

Work Authorization Document

NSTX Upgrade Project

| | | | |
|---------------------------|------|---------------|--------------|
| Control Account #: | 1300 | Title: | Center Stack |
|---------------------------|------|---------------|--------------|

| | | | |
|------------|-------|---------------|----------------|
| WBS | 1.1.3 | Title: | Magnet Systems |
|------------|-------|---------------|----------------|

Period of Performance: 04 January 2010 through 21 February 2014

| | | | |
|---------------------------|---------|---------------------------------|-------------|
| Authorized Budget: | \$1,063 | Control Account Manager: | Chrzanowski |
|---------------------------|---------|---------------------------------|-------------|

| | | | |
|--------------------|---|-----------------------|---------|
| Revision #: | 0 | Revision Date: | July-11 |
|--------------------|---|-----------------------|---------|

Authorized Work Description:

The magnet system consists of the outer Poloidal Field (PF) coils (PF#2-5), the outer Toroidal Field (TF) coil legs, and the Center Stack Assembly (CSA). The CSA contains the inner TF coil legs, the TF coil joint (flex bus assembly), the OH solenoid, the shaping coils, and the center stack casing. This WBS element includes the design, analysis, prototypes (as required), procurement activities and fabrication of the magnet systems up to and including the magnet system coil buswork, but does not include installation costs. Installations costs are included in WBS 1.8

The NSTX Upgrade Project will require engineering, analysis, design procurement and fabrication of a new CSA, replacement of two outer TF coil legs, and a fabrication of a new TF coil joint

This WBS element provides CAD design support for the overall assembly drawings associated with the CSA upgrade. It also includes some time for space allocation studies associated with the magnet upgrades. CAD design support for individual components is included in the specific component jobs.

Attachments:

- 1- A detailed Control Account schedule showing all work packages and planning packages.
- 2- Budgeted Cost by month.
- 3- Original Work Authorization Form (WAF)
- 4- WBS Dictionary sheet that defines the scope of work for this WBS element.

Control Account History

| ECP# | Implement Date | Prior Budget | New Budget | Signature |
|------|----------------|--------------|------------|-----------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| Approvals | Name | Signature | Date |
|-------------------------|------------------|-----------|------|
| NSTX-U Project Manager | R. Strykowski | | |
| Control Account Manager | Chrzanowski | | |
| Functional Manager | P. Heitzenroeder | | |

| Activity ID | Activity Description | Work Days | BASELINE START | Forecast Start | BASELINE FINISH | Forecast Finish | Schedule Slip (Days) | Total Float | Budgeted Cost | PPCT | Earned value cost (BCWP) | Planned value cost (BCWS) | FY11 | FY12 | FY13 | FY14 | FY15 | FY16 |
|---|--|-----------|----------------|----------------|-----------------|-----------------|----------------------|-------------|---------------|------|--------------------------|---------------------------|------------------------------|------|------|------|------|------|
| NSTX Upgrade Project | | | | | | | | | | | | | | | | | | |
| Subtotal | | 1,032 | 01JAN10A | 01JAN10A | 21FEB14 | 21FEB14 | 0 | 1,621 | 1,062,421.28 | | 315,483.55 | 315,483.55 | | | | | | |
| Job: 1300 - Center Stack-CHRZANOWSKI | | | | | | | | | | | | | | | | | | |
| Subtotal | | 1,032 | 01JAN10A | 01JAN10A | 21FEB14 | 21FEB14 | 0 | 1,621 | 1,062,421.28 | | 315,483.55 | 315,483.55 | | | | | | |
| 1300-0010 | Engineering & Dsgn Supp-Final Design (LOE) | 249* | 03MAY10A | 03MAY10A | 29APR11 | 29APR11A | 0 | | 272,028.55 | LOE | 272,028.55 | 272,028.55 | EA//EM =1,284 ; EA/SB =300 ; | | | | | |
| 1300-0011 | Engineering and Design Support-Title III | 698 | 02MAY11 | 02MAY11* | 21FEB14 | 21FEB14 | 0 | 1,621 | 746,937.73 | | 0.00 | 0.00 | EA//EM =3,834 ; | | | | | |
| FY101300 | FY10 Actual Cost | 85 | 01JAN10A | 01JAN10A | 30APR10A | 30APR10A | 0 | | 48,143.00 | 100 | 48,143.00 | 48,143.00 | | | | | | |
| FY101300A | FY10 Actual Cost (Corresponds to BCWP) | 110 | 03MAY10A | 03MAY10A | 30SEP10A | 30SEP10A | 0 | | -4,688.00 | 100 | -4,688.00 | -4,688.00 | 81= Net 0 | | | | | |

Data Date 30APR11 1105
Run Date 20MAY11 10:47

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**NSTX UPGRADES
RESOURCE LOADED SCHEDULE
CD-2 Schedule
April 2011**

Early Bar
 Progress Bar
 Critical Activity

| 1300 Center Stack (Chrzanowski) | 31JAN2011 | 28FEB2011 | 31MAR2011 | 30APR2011 | 31MAY2011 | 30JUN2011 | 31JUL2011 | 31AUG2011 | 30SEP2011 | 31OCT2011 | 30NOV2011 | 31DEC2011 |
|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| BCWS | 24 | 23 | 26 | 24 | 19 | 20 | 19 | 21 | 20 | 21 | 22 | 22 |
| CUM BCWS | 242 | 265 | 291 | 315 | 335 | 355 | 375 | 396 | 416 | 438 | 460 | 483 |
| BCWP | 24 | 23 | 26 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CUM BCWP | 242 | 265 | 291 | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 315 |
| ACWP | 13 | 15 | 20 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CUM ACWP | 204 | 219 | 239 | 264 | 264 | 264 | 264 | 264 | 264 | 264 | 264 | 264 |
| CV | 38 | 46 | 52 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 |
| SV | . | . | . | . | -19. | -40. | -59. | -81. | -101. | -122. | -145. | -167. |
| CPI | 1.19 | 1.21 | 1.22 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 |
| SPI | 1 | 1 | 1 | 1 | 0.94 | 0.89 | 0.84 | 0.8 | 0.76 | 0.72 | 0.69 | 0.65 |

| 1300 Center Stack (Chrzanowski) | 31JAN2012 | 29FEB2012 | 31MAR2012 | 30APR2012 | 31MAY2012 | 30JUN2012 | 31JUL2012 | 31AUG2012 | 30SEP2012 | 31OCT2012 | 30NOV2012 | 31DEC2012 |
|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| BCWS | 22 | 21 | 22 | 21 | 23 | 21 | 22 | 23 | 20 | 24 | 23 | 22 |
| CUM BCWS | 505 | 526 | 549 | 570 | 593 | 615 | 637 | 660 | 681 | 705 | 727 | 749 |
| BCWP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CUM BCWP | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 315 |
| ACWP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CUM ACWP | 264 | 264 | 264 | 264 | 264 | 264 | 264 | 264 | 264 | 264 | 264 | 264 |
| CV | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 |
| SV | -189. | -211. | -233. | -254. | -278. | -299. | -322. | -345. | -365. | -389. | -412. | -434. |
| CPI | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 |
| SPI | 0.62 | 0.6 | 0.58 | 0.55 | 0.53 | 0.51 | 0.5 | 0.48 | 0.46 | 0.45 | 0.43 | 0.42 |

| 1300 Center Stack (Chrzanowski) | 31JAN2013 | 28FEB2013 | 31MAR2013 | 30APR2013 | 31MAY2013 | 30JUN2013 | 31JUL2013 | 31AUG2013 | 30SEP2013 | 31OCT2013 | 30NOV2013 | 31DEC2013 |
|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| BCWS | 24 | 21 | 22 | 23 | 24 | 21 | 24 | 23 | 22 | 25 | 23 | 24 |
| CUM BCWS | 773 | 794 | 816 | 838 | 862 | 883 | 907 | 930 | 951 | 976 | 999 | 1,022 |
| BCWP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CUM BCWP | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 315 |
| ACWP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CUM ACWP | 264 | 264 | 264 | 264 | 264 | 264 | 264 | 264 | 264 | 264 | 264 | 264 |
| CV | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 |
| SV | -458. | -478. | -500. | -523. | -547. | -568. | -591. | -614. | -636. | -661. | -683. | -707. |
| CPI | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 |
| SPI | 0.41 | 0.4 | 0.39 | 0.38 | 0.37 | 0.36 | 0.35 | 0.34 | 0.33 | 0.32 | 0.32 | 0.31 |

Annex I – WBS Dictionary

This Work Breakdown Structure (WBS) organizes and defines the scope of the NSTX Upgrade using the WBS as established by the original NSTX project and modified to accommodate the NSTX Upgrade.

| <u>WBS</u> | | | |
|------------|------------|-----------|---|
| <u>L1</u> | <u>L2</u> | <u>L3</u> | <u>Description</u> |
| 1 | | | NSTX UPGRADE PROJECT |
| | 1.1 | | Torus Systems |
| | | 1.1.0 | Project Integrated Model |
| | | 1.1.1 | Plasma Facing Components |
| | | 1.1.2 | Vacuum Vessel and Support Structure |
| | | 1.1.3 | Magnet Systems |
| | 1.2 | | Plasma Heating and Current Drive Systems |
| | | 1.2.1 | High Harmonic Fast Wave (HHFW) |
| | | 1.2.2 | Coaxial Helicity Injection (CHI) Current Drive |
| | | 1.2.3 | Electron Cyclotron Heating (ECH) |
| | | 1.2.4 | Neutral Beam Injection (NBI) |
| | 1.3 | | Auxiliary Systems |
| | | 1.3.1 | Vacuum Pumping System |
| | | 1.3.2 | Coolant Systems |
| | | 1.3.3 | Bakeout Heating System |
| | | 1.3.4 | Gas Delivery System |
| | | 1.3.5 | Glow Discharge Cleaning System |
| | 1.4 | | Plasma Diagnostics |
| | | 1.4.1 | Plasma Diagnostics |
| | 1.5 | | Power Systems |
| | | 1.5.1 | AC Power Systems |
| | | 1.5.2 | AC/DC Converters |
| | | 1.5.3 | DC Systems |
| | | 1.5.4 | Control and Protection System |
| | | 1.5.5 | General Power Systems and Integration |
| | 1.6 | | Central Instrumentation and Controls (I&C) |
| | | 1.6.1 | Control System |
| | | 1.6.2 | Data Acquisition System |
| | 1.7 | | Project Support & Integration |
| | | 1.7.1 | Project Management and Integration |
| | | 1.7.2 | Project Physics |
| | | 1.7.3 | Integrated Systems Tests |
| | 1.8 | | Site Preparation and Assembly |
| | | 1.8.1 | Site Preparation |
| | | 1.8.2 | Torus Assembly and Construction |

Annex I – WBS Dictionary

does not include installation costs. Installations costs are included in WBS 1.8. **{Vacuum Vessel & Support Structure (Job 1200)}**

WBS Element: 1.1.3

WBS Level: 3

WBS Title: Magnet Systems

Definition: The magnet system consists of the outer Poloidal Field (PF) coils (PF#2-5), the outer Toroidal Field (TF) coil legs, and the Center Stack Assembly (CSA). The CSA contains the inner TF coil legs, the TF coil joint (flex bus assembly), the OH solenoid, the shaping coils, and the center stack casing. This WBS element includes the design, analysis, prototypes (as required), procurement activities and fabrication of the magnet systems up to and including the magnet system coil buswork, but does not include installation costs. Installations costs are included in WBS 1.8

The NSTX Upgrade Project will require engineering, analysis, design procurement and fabrication of a new CSA, replacement of two outer TF coil legs, and a fabrication of a new TF coil joint

This WBS element provides CAD design support for the overall assembly drawings associated with the CSA upgrade. It also includes some time for space allocation studies associated with the magnet upgrades. CAD design support for individual components is included in the specific component jobs.

{Center Stack Upgrade Project Design Support (Job 1300)}

WBS Element: 1.1.3.1

WBS Level: 4

WBS Title: Outer Poloidal Field Coils (PF #3-5)

Definition: The outer Poloidal Field coils (PF 3-5) consist of 5 poloidal field coils PF 3 upper and lower, PF 4 upper and lower and PF 5. There are no changes to the outer PF coils as part of the NSTX Upgrade Project scope.

WBS Element: 1.1.3.2

WBS Level: 4

WBS Title: Outer Toroidal Field Coils

Definition: The outer Toroidal Field coils subsystem consists of the coil sections that make up the 12 TF outer legs. This WBS element includes the design, analysis, prototypes (as required), procurement activities and fabrication. For the NSTX Upgrade Project two (2) new Outer TF coils will be fabricated to replace existing ones. This WBS element includes the fabrication of (2) new Outer TF coils to replace the existing leaking OTF#7 and OTF#11 in NSTX. The scope includes the procurement of conductor, insulation material, aluminum castings and supports necessary to fabricate a new OTF coils. Coil fabrication will be performed in-house. This scope does not include costs associated with installation. Installations costs are included in WBS 1.8

{Outer Toroidal Field Coil Repairs (Job 1301)}

Work Approval Form (WAF)

Cost Center: 9417
Job Number: 1300
Job Title: Title: Centerstack Design Support
Job Manager: Job Manager: James H. Chrzanowski

Description:

- 1) This job provides Engineering support for the 1300 CS upgrade activities.
- 2) Cad design support for upgrading machine assembly drawings associated with the CS upgrades.

Schedule:

See Tab B or attached

Approvals:

Job Manager

Project Manager

Engineering Department Head

Cost Center: 9417
Job Number: 1300
Job Title: Centerstack Design Support
Job Manager: James H. Chrzanowski

| USER INPUT TASKS AND DESCRIPTIONS | | SCHEDULE | | | | |
|-----------------------------------|---|-------------|-----------------------|--|------------|-------------|
| task | TASK DESCRIPTION | RESPONSIBLE | USER INPUT | | Calculated | |
| | | | DURATION in WORK DAYS | Logical Pre-requisites (one task number in each column, any order) | | |
| numb | | | DURATION in WORK DAYS | Logical Pre-requisites (one task number in each column, any order) | START DATE | FINISH DATE |
| 1 | Preliminary Design Review | Chrzanowski | 70 | | 6/24/10 | 9/30/2010 |
| 2 | Fiscal year 2010- Design support | Chrzanowski | 125 | | 10/1/10 | 3/25/2011 |
| 3 | Fiscal year 2011- Design support- Phase I | Chrzanowski | 135 | | 3/24/11 | |
| 4 | Fiscal year 2011- Engr Support- Phase II | Chrzanowski | 261 | | 3/25/11 | 9/30/2011 |
| 5 | Fiscal year 2012- Engr Support | Chrzanowski | 260 | | 10/1/11 | 9/30/2012 |
| 6 | Fiscal year 2013- Engr Support | Chrzanowski | | | 10/1/12 | 9/30/2013 |
| 7 | Cad design support- Overall machine assy drawings | Chrzanowski | 210 | | 6/4/10 | 3/25/2011 |
| 8 | OTHER TASKS | | | | | |

| task | TASK DESCRIPTION | RESPONSIBLE | DURATION in WORK DAYS | Logical Pre-requisites (one task number in each column, any order) | START DATE | FINISH DATE | Estimate (user input) | | | | | | | | | | | | | | | | | | | |
|---------------------------------------|---|-------------|-----------------------|--|------------|-------------|-----------------------|--|--|--|--|------------------------------|--|--|--|--|--|--------------------|--|---------------------|--|--|--|--|--|--|
| | | | | | | | FY10\$K | | | | | HOURS (priced at FY10 rates) | | | | | | COST CONTINGENCY % | | SCHED CONTINGENCY % | | | | | | |
| 1 | Preliminary Design Review | Chrzanowski | 70 | | 6/24/10 | 9/30/2010 | | | | | | | | | | | | | | | | | | | | |
| 2 | Fiscal year 2010- Design support | Chrzanowski | 125 | | 10/1/10 | 3/25/2011 | | | | | | | | | | | | | | | | | | | | |
| 3 | Fiscal year 2011- Design support- Phase I | Chrzanowski | 135 | | 3/24/11 | | | | | | | | | | | | | | | | | | | | | |
| 4 | Fiscal year 2011- Engr Support- Phase II | Chrzanowski | 261 | | 3/25/11 | 9/30/2011 | | | | | | | | | | | | | | | | | | | | |
| 5 | Fiscal year 2012- Engr Support | Chrzanowski | 260 | | 10/1/11 | 9/30/2012 | | | | | | | | | | | | | | | | | | | | |
| 6 | Fiscal year 2013- Engr Support | Chrzanowski | | | 10/1/12 | 9/30/2013 | | | | | | | | | | | | | | | | | | | | |
| 7 | Cad design support- Overall machine assy drawings | Chrzanowski | 210 | | 6/4/10 | 3/25/2011 | | | | | | | | | | | | | | | | | | | | |
| 8 | OTHER TASKS | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTALS | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL Preliminary Cost Estimate (\$K) | | | | | | | | | | | | | | | | | | | | | | | | | | |

| task | TASK DESCRIPTION | RESPONSIBLE | DURATION in WORK DAYS | Logical Pre-requisites (one task number in each column, any order) | START DATE | FINISH DATE | Estimate (user input) | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------|---|-------------|-----------------------|--|------------|-------------|-----------------------|--|--|--|--|------------------------------|--|--|--|--|--|--------------------|--|---------------------|--|--|--|--|--|--|--|
| | | | | | | | FY10\$K | | | | | HOURS (priced at FY10 rates) | | | | | | COST CONTINGENCY % | | SCHED CONTINGENCY % | | | | | | | |
| 9 | Fiscal year 2010- Design support | Chrzanowski | 70 | | 6/24/10 | 9/30/2010 | | | | | | | | | | | | | | | | | | | | | |
| 10 | Fiscal year 2011- Design support- Phase I | Chrzanowski | 125 | | 10/1/10 | 3/25/2011 | | | | | | | | | | | | | | | | | | | | | |
| 11 | Fiscal year 2011- Engr Support- Phase II | Chrzanowski | 135 | | 3/24/11 | | | | | | | | | | | | | | | | | | | | | | |
| 12 | Fiscal year 2012- Engr Support | Chrzanowski | 261 | | 3/25/11 | 9/30/2011 | | | | | | | | | | | | | | | | | | | | | |
| 13 | Fiscal year 2013- Engr Support | Chrzanowski | 260 | | 10/1/11 | 9/30/2012 | | | | | | | | | | | | | | | | | | | | | |
| 14 | Cad design support- Overall machine assy drawings | Chrzanowski | 210 | | 6/4/10 | 3/25/2011 | | | | | | | | | | | | | | | | | | | | | |
| 15 | OTHER TASKS | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTALS | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL Preliminary Cost Estimate (\$K) | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Notes: (1) Procurement lead time:
Purchase orders-Commercial, off-the-shelf items
Purchase orders-Noncommercial items
Subcontracts (non construction)
Construction subcontracts

CATEGORIZATION CODES:
1 - National Standards
2 - Engineering Judgement/Experience
3 - Estimates/Data from External Sources (e.g., WTX
4 - Previous PPPL/ORNL Experience (e.g., TFTR, NS
5 - Prototype Data/Test Results
6 - Catalogue Price/Vendor Quote
7 - Placed Contracts
8 - Actual experience for NCSX Work
9 - Other

| | | | | | | | | | | | |
|---|------------------------------------|-------------------------|-----------------|-------------------|-----------------------|-----------------|----------------------|-----------------------|--|--|--------------------------------------|
| Cost Center: | 9417 | | | | | | | | | | |
| Job Number: | 1300 | | | | | | | | | | |
| Job Title: | Title: Centerstack Design Support | | | | | | | | | | |
| Job Manager: | Job Manager: James H. Chrizanowski | | | | | | | | | | |
| Uncertainty of the Estimate | | | | | | | | | | | |
| | | High | Medium | Low | Uncertainty Range (%) | | | | | | <u>Comments/Other Considerations</u> |
| Design Maturity | | | | | | LOE as required | | | | | |
| Design Complexity | | | | | | | | | | | |
| Residual Impacts | | | | | | | | | | | |
| | Risk Description | Likelihood of Occurring | Mitigation Plan | Basis of estimate | Low (\$K) | High (\$K) | Schedule Low (weeks) | Schedule High (Weeks) | | | |
| 1 | No risks | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| Notes: | | | | | | | | | | | |
| (1) Cost impacts should NOT include standing army costs which are separately calculated from the schedule impact | | | | | | | | | | | |
| (2) 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. | | | | | | | | | | | |
| (3) 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=Unlikely (40%>P>10%), VU=Very Unlikely (P<10%), NC=Non-credible (P<1%) | | | | | | | | | | | |

| Design Maturity | | Design Complexity | | | Design Maturity Definition | | | |
|-----------------|------|-------------------|--------|------|-------------------------------------|---|--------|--|
| | | Low | Medium | High | | | | |
| Low | -15% | +25% | -20% | +40% | -30% | +60% | High | Final design available. All design features/requirements well known. No further design development or evolution expected that will impact estimate. |
| Medium | -10% | +15% | -15% | +25% | -20% | +40% | Medium | Preliminary design available. Some additional design evolution likely. Further developments can be somewhat expected or anticipated and reflected in estimate. |
| High | -5% | +10% | -10% | +15% | -15% | +25% | Low | No better than conceptual design basis currently available. Design details, procedures, etc. still need much development and evolution of requirements beyond estimate basis is likely and expected. |
| | | | | | Design Complexity Definition | | | |
| | | | | | Low | Work is fairly well understood -- either standard construction or repetition of activities performed in past. Little likelihood of estimate not being well understood and requirements not being well defined. | | |
| | | | | | Medium | More complex work requirements that have potential to impact cost and schedule estimates. Limited experience performing similar tasks, so ability to estimate accurately is somewhat suspect | | |
| | | | | | High | Extremely challenging tasks and/or requirements. Unique or first-of-a-kind assembly or work tasks. No good basis for estimating work exists so there is a high degree of estimate uncertainty. Based on standard industry and DOE estimate classifications (Per AACEI Recommended | | |

Cost Center:
Job Number:
Job Title:
Job Manager:

9417
 1300
 Title: Centerstack Design Support
 Job Manager: James H. Chrzanowski

Materials and Subcontracts (M&S)

Basis of Estimate

Description:

NO M&S Costs

N/A

| CATEGORIZATION CODES: | |
|--|---------|
| 1 - National Standards | #DIV/0! |
| 2 - Engineering Judgement/Experience | #DIV/0! |
| 3 - Estimate/Data from External Sources (e.g., W7X, ATF, etc.) | #DIV/0! |
| 4 - Previous PPP/ORNL Experience (e.g., TFR, NSTX, PLT, etc.) | #DIV/0! |
| 5 - Prototype Data/Test Results | #DIV/0! |
| 6 - Catalogue Price/Vendor Quote | #DIV/0! |
| 7 - Placed Contracts | #DIV/0! |
| 8 - Actual experience for NCSX Work | #DIV/0! |
| 9 - Other | #DIV/0! |
| TOTALS | \$ |