Chairman's Report

Dick Bernier

May 10, 2001

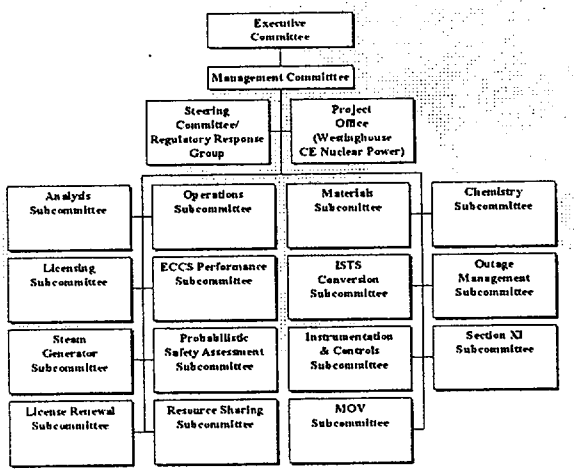
Topics

- Management Update
- Chairman's Priorities
- Strategic Technical Issues

Management Update

- 2001/2002 CEOG Officers
  - Chairman - Dick Bernier (APS)
  - Vice Chairman - Gary Pavis (CCNPP)
  - Steering Committee
    - Dave Pilmer (SCE)
    - Jerry Holman (Entergy - WSES)

CEOG COMBUSTION ENGINEERING OWNERS GROUP



Management Update

- Frequent Interaction with NRC staff via meetings, telecon
- One Safety Evaluation Issued (11/2000 - 4/2001)
  - PTLR
- Two Safety Evaluations Updated (11/2000 - 4/2001)
  - RTT Elimination
  - Ctmt Isolation Valve AOT
- Four CEOG Topicals Currently (11/00) under Review
  - Tech Spec End States
  - DC (Battery) Power
  - RCP Seals
  - Alloy 600 / 690 Nozzles
- Six CEOG Topicals under Development
  - Alt Mode 6 Cooling
  - SU Time Reduction
  - Staggered ESF Testing
  - Common-Q phase 3
  - Risk-Informed Vessel ISI
  - Containment ILRT

Chairman's Priorities

1. CEOG Synergies
2. Project Excellence
3. Industry Relationship

Chairman's Priorities

1. CEOG/WOG Collaboration
   - Work with WOG to realize synergies
     - RV ISI Extension - joint CEOG/WOG project
     - Elimination of LB LOCA
     - Several near term opportunities being pursued (e.g. RI Safety Analyses, AFW Pump Testing in Mode 1)
   - Identify high generic content projects for best utilization of NRC resources
   - Adopt best practices
     - Cafeteria funding, meetings at plant sites, etc.

Chairman's Priorities

2. Project Excellence
   - Continue focus on OTD and project costs
   - Better definition of cost/benefit of CEOG projects with emphasis on 'total cost' and 'total benefit'
   - Resource issues (skills retention, maintenance of CE NSSS design knowledge)

Chairman's Priorities

3. Industry Relationship
   - Licensing Subcommittee providing leadership to strengthen relations with NRC
     - Agenda topic for today
   - CEOG coordination with EPRI
   - Close working relationship with NEI
     - 3 NEI/OG coordination meetings per year
     - Frequent interaction on various issues

Topics

- Management Update
- Chairman's Priorities
- Strategic Technical Issues

2001 CEOG Strategic Issues

- Steam Generator Integrity
- Design/Licensing Basis
- Reactor Plant Materials Issues
- Plant Performance Improvements
- Shorter Refueling Outages
- O&M and Capital Cost Reduction
- Equipment Obsolescence

2001 CEOG Strategic Issues

- **Steam Generator Integrity**
  - Tools for Operational Assessments and Condition Monitoring
  - Improvements in NDE and Basis for Tube-sheet Region Inspections
  - Thermally Induced SGTR Analyses
  - IP2 Steam Generator Tube Rupture Event
  - Coordination with EPRI SGMP

2001 CEOG Strategic Issues

- **Design/Licensing Basis**
  - Joint Engineering Inspections (self-assessments)
  - License Renewal/Generic Aging Management Reports
  - Risk-informed Regulation/Technical Specifications
  - Risk-informed Safety Analysis
  - Comments on DG-1096 (transient analysis methods)
  - Maintenance Rule Implementation
  - RCP Seal Integrity
  - ECCS Sump Strainer Performance
  - Elimination of MNSA Replacement Requirements
  - Extend LBB to Redefine LB LOCA

2001 CEOG Strategic Issues

- **Reactor Plant Materials Issues**
  - Alloy 600 Issue Management
  - Coordination with EPRI MRP
- **Plant Performance Improvements**
  - Analysis of UCLF Contributors
- **Shorter Refueling Outages**
  - Outage Preparation Readiness Review Program
  - Alternate Decay Heat Removal in Mode 6
  - Startup Test Elimination, STAR
  - Containment ILRT Extension
  - Staggered ESF Testing

CEOG Topical Report Development and Approval Process Self Assessment

Ed Weinkam

May 10, 2001

Self-Assessment Basis

Purpose - Review the CEOG Topical Report Development, Submittal, NRC Review, Approval and Implementation Process

Scope - Case Study of Previously-submitted Topical Reports

- Joint Application Report for SIT-LPSI-EDG AOT Extension (CE NPSD-994, 995, 996)
- Elimination of Post-Accident Sampling System from Plant Design & Licensing Basis (CE NPSD-1157)

Self-Assessment Objectives

Objectives - Identify Process Improvements that result in:

- Improved Topical Quality, on Schedule, within Budget
- Submittals that Improve Efficiency of NRC Review and Approval
- Timely and Cost-Effective Implementation at participating CEOG Member Plants

Self-Assessment Schedule

Schedule -

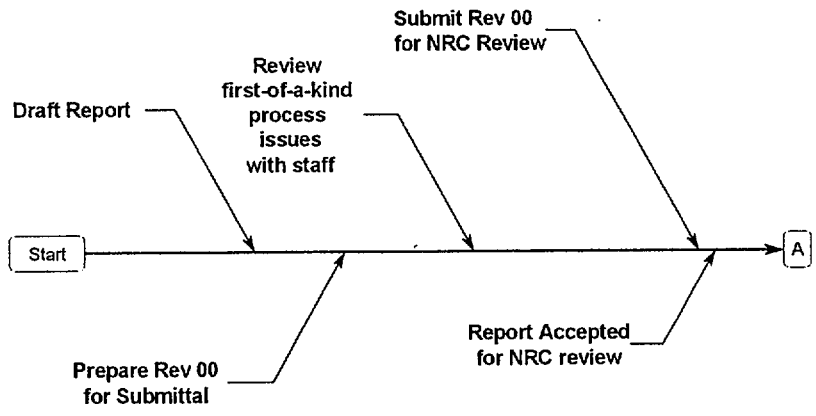
- Gather and Evaluate Data	5/18
- Develop Process Metrics	5/25
- Identify Potential Improvements	6/10
- Issue Draft Report	6/15
- Release Final Report	6/29

Self-Assessment Plan

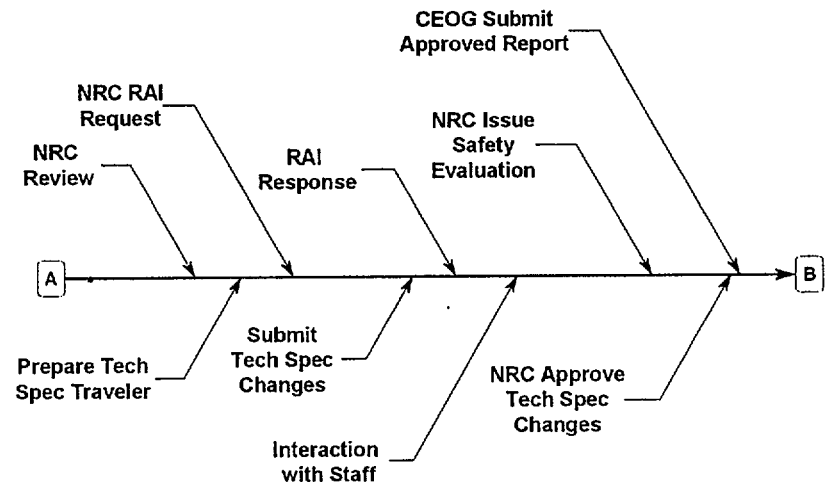
Plan Elements:

- Review "Life Cycle" of Target Topical Reports
- Identify Actions and Process Improvements
- Establish Metrics to Provide On-Going Performance Assessment and Need for Further Process Improvements
- Address Generic Implications

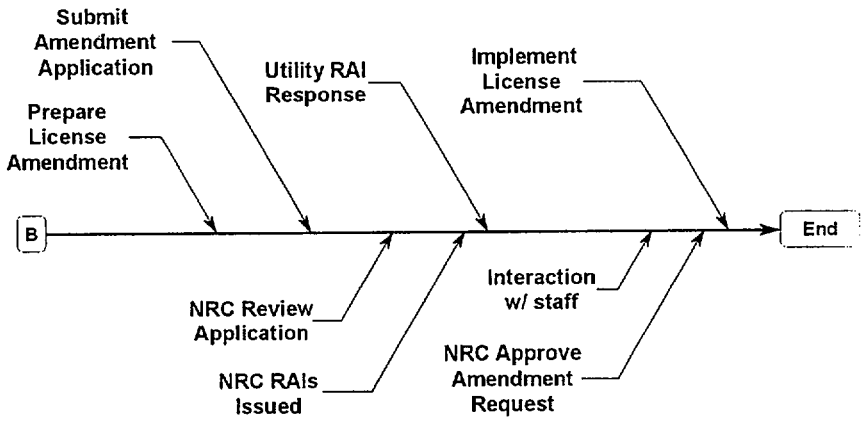
Topical Report Development



NRC Approval Process



Topical Report Implementation

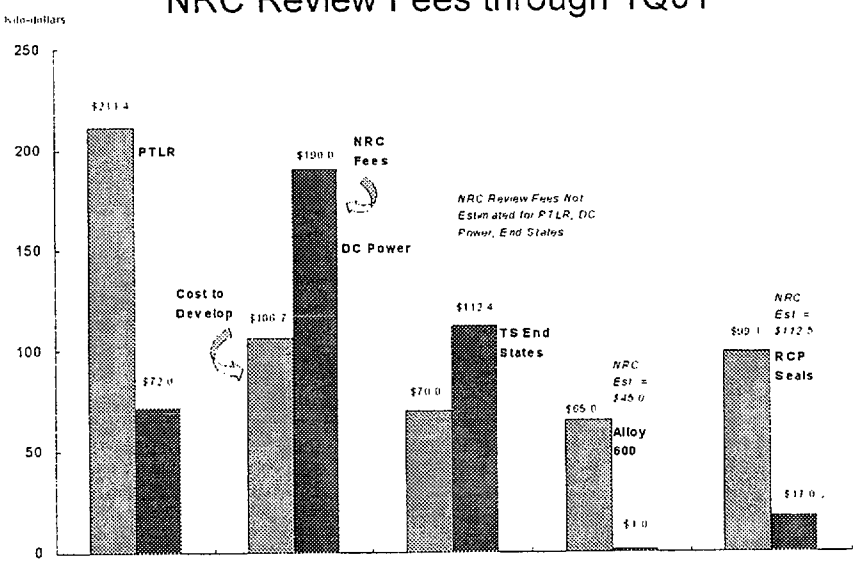


CEOG Risk-Informed Tech Spec Implementation Status

Subject	Review Status	ANO-2	CO-1	CC-2	FC-1	NP-2	PM	PV-1	PV-2	PV-3	SL-1	SL-2	SO-2	SO-3	WA-3
Change in Tech Spec End-of-Cycle Negative MTC Limit *CE NPSD-911*	Generic SE Issued 5/14/00	5/01	2nd qtr 2001	2nd qtr 2001			N/A to Palisades	N/A to Palo Verde	N/A to Palo Verde	N/A to Palo Verde	N/A to St Lucie	N/A to St Lucie			4/21/00
SIT AOT Extension *CENPSD-994*	SE issued to ANO 6/98	Pending	3rd qtr 2001	3rd qtr 2001		6/98	12/00	10/01	10/01	10/01			6/99	6/99	2/7/00
LPSI AOT Extension, *CENPSD-995*	SE issued to SCE 6/98	TBD	3rd qtr 2001	3rd qtr 2001			10/00	2/02	2/02	2/02			6/99	6/99	5/25/00
Diesel Generator AOT Extension *CENPSD-996*	SE issued to SCE 6/98	11/01	3rd qtr 2001	3rd qtr 2001			Not planned	3/02	3/02	3/02			6/98	6/98	7/21/00
Containment Spray System AOT Extension *CENPSD-1045*	SE issued 12/2/98	TBD	3rd qtr 2001	3rd qtr 2001			Wait TSTF results	12/01	12/01	12/01	2001	2001	3/00	3/00	5/15/00
PASS Elimination *CENPSD-1157, R01* CLIIP app'vd by NRC 10/26/00, 65FR49271	SE issued 5/14/00	8/13/00 CLIIP issued	N/A to CCNPP	N/A to CCNPP			2/01	5/01 (target)	5/01 (target)	5/01 (target)	3/25/01	3/25/01	3/26/01	3/26/01	2/01
Elimination of Response Time Testing *CENPSD-1167 R02*	SE issued 12/06/00	7/01	3/01	3/01			N/A to Palisades	5/01 (target)	5/01 (target)	5/01 (target)	2002	2002	03/02	03/02	2nd qtr 2001
Containment Isolation Valve AOT Extension *CENPSD-1168*	SE issued 12/21/00 (JAR for 8 CEOG plant)	TBD	3rd qtr 2001	3rd qtr 2001			2002	3/02	3/02	3/02	2001	2001	Not planned	Not planned	1st qtr 2002

CEOG 9

NRC Review Fees through 1Q01



CEOG 10

Preliminary Insights for NRC

- NRC safety evaluation should summarize plant-specific open issues & limit LAA review for applicable plants
- NRC should confirm that necessary lessons of risk-informed application process have been implemented

Self-Assessment Bottom Line

The Self-Assessment Will:

- Address Topical Report Development, Approval and Implementation Phases
- Provide for CEOG Member Utility Review and Comment
- Compare the CEOG Process with the WOG Process
- Validate Conclusions with the NRC

PRIMARY WATER STRESS CORROSION CRACKING OF VESSEL HEAD PENETRATION NOZZLES

Presented by James Medoff
for the CEOG Executive Meeting

May 10, 2001

CIRCUMFERENTIAL CRACKING OF OCONEE CRDM NOZZLES

- EdF Issued Report of VHP Nozzle Cracking in CRDM Nozzles at Bugey Unit 3, A French Reactor, in Spring 1989.
  - Cracks in Bugey 3 CRDM Nozzle Oriented Predominantly in Axial Direction, with Some Minor Incipient Circumferential Branches.
  - Root Cause of Cracking Attributed to Primary Water Stress Corrosion Cracking (PWSCC) of Alloy 600 Nozzles.
  - EdF Implements Program to Replace All Upper Vessel Heads in EdF-Designed PWRs.

CHRONOLOGY

- Spring 1989 - EdF Reported Cracking in CRDM Nozzles at Bugey 3.
  - Cracks Oriented Predominantly in Axial Direction, with Some Minor Incipient Circumferential Branches.
  - Cracking Root Cause Attributed to Primary Water Stress Corrosion Cracking (PWSCC) of Alloy 600 Nozzles.
  - EdF Implemented Program to Replace All Upper Vessel Heads in EdF-Designed PWRs.
- 1991-1992 - PWR Owners Groups (WOG, CEOG, B&WOG) Submit Initial Safety Evaluations on CRDM Nozzle Cracking.
- November 19, 1993 - NRC Issues Safety Evaluation to NUMARC on Initial Safety Assessments.
- April 1, 1997 - NRC Issues GL 97-01, "Degradation of Control Rod Drive Mechanism Nozzle and Other Vessel Closure Head Penetrations."

CHRONOLOGY (cont.)

- Summer 1997 - PWR Owners Groups Submit GL 97-01 Generic Responses:
  - B&WOG Topical Report BAW-2301
  - WOG Topical Report WCAP-14901
  - WOG Topical Report WCAP-14902
  - CEOG Topical Report CE NPSD-1085
- Spring and Summer, 1997 - PWR Licensees Submit Plant-Specific Responses to GL 97-01.
- June 23, 1998 - NRC Issues RAI on Generic Responses to GL 97-01.
- December 11, 1998 - NEI Submits Industry's Generic Response to June 23, 1998, RAI and Provides Normalized Ranking of VHP Nozzles For Industry.
- March 21, 1999 - NRC Letter to David Modeen, NEI, Informing Industry of NRC's Approval of Integrated Program as Acceptable Means of Monitoring and Controlling Cracking in PWR VHP Nozzles.

CHRONOLOGY (cont.)

- 1998-2000 - NRR Division of Licensing and Program Management Issues Plant-Specific GL 97-01 Closures Letters to PWR Licensees.
- Fall 2000 through Spring 2001 - SCC Reported in VHP Nozzles of Oconee Units 1 & 3, and ANO Unit 1.
- April 12, 2001 - Public Meeting with Duke Power, EPRI, NEI, and MRP to Discuss Generic Implications of Oconee Cracking.
- April 17, 2001 - NRC Issues Letter to NEI Requesting Generic JCO Based on Implications of Oconee Cracking.
- April 30, 2001 - NRC Issues INFORMATION NOTICE 2001-05, "Through-Wall Circumferential Cracking of Reactor Pressure Vessel Head Control Rod Drive Mechanism Penetration Nozzles at Oconee Nuclear Station, Unit 3"

NRC AND SECTION XI REQUIREMENTS

- Section (g)(4) of 10 CFR 50.55a Requires Licensees to Follow Inservice Inspection Requirements of Section XI of ASME Boiler and Pressure Vessel Code, Division 1.
  - Edition of Record Through Editions Currently Endorsed in 10 CFR 50.55a (i.e., 1995 Edition, Inclusive of 1996 Addenda) are Acceptable.
  - Inspection Category B-E to Table IWB-2500-1 of Section XI Requires VT-2 Type Visual Examinations Be Performed Once per Inspection Interval on 25% of VHP Nozzles Joined by Partial Penetration Welds to RPV Heads (Depending on Code of Record May Not Be Applicable to all Facilities).
  - Inspection Category B-P to Table IWB-2500-1 Requires VT-2 Type Visual Examinations (System Leakage Tests) Be Performed Once Each Refueling Outage on the Pressure Retaining Boundary of RPV.
  - Inspection Category B-P to Table IWB-2500-1 Also Requires VT-2 Type Visual Examinations (System Hydro tests) be Performed Once per Inspection Interval on the Pressure Retaining Boundary of the Reactor Vessel (Depending on Code of Record May Not Be Applicable to all Facilities).
  - IWA-5242 does not require licensees to remove thermal insulation when performing VT-2 examinations of insulated pressure boundary components.

INITIAL SAFETY ASSESSMENTS OF POTENTIAL FOR PWSCC TO DEVELOP IN U.S. PWR VHP NOZZLES

NRC Discussed U.S. Nuclear Industry's Plans for Addressing Alloy 600 PWR VHP Nozzles Degradation of With NUMARC/NEI and PWR OGs in Early 1990s

- CEOG, WOG, and B&WOG Each Submitted Initial Safety Assessments of Potential for Cracking to Develop in Respective PWR VHP Nozzles Designs.
- These Safety Assessments Concluded:
  - Cracking of VHP Nozzles Is an Economic Issue, and Not a Safety Issue for U.S. Industry;
  - Nozzle Hoop Stresses Dominate over Axial Tensile Stresses;
  - Nozzle Cracking Would Be Oriented in Axial Direction;
  - Circumferential Cracking in Nozzles Could Only Be Initiated If Borated Coolant Were to Leak into Gap as Result of Throughwall Axial Crack

INITIAL SAFETY ASSESSMENTS (con't)

- These Safety Assessments Concluded (con't):
  - Would Take Significant Number of Years for Potential Circumferential Crack to Grow 360° and Throughwall
  - Evidence of Throughwall Leakage Would Be Detected as Part of Plant's Boric Acid Walkdowns Prior to Any Catastrophic Failure of Nozzle

EARLY NRC ACTIONS

NRC Evaluated Initial PWR OGs' Safety Assessments.

- NRC Concluded in Safety Evaluation Dated November 19, 1993, That VHP Nozzle Cracking Not Near-Term Safety Issue.
  - However, VHP Nozzle Cracking May Be Long-Term Safety Issue.
  - NRC Established a 75% Through-Wall Limit for Recordable Axial Flaws That May Remain in Service.
  - Due to Safety Significance of Circumferential Flaw in Nozzles, Evaluations of Recordable Circumferential Flaws Would Need to Be Submitted for Staff Evaluation If Licensee Planned to Leave in Service.

GENERIC LETTER 97-01

Issued Generic Letter (GL) 97-01, "Degradation of Control Rod Drive Mechanism Nozzle and Other Vessel Closure Head Penetrations," on April 1, 1997

- Requested PWR Licensees Inform Staff of Intentions to Perform Volumetric Examinations of Their VHP Penetration Nozzles.
- Also Requested PWR Licensees Submit Detailed History Information Relative to Purity Levels of Their Reactor Coolant.
- NRC Encouraged Industry to Coordinate Plant-Specific Responses to GL with Industry-wide Responses from PWR OGs and NEI.

U.S. Nuclear Industry's Responses to GL 97-01

- WOG, CEOG, and B&WOG Submitted Generic GL 97-01 Responses on Behalf of Respective Owners Groups (OGs).
  - B&WOG Also Compiled and Submitted Detailed Reactor Coolant Chemistry History for B&WOG Member Plants.
- PWR OGs' Generic Responses Provided Model for Predicting Which Member Facilities Would Have Highest Probability of Initiating and Growing Cracks in VHP Nozzles:
  - Original Models Developed by Westinghouse, Dominion Engineering and CE on Behalf of Member Utilities in WOG, B&WOG, and CEOG.
  - All Models Based on Monte Carlo Type Probabilistic Models.
  - Probabilistic Methods Only Model Susceptibility of Alloy 600 Base Metal Materials to Crack, and Do Not Include Methods for Modeling Susceptibility of Alloy 82/182 Filler Metal Materials to Cracking
  - CEOG Member Utilities Later Decided to Adopt the Dominion Engineering Model as the Probabilistic Model for Ranking the VHP Nozzles of CEOG Member Plants.

U.S. Nuclear Industry's Responses to GL 97-01 (Con't.)

- Plant-Specific Responses Referenced Generic Response from Respective Owners Group
  - Some Plant-Specific Responses Also Included Additional Plant-Specific Information Not Provided in Generic Responses for Their Facilities.
- NEI Coordinated Industry Efforts and Developed Normalized Ranking of VHP Nozzles in U.S. PWRs.
- NEI and U.S. PWR Industry Committed to Perform Voluntary, Volumetric Examinations of the VHP Nozzles at Selected U.S. Sites.
- Sites Selected Were Those Whose VHP Nozzles Are Identified as Being Highly or Moderately Susceptible to Cracking.
  - Sites for B&WOG Member Plants Are Oconee Unit 2 and Crystal River.
  - Sites for WOG Member Plants Are Farley Unit 2 and Diablo Canyon Unit 2.
    - RG&E Also Volunteered to Perform Volumetric Examinations at Ginna.
  - Sites for CEOG Member Plants Are Millstone Unit 2 and San Onofre Unit 3.

GL 97-01 RESPONSES FROM B&WOG, CEOG AND WOG INSPECTION PLANS

- Volumetric Inspections Completed to Date:
  - WOG: Point Beach Unit 1, D.C. Cook Unit 2, North Anna Unit 1, Ginna
  - CEOG: Palisades, Millstone 2
  - B&WOG: Oconee Unit 2 (three inspections: 1994 [69], 1996 [2], 1999 [6])
- Additional Voluntary Volumetric Examinations of VHP Nozzles Originally Planned:
  - Crystal River 3 in 2001
  - Farley Unit 2 in 2002
  - Diablo Canyon Unit 2 in 2004
  - San Onofre Unit 3 in 2008

VHP NOZZLE CRACKING EVENTS IN U.S.

- D.C. Cook Unit 2 - Three Axial Indications Reported in 1994 in Single CRDM Penetration Nozzle.
- Oconee Unit 1 - November 2000, Borated Water Leakage Reported in Four Thermocouple Nozzles and One CRDM Penetration Nozzle.
  - NDE Examinations Confirmed Through-Wall Axial Indications in J-groove Welds.
  - Subsequent Examinations of Four Remaining Thermocouple Nozzle Confirmed That All J-groove Welds for Thermocouple Nozzles Were Cracked.
- ANO Unit 1 - February 2001, Borated Water Leakage Reported in One CRDM Penetration Nozzle.
  - NDE Examinations Confirmed Through-Wall Axial Crack in J-groove Weld.

VHP NOZZLE CRACKING EVENTS IN U.S. (Con't)

- Oconee Unit 3 - March 2001, Borated Water Leakage Reported in Nine CRDM Penetration Nozzles.
  - NDE Examinations Confirmed Presence of Through-Wall Axial Indications Located in J-groove Welds.
  - Weld Repair Excavation Activities Confirmed Presence of Significant Circumferential Cracking in Two of Leaking Penetration Nozzles (i.e., No. 50 and 56 CRDM Nozzles).

CRITICAL INFORMATION

- Cracking Found in VHP Nozzles at Oconee Units 1 and 3, and ANO Unit 1, Are Reported to Occur in the Alloy 82/182 Filler Metals and Heat Affected Zones of the J-groove Welds Joining Nozzles to RPV heads
  - Cracking in Oconee 3 No. 50 and 56 CRDM Nozzles Are First Report of Circumferential Cracking in PWR VHP Nozzles.
- Industry Previously Justified That VHP Nozzle Cracking Is Not a Significant Safety Issue on the Bases That:
  - Significant Long-term Leakage into Nozzle Annulus Region Would Be Needed to Initiate Circumferential Cracking of a VHP Nozzle, and
  - This Leakage Would Be Detected Well Before Any Catastrophic Failure of a VHP Nozzle.

CRITICAL INFORMATION (con't)

- MRP in April 12, 2001, Public Meeting Informed Staff:
  - Crack Growth Rates in Alloy 82/182 Filler Metals May Be Significantly Higher than Those Assumed for Alloy 600 Base Metal Materials.
  - CE and Westinghouse PWR Licensees May Not Be Capable of Conducting Visual Walkdowns of PWR Head Surfaces Without Removal of the Thermal Insulation Materials.
  - Circumferential Failure of CRDM Nozzle below J-groove Weld Has Potential to Block CRDM Rod Insertion and May Be Safety Issue.

KEY ISSUES

- PWR OG's Generic Models Do Not Include Probabilistic Modeling of Alloy 82/182 Filler Metal Materials
  - May Need Updating Based on Oconee and ANO Cracking Experiences.
- Uncertainty as to Whether Licensees Are Performing Adequate Examinations of PWR Head Surfaces
  - Scope of IWA-5242 for Performing Visual VT-2 Examinations of Thermally Insulated RPV Heads May Not Be Sufficient for Detection of Boric Acid Residue.
- Oconee CRDM Nozzle Circumferential Cracking Creates Uncertainty:
  - Whether Analysis of Postulated Circumferential Cracking Is Conservative or Valid.
  - Whether PWR VHP Nozzle Could Potentially Have Significant, Undetected Circumferential Cracks.
- Circumferential Failure of CRDM Nozzle Below J-groove Weld Has Potential to Block Rod Insertion Could Change Conclusion in 1993 Safety Evaluation That Such Cracking Is Not Safety Significant.