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
  - Feedring 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