NSTX UPGRADE CONCEPTUAL DESIGN COST ESTIMATE
CONSTRAINED CASE 11/19/09

DESCRIPTION	TOTAL	FY 2009 Actual Cost	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Uncertainty % Low	Uncertainty % High	Uncertainty $ Low (1)	Uncertainty $ Average (2)	Uncertainty $ High (3)	Risk Gross risk $ (4)	Risk Likelihood	Risk Weighted Risk (5) $	Recommended Contingency Lower = (2)+(5)	Recommended Contingency Upper = (3)+(4)	CONCEPTUAL DESIGN ESTIMATE RANGE LOWER	CONCEPTUAL DESIGN ESTIMATE RANGE UPPER
Job: 1000 - CSU Analytical Support	**$421**		150.5	133.8	68	69.1			-20%	40%	-$84	$42	$169			$0	$42	$169	**$464**	**$590**
Job: 1001 - CS Plasma Facing Components	**$1,696**	64.6	202.8	220.5	1131.4	76.2			-20%	40%	-$326	$163	$652	40	L	$24	$187	$692	**$1,883**	**$2,388**
Job: 1002 -Passive Plate Analysis & Upgrade Act	**$208**		140.8	67.3					-20%	40%	-$42	$21	$83	-		$0	$21	$83	**$229**	**$291**
Job: 1200 - Vacuum Vessel & Structural Support	**$778**	571.7	193.6	12.4					-20%	40%	-$41	$21	$82	60	U	$15	$36	$142	**$813**	**$920**
Job: 1201 - Outer TF Structures	**$680**		167.1	101.5		411.7			-20%	40%	-$136	$68	$272	-		$0	$68	$272	**$748**	**$952**
Job: 1202 - Outer PF Coil Structures	**$1,087**		288.4	149.2		649.8			-20%	40%	-$217	$109	$435	-		$0	$109	$435	**$1,196**	**$1,522**
Job: 1203 - Umbrella Structural Reinforcement	**$273**		135.3	51.7		85.9			-20%	40%	-$55	$27	$109	-		$0	$27	$109	**$300**	**$382**
Job: 1204 - CS Support Pedestal	**$212**		92.9	32.6		43.7	42.3		-20%	40%	-$42	$21	$85	-		$0	$21	$85	**$233**	**$296**
Job: 1205 - Misc VV Structural Support	**$238**		65.6	37.1		135			-20%	40%	-$48	$24	$95	-		$0	$24	$95	**$261**	**$333**
Job: 1301 - Outer Toroidal Field Coils	**$733**		53.5	56.6	2.6	620.7			-10%	15%	-$73	$18	$110	240	U	$60	$78	$350	**$812**	**$1,083**
Job: 1303 - TF Joint Test Stand & Perform Test	**$340**		313.1	26.7					-15%	25%	-$51	$17	$85	15	VU	$1	$18	$100	**$358**	**$440**
Job: 1304 - Inner TF Bundle (Dsgn/Fab)	**$1,929**		730.2	783.3	3.2	411.9			-20%	40%	-$386	$193	$771	165	U	$41	$234	$936	**$2,163**	**$2,865**
Job: 1305 - OHMIC Heating Coil (OH) DSGN/FAB	**$4,044**	1055.6	240.8	219	1188.9	1339.5			-20%	40%	-$598	$299	$1,195	550	U	$138	$436	$1,745	**$4,480**	**$5,789**
Job: 1306 - Inner Poloidal Field Coils (Shaping)	**$549**		95.2	48	35.4	357	13.7		-20%	40%	-$110	$55	$220	125	U	$31	$86	$345	**$635**	**$894**
Job: 1307 - CS Casing Assembly (DSGN/FAB)	**$907**		120.6	111.9	532.6	141.5			-20%	40%	-$181	$91	$363	-		$0	$91	$363	**$997**	**$1,269**
Job: 1302 - Center Stack Assembly	**$847**			51.5		551.4	243.6		-20%	40%	-$169	$85	$339	-		$0	$85	$339	**$931**	**$1,185**
Job: 2300 ECH Analysis	**$183**		122.5	60.9					-20%	40%	-$37	$18	$73	100	U	$25	$43	$173	**$227**	**$357**
Job: 2420 - 2nd NBI Sources	**$1,432**		9.1	9.2		423	990.8		-5%	10%	-$72	$36	$143	-		$0	$36	$143	**$1,468**	**$1,575**
Job: 2425 - BL Relocation	**$1,753**	15	227.2	208.2	200.8	167.7	934.4		-15%	25%	-$261	$87	$435	-		$0	$87	$435	**$1,840**	**$2,188**
Job: 2430 - 2nd NBI Decontamination	**$2,842**	1238.5	1603.2						-20%	10%	-$321	-$80	$160	-		$0	-$80	$160	**$2,762**	**$3,002**
Job: 2440 - 2nd NBI Beamline	**$2,542**	28.6		418.1	470.9	1519.7	104.7		-10%	15%	-$251	$63	$377	(184)	L	-$110	-$48	$193	**$2,494**	**$2,735**
Job: 2450 - 2nd NBI Services	**$3,655**	76.7	299.7	77.3	542.6	2542.2	116		-15%	25%	-$537	$179	$894	50	U	$13	$191	$944	**$3,846**	**$4,599**
Job: 2460 - 2nd NBI Armor	**$409**	35.8	116.5	26.9		230			-10%	15%	-$37	$9	$56	-		$0	$9	$56	**$419**	**$465**
Job: 2470 - 2nd NBI Power	**$3,091**	115.2	62.6	310.7	96.6	2399.7	106.6		-15%	25%	-$446	$149	$744	50	U	$13	$161	$794	**$3,253**	**$3,885**
Job: 2475 - 2nd NBI Controls	**$1,809**		302.2	80.5	8.1	665.1	753		-15%	25%	-$271	$90	$452	-		$0	$90	$452	**$1,899**	**$2,261**
Job: 2480 - 2nd NBI/TVPS Duct	**$2,675**	183.4	271.4		312.4	1907.3			-10%	15%	-$249	$62	$374	125	L	$75	$137	$499	**$2,812**	**$3,173**
Job: 2485 - Vacuum Pumping System	**$316**		73.3	16.8		226			-5%	10%	-$16	$8	$32	-		$0	$8	$32	**$324**	**$348**
Job: 2490 - NTC Equipt Relocations	**$3,392**	143		72.1	675.1	1154.1	1347.4		-20%	40%	-$650	$325	$1,299	366	U	$92	$416	$1,665	**$3,808**	**$5,057**
Job: 3200 - Water Cooling System Mods for CSU	**$399**	5.4	186.4	49.5		80.6	77.2		-15%	25%	-$59	$20	$98	-		$0	$20	$98	**$419**	**$498**
Job: 3300 - Bakeout System Mods for CSU	**$84**		7.1	3		73.9			-5%	10%	-$4	$2	$8	-		$0	$2	$8	**$86**	**$92**
Job: 3400 - Gas Delivery System Mods for CSU	**$92**		48.1	13		30.4			-15%	25%	-$14	$5	$23	10	VU	$1	$5	$33	**$97**	**$124**
Job: 4100 - Center Stack Diagnostics for CSU	**$904**	11.3	121.7	98.1	248.6	423.9			-5%	10%	-$45	$22	$89	-		$0	$22	$89	**$926**	**$993**
Job: 5000 - CSU Power Systems	**$9,156**	385.8	1136	457	256.3	3584.1	3319.3	17.4	-15%	25%	-$1,316	$439	$2,193			$0	$439	$2,193	**$9,594**	**$11,348**
Job: 5501 - Coil Bus Runs	**$714**		205.7	98.7		405	4.4		-20%	40%	-$143	$71	$286	-		$0	$71	$286	**$785**	**$999**
Job: 6100 - Control Sys & Data Acquisition Sys	**$829**		93.9	159.4	8.2	274.9	292.8		-15%	25%	-$124	$41	$207	253	U	$63	$105	$460	**$934**	**$1,290**
Job: 7100 - Project Mgt & Integration CSU & NBI	**$5,750**	625.8	704.1	847.4	1049.9	1309.1	1213.2		-15%	25%	-$769	$256	$1,281	150	U	$38	$294	$1,431	**$6,043**	**$7,180**
Job: 7200 - Center Stack Management	**$1,714**		384.4	339.4	333	324.3	332.4		-15%	25%	-$257	$86	$428	107	U	$27	$112	$535	**$1,826**	**$2,249**
Job: 7300 - NB2 Management	**$1,959**	63.3	275.3	362.1	438.5	449.4	370.7		-15%	25%	-$284	$95	$474	75	U	$19	$114	$549	**$2,073**	**$2,508**
Job: 7400 - Health Physics Support	**$3,133**		674.9	1039.8	695.9	356.6	365.5		-15%	25%	-$470	$157	$783	35	L	$21	$178	$818	**$3,310**	**$3,951**
JOB: 7700 - NSTX Upgrade HP Allocations	**$2,189**		453	434	434	434	434		-15%	25%	-$328	$109	$547	70	L	$42	$151	$617	**$2,340**	**$2,806**
Job: 7710 - Upgrade Allocations	**$949**	526.3	299	31	31	31	31		-15%	25%	-$63	$21	$106	20	L	$12	$33	$126	**$982**	**$1,075**
Job; 8200 - Centerstack & Coil Structural Instal	**$5,894**		23.7	336.1	652.5	3315	1566.2		-20%	40%	-$1,179	$589	$2,357	370	U	$93	$682	$2,727	**$6,575**	**$8,621**
Job: 8250 - Remove/Install Centerstack	**$944**					179.6	764.3		-30%	60%	-$283	$142	$566	196	U	$49	$191	$762	**$1,134**	**$1,706**
Job: 7900 - Integrated System	**$73**		1.6	1.7	1.7	22.8	44.1	1	-20%	40%	-$15	$7	$29	-		$0	$7	$29	**$80**	**$102**
schedule (months)	**48**	**(note upper cont % not considered since OT and 2nd shift option remain)**								**7.2 months**			**15%**				$1,743	$1,743	**$1,743**	**$1,743**
Base Estimate =	**$73,820**	$5,146	$10,693	$7,654	$9,418	$27,423	$13,468	$18	-15%	27%	-$11,059	$4,261	$19,582	2,988		$779	$6,783	$24,312	**$80,603**	**$98,132**
etc=	**$68,674**		*3%*	*4%*	*7%*	*8%*	*11%*													
Uncertainty Based Contingency(Lower)=	$4,259		$165	$165	$515	$2,000	$1,400	$14												
Risk based Contingency(Lower)=	$779		$180	$145	$190	$170	$94													
Schedule Contingency(Lower)=	$1,743							$1,743												
Total (Lower)=	**$80,601**	**$5,146**	**$11,038**	**$7,964**	**$10,123**	**$29,593**	**$14,962**	**$1,775**												
	$80,601		*14%*	*17%*	*33%*	*36%*	*50%*													
Uncertainty based Contingency (Upper) =	$19,574		$758	$758	$2,367	$9,191	$6,433	$67												
Risk Based Contingency (Upper) =	$2,988		$690	$556	$729	$652	$361	$0												
Schedule Contingency (Upper) =	$1,743							$1,743												
Total (Upper) =	**$98,124**	**$5,146**	**$12,142**	**$8,968**	**$12,513**	**$37,265**	**$20,262**	**$1,828**												
	$98,124																			
			8.0	**7.3**	**10.7**	**28.1**	**28.5**	**6.3**												

Managment /oversight (standing army) cost	$K/mo.
Job: 7100 - Project Mgt & Integration C	$ 109
Job: 7200 - Center Stack Management	$ 27
Job: 7300 - NB2 Management	$ 37
Job: 7400 - Health Physics Support	$ 30
JOB: 7700 - NSTX Upgrade HP Allocat	$ 36
Job: 7710 - Upgrade Allocations	$ 3
	$ 242

Contingency % of ETC =		
	10%	**35%**

Use for weighted risk

Very Likely = >80%	**90%**
Likely = 80-40%	**60%**
Unlikely = 40-10%	**25%**
Very Unlikely = <10%	**5%**