NSTX-U

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NSTX-U Diagnostic Installations

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With help from A. von Halle, E. Perry, F. Jones

Coll of Wm & Mary
Columbia U
CompX
General Atomics
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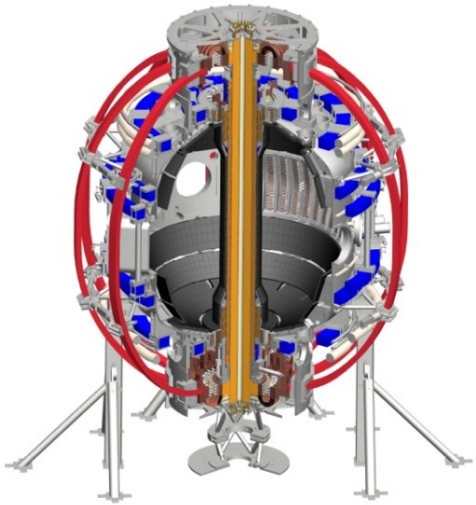

Culham Sci Ctr
York U
Chubu U
Fukui U
Hiroshima U
Hyogo U
Kyoto U
Kyushu U
Kyushu Tokai U
NIFS
Niigata U
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JAEA
Inst for Nucl Res, Kiev
Ioffe Inst
TRINITI
Chonbuk Natl U
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KAIST
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Seoul Natl U
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CIEMAT
FOM Inst DIFFER
ENEA, Frascati
CEA, Cadarache
IPP, Jülich
IPP, Garching
ASCR, Czech Rep

Overview Comments

- NTC under control of the “Upgrade Project” through CD-4.
  - They are working under a formal system of procedures and “work packages”.
  - Upgrade project management concerns about diagnostic installations:
    - Not in the formal approved scope of the Upgrade.
    - Ground classes being cross-contaminated.
    - Installations that are not consistent with code.
    - Installations that are not documented and traceable.
    - Safety in the construction environment.
- Cannot assume that Lane will be here to help during diagnostic installations.
- Tried to smooth the installation process by developing a procedure template for diagnostic installations.

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Most Important Consideration!

- Cannot assume that Lane will be here to help during diagnostic installations.
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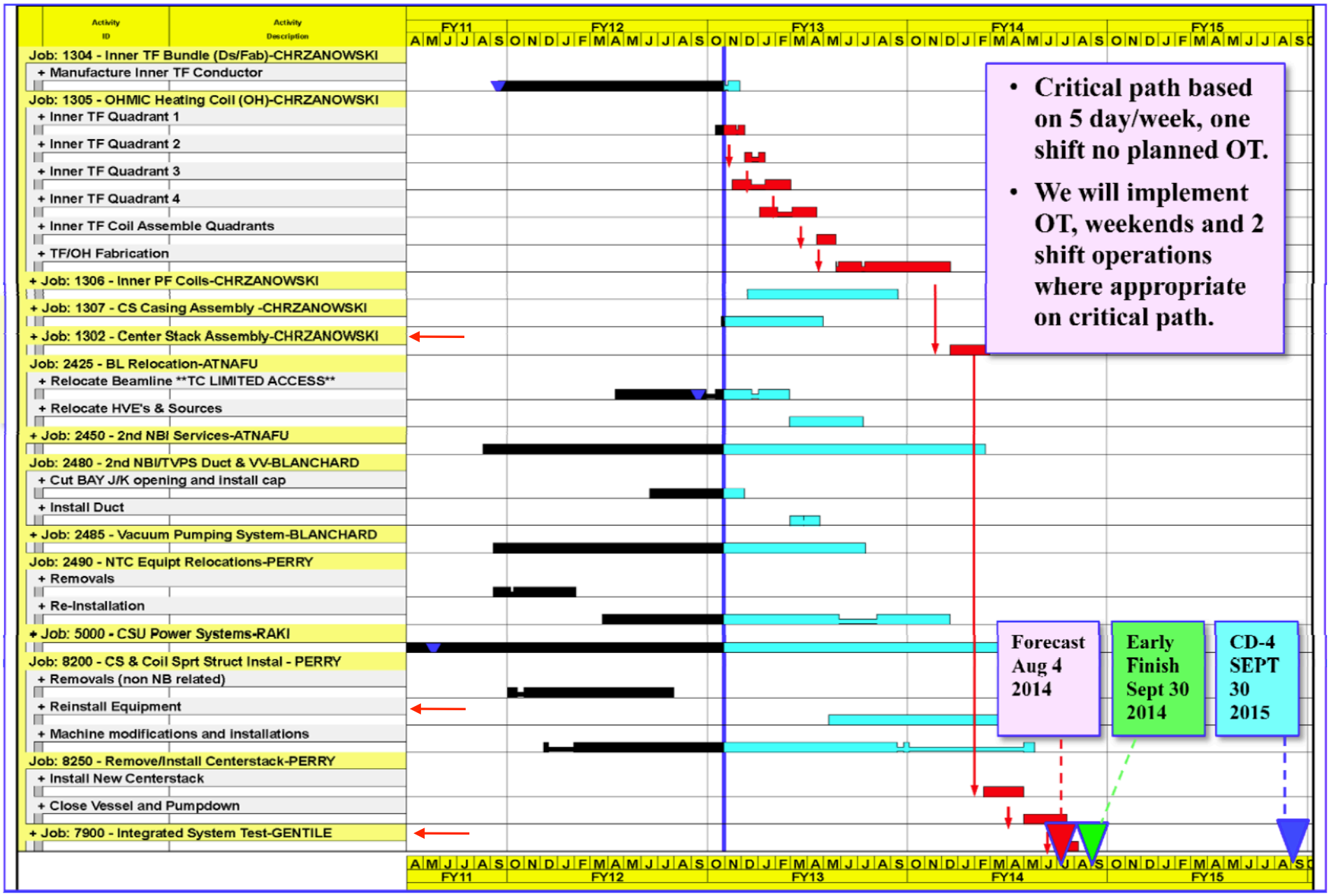
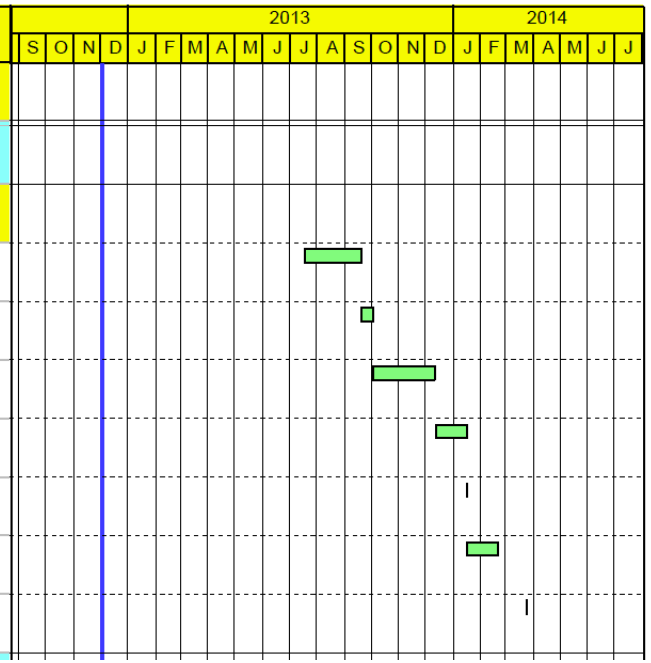

Activity ID
Activity Description
FY11
FY12
FY13
FY14
FY15
Job: 1304 - Inner TF Bundle (Ds/Fab)-CHRZANOWSKI
+ Manufacture Inner TF Conductor
Job: 1305 - OHMIC Heating Coil (OH)-CHRZANOWSKI
+ Inner TF Quadrant 1
+ Inner TF Quadrant 2
+ Inner TF Quadrant 3
+ Inner TF Quadrant 4
+ Inner TF Coil Assemble Quadrants
+ TF/OH Fabrication
+ Job: 1306 - Inner PF Coils-CHRZANOWSKI
+ Job: 1307 - CS Casing Assembly -CHRZANOWSKI
+ Job: 1302 - Center Stack Assembly-CHRZANOWSKI
Job: 2425 - BL Relocation-ATNAFU
+ Relocate Beamline **TC LIMITED ACCESS**
+ Relocate HVE's & Sources
+ Job: 2450 - 2nd NBI Services-ATNAFU
Job: 2480 - 2nd NBI/TVPS Duct & VV-BLANCHARD
+ Cut BAY J/K opening and install cap
+ Install Duct
+ Job: 2485 - Vacuum Pumping System-BLANCHARD
Job: 2490 - NTC Equipt Relocations-PERRY
+ Removals
+ Re-Installation
+ Job: 5000 - CSU Power Systems-RAKI
Job: 8200 - CS & Coil Sprt Struct Instal - PERRY
+ Removals (non NB related)
+ Reinstall Equipment
+ Machine modifications and installations
Job: 8250 - Remove/Install Centerstack-PERRY
+ Install New Centerstack
+ Close Vessel and Pumpdown
+ Job: 7900 - Integrated System Test-GENTILE
• Critical path based on 5 day/week, one shift no planned OT.
• We will implement OT, weekends and 2 shift operations where appropriate on critical path.
Forecast Aug 4 2014
Early Finish Sept 30 2014
CD-4 SEPT 30 2015

Some Time For Installation and Calibration Has Been Placed on the Rollover Schedule

- Definitions
  - Installation Period #1: Diagnostics for Calibration Period #1
  - Installation Period #2: Diagnostics For Calibration Period #2
  - Calibration Period #1: Calibrations with CS not in machine.
  - Installation Period #3: Diagnostics without calibration needs.
  - Calibration Period #2: Calibrations with CS in machine.
- Need to refine these dates based on new Upgrade schedule and better knowledge of installation work…*need your help to define this scope*.

Activity ID	Activity Name	Start	Finish	Original Duration	Resp
von Halle					
1151-**-X450 NSTX Diag Ops Support**					
Diagnostic Installation & Calibration					
2000	Installation Period #1	19-Jul-13	19-Sep-13	45	STRATTON
2010	Installation Period #2	20-Sep-13	03-Oct-13	10	STRATTON
2020	Calibration Period #1	04-Oct-13	12-Dec-13	50	STRATTON
2030	Installation Period #3	13-Dec-13	16-Jan-14	25	STRATTON
2040	CENTER STACK INSTALLATION (Lift in New Center Stack ID-1230)	17-Jan-14*	17-Jan-14	0	Strykowsky
2050	Calibration Period #2	17-Jan-14	20-Feb-14	25	STRATTON
2060	Begin Machine Pumpdown (ID-1300)	25-Mar-14*	25-Mar-14	0	Strykowsky



From Lehman Review Slides By E. Perry

Outage Planning for Diagnostic Calibrations

- Diagnosticians have listed the calibrations they would like prior to re-starting NSTX
- Detailed schedules for these calibrations are being prepared
  - Schedules will be fit into the existing outage schedule
  - Each calibration will be scheduled as early as possible to avoid delays once the installation work has been completed
  - Calibrations may be scheduled to occur after the Upgrade Outage if they are not required for CD-4 or early operations
- Re-installation requirements for some diagnostics not well defined
  - Diagnostics in process of defining requirements or electing not to re-install some items

Scope of Installation Procedure Template

- In scope:
  - The installation of vacuum hardware:
    - Windows, gate-valves, diode arrays,…
    - Must meet all PPPL vacuum guidelines, leak checking,…
    - Primary vacuum seals to be actually made by machine techs.
  - Installation of fiber optics holders on the machine.
  - Installation of fiber optics and <50 V signal cables in the trays.
  - With the exception of vacuum seals, the scope should be such that physicists and diagnostic techs can accomplish most/all of the tasks.
    - This minimizes impact on the Upgrade scope and schedule.
- Out of scope (need additional procedures):
  - Changes to the NTC AC power infrastructure
  - Modifications to or implementation of NTC penetrations.
  - Work outside of NTC.

Locating and Accessing Equipment

- In NTC? Might need escort for inspections of items during procedure writing.
  - See J. Winston.
  - Probably won't allow escorted tours until some time in January/February.
- In DARM? All equipment there is inventoried monthly.
  - See J. Winston.
  - If not activated, then it can be checked out by machine techs as per OP-AD-115
  - If activated but to be installed as is, then machine techs can move items to NTC at appropriate time.
  - If activated and need modifications, work with E. Perry, J. Winston to set up area for work.
    - those tasks not part of this discussion.

Running Things in the Cable Trays

- If approved drawings of the cable or fiber runs exist:
  - Locate the drawings, and include the drawing numbers in the installation procedures.
- If NO approved drawings for new cables/fibers:
  - Identify the total count and type of items, as well as start and ending locations.
  - Take information to drafting, get them to tell you the approved cable tray route.
    - Installation procedure template has information on how to do this.
  - Include that information in a schematic in your procedure.
- If the cables/fibers are presently coiled up in the trays:
  - Determine the name of the trays that the cables/fibers are in.
    - Either drafting or Joe Winston.
  - Include that information in procedure.
- In all cases, label the cables/fibers:
  - With the nomenclature in the drawings or schematic.
  - With the procedure number that they are installed under.

Table at Front Is to Help The Work Control Center Understand the Scope of Job

Section(s) of platform to be utilized	
Rack(s) where work is to be performed	
Bay(s) where work is to be performed	
Number of machine technician man-days required	
Number and type of vacuum flanges to be installed by machine technicians	
Number and type, including grounding class, of cables or fiber optics to be installed in trays (See requirements in section 2.0 for fiber & cable routing requirements).	
Metrology needs during installation	
Crane usage for installation (list lift procedure numbers here)	
Any requirement for NTC closure	
Any welding, brazing, grinding, or other significant machine tool usage. (Note: approved drawings required)	

The Process

- In the near term, fill out the procedure in a rough way, so that the # of days and required diagnostic technician usage can be estimated.
  - Bob, Brent, and I have a spreadsheet that tracks that, can use information to improve interface to the upgrade project.
  - Also, would like calibration period requirements.
- Following that, fill out the procedure completely.
- Get it approved by Bob or Brent.
- Put in the drag-n-drop folder on procedures
  - So that your peers can benefit from seeing completed versions.
- Get other approvals (F. Jones, J. Boscoe, J. Winston,…)
- Once approved, coordinate timing with work control center.
- Suggestion:
  - If diagnostic is
    - not needed for CD-4 and machine commissioning,
    - only needs a vacuum interface before pump-down,
    - doesn't need a block of time during calibration phase,
  - Then consider
    - only installing the vacuum interface.
    - Leave remainder of job for maintenance weeks after CD-4.

Diagnostics Under Consideration

- For near-term time estimates, please consider all diagnostics that are your responsibility.
- For detailed procedure writing, please focus first on the diagnostics that have the broadest impact on operations and physics analysis.
  - Toroidal CHERS
  - Neutrons
  - EIES
  - MSE CIF
  - ORNL IR Cameras
  - Plasma TV
  - VB
  - MSE LIF
  - XEUS & LoWEUS
  - BES
  - FIDA
  - Hup & Hdown

Suggested List

Note:
If in-vessel components, or vacuum interfaces, have been modified since NSTX, then will need either peer reviews or design reviews before I.P. will be signed off.