

Experiences with Large Component Replacements

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License Renewal

- Granted in 2004, solidified corporate support for “life” to 2033 and beyond.
 - Economics
 - Reliable Operation
 - Efficiency
 - Extended Power Uprate (EPU) of 17%

2005 Outage

- Condenser Replacement
 - Chronic tube/tube sheet leakage
 - Chloride pitting 7% of one bundle
 - Under sized for current power, now EPU
 - Overall health of RSG
 - Titanium tubes
- Moisture Separator Refurbishment
 - Efficiency
 - Reduce moisture

2006 Outage

- Nuclear Steam Supply System Refurbishment Project (NSSSRP)
 - Steam Generators
 - Pressurizer
 - Reactor Vessel Head
 - Rapid Refueling Package
(aka - Integrated Head Assembly)

Steam Generators

- Among longest service alloy 600 mill annealed
 - IGSCC, dents at carbon steel supports, inspection cost
- Improvements
 - Integral forged piping nozzles and forged shells
 - Alloy 690 thermally treated tubing
 - Feeding and loose parts trap
 - Inspection port access
 - Supports – wear & corrosion
 - Anti-vibration bars
 - Broached hole
 - Stainless steel
 - Tube expansion techniques – reduced stresses
 - Blowdown
 - Sized for EPU

Pressurizer

- One leak at temperature nozzle. 72 heater nozzles.
 - Predict failure in plant life
 - Concern of leak at start-up
 - Containment opening available
- Improvements
 - Integral forged piping nozzles and forged shells
 - Stainless steel heater sleeves
 - 36 heaters
 - Alloy 52/152 weld material
 - Increased size – EPU operational benefit
 - TE for thermal transient monitoring
 - Insulation access for inspection

Reactor Vessel Head

- Replacement
 - High inspection costs
 - Predict failure during plant life
 - Containment opening available
- Improvements
 - Mono-block forging
 - Eliminate extra nozzles
 - Alloy 690/52/152 materials
 - Minimize J-groove stresses

Rapid Refueling Package

- Replacement
 - CEDM upper housing leaks – PWSCC on spare housings
 - Outage time constraints, space available and predicted dose
- Improvement
 - CEDM upper housing design for stress and weld reduction
 - Improved cooling with focus on housings and EEQ
 - Minimize outage time

Reactor Coolant Pumps/Motors – Not part of NSSSRP

- Rotating through pumps and motors for rebuild

2006 Outage

- Low Pressure Turbine Rotors
 - Indications of SCC in disk
 - Benefit of efficiency
 - Size for EPU
- Generator Hydrogen Coolers
 - Copper – Impact on RSG
 - Size for EPU
- Main Transformer
 - Degradation of Insulation

Planned Projects

- Extended Power Uprate
 - High Pressure Turbine
 - Efficiency
 - Generator Rewind
 - Rerate
 - Time and temperature on insulation
 - Feedwater Heaters - possible
 - Pressure and flow
- Transformers
 - Spare house and auxiliary