



| NSTX UPGRADE CD-2 COST ESTIMATE                  |            |                     | P3 file: CD2B   |         | Outage Start= 4/1/2012 |          | Early Finish= 9/30/2014 |         | Risk     |             |                            |            | OUTAGE    |                                |  |
|--|------------|---------------------|---|---------|------------------------|----------|-------------------------|---------|----------|-------------|----------------------------|------------|-----------|--------------------------------|--|
| DESCRIPTION                                      | CD-2 TOTAL | FY 2009 Actual Cost | FY 2010 Actual Cost   | FY 2011 | FY 2012                | FY 2013  | FY 2014                 | FY 2015 | Gross \$ | Weighted \$ | Bottoms-up contin- gency\$ | total cont | TOTAL TPC | cont. to on etc from 10/1/2010 |  |
| Job: 1000 - CSU Analytical Support-TITUS         | \$387      |                     | 64.7  | 147.2   | 58.7                   | 58.4     | 57.7                    |         | 80       | \$26        | 103                        | \$129      | \$516     | 40%                            |  |
| Job: 1001 - CS Plasma Facing Components-TRESEMER | \$2,175    | 64.6                | 288.2   | 461.6   | 627.6                  | 657.6    | 75.2                    |         | 421      | \$126       | 410                        | \$536      | \$2,711   | 29%                            |  |
| Job: 1002 -Passive Plate Analysis &Upgrade-TITUS | \$253      |                     | 169.9   | 83.2    |                        |          |                         |         | 20       | \$12        | 17                         | \$29       | \$282     | 34%                            |  |
| Job: 1200 - Vacuum Vsl & Struct Support-SMITH    | \$1,509    | 571.7               | 937.6   |         |                        |          |                         |         | 60       | \$15        |                            | \$15       | \$1,524   |                                |  |
| Job: 1201 - Outer TF Structures-SMITH            | \$704      |                     | 19.6  | 125     | 56.2                   | 502.7    |                         |         | -        | \$0         | 160                        | \$160      | \$863     | 23%                            |  |
| Job: 1202 - Outer PF2 Coil Structures-SMITH      | \$41       |                     | 0.4   | 19.3    | 2.4                    | 18.6     |                         |         | -        | \$0         | 9                          | \$9        | \$50      | 22%                            |  |
| Job: 1203 - PF3 Support.-SMITH                   | \$22       |                     | 0.2   | 10.9    | 10.5                   |          |                         |         | -        | \$0         | 5                          | \$5        | \$27      | 24%                            |  |
| Job: 1204 - PF4/5 Leads & Radial Supports-SMITH  | \$11       |                     | 2.5   | 8.1     |                        |          |                         |         | -        | \$0         | 2                          | \$2        | \$13      | 29%                            |  |
| Job: 1205 - Umbrella-SMITH                       | \$630      |                     | 25.4  | 170.3   | 7.7                    | 426.2    | 0.3                     |         | -        | \$0         | 78                         | \$78       | \$707     | 13%                            |  |
| Job: 1206 - Pedestal -SMITH                      | \$139      |                     | 4.9   | 40.8    |                        | 74.9     | 18.6                    |         | -        | \$0         | 35                         | \$35       | \$175     | 26%                            |  |
| Job: 1207 - Vessel Legs -SMITH                   | \$17       |                     | 2.7   | 5.6     |                        | 8.7      |                         |         | -        | \$0         | 3                          | \$3        | \$20      | 21%                            |  |
| Job: 1208 - PF4&5 Verticle Support-SMITH         | \$256      |                     | 21.7  | 97.5    | 8.7                    | 128      |                         |         | -        | \$0         | 64                         | \$64       | \$320     | 27%                            |  |
| Job: 1220 - Misc Structural Design-SMITH         | \$196      |                     | 40.3  | 155.8   |                        |          |                         |         | -        | \$0         | 68                         | \$68       | \$264     | 43%                            |  |
| Job: 1300 - Center Stack-CHRZANOWSKI             | \$1,065    |                     | 132.6   | 299.7   | 266.5                  | 265.4    | 100.6                   |         | -        | \$0         | 90                         | \$90       | \$1,155   | 10%                            |  |
| Job: 1301 - Outer TF Coils-CHRZANOWSKI           | \$338      |                     | 19.9  |         | 19.6                   | 241.1    | 57.3                    |         | 100      | \$25        | 81                         | \$106      | \$444     | 33%                            |  |
| Job: 1303 - TF Joint Test Stand&Test-KOZUB       | \$353      |                     | 79.6  | 273.5   |                        |          |                         |         | 130      | \$27        | 55                         | \$82       | \$435     | 30%                            |  |
| Job: 1304 - Inner TF Bundle (Ds/Fab)-CHRZANOWSKI | \$2,596    |                     | 328.2   | 869     | 461.2                  | 578.1    | 359.3                   |         | 430      | \$108       | 701                        | \$809      | \$3,405   | 36%                            |  |
| Job: 1305 - OHMIC Heating Coil (OH)-CHRZANOWSKI  | \$4,557    | 1055.6              | 313.4   | 406.6   | 1284.7                 | 1496.6   |                         |         | 1,725    | \$431       | 1107                       | \$1,538    | \$6,095   | 48%                            |  |
| Job: 1306 - Inner PF Coils-CHRZANOWSKI           | \$668      |                     | 99.5  | 75      | 312.1                  | 181.4    |                         |         | 100      | \$25        | 140                        | \$165      | \$833     | 29%                            |  |
| Job: 1307 - CS Casing Assembly -CHRZANOWSKI      | \$903      |                     | 93.7  | 72.9    | 262                    | 451.7    | 23.1                    |         | -        | \$0         | 231                        | \$231      | \$1,134   | 29%                            |  |
| Job: 1310 - CSU Magnet Systems-CHRZANOWSKI       | \$442      |                     | 441.9   |         |                        |          |                         |         | -        | \$0         |                            | \$0        | \$442     |                                |  |
| Job: 1302 - Center Stack Assembly-CHRZANOWSKI    | \$990      |                     |   |         | 27.4                   | 181.4    | 781.2                   |         | -        | \$0         | 276                        | \$276      | \$1,266   | 28%                            |  |
| Job: 2300 - ECH Analysis-TITUS                   | \$84       |                     | 26.6  | 57.8    |                        |          |                         |         | 125      | \$48        | 12                         | \$60       | \$144     | 103%                           |  |
| Job: 2420 - 2nd NBI Sources-CROPPER              | \$1,094    |                     |   | 3.7     |                        | 220.7    | 869.3                   |         | -        | \$0         | 175                        | \$175      | \$1,269   | 16%                            |  |
| Job: 2425 - BL Relocation-DENAULT                | \$1,859    | 15                  | 28.3  | 57.7    |                        | 1062.3   | 696                     |         | -        | \$0         | 257                        | \$257      | \$2,116   | 14%                            |  |
| Job: 2430 - 2nd NBI Decontamination-STEVENSON    | \$2,057    | 1238.5              | 800.5   | 18      |                        |          |                         |         | -        | \$0         | 3                          | \$3        | \$2,060   | 15%                            |  |
| Job: 2440 - 2nd NBI Beamline-DENAULT             | \$2,588    | 28.6                | 12  | 494.6   | 769.6                  | 1225.3   | 57.6                    |         | -        | \$0         | 364                        | \$364      | \$2,952   | 14%                            |  |
| Job: 2450 - 2nd NBI Services-DENAULT             | \$4,516    | 76.7                | 189.3   | 86.2    | 119.4                  | 1169.4   | 2875.2                  |         | -        | \$0         | 986                        | \$986      | \$5,502   | 23%                            |  |
| Job: 2460 - 2nd NBI Armor-PRINISKI               | \$700      | 35.8                | 236.4   | 119.3   |                        | 62.4     | 245.7                   |         | -        | \$0         | 104                        | \$104      | \$803     | 24%                            |  |
| Job: 2470 - 2nd NBI Power-RAKI                   | \$3,335    | 115.2               | 98.6  | 39      | 87.8                   | 1110.5   | 1883.6                  |         | -        | \$0         | 557                        | \$557      | \$3,892   | 18%                            |  |
| Job: 2475 - 2nd NBI Controls-CROPPER             | \$2,089    |                     | 8.2   | 240.6   | 572.8                  | 740.9    | 526.7                   |         | -        | \$0         | 253                        | \$253      | \$2,342   | 12%                            |  |
| Job: 2480 - 2nd NBI/TVPS Duct                    | \$2,258    | 183.4               | 171.2   | 103.8   | 116.8                  | 1313.3   | 369.9                   |         | -        | \$0         | 480                        | \$480      | \$2,739   | 25%                            |  |
| Job: 2485 - Vacuum Pumping System-PRINISKI       | \$387      |                     | 42.7  | 47.3    |                        |          | 297.4                   |         | -        | \$0         | 54                         | \$54       | \$442     | 16%                            |  |
| Job: 2490 - NTC Equipmt Relocations-PERRY        | \$3,618    | 143                 | 135.2   | 2.8     | 916.2                  | 792.4    | 1628.3                  |         | 294      | \$74        | 501                        | \$575      | \$4,193   | 17%                            |  |
| Job: 3200 - Water Cooling System Mods-DENAULT    | \$195      | 5.4                 | 10.2  | 58.5    |                        |          | 121.1                   |         | -        | \$0         | 18                         | \$18       | \$213     | 10%                            |  |
| Job: 3300 - Bakeout System Mods for CSU-RAKI     | \$79       |                     |   | 4.8     |                        |          | 74.4                    |         | -        | \$0         | 16                         | \$16       | \$95      | 20%                            |  |
| Job: 3400 - Gas Delivery System Mods-BLANCHARD   | \$102      |                     | 2.7   | 38.3    |                        |          | 61.3                    |         | 10       | \$1         | 21                         | \$22       | \$124     | 22%                            |  |
| Job: 4100 - Center Stack Diagnostics-KAITA       | \$836      | 11                  | 80.7  | 91.4    | 213.6                  | 439      |                         |         | -        | \$0         | 126                        | \$126      | \$962     | 17%                            |  |
| Job: 4500 - MPTS VV Modification                 | \$942      |                     | 125.1   | 510     | 245.8                  | 57.4     | 4                       |         |          |             | 268                        | \$268      | \$1,210   | 33%                            |  |
| Job: 5000 - CSU Power Systems-RAKI               | \$1,103    | 385.8               | 717.3   |         |                        |          |                         |         |          | \$0         |                            | \$0        | \$1,103   |                                |  |
| Job: 5001 - AC Power-RAKI                        | \$193      |                     |   | 11.5    |                        | 61.6     | 120.1                   |         |          |             | 19                         | \$19       | \$213     | 10%                            |  |
| Job: 5002 - AC/DC Converters-RAKI                | \$58       |                     |   |         |                        | 18       | 39.8                    |         |          |             | 6                          | \$6        | \$64      | 10%                            |  |
| Job: 5003 - FCPC PF5 DC Systems-RAKI             | \$0        |                     |   |         |                        |          |                         |         |          |             |                            | \$0        | \$0       |                                |  |
| Job: 5004 - TA-NTC DC Systems-RAKI               | \$114      |                     |   | 7.5     |                        | 33.7     | 72.6                    |         |          |             | 28                         | \$28       | \$142     | 25%                            |  |
| Job: 5005 - FCPC DC PF1 & TF Systems-RAKI        | \$1,690    |                     |   | 31.2    | 297.4                  | 252.4    | 1108.9                  |         |          |             | 398                        | \$398      | \$2,088   | 24%                            |  |
| Job: 5006 - Control & Protection-RAKI            | \$1,896    |                     |   | 95.5    | 209.3                  | 666.7    | 924.2                   |         |          |             | 308                        | \$308      | \$2,203   | 16%                            |  |
| Job: 5007 - Systems Design & Integration-RAKI    | \$681      |                     | 36.2  | 166.1   | 94.3                   | 93.9     | 290.3                   |         |          |             | 64                         | \$64       | \$745     | 10%                            |  |
| Job: 5200 - Digital Coil Protection-HATCHER      | \$2,493    |                     | 83.4  | 363.2   | 437.2                  | 664.7    | 944.3                   |         |          |             | 997                        | \$997      | \$3,490   | 41%                            |  |
| Job: 5501 - Coil Bus Runs-SMITH                  | \$1,129    |                     | 185   | 192.8   |                        | 123.5    | 627.5                   |         | -        | \$0         | 277                        | \$277      | \$1,406   | 29%                            |  |
| Job: 6100 - Control Sys Data Acquisition -SICHTA | \$918      |                     | 40.7  | 127.7   | 6.9                    | 33       | 709.7                   |         | 375      | \$89        | 88                         | \$177      | \$1,095   | 20%                            |  |
| Job: 7100 - Project Mgt & Integration-STRYKOWSKY | \$5,812    | 625.8               | 781.1   | 841.6   | 1009.7                 | 1258.9   | 1294.8                  |         | 150      | \$37        | 440                        | \$477      | \$6,289   | 11%                            |  |
| Job: 7200 - Center Stack Management-DUDEK        | \$1,540    |                     | 222.2   | 320.5   | 335.1                  | 325.5    | 336.2                   |         | 107      | \$27        | 171                        | \$198      | \$1,738   | 15%                            |  |
| Job: 7300 - NB2 Management-STEVENSON             | \$1,450    | 63.3                | 137   | 269.6   | 295.7                  | 425.6    | 258.8                   |         | 75       | \$19        | 162                        | \$181      | \$1,631   | 14%                            |  |
| Job: 7400 - Health Physics Support-STEVENSON     | \$2,507    |                     | 386.5   | 511.4   | 835.3                  | 504.1    | 269.9                   |         | 35       | \$21        | 276                        | \$297      | \$2,804   | 14%                            |  |
| JOB: 7700 - NSTX-U HP Allocations-STRYKOWSKY     | \$2,603    | 367.3               | 452.4   | 353.1   | 535                    | 481.5    | 414                     |         | 130      | \$78        | 178                        | \$256      | \$2,859   | 14%                            |  |
| Job: 7710 - Upgrade Allocations-STRYKOWSKY       | \$381      | 159                 | 183.6   | 29.7    | 3.5                    | 3.6      | 1.8                     |         | 86       | \$51        | 4                          | \$55       | \$436     | 143%                           |  |
| Job: 8200 - CS & Coil Sprt Struc Install- VIOLA  | \$6,474    |                     | 38.6  | 46.5    | 1452.2                 | 1958     | 2978.5                  |         | 1,120    | \$786       | 1464                       | \$2,250    | \$8,724   | 35%                            |  |
| Job: 8250 - Remove/Install Centerstack-PERRY     | \$1,174    |                     |   |         |                        | 366.2    | 807.4                   |         | 287      | \$61        | 176                        | \$237      | \$1,411   | 20%                            |  |
| Job: 7900 - Integrated System-GENTILE            | \$78       |                     | 4   | 1.8     | 1.8                    | 1.8      | 68.9                    |         |          | \$0         | 19                         | \$19       | \$97      | 25%                            |  |
| schedule (months)                                |            |                     | (OT and 2nd shift available to maintain schedule and supplement sched conting |         |                        |          |                         | 8.0     | months   |             |                            | \$1,999    | \$1,999   | \$1,999                        |  |
| Base Estimate(early schedule)=                   | \$77,283   | \$5,146             | \$8,323   | \$8,666 | \$11,961               | \$20,737 | \$22,452                | \$0     | 5,860    | \$2,087     | \$14,905                   | \$16,992   | \$94,276  |                                |  |
| Contingency % =                                  |            |                     |   | 11%     | 22%                    | 22%      | 23%                     |         |          |             |                            |            |           |                                |  |
| Contingency                                      | \$16,992   |                     |   | \$912   | \$2,669                | \$4,543  | \$5,089                 | \$3,779 |          |             |                            |            |           | 27%                            |  |
| Total =  | \$94,276   | \$5,146             | \$8,323   | \$9,578 | \$14,630               | \$25,280 | \$27,540                | \$3,779 |          |             |                            |            |           |                                |  |
| Guidance =                                       |            |                     |   | \$9,578 | \$14,630               | \$25,280 | \$27,540                | \$6,970 |          |             |                            |            |           |                                |  |

| <b>NSTX UPGRADE CD-2 COST ESTIMATE</b>           |                |
|--|----------------|
| DESCRIPTION                                      | FY 2011 (\$K)  |
| Job: 1000 - CSU Analytical Support-TITUS         | \$147          |
| Job: 1001 - CS Plasma Facing Components-TRESEMER | \$462          |
| Job: 1002 -Passive Plate Analysis &Upgrade-TITUS | \$83           |
| Job: 1200 - Vacuum Vsl & Struct Support-SMITH    |                |
| Job: 1201 - Outer TF Structures-SMITH            | \$125          |
| Job: 1202 - Outer PF2 Coil Structures-SMITH      | \$19           |
| Job: 1203 - PF3 Support.-SMITH                   | \$11           |
| Job: 1204 - PF4/5 Leads & Radial Supports-SMITH  | \$8            |
| Job: 1205 - Umbrella-SMITH                       | \$170          |
| Job: 1206 - Pedestal -SMITH                      | \$41           |
| Job: 1207 - Vessel Legs -SMITH                   | \$6            |
| Job: 1208 - PF4&5 Verticle Support-SMITH         | \$98           |
| Job: 1220 - Misc Structural Design-SMITH         | \$156          |
| Job: 1300 - Center Stack-CHRZANOWSKI             | \$300          |
| Job: 1301 - Outer TF Coils-CHRZANOWSKI           |                |
| Job: 1303 - TF Joint Test Stand&Test-KOZUB       | \$274          |
| Job: 1304 - Inner TF Bundle (Ds/Fab)-CHRZANOWSKI | \$869          |
| Job: 1305 - OHMIC Heating Coil (OH)-CHRZANOWSKI  | \$407          |
| Job: 1306 - Inner PF Coils-CHRZANOWSKI           | \$75           |
| Job: 1307 - CS Casing Assembly -CHRZANOWSKI      | \$73           |
| Job: 1310 - CSU Magnet Systems-CHRZANOWSKI       |                |
| Job: 1302 - Center Stack Assembly-CHRZANOWSKI    |                |
| Job: 2300 - ECH Analysis-TITUS                   | \$58           |
| Job: 2420 - 2nd NBI Sources-CROPPER              | \$4            |
| Job: 2425 - BL Relocation-DENAULT                | \$58           |
| Job: 2430 - 2nd NBI Decontamination-STEVENSON    | \$18           |
| Job: 2440 - 2nd NBI Beamline-DENAULT             | \$495          |
| Job: 2450 - 2nd NBI Services-DENAULT             | \$86           |
| Job: 2460 - 2nd NBI Armor-PRINISKI               | \$119          |
| Job: 2470 - 2nd NBI Power-RAKI                   | \$39           |
| Job: 2475 - 2nd NBI Controls-CROPPER             | \$241          |
| Job: 2480 - 2nd NBI/TVPS Duct                    | \$104          |
| Job: 2485 - Vacuum Pumping System-PRINISKI       | \$47           |
| Job: 2490 - NTC Equipt Relocations-PERRY         | \$3            |
| Job: 3200 - Water Cooling System Mods-DENAULT    | \$59           |
| Job: 3300 - Bakeout System Mods for CSU-RAKI     | \$5            |
| Job: 3400 - Gas Delivery System Mods-BLANCHARD   | \$38           |
| Job: 4100 - Center Stack Diagnostics-KAITA       | \$91           |
| Job: 4500 - MPTS VV Modification                 | \$510          |
| Job: 5000 - CSU Power Systems-RAKI               |                |
| Job: 5001 - AC Power-RAKI                        | \$12           |
| Job: 5002 - AC/DC Converters-RAKI                |                |
| Job: 5003 - FCPC PF5 DC Systems-RAKI             |                |
| Job: 5004 - TA-NTC DC Systems-RAKI               | \$8            |
| Job: 5005 - FCPC DC PF1 & TF Systems-RAKI        | \$31           |
| Job: 5006 - Control & Protection-RAKI            | \$96           |
| Job: 5007 - Systems Design & Integration-RAKI    | \$166          |
| Job: 5200 - Digital Coil Protection-HATCHER      | \$363          |
| Job: 5501 - Coil Bus Runs-SMITH                  | \$193          |
| Job: 6100 - Control Sys Data Acquisition -SICHTA | \$128          |
| Job: 7100 - Project Mgt & Integration-STRYKOWSKY | \$842          |
| Job: 7200 - Center Stack Management-DUDEK        | \$321          |
| Job: 7300 - NB2 Management-STEVENSON             | \$270          |
| Job: 7400 - Health Physics Support-STEVENSON     | \$511          |
| JOB: 7700 - NSTX-U HP Allocations-STRYKOWSKY     | \$353          |
| Job: 7710 - Upgrade Allocations-STRYKOWSKY       | \$30           |
| Job: 8200 - CS & Coil Sprt Struc Install- VIOLA  | \$47           |
| Job: 8250 - Remove/Install Centerstack-PERRY     |                |
| Job: 7900 - Integrated System-GENTILE            | \$2            |
| Base Estimate(early schedule)=                   | <b>\$8,666</b> |