




UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

May 1, 2000

MEMORANDUM TO: Stuart A. Richards, Director
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: Robert M. Pulsifer, Project Manager, Section 2 
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF MANAGEMENT MEETING WITH THE BOILING WATER
REACTOR OWNERS GROUP (BWROG) AND THE BOILING WATER
REACTOR VESSEL AND INTERNALS PROGRAM (BWRVIP)

On March 16, 2000, the staff met with members of the Boiling Water Reactor Owners Group (BWROG) and the Boiling Water Reactor Vessel and Internals Project (BWRVIP) to discuss various activities of both the BWROG and the BWRVIP. A list of attendees of the March 16, 2000, meeting and their affiliations is provided as Attachment 1. The meeting started with the BWROG activities then proceeded to the BWRVIP activities. A copy of the handouts provided by the staff, BWROG, and BWRVIP for their presentations is provided as indicated.

Members of the staff and the BWROG continued the meeting as summarized below:

Opening Remarks/Introductions

The meeting began with the review of the action items from the previous BWROG meeting of December 8, 1999. It was decided that the action items would be discussed when the subject was addressed according to the agenda (Attachment 2). The action item that involved the activities of the integrated risk informed regulation (IRIR) committee of the BWROG regarding A.4 of the maintenance rule will be discussed at a future meeting.

BWR Operating Experience (Attachment 3)

The BWROG led a discussion on how the BWROG keeps its members informed of recent happenings. The BWROG stated that sharing experience and information is handled through several means including: (1) discussions during their quarterly General Meeting of the BWROG, (2) during specific BWROG committee meetings, (3) via fax or e-mail, and (4) disposed through the Potential Issue Review Team (PIRT). The PIRT is a team of individuals from the BWROG, General Electric (GE), and outside contractors to screen and disposition issues raised to the PIRT. The BWROG stated that "Voluntary Initiatives" are processed through the PIRT and the staff indicated that guidelines on "Voluntary Initiatives" to the industry and public which will include a definition of "Voluntary Initiatives" are being developed and should be issued for public comment following Commission approval.

PASS, H₂, Loose Parts Monitoring (Attachment 4)

The BWROG said that the objective is to relax regulatory requirements of the post accident sampling system (PASS), H₂/O₂ monitors, H₂ recombiner, and loose parts monitoring system (LPM). The BWROG is monitoring similar staff work with the pressurized water reactor owners and will submit requests for PASS and LPM relaxations this year. The staff indicated that its review did not identify any specific requirements for the LPM, or a clean dependence on the LPM for closure of specific issues.

DC Motor Methodology (Attachment 5)

The BWROG provided a short update on their work concerning direct current motors on motor operated valves. They stated that the final draft of their report is scheduled to be issued this month to their members and that Limitorque has been requested to review/endorse the work. The BWROG said that they anticipate a meeting with the staff in the Fall of 2000 after the review by Limitorque; however, the staff recommended that the BWROG not wait for the Limitorque review before scheduling another meeting with the staff. The staff said that this work by the BWROG has been a good effort and that there has been good communications between the BWROG and the staff.

Update on Containment Coatings Issue

The staff provided a brief discussion regarding the NRC research effort on the generic containment coatings issue. A public meeting is tentatively set for May 2000 to discuss this effort. There has been delays with the testing due to the unavailability of materials used in older plant containment coatings. Testing is scheduled to be completed by the end of this year.

Status of SLMCPR TSTF

The staff stated that it had rejected the safety limit minimum critical power ratio (SLMCPR) technical specification task force (TSTF) issue. The decision of the staff will be issued in writing soon. The BWROG said that they are now looking at alternatives.

Appendix R Document Status (Attachment 6)

The staff provided a presentation on its efforts to review the SRV/LPS (safety relief valve/low pressure systems) topical report and the submittals from the BWROG and Nuclear Energy Institute on fire-induced circuit failure methodology. The staff indicated that there are technical as well as legal issues that need to be addressed and that a meeting is being arranged for April 25, 2000 to discuss these issues. The BWROG has requested that NRC management meet with the BWROG after the technical meeting to discuss the legal issues.

Feedwater Nozzle Inspection Safety Evaluation (SE)

The staff stated that the feedwater nozzle inspection SE for its review of Topical Report GENE-523-A71-0594, Revision 1, "Alternate BWR Feedwater Nozzle Inspection Requirements" was issued on March 10, 2000. The BWROG indicated that licensees would save about \$279,000 each time they need to do this inspection.

Excess Flow Check Valve SE

The staff stated that the excess flow check valve SE for its review of Topical Report B21-00658-01, "Excess Flow Check Valve Testing Relaxation," dated November 1998 was issued on March 14, 2000.

Global Nuclear Fuel (Attachment 7)

Mr. Klapproth from GE provided a brief overview of their new joint venture in the nuclear fuel business consolidating fuel activities in Wilmington, NC, Japan, and Europe under an organization called Global Nuclear Fuel reporting to GE Nuclear Energy in San Jose, California.

Open Discussion

During the open discussion, the staff briefed the BWROG on the closure of Generic Safety Issue (GSI) B-55 (Attachment 8) on improved reliability of target rock safety relief valves (SRV). The staff had determined that if actions need to be taken to improve the performance of the SRVs in the future, the existing quality assurance, maintenance rule, and codes and standards regulations provide regulatory mechanics for pursuing additional improvements on a plant specific basis. The staff plans to issue a Regulatory Issue Summary to inform the industry of the closure of GSI B-55.

The staff asked the BWROG to comment on their recent meeting on a potential concern regarding local suppression pool temperature limits and ECCS strainer steam ingestion. The BWROG stated that the PIRT has addressed this concern and that they will provide a report to the BWROG. The staff asked whether GE Service Information Letter (SIL) 615 was considered during the PIRT review. Immediately following the meeting the BWROG informed the staff that it did not consider SIL-615 during their review because it had been dispositioned earlier.

Mr. Klaproth from GE asked if the staff was shifting resources away from topical report reviews to licensing actions. The staff said that the present rate of expenditure of resources for topical report reviews would result in exceeding the budgeted resources for the year; therefore, resources are temporarily being diverted to the completion of licensing actions. The staff said that they will inform the BWROG if the review of a topical report is slipping because of budget concerns. Mr. Sheron did emphasize that it is important that licensees respond to the staff's request to identify potential licensing submittals that would need staff review so that proper resources can be budgeted.

Summary and Review Action Items

- (1) The staff will set up the Appendix R (SRV/LPS) technical and management meetings. This technical meeting has been set for April 25, 2000. The management meeting is still to be scheduled.
- (2) The BWROG will discuss at a future management meeting the activities of the IRIR committee regarding A.4 of the maintenance rule.

- (3) The BWROG will inform the staff whether the PIRT considered SIL-615 in their recent ECCS suction strainer review. As stated above, the BWROG did inform the staff after the meeting.

Members of the staff and the BWRVIP continued the meeting as summarized below:

Opening Remarks/Introduction

The staff met with the Executive Oversight Committee (EOC) of the BWR Vessel and Internals Project (BWRVIP) to discuss issues related to the status of technical reviews and future activities by the BWRVIP (Attachment 9).

Update of BWRVIP Key Accomplishments and Activities

Mr. Terry, the Chairman of the BWRVIP EOC began the meeting with a brief update of the key accomplishments and activities of the BWRVIP since the last EOC meeting with senior NRR staff in March 1999. These activities include submittals for the Integrated Surveillance Program (ISP, BWRVIP-78), proposed revisions to NUREG-0313 inspection schedules (BWRVIP-75), revisions to the vessel and core shroud inspection guidelines (BWRVIP-74 and -76, respectively), initiation of complementary research with the NRC's Office of Nuclear Regulatory Research on weldability of irradiated material, and vessel and internal inspection summaries for Fall 1998 outages. He then provided a short summary of key BWRVIP accomplishments since the March 1999 NRR/EOC meeting, and activities the BWRVIP will undertake in 2000.

Technical Committee Summaries

The Technical Chairs for the Integration, Assessment, Inspection, Repair and Mitigation Committees then provided a synopsis of the key issues each committee is addressing in the coming year, and the proposed deliverables to the staff. These are summarized in the BWRVIP handout (Attachment 9).

Open Discussion

In the open discussion portion of the meeting, the NRC Lead Project Manager (LPM) summarized the status of BWRVIP documents presently under review, including a proposed schedule for issuing SEs (Attachment 10). The review of the BWRVIP license renewal (LR) appendices was discussed, and the LPM stated that as of the present time, no obstacles are foreseen to prevent the LR SEs from being completed, or otherwise impacting the review of the Hatch Plant LR submittal. The BWRVIP has 12 Inspection and Flaw Evaluation (I&E) Guidelines under staff review for the license renewal period, plus two additional reports that directly support LR. Of these, seven are complete or essentially complete (BWRVIP-18, -25, -26, -27, -47, -48, and -49), and five are expected to be completed in the next few months (BWRVIP-38, -41, -42, -75, and -76). The two remaining reports (BWRVIP-74 and -78) involve issues related to RPV shell welds, for which confirmatory research is underway, and the ISP. The staff expects to complete the reviews of these two documents in early 2001, which will allow for completion of the Hatch Plant LR review on schedule.

Also discussed was the staff's review of the BWRVIP's proposal for inspection relief based on hydrogen water chemistry (HWC). This proposal is under staff and contractor review. A draft technical evaluation report (TER) has been received from the contractor, and the staff is reviewing the draft TER.

Mr. Terry then discussed an approach the BWRVIP is evaluating for assessing how the member utilities are implementing BWRVIP products. The BWRVIP is considering having Institute of Nuclear Power Operation (INPO) involved in the pilot assessments of 2 to 3 utilities in 2000. This process will be evaluated and the future scope and schedule will be determined following the completion of the pilot assessments.

Finally, Mr. Terry discussed the closeout of the BWRVIP program and transitioning to a maintenance mode, which will continue interaction with the NRC, collecting and disseminating plant inspection data and experience, and responding to future issues in a timely and proactive way. Mr. Terry also re-stressed briefly license renewal issues, the ISP submittal, revised NUREG-0313 inspection schedules, and inspection relief for HWC.

Research Efforts Regarding Cascading Failures (Attachment 11)

Finally, a presentation was made by the staff on the results of NRC confirmatory research program performed by Idaho National Engineering and Environmental Laboratory on "Risk Associated with IGSCC-Induced Failure of BWR Internals," which examined the potential risks associated with the synergistic failures of degraded BWR internals. It concluded that, with no inspection, monitoring or repair, degraded internal components could fail in either a common mode or in a cascading, synergistic manner, potentially leading to an inability to insert rods or cool the core in the event of a severe internal or external event. However, for licensees following the current BWRVIP program, as approved by the staff, there is a significant decrease (on the order of two-plus orders of magnitude) in core damage frequency (CDF) caused by failures of BWR internals, bringing the CDF to less than 5×10^{-6} events/yr.

The meeting ended with an agreement that future meetings with the BWRVIP will be arranged as needed and required.

Project No. 691

- Attachments:
1. Attendance List
 2. Draft Agenda
 3. BWROG Operating Experience
 4. Regulatory Relaxations
 5. MOV/DC Motors
 6. SRV/LPS Topical Report
 7. Joint Venture Scope
 8. Closeout of GSI B-55
 9. BWRVIP Handout
 10. Status of BWRVIP Submittals
 11. Risk Associated with IGSCC-Induced Failure of BWR Internals

cc w/atts: See next page

DISTRIBUTION: See attached list

Accession No. ML0037

OFFICE	PDI-2/PM	PDIV-2/LA	EMCB	DSSA	DE/D	PDIV-2/SC
NAME	RPulsifer	EPeyton	GCarpenter	TCollins	JStronider	SDembek
DATE	4/17/00	4/14/00	4/26/00	4-17-00	4/17/00	5/1/00

DOCUMENT NAME: G:\PDIV-2\bwrog\031600 Meeting Summary.wpd

OFFICIAL RECORD COPY

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DISTRIBUTION FOR MARCH 16, 2000, MEETING WITH THE BOILING WATER REACTOR OWNERS GROUP

Dated: May 1, 2000

PUBLIC

PDIV-2 Reading File

JZwolinski/SBlack (RidsNrrDlpm)

SRichards (RidsNrrDlpmLpdiv)

SDembek (RidsNrrDlpmLpdiv2)

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RPulsifer (RidsNrrPMRPulsifer)

BSheron (RidsNrrAdpt)

BBateman (RidsNrrPMBBateman)

EWeiss

CECarpenter

RAnand

GHubbard

WBeckner (RidsNrrDripRtsb)

TScarbrough

RCaruso

RHermann

JStrosnider

TCollins

Meeting With Boiling Water Owners Group

Meeting Attendees

To Discuss Reactor Vessel And Internal Program

March 16, 2000

<u>NAME</u>	<u>AFFILIATION</u>
Robert Pulsifer	NRC
Stephen Dembek	NRC
Bill Bateman	NRC
Eric Weiss	NRC
George Hubbard	NRC
William Beckner	NRC
Thomas Scarbrough	NRC
Ralph Caruso	NRC
C. E. Carpenter	NRC
Robert Hermann	NRC
Jack Strosnider	NRC
Brian Sheron	NRC
Tim Collins	NRC
Raj Anand	NRC
George Vandesheyden	COMED/BWRVIP
Richard E Ciemiewicz	PECO Energy
James W. Langenbach	PECO Energy
Bob Carter	EPRI
Tom Mulford	EPRI
Jack Dillich	EPRI
Raj Pathania	EPRI
Larry Steinert	EPRI
George Selby	EPRI
Christine Cave	McGraw Hill
Nancy Chapman	SERCH/BECHTEL
Carl Larsen	Vermont Yankee (BWRVIP)
Bruce McLeod	SAIC/BWRVIP
Harry Salmon	NYP&L/BWRVIP/EOC
Vaughn Wagner	CP&L/BWRVIP
John A. Wilson	AmerGen/BWRVIP
Paige Negres	GE
Jim Klapproth	GE
Tom Hurst	GE
Lewis Sumner	SNC
Glen Warren	SNC
Jim Kenny	PPL
Carl Terry	Niagara Mohawk
John Kelly	New York Power Authority
Mike Neal	NUSIS

**NRC/BWRVIP/BWR OWNER'S GROUP
MANAGEMENT MEETING
March 16, 2000 - 9:00AM - 12:00PM
Room T8A & F1
DRAFT AGENDA**

DISCUSSION TOPICS

BWROG Agenda (9:00am)

10 min.	Opening Remarks/Introductions	BWROG
	<ul style="list-style-type: none"> • BWROG is proactive in solving problems for the fleet, incorporating the efforts of our technical exchange committees. Opportunity to share efforts, schedules, and priorities with the staff members 	
	- Update BWROG/NRC action items	BWROG/NRC
10 min.	BWR Operating Experience	BWROG
	<ul style="list-style-type: none"> • Discuss BWROG methods to internally communicate Potential Issues that may affect owners. 	
10 min.	PASS, H2, Loose Parts Monitor	BWROG/NRC
	<ul style="list-style-type: none"> • Following pressurized water reactor actions, the BWROG will discuss status of committee work and solicit NRC comments on these issues. 	
10 min.	DC Motor Methodology	
	<ul style="list-style-type: none"> • The BWROG is developing a computer model to provide guidance for determining the performance of dc-powered motor-operated valves. 	
	- Status BWROG work in developing methodology.	
	- Obtain NRC Feedback on potential Generic Communication in this area.	
5 min.	Update on Containment Coatings Issue	NRC
	<ul style="list-style-type: none"> • Latest results of NRC research on generic containment coatings concern. 	
5 min.	Status of SLMCPR TSTF	NRC
	- Update on status of TSTF-357.	
5 min.	APPENDIX R document status	NRC
	<ul style="list-style-type: none"> • Follow-up of BWROG 11/15/99 submittal and discuss NRC direction and schedule. 	
5 min.	Feedwater Nozzle Inspection SER	NRC
	<ul style="list-style-type: none"> • Status of topical report review "Alternate BWR Feedwater Nozzle Inspection Requirements" 	
5 min.	Excess Flow Check Valve SER	NRC
	<ul style="list-style-type: none"> • Status of topical report review "Excess Check Valve Testing Relaxation" 	
10 min.	Global Nuclear Fuel	Jim Klapproth
	<ul style="list-style-type: none"> • GE announces new fuel partners 	
10 min.	Open Discussion	
5 min.	Summary and Review Action Items	BWROG/NRC

BWRVIP Agenda (10:30am)

- | | | |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 10 min. | Opening Remarks/Introductions | EOC/NRC |
| | <ul style="list-style-type: none">• A special industry review group, the Boiling Water Reactor Vessels and Internals Project (BWRVIP), was formed in 1994 by the member licensees of the BWROG to address issues related to reactor vessel, reactor coolant piping, and reactor internals degradation. The BWRVIP has been instrumental in developing and implementing proactive guidelines to address these issues. | |
| | <ul style="list-style-type: none">- Update of BWRVIP Key Accomplishments and Activities | C. Terry |
| 45 min. | Technical Committee Summaries | |
| | <ul style="list-style-type: none">- Integration- Assessment- Inspection- Repair- Mitigation | H. Salmon
G. Vanderheyden
W. Eaton
G. Jones
L. Sumner |
| 15 min. | Status of Key Technical Issues | C. Terry |
| | <ul style="list-style-type: none">- Integrated Surveillance Program- License Renewal Appendices- Revision to NUREG-0313 | |
| 15 min. | Open Discussion | BWRVIP/NRC |
| | <ul style="list-style-type: none">- Status of NRC Review/Acceptance of BWRVIP Products- Assessment of BWRVIP Implementation- BWRVIP Direction in 2000 and Beyond- Items from the Floor | NRC
C. Terry
C. Terry |
| 5 min. | Research Efforts Regarding Cascading Failures | NRC |
| | <ul style="list-style-type: none">• Present the results of RES Program on "Evaluation of Degradation of BWR Internals." | |
| | Summary and Review Action Items | BWRVIP/NRC |

BWROG Operating Experience

Presentation for BWROG/NRC
Management Meeting

March 16, 2000

Washington, DC

Presentation Objective

- **Provide information on methods utilized by the BWROG to keep all members informed of recent happenings**

Sharing Experience and Information

- **Potential Issue Review Team (PIRT)**
- **General Meeting Roundtable**
- **General Meeting Presentations**
- **Committee Presentations**
- **Sprint Fax and E-mail**

Potential Issue Review Team

- **Established as part of BWROG Charter and Operating Principles**
- **Team makeup**
 - **BWROG Chairman and Vice-Chairman**
 - **RRG Chairman**
 - **Advisory Committee (Prime Reps)**
 - **Selected Committee Chairmen**
 - **GE**
 - **Outside Contractors**

Potential Issue Review Team

- **Dedicated staff member to manage**
- **Data base maintained**
 - **Issue Log**
 - **Action Items**
 - **Available on BWROG Web page**
- **Anyone can submit issue for review**
- **Determine if immediate need to address**
 - **Chairman can authorize funds**

Potential Issue Review Team

- **Scheduled discussion every 6 - 8 weeks**
 - **More often if needed**
- **Screen issues for applicability to BWRs**
- **Determine appropriate disposition**
 - **Assign to current committee**
 - **Create new committee**
 - **Authorize work to outside contractor**
 - **Close without work**

General Meeting Roundtable

- **Quarterly with all utility Prime Reps**
- **Mostly Middle Management levels**
- **2 day meeting**
- **2 hrs dedicated to Operating Experience**
 - **Each plant submits written and verbal**
 - **Events, Experience, and lessons learned**
 - **Operational and licensing**

General Meeting Presentations

- **Prime Reps can request agenda time**
 - Typical agenda slot for last minute addition
- **PIRT may ask for presentations**
- **Any member of BWROG can request to present or have presentation made**
- **NEI, EPRI, and INPO routinely present**

Committee Presentations

- **Specific presentations are made at applicable committee meetings**
- **Applicable committees present at General and Executive Meetings**

Sprint Fax and E-mail

- **All committees are on Sprint Fax and E-mail distribution lists**
- **Any member can share information with utility peers via Project Manager**
 - **Distribution is then made to all applicable members**

PASS, H₂/O₂ Monitors, H₂ Recombiner, Loose Parts Monitoring System Regulatory Relaxations

Presentation for
NRC/BWROG Management Meeting

March 16, 2000
Washington, DC

PASS, H₂/O₂ Monitors, H₂ Recombiner, Loose Parts Monitoring System Regulatory Relaxations

Committee Objective:

- Eliminate unnecessary post-accident sampling and analysis requirements for BWRs
- Declassify H₂/O₂ monitors to non-safety related
- Eliminate requirements for H₂ recombiners and Containment Air Dilution (CAD) systems or relax to non-safety
- Justify elimination of Loose Parts Monitoring System

Presentation Objective:

- Update NRC Management
- Request NRC provide promised information regarding elimination of Loose Parts Monitor System

PASS, H₂/O₂ Monitors, H₂ Recombiner, Loose Parts Monitoring System Regulatory Relaxations

Current Status/Schedule:

- BWROG monitoring similar work performed by PWR Owners
 - Awaiting issuance of Safety Evaluation Reports on PASS elimination
- Discussed issues with NRC Staff on October 7, 1999
 - NRC provided comments and suggestions regarding BWROG approach
 - In December '99, NRC provided preliminary comments regarding elimination of Loose Parts Monitoring System and agreed to provide additional information later regarding their comments
- BWROG has been responsive to NRC requests which support risk informing 10CFR50.44 (combustible gas control)
 - Utility cost burden important

PASS, H₂/O₂ Monitors, H₂ Recombiner, Loose Parts Monitoring System Regulatory Relaxations

H₂ Recombiner/CAD System Regulatory Relaxation Status:

- Deterministic evaluation approach successful if core iodine release is small (a few % of core inventory)
 - Detonable gas mixture would not occur for design basis events
- Radiolytic decomposition of water increases significantly at higher iodine concentrations
- NUREG-1465 specifies gap and early release of 30% of core iodine inventory
 - Increases radiolytic decomposition of water such that recombiners may be beneficial for design basis events

PASS, H₂/O₂ Monitors, H₂ Recombiner, Loose Parts Monitoring System Regulatory Relaxations

Loose Parts Monitor Elimination:

- 9 BWRs do not have requirements for this system
- Currently collecting system operating experience from all other BWRs
- Goal is show that the operating experience does not demonstrate that LPM Systems provide safety benefits
 - Compare RG1.133 requirements/expectations to system operating history
- *BWROG requests additional clarification from NRC regarding preliminary comments*
 - *Use of LPM to resolve VIP issues*
 - *On-going ASME activities*

PASS, H₂/O₂ Monitors, H₂ Recombiner, Loose Parts Monitoring System Regulatory Relaxations

Program Summary:

<u>Subject</u>	<u>Approach</u>	<u>Schedule</u>
PASS	Develop revised CDA procedure Follow PWR successes	2Q00
	Submittal to eliminate all requir.	3Q00
H2/O2 Monitors	Maintain parallel deterministic / risked-informed resolution options	} <i>schedules have</i>
H2 Recomb./CADs	Maintain parallel deterministic / risked-informed resolution options	
Loose Parts Monitor	Complete surveys and submit separate LTR	2Q00

BWR OWNERS' GROUP MOV/DC MOTORS

PRESENTATION TO NRC

March 16, 2000

White Flint, MD

March 16, 2000

BWROG-NRC Meeting

BWROG MOV/DC MOTORS

PURPOSE OF PRESENTATION

➤ **Program Update**

➤ **Schedule Review**

BWROG MOV/DC MOTORS

PRIMER

• Issue: Motor speed/output affected by stem load, supplied voltage and winding temperature.

• Potential Impact:

- Longer MOV stroke times
- Lower motor output (torque), thus lower valve thrust

BWROG MOV/DC MOTORS

NOTABLE EVENTS SINCE LAST BRIEF

- **Oct 99**: Draft 1 of report issued to BWROG for initial review and comment. [Limatorque on distribution]
- **Dec 99**: VTRG Telecon with contractor (MPR Associates) to discuss utility comments; MPR addressed all utility comments.
- **Feb 00**: Draft 2 of report issued to BWROG for second review; additional comments addressed by VTRG and MPR. [Limatorque on distribution]
- **Mar 00**: Final BWROG issued to utilities; official Limatorque review/endorsement requested.

BWROG MOV/DC MOTORS
NRC INTERFACE

- **Have kept NRC briefed on program status:**
 - **Apr 99 & Oct 99 JOG PV-NRC Status Meetings**
 - **Aug 99 & Dec 99 EOC-NRC Management Meetings**
 - **Planned Jul 00 NRC/ASME Pump & Valve Symposium**
- **NRC has supported BWROG schedule & is interested in reviewing the final BWROG product.**

BWROG MOV/DC MOTORS
SCHEDULE

- ☛ Final BWROG Report issued: Week of March 6**
- ☛ Anticipated Limitorque Review/Endorsement:
Summer 2000**
- ☛ Anticipated NRC-BWROG meeting to discuss:
Fall 2000**

SRV/LPS TOPICAL REPORT

- September 1, 1999 BWROG submitted Topical Report "BWR Owner's Group Appendix R Fire Protection Committee Position on SRVs and Low Pressure Systems used as 'Redundant' Shutdown Systems Under Appendix R"
- Enforcement in abeyance due to EGM
(Systems selection is part of circuit analysis)
- Staff is willing to accept proposals that reduce regulatory burden provided that they maintain safety (level of FP in existence)
- Staff Review of Risk shows Removal of Fire Detection and Suppression Features associated with III.G.3 could result in factor of 10 increase risk for some rooms at some plants (Plant Specific Analysis is Important)
- March 1, 2000 call- BWROG position is that about 20 plants were licensed with SRV/LPS as a "Redundant" means (Two examples provided on March 2, 2000)
- Evidence of "Redundant" means as a licensing basis not clear
(III G.2 Redundant means was not required to be reviewed by the staff)
- Staff acceptance of SRV/LPS as a "Redundant" would have legal and technical implications that are inter-related
- More work needed to converge on an acceptable approach
- Candidate proposed resolution paths for accepting SRV/LPS
 - Licensing Basis Documentation
 - NFPA 805 analysis and rule change
(March 2001 and March 2002)
 - Exemption Request
 - License Condition
 - Credit for Feedwater as redundant safe S/D
- Schedule
 - Technical meeting proposed for April
 - May 2000 - RAI
 - July 2000 - RAI response

NEI RISK-INFORMED FIRE-INDUCED CIRCUIT FAILURE METHODOLOGY

- On April 13, 2000 the staff will meet with NEI for a presentation of a partial, initial draft of the NEI risk-informed, fire-induced circuit failure methodology.
- The staff will review the April 13, 2000 NEI document in parallel with ongoing NEI and EPRI confirmatory fire tests and pilot applications, and provide a draft RAI to NEI by May 15, 2000. The confirmatory fire test and pilot application schedules will be available by April 15, 2000.
- The staff will meet with NEI and possibly EPRI during June, 2000 to revise the RAI based on NEI/EPRI clarifications. A final RAI will be issued shortly after this meeting.
- It is planned that by August 15, 2000, NEI will respond to the final RAI, contingent upon completion of confirmatory fire testing. At that time SPLB, SPSB and EEIB, and possibly SNL, will conduct reviews of the RAI response from NEI.
- The time frame for issuance of an SER on the NEI risk-informed fire-induced circuit failure methodology is, of course, dependent on the technical complexity and adequacy of the NEI RAI response. The staff expectation is that an SER can be issued during fall, 2000.
- [It should be noted that a planned NRC/industry expert elicitation panel supporting NEI's effort now will likely not have NRC participation for Federal Advisory Committee Act (FACA) and NRC cost reasons. It is possible that this expert panel will complete its review of fire test data and provide important input into NEI's August 15, 2000 RAI response. It is also possible that the RAI response will be delayed pending expert panel input, scheduled to be defined.]

BWROG DETERMINISTIC FIRE-INDUCED CIRCUIT FAILURE METHODOLOGY

- EEIB/NRR and SPSB/NRR are to have provided their comments on the BWROG methodology by March 20, 2000, and SNL will also have provided the staff with their review results by March 20, 2000.
- By March 31, 2000, SPLB plans to issue a draft RAI to BWROG.
- The staff will meet with the BWROG during April, 2000 to revise the RAI based on BWROG clarifications. A final RAI will be issued shortly after this meeting.
- It is planned that by June 15, 2000 the BWROG will respond to the final RAI. At that time SPLB, SPSB and EEIB, and possibly SNL, will conduct reviews of the RAI response from BWROG.
- The time frame for issuance of an SER on the BWROG deterministic fire-induced circuit failure methodology is, of course, dependent on the technical complexity and adequacy of the BWROG RAI response. The staff expectation is that an SER can be issued during summer, 2000.



"The Scope of the Joint Venture Shall be the *Nuclear Fuel Business*"

JV Activities

- Design
- Licensing
- Engineering
- Manufacturing
- Fabrication
- Marketing
- Distributing
- Selling

JV Products & Services

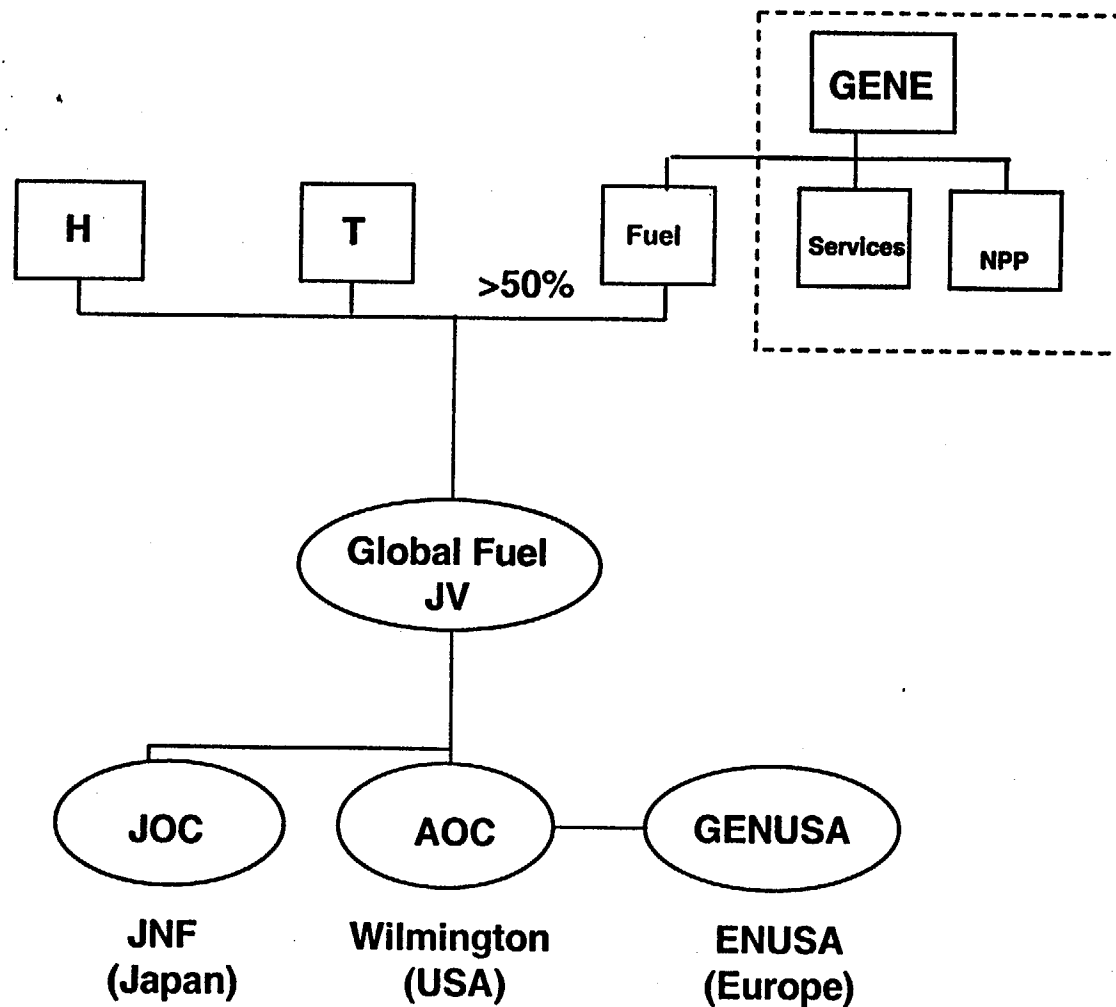
- Fuel Bundles
- Components
- Engineering Services
- Core Monitoring Services
- Fuel Inspection Services
- R&D

JV Scope Covers All Fuel Related Activities



JV Structure

Nuclear Fuel Joint Venture

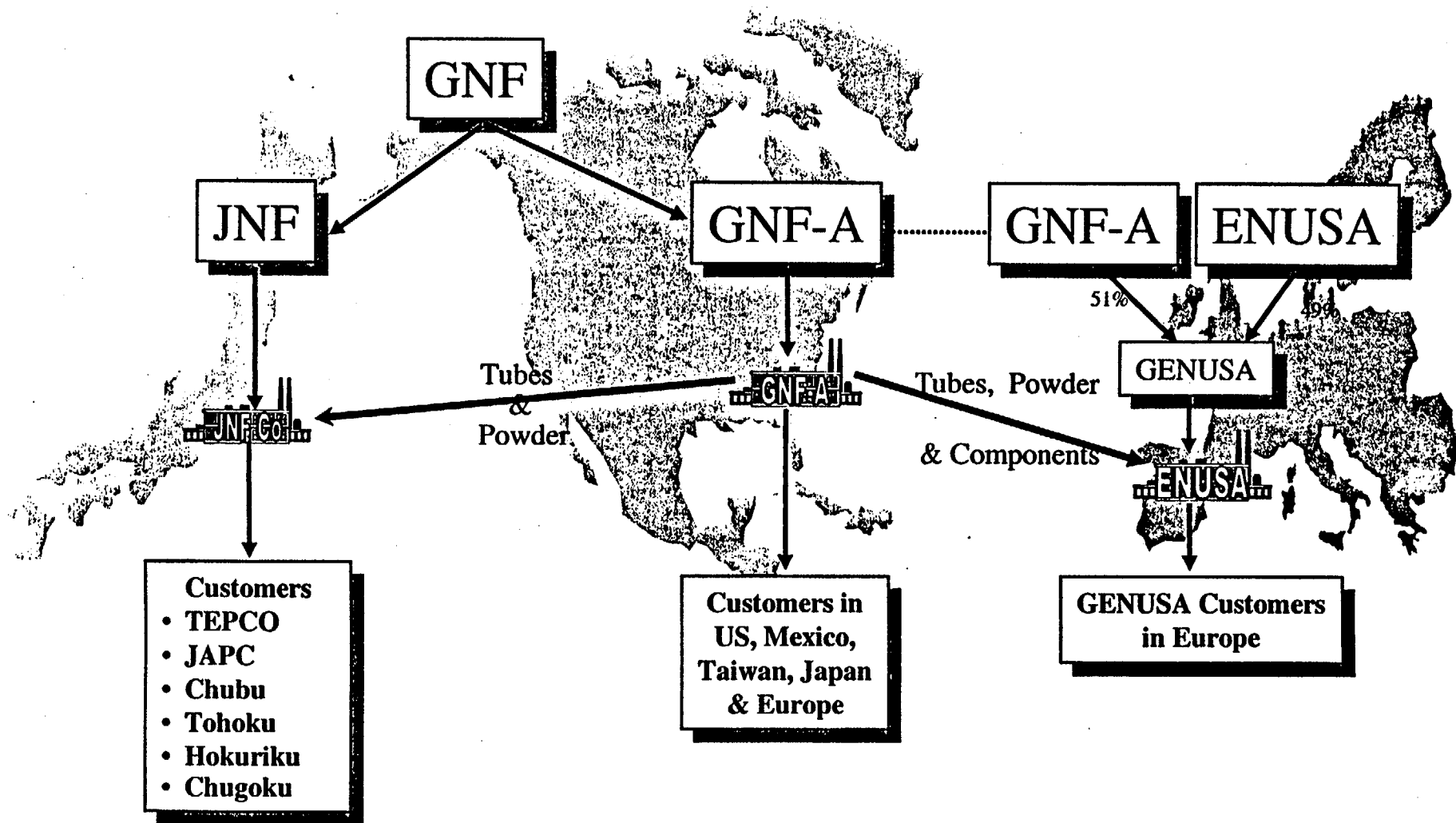


***Fuel JV Part of GE Nuclear
JV Control will Reside with GE***



JV Relationships

Nuclear Fuel Joint Venture



Go To Market . . . Region Specific

CLOSEOUT OF GENERIC SAFETY ISSUE B-55, IMPROVED RELIABILITY OF TARGET ROCK SAFETY RELIEF VALVES

- GSI B-55 created in early 1980's as a result of problems with spurious opening and blowing down of Target Rock 3-stage SRVs and upward setpoint drift of 2-stage SRVs.
- As a result of actions which have been taken by the BWROG and individual licensees to improve the performance of Target Rock SRVs, the staff decided to close GSI B-55 based on:
 - The spurious lifting and blowing down of Target Rock three-stage SRVs has been significantly improved by improved maintenance, increased simmer margins, and reduced numbers of challenges.
 - For the two-stage SRVs, licensees implemented one of three modifications which have significantly improved the upward setpoint drift problem:
 - Ion-beam implanted platinum pilot disks
 - Stellite 21 pilot disks
 - Additional pressure actuation switches

- The staff also found that the BWROG and individual licensees were continuing to evaluate and improve the performance of the valves, as necessary, with sufficient resources.
- The staff determined that if actions need to be taken to improve the performance of the SRVs in the future, the existing Quality Assurance, Maintenance Rule, and Codes and Standards regulations provide regulatory mechanisms for pursuing additional improvements on a plant-specific basis.
- The ACRS reviewed the resolution of GSI B-55 on October 1, 1999, and the staff closed out the issue in a letter to the EDO dated December 17, 1999.
- As a followup activity, the staff plans to issue a Regulatory Issue Summary to inform the industry of the closure of GSI B-55.

BWRVIP/NRC Management Meeting

March 16, 2000

**NRC Offices
Rockville, MD**

BWRVIP

BWRVIP/NRC Management Meeting Agenda

10:30 a.m.	Opening Remarks/Introductions <ul style="list-style-type: none">• Update of BWRVIP Key Accomplishments and Activities	EOC/NRC C. Terry
10:40 a.m.	Technical Committee Summaries <ul style="list-style-type: none">• Integration• Assessment• Inspection• Repair• Mitigation	V. Wagoner R. Carter C. Larsen B. McLeod J. Wilson
11:25 a.m.	Open Discussion <ul style="list-style-type: none">• Status of NRC Review/Acceptance of BWRVIP Products• Assessment of BWRVIP Implementation• BWRVIP Direction in 2000 and Beyond• BWRVIP Summary• Items from the Floor	BWRVIP/NRC NRC C. Terry C. Terry C. Terry
11:55 a.m.	Research Efforts Regarding Cascading Failures	NRC
12:00 noon	Summary and Review Action Items	

BWRVIP Organization

Carl Terry
NMPC
Chairman

Joe Hagan
PECO Energy
Vice Chairman

Assessment

Geoge Vanderheyden
ComEd
Executive Chair

Inspection

Bill Eaton
Entergy
Executive Chair

Mitigation

Lewis Sumner
SNC
Executive Chair

Repair

George Jones
PPL
Executive Chair

Integration

Harry Salmon
NYPA
Executive Chair

Rich Ciemiewicz
PECO Energy
Tech Chair

Carl Larsen
VT Yankee
Tech Chair

John Wilson
Amergen
Tech Chair

Bruce McLeod
SNC
Tech Chair

Vaughn Wagoner
CP&L
Tech Chair

Bob Carter
EPRI
Task Mgr

Greg Selby
EPRI
Task Mgr

Raj Pathania
EPRI
Task Mgr

Ken Wolfe
EPRI
Task Mgr

Tom Mulford
EPRI
Task Mgr

Jack Dillich
NPPD

BWRVIP Liaison to EPRI Nuclear Power Council

Bold indicates change since March 1999 meeting

BWRVIP

BWRVIP Key Accomplishments Since March 1999

- Submitted BWR Integrated Surveillance Program Plan
- Submitted technical basis for revisions to Generic Letter 88-01 inspection schedules
- Completed RPV and updated core shroud I&E guidelines
- Completed two updates to internals examination guidelines
- Initiated complementary BWRVIP and NRC RES project on weldability of irradiated material
- Transmitted to NRC Vessel and Internals Inspection Summaries for Fall 1998 outages and inspection plans for 1999 and 2000

BWRVIP Key 2000 Activities

- **Support NRC review and closure on all BWRVIP guidelines**
- **Support NRC review of I&E guidelines license renewal appendices**
- **Support NRC review of BWR Integrated Surveillance Program Plan and produce implementation plan**
- **Submit fracture toughness and crack growth evaluations of irradiated stainless steel**
- **Coordinate assessment of BWRVIP implementation similar to steam generator assessments**
- **Continue complementary BWRVIP and NRC RES work on weldability of irradiated material**
- **Continue transition to a maintenance mode**

Integration Committee Summary

**Vaughn Wagoner
Technical Chairman
Carolina Power & Light**

Integration Committee

2000 Deliverables

- **Vessel Internals Inspection Summaries for 1999 and 2000 outages**
- **Coordinate assessment of BWRVIP implementation**
- **BWRVIP training modules**

Key Issues

- **Continue technical dialog to achieve closure on all BWRVIP guidelines**
- **Coordinate BWRVIP transition to a maintenance mode**

Assessment Committee Summary

Bob Carter
EPRI Task Manager

Assessment Committee

1999 Deliverables

- **“Evaluation of Stress Corrosion Crack Growth in Low Alloy Steel Vessel Materials in the BWR Environment (BWRVIP-60),” March 1999.**
- **“Induction Heating Stress Improvement Effectiveness on Crack Growth in Operating Plants (BWRVIP-61),” January 1999.**
- **“Shroud Vertical Weld Inspection and Evaluation Guidelines (BWRVIP-63),” June 1999.**
- **“Review of Test Data for Irradiated Stainless Steel Components (BWRVIP-66),” March 1999.**
- **“BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines (BWRVIP-74),” September 1999.**
- **“Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules (BWRVIP-75),” October 1999.**
- **“BWR Core Shroud Inspection and Flaw Evaluation Guidelines (BWRVIP-76),” November 1999.**
- **“BWR Integrated Surveillance Program Plan (BWRVIP-78),” December 1999.**

Assessment Committee

1999 Deliverables

(continued)

- **Responses to NRC RAIs**
 - **BWRVIP-05, 38, 41**
- **Responses to NRC SEs on:**
 - **BWRVIP-18, 25, 26, 42, 47, 48**

Assessment Committee

2000 Deliverables

- **BWR Integrated Surveillance Program (ISP)**
 - Revised ISP test plan
 - Implementation plan for ISP
 - Conduct surveillance capsule testing in accordance with ISP
- **Fracture Toughness of Irradiated SS**
 - Issue report on effects of radiation on fracture toughness of SS
- **Evaluation of Crack Growth in irradiated stainless steel**
- **I&E Guideline Revisions**
- **Vibration Monitoring of Jet Pumps**
 - Issue report on feasibility

Assessment Committee

Key Issues

- **Support timely NRC review of remaining I&E guidelines**
- **Complete NRC review of:**
 - **License renewal appendices of I&E guidelines**
 - **BWRVIP-75, revision to GL88-01 piping inspections**
 - **BWRVIP-78, ISP**

License Renewal Appendices

- **License renewal appendices for RPV and all safety-related internals have been submitted to NRC**
- **These submittals support initial BWR license renewal application**
- **NRC has approved two license renewal appendices for referencing in license renewal applications -- need prompt NRC approval of remaining appendices**

Revision to GL 88-01 Inspection Schedules

- **BWRVIP revised GL 88-01 inspection schedules benefit both industry and NRC**
- **Important that NRC review be completed promptly**
 - **Significant burden reduction via reduced piping inspection and person-REM exposure**

BWR Integrated Surveillance Program

- **Submitted BWR Integrated Surveillance Program (ISP) Plan in December 1999**
- **Reviewed ISP Plan with NRC staff on March 14, 2000**
- **BWRVIP goal is to obtain NRC approval by end of 2000**
 - **need prompt identification and resolution of issues**
 - **need to maintain positive ISP cost-benefit for the BWR fleet**

Inspection Committee Summary

**Carl Larsen
Technical Chairman
Vermont Yankee**

Inspection Committee 1999 Deliverables

- **Revisions to examination guidelines BWRVIP-03**
 - Revision 1 submitted together with response to Revision 0 SER 3/99
 - NRC accepted both with no issues
 - Revision 2 submitted (for information) 12/99
- **Advanced UT and ET methods for internals**
(core spray P9, core plate bolts from shroud OD, shroud H1 rapid exam)
- **Component mockups for UT and ET demonstrations (attachment welds)**
- **Conducted three (3) IVVI Training sessions**

Inspection Committee

2000 Deliverables

- **Update to internals examination guidelines (BWRVIP-03, Revision 3)**
- **NDE methods for internal attachment welds**
- **Conduct one (1) IVVI Training session**

Inspection Committee

Key Issues

- **Stay ahead of internal inspection needs**
 - **Internal attachment weld NDE program**
 - **Other items as necessary**

Repair Committee Summary

**Bruce McLeod
Technical Chairman
Southern Nuclear**

Repair Committee

1999 Deliverables

- **Core Shroud Repair Design Criteria (Rev.2)**
 - Revision to address vertical weld repair
- **Respond to RAIs and SEs**
 - Repair Design Criteria
 - CRD Weld Repair
- **Repair Material Guideline**
- **Continue BWRVIP work on weldability of irradiated material**
 - Sampling tool development and qualification
 - Sampling analysis plan and contract
 - Plant and sample location selection
 - Sample process development, crew training, mobilization

Repair Committee **2000 Deliverables**

- **Material Guideline for use with BWRVIP Repair Design Criteria**
- **Weldability of Irradiated Material Project**
 - **Interim guidance for weld repair**
 - **Interim report on jet pump riser brace sampling program**
- **RAI/SE Responses**

Repair Committee

Key Issues

- **Optimize results from joint BWRVIP/NRC project on weldability of irradiated materials**

Mitigation Committee Summary

**John Wilson
Technical Chairman
AmerGen**

Mitigation Committee

1999 Deliverables

- **Published reports on Duane Arnold NMCA durability and fuel surveillance after one cycle and completed data collection on NMCA durability and fuel after two cycles (BWRVIP-67, -68, -69)**
- **NMCA done at 8 plants including reapplication at Duane Arnold**
- **Delivered BWRVIA Radiolysis and ECP Model and conducted two training workshops for utility staff**
- **Published BWR Water Chemistry Guidelines (BWRVIP-79)**
- **Published reports on flow effects on ECP and IGSCC and in-core crack growth tests (BWRVIP-64, -73, -77)**

Mitigation Committee

2000 Deliverables

- **Publish reports on Duane Arnold NMCA durability and fuel surveillance after two cycles**
- **Publish report on NMCA experience at other plants**
- **Conduct one cycle fuel surveillance at Peach Bottom 2 to evaluate the effect of higher fuel duty and noble metal loadings on fuel performance**
- **Respond to NRC RAIs on “Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection (BWRVIP-62)”**

Open Discussion

- **Status of NRC Review of BWRVIP Products**
- **Assessment of BWRVIP Implementation**
- **BWRVIP Direction in 2000 and Beyond**
- **BWRVIP Summary**
- **Items from the Floor**

Assessment of BWRVIP Implementation

- **BWRVIP evaluating an approach for assessment of utility implementation of BWRVIP products**
- **Considering INPO involvement**
- **Develop and conduct 2-3 pilot assessments in 2000**
- **Evaluate process and results after pilot assessments and determine subsequent scope and schedule**

BWRVIP Direction in 2000

- **Expect closure with NRC on BWRVIP base program guidelines in 2000**
- **BWRVIP transition to a maintenance mode**
- **Executive oversight and timely response to industry issues will be maintained**
 - continue NRC interaction
 - collection and dissemination of plant inspection data and experience
 - utility implementation assessments
 - implementation, training and assistance
 - program maintenance based on industry experience

BWRVIP Summary

- **BWRVIP base program guidelines have been submitted to NRC**
- **Expect closure with NRC on BWRVIP base program guidelines in 2000**
- **Need to continue close coordination between BWRVIP and NRC activities to ensure timely approval and implementation of products that will result in maintaining safety, reducing burdens and increasing effectiveness and efficiency for:**
 - License renewal appendices
 - ISP
 - Revised GL 88-01 inspection schedules
 - Inspection relief for HWC

BWRVIP SUBMITTALS

Title		Submitted	Status
I & E REPORTS WITH LR APPENDICES			
BWRVIP-18,	Core Spray Internals Inspection and Flaw Evaluation Guidelines Appendix C - Demonstration of Compliance with the Licence Renewal Rule (10 CFR Part 54)	07/26/1996 12/20/1996	12/02/1999 CF 02/21/2000 CF
BWRVIP-25,	Core Plate Inspection and Flaw Evaluation Guideline Appendix B - Demonstration of Compliance with the Licence Renewal Rule (10 CFR Part 54)	12/27/1996 07/17/1997	12/19/1999 CF 03/31/2000 T
BWRVIP-26,	Top Guide Inspection and Flaw Evaluation Guideline Appendix C - Demonstration of Compliance with the Licence Renewal Rule (10 CFR Part 54)	12/27/1996 07/17/1997	09/29/1999 CF 03/09/2000 CF
BWRVIP-27,	Standby Liquid Control System / Core Plate ΔP Inspection and Flaw Evaluation Guidelines Appendix B - Demonstration of Compliance with the Licence Renewal Rule (10 CFR Part 54)	04/29/1997 05/15/1998	04/27/1999 CF 12/30/1999 CF
BWRVIP-38,	Shroud Support Inspection and Flaw Evaluation Guidelines Appendix B - Demonstration of Compliance with the Licence Renewal Rule (10 CFR Part 54)	09/15/1997 09/15/1997	09/16/1999 CI TBD
BWRVIP-41,	BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines Appendix A - Demonstration of Compliance with the Licence Renewal Rule (10 CFR Part 54)	10/15/1997 10/15/1997	03/28/2000 T TBD
BWRVIP-42,	BWR LPCI Coupling Inspection and Flaw Evaluation Guidelines Appendix A - Demonstration of Compliance with the Licence Renewal Rule (10 CFR Part 54)	12/11/1997 12/11/1997	06/14/1999 CI TBD
BWRVIP-47,	BWR Lower Plenum Inspection and Flaw Evaluation Guidelines Appendix A - Demonstration of Compliance with the Licence Renewal Rule (10 CFR Part 54)	12/30/1997 12/30/1997	10/13/1999 CF 03/06/2000 CF
BWRVIP-48,	Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines Appendix A - Demonstration of Compliance with the Licence Renewal Rule (10 CFR Part 54)	03/06/1998 03/06/1998	09/29/1999 CF 11/19/1999 CF
BWRVIP-49,	Instrument Penetration Inspection and Flaw Evaluation Guidelines Appendix A - Demonstration of Compliance with the Licence Renewal Rule (10 CFR Part 54)	03/13/1998 03/13/1998	08/04/1998 CF 07/15/1999 CF
BWRVIP-74,	BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines (subsumes BWRVIP-05, BWR RPV Shell Weld Inspection Recommendations) Appendix A - Demonstration of Compliance with the Licence Renewal Rule (10 CFR Part 54)	09/21/1999 09/21/1999	TBD TBD
BWRVIP-76,	BWR Core Shroud Inspection & Flaw Evaluation Guidelines (subsumes BWRVIP-07, Guidelines for Reinspection of BWR Core Shrouds, and BWRVIP-63, Shroud Vertical Weld Inspection and Evaluation Guidelines) Appendix K - Demonstration of Compliance with the Licence Renewal Rule (10 CFR Part 54)	12/09/1999 12/09/1999	04/30/2000 T 06/30/2000 T

BWRVIP SUBMITTALS

Title		Submitted	Status
BWRVIP REPORTS THAT SUPPORT LR			
BWRVIP-75,	Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules (NUREG-0313)	10/27/1999	04/30/2000 T
BWRVIP-78,	BWR Integrated Surveillance Program - Unirradiated Charpy Reference Curves for Surveillance Material	12/01/1999	12/31/2000 T
REPAIR REPORTS - NOT DIRECTLY APPLICABLE TO LR			
BWRVIP-16,	Internal Core Spray Piping and Sparger Replacement Design Criteria	03/18/1997	11/16/1998 CI
BWRVIP-19,	Internal Core Spray Piping and Sparger Repair Design Criteria	09/17/1996	11/16/1998 CI
BWRVIP-34,	Technical Basis for Part Circumferential Weld Overlay Repair of Vessel Internal Core Spray Piping	05/22/1997	DEFERRED
BWRVIP-44,	Underwater Weld Repair of Nickel Alloy Reactor Vessel Internals	10/27/1997	06/09/1999 CF
BWRVIP-45,	Weldability of Irradiated LWR Structural Components	10/27/1997	REVIEWING
BWRVIP-50,	Top Guide / Core Plate Repair Design Criteria	05/14/1998	04/28/2000 T
BWRVIP-51,	Jet Pump Repair Design Criteria	05/14/1998	04/28/2000 T
BWRVIP-52,	Shroud Support and Vessel Bracket Repair Design Criteria	06/26/1998	04/28/2000 T
BWRVIP-53,	Standby Liquid Control Line Repair Design Criteria	07/02/1998	04/28/2000 T
BWRVIP-55,	Lower Plenum Repair Design Criteria	09/22/1998	04/28/2000 T
BWRVIP-56,	LPCI Coupling Repair Design Criteria	11/16/1998	04/28/2000 T
BWRVIP-57,	Instrument Penetrations Repair Design Criteria	12/16/1998	04/28/2000 T
BWRVIP-58,	CRD Internal Access Weld Repair	12/22/1998	04/28/2000 T
MITIGATION REPORTS - NOT DIRECTLY APPLICABLE TO LR			
BWRVIP-14,	Evaluation of Crack Growth in BWR Stainless Steel RPV Internals	03/18/1996	12/03/1999 CF
BWRVIP-59,	Evaluation of Crack Growth in BWR Nickel-Base Austenitic Alloys in RPV Internals	12/23/1998	04/28/2000 T
BWRVIP-60,	Evaluation of Crack Growth in BWR Low Alloy Steel RPV Internals	03/30/1999	07/08/1999 CF
BWRVIP-62,	Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection	12/31/1998	04/28/2000 T
OTHER SUPPORTING BWRVIP REPORTS - NOT DIRECTLY APPLICABLE TO LR			
BWRVIP-03,	RPV Internals Examination Guidelines	11/10/1995	07/28/1998 CF
BWRVIP-06,	Safety Assessment of BWR Reactor Internals	10/05/1995	09/15/1998 CF
BWRVIP-61,	BWR Vessel and Internals Induction Heating Stress Improvement Effectiveness on Crack Growth in Operating Plants	01/29/1999	04/28/2000 T

RISK ASSOCIATED WITH IGSCC-INDUCED FAILURE OF BWR INTERNALS

**NRC Program Manager: T.Y. Chang
United States Nuclear Regulatory Commission
Rockville, MD**

**Principal Investigator: A.G. Ware
Idaho National Engineering & Environmental Laboratory
Idaho Falls, ID**

**Presented to NRC Staff
Rockville, MD
March 2000**

BACKGROUND

- **Program objective is to assess the potential risk associated with the failure of Intergranular Stress Corrosion Cracking (IGSCC)-susceptible Boiling Water Reactor (BWR) vessel internals components, both singly and in combination with the failures of others**
- **Focus is on mechanical design, failure locations, consequences, potential accident scenarios, and characterization of risk**
- **Only degradation mechanism considered is IGSCC, including contributing SCC mechanisms such as irradiation-assisted SCC (IASCC)**
 - **other degradation mechanisms such as fatigue can act synergistically with IGSCC in that a crack which is initiated by IGSCC can propagate to failure from fatigue**

BACKGROUND (Continued)

- **NRC investigating causes and contributing aspects of the IGSCC problem in separate programs**
- **Industry groups are investigating inspection, mitigation, repair, and replacement, as well as the causes and contributing aspects of IGSCC**
- **First phase of program**
 - **gathered background information**
 - **identified potential accident sequences**
- **Second phase of program**
 - **initially, jet pump failures studied to develop methodology**
 - **potential accident sequences that could develop from failures of remaining reactor vessel internals investigated to assess risk**

CONCLUSIONS

- **IGSCC has been detected at many locations in BWR reactor internals.**
- **IGSCC cracking is expected to continue as the plants age.**
- **Consequently, the probability of developing IGSCC cracks in reactor internals is assumed to be 1 (conservative).**
- **With no inspection, monitoring, or repair, there are a number of internals, if severely degraded by IGSCC, that could fail either in a common mode or cascading manner, leading to an inability to insert rods or cool the core in the event of a severe internal or external event.**
- **With no credit for inspection, monitoring, and repair, and a probability of significant cracks developing of 1, coupled with the initiating event frequencies and system failure frequencies in the PRA studied, an undesirable increase ($> 5 \times 10^{-6}$ events/yr) in the plant CDF is predicted.**

CONCLUSIONS (CONTINUED)

- **The BWRVIP submittals have been reviewed, independent confirmatory assessments and analyses have been performed, and probability estimates have been made for cascading events. The calculations and estimates in the documents submitted by the BWRVIP appear reasonable.**
- **With the current BWRVIP inspection, monitoring, and repair proposals, there is expected to be no significant increase in CDF ($< 5 \times 10^{-6}$ events/yr) caused by failures of BWR internals. That is, IGSCC problems can be identified and evaluated or corrected, to preclude a significant increase in the CDF.**
- **The BWRVIP program of IGSCC aging management of BWR reactor internals, including inspection, monitoring, and repair, along with NRC/NRR review of the BWRVIP activities, creates an atmosphere of acceptable risk for continued BWR operation.**