

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												
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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Parallel ops for sta 2																																		
															K\$	FTE																		
TASK DESCRIPTION															4IMS	3STFK	3STRVL	3HOT	ORNL	EM/DSN	SHTB	EMEM	EMSM	EMSB	EMTB	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	1.00	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
															K\$	Hours																		

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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 vs1	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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Parallel ops for sta 2													
Station 2 Trials													
	Trial tensioning test on prototype	2.0	\$ 3.0K								40	2.5	checked with primavera
	Trial bushing and shim test on prototype	12.0	\$ 2.0K								240	2.5	checked with primavera
	Bushing test B-C	7.0									112	2.0	checked with primavera
	Alignment mechanisms, metro equip & positioning	6.0	\$ 40.0K								120	2.5	checked with primavera
	Procure alignment mechanisms, fiducials, lifting	20.0	\$ 25.0K								400	2.5	checked with primavera
	Consulting support for NOSE WELDING	loe	\$ 70.0K										Perform welding trials and procure EWI and Bob Parcels support.
	Determine fiducial types&locations	11.0	\$ 2.0K								220	2.5	checked with primavera
	Procure monuments&related metrology equipment	15.0	\$ 15.0K								300	2.5	checked with primavera
INTRF-001	PPPL buy SS plate for weld trials	10									31		checked with primavera
INTRF-035	PPPL Determine shim material	23					40						checked with primavera
PHIL-04	water jet cut shims for A/B flange weld test	3									24		
PHIL-05	solution anneal shims (note: shims not ground).	1						8					
PHIL-06	assemble shims&flanges;grind relief in flanges	3									48		
PHIL-07	weld & monitor distortion; improvise clamping	3									48		
PHIL-11	Mount A6 on angle plate	1									16		
PHIL-12	Weld fiducials on A6 & B6	2									32		
PHIL-13	Measure A6 casting	2									0		
PHIL-15	Remove A6 & lower & grout wedge	4									64		
PHIL-16	Re-mount A6 on wedge	2									32		
PHIL-17	Re-measure A6	2									0		
PHIL-18	Measure B6 on wedge	2									32		
PHIL-19	Place B6 on A6; Meas B6 casting use A6 as base	2									0		
PHIL-21	Prepare angle plate dogs & chocks	4									64		
PHIL-22	Water jet cut outboard 0.5" stk 316 SS shims	4									32		
PHIL-23	Water jet cut inboard 0.625 316 SS	3									24		
PHIL-24	Assemble castings,align torque&meas inbd. shims	4									64		
PHIL-27	Solution anneal shims	2						16					
PHIL-32	Align castings	2									32		
PHIL-33	Fit&install bushings 25% stock, 25% eccentric	5									80		
PHIL-34	Weld procedure/weld qual.	7									56		
PHIL-36	Install strain gauges	5						40					
PHIL-37	Set up dial ind., CMM, transit system	5									40		
PHIL-38	Install all shims and adjust bushings	2									32		
PHIL-39	Final align and baseline measurements	3									72		
PHIL-40	Perform 25% of welding & measure	2									32		
PHIL-41	Perform 50% of welding & measure	2									32		
PHIL-42	Perform 75% of welding & measure	2									32		
PHIL-43	finish welding & measure	2									32		
PHIL-25	Purchase (2) grinding machines	45	40.00										
PHIL-26	Grind inbd. Shims to thickness (outside shop)	4	1.00										
PHIL-30	Zenex - fabricate eccentric bushings	5	1.30										
	Hardware rework (1/2 FTE)	120.0	\$ 10.0K								960	1.0	MISC LOE SUPPORT
Station 2 Setup													
	Misc Hardware		\$ 5.0K										checked with primavera
	Test out equip & procedures	7.0									140	2.5	checked with primavera
	Receive drawings and hardware (shims and bolts)	7.0									140	2.5	checked with primavera
3.00	Shim sizing / preparations												checked with primavera
3.01	Using flange measurement of the coils, define the A/A and A/B shim thickness.												checked with primavera
Back Office													

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	Assumes 5 day workweek 1 shift no overtime											
	Parallel ops for sta 5 (2 fixtures available)											
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	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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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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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												
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												
2.04 Using the SISSCO crane, position left MCHP on the cart assembly												
1.0												
20 2.5												
2.05 Secure left MCHP at three location to vertical support posts on support cart base.												
2.0												
40 2.5												
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												
3.00 Pre-assemble right MCHP												
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												
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												
3.03 Temporary fasteners located adjacent to the alignment bushings can be used to help bring the parts together.												
0.0												
0 2.5												
3.04 While held by the crane bring the AirLoc Wedgemount leveler up to take the load.												
0.0												
0 2.5												
3.05 Install temporary scaffolding to install flange hardware												
1.0												
20 2.5												
3.06 Install bolts and shims as needed for assembly tolerances.												
1.0												
20 2.5												
3.07 Tighten flange fasteners to 50%												
1.0												
20 2.5												
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												
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												

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Parallel ops for sta 5 (2 fixtures available)															
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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

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											
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
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

NCSX June 2007 ETC
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Job Numbers: 1802, 1810, and 1815																
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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	

