

## NCSX Work Approval Form (WAF)

**WBS Number: 63**

**WBS Title: Utility Systems**

**Job Number: 6301**

**Job Title: Utility Systems**

**Job Manager: Larry Dudek**

**Description:**

The Utility Systems (WBS 63) are required to provide service manifolds around the NCSX stellarator for compressed air, vacuum pump venting and gaseous nitrogen. Utility Systems are comprised of three (3) service manifolds around the NCSX vacuum vessel: one for vacuum venting; one for GN2 service; and one for compressed air. The WBS element only consists of the effort to provide the design, fabrication and installation of a manifold system around the NCSX stellarator for compressed air, vacuum pump venting and gaseous nitrogen.

**Schedule:**

See Attached

**Approvals:**

\_\_\_\_\_  
Job Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
Responsible Line Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
Project Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
Engineering Department Head

\_\_\_\_\_  
Date



NCSX June 2007 ETC  
**TABLE II - Materials and Subcontracts**

|   |  |  |  |  |  |  |  |                          |
|---|--|--|--|--|--|--|--|--------------------------|
| <b>WBS Number: 63</b>                       |  |  |  |  |  |  |  |                          |
| <b>WBS Title: Utility Systems</b>           |  |  |  |  |  |  |  |                          |
| <b>Job Number: 6301</b>                     |  |  |  |  |  |  |  |                          |
| <b>Job Title: Utility Systems</b>           |  |  |  |  |  |  |  |                          |
| <b>Job Manager: Larry Dudek</b>             |  |  |  |  |  |  |  |                          |
| <b>Materials and Subcontracts (M&amp;S)</b> |  |  |  |  |  |  |  | <b>Basis of Estimate</b> |
| <b>M&amp;S in Table I</b>                   |  |  |  |  |  |  |  |                          |
|   |  |  |  |  |  |  |  |                          |
|   |  |  |  |  |  |  |  |                          |

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**TABLE III - Fabrication/Assembly Installation**

|   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <b>In-house Fabrication and Assembly and Installation</b> |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <b>Fabrication &amp; Installation in Table I</b>          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**NCSX June 2007 ETC**  
**TABLE IV - Uncertainty of Estimate and Residual Risk Assessment**

**WBS Number: 63**  
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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             |            |                              | Design not complicated, but still in a conceptual stage. |
| Design Complexity |             |               | X          | -10%/+15%                    | Standard piping -- off-the-shelf components              |

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

**Residual Impacts**

| <u>Job</u> | <u>Risk Description</u> | <u>Likelihood of Occurring</u> | <u>Mitigation Plan</u> | <u>Basis of estimate</u> | <u>Cost Impact</u> |             | <u>Schedule Impact</u> |             |
|------------|-------------------------|--------------------------------|------------------------|--------------------------|--------------------|-------------|------------------------|-------------|
|            |                         |                                |                        |                          | <u>Low</u>         | <u>High</u> | <u>Low</u>             | <u>High</u> |
| NONE       |                         |                                |                        |                          |                    |             |                        |             |

**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%)





| 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 |  |
| <b>63 - Utility Systems</b>              |                           |  |                      |                |                 |        |             |         |                   |                                |      |      |      |      |      |  |
| <b>Job: 6301 - Utility Systems-DUDEK</b> |                           |  |                      |                |                 |        |             |         |                   |                                |      |      |      |      |      |  |
|  |                           |  |                      |                |                 |        |             |         |                   |                                |      |      |      |      |      |  |
| 6301-001                                 |                           | Vac Vent and Air sys- Prelim Dsn                 | 20                   | 06OCT08*       | 31OCT08         |        | 285         |         | 18,479.60         | EM//EM =52hr ; EA//SB =80hr ;  |      |      |      |      |      |  |
| 6301-005                                 |                           | Vac Vent and Air sys- PDR                        | 1                    | 03NOV08*       | 03NOV08         |        | 285         |         | 1,324.00          | EM//EM =08hr ;                 |      |      |      |      |      |  |
| 6301-009                                 |                           | Vac Vent and Air sys- Final dsn                  | 10                   | 04NOV08*       | 17NOV08         |        | 285         |         | 11,859.60         | EM//EM =12hr ; EA//SB =80hr ;  |      |      |      |      |      |  |
| 6301-010                                 |                           | Vac Vent and Air sys- FDR                        | 1                    | 18NOV08*       | 18NOV08         |        | 285         |         | 1,324.00          | EM//EM =08hr ;                 |      |      |      |      |      |  |
| 6301-013                                 |                           | Vac Vent and Air sys- Procure hardware and compo | 60                   | 19NOV08        | 23FEB09         |        | 285         |         | 37,396.80         | EM//EM =20hr ; 41=24.398\$K ;  |      |      |      |      |      |  |
| 6301-017                                 |                           | Vac Vent and Air sys- Fabricate and Install      | 40                   | 01MAY09*       | 26JUN09         |        | 237         |         | 29,862.12         | EM//EM =20hr ; EM//TB =322hr ; |      |      |      |      |      |  |
| 6301-020                                 |                           | Vac Vent and Air sys-Test                        | 10                   | 29JUN09*       | 13JUL09         |        | 237         |         | 4,622.40          | EM//EM =08hr ; EM//TB =40hr ;  |      |      |      |      |      |  |
| Subtotal                                 |                           |  | 190                  | 06OCT08        | 13JUL09         |        | 237         |         | 104,868.52        |                                |      |      |      |      |      |  |