

NCSX Work Approval Form (WAF)

WBS Number: 181

WBS Title: FPA Planning & Design

Job Number: 1806

Job Title: FPA Specs & Drawings

Job Manager: Mike Cole

Description:

This WBS element includes preparation of the specifications and assembly drawings in support of the assembly of the stellarator core field periods in the TFTR Test Cell and NCSX 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: 181
WBS Title: FPA Planning & Design
Job Number: 1806
Job Title: FPA Specs & Drawings
Job Manager: Mike Cole

Description:

Task ID	HOURS			Basis of Estimate
	ORNL EM	ORNL DSN	RM3	
Pro-E models	600			Assumed 10 models (see details below). Estimate based on past experience on preparing specifications and drawings for equipment of this size and technical difficulty.
Assembly Drawings	1680			Assumed 3 assy drawings (see details below). Estimate based on past experience on preparing specifications and drawings for equipment of this size and technical difficulty.
Detailed Drawings	520			Assumed 3 detail drawings (see details below). Estimate based on past experience on preparing specifications and drawings for equipment of this size and technical difficulty.
Electrical Schematic				Electrical schematic will be part of the Coil services WBS12
I&C Schematic				Any instrumentation for the Machine will be part of the the specific WBS element and not this WBS
Stress Analysis				Any analysis required for the Machine will be included will be part of the the specific WBS element and not this WBS
Thermal Analysis				Any analysis required for the Machine will be included will be part of the the specific WBS element and not this WBS
Special Analysis				Any analysis required for the Machine will be included will be part of the the specific WBS element and not this WBS
Specifications	960			Assumed 6 specifications (see details below). Estimate based on past experience on preparing specifications and drawings for equipment of this size and technical difficulty.
Design Reviews	320			Hrs for the design reviews are shown below one FDR and one for undefined reviews
meetings/reporting/presentations	612			
Total Hrs	4692			Assumed 15% of the above
Title III Design in Jobs 1802 (PFA) and Job 1451 (MC Winding)				
<i>Subtotal Title III Design</i>	0	0		

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Notes and Worksheets

1532

Notes and worksheets

Details of Estimate

Specs	Hrs
Preparation of a specification for the assembly of the Type A, Type B and Type C coil into a half period assembly - Station 2	80
Preparation of aspecifacaton for the assembly of the half field period assemblies into a Field Period Assembly w/ VV - Station 3	240
Prepare spec for assy of ports to VV - Station 5	120
Prepare spec for welding spool piece to VV -Station 5	80
Prepare spec for installation of shims on the C-C flange	120
Machine Assembly specification - Station 6	320
<i>Total Specifications</i>	960

Analysis	Hrs/Calc	# Calcs	Total Hrs
stress analysis	40	0	
thermal analysis	40	0	
special analysis (electromagnetics)	160	0	

Models	# Models	Hrs/Model	Total Hrs
Prepare models for using in upper level assy	10	60	600

Design Reviews	Hrs
Prepare final design review for machine assy	160
Additional reviews that have not been defined	160

Drawings	Hrs
Assembly Drawings	
Station 2	160
Station 3	160
Station 5	240
Prepare dwgs for Field Period Asy	480
Prepare dwgs for Mach Assy	640
<i>Subtotal Assembly Drawings</i>	1680
Detailed Drawings	
Prepare dwgs for mach spool piece	200
Prepare dwgs for welding ports to VV at machine assy	240
Prepare dwgs for man access port	80
<i>Subtotal Detailed Drawings</i>	520

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TABLE II- Materials and Subcontracts

WBS Number: 181

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Job Title: FPA Specs & Drawings

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Materials and Subcontracts (M&S)

Basis of Estimate

Description:

NONE

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TABLE III - Fabrication and Assembly

In-house Fabrication and Assembly and Installation

Description: N/A

TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

WBS Number: 181
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Uncertainty of the Estimate

	<u>High</u>	<u>Medium</u>	<u>Low</u>	<u>Uncertainty Range (%)</u>	<u>Comments/Other Considerations</u>
Design Maturity		X		-15%/+25%	Still unknowns on FPA activities (e.g., assy of C-C, etc.)
Design Complexity		X			Welding spool pieces installation, welding of ports,

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

Residual Impacts

Job	Risk Description	Likelihood of Occurring	Mitigation Plan	Basis of estimate	Cost Impact		Schedule Impact	
					Low	High	Low	High

NONE - Title III support of FPA is in Job 1810.

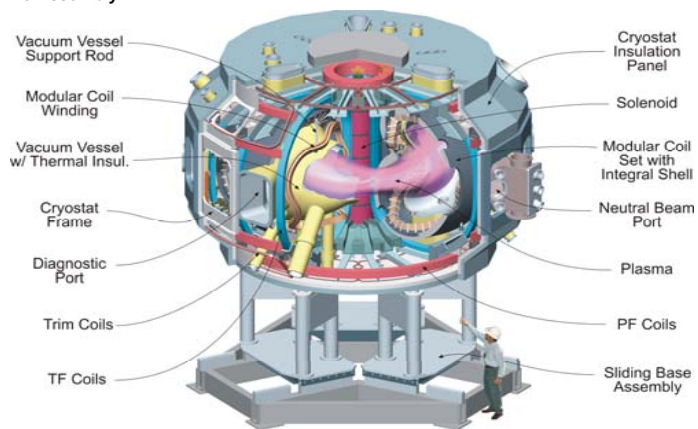
Notes:

- [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%)

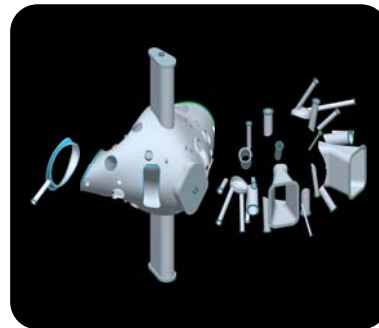
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TABLE V - Basis of Estimate

WBS Number: 181
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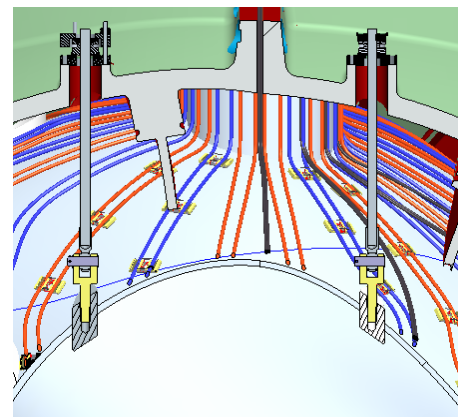
Machine Assembly



Attaching Ports to Vacuum Vessel



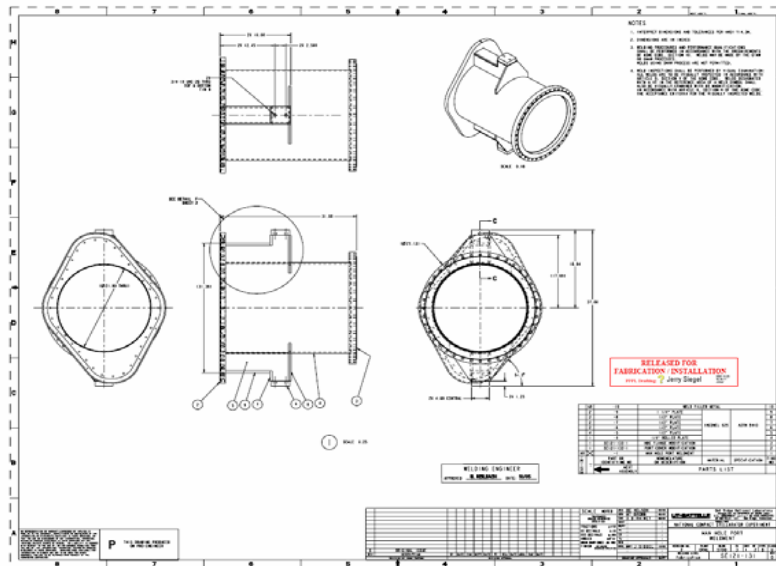
Vacuum Vessel Supports



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TABLE V - Basis of Estimate

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Man Hole Port Drawing



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: 1806 - FP Assembly specs and drawings-COLE																
1.00-VV Prep Station																
1803-609	3	Detail dwgs-spool piece	50	22AUG08	31OCT08		288		17,008.28							
Station 2-Modular Coil Sub- Assembly																
1803-201	3	Station 2 Assembly Specification	65	11JUN07*	11SEP07		0		12,457.60							
1803-205	3	Station 2 Assembly Drawings	65	11JUN07*	11SEP07		14		13,200.00							
Station 3-Modular Coil to VVSA Assembly																
1803-301		Station 3 Assembly Specification	60	24AUG07*	16NOV07		88		38,218.40							
1803-305		Station 3 Assembly Drawings	80	02AUG07*	22NOV07		84		13,287.36							
Station 5-Final Field Period Assembly																
1803-501		Station 5 Assembly Specification	90	03DEC07*	15APR08		97		32,352.00							
1803-505		Station 5 Assembly Drawings	90	03DEC07*	15APR08		97		20,068.80							
1803-509		Field period Assy Dwgs	90	03DEC07*	15APR08		97		40,137.60							
1803-611		Detail dwgs-welding ports	90	03DEC07*	15APR08		97		20,068.80							
6.00-Final Machine Assembly																
1803-601	2	Station 6 Assembly Specification	120	15APR08*	02OCT08		30		71,259.83							
1803-605	2	Station 6 Assembly Drawings	120	15APR08*	02OCT08		30		53,549.76							
1803-613		Detail dwgs-man access port	120	15APR08*	02OCT08		30		6,693.72							
1803-010 Models,design reviews, meetings,reporting,																
1803-010		Models,design reviews, meetings,reporting,	430	01MAY07*	23JAN09		925	LOE	176,478.50							
Subtotal			430	01MAY07	23JAN09		925		514,780.65							