Failure Level 1

- Core Damage
- Large Early Release
- Containment Building Leakage

Failure Level 2

- Small-Break LOCA
- Medium-Break LOCA
- Large-Break LOCA
- Consequential Damage (Damage to Other Mechanisms or Nozzles, Cut Cables, etc.)
- Prevent Multiple Control Rod Drops
- Prevent Control Rod Drop
- Damage to Fuel Pins
- Damage to Steam Generator Tubes or Tubesheet
- Damage to Bottom Reactor Vessel Area
- Other Loose Parts Damage

Failure Level 3

- Nozzle Ejection
- Head Low Alloy Steel Rupture
- Cladding Blowout
- Release of Captured Loose Part
- Release of Non-captured Loose Part

Failure Level 4

- Very Large (Critical Size) Loss of Weld Bond Between Nozzle & Weld
- Circ Crack >~95% of Nozzle Cross Section Above or Near Top of Weld
- ASME Code Stress Margins Exceeded
- Wastage Cavity Uncovering Large Cladding Area
- Flaws in the Vessel Cladding
- Intersecting Group of Axial and Circ Thru-Wall Cracks Below Weld
- Thru-Wall Circ Crack 100% Around Nozzle Below Weld

Failure Level 5

- Circ Crack Growth and Possibly Coalescence of Multiple Circs
- Significant Head Wastage in Annulus, at Clad, or on Head Top
- Pre-Existing Boron Deposits on Top Head Surface
- May Impact Leakage Detectability

Failure Level 6

- Turning of Circ-Axial Weld Flaw into Alloy 600 Nozzle Tube
- Initiation of or Branching to OD Circ Crack Above Weld
- Incipient Head Wastage Deep Down in Annulus
- Leakage from Above RPV Head

Failure Level 7

- RPV Head Leak

Failure Level 8

- Growth/ Coalescence of Lack of Fusion Areas
- Growth/ Coalescence of Circ-Axial Weld Flaw
- Growth/ Coalescence of Radial-Axial Weld Flaw
- Growth/Coalescence of ID Axial Flaw (in Depth and Possibly Upward)
- Growth/ Coalescence of OD Axial Flaw Upward
- Growth/ Branching (to Axial) of Below Weld Circ Flaw
- Growth/ Coalescence of Below Weld Circ Flaw

Failure Level 9

- Initiation of Detectable Circ-Axial Weld or Butter Flaw
- Initiation of Detectable Radial-Axial Weld or Butter Flaw
- Initiation of Detectable ID Axial Flaw
- Initiation of Detectable OD Axial Flaw Below Weld
- Initiation of Detectable ID Circ Flaw Above Weld
- Initiation of Detectable ID Circ Flaw Below Weld
- Initiation of Detectable OD Circ Flaw Below Weld

Failure Level 10

- Lack of Fusion (Tube to Weld) from Fabrication
- Lack of Fusion (Weld to Head) from Fabrication
- Increased Potential for SCC Initiation for 182 Weld and Buttering
- Off Water Chemistry Conditions in Past
- Increased Potential for SCC Initiation for Alloy 600 Nozzle Tube
- Welding Residual Stresses
- Fabrication Residual Stresses
- Pressure Stresses
- Low Temp. Crack Propagation
- Fatigue from Normal Operating Transients
- Thermal TASCS Fatigue
- High-Cycle Fatigue

Failure Level 11

- Contaminants from Fabrication
- Grinding of Weld During Head Fabrication
- Previous Chemistry Excursions/ Contamination
- Startup Water Chemistry (Hot Functionals)
- Resin Intrusions
- Surface Contaminants on Nozzle Tube ID & OD During Install
- Grinding of Nozzle Tube ID or OD During Installation
- Mat'l Properties due to Thermal Processing of Base Mat'l
- Nozzle Straightening After Installation
- Nozzle Roll Straightening During Mat'l Processing
- Surface Cold Working from Machining
- Number of Outages and Trips
- Natural Circ. Inside the Nozzle Tube
- Mech. Vibration

- Potential Change in Crack Direction
- Weld Hot Cracking and Other Weld Fabrication Defects
- Volumetric Defects in Nozzle Tube from Mat'l Processing
- Surface Defects in Nozzle Tube from Processing/ Fabrication
- Coalescence of Multiple Flaws
- Crack Growth Driven by Environmental Fatigue
- Crack Growth Driven by Stress Corrosion Cracking

Color Key:

- Not Credible
- Not Actionable
- Actionable

Accident Events
Loose Parts Release
Boric Acid Corrosion
RCS Leakage
Aging Degradation
Plant Operation
Head Fabrication