NSTX

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NSTX Upgrade Project Overview

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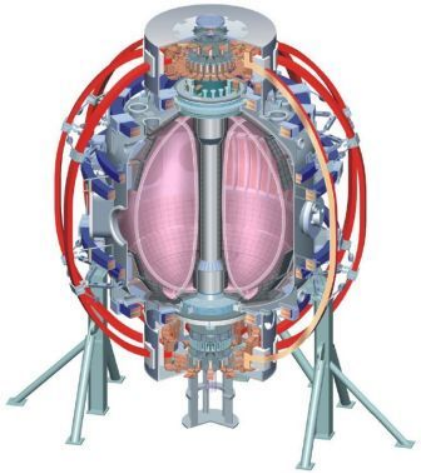
LLNL
Lodestar
MIT
Nova Photonics
New York U
Old Dominion U
ORNL
PPPL
PSI
Princeton U
Purdue U
SNL
Think Tank, Inc.
UC Davis
UC Irvine
UCLA
UCSD
U Colorado
U Illinois
U Maryland
U Rochester
U Washington
U Wisconsin

Erik Perry

NSTX Upgrade Project
Conceptual Design Review
LSB, B318
October 28-29, 2009



Culham Sci Ctr
U St. Andrews
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Fukui U
Hiroshima U
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Kyushu U
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NIFS
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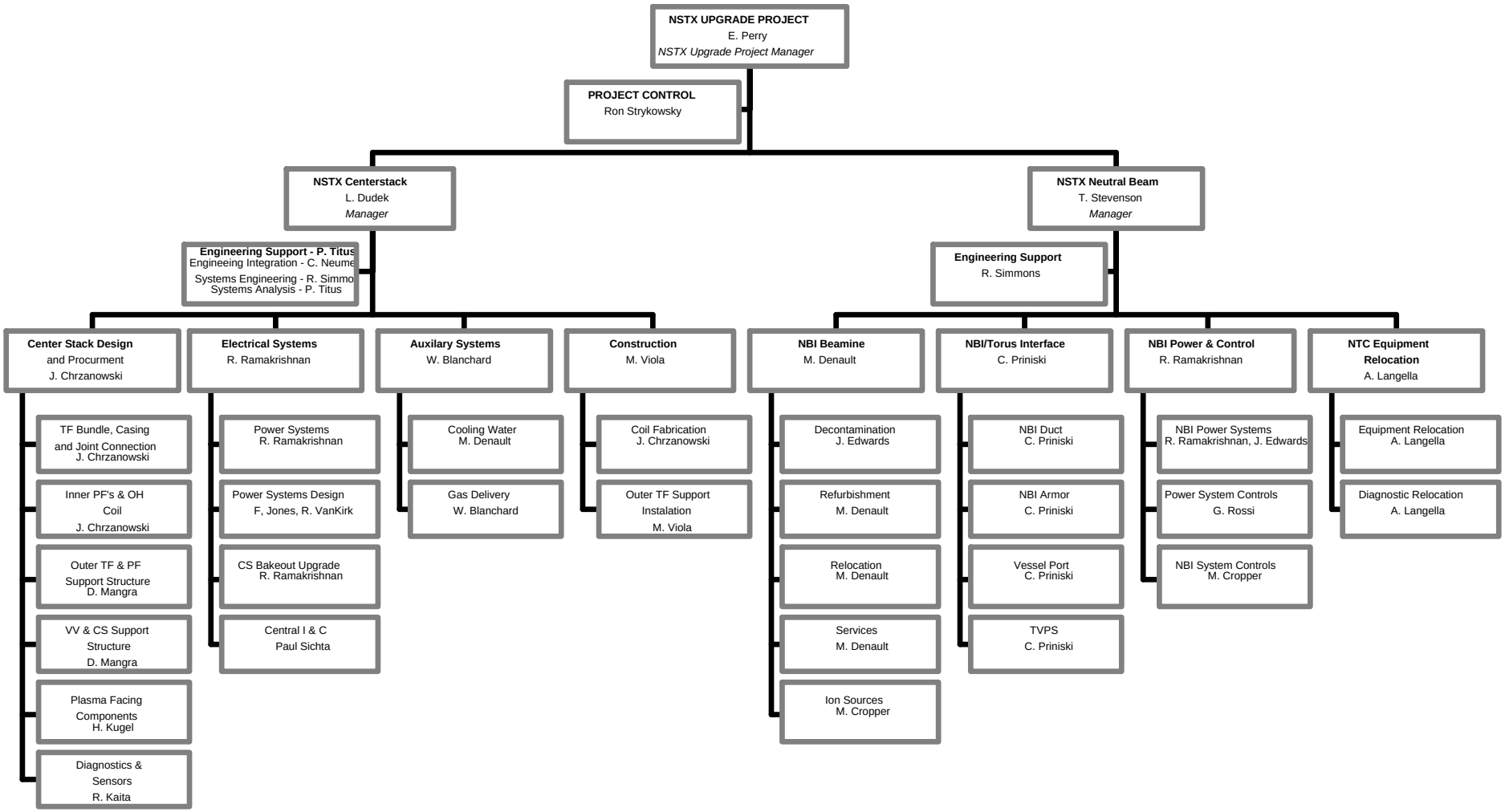
NSTX Upgrade Project

- Upgrade centerstack to enable operations at
  - Toroidal magnetic field of up to 1 Tesla (presently 0.55 Tesla)
  - Plasma current up to 2 Mega-amp (presently 1 Mega-amp)
- Install a second neutral beamline
  - Beams tangent to radii 130cm, 120cm and 109.4cm
  - Configure NB1 and NB2 so they can operate together or separately
- Cost and schedule consistent with CD-0
  - Cost range of $75M - $91M
  - Project completion in 2014 for the baseline case

NSTX Upgrade Project Organization

NSTX UPGRAGE PROGECT ORGANIZATION



General Requirements Documents

- General Requirements Documents (GRDs) were generated and approved early in the conceptual design process
  - One GRD for the centerstack
  - Another GRD for the second neutral beamline
- Design philosophy for the centerstack
  - Very conservative design (to handle maximum output from power supplies)
  - Drop back to designing to the required operational levels if the conservative design becomes too expensive
- Design philosophy for the second neutral beamline (NB2)
  - Provide a beamline with the same characteristics as the first beamline on NSTX
  - Assume that internal copper parts need to be re-made until it is proven that they can be sufficiently decontaminated

Centerstack Upgrade Scope

- Inner TF bundle (centerstack)
- TF Flex bus
- OH coil
- Inner PF coils
- Enhance outer TF supports
- Enhance PF supports
- Reinforce umbrella structure
- New umbrella lids

Centerstack Upgrade

- Plan is to fabricate inner TF bundle in-house
- Estimates are based on the actual costs of designing, fabricating and installing the current centerstack
- Estimates are conservative
  - Opportunities for reducing costs

Second Neutral Beam Scope

- Disassemble and evaluate a TFTR beamline
- Decontaminate
- Refurbish for reuse
- Relocate pumpduct, 22 racks and numerous diagnostics to make room in the NSTX Test Cell
- Install new port on vacuum vessel to accommodate NB2
- Move NB2 to the NSTX Test Cell
- Run services (power, water, cryo and controls)

Neutral Beam #2

- Estimates are based on the actual costs of designing, refurbishing and installing NSTX Neutral Beam #1
- Decontamination estimates are based on actual experience with TFTR neutral beams
- Estimates are conservative
  - Includes costs for making new parts that might be able to be decontaminated for reuse
  - Opportunities for reducing costs whenever decontamination succeeds

Ready for CD-1

- Successful technical peer review in June for Neutral Beam #2
- Successful technical peer review in August for new Centerstack
- Lehman Review December 15th–16th
- Documentation specified by DOE Order 413.3 is on track for submitting a CD-1 request right after Lehman Review

Charge Questions

- Have the requirements in the GRDs been addressed?
  - Yes, both the Centerstack and the Second Neutral Beam have very successfully going through technical peer reviews
- Does the CDR satisfy the objectives of PPPL Procedure ENG-033?
  - Yes, successful technical reviews completed; ES&H is being addressed in designs; bottom-up cost and schedule details for all jobs
- Have risks been appropriately identified and handled?
  - Yes, the risks identified at CD-0, such as the design for the TF flex joint, are being addressed and retired. The Risk Registry is tracking all identified risks.
- Are ES&H issues properly addressed?
  - Yes, the Preliminary Hazard Analysis is based on current plans using the hazard analysis summary in the NSTX Safety Assessment Document.

Charge Questions

- Is the proposed cost range and schedule adequate/realistic (for CD-1)?
  - Yes, a well detailed resource loaded schedule exists and provides the basis for all cost and schedule estimates
- Is the project organization/staffing appropriate?
  - Yes, as part of performing the conceptual design, we have brought on the staff that will be needed for the next phase of the project
- Is the project ready for CD-1 per DOE Order 413.3A?
  - Yes, documents have been prepared … a few, such as the Preliminary Project Execution Plan, will be circulated for sign-off following the CDR