



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

February 13, 1997

MEMORANDUM TO: Keith R. Wichman, Acting Chief
Materials & Chemical Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

FROM: C. E. Carpenter, Jr., Lead Project Manager
Materials & Chemical Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

SUBJECT: MEETING SUMMARY FOR JANUARY 16, 1997, MEETING WITH BOILING
WATER REACTORS VESSEL AND INTERNALS PROJECT (BWRVIP) EXECUTIVE
OVERSIGHT COMMITTEE, AND JANUARY 17, 1997, MEETING WITH BWRVIP
TECHNICAL CHAIRS

January 16, 1997, BWRVIP EOC Meeting

A meeting was held at the U.S. Nuclear Regulatory Commission's (NRC) One White Flint North offices in Rockville, Maryland, on January 16, 1997, with NRC staff and members of the BWR Vessel and Internals Project (BWRVIP) Executive Oversight Committee (EOC) to discuss issues related to the BWRVIP activities. The meeting was held at the request of NRC management. Attachment 1 is a list of attendees. Attachment 2 is the BWRVIP's meeting slides.

The BWRVIP executive chairmen discussed the status of current and future activities related to the resolution of BWR vessel and internals issues in the areas of integration, assessment, inspection, repair and mitigation. The discussion also included the status of key technical issues including cracking of the jet pump riser assembly, Generic Letter 92-01 activities, and the status of NRC staff's review of BWRVIP-05, "BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations," and BWRVIP-06, "Safety Assessment of BWR Reactor Internals." Also discussed were the schedules for the BWRVIP's submittal of planned documents, for the review of BWRVIP documents by the NRC staff, and for planned plant outages for 1997.

The BWRVIP has evaluated the consequences of cracking of the jet pump riser assembly, and has submitted "Assessment of BWR Jet Pump Riser Elbow to Thermal Sleeve Weld Cracking (BWRVIP-28)," dated December 19, 1996, for NRC staff review. The NRC staff's review is ongoing.

The NRC staff reiterated its expectations to the BWRVIP, as was stated in the January 7, 1997, letter to Robert G. Carter from Keith R. Wichman, that it is the NRC staff's expectations that the BWRVIP will make a best-effort search to provide reasonable assurance that bounding data is collected and considered in BWR reactor vessel structural integrity evaluations.

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The NRC staff is continuing its evaluation of BWRVIP-05, and expects to inform the BWRVIP of the resolution to this issue in the near term.

The discussion of BWRVIP-06 included an overview of the prioritization scheme that the BWRVIP used to complete its Safety Assessment of BWR internals degradation. The BWRVIP approach is deterministic in nature, in that the BWRVIP assessed the consequences of assuming that individual components and systems fail. BWRVIP-06 does not evaluate the effects of multiple failures of systems or components. While the NRC staff has previously concluded that the potential for simultaneous failure due to cracking of multiple components or systems leading to cascading effects is low, the Office of Nuclear Regulatory Research (RES) is performing confirmatory research into possible synergistic effects of multiple failures, and requested that the BWRVIP coordinate its research into this area with RES staff. The NRC staff requested to meet with the BWRVIP at some early date to discuss more fully the methodology used to determine the prioritization for evaluating the effects of cracking on individual components and systems. The Lead Project Manager will coordinate the future meetings between the BWRVIP and RES staff on confirmatory research, and the meeting between the BWRVIP and NRC staff on the review of BWRVIP-06.

The BWRVIP informed the NRC staff that the various vendors are being responsive to inspection needs and are developing required tooling and methodology to inspect the various components and systems within the reactor pressure vessel. Further, the BWRVIP is developing, and submitting for NRC staff review, inspection and flaw evaluation guidelines for the various BWR internal components and systems. The NRC staff questioned the BWRVIP as to whether the individual licensees will commit to follow these guidelines once the NRC staff had evaluated and approved the various submittals. The BWRVIP executives committed to inform the NRC staff by April 1997 if the BWRVIP will coordinate individual licensees commitments to follow approved BWRVIP submittals.

The BWRVIP informed the staff of the status of documents presently under preparation for NRC staff review. The NRC staff reminded the BWRVIP executives that timely submittal of the documents for review, along with a list of utilities that plan to use the document during their next outage, is advantageous to a timely review. Also, the NRC staff will expedite the review of all BWRVIP submittals. Further, a listing of utilities outage scopes, with regards to BWRVIP submittals, would be useful to the NRC staff in allocating resources.

The BWRVIP informed the staff that it plans to submit a document on proposed weld overlay repairs of core spray piping that will be referenced by several utilities during the Spring 1997 outage season. The NRC staff agreed to expedite its review of this document.

The staff expressed a concern regarding the BWRVIP's prior commitment to submit the results of BWR internals reinspections immediately following an outage season. To date, an integrated report of the results of the Fall 1996 outages has not been submitted by the BWRVIP to the NRC.

The NRC staff agreed to consider holding a meeting of Regional inspectors and other interested NRC staff to coordinate NRC inspection and review activities associated with BWRVIP submittals.

The meeting concluded with the NRC staff encouraging the BWRVIP to continue to work cooperatively with the NRC staff. Further meetings will be scheduled as needed.

January 16, 1997, BWRVIP Scheduling Meeting

A meeting was held at the NRC's One White Flint North offices on January 17, 1997, with NRC staff and members of the BWRVIP to discuss scheduling of reviews related to the BWRVIP submittals. The meeting was held at the request of the NRC staff. Attachment 3 is the review matrix created from the meeting. Attendees at this meeting are indicated on Attachment 1 by an asterisk.

The BWRVIP has submitted 12 documents that are currently under NRC staff review, and is planning to submit an additional 28 documents over the next year. The NRC staff discussed the status of its present reviews of the 12 documents, including planned requests for additional information (RAIs) that will be required to complete several reviews. Further, planned submittals were discussed and lead NRC staff reviewers were tentatively assigned.

Additionally, the BWRVIP discussed the research activities it has presently undertaken with regards to underwater weld overlay repairs of piping and underwater welding repairs of irradiated metals. The NRC staff suggested that the BWRVIP and NRC share the results of its respective literature searches into this area to ensure that both the industry and the staff are reviewing the most current and relevant data. Further discussions regarding research will be scheduled as needed.

The BWRVIP staff and the NRC staff agreed to continue to meet to discuss emerging technical issues, status of technical reviews and resource allocation.

Attachments: 1. January 16, 1997, List of Attendees
2. January 16, 1997, BWRVIP Handout
3. January 17, 1997, Review Matrix

DISTRIBUTION: see next page

cc:

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Meeting with BWRVIP Executive Oversight Committee
January 16, 1997

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Meeting with BWRVIP Executive Oversight Committee
January 16, 1997

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Meeting with BWRVIP Executive Oversight Committee

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BWRVIP/NRC Management Meeting

January 16, 1997

**NRC Offices
One White Flint North
Rockville, MD**

BWRVIP

BWRVIP/NRC Management Meeting

Agenda

1:00 p.m.	Opening Remarks	EOC/NRC
1:10 p.m.	Technical Committee Summaries	
	<ul style="list-style-type: none">• Integration• Assessment• Inspection• Repair• Mitigation	V. Wagoner C. Terry R. Keaten W. Campbell G. Jones R.Dyle
2:15 p.m.	Status of Key Technical Issues	
	<ul style="list-style-type: none">• Jet Pump Riser Cracking• Generic Letter 92-01 Activities• RPV Shell Weld Inspection Recommendations	
3:15 p.m.	Open Discussion	BWRVIP/NRC
	<ul style="list-style-type: none">• BWRVIP Schedules• Outage Schedules• Other	
4:00 p.m.	Summary/Adjourn	

BWRVIP

Integration Committee Summary

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

Integration Committee

- **The goal is to enhance coordination of all BWRVIP and related activities between the committees, EOC, industry and NRC**

Component Prioritization Matrix

<u>Priority</u>	<u>Component</u>
High	Shroud -- complete Core Spray Piping and Sparger Shroud Support Top Guide Core Plate SLC
Medium	Jet Pump Diffuser
Low	CRD Guide Tube CRD Stub Tube In-Core Housing Dry Tube Instrument Penetrations Jet Pump Assembly Vessel ID Brackets LPCI Coupling

BWRVIP

Condition Assessment Guide

<u>Component</u>	<u>Assessment (I&E) Guidelines</u>	<u>Inspection Guidelines</u>	<u>Repair/Replace Design Criteria</u>	<u>Mitigation Recommendations</u>
core shroud	Doc 1, 5	Doc 2	Doc 3, 4	Doc 6
core spray	Doc 7	Doc 2	Doc 8	N/A
shroud support	*	*		Doc 6
core plate	Doc 9			Doc 6
top guide	Doc 10			Doc 6
SLC	*			Doc 6
jet pump	*			Doc 6

*under development

BWRVIP

Assessment Committee Summary

Carl Terry
Executive Chairman
Niagara Mohawk Power Company

Assessment Committee Approach for Component Degradation Management

- **What needs to be inspected, when does it need to be inspected, inspection options, how do you disposition observed degradation**

Assessment Committee

1996 Deliverables

1. BWR Core Shroud Inspection and Flaw Guideline, Revision 2 (BWRVIP-01)
2. Guidelines for Reinspection of BWR Core Shrouds (BWRVIP-07)
3. Evaluation of Crack Growth in BWR Stainless Steel RPV Internals (BWRVIP-14)
4. BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines (BWRVIP-18)
5. BWR Core Plate Inspection and Flaw Evaluation Guidelines (BWRVIP-25)
6. BWR Top Guide Inspection and Flaw Evaluation Guidelines (BWRVIP-26)
7. Assessment of BWR Jet Pump Riser Elbow to Thermal Sleeve Weld Cracking (BWRVIP-28)
8. SLC I&E Guidelines (delayed to 1997)
9. Shroud Support I&E Guidelines (delayed to 1997)
10. Evaluation of Crack Growth in Low Alloy Steel RPV Internals (delayed to 1997)

BWRVIP

Assessment Committee 1997 Deliverables

- 1. Jet Pump Assembly I&E Guidelines**
- 2. CRD Guide/Stub Tube I&E Guidelines**
- 3. In-Core Housing/Dry Tube I&E Guidelines**
- 4. Instrument Penetrations I&E Guidelines**
- 5. LPCI Coupling I&E Guidelines**
- 6. Internals Brackets I&E Guidelines**
- 7. Evaluation of Crack Growth in Ni-base RPV Internals**

Status of BWRVIP Assessment Reports Under NRC Review

<u>report</u>	<u>submittal date</u>	<u>initial NRC review</u>	<u>RAI/response process</u>	<u>SER issued</u>
shroud I&E, Rev. 0	9/94	complete	complete	9/94
shroud I&E, Rev. 1	4/95	complete	complete	6/95
shroud I&E, Rev. 2	10/96	ongoing	-	-
RPV weld inspection	9/95	4-5/96	6/96	-
safety assessment	10/95	5/96	12/96	-
GL 92-01	11/95	complete	complete	10/96
shroud reinspection	2/96	5/96	10/96	-
SS crack growth	3/96	12/96	ongoing	-
core spray I&E	7/96	ongoing	-	-
core plate I&E	12/96	ongoing	-	-
top guide I&E	12/96	ongoing	-	-
jet pump riser	12/96	ongoing	-	-

BWRVIP

Assessment Committee

Key Issues

- Secure commitment for timely NRC review of jet pump riser I&E guidelines
- Resolve outstanding Generic Letter 92-01 data issues
- Obtain NRC approval of BWRVIP RPV shell weld inspection recommendations
- Obtain approval for use of more realistic stainless steel RPV internals crack growth rate value

Inspection Committee Summary

**Bob Keaten
Executive Chairman
GPU Nuclear**

Inspection Committee Approach for Component Degradation Management

- **How do you inspect, what equipment and techniques are available, what are the associated uncertainties**

Inspection Committee

1996 Deliverables

- 1. Standards for Visual Inspection of Core Spray Piping, Spargers, and Associated Components (Section 6A of BWRVIP-03)**
- 2. Core Spray UT Standards (delayed to 1997)**
- 3. Shroud Support Inspection Standards (delayed to 1997)**

Inspection Committee

1997 Deliverables

- 1. Jet Pump Assembly Inspection Standards**
- 2. SLC Inspection Standards**
- 3. Core Plate Inspection Standards**
- 4. Top Guide Inspection Standards**

Status of BWRVIP Inspection Reports Under NRC Review

<u>report</u>	<u>submittal</u> <u>date</u>	<u>initial</u> <u>NRC review</u>	<u>RAI/response</u> <u>process</u>	<u>SER issued</u>
shroud NDE uncertainty	11/94	complete	complete	6/95
RPV/Internals (BWRVIP-03)	11/95	ongoing	-	-
core spray visual	4/96	ongoing	-	-

Inspection Committee

Key Issues

- **Obtain NRC approval of RPV and internals examination guidelines (BWRVIP-03). Document includes:**
 - **Shroud NDE demonstrations**
 - **Shroud support demonstrations**
 - **Core spray inspection**
 - **Mock-up guidelines**
 - **Visual inspection standards**
 - **NDE uncertainty guidelines**

Repair Committee Summary

**Bill Campbell
Executive Chairman
Carolina Power & Light**

Repair Committee Approach for Component Degradation Management

- **Assure the availability of cost-effective repair options for BWR internals, vessel attachments and penetrations**

Repair Tasks:

- **Identify repair applications**
- **Develop repair design criteria**
- **Develop repair technology as necessary**

Repair Committee **1996 Deliverables**

1. **Roll/Expansion Repair of Control Rod Drive and In-Core Instrument Penetrations in BWR Vessels (BWRVIP-17)**
2. **Internal Core Spray Piping and Sparger Repair Design Criteria (BWRVIP-19)**
3. **Core Spray Replacement Design Criteria (delayed to 1997)**
4. **Underwater Flux Core Welding to 50 feet (delayed to 1997)**

Repair Committee 1997 Deliverables

- 1. Core Spray Piping Weld Overlay Repair**
- 2. Evaluation of Weldability of Irradiated Materials**
- 3. Repair Design Criteria as needed for:**
 - Jet Pump**
 - Top Guide**
 - Core Plate**
 - SLC**

Status of BWRVIP Repair Reports Under NRC Review

<u>report</u>	<u>submittal</u> <u>date</u>	<u>initial</u> <u>NRC review</u>	<u>RAI/response</u> <u>process</u>	<u>SER issued</u>
shroud repair design criteria	9/94	complete	complete	9/94
shroud repair design format/content	10/95	complete	complete	7/96
core spray repair design criteria	9/96	ongoing	-	-
CRD roll expansion repair	11/96	ongoing	-	-

BWRVIP

Repair Committee

Key Issues

- **Request timely NRC response to core spray repair design criteria (BWRVIP-19)**
- **Request timely review of core spray piping weld overlay repair for use in Spring 1997 outages**

Mitigation Committee Summary

George Jones
Executive Chairman
Pennsylvania Power & Light

Mitigation Committee Approach for Component Degradation Management

- **How can stress corrosion cracking degradation be prevented or reduced**

Mitigation Committee

1996 Deliverables

BWR Water Chemistry Guidelines (BWRVIP-29)

- Produce a revised version of the 1993 BWR Water Chemistry Guidelines with recommendations for water chemistry controls that mitigate SCC and meet other plant objectives for water chemistry

Mitigation Committee

Milestones

Noble Metal Chemical Addition (NMCA)

- **Plant demonstration of Noble Metal Chemical Addition (NMCA) at Duane Arnold Energy Center (DAEC)**

Schedule:

- **NMCA process applied at DAEC during October 1996 outage**
 - » Hydrogen benchmark test completed in December 1996
 - » Fuel and core shroud to be inspected at end of first cycle in mid-1998

Mitigation Committee Milestones

Report on Regulatory Credit for Mitigation

- Provide technical basis for monitoring and performance criteria for water chemistry controls including justification for inspection intervals and service life estimates

Schedule:

- December 1997 (delayed from 1996)

Mitigation Committee

Milestones

Advanced Mitigation Techniques

- Perform laboratory studies to verify technical feasibility of zirconium oxide inhibition of SCC without hydrogen addition

Schedule:

- Complete zirconium oxide laboratory demonstration in 1997

Status of Jet Pump Riser Cracking Issue

Jet Pump Riser Cracking

Background:

- **Cracking identified in jet pump riser-to-thermal sleeve weld in international plant in Fall 1996**
- **All 10 welds visually examined in international plant; cracking observed in 2 of 10 welds**
- **NRC informed of cracking in November 1996**
- **Discussions between GE, NRC and BWRVIP initiated**

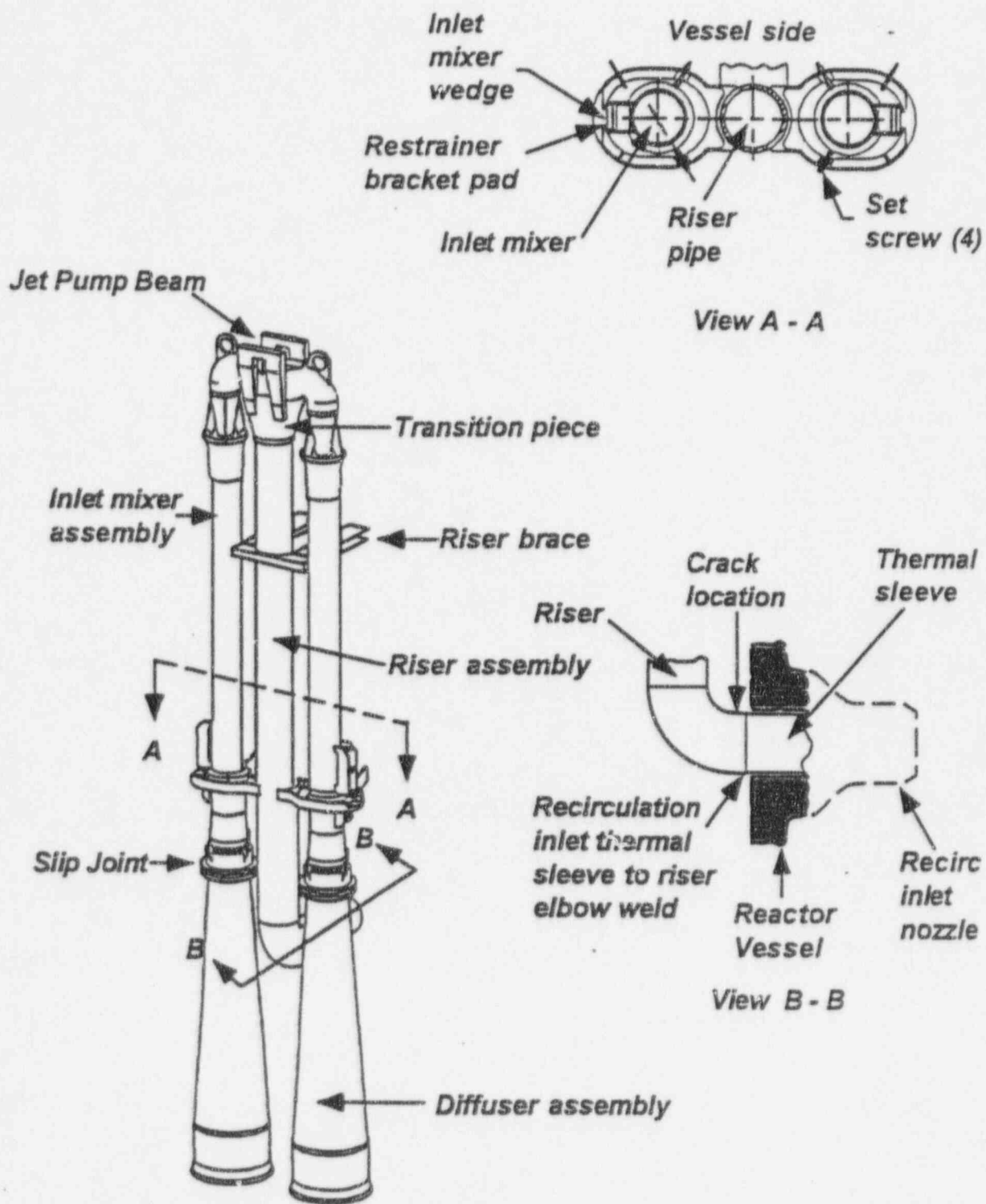


Figure 1. Jet Pump Configuration

Jet Pump Riser Cracking

BWRVIP Actions:

- **Informed BWRVIP utilities and NRC of action plan (December 5, 1996):**
 - **Preliminary GE conclusions that consequences of cracking do not represent a substantial safety hazard**
 - **GE SIL to be issued**
 - **Generic communication with NRC on this subject to be handled by BWRVIP**
 - **BWRVIP pursuing a generic safety assessment**

BWRVIP

Jet Pump Riser Cracking

BWRVIP Actions (continued):

- **BWRVIP transmitted GE SIL to NRC and BWRVIP on December 13, 1996**
- **Transmitted generic safety assessment to NRC on December 23, 1996**
- **Conducted informal survey of jet pump assembly inspection results to date**
- **Pursuing existing BWRVIP plans to prepare jet pump assembly inspection and evaluation (I&E) guidelines as number one priority in 1997**

BWRVIP

Jet Pump Riser Cracking

BWRVIP Generic Safety Assessment:

- **Cracking at the jet pump riser to thermal sleeve weld only a safety issue with complete riser weld failure during a large LOCA**
- **Extremely low probability that cracking will result in a safety issue before next normal outage (and beyond for many plants)**

Jet Pump Riser Cracking

BWRVIP Generic Safety Assessment:

- **Recommendations:**
 - Add jet pump M ratio to jet pump surveillance program (deviation of more than 10% is an indication of jet pump degradation)
 - Shut down plant if a jet pump is significantly degraded
 - Review prior IVVI video tapes of jet pump region to establish, to degree possible, current condition of riser welds
 - Consider inspecting riser welds at next normal refueling outage, factoring in plant age, operating history, water chemistry, etc.

BWRVIP

Jet Pump Riser Cracking

BWRVIP Jet Pump Riser Inspection Survey:

- Requested informal information from all BWRVIP members on inspection of welds in question (all 36 U. S. plants and 5 international plants responded)
- 5 plants examined riser welds by VT-3 in previous inspections with no significant indications found
- 5 plants examined portion of riser welds in Fall 96 by VT-1

Jet Pump Riser Cracking

BWRVIP Plan for Closure:

- **Continue to monitor world wide inspection and cracking experience**
- **Update generic safety assessment as necessary**
- **Prepare jet pump assembly inspection and evaluation (I&E) guidelines as top priority in 1997; pursue development of other examination, repair and mitigation guidance as necessary**
- **Keep NRC informed of progress**

BWRVIP

Status of BWRVIP Response to Generic Letter 92-01

BWRVIP Response to Generic Letter 92-01

- **GL 92-01, Revision 1, Supplement 1, addressing reactor vessel structural integrity issued May 1995**
- **BWRVIP provided a response to GL 92-01, Revision 1, Supplement 1, for BWR/2-6s**
- **August 1995 response (90 day) described actions taken or planned to locate data:**
 - **provide an assessment of RPV integrity issues using existing data by November 1995**
 - **continue to work with industry groups and vessel fabricators to identify and obtain additional data**

BWRVIP

BWRVIP Response to Generic Letter 92-01

- November 1995 response (6 month)
provided a "bounding" assessment utilizing
all currently available data
 - no near term actions needed in response
to issues raised in GL 92-01
 - continue to work with industry groups in
longer term efforts
- BWRVIP continuing to work with other
industry groups, e.g., ASTM, etc.
- Obtained proposals from vessel fabricators
to retrieve and review pertinent records

BWRVIP Response to Generic Letter 92-01

- **Proposals from vessel fabricators estimate costs of \$1M+ to retrieve and review records**
 - **cost perhaps significantly greater than \$1M+**
 - **potential benefit of \$1M+ effort in terms of identifying additional data is not apparent**
- **Thorough search conducted in late 1980s by EPRI to collect all available RPV materials data**
- **All known data for BWRs contained in EPRI databases RPVDATA and PREP4. Both databases were updated in 1996.**

BWRVIP

BWRVIP Response to Generic Letter 92-01

- **BWRVIP course of action:**
 - **“bounding” (not best estimate)
assessment demonstrates no near term
safety issue for BWR/2-6s**
 - **continue to work with other industry
groups to resolve data issues**
 - **work with vessel fabricators to identify
data not previously transmitted to GE,
BWR utilities and EPRI**
 - » **focus on data not located in “typical” places**

Status of RPV Shell Weld Inspection Recommendations

Status of RPV Shell Weld Inspection Recommendations

- **BWRVIP Report “BWR RPV Shell Weld Inspection Recommendations (BWRVIP-05)” submitted September 1995:**
 - irradiation embrittlement effects are greatly reduced in BWRs compared to PWRs
 - operating conditions like PWR pressurized thermal shock are not possible in BWRs
 - the most limiting condition with respect to low temperature pressurization of a BWR vessel is the pressure test each outage
 - circumferential BWR RPV shell welds are much less risk significant than longitudinal welds

Status of RPV Shell Weld Inspection Recommendations

- **NRC issued RAIs on BWRVIP-05 in April and May 1996**
- **BWRVIP response to RAIs submitted in June 1996**
- **July 11, 1996 BWRVIP/NRC management meeting: suggestion was made that BWRVIP petition for rulemaking to revise 10CFR50.55a**
- **October 15, 1996 BWRVIP/NRC working meeting held to discuss BWRVIP petition for rulemaking: approach for requesting an "alternative" to 10CFR50.55a identified**

BWRVIP

Status of RPV Shell Weld Inspection Recommendations

- **BWRVIP request for authorization of a technical alternative per 10CFR50.55a(a)(3)(i) for BWRs submitted on October 29, 1996**

Case	Probability of Vessel Failure	Cost of Inspection	
		per Plant	BWR Fleet
inspect all shell welds	5.69×10^{-8}	\$3.3M	\$119M
inspect long. welds only*	5.69×10^{-8}	\$1.85M	\$67M

*alternative requested

- **Awaiting NRC approval of request for "alternative"**

BWRVIP

BWRVIP Schedules

BWRVIP

BWRVIP REPORTS/NRC REVIEW STATUS

<u>Report</u>	<u>Submittal Date</u>	<u>Initial NRC Review</u>	<u>RAI/Response Process</u>	<u>SER Issued</u>
<u>Assessment:</u>				
1. shroud I&E, Rev. 0	9/94	complete	complete	9/94
2. shroud I&E, Rev. 1	4/95	complete	complete	6/95
3. shroud I&E, Rev. 2	10/96	ongoing	-	-
4. RPV weld inspection	9/95	4-5/96	6/96	-
5. safety assessment	10/95	5/96	12/96	-
6. GL 92-01, Rev. 1, Sup. 1	11/95	complete	complete	10/96
7. shroud reinspection	2/96	5/96	10/96	-
8. SS crack growth	3/96	12/96	ongoing	-
9. core spray I&E	7/96	ongoing	-	-
10. core plate I&E	12/96	ongoing	-	-
11. top guide I&E	12/96	ongoing	-	-
12. jet pump riser	12/96	ongoing	-	-
13. SLC I&E	3/97	-	-	-
14. shroud support I&E	6/97	-	-	-
15. jet pump assembly I&E	6/97	-	-	-
16. CRD guide/stube tube I&E	9/97	-	-	-
17. In-core/dry tube I&E	9/97	-	-	-
18. LPCI coupling I&E	9/97	-	-	-
19. Instrument Pen. I&E	12/97	-	-	-
20. Internals brackets I&E	12/97	-	-	-
21. Low alloy crack growth	12/97	-	-	-
22. Ni-base crack growth	12/97	-	-	-

<u>Report</u>	<u>Submittal Date</u>	<u>Initial NRC Review</u>	<u>RAI/Response Process</u>	<u>SER Issued</u>
<u>Inspection:</u>				
1. shroud NDE uncertainty	11/94	complete	complete	6/95
2. RPV/internals (BWRVIP-03)	11/95	ongoing	-	-
3. core spray visual	4/96	ongoing	-	-
4. SLC stds.	8/97	-	-	-
5. core spray UT	9/97	-	-	-
6. shroud support insp. stds.	12/97	-	-	-
7. jet pump assembly stds.	12/97	-	-	-
8. core plate stds.	12/97	-	-	-
9. top guide stds.	12/97	-	-	-
<u>Repair:</u>				
1. shroud repair design criteria	9/94	complete	complete	9/94
2. shroud repair design format/content	10/95	complete	complete	7/96
3. core spray repair design criteria	9/96	ongoing	-	-
4. CRD roll expansion	11/96	ongoing	-	-
5. core spray replacement design criteria	2/97	-	-	-
6. core spray overlay repair	2/97	-	-	-
7. weldability of irradiated materials	4/97	-	-	-
8. underwater flux core welding	5/97	-	-	-
9. SLC repair criteria	8/97	-	-	-
10. jet pump repair criteria	12/97	-	-	-
11. top guide repair criteria	12/97	-	-	-
12. core plate repair criteria	12/97	-	-	-

<u>Report</u>	<u>Submittal Date</u>	<u>Initial NRC Review</u>	<u>RAI/Response Process</u>	<u>SER Issued</u>
Mitigation:				
1. credit for mitigation	12/97	-	-	-

Schedule of 1997 US BWR Outages

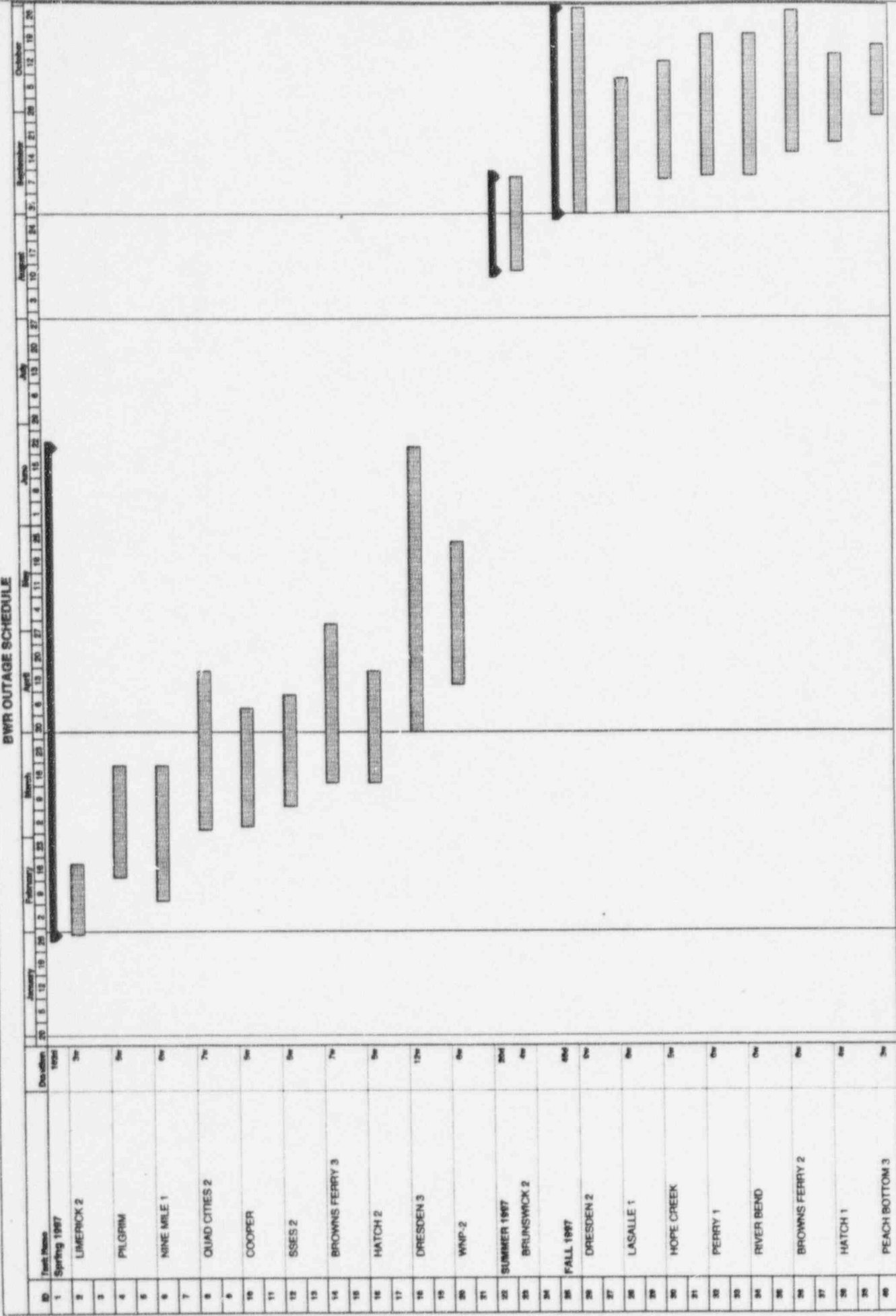
Based on information supplied by:

GENE

BWRVIP Utilities

BWRVIP

BWR OUTAGE SCHEDULE



BWRVIP/NRC Management Meeting Summary

- 8 reports submitted since March 1996
- 12 more near term submittals planned for high priority components
- BWRVIP continues to operate in proactive issue management mode with near term focus on high priority internal components
- Overall Program continues on target for high priority items in 1997 and shifting to "maintenance mode" by end of 1998
- Rapid BWRVIP response to emerging issues demonstrated by quick response to observed jet pump riser cracking

BWRVIP

BWRVIP/NRC Management Meeting Summary

- **BWRVIP will continue to identify and develop proactive initiatives of high value to stay ahead of issues, e.g.**
 - Crack growth evaluations
 - RPV shell weld inspection reductions
 - Underwater weld repair technology
 - Noble Metal Chemical Addition
- **Need to continue close schedule coordination between BWRVIP and NRC activities to ensure timely approval and implementation of remaining guidelines**

BWRVIP Utility Members

U. S. Utilities

Boston Edison
Carolina Power & Light
Centerior
ComEd
Detroit Edison
Entergy
GPU Nuclear
IES Utilities
Illinois Power
Nebraska Public Power District
New York Power Authority
Niagara Mohawk Power Company
Northeast Utilities
Northern States Power
PECO Energy
Pennsylvania Power & Light
Public Service Electric & Gas
Southern Nuclear
TVA
Vermont Yankee
Washington Public Power Supply System

International Utilities

Japan:
Chubu Electric Power Company
Chugoku Electric Power Company
Japan Atomic Power Company
Tohoku Electric Power Company
Tokyo Electric Power Company

Mexico:
Comision Federal de Electricidad

Sweden:
Forsmarks Kraftgrupp AB
OKG Aktiebolag

Spain:
Iberdrola

BWRVIP Transmittals to NRC in 1996

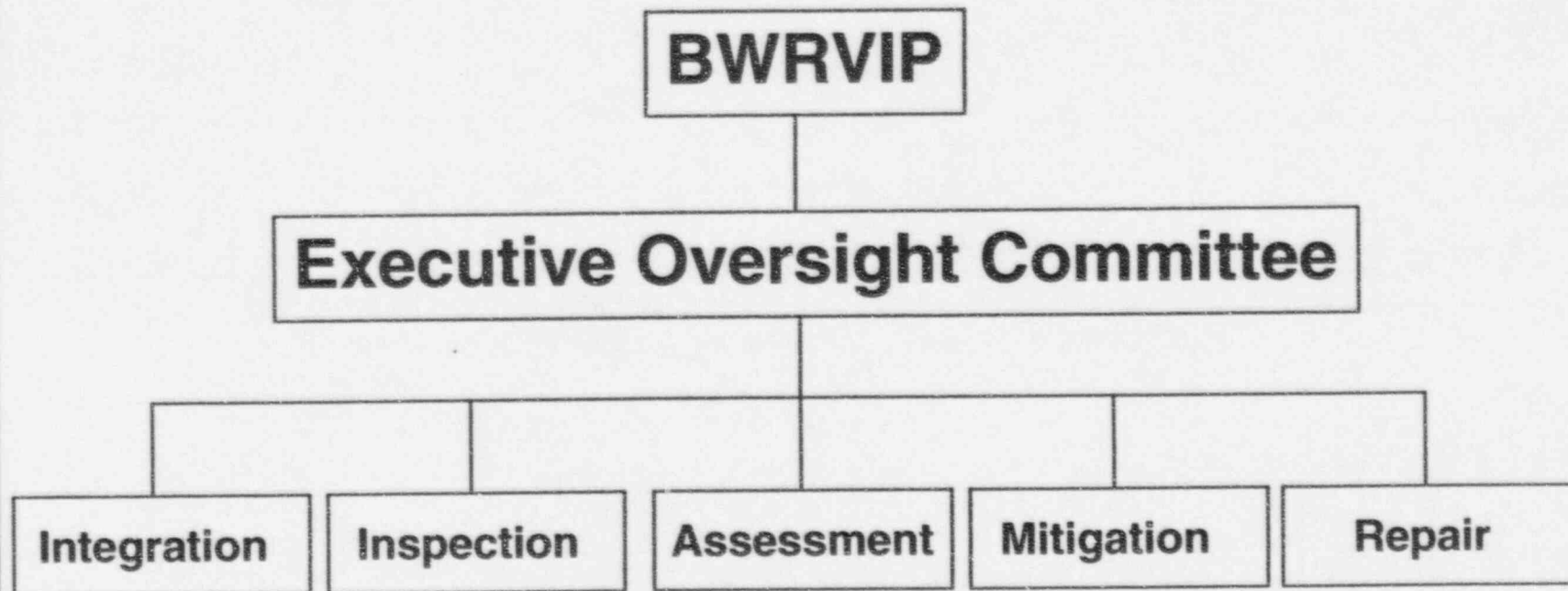
1. "BWR Core Shroud Inspection and Flaw Evaluation Guideline, Revision 2 (BWRVIP-01)," EPRI Report TR-107079, October 1996.
2. "Guidelines for Reinspection of BWR Core Shrouds (BWRVIP-07)," EPRI Report TR-105747, February 1996.
3. "Evaluation of Crack Growth in BWR Stainless Steel RPV Internals (BWRVIP-14)," EPRI Report TR-105873, March 1996.
4. "Roll/Expansion Repair of Control Rod Drive and In-Core Instrument Penetrations in BWR Vessels (BWRVIP-17)," EPRI Report TR-106712, November, 1996.
5. "BWR Vessel and Internals Project, BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines (BWRVIP-18)," EPRI Report TR-106740, July 1996.
6. "Internal Core Spray Piping and Sparger Repair Design Criteria (BWRVIP-19)," EPRI Report TR-106893, September 1996.
7. "BWR Core Plate Inspection and Flaw Evaluation Guideline (BWRVIP-25)," EPRI Report TR-107284, December, 1996.
8. "BWR Top Guide Inspection and Flaw Evaluation Guidelines (BWRVIP-26)," EPRI Report TR-107285, December, 1996.
9. "Assessment of BWR Jet Pump Riser Elbow to Thermal Sleeve Weld Cracking (BWRVIP-28)," EPRI Report TR-107667, December, 1996.
10. "Standards for Visual Inspection of Core Spray Piping, Spargers, and Associated Components," Section 6A of BWRVIP-03, April 1996.
11. "BWRVIP Newsletters," February 29, 1996.
12. "Non-Proprietary Version of BWR Vessel and Internal Project, Guidelines for Reinspection of BWR Core Shrouds (BWRVIP-07)," March 27, 1996.
13. "Non-Proprietary version of: BWR Vessel and Internals Project, Evaluation of Crack Growth in BWR Stainless Steel RPV Internals (BWRVIP-14)," March 29, 1996.
14. "Summary of BWRVIP Technology Development tasks in Assessment and Mitigation Areas," April 29, 1996.

15. "Non-Proprietary version of BWR Vessel and Internals Project BWRVIP-03, 04, 05, 06, 07, 14," April 30, 1996.
16. "BWRVIP Response to NRC Staff Concerns and Unresolved Items," May 17, 1996.
17. "Schedule for BWRVIP Response to NRC Requests for Additional Information," May 28, 1996.
18. "Additional Response to NRC Staff Concerns and Unresolved Items," June 6, 1996.
19. "BWRVIP Response to NRC Requests for Additional Information on BWRVIP-05," June 24, 1996.
20. "Reclassification of a BWRVIP Report Submitted in Response to Generic Letter 92-01, Revision 1, Supplement 1," June 27, 1996.
21. "Summary White Paper for July 11, 1996 BWRVIP Meeting with NRC Management," June 28, 1996.
22. "Intent to Submit a Petition for Rulemaking," September 20, 1996.
23. "Request for Authorization of a Technical Alternative per 10CFR50.55a(a)(3)(i) for Boiling Water Reactors," October 29, 1996.
24. "Clarifications to Core Shroud Reinspection Guidelines," July 17, 1996.
25. "BWRVIP Response to NRC Request for Additional Information on BWRVIP-07," October 21, 1996.
26. "GE Services Information Letter on Jet Pump Riser Pipe Cracking," December 13, 1996.
27. "License Renewal Appendix to BWR Vessel and Internals Project, BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines (BWRVIP-18)," December 20, 1996.
28. "BWRVIP Response to NRC Request for Additional Information on BWRVIP-06," December 20, 1996.

BWRVIP Meetings with NRC in 1996

1. EOC/NRC mangement meeting - March 19, 1996.
2. BWRVIP/NRC management meeting on RPV shell weld inspections - July 11, 1996.
3. RPV shell weld inspection petition for rulemaking meeting - October 15, 1996.
4. License renewal meeting - October 28, 1996.
5. BWRVIP Symposium - November 6-7, 1996.

BWR Vessel and Internals Project Organization



BWRVIP and NRC Committee Interfaces

COMMITTEE	UTILITY	NRC	EPRI
	-Executive Chair -Technical Chair		
INTEGRATION	Open Wagoner (CP&L)	Virgilio Carpenter	Bilanin
INSPECTION	Keaten (GPUN) Leonard (NMPC)	Sheron Wichman	Lance
ASSESSMENT	Terry (NMPC) Dyle (SNC)	Sheron Carpenter	Carter
MITIGATION	Jones (PP&L) Wilson (PSE&G)	Sheron Wichman	Gilman
REPAIR	Campbell (CP&L) McLeod (SNC)	Sheron Hermann	Bilanin

BWRVIP

TAC #	TITLE	Appl. Date	REVIEW			RAI		COMMENTS
			ENCB	EMEB	SRXB	Issued	Rec'd	
	BWR Core Shroud Repair Design Criteria	08/18/94						Safety Evaluation on Boiling Water Reactor Core Shroud Repair Design Criteria. NRC Review Complete 09/29/94
	BWR Core Shroud Inspection and Evaluation Guidelines, Rev. 1 (GENE-523-113-0894), dated March 1995	04/21/95						Evaluation of "BWR Core Shroud Inspection and Evaluation Guidelines," Revision 1, and "BWRVIP Core Shroud NDE Uncertainty & Procedure Standard," Dated 11/22/94. NRC Review Complete 06/16/95
	Core Shroud NDE Uncertainty and Procedure Standard (Shroud NDE Capabilities: H1-H6)	11/22/95						Incorporated into BWRVIP-03
<u>BWRVIP-03</u> M91898 M95369	RPV Internals Examination Guidelines Section 6A - Standards for Visual Examination of Core Spray Piping, Spargers and Misc. Components	11/10/95 04/16/96	L mjb	S fxg	S kek	02/ /97		Under review by Brookhaven NL Final SE ECD 1 month after RAI response
<u>BWRVIP-04</u>	Guide for Format and Content of Core Shroud Repair Design Submittals (EPRI TR-105692, October 1995)	10/05/95						NRC Review completed in Letter to BWRVIP dated 06/96
<u>BWRVIP-05</u> M93925	BWR RPV Shell Weld Inspection Recommendations	09/28/95	L scs	-	-	04/02/96 05/20/96	06/24/96	Technical review complete OGC reviewing Alternative RES Petition possible
<u>BWRVIP-06</u> M93926	Safety Assessment of BWR Reactor Internals	10/05/95	S whk	S fxg	L kek	05/21/96	12/20/96	Under Review - NRC plans for scheduling and scope of other BWRVIP documents Meeting w/BWRVIP on their expanded basis for prioritization 03/ /97 Final SE ECD 04/15/97
<u>BWRVIP-07</u> M94959	Guidelines for Reinspection of BWR Core Shrouds	02/29/96	L whk mjb	S fxg	-	05/21/96	10/21/96	Under review - Final SE ECD 03/01/97

TAC #	TITLE	Appl. Date	REVIEW			RAI		COMMENTS
			EMCB	EMEB	SRXB	Issued	Rec'd	
<u>BWRVIP-08</u> -----	BWR Vessel and Internals Project, Sounding Assessment of BWR/2-6 Reactor Pressure Vessel Integrity Issues	11/15/95 06/27/96	L bje edw	-	-			GL 92-01 Rev. 1, Sup. 1 Response Letter to B Carter (EPRI) 01/01/97
<u>BWRVIP-14</u> M94975	Evaluation of Crack Growth in BWR Stainless Steel RPV Internals	03/18/96	L hfc	-	-	12/09/96		Under review by Argonne ML Final SE ECD 3 month after RAI response NOTE: CCRB REVIEW MAY BE REQUIRED
<u>BWRVIP-17</u> M97373	Roll/Expansion of Control Rod Drive and In-Core Instrument Penetrations in BWR Vessels	11/27/96	S whk	L fxg	S kak	02/ /97		Under Review Final SE ECD 1 month after RAI response Plant Specific Action - Nine Mile Point
<u>BWRVIP-18</u> M96219	Core Spray Internals Inspection and Flaw Evaluation Guidelines Appendix C, Demonstration of Compliance with Technical Information Requirements of License Renewal Rule	07/26/96 12/20/96	L whk cec mjb	S fxg	S kak	01/16/97		Under Review Final SE ECD 1 month after RAI response NOTE: App. C is first BWRVIP license renewal submittal - ECD 12/97
<u>BWRVIP-19</u> M96539	Internal Core Spray Piping and Sparger Repair Design Criteria	09/17/96	L whk cec	S fxg	S kak	01/16/97		Under Review Final SE ECD 1 month after RAI response
<u>BWRVIP-25</u> M97802	Core Plate Inspection and Flaw Evaluation Guideline	12/27/96	L kjk	S fxg	S kak	02/ /97		Under Review Final SE ECD 1 month after RAI response
<u>BWRVIP-26</u> M97803	Top Guide Inspection and Flaw Evaluation Guideline	12/27/96	L kjk	S fxg	L kak	02/ /97		Under Review Final SE ECD 1 month after RAI response
<u>BWRVIP-28</u> M97815 IN M97395 GL M-----	Assessment of BWR Jet Pump Riser Elbow to Thermal Sleeve Weld Cracking	12/19/96	L cec	S fxg	L kak	02/ /97		Under Review IN / GL in progress Final SE ECD 1 month after RAI response

TAC #	TITLE	Appl. Date	REVIEW			RAI		COMMENTS
			EMCB	EMEB	SRXB	Issued	Rec'd	
NOTE: The following documents have not yet been submitted by the BWRVIP for NRC staff review. All reviewers and lead/support assignments are tentative based on the final document. RAIs are expected to be issued within 2 months of submittal, with final SE completed within 3 months of RAI response								
	Core Spray Replacement Design Criteria	02/97 T	S whk	L fxg	S kak			
	Core Spray Overlay Repair	02/97 T	L whk	S fxg	S kak			
	SLC System Inspection and Flaw Evaluation Guidelines	03/97 T	L kjk	S fxg	S kak			
	Weldability of Irradiated Materials	04/97 T	L whk	S fxg	-			
	Repair Technology Development: Underwater welding to 50 feet	05/97 T	L whk	S fxg	S kak			
	Shroud Support Inspection and Flaw Evaluation Guidelines	06/97 T	L kjk	S fxg	S kak			
	Jet Pump Assembly Inspection and Flaw Evaluation Guidelines	06/97 T	L cec	S fxg	S kak			

TAC #	TITLE	Appl. Date	REVIEW			RAI		COMMENTS
			ENCB	EMEB	SRXB	Issued	Rec'd	
	SLC Inspection & Repair Standards	08/97 T	L kjk	S fxg	S kak			
	CRD Guide / Stub Tube Inspection and Flaw Evaluation Guidelines	09/97 T	L kjk	S fxg	S kak			
	In-Core / Dry Tube Inspection and Flaw Evaluation Guidelines	09/97 T	L kjk	S fxg	S kak			
	LPCI Coupling Inspection and Flaw Evaluation Guidelines	09/97 T	L kjk	S fxg	S kak			
	Instrument Penetration Inspection and Flaw Evaluation Guidelines	12/97 T	L kjk	S fxg	S kak			
	Internals Brackets Inspection and Flaw Evaluation Guidelines	12/97 T	L kjk	S fxg	S kak			
	Low Alloy Crack Growth Assessment	12/97 T	L hfc	-	-			
	Ni-base Crack Growth Assessment	12/97 T	L hfc	-	-			

TAC #	TITLE	Appl. Date	REVIEW			RAI		COMMENTS
			EMCB	EMES	SRXB	Issued	Rec'd	
	Shroud Support Inspection Standards	12/97 T	L kjk	S fxg	S kek			
	Jet Pump Assembly Inspection Standards	12/97 T	L kjk	S fxg	S kek			
	Top Guide Inspection Standards	12/97 T	L kjk	S fxg	S kek			
	Core Plate Inspection Standards	12/97 T	L kjk	S fxg	S kek			
	Shroud NDE Capabilities: H7-W9	___/97 T	L kjk	S fxg	S kek			
	NDE Quantification for other internal components: Core spray piping	___/97 T	L kjk	S fxg	S kek			
	Report on Regulatory Credit for Mitigation	12/97 T	L kip whk	S fxg	S kek			
	NDE Quantification for other internal components: Shroud support legs	1097 T	L kjk	S fxg	S kek			

TAC #	TITLE	Appl. Date	REVIEW			RAI		COMMENTS
			EMCB	EMEP	SRXB	Issued	Rec'd	
	NDE Quantification for other internal components: Top guide	1997 T	L kjk	S fxg	S kek			
	NDE Quantification for other internal components: Core plate	1997 T	L kjk	S fxg	S kek			
	NDE Quantification for other internal components: Standby liquid control	1997 T	L kjk	S fxg	S kek			
	Repair Application Development	TBD	L kjk	S fxg	S kek			

Lead

Support

Estimated Completion Date

T-5C3

The NRC staff agreed to consider holding a meeting of Regional inspectors and other interested NRC staff to coordinate NRC inspection and review activities associated with BWRVIP submittals.

The meeting concluded with the NRC staff encouraging the BWRVIP to continue to work cooperatively with the NRC staff. Further meetings will be scheduled as needed.

January 16, 1997, BWRVIP Scheduling Meeting

A meeting was held at the NRC's One White Flint North offices on January 17, 1997, with NRC staff and members of the BWRVIP to discuss scheduling of reviews related to the BWRVIP submittals. The meeting was held at the request of the NRC staff. Attachment 3 is the review matrix created from the meeting. Attendees at this meeting are indicated on Attachment 1 by an asterisk.

The BWRVIP has submitted 12 documents that are currently under NRC staff review, and is planning to submit an additional 28 documents over the next year. The NRC staff discussed the status of its present reviews of the 12 documents, including planned requests for additional information (RAIs) that will be required to complete several reviews. Further, planned submittals were discussed and lead NRC staff reviewers were tentatively assigned.

Additionally, the BWRVIP discussed the research activities it has presently undertaken with regards to underwater weld overlay repairs of piping and underwater welding repairs of irradiated metals. The NRC staff suggested that the BWRVIP and NRC share the results of its respective literature searches into this area to ensure that both the industry and the staff are reviewing the most current and relevant data. Further discussions regarding research will be scheduled as needed.

The BWRVIP staff and the NRC staff agreed to continue to meet to discuss emerging technical issues, status of technical reviews and resource allocation.

- Attachments: 1. January 16, 1997, List of Attendees
2. January 16, 1997, BWRVIP Handout
3. January 17, 1997, Review Matrix

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