

# National Spherical Torus eXperiment Upgrade

## Bakeout Overview

### WBS 1.03.01

NSTX-U Recovery Project FDE – March 17-19, 2020

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Joe Petrella- Bakeout Systems Responsible Engineer

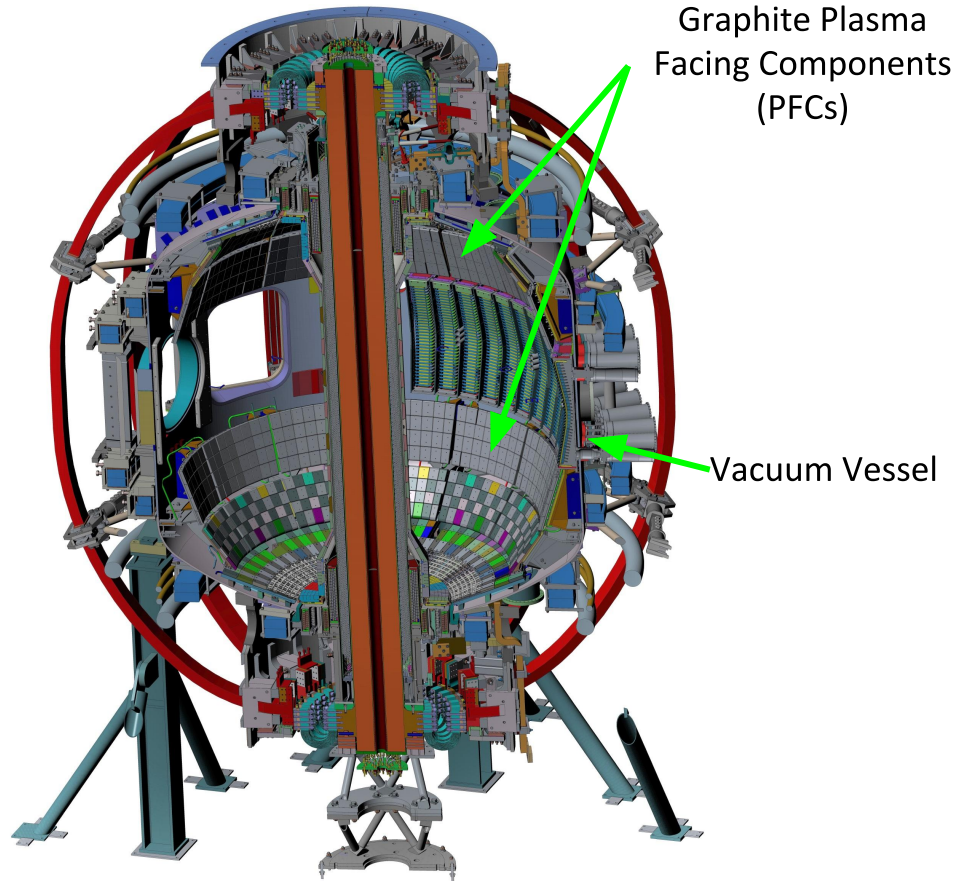
Last edit: 3/10/20

# Outline

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1. Bakeout Purpose
2. Overview of Bakeout Systems
3. Recovery Scope
4. System Performance

# Bakeout desorbs water and impurities from the interior of the vacuum vessel.



**Function:** Heat Graphite PFCs to  $\sim 350^{\circ}\text{C}$  to desorb water and other impurities prior to plasma operations. Heat Vacuum Vessel to  $\sim 150^{\circ}\text{C}$  to desorb water and other impurities prior to plasma operations.

## **Bakeout System consists of:**

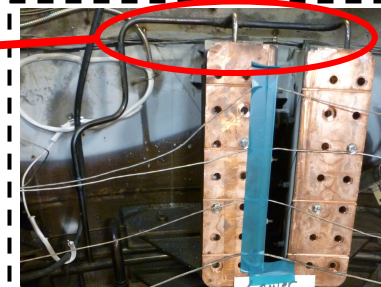
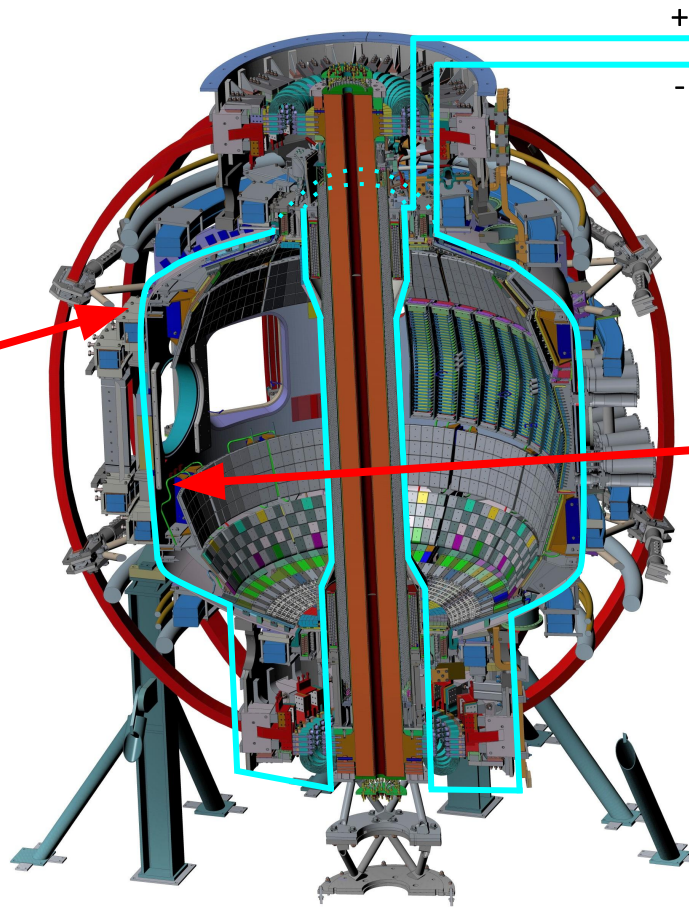
- High Temperature Helium System
- DC Ohmic Heating System
- Ex-Vessel Med. Temp. Water Heating System

# Three systems heat different areas and components of the interior vacuum vessel

Ex-VV regulated to 150C using superheated water through grouted SS tubing

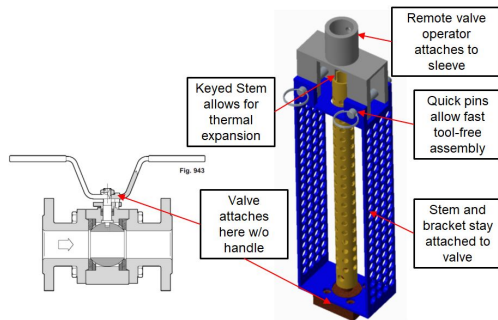
8 kA of Direct Current is driven through the center stack casing (CSC) / Ex-VV to ohmically heat the CSC & heat the attached PFCs

PFCs regulated to 350C using heated helium through in-vessel SS tubing



# Recovery Scope: Incremental Improvements

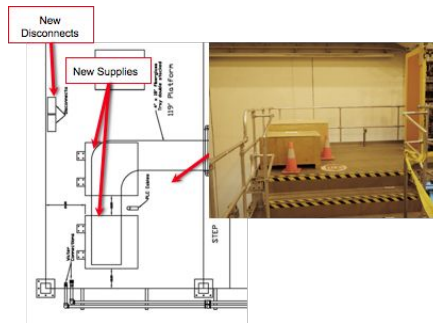
Improve control & feedback of helium gas distribution



High Temperature Helium Heating

*Refer to Presentation by Delvin Reneau*

Relocate DC Power Supplies to 119' platform



DC Power Supply Ohmic Heating

*Refer to Presentation by Antonio Falcon*

Reduce MTWS System Volume & improve safety



Ex-VV MTWS

*Refer to Presentation by Jarmon Browning*



# Bakeout (worst-case) Performance was Verified to Meet KPP by Analysis (Calc Reference: )

