

Designing ALARA in the 21st Century



In 2007 TVA decide to restart construction on Watts Bar Unit-2.

All engineers had to attend ALARA by design presentation.

Design reviews began in 2007 by engineering then routed to ALARA for review and approval.

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Source term reduction

Shielding

Eliminate components/system

Relocate components/systems

Modifications components/ systems

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Source term reduction:

Elevated modified pH Program

Zinc Injection at start up

Electro polish Steam Generator Channel
Heads

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Steam Generator Channel Head before:



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Steam Generator Channel Head after:



WATTS BAR DOSE REDUCTION INITIATIVES



Shielding:

Rx head shield package

Shielding package in annulus

Permanent shielding on loop doors

Permanent shielding on resin transfer lines

Crane wall penetrations

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Reactor Head Shielding



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Loop Door shielding



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Eliminate components/system

Removed RTD bypass system

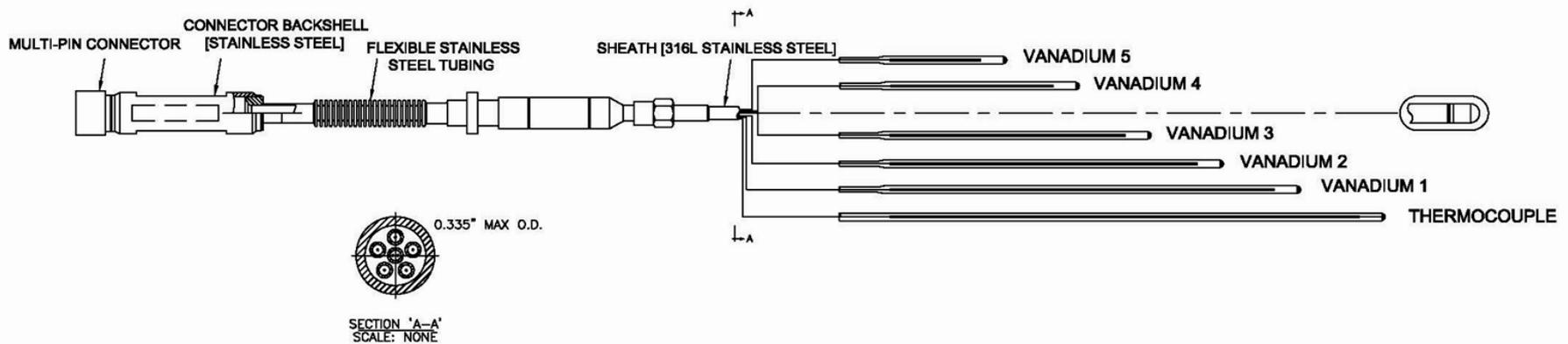
Removed Incore Flux mapping

Reactor Thermocouples

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WINCISE System



OPARSSEL SELF-POWERED DETECTOR ASSEMBLY
FIVE [5] SEQUENTIALLY INCREASING LENGTH VANADIUM ELEMENTS
ONE [1] CORE EXIT THERMOCOUPLE

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Relocate components/systems

CVCS piping in Accumulator 2

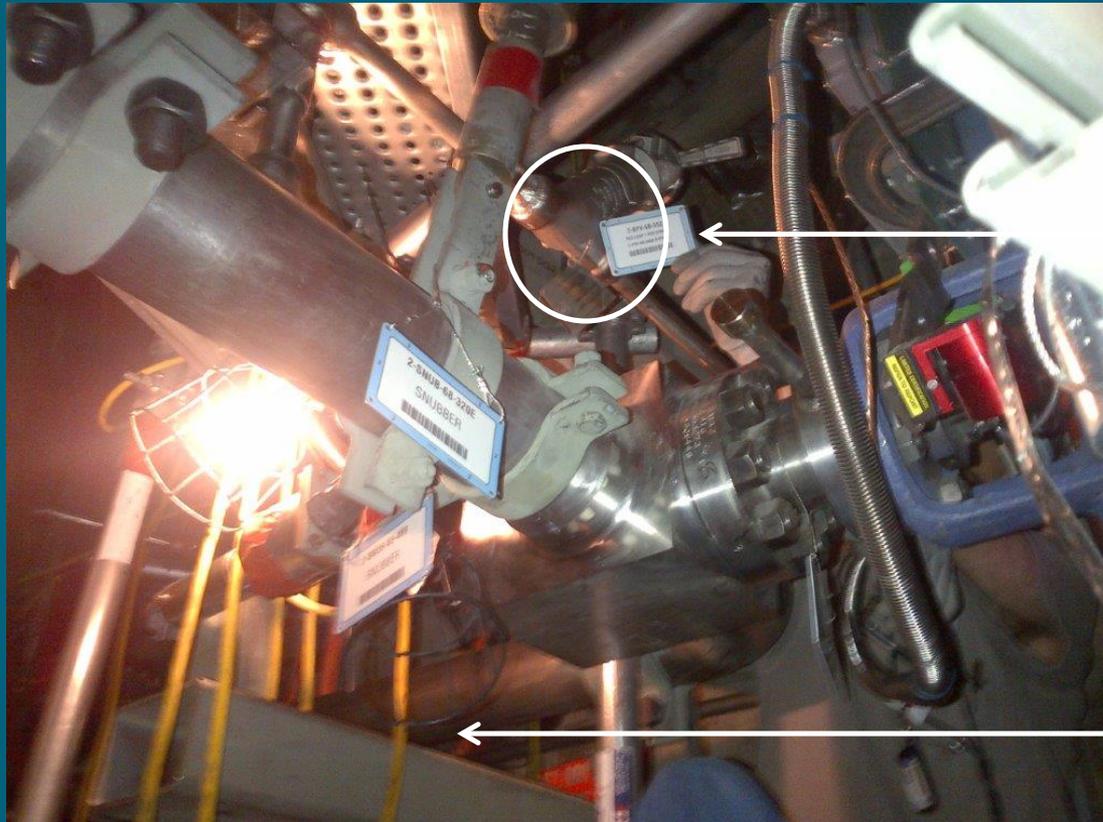
Pressurizer spray bypass valves

ECCS high point vent modification

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Spray valve location



← New location

← Old location

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Modifications components/ systems

Fuel transfer tube blind flange

MSIP (Pressurizer and Rx nozzles)

Upper Internals Split Pin

RHR sump strainer

Core Barrel Up flow conversion

Eliminate compression fittings

Isolation Valves



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Old Flange 20 Bolt Configuration



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New Flange 4 Bolt Configuration



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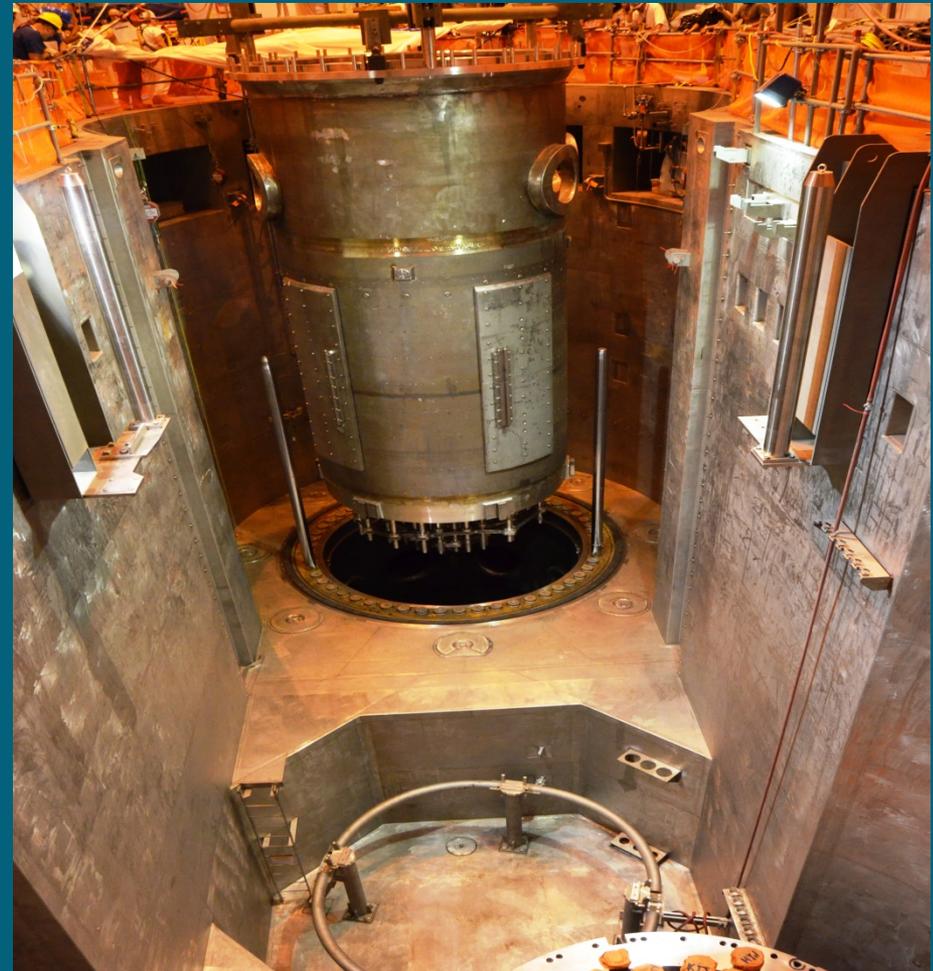
Mechanical Stress Improvement Process



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Core Barrel Up
flow conversion



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Isolation Valves



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SWX -277 Boron Hydrogenated Concrete Mix



Watts Bar Primary Source

- Planning
- Onsite visit
- Mockup
- Special Tooling
- Dosimetry
- Hold Points in Procedures
- Telemetry
- Communications
- Access Controls