



Commission Briefing on Reactor Materials Issues

April 28, 2008

Agenda

- Introduction – Jack Grobe, NRR
- Regulatory Activities –
Michele Evans, NRR
- Research Activities –
Jennifer Uhle, RES
- Human Capital Resources –
Jack Grobe

Introduction

- Pressurizer nozzle flaws
- New Code requirements
- Proposed vessel rule
- Extended operation workshop
- Proactive management NUREG
- NDE effectiveness research

Upper Head Background

- Oconee - Spring 2001
 - Circumferential cracking
- Bulletin 2001-01 – Aug. 2001
- Davis-Besse - Spring 2002
 - Head corrosion
- NRC Order EA-03-009 – Feb. 2003
 - Revised in February 2004

Inspections for PWSCC in Upper Head Penetrations

- All baseline inspections complete
- NRC Order EA-03-009 Inspections
 - Susceptibility ranking
 - 1 of ~1500 Low susceptibility nozzles identified PWSCC

Upper Head Replacement

- PWSCC resistant materials
- Half replaced to date
- Anticipate all High and Moderate susceptibility plants will replace heads

Longer Term Approach

- ASME Code Case N-729-1
 - Replace Order
- 10 CFR 50.55a revision to include Code Case
 - Final Rule scheduled May 2008

PWSCC in Butt Welds

- PWSCC in dissimilar metal (DM) butt welds since 2000
- MRP-139 DM butt weld inspection guidelines
- Staff monitoring MRP-139
- Temporary Instruction

Longer Term Approach

- Staff requested ASME Code to develop inspection requirements
 - Code case under development
 - NRC will incorporate code case in 10 CFR 50.55a

Recent Butt Weld Operating Experience

- Wolf Creek pressurizer welds
 - Advanced finite element analyses
- PWSCC in two Babcock & Wilcox plant drop line DM welds
- Retired pressurizer weld inspection

RPV Embrittlement/Aging

- Management of RPV aging is critical to ensuring plant safety
- Four key NRC rules/regulatory guides establish regulatory framework

Current Regulatory Framework

- More than adequate to maintain nuclear safety
- Excess conservatism may impact plant operation and/or plant operating life

Current & Future Actions

- Significant improvement made in our understanding of RPV integrity issues
- Plan to implement improvements through rulemaking

Extended Operation Materials Issues

- NRC/DOE Workshop Feb. 2008
- Aging issues for long-term operation beyond 60 years
- Industry development needs
- Integrated aging management research plan

Proactive Management of Materials Degradation

- PMMD allows for action before degradation is safety significant
- NUREG/CR-6923
- Material susceptibility and knowledge level
- Comparison to industry results

PMMD (continued)

- Review of current research programs
- Collaborative programs with industry but maintain independence
- Enhance coordination
- Prioritize issue resolution

PMMD Implementation

- Database to facilitate updates
- Links to operating experience and research findings
- Knowledge management tool
- International cooperation

Non-Destructive Examination Techniques

- Resolution by prevention or detection and repair/replacement
- Industry initiatives to reduce in-service inspection (ISI) time
- Reliability and effectiveness of NDE techniques are more important

NDE (continued)

- Weld overlays
- High density polyethylene piping
- Program for inspection of nickel-based alloy components
- NDE and PMMD inform NRC's review of Life Beyond 60

Materials Human Resources

- Human Capital
 - Hiring/Retention
 - Training/Knowledge Management
 - Technical Consistency

Acronyms

- PWSCC - Primary Water Stress Corrosion Cracking
- MRP - Materials Reliability Program
- NDE - Non-destructive examination
- RPV - Reactor Pressure Vessel
- ASME - American Society of Mechanical Engineers

Acronyms

- PMMD - Proactive Management of Materials Degradation