07 February 2006

To: Distribution

From: Wayne Reiersen

Subject: Notes from yesterday's meeting on Station 1 preparations

Our weekly telecon to track progress and issues regarding Station 1 preparation activities was held yesterday. Dudek, Labik, Raftopoulos, Edwards, Stratton, and Reiersen participated from PPPL. Goranson and Nelson participated from ORNL. Viola was still away at MTM assisting in bakeout and leak checking.

1. **Procurements (Dudek)**.
    a. Dudek reported that the cryostat interface flanges have arrived. Dimensionally, they look good. Permeability of the welds looks high (1.1-1.2) but there was no spec on permeability, just SS316. The bellows were dented but since this is not a vacuum application, that should be fine.
    b. Edwards identified a vendor for the Inconel studs. *He will provide the vendor info to Goranson so he can call out the part on the drawing. Edwards was authorized to go ahead with the stud order.*
2. **Station 1 fabrication and installation (Dudek)**. Dudek reported that both fixtures have been completed. A designer is working on the design of a brake to ensure that the VV period assembly cannot move after it has been positioned.
3. **Magnetic diagnostics (Labik)**.
    a. Labik indicated that the templates will be fabricated at PPPL to ensure that they will be ready on time. Most of the templates have been released for fabrication. Modifications to the large loops are still being made. Labik indicated that the cutouts to hold the clips are being incorporated into the drawings, obviating the need to hand cut them afterwards. The copper sheet has been received from McMaster-Carr. Water jet cutting of the templates should begin this week.
    b. Tom Brown reported in the last telecon that the loop positions have been sent to *Cole who will be updating the Martin Brown drawings*. No work has been done on this yet due to other commitments.
4. **H/C tube final design (Goranson)**.
    a. Goranson reported that the tests of the H/C tube were successful when a Grafoil gasket material was used under the saddles. Goranson indicated that another three days would be required to reduce the data. Doilies are also being tested which may impact the stud patterns. The pressure drop was reported to be high. Labik expressed concern about flow balancing in the absence of active controls. Goranson indicated that an FDR was at

least two weeks away. *Goranson to complete final design of the H/C tubes and conduct an FDR ASAP*.

5. **Heater tape design (Goranson)**.

    a. The non-magnetic heater tape arrived at ORNL and the nickel-plated copper leads appear magnetic. The plan was for ORNL to do some basic tests with the non-magnetic heater tape – make sure it can operate at 350C and verify that it is non-magnetic. Goranson indicated that these tests were held up pending resolution of the magnetic lead issue. Art Brooks is looking into the acceptability of the "non-magnetic" heater tape. His intuition is that given the low saturation field and the low volume of magnetic material (just the nickel plating), the commercially available product will be acceptable. He will confirm this as soon as he can fit it in. Meanwhile, *Goranson will proceed with the test to verify that it can indeed operate at 350C. Dudek is exploring the silver plated option suggested by Goranson with the manufacturer.*

    b. ORNL will also test the heater tape as part of an integrated test (prototype) of the H/C tubes, heater tape, thermal insulation system, and magnetic loops. The integrated test, which will address whether we can really control the temperature profile adequately, should be completed before we install the heater tape on Port 12. Upon completion of the integrated test, there will be a follow-up FDR that will be used as the basis for authorizing installation of the heater tape on Port 12 and procurement of the heater tape for the other port extensions. No progress was reported on setting up the integrated test, but it was noted that this work is not schedule critical for the heater tapes which can be installed after the flux loops and H/C tubes if necessary. *(Goranson to expedite conduct of the integrated test.)*

6. **Station 1 plan and procedure development (Viola)**.

    a. *No report this week other than from John Edwards who indicated that he is developing the procedure for assembling the flux loops and coolant tubes on the VV period assembly*. There are a number of plans and procedures required for Station 1 activities. The Station 1 Dimensional Control Plan (Stratton) is complete and in the signature loop. The Station 1 FPA Sequence Plan (Brown) is in the review cycle. These two documents along with the Station 1 assembly drawings are foundational for developing the Station 1 MIT/QA Plan and implementing procedures. The project has developed guidelines for what should be in a facility operations plan and what should be in an MIT/QA plan. Bob Simmons has updated the Manufacturing Facility Operations Plan and the draft Station 1 MIT/QA Plan consistent with these guidelines. The updated plans were sent out for review. Viola discussed his vision of procedures required for Station 1. The first Station 1 procedure will be a QA procedure which Viola and Edwards will write. This procedure will include [1] a "gross damage and number count" receipt inspection of the VVSA [2] mounting the VV period assembly in the turning fixture [3]

performing a metrology check of the VVSA dimensions and [4] performing receipt inspection of all components to be installed on Station 1 including H/C tubes and manifold assemblies and attaching hardware; heater tapes; cryostat interface flanges; flux loop templates and wire; and miscellaneous hardware. Viola is planning to have supporting procedures written for the VV period assembly critical lift (Viola) and metrology check (Raftopoulos). The QA procedure should be out for review by February 7. (*Viola to develop a comprehensive list of procedures to execute all the work on Station 1 and to work with Dudek to have all activities associated with procedure development, review, and approval reflected in the schedule for Station 1 prep which Dudek is maintaining.)*

b. There was discussion of what drawings would be available to support work on Station 1 and what additional drawings would be required. *No report this week. Viola to resolve with Brown the additional information required on the drawings to support writing the procedures and performing Station 1 assembly activities. He should also explore the use of "eDrawings" to facilitate viewing of Pro/E models and assemblies during FPA.)*

7. **Station 1 metrology (Raftopoulos)**.

a. The Leica laser tracker and a refurbished Romer arm will reportedly be used for assembly operations on Station 1. The Leica has not been used before on the NCSX project. New software has been bought or is planned to be bought. Nobody is expert in the use of this equipment. Raftopoulos believes the Leica is working properly, but is not sure. He has not been able to do the calibration due to Duco's unavailability. Dudek said that the Leica should be factory serviced before being put in service. *Raftopoulos to arrange for a factory service ASAP, even before the calibration if possible.*

b. Raftopoulos indicated Verisoft training has been arranged for March 1-3. The training will be conducted in the NCSX Test Cell. *Raftopoulos to verify test cell availability with Erik Perry.*

c. Raftopoulos would like for the training to be conducted on the VVSA and would like to trial the procedures for mounting the flux loops and studs for the H/C tube clamps as part of the training. *Raftopoulos to make the necessary arrangements for all of the hardware required to support the training to be available on time. Raftopoulos is also asked to update his plan for ensuring that all of the required hardware and software for metrology activities on Station 1 is operational and personnel have been trained before Station 1 activities are scheduled to begin consistent with this new training date.*

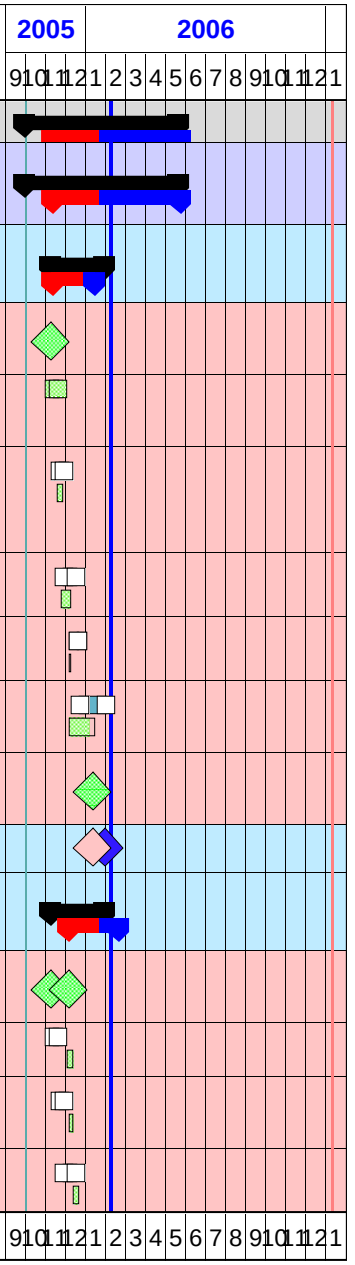
Please advise if any additions or corrections are in order. There will be no meeting next week. The next meeting will be the next Monday, February 13, at our regular 10am time slot. *Please be prepared to respond to the assigned action items.* An updated schedule

for MC fabrication prep and FPA Station1 prep activities (courtesy of Larry Dudek) has been attached.

Distribution: Dudek, Nelson, Goranson, Labik, Brown, Cole, Neilson, Stratton, Zarnstorff, Raftopoulos, Viola, Simmons, Edwards

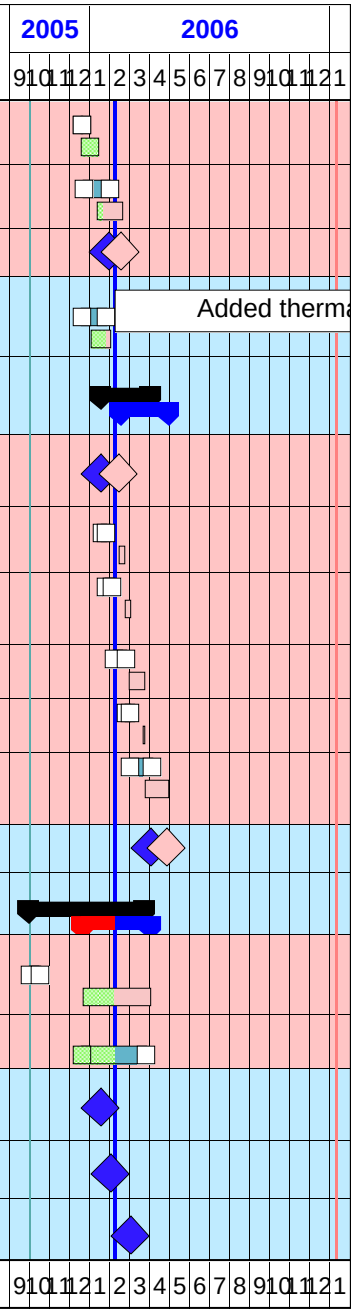
NCSX Fabrication

	Job No.	Activity Name	Respon.	Dur. (Work Days)	Revised Start Date	Revised Finish Date	% Comp.
1	12**	**VV SUBASSEMBLY**		**162.00**	**11/11/05**	**5/23/06**	**37.1%**
2	1203	VV Final Design (Job 1203) - Goranson		**162.00**	**11/11/05**	**5/23/06**	**37.2%**
3	1203	*Procurement of cryostat interface flange*		***53.00***	**11/11/05**	**1/13/06**	***90.0%***
4	1203	Authorize procurement of cryostat interface flange	Nelson	0.00	11/11/05	11/11/05	100.0%
5	1204	Cryostat interface flange Requisition No. 403465	Dudek	5.00	11/14/05	11/18/05	100.0%
6	1204	Cryostat interface flange RequisitionReview/Approval/Assignment	Dudek	6.00	11/18/05	11/25/05	100.0%
7	1204	Cryostat interface flange RFQ	Dudek	14.00	11/25/05	12/6/05	100.0%
8	1204	Cryostat interface flange Award	Dudek	2.00	12/6/05	12/7/05	100.0%
9	1204	Cryostat interface flange Procurement /Delivery	Dudek	25.00	12/8/05	1/13/06	79.0%
10	1204	Receive Cryostat Interface flange for VV seg 1		0.00	1/13/06	1/13/06	100.0%
11	1204	*Receive cryostat interface flanges*	*Dudek*	*0.00*	1/13/06	1/13/06	*0.0%*
12	1203	*Procurement of H/C manifolds*		***53.00***	**12/5/05**	**2/17/06**	***61.5%***
13	1203	Authorize procurement of H/C manifolds	Nelson	0.00	12/6/05	12/6/05	100.0%
14	1204	H/C manifolds Requisition	Dudek	5.00	12/5/05	12/9/05	100.0%
15	1204	H/C manifolds Requisition Review/Approval/Assignment	Dudek	6.00	12/6/05	12/9/05	100.0%
16	1204	H/C manifolds RFQ	Dudek	14.00	12/12/05	12/20/05	100.0%
				744.50			



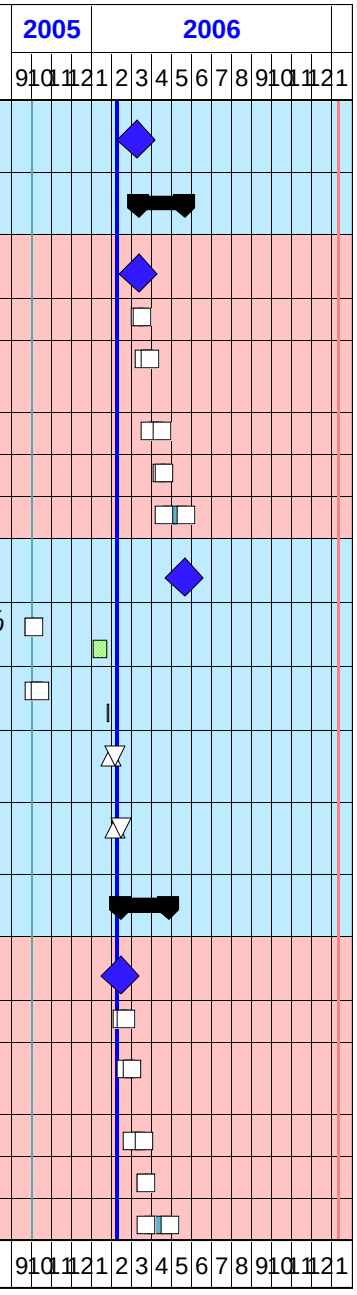
NCSX Fabrication

	Job No.	Activity Name	Respon.	Dur. (Work Days)	Revised Start Date	Revised Finish Date	% Comp.
17	1204	H/C manifolds Award	Dudek	2.00	12/20/05	1/13/06	100.0%
18	1204	H/C manifolds Procurement /Delivery	Dudek	25.00	1/13/06	2/17/06	20.0%
19	1204	Receive H/C manifold	Dudek	0.00	2/17/06	2/17/06	0.0%
20	1203	*Conduct test of H/C Tube*	*Goranson*	*20.00*	1/3/06	1/31/06	*70.0%*
21	1203	*Procurement of H/C tubes and attachments*		***52.00***	**2/14/06**	**4/27/06**	***0.0%***
22	1203	Authorize procurement of H/C tubes and attachments	Nelson	0.00	2/14/06	2/14/06	0.0%
23	1204	H/C Tube & Att. Requisition	Dudek	5.00	2/14/06	2/21/06	0.0%
24	1204	H/C Tube & Att. Requisition Review/Approval/Assignment	Dudek	6.00	2/22/06	3/1/06	0.0%
25	1204	H/C Tube & Att. RFQ	Dudek	14.00	3/2/06	3/21/06	0.0%
26	1204	H/C Tube & Att. Award	Dudek	2.00	3/22/06	3/23/06	0.0%
27	1204	H/C Tube & Att. Procurement /Delivery	Dudek	25.00	3/24/06	4/27/06	0.0%
28	1204	*Receive H/C tubes and attachments*	*Dudek*	*0.00*	4/27/06	4/27/06	*0.0%*
29	1204	*VV Vertical Supports Procurements*		***120.00***	**12/19/05**	**3/30/06**	***47.2%***
30	1204	G-11CR Parts Procurement	Dudek	12.00	12/22/05	3/30/06	44.4%
31	1204	Titanium Rod Ends Procurement	Dudek	64.00	12/19/05	3/24/06	50.0%
32	1203	*Develop layout of thermocouples on 120-degree segment*	*Goranson*	*0.00*	1/20/06	1/20/06	*0.0%*
33	1203	*Conduct PDR for Local I&C*	*Goranson*	*0.00*	2/3/06	2/3/06	*0.0%*
34	1203	*Conduct FDR for Local I&C*	*Goranson*	*0.00*	3/3/06	3/3/06	*0.0%*
				744.50			



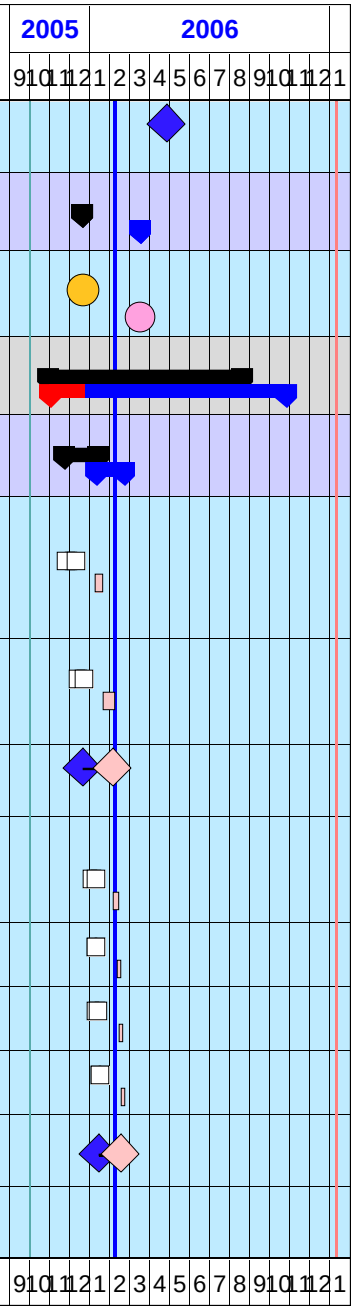
NCSX Fabrication

	Job No.	Activity Name	Respon.	Dur. (Work Days)	Revised Start Date	Revised Finish Date	% Comp.
35	1203	*Finalize procurement package for Local I&C*	*Goranson*	*0.00*	3/10/06	3/10/06	*0.0%*
36	1203	*Procurement of Local I&C*		***52.00***	**3/13/06**	**5/23/06**	***0.0%***
37	1203	Authorize procurement of Local I&C	Nelson	0.00	3/13/06	3/13/06	0.0%
38	1204	Local I&C Requisition	Dudek	5.00	3/13/06	3/17/06	0.0%
39	1204	Local I&C Requisition Review/Approval/Assignment	Dudek	6.00	3/20/06	3/27/06	0.0%
40	1204	Local I&C RFQ	Dudek	14.00	3/28/06	4/14/06	0.0%
41	1204	Local I&C Award	Dudek	2.00	4/17/06	4/18/06	0.0%
42	1204	Local I&C Procurement /Delivery	Dudek	25.00	4/19/06	5/23/06	0.0%
43	1204	*Receive Local I&C*	*Dudek*	*0.00*	5/23/06	5/23/06	*0.0%*
44	1203	*Procure Sample Heater Tape*	*Dudek*	*1.00*	1/3/06	1/23/06	*100.0%*
45	1203	*Test Sample Heater Tape*	*Goranson*	*10.00*	1/24/06	1/24/06	*50.0%*
46	1203	*Conduct FDR for Port 12 heater tape to support porcurement*	*Goranson*	*5.00*	1/31/06	2/6/06	*0.0%*
47	1203	*Finalize procurement package for Port 12 heater tape*	*Goranson*	*5.00*	2/7/06	2/13/06	*0.0%*
48	1203	*Procurement of Port 12 heater tape*		***52.00***	**2/13/06**	**4/26/06**	***0.0%***
49	1203	Authorize procurement of heater tape	Nelson	0.00	2/13/06	2/13/06	0.0%
50	1204	Heater tape Requisition	Dudek	5.00	2/14/06	2/20/06	0.0%
51	1204	Heater tape Requisition Review/Approval/Assignment	Dudek	6.00	2/21/06	2/28/06	0.0%
52	1204	Heater tape RFQ	Dudek	14.00	3/1/06	3/20/06	0.0%
53	1204	Heater tape Award	Dudek	2.00	3/21/06	3/22/06	0.0%
54	1204	Heater tape Procurement /Delivery	Dudek	25.00	3/23/06	4/26/06	0.0%
				744.50			



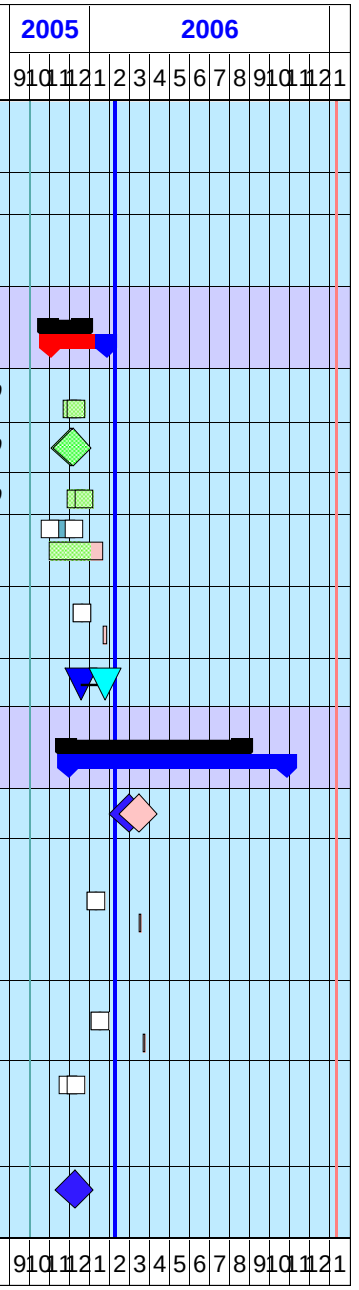
NCSX Fabrication

	Job No.	Activity Name	Respon.	Dur. (Work Days)	Revised Start Date	Revised Finish Date	% Comp.
55	1204	*Receive Port 12 heater tape and attaching hardware*	*Dudek*	*0.00*	4/26/06	4/26/06	*0.0%*
56	1250	VVSA Fabrication (Job 1250) - Viola		**0.00**	**3/15/06**	**3/15/06**	**0.0%**
57	1250	*Receive / acceptance of 1st VVSA*	*Viola*	*0.00*	3/15/06	3/15/06	*0.0%*
58	18**	**FIELD PERIOD ASSEMBLY**		**204.00**	**11/1/05**	**10/26/06**	**14.8%**
59	1802	FPA Oversight and Support (Job 1802) - Viola		**30.13**	**1/9/06**	**2/20/06**	**0.0%**
60	1802	*Develop draft procedure for mounting 120-degree segment in Station 1 and performing receipt inspection. Issue for review.*	*Viola*	*10.00*	1/9/06	1/20/06	*0.0%*
61	1802	*Finalize procedure for mounting 120-degree segment in Station 1 and performing receipt inspection*	*Viola*	*10.00*	1/23/06	2/6/06	*0.0%*
62	1802	*D-Site Work Permit / Authorize WP form for Installation to commence*	*Viola*	*0.00*	2/6/06	2/6/06	*0.0%*
63	1802	*Conduct JHA/training/pre-job brief for mounting 120-degree segment in Station 1 and performing receipt*	*Viola*	*4.00*	2/7/06	2/13/06	*0.0%*
64	1802	*Conduct ACC Review*	*Viola*	*1.00*	2/13/06	2/14/06	*0.0%*
65	1802	*Address ACC recommendations*	*Viola*	*3.00*	2/14/06	2/17/06	*0.0%*
66	1802	*Authorize initial operation of Station 1*	*Viola*	*1.00*	2/17/06	2/20/06	*0.0%*
67	1802	*<< Station 1 authorized for mounting and receipt inspection >>*		*0.00*	2/17/06	2/17/06	*0.0%*
68	1802	*Expand Station 1 procedure to include metrology set-up and initial layout*					
				744.50			



NCSX Fabrication

	Job No.	Activity Name	Respon.	Dur. (Work Days)	Revised Start Date	Revised Finish Date	% Comp.
69	1802	*Complete Station 1 procedure. Issue for review.*					
70	1802	*Finalize Station 1 procedure*					
71	1802	*<< Procedures ready to complete Station 1 activities >>*					
72	1803	FPA Tooling and Constructability (Job 1803) - Brown		**38.00**	**11/1/05**	**1/24/06**	**81.2%**
73	1803	*Develop assembly sequence*		*5.00*	12/5/05	12/9/05	*100.0%*
74	1803	**Peer review assembly sequence**	*Brown*	*0.00*	12/8/05	12/8/05	*100.0%*
75	1803	*Finalize assembly sequence*	*Brown*	*10.00*	12/9/05	12/22/05	*100.0%*
76	1803	*Fabricate Station 1 assembly fixture at PPPL*	*Dudek*	*25.00*	11/1/05	1/20/06	*80.1%*
77	1803	*Clear North Area of FPA area / Install fixture in Test Cell*	*Viola*	*2.00*	1/23/06	1/24/06	*0.0%*
78	1803	*<< Station 1 fixture assembled >>*		*0.00*	1/24/06	1/24/06	*0.0%*
79	1810	Field Period Assembly (Job 1810) - Viola		**185.00**	**11/28/05**	**10/26/06**	**0.0%**
80	1810	*Receive and inspect VVSA (on pallet)*	*Viola*	*0.00*	3/15/06	3/15/06	*0.0%*
81	1810	*Prep 120-degree segment for mounting on Station 1 fixture (includes installation of cryostat interface flange, port flanges, etc.)*	*Viola*	*3.00*	3/15/06	3/17/06	*0.0%*
82	1810	*Check CG and mount 120-degree segment on Station 1 fixture*	*Viola*	*1.00*	3/22/06	3/22/06	*0.0%*
83	1810	*Develop metrology procedure for performing the inital metrology setup. Issue for review.*	*Raftopoulos*	*10.00*	11/28/05	12/9/05	*0.0%*
84	1810	*Issue metrology procedure for review (Station 1 Act)*	*Raftopoulos*	*0.00*	12/9/05	12/9/05	*0.0%*
				744.50			



NCSX Fabrication

	Job No.	Activity Name	Respon.	Dur. (Work Days)	Revised Start Date	Revised Finish Date	% Comp.
85	1810	*Finalize metrology procedure for performing the inital metrology setup*	*Raftopoulos*	*10.00*	12/9/05	12/23/05	*0.0%*
86	1810	*Develop draft metrology procedure for laying out magnetic diagnostics, H/C Lines. Issue for review.*	*Raftopoulos*	*10.00*	12/2/05	12/15/05	*0.0%*
87	1810	*Leica Verisurf Training*	*Raftopoulos*	*3.00*	2/27/06	3/1/06	*0.0%*
88	1810	*Finalize draft procedure for laying out magnetic diagnostics, H/C lines*	*Raftopoulos*	*10.00*	3/2/06	3/15/06	*0.0%*
89	1810	*Metrology set-up and initial settings*	*Viola*	*4.00*	3/23/06	3/28/06	*0.0%*
90	1810	*Lay out magnetic diagnostics, H/C lines, and thermocouple wiring*	*Viola*	*24.00*	3/29/06	5/1/06	*0.0%*
91	1810	*<< 120-degree segment ready for installation activities >>*	*Viola*	*0.00*	5/8/06	5/8/06	*0.0%*
92	1810	*Install heater tape on vertical ports*	*Viola*	*4.00*	5/9/06	5/15/06	*0.0%*
93	1810	*Verify installation of heater tapes*	*Viola*	*1.00*	5/17/06	5/17/06	*0.0%*
94	1810	*Install magnetic diagnostics*	*Viola*	*48.00*	5/18/06	7/24/06	*0.0%*
95	1810	*Terminate and verify magnetic diagnostics*	*Viola*	*10.50*	7/25/06	8/8/06	*0.0%*
96	1810	*Attach studs for H/C lines*	*Viola*	*16.00*	8/8/06	8/29/06	*0.0%*
97	1810	*Install H/C lines, headers, and manifolds*	*Viola*	*24.00*	8/30/06	10/3/06	*0.0%*
98	1810	*Verify installation of H/C lines, headers, and manifolds*	*Viola*	*5.00*	10/3/06	10/9/06	*0.0%*
99	1810	*Install Local I&C (including thermocouples)*	*Viola*	*7.00*	10/10/06	10/18/06	*0.0%*
100	1810	*Verify installation of Local I&C*	*Viola*	*3.00*	10/19/06	10/23/06	*0.0%*
				744.50