

NCSX Work Approval Form (WAF)

WBS Number: 185

WBS Title: Assembly of Field Periods

Job Numbers: 1802, 1810, and 1815

Job Title: FPA Oversight & support (1802)

Job Title: FPA Operations - Stations 1, 2, & 3 (1810)

Job Title: FPA Operations - Station 5 (1815)

Job Manager: Mike Viola

Description:

This WBS element consists of those activities associated with the assembly of the three individual field periods in the TFTR Test Cell.

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 Number: 185													
WBS Title: Assembly of Field Periods													
Job Numbers: 1802, 1810, and 1815													
Job Title: FPA Oversight & support (1802)													
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)													
Job Title: FPA Operations - Station 5 (1815)													
Job Manager: Mike Viola													
Description:													
TASK DESCRIPTION	Work days	41MS	48MS	37STK	35TRV L	31OT	ORNL M	ORNLDSN	EMEM	EMSM	EMSB	EMTB	CREW
Design													
This is a Fabrication Job - All labor in Table III													

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TABLE II - Materials and Subcontracts

WBS Number: 185							
WBS Title: Assembly of Field Periods							
Job Numbers: 1802, 1810, and 1815							
Job Title: FPA Oversight & Support (1802)							
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)							
Job Title: FPA Operations - Station 5 (1815)							
Job Manager: Mike Viola							
Materials and Supplies							
Metrology Consumables - Input by Steve Raftopoulos							Basis of Estimate
CC	Item	Quantity	Cost	Annual cost	Years	FY'07-FY'09 Cost	Comment
5323	Generic replacement or consumables						
	Surface probe kits	2	\$7,500	\$15,000	1	\$15,000	Consumable
	Replacement Leica Workstation Computer	1	\$3,000	\$3,000	1	\$3,000	Recent procurements
	Replacement Laptops for Romer Arms	3	\$3,000	\$9,000	1	\$9,000	Recent procurements
	Replace Thommen Sensor for Leica Tracker	1	\$1,500	\$1,500	2	\$3,000	Recent procurements
	Replacement tips for Leica and FARO surface probes	4	\$300	\$1,200	3	\$3,600	Consumable
	1.5" CCRs 2 per year, per tracker	4	\$2,000	\$8,000	3	\$24,000	Consumable
	0.5" CCRs 2 per year, per tracker	4	\$1,200	\$4,800	3	\$14,400	Consumable
	Replacement misc. computer parts	1	\$700	\$700	3	\$2,100	Consumable
	Replacement/additional extension bar kits	2	\$1,000	\$2,000	3	\$6,000	Consumable
	Replacement and special nests and adapters	15	\$300	\$4,500	3	\$13,500	Consumable
	Replacement/additional 1.5" CCR drift nest pucks	30	\$30	\$900	3	\$2,700	Consumable
	Replacement Probe Tips for Romer Arms	6	\$600	\$3,600	3	\$10,800	Consumable
			Subtotal	\$54,200		\$107,100	
5323	Generic one-time needs						
	2 - Prortable Brunson Stands	2	\$2,000	\$4,000	1	\$4,000	One-time need
	Dial indicators for Coil Winding Turning fixture	6	\$200	\$1,200	1	\$1,200	One-time need
	Brunson Adapter plates	6	\$500	\$3,000	1	\$3,000	for mounting of equipment in various configurations
	Recondition/maintenance of K&E stands	4	\$500	\$2,000	1	\$2,000	stands are old and need maintenance
			Subtotal	\$10,200		\$10,200	
Job 1810	9450 NCSX specific needs						
	Monuments/nests for floor grid in NCSX test cell	75	\$75	\$5,625	2	\$11,250	NCSX specific one-time need
	Reflector holders for wall - NCSX test cell	50	\$150	\$7,500	1	\$7,500	NCSX specific one-time need
	Leica fixed position reflectors for NCSX test cell walls	50	\$300	\$15,000	1	\$15,000	NCSX specific one-time need
	Leica 0.5" CCRs	15	\$1,200	\$18,000	1	\$18,000	reflectors required to track FPA assembly in mid-air flight and positioning
			Subtotal	\$46,125		\$51,750	
5323	Annual software and hardware maintenance costs						
	Annual Service Contract for Leica Tracker	1	\$17,500	\$17,500	3	\$52,500	Consumable
	Annual Software maintenance Verisurf	2	\$1,750	\$3,500	3	\$10,500	Annual software renewal to stay current
	Annual Software maintenance Romer	3	\$1,750	\$5,250	3	\$15,750	Annual software renewal to stay current
	Romer Arm Maintenance agreements	3	\$4,500	\$13,500	3	\$40,500	We've been spending \$5k/arm (\$15K tot) each year for repairs. Maint. agreement provides for loaner and/or quicker turnaround.
			Subtotal	\$39,750		\$119,250	
	Total			\$150,275		\$288,300	
	Total Cost to NCSX			\$46,125		\$51,750	

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TABLE III - Fabrication and Installation

WBS Number: 185 WBS Title: Assembly of Field Periods Job Numbers: 1802, 1810, and 1815 Job Title: FPA Oversight & Support (1802) Job Title: FPA Operations - Stations 1, 2, & 3 (1810) Job Title: FPA Operations - Station 5 (1815) Job Manager: Mike Viola																
Fabrication and Assembly Assumptions: Assumes 5 day workweek 1 shift no overtime Parallel ops for sta 5 (2 fixtures available) Parallel ops for sta 5 (2 fixtures available) Only 1 fixture for station 3 only Parallel ops for sta 2																
		Work days	K\$				FTE									
TASK DESCRIPTION			4IMS	3STFK	3STRVL	3HOT	ORNL BM/DSN	SHTB	BMEM	BMSM	BMSB	BMTB	CREW	Met Crew	Basis of Estimate	
															Estimate based on recent NCSX FPA activities and the amount of oversight and supervision that is required,	
Job 1802																
Oversight & Supervision																
Metrology Engineering Supervision Station 1 through station 5 raftopolous 50%									0.50						this is LOE adjust consistent with overall schedule checked with primavera	
PPPL EM LOE Station 1 through station 5 Viola 100%									1.00						this is LOE adjust consistent with overall schedule checked with primavera	
Title III field period assembly Station 1 through station 5 ORNL support															this is LOE adjust consistent with overall schedule. See table V for detail from Mike Cole checked with primavera	
HP Coverage in the TFTR TC LOE Station 1 through station 3 @ .75 ft									0.75						this is LOE adjust consistent with overall schedule checked with primavera	
Station 2-Modular Coil Sub- Assembly																
Sequence Plan (Brown) - Covered in Job 1803															checked with primavera	
Systems Analysis (Brooks) - covered in Job 8204															checked with primavera	
Metrology Plan (Eillis) - Covered in Job 8205															checked with primavera	
Procedures written & approved		14.0													checked with primavera	
JHA completed		6.0													checked with primavera	
Training needs identified & released		6.0													checked with primavera	
ACC review completed		2.0													checked with primavera	
Pre-job brief completed		1.0													checked with primavera	
Station 2 operational															checked with primavera	
Station 3-Modular Coil to VVSA Assembly																
Sequence Plan (Brown) - Covered in Job 1803															checked with primavera	
Systems Analysis (Brooks) - covered in Job 8204															checked with primavera	
Metrology Plan (Eillis) - Covered in Job 8205															checked with primavera	
Procedures approved		10.0													checked with primavera	
JHA completed		6.0													checked with primavera	
Training needs identified & released		6.0													checked with primavera	
ACC review completed		6.0													checked with primavera	
Pre-job brief completed		6.0													checked with primavera	
Station 3 operational		1.0													checked with primavera	
Fixtures installed		6.0													checked with primavera	

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Job Title: FPA Operations - Stations 1, 2, & 3 (1810)												
Job Title: FPA Operations - Station 5 (1815)												
Job Manager: Mike Viola												
Fabrication and Assembly												
Assumptions:												
Assumes 5 day workweek 1 shift no overtime												
Parallel ops for sta 5 (2 fixtures available)												
Parallel ops for sta 5 (2 fixtures available)												
Only 1 fixture for station 3 only												
Parallel ops for sta 2												
Station 5-Final Field Period Assembly												
Sequence Plan (Brown) - Covered in Job 1803												checked with primavera
Systems Analysis (Brooks) - covered in Job 8204												checked with primavera
Metrology Plan (Ellis) - Covered in Job 8205												checked with primavera
Procedures approved												checked with primavera
JHA completed												checked with primavera
Training needs identified & released												checked with primavera
ACC review completed												checked with primavera
Pre-job brief completed												checked with primavera
Station 5 operational												checked with primavera
Job: 1802 - FP Assy Oversight&Support-VIOLA Total												checked with primavera
												checked with primavera

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Job Title: FPA Operations - Stations 1, 2, & 3 (1810)																																
Job Title: FPA Operations - Station 5 (1815)																																
Job Manager: Mike Viola																																
Fabrication and Assembly Assumptions:																																
Assumes 5 day workweek 1 shift no overtime																																
Parallel ops for sta 5 (2 fixtures available)																																
Parallel ops for sta 5 (2 fixtures available)																																
Only 1 fixture for station 3 only																																
Parallel ops for sta 2																																
															K\$	FTE																
TASK DESCRIPTION															Work days	4IMS	3STFK	3STRVL	3HOT	ORNL	EM/DSN	SHTB	EMEM	BMSM	BMSB	BMTB	CREW	Met Crew	Basis of Estimate			
Job: 1810 - Field Period Assembly-VIOLA																																
																												Station 1: Based on actual VV #1 costs - almost completed.	checked with primavera			
																													Station 2: Based on actual VV #1 costs - almost completed.	checked with primavera		
																													Based on experience to accomplish similar tasks (e.g., metrology scans/lock-ins, coil trial fitups, gross checks). Also, it appears that your single shift activity is running parallel resources that are not available. i.e. the trials development crew are the same as the FP crew.	checked with primavera		
																													Nose/Bushing related items based on conceptual designs and rough estimates	checked with primavera		
																													Assumed nose concept based on application of epoxy & set-up times	checked with primavera		
																														estimates based on conceptual designs tempered with experience in alignment of multiple components	checked with primavera	
General F.P. Assy support																															checked with primavera	
LOE Crane support, fixture setupfor . Station 1 through station 5 1.2fte																															2 men 3 day a week .LOE adjust consistent with schedule thru Station 5	checked with primavera
LOE Field Supervision for station 1 through station 5 edwards 1.0fte																								1.00							This is LOE adjust consistent with overall schedule thru Station 5.	checked with primavera
LOE Metrology support Station 1 tthrough station 5 1.5 fte engr plus ducco 100%																							1.50								this is LOE adjust consistent with overall schedule. Hours distributed per task based resource profile	checked with primavera
Misc M&S station 1 through station 5																															3K/month	checked with primavera
																														3K/month	checked with primavera	
																																checked with primavera

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Job Title: FPA Operations - Stations 1, 2, & 3 (1810)														
Job Title: FPA Operations - Station 5 (1815)														
Job Manager: Mike Viola														
Fabrication and Assembly Assumptions:														
Assumes 5 day workweek 1 shift no overtime														
Parallel ops for sta 5 (2 fixtures available)														
Parallel ops for sta 5 (2 fixtures available)														
Only 1 fixture for station 3 only														
Parallel ops for sta 2														
TASK DESCRIPTION	Work days	4IMS	5STK	5TRVL	3HOT	ORNL EMDSN	SHTB	EMEM	EMSM	EMSB	EMTB	CREW	Met Crew	Basis of Estimate
Station 1-FP #1 VV Prep (hard surface components)														
Layout diagnostic&coolant paths on vessel - Completed	35.0													checked with primavera
Install heater tape on vertical ports - Completed	7.0													checked with primavera
Verify installation of heater tapes - Completed	1.0													checked with primavera
Attach studs for coolant lines - Completed	3.0													checked with primavera
Wind magnetic diagnostic sensors - Completed	14.0													checked with primavera
Install precision magnetic diagnostic sensors - Completed	3.0													checked with primavera
Verify installation magnetic diagnostic sensors - Completed	4.0													checked with primavera
Install local I&C (incl thermocouples) - Completed	5.0													checked with primavera
Verify installation of local I&C	2.0													checked with primavera
Install cooling/htg lines to vac vs1	15.0										300	2.5		checked with primavera
Weld cooling/htg risers	16.0	\$	2.0K								320	2.5		serial tasks alternating between FPA constant 2.5 men checked with primavera
Verify Instl of H/C lines,headers,manifolds	5.0										100	2.5		serial tasks alternating between FPA constant 2.5 men checked with primavera
Perform final acceptance testing (H/C flow test)	5.0	\$	4.0K								100	2.5		serial tasks alternating between FPA constant 2.5 men checked with primavera
Trim seal plates	2.0										40	2.5		serial tasks alternating between FPA constant 2.5 men checked with primavera
Loop termination & verification	18.0										360	2.5		serial tasks alternating between FPA constant 2.5 men checked with primavera
Install Final Internal and External monuments and measure	4.0										80	2.5		checked with primavera
Final Scan	4.0										80	2.5		serial tasks alternating between FPA constant 2.5 men checked with primavera
Install heater tape on removeable ports	10.0										200	2.5		serial tasks alternating between FPA constant 2.5 men checked with primavera
Prepare and transfer completed VV to holding are	2.0										40	2.5		serial tasks alternating between FPA constant 2.5 men checked with primavera

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Job Title: FPA Operations - Stations 1, 2, & 3 (1810)												
Job Title: FPA Operations - Station 5 (1815)												
Job Manager: Mike Viola												
Fabrication and Assembly												
Assumptions:												
Assumes 5 day workweek 1 shift no overtime												
Parallel ops for sta 5 (2 fixtures available)												
Parallel ops for sta 5 (2 fixtures available)												
Only 1 fixture for station 3 only												
Parallel ops for sta 2												
Station 1- FP #2 VV Prep (hrd surf cmpmts)												
Misc Hardware - Completed			\$ 2.0K									checked with primavera
Layout diagnostic&coolant paths on vessel - Completed	12.0											checked with primavera
Install heater tape on vertical ports - Completed	7.0											checked with primavera
Verify installation of heater tapes - Completed	1.0											checked with primavera
Attach studs for coolant lines - Completed	3.0											checked with primavera
Wind magnetic diagnostic sensors - Completed	14.0											checked with primavera
Install precision magnetic diagnostic sensors - Completed	3.0											checked with primavera
Verify installation magnetic diagnostic sensors - Completed	4.0											checked with primavera
Install local I&C (incl thermocouples) - Completed	5.0											checked with primavera
Verify installation of local I&C - Completed	2.0											checked with primavera
Install cooling/htg lines to vac vsl	15.0							300	2.5			Serial tasks alternating between FPA constant 2.5 men. checked with primavera
Weld cooling/htg risers	16.0		\$ 2.0K					320	2.5			Serial tasks alternating between FPA constant 2.5 men. Delayed due to coil tests checked with primavera
Verify Instl of H/C lines,headers,manifolds	5.0							100	2.5			Serial tasks alternating between FPA constant 2.5 men. Serial tasks are showing up as parallel on schedule checked with primavera
Perform final acceptance testing (H/C flow test)	5.0		\$ 4.0K					100	2.5			Serial tasks alternating between FPA constant 2.5 men checked with primavera
Trim seal plates	2.0							40	2.5			Serial tasks alternating between FPA constant 2.5 men. Need to buy high strength nibbler. checked with primavera
Loop termination & verification	18.0							360	2.5			Serial tasks alternating between FPA constant 2.5 men checked with primavera
Install Final Internal and External monuments and measure	4.0							80	2.5			checked with primavera
Final Scan	4.0							80	2.5			Serial tasks alternating between FPA constant 2.5 men checked with primavera
Install heater tape on removeable ports	10.0							200	2.5			Serial tasks alternating between FPA constant 2.5 men checked with primavera
Prepare and transfer completed VV to holding are	2.0							40	2.5			Serial tasks alternating between FPA constant 2.5 men checked with primavera

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Job Title: FPA Operations - Station 5 (1815)											
Job Manager: Mike Viola											
Fabrication and Assembly Assumptions:											
Assumes 5 day workweek 1 shift no overtime											
Parallel ops for sta 5 (2 fixtures available)											
Parallel ops for sta 5 (2 fixtures available)											
Only 1 fixture for station 3 only											
Parallel ops for sta 2											
Station 1- FP #3 VV Prep (hrd surf cmpnts)											
Misc Hardware											
\$ 2.0K											
Layout diagnostic&coolant paths on vessel - Completed											
12.0											
240 2.5											
15% complete											
Serial tasks alternating between FPA constant 2.5 men. Not started yet due to coil alignment tests											
checked with primavera											
Install heater tape on vertical ports											
7.0											
140 2.5											
Serial tasks alternating between FPA constant 2.5 men. Not started yet due to coil alignment tests											
checked with primavera											
Verify installation of heater tapes											
1.0											
20 2.5											
Serial tasks alternating between FPA constant 2.5 men. Not started yet due to coil alignment tests											
checked with primavera											
Attach studs for coolant lines											
3.0											
60 2.5											
Serial tasks alternating between FPA constant 2.5 men. Not started yet due to coil alignment tests											
checked with primavera											
Install Templates											
3.0											
60 2.5											
Serial tasks alternating between FPA constant 2.5 men. Not started yet due to coil alignment tests											
checked with primavera											
Wind magnetic diagnostic sensors											
14.0											
280 2.5											
Serial tasks alternating between FPA constant 2.5 men. Not started yet due to coil alignment tests											
checked with primavera											
Install precision magnetic diagnostic sensors - Completed											
3.0											
60 2.5											
Serial tasks alternating between FPA constant 2.5 men.											
checked with primavera											
Verify installation magnetic diagnostic sensors - Completed											
4.0											
80 2.5											
Serial tasks alternating between FPA constant 2.5 men.											
checked with primavera											
Install local I&C (incl thermocouples)											
5.0											
100 2.5											
Serial tasks alternating between FPA constant 2.5 men.											
checked with primavera											
Verify installation of local I&C											
2.0											
40 2.5											
Serial tasks alternating between FPA constant 2.5 men.											
checked with primavera											
Install cooling/htg lines to vac vsl											
15.0											
300 2.5											
Serial tasks alternating between FPA constant 2.5 men.											
checked with primavera											
Weld cooling/htg risers											
16.0											
320 2.5											
Serial tasks alternating between FPA constant 2.5 men Experience is 8 tubes per day 128 tubes per VVSA											
checked with primavera											
Verify Instl of H/C lines,headers,manifolds											
5.0											
100 2.5											
Serial tasks alternating between FPA constant 2.5 men.											
checked with primavera											
Perform final acceptance testing (H/C flow test)											
5.0											
100 2.5											
Serial tasks alternating between FPA constant 2.5 men											
checked with primavera											
Trim seal plates											
2.0											
40 2.5											
Serial tasks alternating between FPA constant 2.5 men											
checked with primavera											
Loop termination & verification											
18.0											
360 2.5											
Serial tasks alternating between FPA constant 2.5 men.											
checked with primavera											
Install Final Internal and External monuments and measure											
4.0											
80 2.5											
Serial tasks alternating between FPA constant 2.5 men.											
checked with primavera											
Final Scan											
4.0											
80 2.5											
Serial tasks alternating between FPA constant 2.5 men.											
checked with primavera											
Install heater tape and insulation on removeable ports											
10.0											
200 2.5											
Serial tasks alternating between FPA constant 2.5 men											
checked with primavera											
Prepare and transfer completed VV to holding area											
2.0											
40 2.5											
Serial tasks alternating between FPA constant 2.5 men.											
checked with primavera											
Station 1-Spool pieces (3) (spacers)											
2702											
Attach diagnostics, studs and coolant lines											
17.0											
340 2.5											
checked with primavera											
Install Final Internal and External monuments and measure											
2.0											
40 2.5											
checked with primavera											

**NCSX June 2007 ETC
TABLE III - Fabrication and Installation**

WBS Number: 185												
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Job Title: FPA Operations - Stations 1, 2, & 3 (1810)												
Job Title: FPA Operations - Station 5 (1815)												
Job Manager: Mike Viola												
Fabrication and Assembly Assumptions:												
Assumes 5 day workweek 1 shift no overtime												
Parallel ops for sta 5 (2 fixtures available)												
Parallel ops for sta 5 (2 fixtures available)												
Only 1 fixture for station 3 only												
Parallel ops for sta 2												
Station 2 Trials												
Trial tensioning test on prototype												
Trial bushing and shim test on prototype												
Bushing test B-C												
Alignment mechanisms, metro equip & positioning												
Procure alignment mechanisms, fiducials, lifting												
Consulting support for NOSE WELDING												
Determine fiducial types&locations												
Procure monuments&related metrology equipment												
INTRF-001 PPPL buy SS plate for weld trials												
INTRF-035 PPPL Determine shim material												
PHIL-04 water jet cut shims for A/B flange weld test												
PHIL-05 solution anneal shims (note: shims not ground).												
PHIL-06 assemble shims&flanges;grind relief in flanges												
PHIL-07 weld & monitor distortion; improvise clamping												
PHIL-11 Mount A6 on angle plate												
PHIL-12 Weld fiducials on A6 & B6												
PHIL-13 Measure A6 casting												
PHIL-15 Remove A6 & lower & grout wedge												
PHIL-16 Re-mount A6 on wedge												
PHIL-17 Re-measure A6												
PHIL-18 Measure B6 on wedge												
PHIL-19 Place B6 on A6; Meas B6 casting use A6 as base												
PHIL-21 Prepare angle plate dogs & chocks												
PHIL-22 Water jet cut outboard 0.5" stk 316 SS shims												
PHIL-23 Water jet cut inboard 0.625 316 SS												
PHIL-24 Assemble castings,align torque&meas inbd. shims												
PHIL-27 Solution anneal shims												
PHIL-32 Align castings												
PHIL-33 Fit&install bushings 25% stock, 25% eccentric												
PHIL-34 Weld procedure/weld qual.												
PHIL-36 Install strain gauges												
PHIL-37 Set up dial ind., CMM, transit system												
PHIL-38 Install all shims and adjust bushings												
PHIL-39 Final align and baseline measurements												
PHIL-40 Perform 25% of welding & measure												
PHIL-41 Perform 50% of welding & measure												
PHIL-42 Perform 75% of welding & measure												
PHIL-43 finish welding & measure												
PHIL-25 Purchase (2) grinding machines												
PHIL-26 Grind inbd. Shims to thickness (outside shop)												
PHIL-30 Zenex - fabricate eccentric bushings												
Hardware rework (1/2 FTE)												
Perform welding trials and procure EWI and Bob Parcels support.												
MISC LOE SUPPORT												
Station 2 Setup												
Misc Hardware												
Test out equip & procedures												
Receive drawings and hardware (shims and bolts)												
3.00 Shim sizing / preparations												
3.01 Using flange measurement of the coils, define the A/A and A/B shim thickness.												
Back Office												

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Job Title: FPA Operations - Stations 1, 2, & 3 (1810)												
Job Title: FPA Operations - Station 5 (1815)												
Job Manager: Mike Viola												
Fabrication and Assembly Assumptions:												
Assumes 5 day workweek 1 shift no overtime												
Parallel ops for sta 5 (2 fixtures available)												
Parallel ops for sta 5 (2 fixtures available)												
Only 1 fixture for station 3 only												
Parallel ops for sta 2												
3.02	Surface grind a set of metal shims that will be used on the first MCHP article for assembly process qualifications.		12.0							240	2.5	
3.03	Compress alumina coated shims and sort by thickness the shim set that will be installed on the MCHP.		6.0							120	2.5	
4.00	Pre-Installation Station 2 set-up											
4.01	Install MCHP fixtures and metrology equipment.											
4.02	Perform metrology set-up and checks		5.0							100	2.5	
	Install FIRST Holding 20 deg fixture		4.0		\$ 2.0K					80	2.5	
	Install SECOND Holding 20 deg fixture		3.0		\$ 2.0K					60	2.5	
	Install THIRD Holding 20 deg fixture		6.0		\$ 2.0K					120	2.5	
	Install LAST Holding 20 deg fixture		3.0		\$ 2.0K					60	2.5	
	Tools&tooling available for FPA operations		2.0							40	2.5	

Actual experience (LED: actual Experience Was 4 days per JOINT)
checked with primavera

800 shims - not critical path
checked with primavera

Metrology plan covering Station 2: not critical path - separate crew in parallel
checked with primavera

not critical path - separate crew in parallel
checked with primavera

Just received - Not done yet
checked with primavera

Just received - Not done yet
checked with primavera

Just received - Not done yet
checked with primavera

checked with primavera

checked with primavera

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 TABLE III - Fabrication and Installation

WBS Number: 185												
WBS Title: Assembly of Field Periods												
Job Numbers: 1802, 1810, and 1815												
Job Title: FPA Oversight & Support (1802)												
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)												
Job Title: FPA Operations - Station 5 (1815)												
Job Manager: Mike Viola												
Fabrication and Assembly												
Assumptions:												
	Assumes 5 day workweek 1 shift no overtime											
	Parallel ops for sta 5 (2 fixtures available)											
	Parallel ops for sta 5 (2 fixtures available)											
	Only 1 fixture for station 3 only											
	Parallel ops for sta 2											
STATION 2												
Pre-measuring and fitup checks												
1.00	MC fit-up pre-check and surface insulation											checked with primavera
												Sequence Plan R5
1.01	Verify that mating MC's of a MCHP will come together without interferences by pre-fitting mating coils. This will include the Type-C coil with its interfacing Period Type-C coil.	4.0							80	2.5		checked with primavera
1.02	Epoxy paint all close fitting interfacing surfaces.	3.0							60	2.5		checked with primavera
2.00	Pre-measurement of MCHP Type A, B and C coils flanges plus interfacing Type-A coil flange											2 at a time on the two 20 degree wedges
2.01	Set the Type-A coil on the pre-measurement fixture, "A" side flange down.	1.0							20	2.5		checked with primavera
2.02	Using the laser tracker, align to the conical seats locking into a minimum of 8 of them.	2.0									40	May be done early
2.03	Establish a global coordinate system based on the modular coil geometry. Measure the monuments on the fixture and on the walls.	7.0									140	Metrology Staff Budgeted as LOE
2.04	Measure all of the tooling ball monuments on the winding form.	1.0									20	checked with primavera
2.05	Scan the "B" flange of the Type-A coil.	1.0									20	Metrology Staff Budgeted as LOE
2.07	Remove Type-A coil from stand and move to holding area.	1.0							20	2.5		checked with primavera
2.08	Measure Type B "A" flanges	14.0							40	2.5	220	Repeats 2.01-2.07
2.11	Measure Type C "A" flanges	13.0							40	2.5	220	Repeats 2.01-2.07
2.14	Measure Type A-A "A" flange	13.0							40	2.5	220	Repeats 2.01-2.07
3.00	Shim sizing / preparations											Sequence Plan R5
3.01	Using flange measurement of the coils, define the A/A and A/B shim thickness.											Back Office
3.02	Surface grind a set of metal shims that will be used on the first MCHP article for assembly process qualifications.	4.0							80	2.5		Actual experience
4.00	Pre-Installation Station 2 set-up recalibration											Sequence Plan R5
4.01	Install MCHP fixtures and metrology equipment.								0	2.5		checked with primavera
4.02	Perform metrology set-up and checks	66									40	Metrology Staff Budgeted as LOE
												checked with primavera

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TABLE III - Fabrication and Installation

WBS Number: 185												
WBS Title: Assembly of Field Periods												
Job Numbers: 1802, 1810, and 1815												
Job Title: FPA Oversight & Support (1802)												
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)												
Job Title: FPA Operations - Station 5 (1815)												
Job Manager: Mike Viola												
Fabrication and Assembly Assumptions:												
Assumes 5 day workweek 1 shift no overtime												
Parallel ops for sta 5 (2 fixtures available)												
Parallel ops for sta 5 (2 fixtures available)												
Only 1 fixture for station 3 only												
Parallel ops for sta 2												
Assemble A1B1C1												
5.00	Pre-assemble A1-A2										Sequence Plan R5	checked with primavera
5.01	Position the Type-A modular coil on the fixture, "B" flange down. Obtain a set of "realigned" fiducial positions.	2.0			40						Metrology Staff Budgeted as LOE - COMPLETED	checked with primavera
5.02	Align the laser tracker to the conical seats locking into a minimum of 8 of them.	1.0						20			Metrology Staff Budgeted as LOE	checked with primavera
5.03	Establish a global coordinate system based on the modular coil geometry. Measure the monuments on the fixture and on the walls.	2.0								40	Metrology Staff Budgeted as LOE	checked with primavera
5.04	Place the an initial set of metal shims on the coil in the designated locations, identical to those in the A1-A2 fit up test.	0.5						10	2.5			checked with primavera
5.05	Install dial indicators on the modular coil in areas where we expect to see deflection.	2.0						40	2.5			checked with primavera
5.06	Lower the mating type A modular coil into position.	1.0						20	2.5			checked with primavera
5.07	Measure the monuments on the bottom coil. Jack areas of the coil as necessary to bring displaced monuments back to within .002" of their original position.	1.0						20	2.5			checked with primavera
5.08	Using three target points, perform the positioning as was done in the A1-A2 fit up test.	1.0						20	2.5			checked with primavera
5.09	Install the remaining metal shims with Fuji paper, install studs, supernuts, and torque to 50% of final value.	2.0						40	2.5			checked with primavera
5.10	Make a hand "wiggle" test (rotate on bolt) on all shims to make sure that they are tight. If a loose shim is found back off on sufficient adjacent bolts to allow a replacement shim to be inserted. Tighten bolt and recheck.	1.0						20	2.5			checked with primavera
5.11	Measure the tooling balls on both coils. The maximum deviation from the "realigned" points should be .007" or less.	5.0								100	Metrology Staff Budgeted as LOE	checked with primavera
5.12	If the above step does not fall within .007" or less then loosen all studs, adjust shims locally. Re-torque all studs to 50%.	3.0						60	2.5			checked with primavera
5.13	Loosen studs to extract Fuji paper. Evaluate shim pressure distribution and make shim adjustments if shim pressure is unacceptable. Re-torque all studs to 50% and recheck alignment.											checked with primavera
5.14	Install the A-A locator bushings at two stud locations for use in re-positioning MCHP in Stage 3.	2.0						40	2.5			checked with primavera
5.15	Remove all studs, nuts, shims etc. Identify shim locations.	1.0						20	2.5			checked with primavera
6.00	A-B modular coil assembly										Sequence Plan R5	checked with primavera
6.01	Place the Type-A coil, "A" flange down, on the 20deg fixture. Obtain a set of "realigned" fiducial positions for the "A" and "B" coils.	2.0						40	2.5			checked with primavera
6.02	Using the laser tracker, align to the conical seats locking into a minimum of 8 of them.	1.0								20	Metrology Staff Budgeted as LOE	checked with primavera
6.03	Establish a global coordinate system based on the modular coil geometry. Measure the monuments on the fixture and on the walls.	2.0								40	Metrology Staff Budgeted as LOE	checked with primavera
6.04	Place the an initial set of metal shims on the coil in the designated locations.	2.0						40	2.5			checked with primavera
6.04.1	Stuff Shim Bag with Fiberglass. Reseal, Place Shim Bag on Wing	0.3							5	2.5	LED: Must place bag before coil assembly	checked with primavera
6.05	Lower the Type-B coil onto the Type-A coil.	1.0						20	2.5			checked with primavera
6.06	Measure the monuments on the A coil. Jack areas of the coil as necessary to bring displaced monuments back to within .002" of their original position.	1.0						20	2.5			checked with primavera
6.06.1	Install Dial indicators for X-Y Positioning	1.0						20	2.5		LED: Missing from sequence	checked with primavera
6.07	Using three target points on the B coil, perform the X-Y positioning of the B coil.	1.0						20	2.5			checked with primavera
6.08	Install the remaining metal shims with Fuji paper, install studs, supernuts, and torque to 50% of final value.	2.0						40	2.5			checked with primavera
6.09	Make a hand "wiggle" test (rotate on bolt) on all shims to make sure that they are tight. If a loose shim is found back off on sufficient adjacent bolts to allow a replacement shim to be inserted. Tighten bolt and recheck.	1.0						20	2.5			checked with primavera
6.10	Measure the tooling balls on both coils. The maximum deviation from the "realigned" points should be .007" or less.	5.0								100	Metrology Staff Budgeted as LOE	checked with primavera
6.11	If the above step does not fall within .007" or less then loosen all studs, adjust shims locally. Re-torque all studs to 50%.	3.0						60	2.5			checked with primavera
6.12	Loosen all studs, reduce load on flanges and install an equivalent set of alumina coated metal shims. Re-torque all studs to 50%.	1.0						20	2.5			checked with primavera
6.13	Make a hand "wiggle" test (rotate on bolt) on all shims to make sure that they are tight. If a loose shim is found back off on sufficient adjacent bolts to allow a replacement shim to be inserted. Tighten bolt and recheck.	1.0						20	2.5			checked with primavera
6.14	Measure the tooling balls on both coils. The maximum deviation from the "realigned" points should be .007" or less.	5.0								100	Metrology Staff Budgeted as LOE	checked with primavera

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TABLE III - Fabrication and Installation

WBS Number: 185												
WBS Title: Assembly of Field Periods												
Job Numbers: 1802, 1810, and 1815												
Job Title: FPA Oversight & Support (1802)												
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)												
Job Title: FPA Operations - Station 5 (1815)												
Job Manager: Mike Viola												
Fabrication and Assembly Assumptions:												
	Assumes 5 day workweek 1 shift no overtime											
	Parallel ops for sta 5 (2 fixtures available)											
	Parallel ops for sta 5 (2 fixtures available)											
	Only 1 fixture for station 3 only											
	Parallel ops for sta 2											
6.15	If the above step does not fall within .007" or less then loosen all studs, adjust shims locally. Re-torque all studs to 50%.	3.0								60	2.5	checked with primavera
6.16	One hole at a time, remove the supernut. Using the eccentric gage slid onto the stud define the hole eccentricity. Select bushing and machine to match required eccentricity. Install bushing. Replace nut and tighten back to 50% and recheck alignment. Total 10 days 7 days to pre fit & fab bushings (in parallel with other tasks) and 3 days to install	10.0								200	2.5	LED: Technical Issue space in some areas is insufficient to remove nuts with flanges in position. If there is space duration should be 1.5 days
6.17	Complete tightening of flange bolts to 100%.	1.0								20	2.5	checked with primavera
6.18	Measure the tooling balls on both coils. The maximum deviation from the "realigned" points should be .007" or less.	2.0										Metrology Staff Budgeted as LOE
6.19	Scan the "B" flange of Type-B coil	1.0								20	2.5	checked with primavera
6.20	Using the "B" flange measurement of the Type-B coil and the earlier "A" flange measurement of the Type-C coil, define all B/C flange shim thickness.											Back office
7.00	(A-B) to C modular coil assembly (MCHP)											Sequence Plan R5
7.01	Place the "A/B" assembly, "A" coil down, on the 40deg fixture. Obtain a set of "realigned" fiducial positions. For the "A", "B", and "C" coils.	3.0								60	2.5	checked with primavera
7.02	Using the laser tracker, align to the conical seats locking into a minimum of 8 of them.	1.0										Metrology Staff Budgeted as LOE
7.03	Establish a global coordinate system based on the modular coil geometry. Measure the monuments on the fixture and on the walls.	2.0										Metrology Staff Budgeted as LOE
7.04	Place the an initial set of metal shims on the coil in the designated locations.	2.0								40	2.5	checked with primavera
7.05	Lower the Type-C coil onto the Type-B coil.	1.0								20	2.5	checked with primavera
7.06	Measure the monuments on the A coil to evaluate monument displacements. If movement greater than .002" is observed discuss with back office on how to proceed in bringing displaced monuments back to within .002" of their original position.	1.0										Metrology Staff Budgeted as LOE
6.06.1	Install Dial indicators for X-Y Positioning	1.0								20	2.5	LED: Missing from sequence
7.07	Using three target points on the Type-C coil, perform the X-Y positioning of the coil.	1.0								20	2.5	checked with primavera
7.08	Install the remaining metal shims with Fuji paper, install studs, supernuts, and torque to 50% of final value.	2.0								40	2.5	checked with primavera
7.09	Make a hand "wiggle" test (rotate on bolt) on all shims to make sure that they are tight. If a loose shim is found back off on sufficient adjacent bolts to allow a replacement shim to be inserted. Tighten bolt and recheck.	1.0								20	2.5	checked with primavera
7.10	Measure the tooling balls on all coils. The maximum deviation from the "realigned" points should be .010" or less.	5.0										Metrology Staff Budgeted as LOE
7.11	If the above step does not fall within .010" or less then loosen all studs, adjust shims locally. Re-torque all studs to 50%.	3.0								60	2.5	checked with primavera
7.12	Loosen all studs, reduce load on flanges and install an equivalent set of alumina coated metal shims. Re-torque all studs to 50%.	1.0								20	2.5	checked with primavera
7.13	Make a hand "wiggle" test (rotate on bolt) on all shims to make sure that they are tight. If a loose shim is found back off on sufficient adjacent bolts to allow a replacement shim to be inserted. Tighten bolt and recheck.	1.0								20	2.5	checked with primavera
7.14	Measure the tooling balls on all coils. The maximum deviation from the "realigned" points should be .010" or less.	5.0								100	2.5	checked with primavera
7.15	If the above step does not fall within .010" or less then loosen all studs, adjust shims locally. Re-torque all studs to 50%.	3.0								60	2.5	checked with primavera
7.16	One hole at a time, remove the supernut. Using the eccentric gage slid onto the stud define the hole eccentricity. Select bushing and machine to match required eccentricity. Install bushing. Replace nut and tighten back to 50% and recheck alignment. Total 10 days 7 days to pre fit & fab bushings (in parallel with other tasks) and 3 days to install	10.0								200	2.5	LED: Increase duration to 1.5
7.17	Complete tightening of flange bolts to 100%.	1.0								20	2.5	checked with primavera
11.01	Install or identify three primary fiducials that will be used in positioning the Period in Station 3.	1.0								20	2.5	checked with primavera
7.18	Measure the tooling balls on both coils. The maximum deviation from the "realigned" points should be .010" or less. Make final metrology measurement of all fiducials. Scan the "B" flange of Type-C coil. Record the results.	5.0										Metrology Staff Budgeted as LOE
8.00	Tack weld inboard welded shims											Sequence Plan R5
8.01	Partially tack weld all inboard shims to one flange to keep them in place. The final welding of all welded shims to take place in Station 3.	2.0								40	2.5	Perform at A-B also
9.00	Install trim coil											Sequence Plan R5

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Job Title: FPA Oversight & Support (1802)												
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)												
Job Title: FPA Operations - Station 5 (1815)												
Job Manager: Mike Viola												
Fabrication and Assembly Assumptions:												
	Assumes 5 day workweek 1 shift no overtime											
	Parallel ops for sta 5 (2 fixtures available)											
	Parallel ops for sta 5 (2 fixtures available)											
	Only 1 fixture for station 3 only											
	Parallel ops for sta 2											
9.01	Install trim coil on the top surface of the Type-C on Period 1 and 2 only on the MCHP - Right Side (See Figure 3 below).	6.0							120	2.5		
10.00	Complete local service and interface details											
10.01	Install all wing support bladders between wing surfaces (A/B, B/C) and on the C wing (MCHP - Right Side only).	2.0							40	2.5		
10.02	Make local service runs/connections on the shell of each MC.	8.0							160	2.5		
10.03	Inject stycast or some compound to fill in all shim spaces in order to prevent VV/MC insulation from falling out.	1.0							20	2.5		
11.00	Final measurements / transfer completed MCHP to holding area											
11.02	Make final metrology measurement of all fiducials. Scan the "B" flange of Type-C coil. Record the results.								0	2.5		
11.03	Using tension tester measure bolt length on all tension fasteners and record the results.	0.5							10	2.5		
11.04	Mark part for identification	0.0							0	2.5		
11.05	Install lift support beams	2.0							40	2.5		
11.06	Remove from stand and measure weight of completed assembly	1.0							20	2.5		
11.07	Move to holding area.	0.0							0	2.5		
											246 shifts	

Sequence Plan R5
checked with primavera
checked with primavera
LED: Bags were placed earlier
4 days for coolant lines 4 days for
mod coils thermocouples and strain
gages terminations
checked with primavera
checked with primavera
Sequence Plan R5
checked with primavera
checked with primavera
Done at 7.18
checked with primavera
checked with primavera
checked with primavera
checked with primavera
checked with primavera
checked with primavera

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WBS Number: 185									
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Job Numbers: 1802, 1810, and 1815									
Job Title: FPA Oversight & Support (1802)									
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)									
Job Title: FPA Operations - Station 5 (1815)									
Job Manager: Mike Viola									
Fabrication and Assembly Assumptions:									
Assumes 5 day workweek 1 shift no overtime									
Parallel ops for sta 5 (2 fixtures available)									
Parallel ops for sta 5 (2 fixtures available)									
Only 1 fixture for station 3 only									
Parallel ops for sta 2									
A1,B1,C1 subtotal task 5-11 (total elapsed time			126			2125	740		
Station 2 - Production Articles (HPA) and second half of FP #1 A2,B2,C2									
1.00	MC fit-up pre-check and surface insulation								checked with primavera
1.01	Verify that mating MC's of a MCHP will come together without interferences by pre-fitting mating coils. This will include the Type-C coil with its interfacing Period Type-C coil.	4.0				80	2.5		checked with primavera
1.02	Epoxy paint all close fitting interfacing surfaces.	3.0				60	2.5		checked with primavera
2.00	Pre-measurement of MCHP Type A, B and C coils flanges plus interfacing Type-A coil flange								checked with primavera
2.08	Measure Type B "A" flanges	14.0				40	2.5	220	Sequence Plan R5 checked with primavera
2.11	Measure Type C "A" flanges	13.0				40	2.5	220	Repeats 2.01-2.07 checked with primavera
2.14	Measure Type A-A "A" flange	13.0				40	2.5	220	Repeats 2.01-2.07 checked with primavera
3.00	Shim sizing / preparations								Sequence Plan R5 checked with primavera
3.01	Using flange measurement of the coils, define the A/A and A/B shim thickness.								checked with primavera
3.02	Compress alumina coated shims and sort by thickness the shim set that will be installed on the MCHP.	4.0				80	2.5		May need more shims checked with primavera
4.00	Pre-Installation Station 2 set-up recalibration								Sequence Plan R5 checked with primavera
4.01	Install MCHP fixtures and metrology equipment.					0	2.5		checked with primavera
4.02	Perform metrology set-up and checks	53.0	2.0					40	Metrology Staff Budgeted as LOE checked with primavera
5.00	Pre-assemble A-A (Needs to be done total of 3 times A1-A2, A3-A4, A5-A6)								checked with primavera
5.01	Position the Type-A modular coil on the fixture, "B" flange down. Obtain a set of "realigned" fiducial positions.								checked with primavera
5.02	Align the laser tracker to the conical seats locking into a minimum of 8 of them.								checked with primavera
5.03	Establish a global coordinate system based on the modular coil geometry. Measure the monuments on the fixture and on the walls.								checked with primavera
5.04	Place all alumina and grind inboard weld shims on the coil.								checked with primavera
5.05	Install dial indicators on the modular coil in areas where we expect to see deflection.								checked with primavera
5.06	Lower the mating type A modular coil into position.								checked with primavera
5.07	Measure the monuments on the bottom coil. Jack areas of the coil as necessary to bring displaced monuments back to within .002" of their original position.								checked with primavera
5.08	Using three target points, perform the positioning as was done in the A1-A21								checked with primavera
5.09	Install studs, supernuts, and torque to 50% of final value.								checked with primavera
5.10	Make a hand "wobble" test (rotate on bolt) on all shims to make sure that the found back off on sufficient adjacent bolts to allow a replacement shim to be rechecked.								checked with primavera
5.11	Measure the tooling balls on both coils. The maximum deviation from the "realigned" fiducial positions shall be .007" or less.								checked with primavera
5.12	If the above step does not fall within .007" or less then loosen all studs, adjust shims locally. Re-torque all studs to 50%.								checked with primavera
5.13	Install the A-A locator bushings at two stud locations for use in re-positioning MCHP in Stage 3.								checked with primavera
5.14	Remove all studs, nuts, shims etc. Identify shim locations.								checked with primavera
6.00	A-B modular coil assembly								Sequence Plan R5 checked with primavera
6.01	Place the Type-A coil, "A" flange down, on the 20deg fixture. Obtain a set of "realigned" fiducial positions for the "A" and "B" coils.	1.0				20	2.5		checked with primavera
6.02	Using the laser tracker, align to the conical seats locking into a minimum of 8 of them.	1.0						20	Metrology Staff Budgeted as LOE checked with primavera
6.03	Establish a global coordinate system based on the modular coil geometry. Measure the monuments on the fixture and on the walls.	2.0						40	Metrology Staff Budgeted as LOE checked with primavera
6.04	Place all alumina and grind inboard weld shims on the coil.	2.0				40	2.5		checked with primavera
6.04.1	Stuff Shim Bag with Fiberglass, Reseal, Place Shim Bag on Wing								LED: Must place bag before coil assembly checked with primavera
6.05	Lower the Type-B coil onto the Type-A coil.	1.0				20	2.5		checked with primavera
6.06	Measure the monuments on the A coil. Jack areas of the coil as necessary to bring displaced monuments back to within .002" of their original position.	1.0						20	Metrology Staff Budgeted as LOE checked with primavera
6.06.1	Install Dial Indicators for X-Y Positioning	1.0				20	2.5		LED: Missing from sequence checked with primavera

A-A done above

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TABLE III - Fabrication and Installation

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Job Title: FPA Oversight & Support (1802)													
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)													
Job Title: FPA Operations - Station 5 (1815)													
Job Manager: Mike Viola													
Fabrication and Assembly Assumptions:													
Assumes 5 day workweek 1 shift no overtime													
Parallel ops for sta 5 (2 fixtures available)													
Parallel ops for sta 5 (2 fixtures available)													
Only 1 fixture for station 3 only													
Parallel ops for sta 2													
6.07	Using three target points on the B coil, perform the X-Y positioning of the B coil.	1.0								20		Metrology Staff Budgeted as LOE	checked with primavera
6.08	Install studs, supernuts, and torque to 50% of final value.	2.0							40	2.5			checked with primavera
6.09	Make a hand "wiggle" test (rotate on bolt) on all shims to make sure that they are tight. If a loose shim is found back off on sufficient adjacent bolts to allow a replacement shim to be inserted. Tighten bolt and recheck.								20	2.5			checked with primavera
6.10	Measure the tooling balls on both coils. The maximum deviation from the "realigned" points should be .007" or less.	1.0									100	Metrology Staff Budgeted as LOE	checked with primavera
6.11	If the above step does not fall within .007" or less then loosen all studs, adjust shims locally. Re-torque all studs to 50%.	3.0							60	2.5			checked with primavera
6.12	One hole at a time, remove the supernut. Using the eccentric gage slid onto the stud define the hole eccentricity. Select bushing and machine to match required eccentricity. Install bushing. Replace nut and tighten back to 50% and recheck alignment. Total 10 days 7 days to pre fit & fab bushings (in parallel with other tasks) and 3 days to install.	10.0							200	2.5		LED: See above	checked with primavera
6.13	Complete tightening of flange bolts to 100%.	1.0							20	2.5			checked with primavera
6.14	Measure the tooling balls on both coils. The maximum deviation from the "realigned" points should be .007" or less.	3.0									60	Metrology Staff Budgeted as LOE	checked with primavera
6.15	Scan the "B" flange of Type-B coil	1.0							20	2.5			checked with primavera
6.16	Using the "B" flange measurement of the Type-B coil and the earlier "A" flange measurement of the Type-C coil, define all B/C flange shim thickness.												checked with primavera
7.00	(A-B) to C modular coil assembly (MCHP)												Sequence Plan R5
7.01	Place the "A/B" assembly, "A" coil down, on the 40deg fixture. Obtain a set of "realigned" fiducial positions. For the "A", "B", and "C" coils.	2.0							40	2.5			checked with primavera
7.02	Using the laser tracker, align to the conical seats locking into a minimum of 8 of them.	1.0									20	Metrology Staff Budgeted as LOE	checked with primavera
7.03	Establish a global coordinate system based on the modular coil geometry. Measure the monuments on the fixture and on the walls.	2.0									40	Metrology Staff Budgeted as LOE	checked with primavera
7.04	Place all alumina and grind inboard weld shims on the coil.	2.0							40	2.5			checked with primavera
7.05	Lower the Type-C coil onto the Type-B coil.	1.0							20	2.5			checked with primavera
7.06	Measure the monuments on the A coil to evaluate monument displacements. If movement greater than .002" is observed discuss with back office on how to proceed in bringing displaced monuments back to within .002" of their original position.	1.0									20	Metrology Staff Budgeted as LOE	checked with primavera
7.07	Using three target points on the Type-C coil, perform the X-Y positioning of the coil.	1.0							20	2.5			checked with primavera
7.08	Install studs, supernuts, and torque to 50% of final value.	2.0							40	2.5			checked with primavera
7.09	Make a hand "wiggle" test (rotate on bolt) on all shims to make sure that they are tight. If a loose shim is found back off on sufficient adjacent bolts to allow a replacement shim to be inserted. Tighten bolt and recheck.	1.0							20	2.5			checked with primavera
7.10	Measure the tooling balls on all coils. The maximum deviation from the "realigned" points should be .010" or less.	5.0									100	Metrology Staff Budgeted as LOE	checked with primavera
7.11	One hole at a time, remove the supernut. Using the eccentric gage slid onto the stud define the hole eccentricity. Select bushing and machine to match required eccentricity. Install bushing. Replace nut and tighten back to 50% and recheck alignment. Total 10 days 7 days to pre fit & fab bushings (in parallel with other tasks) and 3 days to install.	10.0							200	2.5		LED: See above	checked with primavera
7.12	Complete tightening of flange bolts to 100%.	1.0							20	2.5			checked with primavera
7.13	Measure the tooling balls on both coils. The maximum deviation from the "realigned" points should be .010" or less.	4.0									80	Metrology Staff Budgeted as LOE	checked with primavera
8.00	Tack weld inboard welded shims												Sequence Plan R5
8.01	Partially tack weld all inboard shims to one flange to keep them in place. The final welding of all welded shims to take place in Station 3.	1.0							20	2.5			checked with primavera
9.00	Install trim coil												Sequence Plan R5
9.01	Install trim coil on the top surface of the Type-C on Period 1 and 2 only on the MCHP - Right Side (See Figure 3 below).	6.0							120	2.5			checked with primavera
10.00	Complete local service and interface details												Sequence Plan R5
10.01	Inflate all wing support bladders between wing surfaces (A/B, B/C) and on the C wing (MCHP - Right Side only).	2.0							40	2.5		See above	checked with primavera
10.02	Make local service runs/connections on the shell of each MC.	8.0							160	2.5		4 days for coolant lines 4 days for mod coils thermocouples and strain gages terminations	checked with primavera

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 TABLE III - Fabrication and Installation

WBS Number: 185															
WBS Title: Assembly of Field Periods															
Job Numbers: 1802, 1810, and 1815															
Job Title: FPA Oversight & Support (1802)															
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)															
Job Title: FPA Operations - Station 5 (1815)															
Job Manager: Mike Viola															
Fabrication and Assembly															
Assumptions:															
Assumes 5 day workweek 1 shift no overtime															
Parallel ops for sta 5 (2 fixtures available)															
Parallel ops for sta 5 (2 fixtures available)															
Only 1 fixture for station 3 only															
Parallel ops for sta 2															
10.03	Inject stycast or some compound to fill in all shim spaces in order to prevent VV/MC insulation from falling out.	1.0									20	2.5			
11.00	Final measurements / transfer completed MCHP to holding area													Sequence Plan R5	checked with primavera
11.01	Install or identify three primary fiducials that will be used in positioning the Period in Station 3.	1.0									20	2.5			checked with primavera
11.02	Make final metrology measurement of all fiducials. Scan the "B" flange of Type-C coil. Record the results.	5.0											100	Metrology Staff Budgeted as LOE	checked with primavera
11.03	Using tension tester measure bolt length on all tension fasteners and record the results.	0.5									10	2.5			checked with primavera
11.04	Mark part for identification	0.0									0	2.5			checked with primavera
11.05	Install lift support beams	2.0									40	2.5			checked with primavera
11.06	Remove from stand and measure weight of completed assembly and Move to holding area.	2.0									40	2.5			checked with primavera

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WBS Number: 185										
WBS Title: Assembly of Field Periods										
Job Numbers: 1802, 1810, and 1815										
Job Title: FPA Oversight & Support (1802)										
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)										
Job Title: FPA Operations - Station 5 (1815)										
Job Manager: Mike Viola										
Fabrication and Assembly Assumptions:										
Assumes 5 day workweek 1 shift no overtime										
Parallel ops for sta 5 (2 fixtures available)										
Parallel ops for sta 5 (2 fixtures available)										
Only 1 fixture for station 3 only										
Parallel ops for sta 2										
A2,B2,C2 Subtotal task 5-11 (total elasp time)			83					1335	620	
Station 2-Modular Coil Subassembly-FP#2										
Assemble/Align Mod-Coils A3/B3/C3			126					2125	740	Sequence Plan R5
Assemble/Align Mod-Coils A4/B4/C4			83					1335	620	Sequence Plan R5
Station 2-Modular Coil Subassembly-FP#3										
Assemble/Align Mod-Coils A5/B5/C5			126					2125	740	Sequence Plan R5
Assemble/Align Mod-Coils A6/B6/C6			83					1335	620	Sequence Plan R5
Station 3-Assemble Mod Coils and VVSA-FP#1										
Misc Hardware				\$ 5.0K						
Procure and load test 3 legged actuator System			4.0	\$ 43.0K				96	3.0	
Procure, Fabricate and load test 3 legged actuator Lift Fixture			8.0	\$ 6.0K				128	2.0	
Begin Assembly of First Field Period Assy			2.0					40	2.5	
Fab new platform legs			4.0					64	2.0	
Install station 3 platforms (8 required)			4.0	\$ 10.0K				112	3.5	
Test out station 3 equipment and procedures				\$ 10.0K				0	2.5	
Assembly Step										
1.00	Pre-Installation set-up									
1.01	Install Station 3 site monuments as needed to perform metrology measurements.		3.0	\$ 2.0K				60	2.5	
1.02	Install floor mounted tracks and VV base support		5.0	\$ 1.0K				100	2.5	
1.03	Use rigging operations to establish the MCHP CG location.		2.0					40	2.5	
2.00	Pre-assemble left MCHP							0	2.5	
2.01	Install MCHP support cart assemblies		4.0					80	2.5	
2.02	Verify cart motion. Move left cart to final assembly position to accept left MCHP and secure to the floor supports. Move right cart far to the right.		2.0					40	2.5	
2.03	Install adjustor bar support weldment on Left Side		0.0					0	2.5	checked with primavera
2.04	Using the SISSCO crane, position left MCHP on the cart assembly		1.0					20	2.5	checked with primavera
2.05	Secure left MCHP at three location to vertical support posts on support cart base.		2.0					40	2.5	checked with primavera
2.06	Measure the monuments on the positioned left MCHP and on the walls to establish the machine coordinate for further assembly operations.		5.0						100	Metrology Staff Budgeted as LOE
2.07	Set the positioning stop on the cart so it returns to the machine coordinate defined position in further assembly steps.		1.0					20	2.5	checked with primavera
3.00	Pre-assemble right MCHP							0	2.5	checked with primavera
3.01	Move the right base support cart to its final position ready to accept the right MCHP. Position the AirLoc Wedgemount in a lowered position.		0.5					10	2.5	checked with primavera
3.02	Lift the right side MCHP using the SISSCO crane and position it to be ready to engage the preinstalled Type-A flange guide bushings.		1.0					20	2.5	checked with primavera
3.03	Temporary fasteners located adjacent to the alignment bushings can be used to help bring the parts together.		0.0					0	2.5	checked with primavera
3.04	While held by the crane bring the AirLoc Wedgemount leveler up to take the load.		0.0					0	2.5	checked with primavera
3.05	Install temporary scaffolding to install flange hardware		1.0					20	2.5	checked with primavera
3.06	Install bolts and shims as needed for assembly tolerances.		1.0					20	2.5	checked with primavera
3.07	Tighten flange fasteners to 50%		1.0					20	2.5	checked with primavera
3.08	Perform metrology measurements of all alignment fiducials on both MCHPs. The maximum deviation from the reference points should be .020" or less.		5.0						100	Metrology Staff Budgeted as LOE
3.09	Perform position adjustments on the right side MCHP if needed. Loosen all studs, adjust AirLock Wedgemounts as needed and install alternate sized shims. Re-torque all studs to 50% and recheck.		2.0					40	2.5	checked with primavera
3.10	Verify position of the VV support hanger locations (top and bottom) on the left and right MCHP. May be done as part of 3.08 if 3.09 not needed		3.0						60	Metrology Staff Budgeted as LOE
3.11	Remove flange hardware and temporary platforms		1.0					20	2.5	checked with primavera

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Job Title: FPA Oversight & Support (1802)															
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)															
Job Title: FPA Operations - Station 5 (1815)															
Job Manager: Mike Viola															
Fabrication and Assembly Assumptions:															
Assumes 5 day workweek 1 shift no overtime															
Parallel ops for sta 5 (2 fixtures available)															
Parallel ops for sta 5 (2 fixtures available)															
Only 1 fixture for station 3 only															
Parallel ops for sta 2															
4.00	Install laser screens											\$ 2.0K			
4.01	Establish a global coordinate system based on the full period geometry. Measure the monuments on the MCHP's and on the walls.											40	Metrology Staff Budgeted as LOE	checked with primavera	
4.02	Using metrology and the established global coordinate system place all of the laser screens as called out in the Stage 3 drawings.											40	2.5	checked with primavera	
4.03	Turn each lasers on and with metrology determine their alignment. Record the laser position.											20	2.5	checked with primavera	
4.04	Based on metrology measurements of the screens and lasers the screens path can be defined by the back office. Print the path on milar paper and using metrology mount the milar on the screens.											0	2.5	checked with primavera	
4.05	Disengage the MCHP's by using the left support and adjustor bar to move the left MCHP.											20	2.5	checked with primavera	
4.06	Remove both MCHP's.											40	2.5	Can these stay on the carts and be rolled all the way back? checked with primavera	
5.00	Install vacuum vessel											0	2.5	checked with primavera	
5.01	Remove the adjustor bar support from left side.											0	2.5	checked with primavera	
5.02	Install VV NBI port support stand.											40	2.5	checked with primavera	
5.03	Install VVSA to base support and make the connection to the NBI port attachment.											20	2.5	checked with primavera	
5.04	Using metrology take tooling ball readings off the VV shell to properly position the VVSA to the global coordinate system. Secure the VVSA to the base and at the NBI port support stand.											40	2.5	checked with primavera	
6.00	Install left MCHP over VV											0	2.5	checked with primavera	
6.01	Install any bumper protection components on the VV (left and right side) before manipulating left MCHP over the VV.											10	2.5	checked with primavera	
6.02	Move the left base support cart to the far left so it will not interfere with the MCHP installation. Position the AirLoc Wedgemount in a lowered position.											0	2.5	checked with primavera	
6.03	Using the SISSCO actuators with laser guidance move the left MCHP over the VV.											40	2.5	checked with primavera	
6.04	Re-install the left adjustor bar.											0	2.5	checked with primavera	
6.05	Once the MCHP has been moved over the VV bring up Wedgemount levelers to stabilize the unit and take metrology measurements. Make position adjustments to properly align the MCHP.											40	2.5	checked with primavera	
6.06	Transfer the full load to the AirLoc Wedgemount leveler.											0	2.5	checked with primavera	
6.07	Using the adjustor bar on the left side move the MCHP to the left 1/2".											0	2.5	checked with primavera	
7.00	Install right MCHP over VV											0	2.5	checked with primavera	
7.01	Move the right base support cart to the far right so it will not interfere with the MCHP installation. Position the AirLoc Wedgemount in a lowered position.											0	2.5	checked with primavera	
7.02	Using the SISSCO actuators with laser guidance move the right MCHP over the VV TO WITHIN 1/2" OF ITS FINAL POSITION and pause. Go to the next step.											40	2.5	checked with primavera	
7.03	Using the adjustor bar on the left side move the left MCHP to its final position.											10	2.5	checked with primavera	
7.04	With the left MCHP in place, move the right side MCHP using the CISSCO crane and position it to be ready to engage the preinstalled Type-A flange guide bushings.											10	2.5	checked with primavera	
7.05	Temporary fasteners located adjacent to the alignment bushings can be used to help bring the parts together.											0	2.5	checked with primavera	
7.06	While held by the crane bring the AirLoc Wedgemount leveler up to take the load.											10	2.5	checked with primavera	
7.07	Remove the laser screens to provide more floor space for scaffolding.											0	2.5	checked with primavera	
7.08	Install temporary scaffolding to install flange hardware											80	2.5	checked with primavera	
7.09	Install bolts and all alumina and inboard weld shims.											40	2.5	checked with primavera	
7.10	Tighten flange fasteners to 50%											20	2.5	checked with primavera	
7.11	Make a hand "wiggle" test (rotate on bolt) on all shims to make sure that they are tight. If a loose shim is found back off on sufficient adjacent bolts to allow a replacement shim to be inserted. Tighten bolt and recheck.											20	2.5	checked with primavera	
7.12	Perform metrology measurements of all alignment fiducials on both MCHP's. The maximum deviation from the reference points should be .020" or less.											5.0	100	Metrology Staff Budgeted as LOE	checked with primavera
7.13	Perform position adjustments on the right side MCHP if tolerance is not met. Loosen all studs, adjust AirLock Wedgemounts as needed; install alternate sized shims. Re-torque all studs to 50% and recheck.											3.0	60	2.5	checked with primavera
7.14	Remove SISSCO actuator from right MCHP.											0	2.5	checked with primavera	
7.15	One hole at a time, remove the supernut. Using the eccentric gage slid onto the stud define the hole eccentricity. Select bushing and machine to match required eccentricity. Install bushing. Replace nut and tighten back to 50% and recheck alignment. Total 10 days 7 days to pre fit & fab bushings (in parallel with other tasks) and 3 days to install											10.0	200	2.5	checked with primavera

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TABLE III - Fabrication and Installation

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Job Title: FPA Operations - Stations 1, 2, & 3 (1810)												
Job Title: FPA Operations - Station 5 (1815)												
Job Manager: Mike Viola												
Fabrication and Assembly												
Assumptions:												
Assumes 5 day workweek 1 shift no overtime												
Parallel ops for sta 5 (2 fixtures available)												
Parallel ops for sta 5 (2 fixtures available)												
Only 1 fixture for station 3 only												
Parallel ops for sta 2												
7.16	Tighten nuts 100%. Measure before welding adequate coil alignment and fit-up of shims	1.0								20	2.5	
8.00	Weld all inboard shims									0	2.5	checked with primavera
8.01	Follow a predefined weld sequence at all MC's and partially weld the inboard shim. Perform weld peening operation. Perform a metrology measurement to re-verify coil alignment.	15.0								300	2.5	checked with primavera
8.02	Final complete MC scan to verify period alignment.	5.0								100		Metrology Staff Budgeted as LOE checked with primavera
9.00	VVSA attachment to MC.									0	2.5	checked with primavera
9.01	Attach VV permanent vertical supports to the MC at the two outboard connection points at the top and bottom of the Type-A MC.	2.0								40	2.5	checked with primavera
9.02	Attach temporary VV vertical supports to the MC at the two connection points at the top and bottom of the Type-B MC.	1.0								20	2.5	checked with primavera
9.03	Disconnect base support and transfer load to VV vertical supports.	1.0								20	2.5	checked with primavera
9.04	Install VV lateral supports and align VVSA to modular coils	4.0								80	2.5	checked with primavera
9.05	Prepare VVSA for transport. Install blocking as required to prevent any motion relative to the modular coils.	2.0								40	2.5	checked with primavera
10.00	Transfer Period to NCSX test cell.									0	2.5	checked with primavera
10.01	Install crane rigging to MCWF and transfer the unit to the transfer support frame. Secure Period /support frame to the transporter.	2.0								80	5.0	checked with primavera
10.02	Transfer completed Period to Station 5 located in NCSX test cell.	1.0								40	5.0	checked with primavera
	Subtotal FP#1	115	5							1990	500	2495 checked with primavera
	Station 3-Assemble Mod Coils and VVSA-FP#2											checked with primavera
	Perform above sequence	115	\$ 5.0K							1990	2.6 500.0	checked with primavera
	Station 3-Assemble Mod Coils and VVSA-FP#3											checked with primavera
	Perform above sequence	115	\$ 5.0K							1990	2.6 500.0	checked with primavera

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Job Title: FPA Oversight & Support (1802)																
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)																
Job Title: FPA Operations - Station 5 (1815)																
Job Manager: Mike Viola																
Fabrication and Assembly Assumptions:																
Assumes 5 day workweek 1 shift no overtime																
Parallel ops for sta 5 (2 fixtures available)																
Parallel ops for sta 5 (2 fixtures available)																
Only 1 fixture for station 3 only																
Parallel ops for sta 2																
TASK DESCRIPTION	Work days	4HMS	37STK	35TRVL	310T	ORNL EM/DSN	SHTB	EMEM	EMSM	EMSB	EMTB	CREW	Met Crew	Basis of Estimate	checked with primavera	
														Shop based on similar tasks, tempered (adjusted) for complexity of having to do all welds from inside of	checked with primavera	
Job: 1815 - Field Period Assembly Station 5 (in NCSX TC)-VIOLA																
Station 5- Final FP Assy -FP#1 (in NCSX TC)																
metrology network	10.0	\$ 7.0K										160			checked with primavera	
Bolt on 2 Port Extensions needed for first Plasma diagnostics	1.0											16	2.0	10" ports provided by WBS 38	checked with primavera	
MTM NCR Hardware repurchase (bolt kits & cover plates)		\$ 42.0K													checked with primavera	
Weld Wire & weld supplies		\$ 15.0K													checked with primavera	
Testout Sta 5 equipt & procedures	5.0											160	4.0		checked with primavera	
Check 3 sled interfaces adjust holes	12.0											384	4.0		checked with primavera	
Fixtures installed - final metrology	6.0											192	4.0		checked with primavera	
Miscellaneous for tooling														\$ 1,027.8K	checked with primavera	
Station 5 preinstallation in parallel																
1.00 Component preparations																
1.01 The short dome port (the one on the top of the dome) needs to cut off near the dome. The longest port can remain.	2.0											40	2.5		checked with primavera	
1.02 Install heat tape and thermocouples on all ports.	0.0											0	2.5	Covered in Station 2 LED: Reversed order of 1.02 & 1.03	checked with primavera	
1.03 Install insulation system around all ports.	0.0											0	2.5	Covered in Station 2	checked with primavera	
Install insulation system around all ports.	0.0											0	2.5		checked with primavera	
Install heat tape and thermocouples on all ports.	0.0											0	2.5		checked with primavera	
2.00 Pre-Installation set-up																
2.01 Install period support fixture	2.0											40	2.5		checked with primavera	
2.02 Install FPA on support stand. Use leveler pad to engage base of MC. Add bolts to secure in place.	2.0											40	2.5		checked with primavera	
2.03 Install external working platforms	4.0											80	2.5		checked with primavera	
2.04 Install internal VV working platforms	3.0											60	2.5		checked with primavera	
3.00 VV port installation																
3.01 Install the domes (left and right side), inserting the long dome port through the MC opening, and weld the dome shell to the VV.	2.0											40	2.5		checked with primavera	
3.02 Install small dome ports and remaining circular ports. Use a guide tool located at the MC hole opening to help support and center the port. Ports should already have insulation, heater tape and thermocouples on them.	30.0											600	2.5		checked with primavera	
3.03 Leak check each port immediately after it is welded.	30.0											600	2.5		checked with primavera	
4.00 Install port boot seal assembly																
4.01 Install boots on all ports except for the two port 4's.	16.0											320	2.5		checked with primavera	
5.00 MC lead and coolant connections																
5.01 Install MC lead connections on each of the MC's and temporarily position the leads so they will not interfere with the TF coil installation and for routing through the PF structure.	6.0											72	1.5	in parallel with 5.02	checked with primavera	
5.02 Install MC coolant lines on each MC and position them for the TF installation and routing through PF structure.	12.0											240	2.5		checked with primavera	
5.03 Platforms may need to be altered or moved for the installation of the TF coils.	3.0											60	2.5		checked with primavera	
6.00 TF installation - right side																
6.01 Rotate two individual TF coils over the MC on the right side and temporarily support them off the Type-B and C MC's.	2.0											40	2.5		checked with primavera	

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TABLE III - Fabrication and Installation**

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Job Title: FPA Operations - Stations 1, 2, & 3 (1810)											
Job Title: FPA Operations - Station 5 (1815)											
Job Manager: Mike Viola											
Fabrication and Assembly Assumptions:											
	Assumes 5 day workweek 1 shift no overtime										
	Parallel ops for sta 5 (2 fixtures available)										
	Parallel ops for sta 5 (2 fixtures available)										
	Only 1 fixture for station 3 only										
	Parallel ops for sta 2										
6.02	Attach the temporary support at the end of the Type-C MC used to unload the a pair of center supports.	1.0						20	2.5		checked with primavera
6.03	Lower leveler pad to disengage base of MC on the right side. Remove right side leveler pad and intermediate support.	0.0						0	2.5		checked with primavera
6.04	Install TF support brackets (top & bottom) to the port 12 side on the Type-A MC (platforms will be needed).	2.0						40	2.5		checked with primavera
6.05	Slide the first TF assembly against the TF support bracket and secure in place with the mating support bracket.	1.0						20	2.5		checked with primavera
6.06	Install TF support brackets (top & bottom) to the port 12 side on the Type-B MC.	2.0						40	2.5		checked with primavera
6.07	Slide the second TF assembly against the support bracket and secure in place with the mating support bracket.	1.0						20	2.5		checked with primavera
6.08	Install machine support plates (inboard and outboard) on the bottom, spanning two TF coil support brackets.	3.0						60	2.5		checked with primavera
6.09	Reinstall leveler pad to engage base of MC on the right side.	0.0						0	2.5		checked with primavera
6.10	Installed one side of the TF support brackets on the Type-C coil (top and bottom) for the TF installation to occur at Station 6.	1.0						20	2.5		checked with primavera
7.00	TF installation - left side										checked with primavera
7.01	The TF installation on the left side will follow the same ten (10) steps that were followed on the right side.	13.0						260	2.5		checked with primavera
8.00	TF fit-up check										checked with primavera
8.01	Perform a fit-up check of the four TF coils to determine if they can be positioned within tolerances.	5.0						100	2.5		checked with primavera
9.00	Install Ports 4										checked with primavera
9.01	Tack weld the left and right port 4's. Use a local laser attached to the port cover to define the port trajectory and to aid positioning in port during welding.	2.0						40	2.5		checked with primavera
9.02	Install boots on both port 4's.	4.0						80	2.5		checked with primavera
10.00	Installation of PF structural members and routing of MC coolant and leads.										checked with primavera
10.01	Install the PF coil support structure that surround the TF coils. In doing this the MC leads and coolant lines need to be routed to the outside of the PF structure. PF structure is only partially installed at the Type-C MC's.	8.0						160	2.5		checked with primavera
11.00	MC header installation and coolant connections										checked with primavera
11.01	Install the MC coolant manifold outside of the PF structure in the area of PF6.	3.0						60	2.5		checked with primavera
11.02	Connect all MC coolant lines to the manifold (40 lines top and bottom)	20.0						400	2.5	Flex lines but need field supports installed	checked with primavera
12.00	Diagnostic										checked with primavera
12.01	Install Rogowski coils on the end of the VV, left side. Route leads through space between port 8 and spool port opening and coil onto shell of MC for future routing	5.0						100	2.5		checked with primavera
13.00	Final measurements										checked with primavera
13.01	Obtain a set of Period 1 alignment fiducial positions to use in locating the VV within the MC.	5.0						100		Metrology Staff Budgeted as LOE	checked with primavera
13.02	Using the laser tracker, align to tooling balls on each MCHP, locking into a minimum of 8 of them.	1.0						20		Metrology Staff Budgeted as LOE	checked with primavera
13.03	Using monuments on the VV for alignment, bring the VV into proper alignment. Make final adjust in the VV supports to secure VV in place.	4.0						80	2.5		checked with primavera
13.04	Install or identify three primary fiducials that will be used in positioning the Period in Station 6.	2.0						40	2.5		checked with primavera
13.05	Make a final measurement of all fiducials, the VV end flanges and the Type-C MC end flanges. Record the results.	5.0						100		Metrology Staff Budgeted as LOE	checked with primavera
13.10	Final Acceptance tests										checked with primavera
13.11	Check Assembly (bolts, etc)	5.0						100	2.5		checked with primavera
13.12	Check Diagnostics (Loops, thermocouples)	5.0						100	2.5		checked with primavera
13.13	Check manifolds (pressure, flow, etc.)	5.0						100	2.5		checked with primavera
13.14	Check 6 modcoils (voltage etc)	6.0						120	2.5		checked with primavera
13.15	Check trim coils (voltage etc)	3.0						60	2.5		checked with primavera
13.16	Check TF coils (voltage etc)	6.0						120	2.5		checked with primavera
14.00	Transfer Period to final assembly (Station 6).										checked with primavera
14.01	Install crane rigging to completed Period assembly	2.0						40	2.5		checked with primavera
14.02	Remove platforms	1.0						20	2.5		checked with primavera
14.03	Transfer completed Period to Station 6 located in NCSX test cell.	2.0						40	2.5		checked with primavera

NCSX June 2007 ETC
TABLE III - Fabrication and Installation

WBS Number: 185														
WBS Title: Assembly of Field Periods														
Job Numbers: 1802, 1810, and 1815														
Job Title: FPA Oversight & Support (1802)														
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)														
Job Title: FPA Operations - Station 5 (1815)														
Job Manager: Mike Viola														
Fabrication and Assembly Assumptions:														
Assumes 5 day workweek 1 shift no overtime														
Parallel ops for sta 5 (2 fixtures available)														
Parallel ops for sta 5 (2 fixtures available)														
Only 1 fixture for station 3 only														
Parallel ops for sta 2														
Install on support platform (incl in job 7503)														
subtotal														
196		0		4472		220		\$ 4,692.0K		checked with primavera				
Station 5- Final FP Assy -FP#2 (in NCSX TC)														
Repeat steps for FP #1		196 \$ -		4472		220				checked with primavera				
Station 5- Final FP Assy -FP#3 (in NCSX TC)														
Repeat steps for FP #1		196 \$ -		4472		220				checked with primavera				

NCSX June 2007 ETC

TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

WBS Number: 185
WBS Title: Assembly of Field Periods
Job Numbers: 1802, 1810, and 1815
Job Title: FPA Oversight & Support (1802)
Job Title: FPA Operations - Stations 1, 2, & 3 (1810)
Job Title: FPA Operations - Station 5 (1815)
Job Manager: Mike Viola

Uncertainty of the Estimate

	<u>High</u>	<u>Medium</u>	<u>Low</u>	<u>Uncertainty Range (%)</u>	<u>Comments/Other Considerations</u>
Job 1802					
Design Maturity	X			-10%/+15%	LOE work based on recent NCSX experience
Design Complexity		X			LOE work based on recent NCSX experience, but complex processes
Job 1810					
Station 1					
Maturity	X			-10%/+15%	VV #1 actual experience - very near completion
Complexity		X			Requires field adjustments & tight metrology requirements which necessitates "back office" support
Station 2					
Maturity			X	-30%/+60%	Still at conceptual design for all aspects of joint
Complexity	X				Challenging all aspects of engineering - W&-X experience also indicates FPA is the most challenging task
Station 3					
Maturity			X	-30%/+60%	Still at conceptual design for all aspects of joint
Complexity	X				Challenging all aspects of engineering - W7-X experience also indicates FPA is the most challenging task
Job 1815					
Design Maturity			X	-20%/+40%	Standard welding techniques adjust for welding in tight confines inside vessel
Design Complexity		X			Welding vessel while using metrology for measuring distortion

Note: High/Medium/Low uncertainty assessment from Job Manager. Uncertainty range based on ACEI recommended practice 18R-97 as amended for NCSX.

NCSX June 2007 ETC

TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

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Job Title: FPA Operations - Stations 1, 2, & 3 (1810)
Job Title: FPA Operations - Station 5 (1815)
Job Manager: Mike Viola

Residual Impacts								
Job	Risk Description	Likelihood of Occurring	Mitigation Plan	Basis of estimate	Cost Impact		Schedule Impact	
					Low	High	Low	High
1802	Loss or prolonged unavailability of certain key personnel (Viola or Perry) from the project could substantially impact the schedule.	VU	Viola and Perry will be cross-trained such that each could do the other's job	Estimated impact is <1 months on the critical path. Cost estimates cover 0-1 months of near term FPA assembly (in addition to the standing army costs addressed under schedule impact).	+\$0	+\$150	+ 0.00	+ 0.50
1810	"Back office" support for FPA and final assembly becomes a chronic bottleneck, stretching out the time required to complete assembly operations	VU	Additional support budgeted for Brown, Brooks, and Ellis providing "2 deep" back office support. Should be available to mitigate peak demands once training in key skills is completed.	Estimated impact is <2 months on the critical path. Cost impact covers up to 2 months of FPA/final assembly.	+\$0	+\$600	+ 0.00	+ 2.00
	Modular coil damaged during assembly requiring significant rework to coil	VU	Equipment will be handled during FPA using carefully constructed procedures to minimize likelihood of damage.	Nominally repaired with a 2-man crew within 2 weeks	+\$10	+\$20	+ 0.00	+ 0.50
	VV surface component (coolant tube, flux loop, or TC) damaged during FPA requiring significant rework	VU	Equipment will be handled during FPA using carefully constructed procedures to minimize likelihood of damage.	Nominally repaired with a 2-man crew within 2 weeks	+\$10	+\$20	+ 0.00	+ 0.50

NCSX June 2007 ETC

TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

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Job Manager: Mike Viola

Unacceptable distortion in a field period when welding modular coil shims requiring	VU	Likelihood of occurrence is very unlikely as a result of extensive welding R&D and careful monitoring during welding.	Cut apart and re-weld two coils back together. Nominally a 2.5-man crew in 12 weeks.	+ \$25	+ \$35	+ 0.75	+ 1.25
Field period damaged during loading, transport, or unloading from TFTR TC to NCSX TC	NC	Extreme care will be taken when transporting a field period renering this event extremely unlikely.	<i>Crisis event not covered by contingency</i>				
Metrology equipment and general purpose tooling/ lifting equipment (e.g.cranes) not available to support the schedule	U	Maintenance contract mitigates impact of metrology equipment. Additional \$200K budgeted for a 3rd laser tracker and/or spare metrology equipment. Should result in improved efficiency.	Up to 2 week impact on FPA and critical path. FPA cost impact assumed to be \$300k/mo.	+ \$0	+ \$150	+ 0.00	+ 0.50
1815 Metrology equipment and general purpose tooling/ lifting equipment (e.g.cranes) not available to support the schedule	U	Maintenance contract mitigates impact of metrology equipment. Additional \$200K budgeted for a 3rd laser tracker and/or spare metrology equipment. Should result in improved efficiency.	Up to 2 week impact on FPA and critical path. FPA cost impact assumed to be \$300k/mo.	+ \$0	+ \$150	+ 0.00	+ 0.50

NCSX June 2007 ETC

TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

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 Job Manager: Mike Viola

Multiple vacuum leaks during initial pumpdown	NC	Welds will be leak checked during FPA when leaks can be addressed without significantly impacting the critical path. Likelihood of many leaks appearing during initial pumpdown is considered extremely unlikely with this mitigation plan.	Impacts of having a few leaks is covered in estimate uncertainty with present mitigation plan
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- Notes:
- [1] Low cost and schedule impacts are considered the minimum (0-percentile) impacts should the event occur. High cost and schedule impacts are considered the maximum (100-percentile) impacts should the event occur
 - [2] Cost impacts should be entered as man-hours (by demographic) and M&S direct cost under basis of estimate. Cost impacts should NOT include standing army costs which are separately calculated from the schedule impact. Project control is responsible for quantifying the low and high cost impacts based on the labor hours and M&S identified
 - [3] 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.
 - [4] 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=Unlikley (40%>P>10%), VU=Very Unlikely (P<10%), NC=Non-credible (P<1%)

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

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Job Title: FPA Operations - Stations 1, 2, & 3 (1810)
Job Title: FPA Operations - Station 5 (1815)
Job Manager: Mike Viola

EWI Budgetary Proposal No. 50782GTH Date: June 5, 2007

Submitted to: Princeton Plasma Physics Lab

Title: On-Site Design Review and Sample Evaluation

Objectives: Discuss design for welding with minimal distortion meeting minimum fatigue requirements. Perform evaluation of welds on test specimen.

Approach:

1. Design review with Bill Mohr from EWI in Princeton, New Jersey, followed up with a written report. Dr. Mohr has extensive experience in fitness-for-service assessment, design, and fatigue of welded structures. This will be an opportunity to validate your considerations regarding distortion, allowable stresses, and other design concerns.
2. A sample weld to be evaluated at EWI using ultrasonic and radiographic testing. Macros will be generated and evaluated and a report will be sent.
3. Recommendation for additional work will be made after the design review and test weld assessment.

Deliverables:

A report will be written summarizing the results of the design review. Lab results, macros and a summary of explanation will be delivered with recommendations.

Program Budget and Duration:

The above work can be completed with a price of **\$18,075**. The work is planned for a period of **20 days** after receipt of purchase order and any required materials. This quotation is firm fixed price for the work scope outlined in the proposal and, once accepted, will not be changed without the concurrence of both parties. It is understood that if the Client requests an expanded work scope, EWI will quote the cost and timing to complete the additional work.

Budget	Hours	Total	Labor	Task	Hr
Labor	63	\$ 15,785	Labor Grade		18
Travel plus GAA		\$ 1,168	Principal Eng		1
Material		\$ -	Senior Eng		2
Subcontracts		\$ -			20
Miscellaneous		\$ -	Program Mgr		3
Fee on Material, Subcontracts & Misc.		\$ -			5
Lab Services		\$ 1,122			63
Total Program		\$ 18,075			

Notes
 1 - Labor rates are fully burdened
 2 - EWI indirect rates are ACO approved provisional rates

Lab Services
(R) Material Mounts @ \$132 per mount = \$792
(R) Micrograph with max field of view size of .290-in. by .370-in. = \$192
(S) Macrographs @ \$40 per macro = \$138

Edison Welding Institute Support of Test Welding Program

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

ORNL Updated Title III Engineering (6/8/2007)

Station No.	start date	end date	days	weeks	1st peric	2nd peri	3thd period	ENGR	Designe	Total hrs		
station 2	Oct-07	Mar-09	517.00	74	2954	591	394	197	1182	591	591	1182
station 3	Feb-08	Jul-09	516.00	74	2949	491	295	98	885	442	442	885
station 5	Apr-08	Sep-09	518.00	74	2960	493	296	99	888	444	444	888
station 6	Jun-09	Oct-10	487.00	70	2783	742	557	371	1670	1670	835	2505

Total Hours	
Station 2 to 5 (FPA - .	2954
Station 6 (Fnl Mach A	2505

Assume each period is 1/3 of the number of weeks

Station	Coverage	Title III Support Travel	
Station 2	1st period	60%	60% Engr/Dsn
	2nd period	40%	40% Engr/Dsn
	3thd period	20%	20% Engr/Dsn
	ENGR Designer	50% Average	50% Average
		Job 1802	Job 7503
		\$4,500	FY2007
		\$9,000	FY2008
		\$4,500	\$1,500 FY2009
			\$6,000 FY2010
			\$4,500 FY2011
Station 3	0	50%	50% Engr/Dsn
	0	30%	30% Engr/Dsn
	0	10%	10% Engr/Dsn
	ENGR Designer	50% Average	50% Average
Station 5	0	50%	50% Engr/Dsn
	0	30%	30% Engr/Dsn
	0	10%	10% Engr/Dsn
	ENGR Designer	50% Average	50% Average
Station 6	0	80%	80% Engr/Dsn
	0	60%	60% Engr/Dsn
	0	40%	40% Engr/Dsn
	ENGR Designer	100% Average	50% Average

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted							
										FY07	FY08	FY09	FY10	FY11	FY12	
Job: 1802 - FP Assy Oversight&Support-VIOLA																
Oversight and Supervision																
1802MAY		May cost incr	20	01MAY07*	29MAY07		1,335	LOE	15,000.00							
1802ORNLO2		ORNL Title III field period assy station 2	326*	24OCT07	19FEB09		4	LOE	152,828.16	ORNLEM =591;ornldm=591 travel=6						
1802ORNLO3		ORNL Title III field period assy station 3	318*	03MAR08	08JUN09		0	LOE	117,143.02	ORNLEM =442;ornldm=442 travel=6						
1802ORNLO5		ORNL Title III field period assy station 5	260*	30OCT08	13NOV09		0	LOE	122,171.24	ORNLEM =444;ornldm=444 travel=6						
R1802-001		Metrology Engr Super FY07	106*	01MAY07*	28SEP07		1,249	LOE	62,722.80	EA//EM =360hr ;						
R1802-003		Metrology Engr Super FY08	250*	01OCT07*	30SEP08		999	LOE	160,310.88	EA//EM =863hr ;						
R1802-004		Metrology Engr Super FY09	281*	01OCT08*	13NOV09		718	LOE	194,695.10	EA//EM =863hr ;						
R1802-004S		Metrology Engr Super FY09 (2n shft suprt .5 fte)	203*	30JAN09*	13NOV09	2	718	LOE	134,631.52	EA//EM =.5 fte						
R1802-005		FPA Management FY07	106*	01MAY07*	28SEP07		1,249	LOE	115,712.78	EM//EM =1.0 fte; 41=06\$K ;						
R1802-007		FPA Management FY08	250*	01OCT07*	30SEP08		999	LOE	277,523.54	EM//EM =1.0 fte						
R1802-008		FPA Management FY09	281*	01OCT08*	13NOV09		718	LOE	322,131.05	EM//EM =1.0 fte						
R1802-013		HP Coverage in the TFTR TC LOE FY07	106*	01MAY07*	28SEP07		1,249	LOE	59,214.54	SH//TB =.75 fte						
R1802-015		HP Coverage in the TFTR TC LOE FY08	250*	01OCT07*	30SEP08		999	LOE	149,857.40	SH//TB =.75 fte						
R1802-016		HP Coverage in the TFTR TC LOE FY09	169*	01OCT08*	08JUN09		830	LOE	104,271.28	SH//TB =(0.75 fte) ;						
R1810-098		Station 3 complete	0		08JUN09		830		0.00	▼						
Station 2 procedures,JHA,ACC,Training,Prep																
R1802-207		Procedures written & approved	14	12SEP07	01OCT07		0		0.00	Viola						
R1802-209		JHA completed	6	02OCT07	09OCT07		0		0.00	Viola						
R1802-211		Training needs identified & released	6	10OCT07	17OCT07		0		0.00	Viola						
R1802-213		ACC review completed	2	18OCT07	19OCT07		0		0.00	Viola						
R1802-215		Pre-job brief completed	1	22OCT07	22OCT07		0		0.00	Viola						
R1802-217		Station 2 operational	1	23OCT07	23OCT07		0		0.00	Viola						
Station 3 procedures,JHA,ACC,Training,Prep																
R1802-307		Procedures written & approved	10	15JAN08	28JAN08		56		0.00	Viola						
R1802-309		JHA completed	6	29JAN08	05FEB08		56		0.00	Viola						
R1802-311		Training needs identified & released	6	06FEB08	13FEB08		56		0.00	Viola						
R1802-313		ACC review completed	6	14FEB08	21FEB08		56		0.00	Viola						
R1802-315		Pre-job brief completed	6	22FEB08	29FEB08		56		0.00	Viola						
Station 5 procedures,JHA,ACC,Training,Prep																
R1802-507		Procedures written & approved	14	16APR08	05MAY08		97		0.00	Viola						
R1802-509		JHA completed	6	06MAY08	13MAY08		97		0.00	Viola						
R1802-519		Fixtures installed	6	14MAY08	21MAY08		97		0.00	Viola						
R1802-511		Training needs identified & released	6	22MAY08	30MAY08		97		0.00	Viola						
R1802-513		ACC review completed	7	02JUN08	10JUN08		97		0.00	Viola						

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmlpt	Proposed Budgeted						
										FY07	FY08	FY09	FY10	FY11	FY12
R1802-515		Pre-job brief completed	7	11JUN08	19JUN08		97		0.00						
Subtotal			637	01MAY07	13NOV09		718		1,988,213.31						

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted							
										FY07	FY08	FY09	FY10	FY11	FY12	
Job:1810-Field Period Assy -Station 1,2,3 VIOLA																
General Assy Support																
R1801-004S		LOE Crane support, fixt setup (2nd shft 1.2 fte	203*	30JAN09*	13NOV09	2	718	LOE	139,343.95							
R1810-001		LOE Crane support, fixture setupfor FY07	106*	01MAY07*	28SEP07		1,249	LOE	64,854.45							
R1810-003		LOE Crane support, fixture setupfor FY08	250*	01OCT07*	30SEP08		999	LOE	165,923.83							
R1810-004		LOE Crane support, fixture setupfor FY09	281*	01OCT08*	13NOV09		718	LOE	192,599.92							
R1810-005		LOE Field Supervision for FY07	106*	01MAY07*	28SEP07		1,249	LOE	96,036.83							
R1810-007		LOE Field Supervision for FY08	250*	01OCT07*	30SEP08		999	LOE	245,765.14							
R1810-008		LOE Field Supervision for FY09	281*	01OCT08*	13NOV09		718	LOE	285,266.98							
R1810-008S		LOE Field Supervision for 2nd shft 1.0 fte	203*	30JAN09*	13NOV09	2	718	LOE	206,388.38							
R1810-009		LOE Metrology sprt FY07 1.5 fte EM & 1.0 fte TB	106*	01MAY07*	28SEP07		1,249	LOE	197,832.33							
R1810-011		LOE Metrology sprt FY08 1.5 fte EM & 1.0 fte TB	250*	01OCT07*	30SEP08		999	LOE	771,108.00							
R1810-012		LOE Metrology sprt FY09 1.5 fte EM & 1.0 fte TB	281*	01OCT08*	13NOV09		718	LOE	433,249.15							
R1810-013		Misc M&S FY07	106*	01MAY07*	28SEP07		1,249	LOE	19,140.00							
R1810-015		Misc M&S FY08	250*	01OCT07*	30SEP08		999	LOE	47,088.00							
R1810-016		Misc M&S FY09	281*	01OCT08*	13NOV09		718	LOE	57,664.57							
R1810-099		Station 5 complete	0		13NOV09		718		0.00							
Station 1-VV Prep (hard surface components) FP#1																
R1810-1105		Instl cooling lines & Weld cooling/htg risers	31	01MAY07*	13JUN07	1	340		49,145.00							
R1810-1107		Verify Instl of H/C lines,headers,manifolds	5	14JUN07	20JUN07	1	340		7,515.00							
R1810-1108		Perform final acceptance testing (H/C flow test)	5	20JUL07	26JUL07	1	320		7,515.00							
R1810-1115		Purchase pump	20	21JUN07*	19JUL07	1	320		5,104.00							
R1810-1109		Loop termination & verification	18	23AUG07	18SEP07	1	187		27,054.00							
R1810-1112		Trim seal plates	2	01OCT07*	02OCT07	1	275		3,204.40							
R1810-1110		Install Final Internal&Ext monuments & meas	4	09JAN08	14JAN08	1	116		6,408.80							
R1810-1111		Final Scan	4	15JAN08	18JAN08	1	116		6,408.80							
R1810-1114		Install heater tape on all removable ports	20	21JAN08	15FEB08	1	116		16,022.00							
R1810-1113		Prepare &transfer completed VV to holding area	2	18FEB08	19FEB08	1	116		3,204.40							
Station 1- VV Prep (hrd surf cmpntsFP#2																
R1810-1203		Misc Hardware	170	01JUN07*	08FEB08		1,163	LOE	2,584.38							
R1810-1209		Install cooling/htg lines to vac vsl	15	01MAY07	21MAY07	1	237		22,545.00							
R1810-1211		Weld cooling/htg risers	16	22MAY07	13JUN07	1	237		26,600.00							
R1810-1213		Verify Instl of H/C lines,headers,manifolds	5	14JUN07	20JUN07	1	390		7,515.00							
R1810-1208		Perform final acceptance testing (H/C flow test)	5	21JUN07	27JUN07	1	390		12,619.00							
R1810-1212		Trim seal plates	2	26OCT07*	29OCT07	1	258		3,204.40							
R1810-1215		Loop termination & verification	18	26NOV07	21DEC07	1	239		28,839.60							
R1810-1216		Install Final Internal&Ext monuments & meas	4	02JAN08	07JAN08	1	239		6,408.80							
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						Resource Loaded Schedule										
						EAC										
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Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted	Fiscal Year						
										FY07	FY08	FY09	FY10	FY11	FY12	
R1810-1217		Final Scan	4	08JAN08	11JAN08	1	239		6,408.80		EM//TB =80hr ;					
R1810-1214		Install heater tape on all removable ports	20	14JAN08	08FEB08	1	239		16,022.00		EM//TB =200hr ;					
R1810-1219		Prepare& transfer completed VV to holding area	2	11FEB08	12FEB08	1	239		3,204.40		EM//TB =40hr ;					
Station 1- VV Prep (hrd surf cmpntsFP#3)																
R1810-1303		Misc Hardware	139	15MAY07*	28NOV07		1,206	LOE	2,571.80		EM//TB =00hr ; 41=02\$sk ;					
R1810-1304		Layout diag &coolant paths on vessel	12	01MAY07	16MAY07	1	450		18,036.00		EM//TB =240hr ;					
R1810-1305		Install heater tape on vertical ports	7	17MAY07	25MAY07	1	450		10,521.00		EM//TB =140hr ;					
R1810-1307		Verify installation of heater tapes	1	02JUL07*	02JUL07	1	442		1,503.00		EM//TB =20hr ;					
R1810-1309		Attach studs forcoolant lines	3	03JUL07	06JUL07	1	442		4,509.00		EM//TB =60hr ;					
R1810-1300		Install Templates	3	25JUN07*	27JUN07	1	227		4,509.00		EM//TB =60hr ;					
R1810-1311		Wind magnetic diagnostic sensors	14	11JUL07*	30JUL07	1	219		21,042.00		EM//TB =280hr ;					
R1810-1313		Install precision magnetic diagnostic sensors	3	31JUL07	02AUG07	1	219		4,509.00		EM//TB =60hr ;					
R1810-1315		Verify installation magnetic diagnostic sensors	4	03AUG07	08AUG07	1	219		6,012.00		EM//TB =80hr ;					
R1810-1317		Install local I&C (incl thermocouples)	5	09AUG07	15AUG07	1	356		7,515.00		EM//TB =100hr ;					
R1810-1319		Verify installation of local I&C	2	16AUG07	17AUG07	1	356		3,006.00		EM//TB =40hr ;					
R1810-1321		Install cooling/htg lines to vac vsl	10	20AUG07	31AUG07	1	356		22,545.00		EM//TB =300hr ;					
R1810-1323		Weld cooling/htg risers	10	04SEP07	17SEP07	1	356		24,048.00		EM//TB =320hr ;					
R1810-1325		Verify Instl of H/C lines,headers,manifolds	5	18SEP07	24SEP07	1	356		7,515.00		EM//TB =100hr ;					
R1810-1308		Perform final acceptance testing (H/C flow test)	5	25SEP07	01OCT07	1	356		7,614.20		EM//TB =100hr ;					
R1810-1312		Trim seal plates	2	30OCT07	31OCT07	1	360		3,204.40		EM//TB =40hr ;					
R1810-1327		Loop termination & verification	18	02JAN08	25JAN08	1	299		28,839.60		EM//TB =360hr ;					
R1810-1328		Install Final Internal&Ext monuments & meas	4	28JAN08	31JAN08	1	299		6,408.80		EM//TB =80hr ;					
R1810-1329	3	Final Scan	4	01FEB08	06FEB08	1	299		6,408.80		EM//TB =80hr ;					
R1810-1314		Install heater tape on all removable ports	20	15FEB08*	13MAR08	1	273		16,022.00		EM//TB =200hr ;					
R1810-1331		Prepare & transfer completed VV to holding area	2	14MAR08	17MAR08	1	273		3,204.40		EM//TB =40hr ;					
Station 1-Spool pieces (3) (spacers)																
R1810-1S03		Attachdiagnostics, studs and coolant lines	17	03NOV08*	25NOV08	1	288		28,036.40		EM//TB =340hr ;					
R1810-1S04		Install Final Internal&Ext monuments & meas	2	26NOV08	01DEC08	1	288		3,298.40		EM//TB =40hr ;					
Station 2 Trials & Development																
Water jet cut A/B flange weld test																
INTRF-035		PPPL Determine shim material	23	01MAY07	01JUN07		59		6,969.20		ea//em=40					
INTRF-001		PPPL buy SS plate for weld trials	10	04JUN07	15JUN07		1,322		40,762.56		M&S=31 em//em=8					
PHIL-02		weld shim DXF files complete	1	28JUN07*	28JUN07		18		0.00							
PHIL-03		complete CAD model of weld test specimen	1	06JUL07*	06JUL07		13		0.00							
PHIL-04		water jet cut shims for A/B flange weld test	3	09JUL07	11JUL07		13		1,803.60		EM//TB =24hr ;					
PHIL-05		solution anneal shims (note: shims not ground).	1	12JUL07	12JUL07		16		991.36		EM//SM =08hr ;					
PHIL-06		assemble shims&flanges;grind relief in flanges	3	13JUL07	17JUL07		16		3,607.20		EM//TB =48hr ;					
PHIL-07		weld & monitor distortion; improvise clamping	3	18JUL07	20JUL07		16		3,607.20		EM//TB =48hr ;					
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Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted						
										FY07	FY08	FY09	FY10	FY11	FY12
PHIL-08		analyze results at PPPL	2	23JUL07	24JUL07		16		0.00						
PHIL-09		analyze welds at EWI	10	25JUL07	07AUG07		16		0.00						
Casting Weld Tests															
PHIL-11		Mount A6 on angle plate	1	25JUN07*	25JUN07		22		1,202.40	EM//TB =16hr ;					
PHIL-12		Weld fiducials on A6 & B6	2	10JUL07*	11JUL07		13		2,404.80	EM//TB =32hr ;					
PHIL-13		Measure A6 casting	2	12JUL07	13JUL07		13		0.00						
PHIL-14		Develop metrology plan for station 2	65*	01JUN07	31AUG07		6		0.00	■					
PHIL-15		Remove A6 & lower & grout wedge	4	16JUL07	19JUL07		13		4,809.60	EM//TB =64hr ;					
PHIL-16		Re-mount A6 on wedge	2	20JUL07	23JUL07		13		2,404.80	EM//TB =32hr ;					
PHIL-17		Re-measure A6	2	24JUL07	25JUL07		13		0.00						
PHIL-18		Measure B6 on wedge	2	26JUL07	27JUL07		13		2,404.80	EM//TB =32hr ;					
PHIL-19		Place B6 on A6; Meas B6 casting use A6 as base	2	30JUL07	31JUL07		15		0.00						
PHIL-20		Complete CAD model for dimensional ref.	3	01AUG07	03AUG07		15		0.00						
PHIL-21		Prepare angle plate dogs & chocks	4	10JUL07*	13JUL07		71		4,809.60	EM//TB =64hr ;					
PHIL-22		Water jet cut outboard 0,5" stk 316 SS shims	4	12JUL07	17JUL07		13		2,404.80	EM//TB =32hr ;					
PHIL-23		Water jet cut inboard 0.625 316 SS	3	18JUL07	20JUL07		13		1,803.60	EM//TB =24hr ;					
PHIL-24		Assemble castings,align torque&meas inbd. shims	4	23JUL07	26JUL07		13		4,809.60	EM//TB =64hr ;					
PHIL-25		Purchase (2) grinding machines	45	13JUL07*	14SEP07		23		51,040.00	■41=40\$K ;					
PHIL-26		Grind inbd. Shims to thickness (outside shop)	4	27JUL07	01AUG07		13		1,276.00	41=01\$K ;					
PHIL-27		Solution anneal shims	2	02AUG07	03AUG07		13		1,982.72	EM//SM =16hr ;					
PHIL-28		bushing drawings complete	0	02JUL07*	29JUN07		54		0.00						
PHIL-29		fabricate stock bushings	5	09JUL07*	13JUL07		55		0.00						
PHIL-30		Zenex - fabricate eccentric bushings	5	09JUL07*	13JUL07		50		1,658.80	41=01\$K ;					
PHIL-31		Receive hardware - studs, washers	0	20JUL07*	19JUL07		19		0.00						
PHIL-32		Align castings	2	30JUL07	31JUL07		13		2,404.80	EM//TB =32hr ;					
PHIL-33		Fit&install bushings 25% stock, 25% eccentric	5	01AUG07	07AUG07		38		6,012.00	EM//TB =80hr ;					
PHIL-34		Weld procedure/weld qual.	7	09JUL07*	17JUL07		31		4,208.40	EM//TB =56hr ;					
PHIL-35		Purchase weld on strain gauges	14	09JUL07*	26JUL07		16		0.00						
PHIL-36		Install strain gauges	5	27JUL07	02AUG07		16		4,956.80	EM//SM =40hr ;					
PHIL-37		Set up dial ind., CMM, transit system	5	01AUG07	07AUG07		13		3,006.00	EM//TB =40hr ;					
PHIL-38		Install all shims and adjust bushings	2	06AUG07	07AUG07		13		2,404.80	EM//TB =32hr ;					
PHIL-39		Final align and baseline measurements	3	08AUG07	10AUG07		13		5,410.80	EM//TB =72hr ;					
PHIL-40		Perform 25% of welding & measure	2	13AUG07	14AUG07		13		2,404.80	EM//TB =32hr ;					
PHIL-41		Perform 50% of welding & measure	2	15AUG07	16AUG07		13		2,404.80	EM//TB =32hr ;					
PHIL-42		Perform 75% of welding & measure	2	17AUG07	20AUG07		13		2,404.80	EM//TB =32hr ;					
PHIL-43		finish welding & measure	2	21AUG07	22AUG07		13		2,404.80	EM//TB =32hr ;					
PHIL-44		Analyze data; write report	14	23AUG07	12SEP07		13		0.00						
R1810-2050		Consulting support for welding trials	56	25JUN07*	12SEP07		1,261		89,320.00	■ewi=20\$K ; parsells=50\$K ;					

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted	Fiscal Year						
										FY07	FY08	FY09	FY10	FY11	FY12	
R1810-2003		Trial tensioning test on prototype with UT	3	09JUL07*	11JUL07	1	43		6,834.00	EM//TB =40hr ; 41=03\$K ;						
R1810-2005		Trial bushing and shim test on prototype	12	16JUL07*	31JUL07	1	29		20,588.00	EM//TB =240hr ; 41=02\$K ;						
R1810-2011		Alignment mechanisms, metro equipt & positioning	26	23AUG07*	28SEP07	1	15		60,058.00	EM//TB =120hr ; 41=40\$K ;						
R1810-2013		Procure alignment mechanisms, fiducials, lifting	40	02AUG07*	27SEP07	1	17		61,960.00	EM//TB =400hr ; 41=25\$K ;						
R1810-2052		Bushing test B-C	7	18JUL07*	26JUL07	1	27		8,416.80	em//tb=112						
R1810-2017		Determine fiducial types&locations	11	09JUL07*	23JUL07	1	35		19,085.00	EM//TB =220hr ; 41=02\$K ;						
R1810-2001		Misc Hardware and hardware rework (1/2 fte loe)	260	01MAY07	14MAY08	1	1,095	LOE	87,913.87	EM//TB =41=10\$K ; EM//TB =960hr ;						
Setup																
R1810-2023		Install FIRST Holding 20 deg fixture	4	09JUL07*	12JUL07	1	70		8,564.00	em//tb=80; 41=2						
R1810-2025		Install SECOND Holding 20 deg fixture	3	01AUG07*	03AUG07	1	45		7,061.00	EM//TB =60hr ; 41=02\$K ;						
R1810-2027		Install THIRD Holding 20 deg fixture	6	06AUG07*	13AUG07	1	45		11,570.00	EM//TB =120hr ; 41=02\$K ;						
R1810-2029		Install LAST Holding 20 deg fixture	3	14AUG07*	16AUG07	1	45		7,061.00	EM//TB =60hr ; 41=02\$K ;						
R1810-2004		Receive Drawings & Hardware (shims & Bolts)	7	12SEP07	20SEP07	1	163		10,521.00	EM//TB =140hr ;						
R1810-2006		Surface grind set of metal shims for qualificat	4	17SEP07*	20SEP07	1	23		18,036.00	EM//TB =240hr ;						
R1810-207		Compress alumina shims and sort	6	20SEP07*	27SEP07	1	18		9,018.00	EM//TB =120hr ;						
R1810-209		Perform metrology setup & checks	22	10SEP07*	09OCT07	1	10		7,672.82	EM//TB =100hr ;						
R1810-2021		Tools&tooling available for FPA operations	2	01OCT07	02OCT07	1	15		9,744.40	EM//TB =40hr ;41=5k						
R1810-2002		Test out Equip & Procedures	7	02OCT07	10OCT07	1	9		11,215.40	EM//TB =140hr ;						
R1810-2108		HARDWARE,DRAWINGS,& PROCURES AVAILABLE STATION	0		23OCT07	1	0		0.00	▼						
Pre-Measuring and fitup checks																
Pre measurement of MCHP A1,B1,C1 flanges																
S21-1.01		Verify mating MC's A1,B1,C1	4	20JUL07*	25JUL07	1	1		6,012.00	EM//TB =80hr ;						
S21-1.02		Epoxy paint all close fitting interfacing surfac	3	26JUL07	30JUL07	1	1		4,509.00	EM//TB =60hr ;						
S21-2.01		Set A1 on pre-measured fixt, "B" side down	1	31JUL07	31JUL07	1	1		1,503.00	EM//TB =20hr ;						
S21-2.02		Align to the conical seats locking into of 8	2	01AUG07	02AUG07	1	1		0.00	ZMET =40 ;						
S21-2.03		Estab global coord sys on mc geometry. Meas monu	7	03AUG07	13AUG07	1	1		0.00	ZMET =140 ;						
S21-2.04		Meas tooling ball monuments on winding form.	1	14AUG07	14AUG07	1	1		0.00	ZMET =20 ;						
S21-2.05		Scan the "A" flange of the Type-A1 coil.	1	15AUG07	15AUG07	1	1		0.00	ZMET =20 ;						
S21-2.07		Remove A1 coil from stand	1	16AUG07	16AUG07	1	1		1,503.00	EM//TB =20hr ;						
S21-2.08		Measure B1 "A" flange	14	17AUG07	06SEP07	1	1		3,006.00	EM//TB =40hr ; ZMET =220 ;						
S21-2.11		Measure C1 "A" flange	13	07SEP07	25SEP07	1	1		3,006.00	EM//TB =40hr ; ZMET =220 ;						
S21-2.14		Measure Type A1-A2 "A" flange	13	26SEP07	12OCT07	1	1		3,158.62	EM//TB =40hr ; ZMET =220 ;						
S21-3.02		Grind shims first article f/assy process qu	4	15OCT07	18OCT07	1	1		6,408.80	EM//TB =80hr ;						
S21-4.02		Perform metrology set-up and checks	2	19OCT07	22OCT07	1	1		0.00	ZMET =40 ;						
S21-3.03		Ready For Preassembly A1B1C1	0		22OCT07	1	1		0.00	▼						
Pre measurement of MCHP A2,B2,C2 flanges																
S22-1.01		Verify mating MC's of MCHP will come together	4	23OCT07	26OCT07		4		6,408.80	EM//TB =80hr ;						
S22-1.02		Epoxy paint all close fitting interfacing surfac	3	29OCT07	31OCT07		4		4,806.60	EM//TB =60hr ;						
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Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted	Fiscal Year						
										FY07	FY08	FY09	FY10	FY11	FY12	
S22-2.08		Measure B2 "A" flange	14	01NOV07	20NOV07	1	4		3,204.40	EM//TB =40hr ; ZMET =220 ;						
S22-2.11		Measure C2 "A" flange	13	21NOV07	11DEC07	1	4		3,204.40	EM//TB =40hr ; ZMET =220 ;						
S22-2.14		Measure Type A1-A2 "A" flange	13	12DEC07	08JAN08	1	4		3,204.40	EM//TB =40hr ; ZMET =220 ;						
S22-3.02		Compress alumina shims sort by thickness	4	09JAN08	14JAN08		4		6,408.80	EM//TB =80hr ;						
S22-4.02		Perform metrology set-up and checks	2	15JAN08	16JAN08		4		0.00	ZMET =40 ;						
S22-4.03		Ready For Preassembly A2B2C2	0		16JAN08		4		0.00							
Pre measurement of MCHP A3,B3,C3 flanges																
S23-1.01		Verify mating MC's of MCHP will come together	4	17JAN08	22JAN08		4		6,408.80	EM//TB =80hr ;						
S23-1.02		Epoxy paint all close fitting interfacing surfac	3	23JAN08	25JAN08		4		4,806.60	EM//TB =60hr ;						
S23-2.01		Set the A3 coil on fixture, A side flange down	1	28JAN08	28JAN08		4		1,602.20	EM//TB =20hr ;						
S23-2.02		Align to the conical seats locking into min of 8	2	29JAN08	30JAN08		4		0.00	ZMET =40 ;						
S23-2.03		Measure monuments on fixture and walls.	7	31JAN08	08FEB08		4		0.00	ZMET =140 ;						
S23-2.04		Measure tooling ball monuments	1	11FEB08	11FEB08		4		0.00	ZMET =20 ;						
S23-2.05		Scan the B flange of A3	1	12FEB08	12FEB08		4		0.00	ZMET =20 ;						
S23-2.07		Remove A3 move to holding area.	1	13FEB08	13FEB08		4		1,602.20	EM//TB =20hr ;						
S23-2.08		Measure B3 "A" flange	14	14FEB08	04MAR08		4		3,204.40	EM//TB =40hr ; ZMET =220 ;						
S23-2.11		Measure C3 "A" flange	13	05MAR08	21MAR08		4		3,204.40	EM//TB =40hr ; ZMET =220 ;						
S23-2.14		Measure Type A3-A4 "A" flange	13	24MAR08	09APR08		4		3,204.40	EM//TB =40hr ; ZMET =220 ;						
S23-3.02		Compress alumina shims sort by thickness	4	10APR08	15APR08		4		4,806.60	EM//TB =60hr ;						
S23-4.02		Perform metrology set-up and checks	2	16APR08	17APR08		4		0.00	ZMET =40 ;						
S23-4.03		Ready For Preassembly A3B3C3	0	18APR08	17APR08		4		0.00							
Pre measurement of MCHP A4,B4,C4 flanges																
S24-1.01		Verify mating MC's of MCHP will come together	4	18APR08	23APR08		4		6,408.80	EM//TB =80hr ;						
S24-1.02		Epoxy paint all close fitting interfacing surfac	3	24APR08	28APR08		4		4,806.60	EM//TB =60hr ;						
S24-2.08		Measure B4 "A" flange	14	29APR08	16MAY08	1	4		3,204.40	EM//TB =40hr ; ZMET =220 ;						
S24-2.11		Measure C4 "A" flange	13	19MAY08	05JUN08	1	4		3,204.40	EM//TB =40hr ; ZMET =220 ;						
S24-2.14		Measure Type A3-A4 "A" flange	13	06JUN08	24JUN08	1	4		3,204.40	EM//TB =40hr ; ZMET =220 ;						
S24-3.02		Compress alumina shims sort by thickness	4	25JUN08	30JUN08		4		6,408.80	EM//TB =80hr ;						
S24-4.02		Perform metrology set-up and checks	2	01JUL08	02JUL08		4		0.00	ZMET =40 ;						
S24-4.03		Ready For Preassembly A4B4C4	0	03JUL08	02JUL08		4		0.00							
Pre measurement of MCHP A5,B5,C5 flanges																
S25-1.01		Verify mating MC's of MCHP will come together	4	03JUL08	09JUL08		4		6,408.80	EM//TB =80hr ;						
S25-1.02		Epoxy paint all close fitting interfacing surfac	3	10JUL08	14JUL08		4		4,806.60	EM//TB =60hr ;						
S25-2.01		Set the A5 coil on fixture, A side flange down	1	15JUL08	15JUL08		4		1,602.20	EM//TB =20hr ;						
S25-2.02		Align to the conical seats locking into min of 8	2	16JUL08	17JUL08		4		0.00	ZMET =40 ;						
S25-2.03		Measure monuments on fixture and walls.	7	18JUL08	28JUL08		4		0.00	ZMET =140 ;						
S25-2.04		Measure tooling ball monuments	1	29JUL08	29JUL08		4		0.00	ZMET =20 ;						
S25-2.05		Scan the B flange of A5	1	30JUL08	30JUL08		4		0.00	ZMET =20 ;						
S25-2.07		Remove A5 move to holding area.	1	31JUL08	31JUL08		4		1,602.20	EM//TB =20hr ;						

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted									
										FY07	FY08	FY09	FY10	FY11	FY12			
S25-2.08		Measure B5 "A" flange	14	01AUG08	20AUG08		4		3,204.40			EM//TB =40hr ; ZMET =220 ;						
S25-2.11		Measure C5 "A" flange	13	21AUG08	09SEP08		4		3,204.40			EM//TB =40hr ; ZMET =220 ;						
S25-2.14		Measure Type A5-A6 "A" flange	13	10SEP08	26SEP08		4		3,204.40			EM//TB =40hr ; ZMET =220 ;						
S25-3.02		Compress alumina shims sort by thickness	4	29SEP08	02OCT08		4		4,877.10			EM//TB =60hr ;						
S25-4.02		Perform metrology set-up and checks	2	03OCT08	06OCT08		4		0.00			ZMET =40 ;						
S25-4.03		Ready For Preassembly A5B5C5	0	07OCT08	06OCT08		4		0.00									
Pre measurement of MCHP A6,B6,C6 flanges																		
S26-1.01		Verify mating MC's of MCHP will come together	4	07OCT08	10OCT08		4		6,596.80			EM//TB =80hr ;						
S26-1.02		Epoxy paint all close fitting interfacing surfac	3	13OCT08	15OCT08		4		4,947.60			EM//TB =60hr ;						
S26-2.08		Measure B6 "A" flange	14	16OCT08	04NOV08	1	4		3,298.40			EM//TB =40hr ; ZMET =220 ;						
S26-2.11		Measure C6 "A" flange	13	05NOV08	21NOV08	1	4		3,298.40			EM//TB =40hr ; ZMET =220 ;						
S26-2.14		Measure Type A5-A6"A" flange	13	24NOV08	12DEC08	1	4		3,298.40			EM//TB =40hr ; ZMET =220 ;						
S26-3.02		Compress alumina shims sort by thickness	4	15DEC08	18DEC08		4		6,596.80			EM//TB =80hr ;						
S26-4.02		Perform metrology set-up and checks	2	19DEC08	22DEC08		4		0.00			ZMET =40 ;						
S26-4.03		Ready For Preassembly A6B6C6	0	23DEC08	22DEC08		4		0.00									
Station 2-MC Sub Assy A1-B1-C1																		
Pre-assemble A1-A2																		
S21-5.00		BEGIN A-A Pre-assembly	0		23OCT07	1	0		0.00									
S21-5.01		Place A2 "B" side down. Obtain fiduals	2	24OCT07	25OCT07	1	0		3,204.40			EM//TB =40hr ;						
S21-5.02		Align to the conical seats locking into 8.	1	26OCT07	26OCT07	1	0		0.00			zmer=20						
S21-5.03		Meas monuments on fixture & walls.	2	29OCT07	30OCT07	1	0		0.00			zmet=40						
S21-5.04		Place shims on coil identical to A1-A2 fit up	1	31OCT07	31OCT07	1	0		801.10			EM//TB =10hr ;						
S21-5.05		Install dial indicators on the MC to see deflec	1	01NOV07	01NOV07	1	0		3,204.40			EM//TB =40hr ;						
S21-5.06		Lower mating A1 modular coil into position.	1	02NOV07	02NOV07	1	0		1,602.20			EM//TB =20hr ;						
S21-5.07		Meas monuments bottom coil. Jack to .002"	1	05NOV07	05NOV07	1	0		1,602.20			EM//TB =20hr ;						
S21-5.08		Using 3 points, position as was done inA1A2 fit	1	06NOV07	06NOV07	1	0		1,602.20			EM//TB =20hr ;						
S21-5.09		Torque to 50%	2	07NOV07	08NOV07	1	0		3,204.40			EM//TB =40hr ;						
S21-5.1		Make "wigggle" test Tighten bolt and recheck.	1	09NOV07	09NOV07	1	0		1,602.20			EM//TB =20hr ;						
S21-5.11		Meas tooling balls both coils.	5	12NOV07	16NOV07	1	0		0.00			ZMET =100 ;						
S21-5.12		Adjust shims locally. Re-torque all studs to 50%	3	19NOV07	21NOV07	1	0		4,806.60			EM//TB =60hr ;						
S21-5.14		Install A-A locator bushings	2	22NOV07	23NOV07	1	0		3,204.40			EM//TB =40hr ;						
S21-5.15		Remove studs,nuts,shims. Identify shim locations	1	26NOV07	26NOV07	1	0		1,602.20			EM//TB =20hr ;						
A-B Assembly																		
S21-6.01		Place Type A "A" side down. Obtain fiduals	2	27NOV07	28NOV07	1	0		3,204.40			EM//TB =40hr ;						
S21-6.02		Align to the conical seats locking into 8.	1	03DEC07	03DEC07	1	0		0.00			ZMET =20 ;						
S21-6.03		Meas monuments on fixture & walls.	2	04DEC07	05DEC07	1	0		0.00			ZMET =40 ;						
S21-6.04		Place the an initial set shims on coil	2	06DEC07	07DEC07	1	0		3,204.40			EM//TB =40hr ;						
S21-6.041		Stuff shim bag w/fiberglass & place on wing	1	10DEC07	10DEC07	1	0		400.55			EM//TB =05hr ;						
S21-6.05		Lower the Type-B coil onto the Type-A coil.	1	11DEC07	11DEC07	1	0		1,602.20			EM//TB =20hr ;						

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted								
										FY07	FY08	FY09	FY10	FY11	FY12		
S21-6.06		Measure monuments on A coil. Jack to .002"	1	12DEC07	12DEC07	1	0		1,602.20		EM//TB =20hr ;						
S21-6.061		instl dial indicators for x-y positioning	1	13DEC07	13DEC07	1	0		1,602.20		EM//TB =20hr ;						
S21-6.07		Perform the X-Y positioning of the B coil.	1	14DEC07	14DEC07	1	0		1,602.20		EM//TB =20hr ;						
S21-6.08		Install remaining metal shims torque to 50%	2	17DEC07	18DEC07	1	0		3,204.40		EM//TB =40hr ;						
S21-6.09		Make "wiggle" test Tighten bolt and recheck.	1	19DEC07	19DEC07	1	0		1,602.20		EM//TB =20hr ;						
S21-6.1		Measure the tooling balls on both coils.	5	20DEC07	04JAN08	1	0		0.00		ZMET =100 ;						
S21-6.11		Loosen studs, adjust shims. Re-torque to 50%.	3	07JAN08	09JAN08	1	0		4,806.60		EM//TB =60hr ;						
S21-6.12		Install alumina shims. Re-torque to 50%.	1	10JAN08	10JAN08	1	0		1,602.20		EM//TB =20hr ;						
S21-6.13		Make "wiggle" test Tighten bolt and recheck.	1	11JAN08	11JAN08	1	0		1,602.20		EM//TB =20hr ;						
S21-6.14		Measuretooling balls . The max devi .007" .	5	14JAN08	18JAN08	1	0		0.00		ZMET =100 ;						
S21-6.15		Loosen studs, adjust shims. Re-torque to 50%.	3	21JAN08	23JAN08	1	0		4,806.60		EM//TB =60hr ;						
S21-6.16		Install bushings. Tighten back to 50%	10	24JAN08	06FEB08	1	0		16,022.00		EM//TB =200hr ;						
S21-6.17		Complete tightening of flange bolts to 100%.	1	07FEB08	07FEB08	1	0		1,602.20		EM//TB =20hr ;						
S21-6.18		Measuretooling balls . The max devi .007" .	2	08FEB08	11FEB08	1	0		0.00		ZMET =40 ;						
S21-6.19		Scan the "B" flange of Type-B coil	1	12FEB08	12FEB08	1	0		1,602.20		EM//TB =20hr ;						
AB - C Assembly																	
S21-7.01		Place "A/B" assy, "A" coil dwn, on 40deg fix.	3	13FEB08	15FEB08	1	0		4,806.60		EM//TB =60hr ;						
S21-7.02		Align to the conical seats locking into a min of	1	18FEB08	18FEB08	1	0		0.00		ZMET =20 ;						
S21-7.03		Measure the monuments on the fixture & the walls	2	19FEB08	20FEB08	1	0		0.00		ZMET =40 ;						
S21-7.04		Place initial set metal shims on the coil	2	21FEB08	22FEB08	1	0		3,204.40		EM//TB =40hr ;						
S21-7.05		Lower the Type-C coil onto the Type-B coil.	1	25FEB08	25FEB08	1	0		1,602.20		EM//TB =20hr ;						
S21-7.06		Meas monuments on A coil to eval displacement.	1	26FEB08	26FEB08	1	0		0.00		ZMET =20 ;						
S21-6.062		instl dial indicators for x-y positioning	1	27FEB08	27FEB08	1	0		1,602.20		EM//TB =20hr ;						
S21-7.07		Perform the X-Y positioning of the coil.	1	28FEB08	28FEB08	1	0		1,602.20		EM//TB =20hr ;						
S21-7.08		Install remaining metal shims torque to 50%	2	29FEB08	03MAR08	1	0		3,204.40		EM//TB =40hr ;						
S21-7.09		"wiggle" test Tighten bolt and recheck.	1	04MAR08	04MAR08	1	0		1,602.20		EM//TB =20hr ;						
S21-7.1		Measure the tooling balls on all coils.	5	05MAR08	11MAR08	1	0		0.00		ZMET =100 ;						
S21-7.11		adjust shims locally. Re-torque all studs to 50%	3	12MAR08	14MAR08	1	0		4,806.60		EM//TB =60hr ;						
S21-7.12		linstall alumina shims. Re-torque all studs to	1	17MAR08	17MAR08	1	0		1,602.20		EM//TB =20hr ;						
S21-7.13		"wiggle" test Tighten bolt and recheck.	1	18MAR08	18MAR08	1	0		1,602.20		EM//TB =20hr ;						
S21-7.14		Measure the tooling balls on all coils.	5	19MAR08	25MAR08	1	0		8,011.00		EM//TB =100hr ;						
S21-7.15		adjust shims locally. Re-torque all studs to 50	3	26MAR08	28MAR08	1	0		4,806.60		EM//TB =60hr ;						
S21-7.16		Install bushings	10	31MAR08	11APR08	1	0		16,022.00		EM//TB =200hr ;						
S21-7.17		Complete tightening of flange bolts to 100%.	1	14APR08	14APR08	1	0		1,602.20		EM//TB =20hr ;						
S21-11.01		Identify primary fiducials for positioning Sta 3	1	15APR08	15APR08	1	0		1,602.20		EM//TB =20hr ;						
S21-7.18		Final metrology meas. Scan "B" flangeType-C coil	5	16APR08	22APR08	1	0		0.00		ZMET =100 ;						
Tack Weld Inboard Welded hims																	
S21-8.01		Tack weld inboard shims	2	23APR08	24APR08	1	0		3,204.40		EM//TB =40hr ;						

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted							
										FY07	FY08	FY09	FY10	FY11	FY12	
Complete Local Service & interface details																
S21-10.01		Install all wing support bladders	2	25APR08	28APR08	1	6		3,204.40							
S21-10.02		Make local service runs/connections	8	25APR08	06MAY08	1	0		12,817.60							
S21-10.03		Inject stycast in all shim spaces	1	25APR08	25APR08	1	7		1,602.20							
Final Measurements/Transfer to Holding Area																
DOE-1		Notify DOE of scheduled station 3 lifts	0		27MAR08	1	0		0.00							
DOE-2		DOE review lift procedures	30	28MAR08	08MAY08	1	0		0.00							
DOE-3		DOE approval of scheduled station 3 lifts	0		08MAY08	1	0		0.00							
S21-11.03		Measure bolt length on all tension fasteners	0	09MAY08	08MAY08	1	0		0.00							
S21-11.04		Mark part for identification	0	09MAY08	08MAY08	1	0		0.00							
S21-11.05		Install lift support beams	2	07MAY08	08MAY08	1	0		3,204.40							
S21-11.06		Remove from stand & measure weight of assy	1	09MAY08	09MAY08	1	0		1,602.20							
S21-11.07	2	Move A1-B1-C1 to holding area.	0	12MAY08	09MAY08	1	0		0.00							
Station 2 MC Sub Assy A2-B2-C2																
A-B Assembly																
S22-6.01		A2 "A" flange dwn, 20deg fixt.Obtain fiduci	1	13FEB08	13FEB08	1	4		1,602.20							
S22-6.02		Align to the conical seats locking into a min of	1	14FEB08	14FEB08	1	4		0.00							
S22-6.03		Measure monuments on fixture and on the walls.	2	15FEB08	18FEB08	1	4		0.00							
S22-6.04		Place alumina grind inboard weld shims on coil.	2	19FEB08	20FEB08	1	4		3,204.40							
S22-6.05		Lower the Type-B coil onto the Type-A coil.	1	21FEB08	21FEB08	1	4		1,602.20							
S22-6.06		Meas monuments on A coil. Jack to within .002"	1	22FEB08	22FEB08	1	4		0.00							
S22-6.07		Perform the X-Y positioning of the B coil.	1	25FEB08	25FEB08	1	4		0.00							
S22-6.08		Install studs, supernuts, torque to 50% of final	2	26FEB08	27FEB08	1	4		3,204.40							
S22-6.09		"wiggle" test Tighten bolt and recheck.	1	28FEB08	28FEB08	1	4		1,602.20							
S22-6.1		Meas tooling balls on both coils. max devi .007"	5	29FEB08	06MAR08	1	4		0.00							
S22-6.11		adjust shims locally. Re-torque all studs to 50%	3	07MAR08	11MAR08	1	4		4,806.60							
S22-6.12		Install bushings	10	12MAR08	25MAR08	1	4		16,022.00							
S22-6.13		Complete tightening of flange bolts to 100%.	1	26MAR08	26MAR08	1	4		1,602.20							
S22-6.14		Measure the tooling balls on both coils.	3	27MAR08	31MAR08	1	4		0.00							
S22-6.15		Scan the "B" flange of Type-B coil	1	01APR08	01APR08	1	4		1,602.20							
AB - C Assembly																
S22-7.01		"A/B" assy "A" coil dwn, 40deg fixt.Obtain fiduc	2	02APR08	03APR08	1	4		3,204.40							
S22-7.02		Align to the conical seats locking into min of 8	1	04APR08	04APR08	1	4		0.00							
S22-7.03		Measure monuments on fixture and walls.	2	07APR08	08APR08	1	4		0.00							
S22-7.04		Place alumin grind inboard weld shims on coil.	2	09APR08	10APR08	1	4		3,204.40							
S22-7.05		Lower the Type-C coil onto the Type-B coil.	1	11APR08	11APR08	1	4		1,602.20							
S22-7.06		Meas monuments on A coil for displacements.	1	14APR08	14APR08	1	4		0.00							
S22-7.07		Perform the X-Y positioning of the coil.	1	15APR08	15APR08	1	4		1,602.20							
S22-7.08		Install studs, supernuts, torque to 50% of fina	2	16APR08	17APR08	1	4		3,204.40							

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted	Fiscal Year						
										FY07	FY08	FY09	FY10	FY11	FY12	
S22-7.09		"wiggle" test Tighten bolt and recheck.	1	18APR08	18APR08	1	4		1,602.20							
S22-7.1		Measure the tooling balls on all coils.	5	21APR08	25APR08	1	4		0.00							
S22-7.11		Install bushings Replace nut and tighten to 50%	10	28APR08	09MAY08	1	4		16,022.00							
S22-7.12		Complete tightening of flange bolts to 100%.	1	12MAY08	12MAY08	1	4		1,602.20							
S22-7.13		Measure the tooling balls on both coils.	4	13MAY08	16MAY08	1	4		0.00							
Tack Weld Inboard Welded hims																
S22-8.01		Tack weld all inboard shims to one flange	1	19MAY08	19MAY08	1	4		1,602.20							
Complete Local Service & interface details																
S22-10.01		Install all wing support bladders	2	20MAY08	21MAY08	1	4		3,204.40							
S22-10.02		local service connections on each MC.	8	22MAY08	03JUN08	1	4		12,817.60							
S22-10.03		Inject stycast to fill in all shim spaces	1	04JUN08	04JUN08	1	4		1,602.20							
Final Measurements/Transfer to Holding Area																
S22-11.01		Install or identify three primary fiducials	1	05JUN08	05JUN08	1	4		1,602.20							
S22-11.02		Final metrology measurement of all fiducials.	5	06JUN08	12JUN08	1	4		0.00							
S22-11.03		Tension tester measure bolt length	1	13JUN08	13JUN08	1	4		801.10							
S22-11.04		Mark part for identification	0	16JUN08	13JUN08	1	4		0.00							
S22-11.05		Install lift support beams	2	16JUN08	17JUN08	1	4		3,204.40							
S22-11.06	3	Remove from stand Move A2-B2-C2 to holding area	2	18JUN08	19JUN08	1	4		3,204.40							
Station 2-Modular Coil Subassembly-FP#2																
S23-A3B3C3		Assemble/Align Mod-Coils A3/B3/C3	140	12MAY08	26NOV08	1	0		171,696.21							
S24-A4B4C4		Assemble/Align Mod-Coils A4/B4/C4	97	03JUL08	18NOV08	1	16		108,078.85							
Station 2-Modular Coil Subassembly-FP#3																
S25-A5B5C5		Assemble/Align Mod-Coils A5/B5/C5 (under 1 shift)	86	07OCT08*	16FEB09	1	5		125,174.28							
S25A5B5C52		Assemble/Align Mod-Coils A5/B5/C5 (under 2 shift)	20	17FEB09*	16MAR09	2	5		50,053.22							
S26-A6B6C6		Assemble/Align Mod-Coils A6/B6/C6	36	23DEC08*	19FEB09	1	4		56,732.48							
S26A6B6C62		Assemble/Align Mod-Coils A6/B6/C6	24	20FEB09*	25MAR09	2	4		53,351.62							
Station 3 Setup/Preparations/General																
R1810-3102		Misc M&S	65	03APR08*	03JUL08	1	1,060		6,540.00							
R1810-3104		Procure 3 legged actuator system	20	01OCT07*	26OCT07	1	134		56,244.00							
R1810-3106		Load test 3 ledged actuator system	3	29OCT07	31OCT07	1	134		7,690.56							
R1810-3108		Procure ,Fabricate 3 legged actuator lift fixtur	20	01OCT07*	26OCT07	1	129		7,848.00							
R1810-3112		Load Test 3 legged actuator lift fixtur	8	29OCT07	07NOV07	1	129		10,254.08							
R1810-3150		Fab New legs	4	01OCT07*	04OCT07	1	143		5,127.04							
R1810-3103		Install station 3 platforms (8 required)	4	20NOV07	23NOV07	1	111		22,052.32							
R1810-3107		Test out station 3 equipment and procedures	4	26NOV07	03DEC07	1	111		13,080.00							
R1810-3109		Begin assy of first field period assy	2	04DEC07	05DEC07	1	111		52,320.00							

Run Date 18JUL07 07:31

ETCZ

NCSX Project
Resource Loaded Schedule
EAC

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Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted							
										FY07	FY08	FY09	FY10	FY11	FY12	
Station 3-Assemble Mod Coils and VVSA-FP#1																
R1810-2109		Begin Station 3	0	03MAR08*		1	56		0.00							
S31-1.01		Install Station 3 site monuments	3	03MAR08	05MAR08	1	56		7,422.60							
S31-1.02		Install floor mounted tracks and VV base support	5	06MAR08	12MAR08	1	56		9,319.00							
S31-1.03		Establish the MCHP CG location.	2	13MAR08	14MAR08	1	56		3,204.40							
S31-2.01		Install MCHP support cart assemblies	4	17MAR08	20MAR08	1	56		6,408.80							
S31-2.02		Verify cart motion.	2	21MAR08	24MAR08	1	56		3,204.40							
S31-2.03		Install adjustor bar support weldment	0	25MAR08	24MAR08	1	56		0.00							
S31-2.04		Position left MCHP on the cart assembly	1	12MAY08	12MAY08	1	22		1,602.20							
S31-2.05		Secure left MCHP on support cart base.	2	13MAY08	14MAY08	1	22		3,204.40							
S31-2.06		Measure monuments on left MCHP and walls	5	15MAY08	21MAY08	1	22		0.00							
S31-2.07		Set positioning stop on the cart	1	22MAY08	22MAY08	1	22		1,602.20							
S31-3.01		Move right base support cart to its final positi	1	23MAY08	23MAY08	1	22		801.10							
S31-3.02		Lift the right side MCHP and position	1	20JUN08	20JUN08	1	4		1,602.20							
S31-3.03		Temporary fasteners bring the parts together.	0	23JUN08	20JUN08	1	4		0.00							
S31-3.04		AirLoc Wedgemount leveler to take load.	0	23JUN08	20JUN08	1	4		0.00							
S31-3.05		Install temp scaffolding to install flange hw	1	23JUN08	23JUN08	1	4		1,602.20							
S31-3.06		Install bolts and shims	1	24JUN08	24JUN08	1	4		1,602.20							
S31-3.07		Tighten flange fasteners to 50%	1	25JUN08	25JUN08	1	4		1,602.20							
S31-3.08		Perform metrology measurements	5	26JUN08	02JUL08	1	4		0.00							
S31-3.09		Perform position adjust on right side MCHP	2	03JUL08	07JUL08	1	4		3,204.40							
S31-3.1		Verify position of the VV support hanger	3	08JUL08	10JUL08	1	4		0.00							
S31-3.11		Remove flange hardware and temp platforms	1	11JUL08	11JUL08	1	4		1,602.20							
S31-4.01		EMeasure monuments on the MCHP's & walls.	2	14JUL08	15JUL08	1	4		2,616.00							
S31-4.02		Place all of the laser screens	2	16JUL08	17JUL08	1	4		3,204.40							
S31-4.03		Determine laser alignment.	1	18JUL08	18JUL08	1	4		1,602.20							
S31-4.04		mount the milar on the screens.	1	21JUL08	21JUL08	1	4		0.00							
S31-4.05		Disengage MCHP's to move the left MCHP.	1	22JUL08	22JUL08	1	4		1,602.20							
S31-4.06		Remove both MCHP's.	2	23JUL08	24JUL08	1	4		3,204.40							
S31-5.01		Remove the adjustor bar support from left side.	0	25JUL08	24JUL08	1	4		0.00							
S31-5.02		Install VV NBI port support stand.	2	25JUL08	28JUL08	1	4		3,204.40							
S31-5.03		Install VVSA to base support	1	29JUL08	29JUL08	1	4		1,602.20							
S31-5.04		Secure the VVSA to base & NBI port sprt stand.	2	30JUL08	31JUL08	1	4		3,204.40							
S31-6.01		Install bumper protection components on the VV	1	01AUG08	01AUG08	1	4		801.10							
S31-6.02		Position AirLoc Wedgemount in lower position.	0	04AUG08	01AUG08	1	4		0.00							
S31-6.03		move the left MCHP over the VV.	2	04AUG08	05AUG08	1	4		3,204.40							
S31-6.04		Re-install the left adjustor bar.	0	06AUG08	05AUG08	1	4		0.00							
S31-6.05		Make adjustments to properly align MCHP.	2	06AUG08	07AUG08	1	4		3,204.40							



|41=02\$K ; EM/TB =60hr ;
 |41=01\$K ; EM/TB =100hr ;
 |EM/TB =40hr ;
 |EM/TB =80hr ;
 |EM/TB =40hr ;
 |EM/TB =00hr ;
 |EM/TB =20hr ;
 |EM/TB =40hr ;
 |EM/TB =00hr ; ZMET =100 ;
 |EM/TB =20hr ;
 |EM/TB =10hr ;
 |EM/TB =20hr ;
 |EM/TB =00hr ;
 |EM/TB =00hr ;
 |EM/TB =20hr ;
 |EM/TB =20hr ;
 |EM/TB =20hr ;
 |EM/TB =00hr ; ZMET =100 ;
 |EM/TB =40hr ;
 |EM/TB =00hr ; ZMET =60 ;
 |EM/TB =20hr ;
 |EM/TB =00hr ; ZMET =40 ;41=2k
 |EM/TB =40hr ;
 |EM/TB =20hr ;
 |EM/TB =40hr ;
 |EM/TB =10hr ;
 |EM/TB =00hr ;
 |EM/TB =40hr ;
 |EM/TB =00hr ;
 |EM/TB =40hr ;

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted	Fiscal Year						
										FY07	FY08	FY09	FY10	FY11	FY12	
S31-6.06		Transfer load to the AirLoc Wedgemount leveler.	0	08AUG08	07AUG08	1	4		0.00							
S31-6.07		move the MCHP to the left 1/2".	0	08AUG08	07AUG08	1	4		0.00							
S31-7.01		Position AirLoc Wedgemount lowered position.	0	08AUG08	07AUG08	1	4		0.00							
S31-7.02		move the right MCHP over the VV	2	08AUG08	11AUG08	1	4		3,204.40							
S31-7.03		move the left MCHP to its final position.	1	12AUG08	12AUG08	1	4		801.10							
S31-7.04		engage the preinstalled Type-A flange bushings.	1	13AUG08	13AUG08	1	4		801.10							
S31-7.05		Temporary fasteners bring the parts together.	0	14AUG08	13AUG08	1	4		0.00							
S31-7.06		AirLoc Wedgemount leveler up to take the load.	1	14AUG08	14AUG08	1	4		801.10							
S31-7.07		Remove laser screens	0	15AUG08	14AUG08	1	4		0.00							
S31-7.08		Install temp scaffolding to install flange hw	4	15AUG08	20AUG08	1	4		6,408.80							
S31-7.09		Install bolts, alumina and inboard weld shims.	2	21AUG08	22AUG08	1	4		3,204.40							
S31-7.1		Tighten flange fasteners to 50%	1	25AUG08	25AUG08	1	4		1,602.20							
S31-7.11		"wiggle" test Tighten bolt and recheck.	1	26AUG08	26AUG08	1	4		1,602.20							
S31-7.12		Perform metrology measurements	5	27AUG08	03SEP08	1	4		0.00							
S31-7.13		Perform position adjustments right side MCHP	3	04SEP08	08SEP08	1	4		4,806.60							
S31-7.14		Remove SISSCO actuator from right MCHP.	0	09SEP08	08SEP08	1	4		0.00							
S31-7.15		Pre-fit & Install bushings	10	28AUG08	11SEP08	1	4		16,022.00							
S31-7.16		Tighten nuts 100%. & Measure	1	12SEP08	12SEP08	1	4		1,602.20							
S31-8.01		partially weld the inboard shim.	15	15SEP08	03OCT08	1	4		24,174.00							
S31-8.02		Final complete MC scan verify period alignment.	5	06OCT08	10OCT08	1	4		0.00							
S31-9.01		Attach VV permanent vertical supports	2	13OCT08	14OCT08	1	4		3,298.40							
S31-9.02		Attach temporary VV vertical supports	1	15OCT08	15OCT08	1	4		1,649.20							
S31-9.03		Transfer load to vertical supports.	1	16OCT08	16OCT08	1	4		1,649.20							
S31-9.04		Install VV lateral supports and align	4	17OCT08	22OCT08	1	4		6,596.80							
S31-9.05		Prepare VVSA for transport.	2	23OCT08	24OCT08	1	4		3,298.40							
S31-10.01		transfer the unit to the transfer support frame	2	27OCT08	28OCT08	1	4		6,596.80							
S31-10.02	2	Transfer Period 1 to Station 5 in NCSX TC	1	29OCT08	29OCT08	1	4		3,298.40							
Station 3-Assemble Mod Coils and VVSA-FP#2																
S32-1.01		Install Station 3 site monuments	3	30OCT08	03NOV08	1	4		7,741.60							
S32-1.02		Install floor mounted tracks and VV base support	5	04NOV08	10NOV08	1	4		9,643.00							
S32-1.03		Establish the MCHP CG location.	2	11NOV08	12NOV08	1	4		3,298.40							
S32-2.01		Install MCHP support cart assemblies	4	13NOV08	18NOV08	1	4		6,596.80							
S32-2.02		Verify cart motion.	2	19NOV08	20NOV08	1	4		3,298.40							
S32-2.03		Install adjustor bar support weldment	0	21NOV08	20NOV08	1	4		0.00							
S32-2.04		Position left MCHP on the cart assembly	1	01DEC08	01DEC08	1	0		1,649.20							
S32-2.05		Secure left MCHP on support cart base.	2	02DEC08	03DEC08	1	0		3,298.40							
S32-2.06		Measure monuments on left MCHP and walls	5	04DEC08	10DEC08	1	0		0.00							
S32-2.07		Set positioning stop on the cart	1	11DEC08	11DEC08	1	0		1,649.20							

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmlpt	Proposed Budgeted								
										FY07	FY08	FY09	FY10	FY11	FY12		
S32-7.11		"wiggle" test Tighten bolt and recheck.	1	11FEB09	11FEB09	2	0		1,649.20			EM/TB =20hr ;					
S32-7.12		Perform metrology measurements	2	12FEB09	13FEB09	2	0		0.00			EM/TB =00hr ; ZMET =100 ;					
S32-7.13		Perform position adjustments right side MCHP	2	16FEB09	17FEB09	2	0		4,947.60			EM/TB =60hr ;					
S32-7.14		Remove SISSCO actuator from right MCHP.	0	18FEB09	17FEB09	2	0		0.00			EM/TB =00hr ;					
S32-7.15		Pre-fit & Install bushings	5	12FEB09	18FEB09	2	0		16,492.00			EM/TB =200hr ;					
S32-7.16		Tighten nuts 100%. & Measure	1	19FEB09	19FEB09	2	0		1,649.20			EM/TB =20hr ;					
S32-8.01		partially weld the inboard shim.	4	20FEB09	25FEB09	2	0		24,738.00			EM/TB =300hr ;					
S32-8.02		Final complete MC scan verify period alignment.	2	26FEB09	27FEB09	2	0		0.00			EM/TB =00hr ; ZMET =100 ;					
S32-9.01		Attach VV permanent vertical supports	1	02MAR09	02MAR09	2	0		3,298.40			EM/TB =40hr ;					
S32-9.02		Attach temporary VV vertical supports	1	03MAR09	03MAR09	2	0		1,649.20			EM/TB =20hr ;					
S32-9.03		Transfer load to vertical supports.	1	04MAR09	04MAR09	2	0		1,649.20			EM/TB =20hr ;					
S32-9.04		Install VV lateral supports and align	2	05MAR09	06MAR09	2	0		6,596.80			EM/TB =80hr ;					
S32-9.05		Prepare VVSA for transport.	1	09MAR09	09MAR09	2	0		3,298.40			EM/TB =40hr ;					
S32-10.01		transfer the unit to the transfer support frame	1	10MAR09	10MAR09	2	0		6,596.80			EM/TB =80hr ;					
S32-10.02	2	Transfer Period 2 to Station 5 in NCSX TC	1	11MAR09	11MAR09	2	0		3,298.40			EM/TB =40hr ;					
Station 3-Assemble Mod Coils and VVSA-FP#3																	
S33-1.01		Install Station 3 site monuments	2	12MAR09	13MAR09	2	0		7,741.60			41=02\$K ; EM/TB =60hr ;					
S33-1.02		Install floor mounted tracks and VV base support	2	16MAR09	17MAR09	2	0		9,643.00			41=01\$K ; EM/TB =100hr ;					
S33-1.03		Establish the MCHP CG location.	1	18MAR09	18MAR09	2	0		3,298.40			EM/TB =40hr ;					
S33-2.01		Install MCHP support cart assemblies	2	19MAR09	20MAR09	2	0		6,596.80			EM/TB =80hr ;					
S33-2.02		Verify cart motion.	1	23MAR09	23MAR09	2	0		3,298.40			EM/TB =40hr ;					
S33-2.03		Install adjustor bar support weldment	0	24MAR09	23MAR09	2	0		0.00			EM/TB =00hr ;					
S33-2.04		Position left MCHP on the cart assembly	1	24MAR09	24MAR09	2	0		1,649.20			EM/TB =20hr ;					
S33-2.05		Secure left MCHP on support cart base.	1	25MAR09	25MAR09	2	0		3,298.40			EM/TB =40hr ;					
S33-2.06		Measure monuments on left MCHP and walls	2	26MAR09	27MAR09	2	0		0.00			EM/TB =00hr ; ZMET =100 ;					
S33-2.07		Set positioning stop on the cart	1	30MAR09	30MAR09	2	0		1,649.20			EM/TB =20hr ;					
S33-3.01		Move right base support cart to its final positi	1	31MAR09	31MAR09	2	0		824.60			EM/TB =10hr ;					
S33-3.02		Lift the right side MCHP and position	1	01APR09	01APR09	2	0		2,473.80			EM/TB =30hr ;					
S33-3.03		Temporary fasteners bring the parts together.	0	02APR09	01APR09	2	0		0.00			EM/TB =00hr ;					
S33-3.04		AirLoc Wedgemount leveler to take load.	0	02APR09	01APR09	2	0		0.00			EM/TB =00hr ;					
S33-3.05		Install temp scaffolding to install flange hw	1	02APR09	02APR09	2	0		1,649.20			EM/TB =20hr ;					
S33-3.06		Install bolts and shims	1	02APR09	02APR09	2	0		1,649.20			EM/TB =20hr ;					
S33-3.07		Tighten flange fasteners to 50%	1	03APR09	03APR09	2	0		1,649.20			EM/TB =20hr ;					
S33-3.08		Perform metrology measurements	2	06APR09	07APR09	2	0		0.00			EM/TB =00hr ; ZMET =100 ;					
S33-3.09		Perform position adjust on right side MCHP	1	08APR09	08APR09	2	0		3,298.40			EM/TB =40hr ;					
S33-3.1		Verify position of the VV support hanger	2	09APR09	10APR09	2	0		0.00			EM/TB =00hr ; ZMET =60 ;					
S33-3.11		Remove flange hardware and temp platforms	2	09APR09	10APR09	2	0		1,649.20			EM/TB =20hr ;					
S33-4.01		EMeasure monuments on the MCHP's & walls.	1	13APR09	13APR09	2	0		2,794.00			EM/TB =00hr ; ZMET =40 ; 41=2k					

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmlpt	Proposed Budgeted						
										FY07	FY08	FY09	FY10	FY11	FY12
S33-9.05		Prepare VVSA for transport.	1	04JUN09	04JUN09	2	0		3,298.40						
S33-10.01		transfer the unit to the transfer support frame	1	05JUN09	05JUN09	2	0		6,596.80						
S33-10.02	2	Transfer Period 3 to Station 5 in NCSX TC	1	08JUN09	08JUN09	2	0		3,298.40						
Subtotal			637	01MAY07	13NOV09		718		5,745,510.07						

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmlpt	Proposed Budgeted							
										FY07	FY08	FY09	FY10	FY11	FY12	
Job: 1815 - Field Period Assy -Station 5-VIOLA																
Setup/Preparations/General																
R1810-5101		MTM NCR hardware re-purchase	25	01JUL08*	05AUG08	1	42		54,936.00	■41=42\$K ;						
R1810-5102		Monuments,reflectors,CCR's	10	01JUL08*	15JUL08	1	47		67,689.00	■41=51.75\$K ;						
R1810-5103		metrology network in NCSX TC	10	16JUL08	29JUL08	1	47		21,973.60	■EM//TB =160hr ; 41=07\$K ;						
R1810-5104		Misc for tooling	10	25AUG08*	08SEP08	1	42		0.00							
R1810-5112		Weld wire & welding supplies	25	01JUL08*	05AUG08	1	42		19,620.00	■41=15\$K ;						
R1810-5106		Testout Sta 5 equipt & procedures	5	06AUG08	12AUG08	1	42		12,817.60	■EM//TB =160hr ;						
R1810-5107		Check 3 sled interfaces adjust holes	12	13AUG08	28AUG08	1	42		30,762.24	■EM//TB =384hr ;						
R1810-5108		Fixtures installed-final metrology	6	29AUG08	08SEP08	1	42		15,381.12	■EM//TB =192hr ;						
Station 5- Final FP Assy -FP#1 (in NCSX TC)																
R1810-5109		Begin Station 5 Operations	0		29OCT08	1	5		0.00	▼						
S51-1.01		cut off short dome	2	30OCT08	31OCT08	1	5		3,298.40	■EM//TB =40hr ;						
S51-1.02		Install insulation system around all ports.	0	03NOV08	31OCT08	1	5		0.00	■EM//TB =00hr ;						
S51-1.03		Install heat tape and theomocouples on all ports	0	03NOV08	31OCT08	1	5		0.00	■EM//TB =00hr ;						
S51-2.01		Install period support fixture	2	03NOV08	04NOV08	1	5		3,298.40	■EM//TB =40hr ;						
S51-2.02		Install FPA on support stand.	2	05NOV08	06NOV08	1	5		3,298.40	■EM//TB =40hr ;						
S51-2.03		Install external working platforms	4	07NOV08	12NOV08	1	5		6,596.80	■EM//TB =80hr ;						
S51-2.04		Install internal VV working platforms	3	13NOV08	17NOV08	1	5		4,947.60	■EM//TB =60hr ;						
S51-3.01		Install the domes (left and right side),	2	18NOV08	19NOV08	1	5		3,298.40	■EM//TB =40hr ;						
S51-3.02		Install small dome ports remaining circ ports.	30	20NOV08	13JAN09	1	5		49,476.00	■EM//TB =600hr ;						
S51-3.03		Leak check each port after it is welded.	30	15DEC08	03FEB09	1	5		49,476.00	■EM//TB =600hr ;						
S51-4.01		Install boots on ports except for the two port	16	23JAN09	13FEB09	1	5		26,387.20	■EM//TB =320hr ;						
S51-5.01		Install MC lead connections to MC's (in job 7503	0	16FEB09	13FEB09	1	5		0.00							
S51-5.02		Install MC coolant lines on each MC	6	16FEB09	23FEB09	2	5		19,790.40	■EM//TB =240hr ;						
S51-5.03		Platforms may need to be altered	2	24FEB09	25FEB09	2	5		4,947.60	■EM//TB =60hr ;						
S51-6.01		Rotate 2 TF coils over the MC on the right side	1	26FEB09	26FEB09	2	5		3,298.40	■EM//TB =40hr ;						
S51-6.02		Attach the temp support at end of Type-C MC	1	27FEB09	27FEB09	2	5		1,649.20	■EM//TB =20hr ;						
S51-6.03		Lower leveler pad disengage base of MC right sid	0	02MAR09	27FEB09	2	5		0.00	■EM//TB =00hr ;						
S51-6.04		Install TF support brackets	1	02MAR09	02MAR09	2	5		3,298.40	■EM//TB =40hr ;						
S51-6.05		Secure First TF assy	1	03MAR09	03MAR09	2	5		1,649.20	■EM//TB =20hr ;						
S51-6.06		Install TF support brackets	1	04MAR09	04MAR09	2	5		3,298.40	■EM//TB =40hr ;						
S51-6.07		Secure 2nd TF coil	1	05MAR09	05MAR09	2	5		1,649.20	■EM//TB =20hr ;						
S51-6.08		Install machine support plates	1	06MAR09	06MAR09	2	5		4,947.60	■EM//TB =60hr ;						
S51-6.09		Reinstall leveler pad	0	09MAR09	06MAR09	2	5		0.00	■EM//TB =00hr ;						
S51-6.1		Installed one side of the TF support brackets	1	09MAR09	09MAR09	2	5		1,649.20	■EM//TB =20hr ;						
S51-7.01		The TF installation on the left side	7	10MAR09	18MAR09	2	5		21,439.60	■EM//TB =260hr ;						

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted							
										FY07	FY08	FY09	FY10	FY11	FY12	
S51-8.01		Perform a fit-up check of the four TF coils	2	19MAR09	20MAR09	2	5		8,246.00			EM//TB =100hr ;				
S51-9.01		Tack weld the left and right port 4's.	1	23MAR09	23MAR09	2	5		3,298.40			EM//TB =40hr ;				
S51-9.02		Install boots on both port 4's.	2	24MAR09	25MAR09	2	5		6,596.80			EM//TB =80hr ;				
S51-10.01		Install PF coil support structure	4	26MAR09	31MAR09	2	5		13,193.60			EM//TB =160hr ;				
S51-11.01		Install tMC coolant manifold	2	01APR09	02APR09	2	5		4,947.60			EM//TB =60hr ;				
S51-11.02		Connect MC coolant lines to the manifold	10	03APR09	16APR09	2	5		32,984.00			EM//TB =400hr ;				
S51-12.01		Install Rogowski coils	3	17APR09	21APR09	2	5		8,246.00			EM//TB =100hr ;				
S51-13.01		Obtain set of Period 1 align fiducial positions	2	22APR09	23APR09	2	5		0.00			EM//TB =00hr ; ZMET =100 ;				
S51-13.02		align to tooling balls on each MCHP	1	24APR09	24APR09	2	5		0.00			EM//TB =00hr ; ZMET =20 ;				
S51-13.03		bring the VV into proper alignment	2	27APR09	28APR09	2	5		6,596.80			EM//TB =80hr ;				
S51-13.04		Install or identify three primary fiducials	1	29APR09	29APR09	2	5		3,298.40			EM//TB =40hr ;				
S51-13.05		Make a final measurement of all fiducials	2	30APR09	01MAY09	2	5		0.00			EM//TB =00hr ; ZMET =100 ;				
S51-13.11		Check Assembly (bolts, etc)	3	04MAY09	06MAY09	2	5		8,246.00			EM//TB =100hr ;				
S51-13.12		Check Diagnostics (Loops, thermocouples)	2	07MAY09	08MAY09	2	5		8,246.00			EM//TB =100hr ;				
S51-13.13		Check manifolds (pressure, flow, etc.)	3	11MAY09	13MAY09	2	5		8,246.00			EM//TB =100hr ;				
S51-13.14		Check 6 modcoils (voltage etc)	3	14MAY09	18MAY09	2	5		9,895.20			EM//TB =120hr ;				
S51-13.15		Check trim coils (voltage etc)	2	19MAY09	20MAY09	2	5		4,947.60			EM//TB =60hr ;				
S51-13.16		Check TF coils (voltage etc)	3	21MAY09	26MAY09	2	5		9,895.20			EM//TB =120hr ;				
S51-14.01		Install crane rigging to completed Period assy	1	27MAY09	27MAY09	2	5		3,298.40			EM//TB =40hr ;				
S51-14.02		Remove platforms	1	28MAY09	28MAY09	2	5		1,649.20			EM//TB =20hr ;				
S51-14.03	2	Transfer Period 1 to Station 6 in NCSX tTC.	1	29MAY09	29MAY09	2	5		3,298.40			EM//TB =40hr ;				
Station 5- Final FP Assy -FP#2 (in NCSX TC)																
S52-1.01		cut off short dome	2	12MAR09	13MAR09	1	9		3,298.40			EM//TB =40hr ;				
S52-1.02		Install insulation system around all ports.	0	16MAR09	13MAR09	1	9		0.00			EM//TB =00hr ;				
S52-1.03		Install heat tape and theomocouples on all ports	0	16MAR09	13MAR09	1	9		0.00			EM//TB =00hr ;				
S52-2.01		Install period support fixture	2	16MAR09	17MAR09	1	9		3,298.40			EM//TB =40hr ;				
S52-2.02		Install FPA on support stand.	2	18MAR09	19MAR09	1	9		3,298.40			EM//TB =40hr ;				
S52-2.03		Install external working platforms	4	20MAR09	25MAR09	1	9		6,596.80			EM//TB =80hr ;				
S52-2.04		Install internal VV working platforms	3	26MAR09	30MAR09	1	9		4,947.60			EM//TB =60hr ;				
S52-3.01		Install the domes (left and right side),	2	31MAR09	01APR09	1	9		3,298.40			EM//TB =40hr ;				
S52-3.02		Install small dome ports remaining circ ports.	30	02APR09	13MAY09	1	9		49,476.00			EM//TB =600hr ;				
S52-3.03		Leak check each port after it is welded.	30	23APR09	04JUN09	1	9		49,476.00			EM//TB =600hr ;				
S52-4.01		Install boots on ports except for the two port	16	26MAY09	16JUN09	1	9		26,387.20			EM//TB =320hr ;				
S52-5.01		Install MC lead connections on each of the MC's	1	17JUN09	17JUN09	2	9		0.00			EM//TB =00hr ;				
S52-5.02		Install MC coolant lines on each MC	6	18JUN09	25JUN09	2	9		19,790.40			EM//TB =240hr ;				
S52-5.03		Platforms may need to be altered	1	26JUN09	26JUN09	2	9		4,947.60			EM//TB =60hr ;				
S52-6.01		Rotate 2 TF coils over the MC on the right side	1	29JUN09	29JUN09	2	9		3,298.40			EM//TB =40hr ;				
S52-6.02		Attach the temp support at end of Type-C MC	1	30JUN09	30JUN09	2	9		1,649.20			EM//TB =20hr ;				

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted	Fiscal Year											
										FY07	FY08	FY09	FY10	FY11	FY12						
S53-14.01		Install crane rigging to completed Period assy	1	11NOV09	11NOV09	2	0		3,410.40							EM/TB =40hr ;					
S53-14.02		Remove platforms	1	12NOV09	12NOV09	2	0		1,705.20							EM/TB =20hr ;					
S53-14.03		Transfer Period 3 to Station 6 in NCSX tTC.	1	13NOV09	13NOV09	2	0		3,410.40							EM/TB =40hr ;					
R1810-5333		Last field period assembled	0		13NOV09	2	0		0.00												
Subtotal			345	01JUL08	13NOV09		0		1,334,540.63												