NSTX-U

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NSTXU Upgrade Quarterly Report
October 22, 2013

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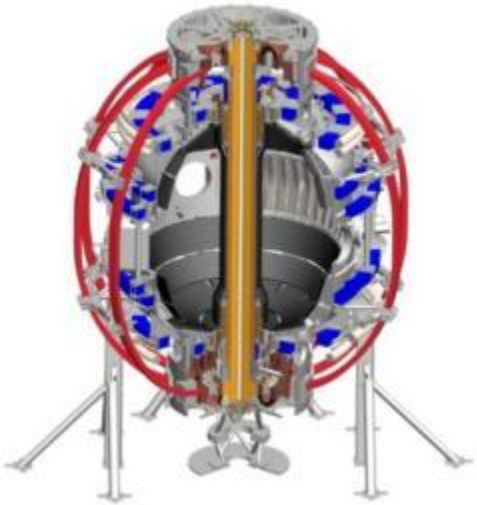
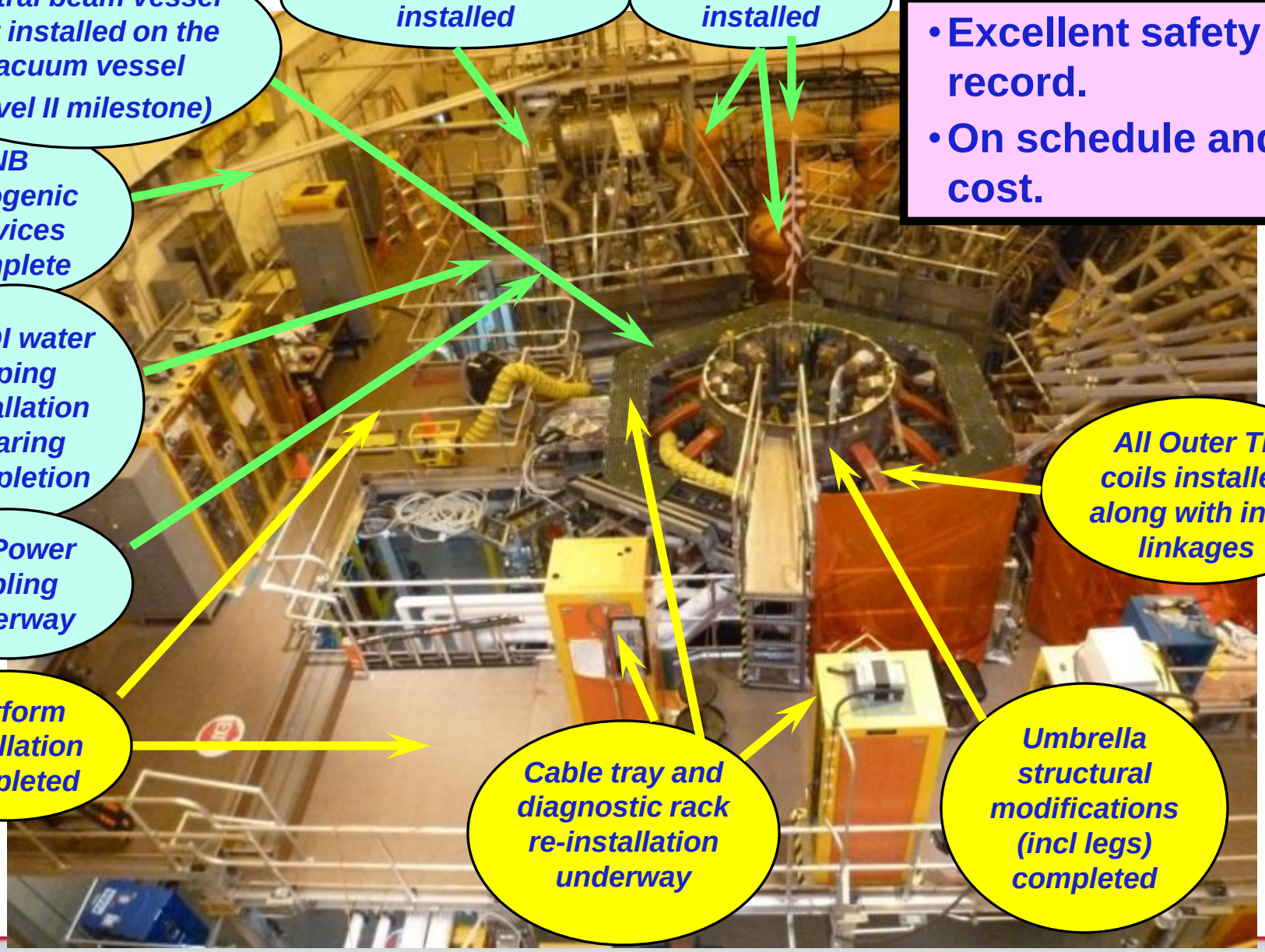


FY2013 - *A Good Year with Significant progress*



Neutral beam vessel port installed on the vacuum vessel (Level II milestone)

Source platform installed

3 HVE's installed

- Excellent safety record.
- On schedule and cost.

NB Cryogenic services complete

NB DI water piping installation nearing completion

NB Power cabling underway

Platform installation completed

All Outer TF coils installed along with inter linkages

Cable tray and diagnostic rack re-installation underway

Umbrella structural modifications (incl legs) completed

Neutral Beams

High Voltage Enclosure relocation completed – 3 HVEs








High Voltage Enclosure relocations completed

NBI Port Extension trial fit completed

TF outer leg clearances maintained

Maintained ¾ inch clearance to Port Extension for OL deflection per spec

Awaiting NBI Duct installation…

Deionized Water Piping subcontract completed (source, dump, HVE)








NBI Armor assembly and installation in progress…

Painstaking trail fit made and supports aligned. Final structural welding completed.

NBI Duct & TVPS duct fabrication completed

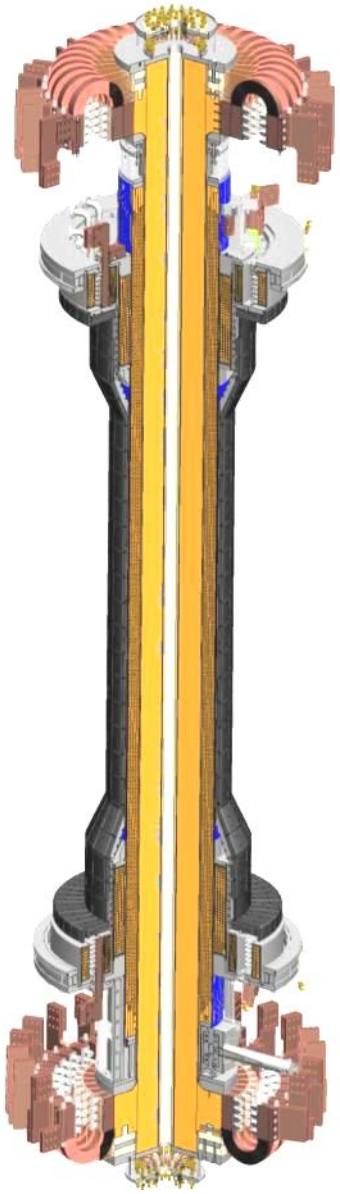
… and leakchecked.

Stainless circular shields complete

Moly shields for rectangular bellows in progress

Centerstack

Center Stack Fabrication is the critical path! Assembly Proceeding Well



- **Inner TF Bundle**
  - (4) TF Quadrants have been VPI'd and tested
  - Full TF Bundle has been VPI'd and tested
- **Assembly tilt fixture fabricated, tested and in-use**
- **Aqua pour process underway**
- **OH winding assembly fabricated & installed**
- **OH Solenoid**
  - Begin winding OH solenoid - **November 2013**
  - VPI OH Solenoid - **March 2014**
- **PF 1 Coils**
  - Coils fabricated. PF1B delivery planned November
- **Centerstack Casing**
  - Delivered and studs have been installed
- **Centerstack Assembly-**
  - Delivery to NSTX Test Cell - **May 2014**

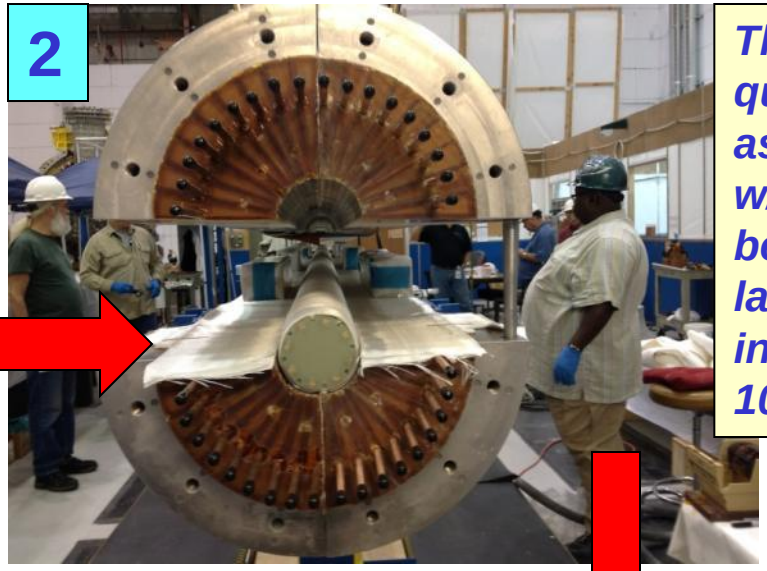
Work was supported by Steve Raftopoulos, Mike Mardenfeld, Irv Zatz & Technician crews led by Mike Anderson and Eugene Kearns

Inner TF Bundle Assembly Was Successful

- **The four VPI's quadrants were then assembled together to complete the full bundle.**

1

2



The quadrants assembled w/ S-2 between layers & pre-insulated G-10 core

3

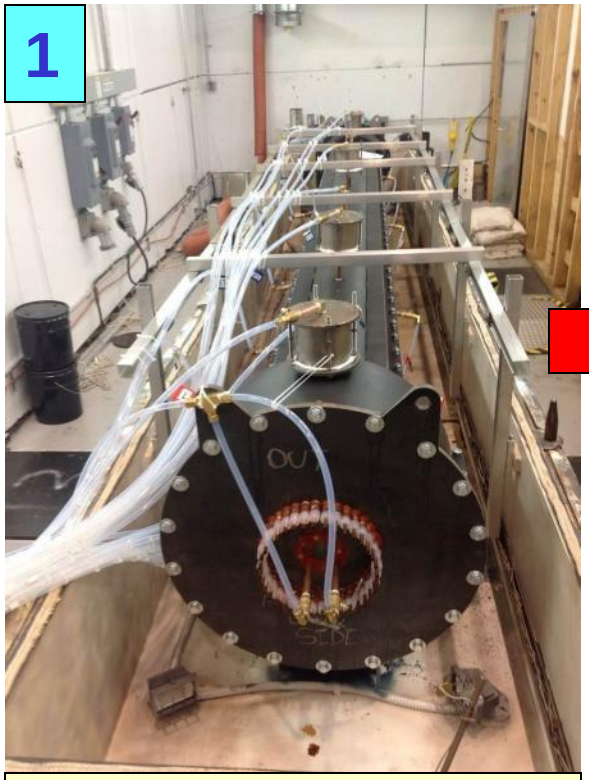
The full TF bundle is Ground wrapped with S-2 glass tape

4

The full TF bundle is placed into a mold and VPI'd

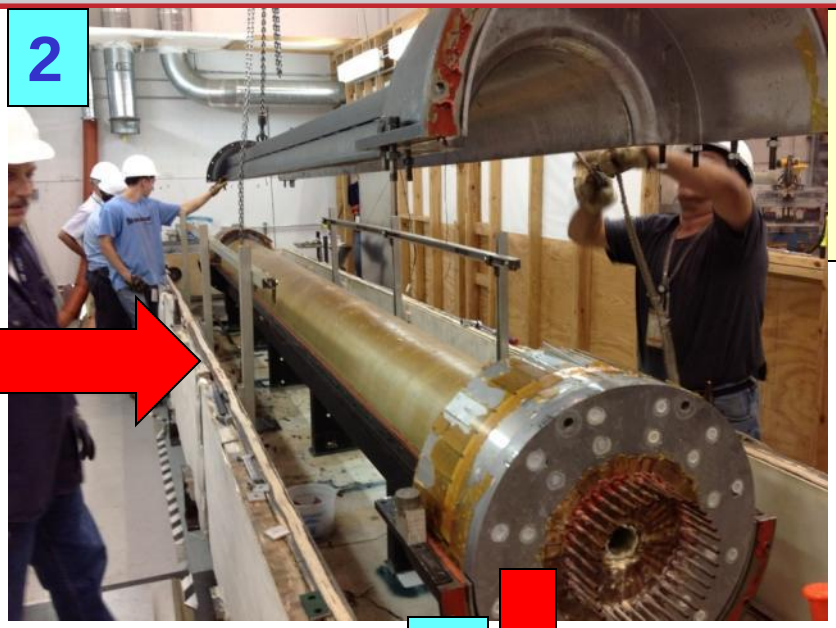
Inner TF Bundle VPI and Test Successful!

1



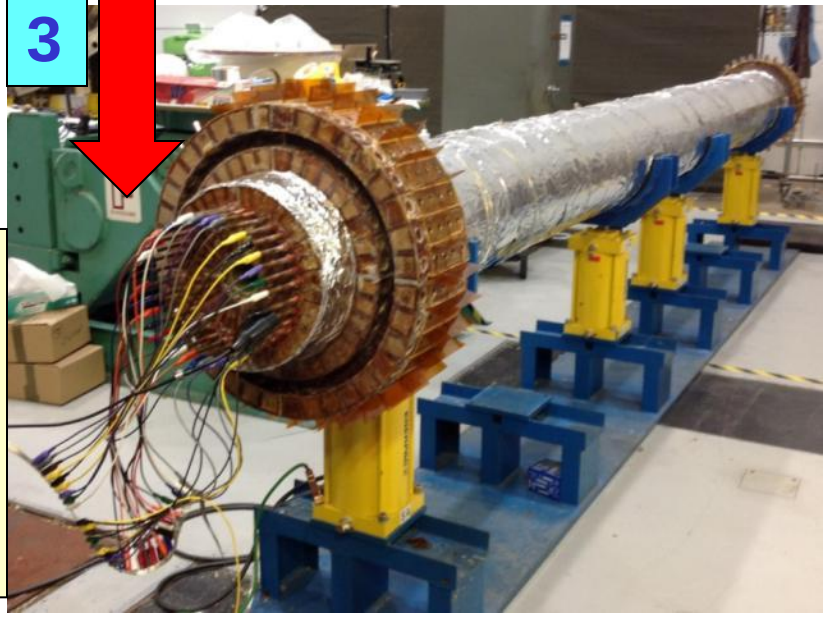
Full TF Bundle in oven and ready for VPI

2



Full TF Bundle after VPI

3

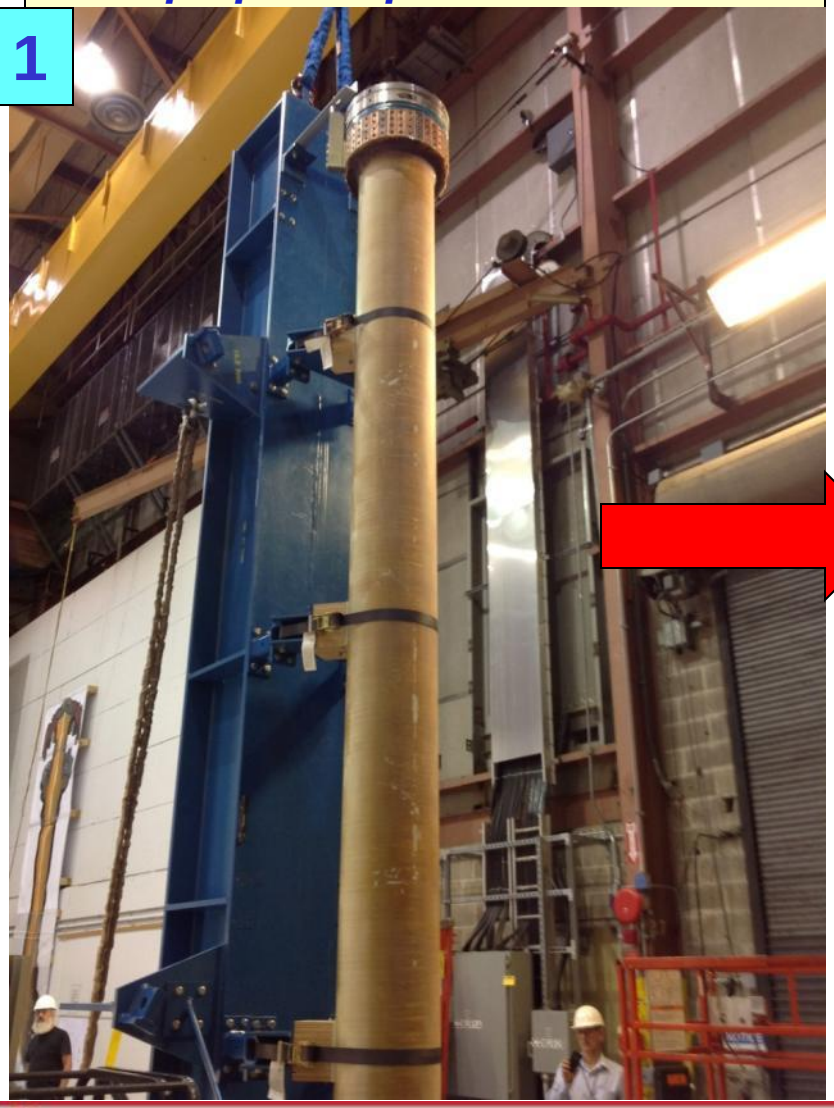


Full TF Bundle during the electrical test

Aquapour process underway

The CS up-right ready for the Aquapour™ process

1



"Aquapour" is used as a temporary spacer that will be used to maintain 0.100 inch gap between the TF OD and OH ID surfaces. It is removed post VPI of OH coil

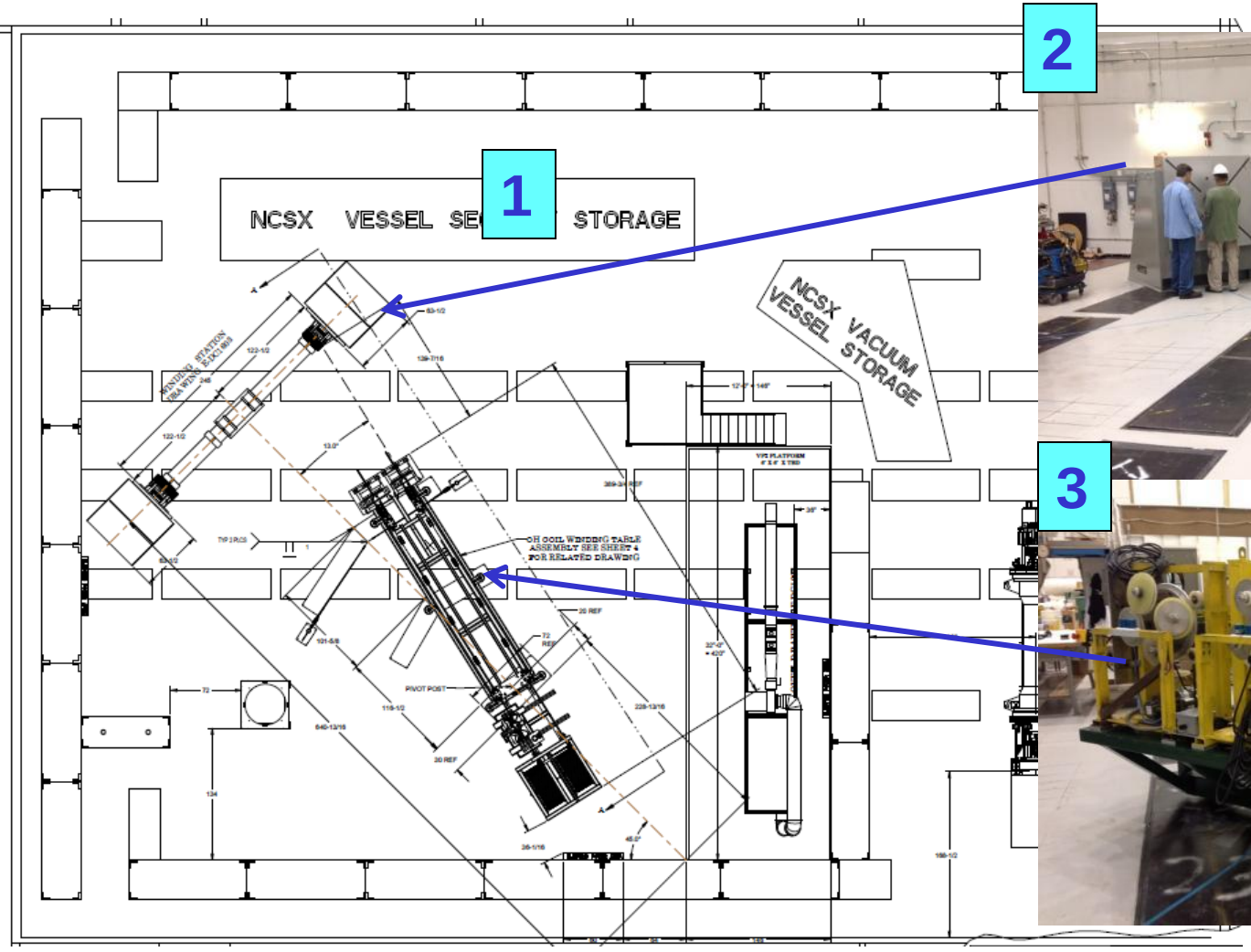
Prototype trials of Aquapour

2

3

Fabrication of OH Solenoid

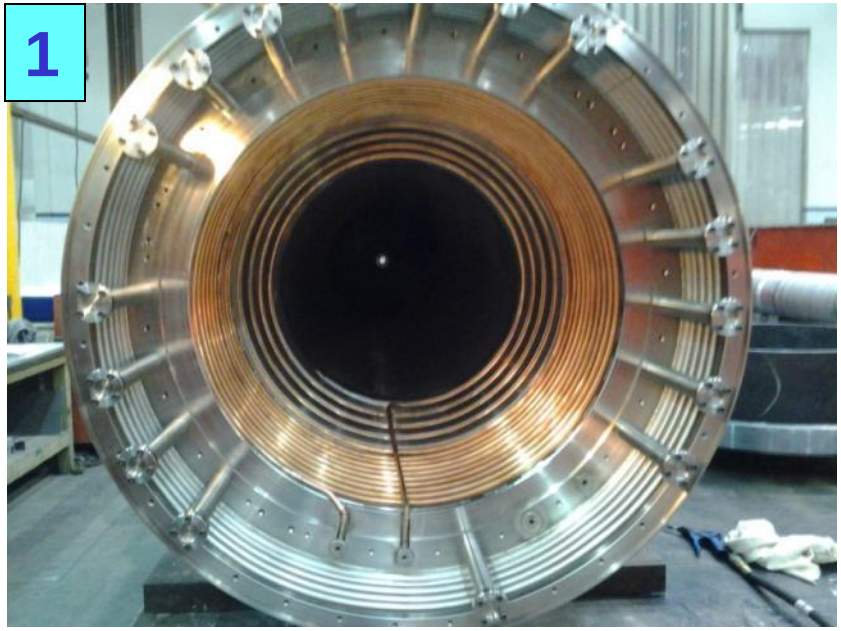
- The OH Solenoid will be wound onto the Inner TF Bundle
- The CS High Bay area is being reconfigured to wind the OH coil



Centerstack Casing

- **The Centerstack Inconel casing has been manufactured by Martinez & Turek located in California.**
- **Inconel studs for supporting the PFC's have been installed**

1



2

Construction and Machine Assembly

Construction Progress in 2013

- Install new umbrella legs / feet / slides
- Install umbrella arch reinforcements

1

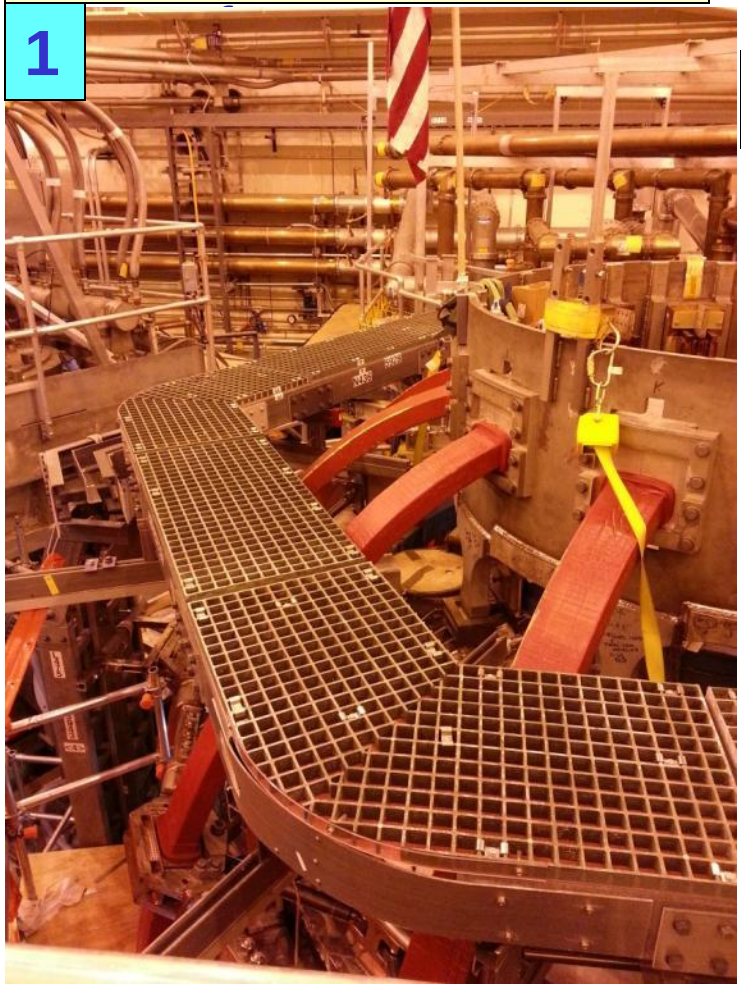
- Install reinforcements for TF to umbrella interface

2

Construction Progress in 2013

Installed new cable tray around top of machine (Walking surface included)

1

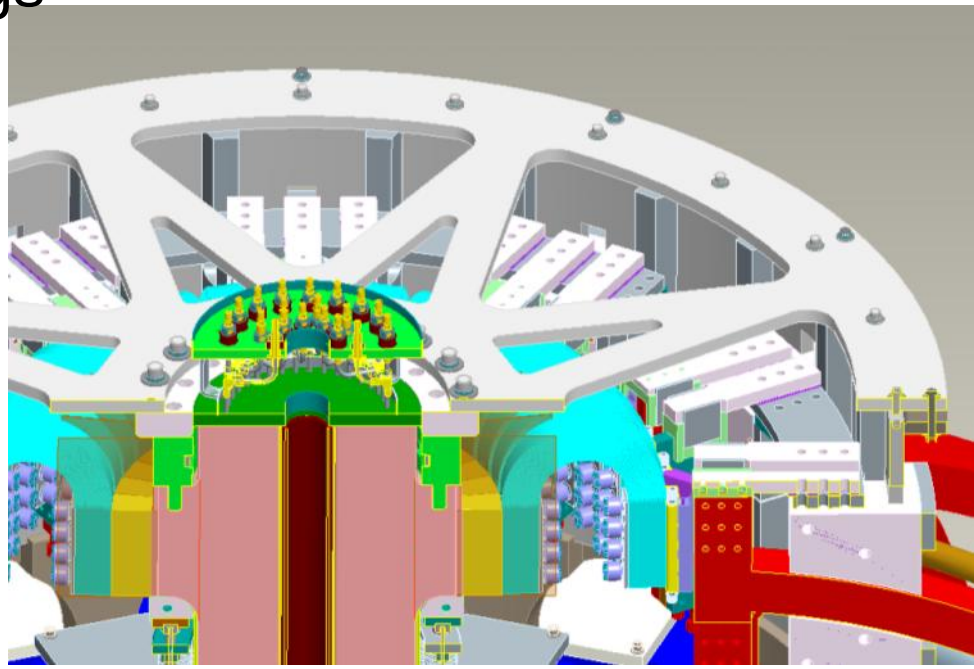


Installed most of the TF outer leg upper support structure

2

Remaining Construction Work in NSTX Test Cell

- Complete Structural work
- Install Centerstack
- Install bus inside umbrella and back to racks
- Install new TF flex bus
- Field measure space between centerstack and all TF flags
- Fabricate 72 unique centerstack to TF flag links
- Install umbrella lid support rings
- Install new umbrella lids
- Clean, photo and close the vacuum vessel
- Pumpdown
- Leak check
- Bakeout

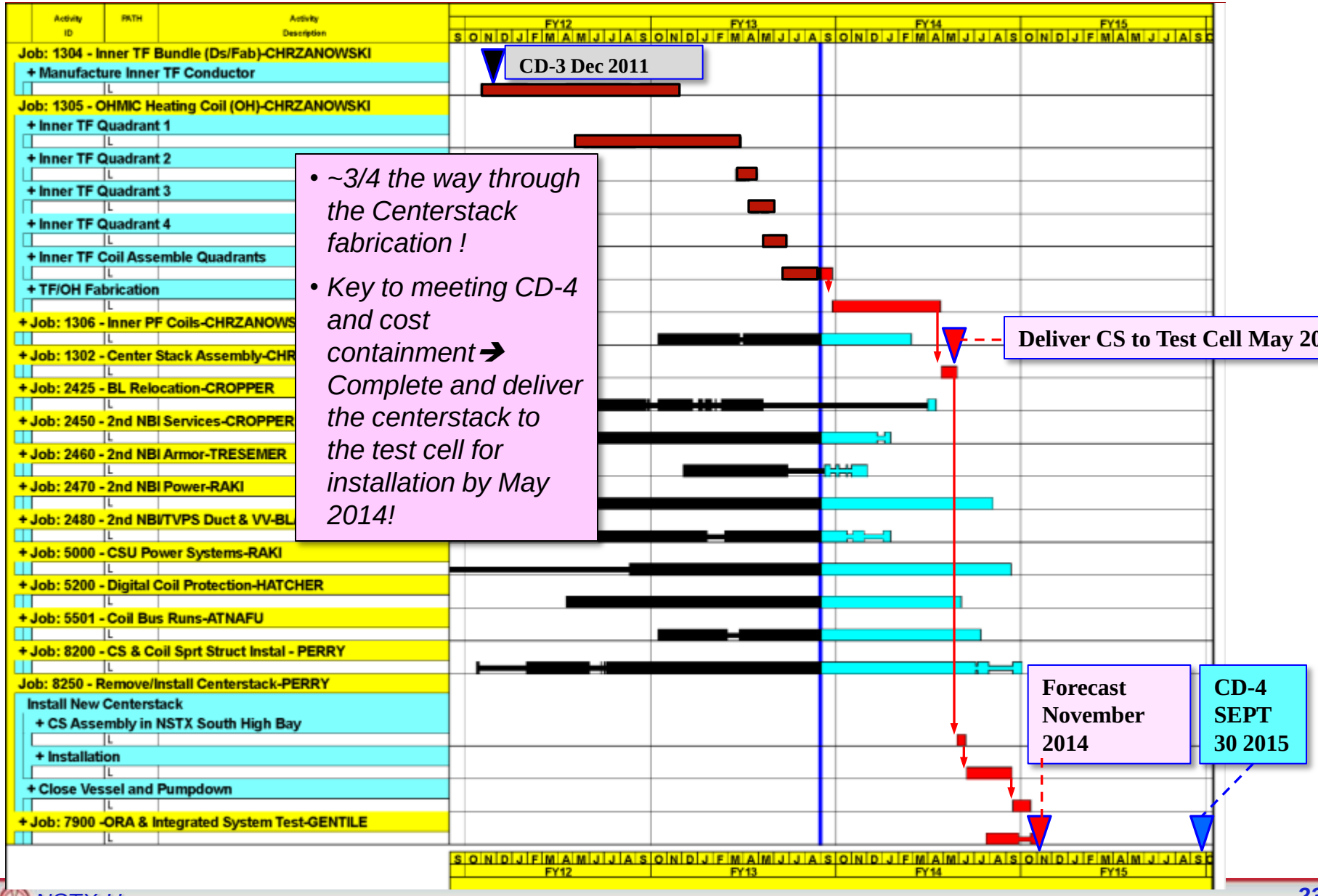


Cost and Schedule

Performance metrics and Costing Good

- **Cost**
  - CPI = 0.97
- **Schedule**
  - SPI = 0.98
  - Total float = 10 $^{1/2}$ months to late finish CD-4
  - CD-4 Completion
    - Forecast = November 2014
    - DOE Milestone (Late Finish) = September 2015
- **BAC =$86.1 EAC= $88.7 TPC =94.3M**
- **Cost to date = $66.2 M 75% complete *(through Sept)***

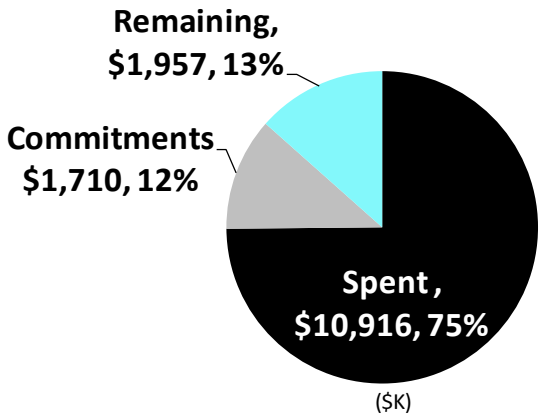
Schedule on track for early finish

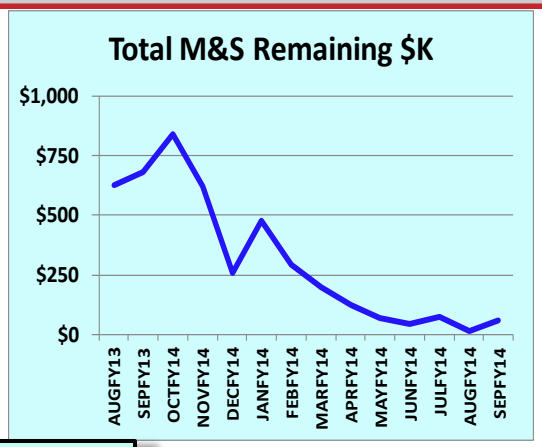


- *~3/4 the way through the Centerstack fabrication !*
- *Key to meeting CD-4 and cost containment ➔ Complete and deliver the centerstack to the test cell for installation by May 2014!*

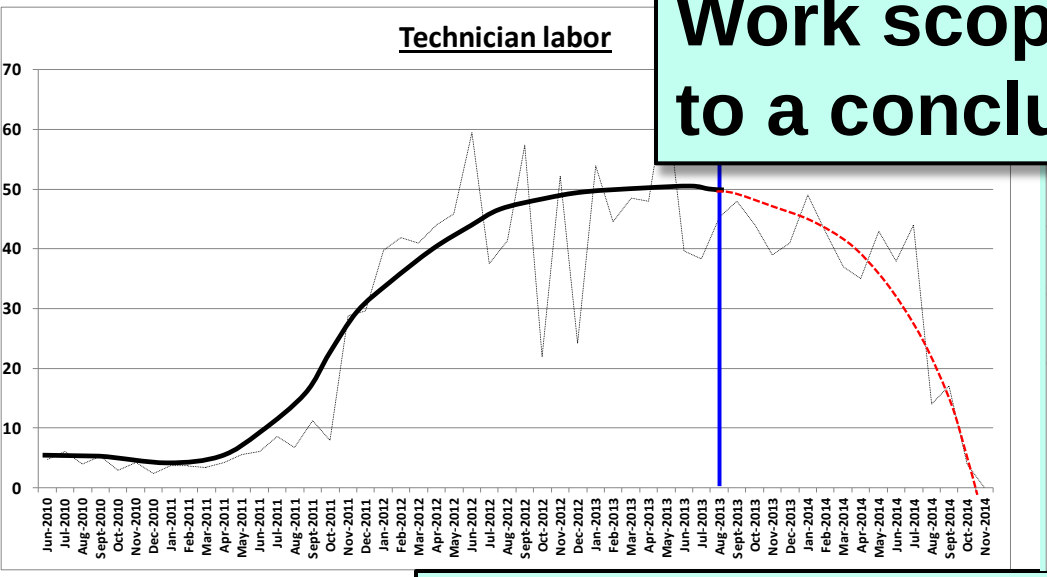
FY2014 - *year ahead in perspective*

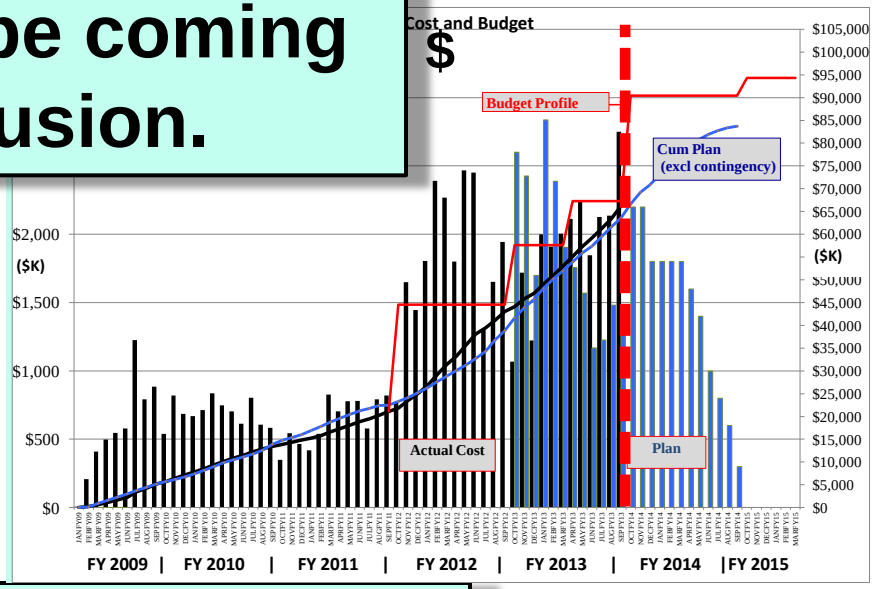
Procurements winding down





Work scope coming to a conclusion.





Startup activities underway

- QA Audit of NSTX-U Startup Documentation April 2014
- ACC – Summer 2014
- DOE – Summer 2014

FY2014 - *Financial position good*

DOE Funding and anticipated CR consistent with and supportive of early finish

	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Total
BA	$5.2	$9.0	$9.9	$20.4	$22.8	$23.7	$3.3	$94.3
BO	$5.1	$8.3	$7.6	$21.9	$23.2	*$20.7*	$0.7	$87.6

Contingency position good

	@ CD-2 *(Dec 2010)*	@ Current (Sept 2013)
% Complete	18%	75%
Contingency remaining	$17M	$6.3M
	26.6%	29%

FY2014 - *Keys for Success*

- **Worker and investment safety while Maintaining the highest degree of technical quality**

- **Milestones:**
  - **Transport Centerstack to the NSTXU Test Cell**
    Forecast: MAY 2014
  - **CD-4**
    DOE commitment: SEPTEMBER 2015
    Forecast: NOVEMBER 2014
- **Risk:**
  - **TF/OH VPI and electrical test**
- **Cost:**
  - **Transition into Startup and Operations**

Lehman Review Conducted Oct 2nd-3rd

Charge Questions

1. *Construction Efforts: Are construction efforts being executed safely? Does the project have adequate resources and the appropriate skills mix to execute the project per the plan?* ***YES***

2. *Baseline Cost and Schedule: Are the current project cost and schedule projections consistent with the approved baseline cost and schedule? Is the contingency remaining adequate for the risks that remain?* ***YES***

3. *Management: Evaluate the management structure as to its adequacy to deliver the scope within budget and schedule. Are risks being actively managed? Has the project responded satisfactorily to the recommendations from the previous project reviews?* ***YES***

4. *Transition to Operations: Is the Project appropriately aligned for completion of construction efforts and transitioning to NSTX-U for CD-4 approval?* ***YES***

Lehman Review Conducted Oct 2nd-3rd

Recommendations

Technical

1) Identify lower risk CS tasks that can be performed by additional personnel or off-shift to gain schedule contingency. ***Plan being Updated***

2) Generate an interim milestone for DCPS for earlier commissioning of a reduced scope system able to support all system testing and initial machine operation. ***Plan being Updated***

Cost & Schedule

3) Include schedule contingency impacts in the ECP forms for the future ECPs. ***OK***

4) The EAC calculation should include items and activities that are likely to occur. ***Done***

5) Ensure risk register is updated and maintained ***Updated***

Management

6) Evaluate a broader range of likely project outcomes to better understand and communicate with DOE the limits of cost and schedule contingencies to ensure project success by **November 1, 2013**. ***Done. To be reviewed with DOE-PSO***

7) Work with the Site Office and program develop a focused “end game plan” to monitor and communicate critical project activities to better ensure project success by **November 1, 2013**. **Done**

8) Action Item; Site Office to schedule a status review **in mid-January 2014**. ***Will be scheduled***

Summary

- **The project has maintained a safe working environment.**
- **The project continues to make good technical progress.**
- **The project is on schedule and cost with adequate contingency to finish.**
- **The project is on track for meeting CD-4 baseline within OFES budgetary guidance.**
- **The project is preparing for transitioning into operations.**