

**PrincetonUniversity Plasma Physics Laboratory  
PPPL COST PERFORMANCE REPORT WORKBREAKDOWN STRUCTURE**

**NCSX**

**\*\*\*\* Cumulative to date FY03, FY04 & FY05\*\*\*\***

**JANUARY FY05**

	CUMULATIVE TO DATE (from 4/1/03) (k)								ECP21	TEC	EAC	Variance Explanation	
	Budgeted Cost			VARIANCES				Budget	Incr.			Schedule	Cost
	BCWS	BCWP	ACWP	Sch Var	SPI	Cst Var	CPI	Thru FY05					
<b>PPPL and ORNL</b>	<b>K</b>								<b>K</b>				
<b>1 - Stellarator Core Systems</b>	<b>19,604</b>	<b>18,222</b>	<b>18,510</b>	<b>-1,382</b>	<b>.93</b>	<b>-289</b>	<b>.98</b>	<b>30,305</b>	<b>50,894</b>	<b>738</b>			
<b>12 Vacuum Vessel Systems</b>	<b>4,217</b>	<b>3,625</b>	<b>3,787</b>	<b>-592</b>	<b>.86</b>	<b>-162</b>	<b>.96</b>	<b>6,942</b>	<b>8,737</b>	<b>378</b>			
1201 - Vacuum Vessel Prelim Dsn	424	424	424	0	1.00	0	1.00	424	424				
1202 - Vacuum Vessel R&D	1,769	1,769	1,771		1.00	-2	1.00	1,769	1,769				
1203 - Vacuum Vessel Final Dsn	732	649	740	-83	.89	-92	.88	770	770	179	Heating/cooling, I&C, Insulation, and vessel supports final design. FDR slipped from Mar 3rd TO May 2nd (supports&analysis) and July 1st (insulation and heating/cooling). SPI .91 last month	Structural analysis by PPPL and design of supports,insulation and heating/cooling ORNL. CPI= .87 last month.	
1204-VV Sys Procurements (non VVSA)								27	519				
1206 - VV Field Weld Joint R&D	11	10	8	-1	.91	2	1.24	210	210	5			
1250 - Vacuum Vessel Fabrication	1,281	772	843	-509	.60	-71	.92	3,742	5,045	194	Only 60% of die and vessel material purchased. Die machining, fixtures and start-up procedures & documentation behind.	Estimated accrual vs earned value estimate difference.	
<b>13 Conventional Coils</b>	<b>703</b>	<b>541</b>	<b>583</b>	<b>-162</b>	<b>.77</b>	<b>-42</b>	<b>.93</b>	<b>1,501</b>	<b>4,441</b>	<b>-</b>			
1301 - TF Design	703	541	583	-162	.77	-42	.93	738	738		PDR slip from Dec 15 to February 7. Kalish and Rushinski only able to devote 50% so far this year. {SPI .82 last month}	Scope of material testing increased due to geometry & insulation. No change in cost variance since last month CPI .93 last month	
1302 - PF and CS Design								140	228				
1303 - Trim coil Design									99				
1351 - TF Coil Procurement								623	1,595				
1352 - PF Coil Procurement									1,285				
1353 - CS Structure Procurement									258				
1354 - Trim Coil Procurement									146				
1355 - WBS 13 I&C Proc & Coil Assy									93				
<b>14 Modular Coils</b>	<b>12,584</b>	<b>11,952</b>	<b>12,238</b>	<b>-633</b>	<b>.95</b>	<b>-286</b>	<b>.98</b>	<b>18,260</b>	<b>26,439</b>	<b>322</b>			
1401 - Mod Coil Prel.Dsn	304	303	304	-1	1.00	-1	1.00	303	303				
1402 - Mod.Coil Analyses	238	239	239	1	1.00		1.00	239	239				
1403 - Modular Coil Final Design	2,393	2,146	2,226	-247	.90	-80	.96	2,676	2,676	107	Winding pack analysis and final design details for the type C production coil slipping. Three FRD's now planned; 2/18 for the cladding,WF and studs, 3/18 for the lead blocks and 4/7 for the chill plates and cooling. {SPI .92 last month}	? {CPI .98 last month}	
1404-MCWF R&D & 1st Prod Casting	2,511	2,513	2,477	2	1.00	36	1.01	2,513	2,513			Contracts being closed. Misc outstanding cost being analyzed with vendors.	
1405-Mod Coil Winding R&D Prep	168	168	168		1.00	0	1.00	168	168				
1406 - Mod. Coil Winding	2,199	2,186	2,185	-13	.99	1	1.00	2,200	2,200		4 turn racetrack fatigue tests late but forecast to complete by Februaryu. Job to be closed.		

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**JANUARY FY05**

	CUMULATIVE TO DATE (from 4/1/03) (k)								ECP21	TEC	EAC	Variance Explanation	
	Budgeted Cost			VARIANCES				Budget	Incr.			Schedule	Cost
	BCWS	BCWP	ACWP	Sch Var	SPI	Cst Var	CPI	Thru FY05					
1410 MC Twisted Racetrack Fabr	204	130	304	-74	.64	-174	.43	423	423	174	Overtime and two shifts authorized to support a March 25 completion (Joule Milestone date of 3/31/05). {SPI .84 last month}	Trial winding and straight tee specimen requiring more tech labor than planned. Winding taking almost double the time (incl OT). Metrology support significantly underestimated. CPI= .51 last month	
1407 -Mod Coil Winding Facility	2,564	2,565	2,546	1	1.00	19	1.01	2,565	2,565				
1412 - Complete Winding Facilities	171	278	275	107	1.63	4	1.01	303	303		3rd winding line components stopped (not req'd for flat funding plan). Credit taken for uncompleted work on 3rd line.		
1408-Mod Coil Winding Supplies	91	66	77	-25	.73	-11	.86	766	1,722		Behind on VPI misc materials and supplies (tubing, valves, fittings, manifolds) Not schedule critical. SPI= .86 last month	Pre-existing cost variance from FY04. FY05 work on track. {CPI .67 last month and .58 in Nov}	
1409 - Mod. Coil Test Stand	442	394	427	-48	.89	-33	.92	486	486		Crystat design and installation of the cryo line still behind. Facility available for TRF by april 10th (supports TRC fab schedule with 2 wks float). Production facility ready by May 26th (7 month ahead of need). {SPI .90 last month}	{CPI .97 last month}	
1411-MCWF Fabrication S005242	1,299	962	1,010	-337	.74	-47	.95	4,638	8,378	15	Procurement of materials, pattern work , Tooling behind.. First casting still forecast for end- May 1 week late.	Estimated accrual vs earned value estimate difference.	
1431 - Modular Coil Local I&C									120				
1451 - Mod Coil Winding								979	4,342	26			
<b>15 Structures</b>	<b>55</b>	<b>54</b>	<b>32</b>	<b>-1</b>	<b>.98</b>	<b>21</b>	<b>1.66</b>	<b>224</b>	<b>1,381</b>	<b>-</b>			
1501 - Structures Design	55	54	32	-1	.98	21	1.66	224	224				
1550 - Structures Procurement									1,156				
<b>16 16 - Coil Services</b>									<b>1,036</b>				
<b>17 Cryostat and Base</b>	<b>203</b>	<b>139</b>	<b>137</b>	<b>-64</b>	<b>.69</b>	<b>3</b>	<b>1.02</b>	<b>305</b>	<b>1,321</b>	<b>-</b>			
1701-Cryostat&Base Sprt Strct Dsn	203	139	137	-64	.69	3	1.02	305	481		No significant progress made in the last two months toward on the prelim design. PDR slipped from Dec to March 7th for the Cryostat and April 4th for the base support structure. Gettelfinger availability has been only 56% to the NCSX project total ytd.. {SPI .85 last month}		
1751 - Cryostat Procurement									509				
1752 - Base Support Structure Procuremer									330				
<b>18 Field Period Assembly</b>	<b>697</b>	<b>776</b>	<b>652</b>	<b>79</b>	<b>1.11</b>	<b>123</b>	<b>1.19</b>	<b>1,538</b>	<b>5,118</b>	<b>38</b>			
1801-Field Period Assly	61	61	61		1.00	0	1.00	61	61				
1802 - FP Assy Oversight&Support	279	279	199	0	1.00	80	1.40	409	954			Positive cost variance likely to materialize into a \$120k underrun at year end due to Viola charging full time to the VVSA contract (job 1250) .	

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**JANUARY FY05**

	CUMULATIVE TO DATE (from 4/1/03) (k)									ECP21 Budget Thru FY05	TEC	EAC Incr.	Variance Explanation	
	Budgeted Cost			VARIANCES				Schedule	Cost					
	BCWS	BCWP	ACWP	Sch Var	SPI	Cst Var	CPI							
1803 - FP Assy Toolg/Constructability	116	99	101	-17	.85	-2	.98	654	1,200		Design of the VV support stand and metrology layout design behind. No schedule impact yet, however there is an opportunity to procure fixturing this FY which can only happen if the design pace picks up. Effort is not staffed adequately. 1.5 fte designers short SPI= .70 last month			
1804-FP Assy Measurement	241	337	292	96	1.40	46	1.16	415	476	38	Second Faro arm delivered ahead of schedule.	This job will ultimately OVERRUN by \$38k. (\$60 positive cost variance thru fy04 and \$98k overrun this fy (Raftopolous metrology support)		
1808 - TF/Mod Coil Sub-Assembly									697					
1810 - Field Period Assembly									1,731					
<b>19 1901 - Stellarator Core Mngtt&amp;Integr</b>	<b>1,145</b>	<b>1,136</b>	<b>1,082</b>	<b>-9</b>	<b>.99</b>	<b>54</b>	<b>1.05</b>	<b>1,534</b>	<b>2,421</b>					
<b>2 - Plasma Heating,Fueling &amp; Vac Sy</b>	<b>366</b>	<b>369</b>	<b>347</b>	<b>3</b>	<b>1.01</b>	<b>22</b>	<b>1.06</b>	<b>369</b>	<b>780</b>	<b>-</b>				
21 - Fueling Systems									81					
22 - Torus Vacuum Pumping Systems									330					
2001-VPS Gas& Cond Sys Oversight	59	60	63	1	1.02	-3	.96	60	60					
2501 - Neutral Beam Refurbishment	307	309	284	2	1.01	25	1.09	309	309					
<b>3 - Diagnostics</b>	<b>255</b>	<b>258</b>	<b>246</b>	<b>3</b>	<b>1.01</b>	<b>12</b>	<b>1.05</b>	<b>502</b>	<b>1,117</b>	<b>-</b>				
# 3101 Magnetic Diagnostics		3	3	3		0	1.00	201	414					
# 36 - Edge and Divertor Diagnostics									43					
38 38 - Electron Beam (EB) Mapping									291					
39 3901 - Diagnostics sys Integration	255	255	242	0	1.00	12	1.05	301	369					
<b>4 - Electrical Power Systems</b>	<b>443</b>	<b>371</b>	<b>295</b>	<b>-72</b>	<b>.84</b>	<b>77</b>	<b>1.26</b>	<b>709</b>	<b>3,216</b>	<b>-</b>				
41 4101 - AC Power	158	157	81	-1	1.00	77	1.95	157	485					
43 4301 - DC Systems	122	56	50	-66	.46	6	1.12	239	446		Inadequate electrical engineer and designer staffing to meet schedule.			
44 4401 - Control & Protection	1	1	24	0	1.00	-23	.04	1	1,216					
45 4501 - Power Sys Dsn & Integr	161	155	138	-6	.97	17	1.12	310	1,068					
46 4601 - FCPC Bldg Mods	1	1	1	0	1.02		1.00	1	1					
<b>5 - Central I&amp;C Systems</b>	<b>28</b>	<b>28</b>	<b>33</b>		<b>1.00</b>	<b>-5</b>	<b>.85</b>	<b>37</b>	<b>1,917</b>	<b>-</b>				
51 51 - TCP/IP Infrastructure Systems									265					
52 52 - Central Instrumentation & Cont									571					
53 53 - Data Acquisition & Fac Comput									328					
54 54 - Facility Timing & Synchronizati									207					
55 55 - Real Time Plasma & Power Sup									151					
56 56 - Central Safety Interlock System									358					
58 5801 -Central I&C Integr	28	28	33		1.00	-5	.85	37	37					
<b>6 - Facility Systems</b>	<b>41</b>	<b>42</b>	<b>24</b>	<b>1</b>	<b>1.01</b>	<b>17</b>	<b>1.72</b>	<b>42</b>	<b>825</b>	<b>-</b>				
61 61 - Water Systems									240					
6163 - Facility Systems Support FY04	32	32	15	0	1.01	17	2.17	32	32					
# 62 - Cryogenic Systems									440					
63 63 - Utility Systems									103					

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#	Description	CUMULATIVE TO DATE (from 4/1/03) (k)							ECP21	TEC	EAC	Variance Explanation		
		Budgeted Cost			VARIANCES				Budget			Incr.	Schedule	Cost
		BCWS	BCWP	ACWP	Sch Var	SPI	Cst Var	CPI	Thru FY05					
# 6501	Facility Systems Integration	9	9	9	0	1.04	0	1.00	9	9				
<b>7</b>	<b>Test Cell Prep &amp; Machine Assy</b>	<b>547</b>	<b>439</b>	<b>436</b>	<b>-108</b>	<b>.80</b>	<b>3</b>	<b>1.01</b>	<b>723</b>	<b>4,211</b>	<b>-</b>			
# 7101	Shield Wall Modif	32	32	32	0	1.00		1.00	32	32				
72	7201 - Control Room Walls&Floors	35			-35				50	50		Control room block wall not started. No schedule impact.		
73	7301 - Platform Design &	39			-39				92	161		Platform design behind schedule. PDR slipped from Dec 1st to end of Feb.		
74	7401 - TC Prep & Mach Assy Plannin	441	407	404	-34	.92	3	1.01	549	1,506		NCSX test cel electrical outlet installation not started No impact.		
<b>75</b>	<b>Machine Assembly</b>								<b>-</b>	<b>2,239</b>	<b>-</b>			
	7501 - Construction Support Crew									1,003				
	7502 - Test Cell Facility Preparations									53				
	7503 - Machine Assembly									1,183				
<b>76</b>	<b>7601 - Tooling Design &amp; Fabrication</b>									<b>223</b>				
<b>8</b>	<b>Project Oversight &amp; Support</b>	<b>4,582</b>	<b>4,582</b>	<b>4,748</b>		<b>1.00</b>	<b>-166</b>	<b>.97</b>	<b>6,066</b>	<b>10,637</b>	<b>26</b>			
<b>81</b>	<b>Project Management and Control</b>	<b>1,970</b>	<b>1,970</b>	<b>2,139</b>		<b>1.00</b>	<b>-169</b>	<b>.92</b>	<b>2,721</b>	<b>4,579</b>	<b>26</b>			
	8101 - Project Management & Control	1,335	1,335	1,483		1.00	-148	.90	1,806	3,090		\$146k of historical variance in FY04.. \$3k variance FY to date. {CPI .89 last month}		
	8102 - NCSX MIE Management ORNL	210	210	177		1.00	34	1.19	274	360				
	8998 - Allocations	426	426	479		1.00	-54	.89	641	1,129	<b>26</b>	Allocations underbudgeted in FY05 by 10% plus costing at higher than linear rate. Forecast year end variance of \$26k {CPI .86 last month}		
<b>82</b>	<b>Project Engineering</b>	<b>2,141</b>	<b>2,141</b>	<b>2,139</b>		<b>1.00</b>	<b>2</b>	<b>1.00</b>	<b>2,875</b>	<b>4,368</b>	<b>-</b>			
	8202 - Engr Mgmt & Sys Eng Support	1,196	1,196	1,212		1.00	-15	.99	1,644	2,662		Reiersen and Simmons cost greater than budgeted. CPI =.99 last month		
	8203 - Design Integration	610	610	619		1.00	-9	.99	717	1,089				
	8204 - Systems Analysis	335	335	308		1.00	27	1.09	513	617		Positive cost variance from FY04. No significant cost varinace forecast at the end of FY05.		
<b>84</b>	<b>Project Physics</b>	<b>470</b>	<b>470</b>	<b>470</b>		<b>1.00</b>	<b>0</b>	<b>1.00</b>	<b>470</b>	<b>1,691</b>	<b>-</b>			
	8401 - Project Phycsis	324	324	324		1.00	0	1.00	324	324				
	8402 - Project Physics MIE ORNL	146	146	146		1.00	0	1.00	146	146				
	85 - Integrated Systems Testing									1,221				
	<b>Subtotal</b>	<b>25,866</b>	<b>24,310</b>	<b>24,639</b>	<b>-1,556</b>	<b>.94</b>	<b>-329</b>	<b>.99</b>	<b>38,752</b>	<b>73,597</b>	<b>764</b>			
	<b>Contingency</b>								<b>2,603</b>	<b>12,756</b>				
	<b>TOTAL PROJECT</b>								<b>41,355</b>	<b>86,352</b>				
	Thru fy04	20,640	19652	19744	-988	0.95	-92	1.00						
	FY05 performance	5,226	4,658	4,895	-568	0.89	-237	0.95						
	Thru NOVEMBER	21,812	21906	22158	94	1.00	-252	0.989						
	Thru DECEMBER	23,813	23042	23434	-771	0.97	-392	0.983						