

***THE
B&W OWNERS GROUP***

Reactor Vessel Working Group

**SUPPLEMENT TO THE
MASTER INTEGRATED REACTOR VESSEL
SURVEILLANCE PROGRAM**

SUPPLEMENT TO THE MASTER INTEGRATED REACTOR VESSEL SURVEILLANCE PROGRAM

by

J. B. Hall

Prepared for

B&W Owners Group Reactor Vessel Working Group

Dominion Generation
Duke Energy Corporation
Entergy Operations, Inc.
Exelon Corporation
FirstEnergy Nuclear Operating Company
Florida Power Corporation
Florida Power & Light Company
Nuclear Management Company

Prepared by

Framatome ANP, Inc.
An AREVA and Siemens Company
3315 Old Forest Road
P. O. Box 10935
Lynchburg, Virginia 24506-0935



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 16, 2005

Mr. Jerald S. Holm
Director, Regulatory Affairs
Framatome ANP
3815 Old Forest Road
Lynchburg, VA 24501

SUBJECT: FINAL SAFETY EVALUATION FOR BABCOCK AND WILCOX OWNERS
GROUP TOPICAL REPORT BAW-1543(NP), REVISION 4, SUPPLEMENT 5,
"SUPPLEMENT TO THE MASTER INTEGRATED REACTOR VESSEL
SURVEILLANCE PROGRAM" (TAC NO. MC1762)

Dear Mr. Holm:

By letter dated December 19, 2003, Babcock and Wilcox Owners Group (B&WOG) submitted BAW-1543(NP), Revision 4, Supplement 5, "Supplement to the Master Integrated Reactor Vessel Surveillance Program" to the U. S. Nuclear Regulatory Commission (NRC) staff for review. On February 1, 2005, an NRC draft safety evaluation (SE) regarding our approval of BAW-1543(NP), Revision 4, Supplement 5, was provided for your review and comments. By letter dated February 21, 2005, you commented on the draft SE. The staff's disposition of your comments on the draft SE are discussed in the attachment to the final SE enclosed with this letter.

The staff has found that BAW-1543(NP), Revision 4, Supplement 5, is acceptable for referencing in licensing applications to the extent specified and under the limitations delineated in the Topical Report (TR) and in the enclosed SE. The SE defines the basis for the acceptance of the TR.

Our acceptance applies only to material provided in the subject TR. We do not intend to repeat our review of the acceptable material described in the TR. When the TR appears as a reference in license applications, our review will ensure that the material presented applies to the specific plant involved. License amendment requests that deviate from this TR will be subject to a plant-specific review in accordance with applicable review standards.

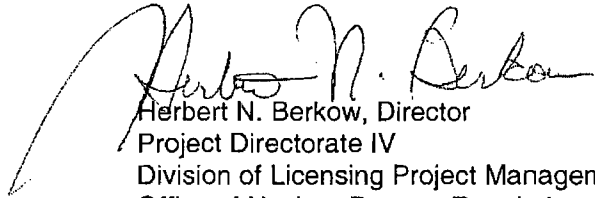
In accordance with the guidance provided on the NRC website, we request that B&WOG publish accepted proprietary and non-proprietary versions of this TR within three months of receipt of this letter. The accepted versions shall incorporate this letter and the enclosed SE after the title page. Also, they must contain historical review information including NRC requests for additional information and your responses. The accepted versions shall include a "-A" (designating accepted) following the TR identification symbol.

J. Holm

- 2 -

If future changes to the NRC's regulatory requirements affect the acceptability of this TR, B&WOG and/or licensees referencing it will be expected to revise the TR appropriately, or justify its continued applicability for subsequent referencing.

Sincerely,



Herbert N. Berkow, Director
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Project No. 693

Enclosure: Safety Evaluation



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

MASTER INTEGRATED REACTOR VESSEL SURVEILLANCE PROGRAM

TOPICAL REPORT BAW-1543, REVISION 4, SUPPLEMENT 5

1.0 INTRODUCTION

By letter dated December 19, 2003, the Babcock and Wilcox (B&W) Owners Group (B&WOG) Reactor Vessel Working Group submitted, for NRC approval, topical report (TR) BAW-1543(NP), Revision 4, Supplement 5, "Supplement to the Master Integrated Reactor Vessel Surveillance Program." The revisions contained in this supplement were necessary due to a commitment not being met in Supplement 4, because capsules OC1-D and OC3-F could not be removed from Crystal River Unit 3.

2.0 BACKGROUND

By letter dated April 10, 2001, the B&WOG submitted, for staff approval, report BAW-1543, Revision 4, Supplement 4, "Supplement to the Master Integrated Reactor Vessel Surveillance Program." BAW-1543, Revision 4, reported the essential features of the master integrated reactor vessel surveillance program (MIRVSP) for all operating B&W 177-fuel assembly (FA) plants and those participating Westinghouse plants having B&W-fabricated reactor vessels. These reactor vessels include seven B&W-designed 177-FA plants and six Westinghouse-designed plants with B&W-fabricated reactor vessels. The program was built upon the integrated surveillance program developed by the B&WOG for the B&W 177-FA plants. All 13 reactors are of the same basic design concept: pressurized water reactor, operating at about 550 °F and 2250 pounds per square inch (psi) nominal inlet temperature and pressure, and with low enrichment fuel (approximately 2 percent to 4 percent enrichment).

The irradiation schedules for the B&WOG MIRVSP include the plant-specific capsules for the B&W- and Westinghouse-designed vessels, and the supplementary weld metal surveillance capsules and higher fluence supplementary weld metal surveillance capsules. All the irradiations, with the exception of Capsule W1 and the Westinghouse plant-specific capsules, are performed in the B&W host reactors, Crystal River Unit 3 and Davis-Besse. Capsule W1, an irradiation capsule of the Westinghouse-design, was irradiated in Surry Unit 2 and was subsequently tested. The Westinghouse plant-specific capsules are irradiated in their respective plants. An updated list of the status of the Westinghouse and B&W plant-specific/integrated surveillance capsules is attached.

The staff evaluated the B&WOG's basis for the integrated program concept. The criteria as provided by Appendix H to Title 10 to the *Code of Federal Regulations*, Part 50, "Reactor Vessel Material Surveillance Program Requirements," were met; therefore, the staff determined the MIRVSP to be acceptable. By letter dated June 11, 1991, BAW-1543, Revision 3, was

approved by the NRC. The staff noted that the discussions of BAW-1543, Revision 4, were essentially the same as those found in BAW-1543, Revision 3, except for an update of some of the units' withdrawal schedules. BAW-1543, Revision 4, Supplement 1, contained quantitative information which was, in general, fluence dependent and, therefore, subject to change. This revision reflected revised fluence values for some units and revised some withdrawal schedules to comply with American Society for Testing and Materials (ASTM) Standard E 185-73, "Standard Recommended Practice for Surveillance Tests for Nuclear Reactor Vessels." It was anticipated that future revisions to BAW-1543 would only involve the Revision 4 Supplement. BAW-1543, Revision 4, Supplement 2, reflected the revised fluence values and the revised withdrawal schedules, and, therefore, replaced BAW-1543, Revision 4, Supplement 1.

The B&WOG later revised and replaced Supplement 2 of Revision 4 of the subject report with Supplement 3. In Supplement 3, the B&WOG deleted Rancho Seco, R.E. Ginna, and Zion Units 1 and 2 from the program. In addition, the B&WOG updated the capsule status and the peak end-of-license fluences for several plants. In Supplement 4, the B&WOG incorporated the disposal plan for stored capsules, updated the status for various capsules, and incorporated current fluence levels. The B&WOG submitted Supplement 5 because the last supplement included a commitment regarding Capsules OC1-D and OC3-F; however, that commitment could not be met because these capsules could not be removed from Crystal River Unit 3.

3.0 EVALUATION

Appendix H to 10 CFR Part 50 includes criteria to monitor changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline region of light-water nuclear power reactors which result from exposure of these materials to neutron irradiation and the thermal environment. Appendix H to 10 CFR Part 50 endorses ASTM Standard E 185-73. Appendix H states that "[t]he design of the surveillance program and the withdrawal schedule must meet the requirements of the edition of ASTM E 185 that is current on the issue date of the ASME [American Society of Mechanical Engineers] Code [Boiler and Pressure Vessel Code] to which the reactor vessel was purchased. Later editions of ASTM E 185 may be used, but including only those editions through 1982."

ASTM Standard E 185-82, "Standard Practice for Conducting Surveillance Tests for Light Water Cooled Nuclear Power Reactor Vessels" and ASTM Standard E 185-66, "Recommended Practice for Surveillance Tests on Structural Materials in Nuclear Reactors" cover procedures for monitoring the radiation-induced changes in the mechanical properties of ferritic materials in the beltline of light-water cooled nuclear power reactor vessels. These practices include guidelines for designing a minimum surveillance program, selecting materials, and evaluating test results.

The staff evaluated the withdrawal schedule for each of the B&W and Westinghouse plant-specific reactor vessel surveillance programs, as provided in BAW-1543(NP), Revision 4, Supplement 5, and determined that the withdrawal schedules were prepared in accordance with ASTM Standard E 185-82 for each of the subject units except for Turkey Point Units 3 and 4. Additional details of the staff's assessment are provided below. It should be noted that this evaluation will focus on the staff's review of the B&WOG's revised withdrawal schedules, as provided in BAW-1543(NP), Revision 4, Supplement 5. As stated previously, capsules OC1-D and OC3-F could not be removed; therefore, credit for these two capsules could no longer be taken for Oconee Unit 1 and Oconee Unit 3, respectively. The staff independently reviewed the

surveillance capsule withdrawal schedules for Oconee Unit 1 and Oconee Unit 3, to ensure that the subject units' surveillance capsule program would still comply with the requirements of ASTM Standard E 185-82.

The staff found that the capsule withdrawal schedule for Oconee Unit 1 adequately met the requirements of ASTM Standard E 185-82, in that four capsules have been withdrawn and tested, and the last capsule that was tested, OC1-C, had a fluence of 1 to 2 times the end-of-life fluence. Therefore, the staff determined that the inability to withdraw capsule OC1-D had no impact on the ability of the Oconee Unit 1 surveillance capsule program to meet the Appendix H requirements.

The staff found that the capsule withdrawal schedule for Oconee Unit 3 adequately met the requirements of ASTM Standard E 185-82, in that three capsules have been tested and an additional capsule, capsule CR3-LG2, which contains the limiting beltline material for Oconee Unit 3 (heat number 72442), was tested and had a fluence of 1 to 2 times the end-of-life fluence for Oconee Unit 3. Therefore, the staff determined that the inability to withdraw capsule OC3-F had no impact on the ability of the Oconee Unit 3 surveillance capsule program to meet the Appendix H requirements.

The staff noted that the Nuclear Management Company (NMC) added a supplemental capsule, to be removed and tested, to the Point Beach Unit 2 surveillance program. Also, the B&WOG updated the status of capsules Y and X of Surry Unit 2 and Turkey Point Unit 3, respectively, to indicate that they had been tested. The staff found that these revisions were enhancements or updates to the program and are, therefore, acceptable to the staff.

On May 26, 2004, the staff requested that the B&WOG remove or address the relevance of the statement, "The owners of plants that have been granted license renewal have made no commitments to test or use information from the capsules that continue to be irradiated under the MIRVSP," because future applicants may wish to take credit for information obtained from the MIRVSP, as opposed to using plant-specific information in order to meet the requirements of 10 CFR Part 50, Appendix H. By letter dated July 7, 2004, the B&WOG indicated that the statement will be removed upon issuance of the approved version of BAW-1543, Revision 4, Supplement 5. The staff found this acceptable.

The staff determined that the withdrawal schedules for Oconee Unit 2, Three Mile Island Unit 1 (TMI-1), Crystal River Unit 3, Arkansas Nuclear One Unit 1, Davis-Besse, Point Beach Unit 2, Surry Unit 1, and Turkey Point Unit 4, as provided in Tables VI and VII of BAW-1543(NP), Revision 4, Supplement 5, did not change from Supplement 4 and, therefore, still comply with the requirements of ASTM Standard E 185-82, as stated in the staff's safety evaluation dated July 31, 2001. However, the staff noted that the information in Table VIII, of the subject TR, did not accurately list the capsules to be withdrawn and tested for Oconee Units 1, 2 and 3, and TMI-1. The B&WOG listed capsules for these subject plants that were no longer going to be withdrawn and tested, i.e., Capsule OC1-D for Oconee Unit 1, Capsule OC2-F for Oconee Unit 2, Capsule OC3-F for Oconee Unit 3, and Capsules F and D for TMI-1.

During a telephone conference call that was held on November 23, 2004, the staff discussed this issue with the B&WOG, who indicated that it would revise Table VIII of the report to accurately list the capsules that were going to replace those that were no longer going to be withdrawn and tested. The staff noted that the withdrawal schedule for Oconee Unit 1 already

met the requirements of ASTM Standard E185-82; however, the table still needed revision, because the capsules listed were not correct. The B&WOG indicated that Oconee Unit 2's limiting material is contained in Capsule A5 (which was irradiated in Davis Besse), which was tested and satisfied the fifth capsule requirement of ASTM Standard E185-82 for Oconee Unit 2. For Oconee Unit 3, the limiting material is contained in Capsule CR3-LG2, which was tested and satisfied the fifth capsule requirement of ASTM Standard E185-82, for Oconee Unit 3. The TMI-1 limiting material is contained in Capsule TMI2-LG2, which was tested and satisfied the fifth capsule requirement of ASTM Standard E185-82.

By supplemental letter dated January 5, 2005, the B&WOG revised Table VIII to the BAW-1543(NP), Revision 4, Supplement 5 report. The staff found that the revised table accurately listed the withdrawal schedules for Oconee Units 1, 2, and 3, and TMI-1. As stated above, the staff found that each of these plants met the capsule withdrawal schedule requirements of ASTM Standard E185-82, even though the original capsules were not going to be withdrawn and tested for Oconee Units 2 and 3 and TMI-1, because there are other capsules in the MIRVSP that contain the same limiting material for the subject plants that will be withdrawn and tested, and, therefore, will satisfy the requirements of ASTM Standard E185-82.

Turkey Point Units 3 and 4 surveillance capsule withdrawal schedules were prepared in accordance with ASTM Standard E 185-66. The Turkey Point Units 3 and 4 reactor vessels were purchased to the Summer 1966 Addenda to the 1965 ASME Code. ASTM Standard E 185-66 was the surveillance capsule standard in effect at the time the Turkey Point Units 3 and 4 reactor vessels were purchased. Since the Turkey Point Units 3 and 4 capsule withdrawal schedules meet the ASTM Standard E 185 edition that was current at the time the reactor vessels were purchased, the withdrawal schedules meet the requirements of Appendix H to 10 CFR Part 50.

It should also be noted that, by letter dated February 8, 1985, a safety evaluation report (SER) was submitted to Florida Power & Light Company, which indicated that the NRC approved an integrated surveillance program for Turkey Point Units 3 and 4. The SER indicated that the only capsules to be tested at Turkey Point Units 3 and 4 in accordance with ASTM Standard E 185 requirements, are those that contain weld metal specimens.

4.0 CONCLUSION

Based on the staff's review of the B&WOG MIRVSP, the staff found that the revised withdrawal schedules, as indicated in Report BAW-1543(NP), Revision 4, Supplement 5, are acceptable for the B&W-designed 177-FA plants and the Westinghouse-designed plants with B&W-fabricated reactor vessels. The proposed withdrawal schedules satisfy the ASTM Standard E 185-82 for all plants participating in the B&WOG MIRVSP except for Turkey Point Units 3 and 4. Turkey Point Units 3 and 4 satisfy the ASTM Standard E 185-66. Since this edition of the standard was current at the time the reactor vessels were purchased, the Turkey Point Units 3 and 4 surveillance capsule withdrawal schedules satisfy the requirements of Appendix H to 10 CFR Part 50. Also, it should be noted that the NRC previously approved an integrated surveillance program for Turkey Point Units 3 and 4.

The staff concluded that the proposed withdrawal schedules of BAW-1543(NP), Revision 4, Supplement 5, comply with Appendix H to 10 CFR Part 50. Therefore, the staff approves the revised withdrawal schedule for each of the plants included in the B&WOG MIRVSP.

5.0 REFERENCES

1. BAW-1543, Revision 4, Supplement 4, "Supplement to the Master Integrated Reactor Vessel Surveillance Program," April 2001.
2. NRC letter to A. Mendiola, from K. Wichman, NRC, "Safety Evaluation of BAW-1543, Master Integrated Reactor Vessel Surveillance Program, Revision 4, Supplement 4," July 31, 2001, ML012130374.
3. Code of Federal Regulations, Title 10, Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements."
4. American Society for Testing and Materials, "Recommended Practice for Surveillance Tests on Structural Materials in Nuclear Reactors," ASTM E 185-66.
5. American Society for Testing and Materials, "Recommended Practice for Surveillance Tests for Nuclear Reactor Vessels," ASTM E 185-70.
6. American Society for Testing and Materials, "Standard Practice for Conducting Surveillance Tests for Light Water Cooled Nuclear Power Reactor Vessels," ASTM E 185-82.
7. NUREG-1511, Supplement 2, "Reactor Pressure Vessel Status Report," October 2000.

Principal Contributor: M. Khanna

Date: May 16, 2005

STATUS OF WESTINGHOUSE PLANT-SPECIFIC SURVEILLANCE CAPSULES

PLANT	CAPSULE ID	TARGET FLUENCE	STATUS	NOTES
POINT BEACH 1	N	4.5E19	STANDBY	1
	P		REMOVED	3
	R,S,T,V		TESTED	
POINT BEACH 2	N	5.0E19	STANDBY	1
	P		REMOVED	3
	R,S,T,V		TESTED	
	W		SUPPL CAPSULE	2
	S	3.9E19	STANDBY	4
	U	3.0E19	STANDBY	4
SURRY 1	W		TESTED	5
	Y	4.3E19	STANDBY	4
	Z	5.2E19	STANDBY	1
	T,V,X		TESTED	
	V,X,Y		TESTED	
	S		TESTED	5
SURRY 2	T	3.8E19	STANDBY	1
	U	3.6E19	STANDBY	1
	W		TESTED	5
	Z	3.4E19	STANDBY	4
	S,T,V,X		TESTED	
	U,W,Y,Z		STANDBY	*
TURKEY POINT 3				
TURKEY POINT 4	S,T		TESTED	
	X		STANDBY	*
	U,V,W,Y,Z	3.85E19	STANDBY	*

NOTES:

1. TO BE WITHDRAWN AND STORED
2. TO BE WITHDRAWN AND TESTED
3. WITHDRAWN AND STORED
4. WILL REMAIN FOR LIFE EXTENSION
5. DOSIMETRY

- During the Turkey Point license renewal review, the applicant stated that the standby capsules can be used to gather data on fluence, spectrum, temperature, and neutron flux during the license renewal period.

STATUS OF BABCOCK AND WILCOX PLANT-SPECIFIC (INTEGRATED)
SURVEILLANCE CAPSULES

PLANT	CAPSULE ID	TARGET FLUENCE	STATUS	NOTE
OCONEE 1	F,E,A,C B		TESTED REMOVED	1
OCONEE 2	C,A,E B,D,F TMI2-LG1 A5		TESTED REMOVED TESTED TESTED	1
OCONEE 3	A,B,D C,E L1 CR3-LG2		TESTED REMOVED TESTED TESTED	1
TMI 1	E, C, W1* B,D,F CR3-LG1 TMI2-LG2		TESTED REMOVED TESTED TESTED	1
CRYSTAL RIVER 3	B,C,D,F A, E		TESTED REMOVED	1
ANO 1	E,B,A,C D, F		TESTED REMOVED	1
DAVIS-BESSE 1	F,B,A,D C, E		TESTED REMOVED	1

NOTE:

1. Capsule contains only base metal specimens, or weld data already exists at the expected/received capsule fluences or data is available at fluences greater than the expected/received capsule fluences, so will be disposed of in accordance with the March 17, 2000, letter from D.L. Howell to the USNRC Document Control Desk.

* Irradiated in Surry and subsequently tested.

PAGE NO. - LINE NOs.	PROPOSED CHANGE AND REASON	STAFF'S DISPOSITION
1 - 13	Add "participating" prior to the words "Westinghouse plants." Not all Westinghouse plants having B&W fabricated reactor vessels participated in the program.	Accepted
1 - 14	Change "nine" to "six." As of April 10, 2001, the submittal date of Supplement 4 of BAW-1 543, Revision 4, there were six Westinghouse-designed plants with B&W fabricated reactor vessels participating in the program.	Accepted
1 - 16	Change "16" to "13" for accuracy (see above comments).	Accepted
1 - 17	Add "about" prior to "550 °F" for accuracy.	Accepted
1 - 25	Change "is being" to "was" for accuracy.	Accepted
2 - 17	Change "archive specimens" to "stored capsules" for clarification.	Accepted
3 - 11	Delete "and test." OC1-D was a standby capsule with no commitment for testing.	Accepted
3 - 18	Delete "and test." OC3-F was a standby capsule with no commitment for testing.	Accepted
3 - 21	Change "the B&WOG" to "NMC" for accuracy.	Accepted - NMC defined
4 - 11, 12, 14	Change "fourth" to "fifth" for accuracy.	Accepted
7 - 5, 6	Under the fifth column entitled "Notes," omit Note 3 for consistency. None of the other capsule irradiation locations are noted	Accepted
7 - 6	Under the second column entitled "Capsule ID," omit Capsule ID "F." This capsule was unable to be removed and is still in the reactor.	Accepted
7 - 7	Under the second column entitled "Capsule ID," Omit Capsule ID "A," or substitute with "W1."	Accepted - Note 2 also removed. W1 was irradiated in Surry.
7 - 17	Omit Note 3 for consistency.	Accepted

Duke Energy Corporation Oconee 1, 2, 3
Entergy Operations, Inc. ANO-1
Progress Energy, Florida Crystal River 3



AmerGen Energy Company, LLC
FirstEnergy Nuclear Operating Company
Framatome ANP, Inc. (FANP)

TMI-1
D-B

Working Together to Economically Provide Reliable and Safe Electrical Power

February 21, 2005
NRC:05:012
BWOG:05:1867

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington D.C. 20555-0001

Comments on Draft Safety Evaluation for BAW-1543(NP), Revision 4, Supplement 5, "Supplement to the Master Integrated Reactor Vessel Surveillance Program"

Ref. 1: Letter, Robert A. Gramm (NRC) to Jerald S. Holm (Framatome ANP), "Draft Safety Evaluation for Babcock and Wilcox Owners Group Topical Report BAW-1543(NP), Revision 4, Supplement 5, 'Supplement to the Master Integrated Reactor Vessel Surveillance Program' (TAC No. MC1762)," February 3, 2005.

The NRC issued a draft safety evaluation on BAW-1543(NP), Revision 4, Supplement 5, and requested that the B&WOG review for any factual errors or clarity concerns. On behalf of the B&WOG, Framatome ANP has reviewed the draft SER provided in Reference 1.

The SER contains minor errors and clarifications which we recommend correcting. A marked up copy of the pages in the draft SER containing the errors is provided in Attachment A. Attachment B provides a summary table of the minor clarifications.

On behalf of the B&WOG, Framatome appreciates this opportunity to offer clarifying comments.

Sincerely,

Jerald S. Holm, Director
Regulatory Affairs

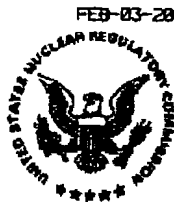
Howard Crawford, Chairman
B&W Owners Group Steering Committee

enclosures

cc: D.G. Holland
Project 693
Reactor Vessel Working Group

Framatome ANP, Inc. B&W Owners Group
3315 Old Forest Road
Lynchburg, VA 24501
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Attachment A



FEB-03-2005 10:59

P.03/09

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DRAFT SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

MASTER INTEGRATED REACTOR VESSEL SURVEILLANCE PROGRAM

TOPICAL REPORT BAW-1543, REVISION 4, SUPPLEMENT 5

1 1.0 INTRODUCTION

2 By letter dated December 19, 2003, the Babcock and Wilcox (B&W) Owners Group (B&WOG)
3 Reactor Vessel Working Group submitted, for NRC approval, topical report (TR)
4 BAW-1543(NP), Revision 4, Supplement 5, "Supplement to the Master Integrated Reactor
5 Vessel Surveillance Program." The revisions contained in this supplement were necessary due
6 to a commitment not being met in Supplement 4, because capsules OC1-D and OC3-F could
7 not be removed from Crystal River Unit 3.

8 2.0 BACKGROUND

9 By letter dated April 10, 2001, the B&WOG submitted, for staff approval, report BAW-1543,
10 Revision 4, Supplement 4, "Supplement to the Master Integrated Reactor Vessel Surveillance
11 Program." BAW-1543, Revision 4, reported the essential features of the master integrated
12 reactor vessel surveillance program (MIRVSP) for all operating B&W 177-fuel assembly (FA)
13 plants and those Westinghouse plants having B&W-fabricated reactor vessels. These reactor
14 vessels include seven B&W-designed 177-FA plants and nine Westinghouse-designed plants
15 with B&W-fabricated reactor vessels. The program was built upon the integrated surveillance
16 program developed by the B&WOG for the B&W 177-FA plants. All 16 reactors are of the
17 same basic design concept: pressurized water reactor, operating at 550 °F and 2250 psi
18 nominal inlet temperature and pressure, and with low enrichment fuel (approximately 2% to 4%
19 enrichment). ^{PARTICIPATING} _{ABOUT}

20 The irradiation schedules for the B&WOG MIRVSP include the plant-specific capsules for the
21 B&W- and Westinghouse-designed vessels, and the supplementary weld metal surveillance
22 capsules and higher fluence supplementary weld metal surveillance capsules. All the
23 irradiations, with the exception of Capsule W1 and the Westinghouse plant-specific capsules,
24 are performed in the B&W host reactors, Crystal River Unit 3 and Davis-Besse. Capsule W1,
25 an irradiation capsule of the Westinghouse design, is being irradiated in Surry Unit 2. The
26 Westinghouse plant-specific capsules are irradiated in their respective plants. An updated list
27 of the status of the Westinghouse and B&W plant-specific/integrated surveillance capsules is
28 provided in Attachment 1.

29 The staff evaluated the B&WOG's basis for the integrated program concept. The criterion as
30 provided by Appendix H to 10 CFR Part 50, "Reactor Vessel Material Surveillance Program

- 2 -

1 Requirements,* were met; therefore, the staff determined the MIRVSP to be acceptable. By
2 letter dated June 11, 1991, BAW-1543, Revision 3, was approved by the NRC. The staff noted
3 that the discussions of BAW-1543, Revision 4, were essentially the same as those found in
4 BAW-1543, Revision 3, except for an update of some of the units' withdrawal schedules.
5 BAW-1543, Revision 4, Supplement 1, contained quantitative information which was, in
6 general, fluence dependent and, therefore, subject to change. This revision reflected revised
7 fluence values for some units and revised some withdrawal schedules to comply with American
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10 revisions to BAW-1543 would only involve the Revision 4 Supplement. BAW-1543, Revision 4,
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12 therefore, replaced BAW-1543, Revision 4, Supplement 1.

13 The B&WOG later revised and replaced Supplement 2 of Revision 4 of the subject report with
14 Supplement 3. In Supplement 3, the B&WOG deleted Rancho Seco, R.E. Ginna, and Zion
15 Units 1 and 2 from the program. In addition, the B&WOG updated the capsule status and the
16 peak end-of-license fluences for several plants. In Supplement 4, the B&WOG incorporated
17 the disposal plan for archive specimens, updated the status for various capsules, and
18 incorporated current fluence levels. The B&WOG submitted Supplement 5 because the last
19 supplement included a commitment regarding Capsules OC1-D and OC3-F; however, that
20 commitment could not be met because these capsules could not be removed from Crystal River
21 Unit 3. STOCKED CAPSULES

22 3.0 EVALUATION

23 Appendix H to 10 CFR Part 50 includes criteria to monitor changes in the fracture toughness
24 properties of ferritic materials in the reactor vessel beltline region of light-water nuclear power
25 reactors which result from exposure of these materials to neutron irradiation and the thermal
26 environment. Appendix H to 10 CFR Part 50 endorses ASTM E 185-73. Appendix H states
27 that "[t]he design of the surveillance program and the withdrawal schedule must meet the
28 requirements of the edition of ASTM E 185 that is current on the issue date of the ASME
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31 only those editions through 1982."

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33 Nuclear Power Reactor Vessels" and ASTM E 185-88, "Recommended Practice for
34 Surveillance Tests on Structural Materials in Nuclear Reactors" cover procedures for monitoring
35 the radiation-induced changes in the mechanical properties of ferritic materials in the beltline of
36 light-water cooled nuclear power reactor vessels. These practices include guidelines for
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39 plant-specific reactor vessel surveillance programs, as provided in BAW-1543(NP), Revision 4,
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41 ASTM E 185-82 for each of the subject units except for Turkey Point Units 3 and 4. Additional
42 details of the staff's assessment are provided below. It should be noted that this evaluation will

- 3 -

1 focus on the staff's review of the B&WOG's revised withdrawal schedules, as provided in
2 BAW-1543 (NP), Revision 4, Supplement 5.

3 As stated previously, capsules OC1-D and OC3-F could not be removed; therefore, credit for
4 these two capsules could no longer be taken for Oconee Unit 1 and Oconee Unit 3,
5 respectively. The staff independently reviewed the surveillance capsule withdrawal schedules
6 for Oconee Unit 1 and Oconee Unit 3, to ensure that the subject units' surveillance capsule
7 program would still comply with the requirements of ASTM E 185-82.

8 The staff found that the capsule withdrawal schedule for Oconee Unit 1 adequately met the
9 requirements of ASTM E 185-82, in that four capsules have been withdrawn and tested, and
10 the last capsule that was tested, OC1-C, had a fluence of 1 to 2 times the end-of-life fluence.
11 Therefore, the staff determined that the inability to withdraw ~~and test~~ capsule OC1-D had no
12 impact on the ability of the Oconee Unit 1 surveillance capsule program to meet the Appendix H
13 requirements.

14 The staff found that the capsule withdrawal schedule for Oconee Unit 3 adequately met the
15 requirements of ASTM E 185-82, in that three capsules have been tested and an additional
16 capsule, capsule CR3-LG2, which contains the limiting beltline material for Oconee Unit 3 (heat
17 number 72442), was tested and had a fluence of 1 to 2 times the end-of-life fluence for Oconee
18 Unit 3. Therefore, the staff determined that the inability to withdraw ~~and test~~ capsule OC3-F
19 had no impact on the ability of the Oconee Unit 3 surveillance capsule program to meet the
20 Appendix H requirements.

21 The staff noted that the ^{NRC} B&WOG added a supplemental capsule, to be removed and tested, to
22 the Point Beach Unit 2 surveillance program. Also, the B&WOG updated the status of capsules
23 Y and X of Surry Unit 2 and Turkey Point Unit 3, respectively, to indicate that they had been
24 tested. The staff found that these revisions were enhancements or updates to the program and
25 are, therefore, acceptable to the staff.

26
27 On May 28, 2004, the staff requested that the B&WOG remove or address the relevance of the
28 statement, "The owners of plants that have been granted license renewal have made no
29 commitments to test or use information from the capsules that continue to be irradiated under
30 the MIRVSP," because future applicants may wish to take credit for information obtained from
31 the MIRVSP, as opposed to using plant-specific information in order to meet the requirements
32 of 10 CFR Part 50, Appendix H. By letter dated July 7, 2004, the B&WOG indicated that the
33 statement will be removed upon issuance of the approved version of BAW-1543, Revision 4,
34 Supplement 5. The staff found this acceptable.

35 The staff determined that the withdrawal schedules for Oconee Unit 2, Three Mile Island Unit 1
36 (TMI-1), Crystal River Unit 3, Arkansas Nuclear One Unit 1, Davis-Besse, Point Beach Unit 2,
37 Surry Unit 1, Turkey Point Unit 4, as provided in Tables VI and VII of BAW-1543(NP), Revision
38 4, Supplement 5, did not change from Supplement 4 and, therefore, still comply with the
39 requirements of ASTM E 185-82, as stated in the staff's safety evaluation dated July 31, 2001.
40 However, the staff noted that the information in Table VIII, of the subject topical report, did not
41 accurately list the capsules to be withdrawn and tested for Oconee Units 1, 2 and 3, and TMI-1.

1 The B&WOG listed capsules for these subject plants that were no longer going to be withdrawn
2 and tested, i.e., Capsule OC1-D for Oconee Unit 1, Capsule OC2-F for Oconee Unit 2,
3 Capsule OC3-F for Oconee Unit 3, and Capsules F and D for TMI-1.

4 During a conference call that was held on November 23, 2004, the staff discussed this issue
5 with the B&WOG, who indicated that it would revise Table VIII of the report to accurately list the
6 capsules that were going to replace those that were no longer going to be withdrawn and
7 tested. The staff noted that the withdrawal schedule for Oconee Unit 1 already met the
8 requirements of ASTM E185-82; however, the table still needed revision, because the capsules
9 listed were not correct. The B&WOG indicated that Oconee Unit 2's limiting material is
10 contained in Capsule A5 (which was irradiated in Davis Besse), which was tested and satisfied
11 the fourth capsule requirement of ASTM E185-82 for Oconee Unit 2. For Oconee Unit 3, the
12 limiting material is contained in Capsule CR3-LG2, which was tested and satisfied the fourth
13 capsule requirement of ASTM E185-82, for Oconee Unit 3. And for TMI-1 the limiting material
14 is contained in Capsule TMI2-LG2, which was tested and satisfied the fourth capsule
15 requirement of ASTM E185-82. ^{FIFTH}

16 By supplemental letter dated January 5, 2005, the B&WOG revised Table VIII to the
17 BAW-1543(NP), Revision 4, Supplement 5 report. The staff found that the revised table
18 accurately listed the withdrawal schedules for Oconee Units 1, 2, and 3, and TMI-1. As stated
19 above, the staff found that each of these plants met the capsule withdrawal schedule
20 requirements of ASTM E185-82, even though the original capsules were not going to be
21 withdrawn and tested for Oconee Units 2 and 3 and TMI-1, because there are other capsules in
22 the MIRVSP that contain the same limiting material for the subject plants that will be withdrawn
23 and tested, and, therefore, will satisfy the requirements of ASTM E185-82.

24 Turkey Point Units 3 and 4 were prepared in accordance with ASTM E 185-66. The Turkey
25 Point Units 3 and 4 reactor vessels were purchased to the Summer 1966 Addenda to the 1966
26 ASME Code. ASTM E 185-66 was the surveillance capsule standard in effect at the time the
27 Turkey Point Units 3 and 4 reactor vessels were purchased. Since the Turkey Point Units 3
28 and 4 capsule withdrawal schedules meet the ASTM E 185 edition that was current at the time
29 the reactor vessels were purchased, the withdrawal schedules meet the requirements of
30 Appendix H to 10 CFR Part 50.

32 It should also be noted that, by letter dated February 8, 1985, a safety evaluation report (SER)
33 was submitted to Florida Power & Light Company, which indicated that the NRC approved an
34 integrated surveillance program for Turkey Point Units 3 and 4. The SER indicated that the
35 only capsules to be tested at Turkey Point Units 3 and 4 in accordance with ASTM E 185
36 requirements, are those that contain weld metal specimens.

37 4.0 CONCLUSION

38
39 Based on the staff's review of the B&WOG MIRVSP, the staff found that the revised withdrawal
40 schedules, as indicated in Report BAW-1543(NP), Revision 4, Supplement 5, are acceptable
41 for the B&W-designed 177-FA plants and the Westinghouse-designed plants with B&W-
42 fabricated reactor vessels. The proposed withdrawal schedules satisfy the ASTM E 185-82
43 Standard for all plants participating in the B&WOG MIRVSP except for Turkey Point Units 3 and
44 4. Turkey Point Units 3 and 4 satisfy the ASTM E 185-66 Standard. Since this edition of the

1 standard was current at the time the reactor vessels were purchased, the Turkey Point Units 3
2 and 4 surveillance capsule withdrawal schedules satisfy the requirements of Appendix H to
3 10 CFR Part 50. Also, it should be noted that the NRC previously approved an integrated
4 surveillance program for Turkey Point Units 3 and 4.

5 The staff concluded that the proposed withdrawal schedules of BAW-1543(NP), Revision 4,
6 Supplement 5, comply with Appendix H to 10 CFR Part 50. Therefore, the staff approves the
7 revised withdrawal schedule for each of the plants included in the B&WOG MIRVSP.

8 5.0 REFERENCES

- 9 1. BAW-1543, Revision 4, Supplement 4, "Supplement to the Master Integrated Reactor
10 Vessel Surveillance Program," April 2001.
- 11 2. NRC letter to A. Mendiola, from K. Wichman, NRC, "Safety Evaluation of BAW-1543,
12 Master Integrated Reactor Vessel Surveillance Program, Revision 4, Supplement 4,"
13 July 31, 2001.
- 14 3. Code of Federal Regulations, Title 10, Part 50, Appendix H, "Reactor Vessel Material
15 Surveillance Program Requirements."
- 16 4. American Society for Testing and Materials, "Recommended Practice for Surveillance
17 Tests on Structural Materials in Nuclear Reactors," ASTM E 185-66.
- 18 5. American Society for Testing and Materials, "Recommended Practice for Surveillance
19 Tests for Nuclear Reactor Vessels," ASTM E 185-70.
- 20 6. American Society for Testing and Materials, "Standard Practice for Conducting
21 Surveillance Tests for Light Water Cooled Nuclear Power Reactor Vessels,"
22 ASTM E 185-82.
- 23 7. NUREG-1511, Supplement 2, "Reactor Pressure Vessel Status Report," October 2000.

STATUS OF WESTINGHOUSE PLANT-SPECIFIC SURVEILLANCE CAPSULES

PLANT	CAPSULE ID	TARGET FLUENCE	STATUS	NOTES
POINT BEACH 1	N P R,S,T,V	4.5E19	STANDBY REMOVED TESTED	1 3
POINT BEACH 2	N P R,S,T,V W	5.0E19	STANDBY REMOVED TESTED SUPPL CAPSULE	1 3 2
SURRY 1	S U W Y Z T,V,X	3.9E19 3.0E19 4.3E19 5.2E19	STANDBY STANDBY TESTED STANDBY STANDBY TESTED	4 4 5 4 1
SURRY 2	V,X,Y S T U W Z	3.8E19 3.6E19 3.4E19	TESTED TESTED STANDBY STANDBY TESTED STANDBY	5 1 1 5 4
TURKEY POINT 3	S,T,V,X U,W,Y,Z		TESTED STANDBY	•
TURKEY POINT 4	S,T X U,V,W,Y,Z	3.85E19	TESTED STANDBY STANDBY	• •

NOTES:

1. TO BE WITHDRAWN AND STORED
2. TO BE WITHDRAWN AND TESTED
3. WITHDRAWN AND STORED
4. WILL REMAIN FOR LIFE EXTENSION
5. DOSIMETRY

* During the Turkey Point license renewal review, the applicant stated that the standby capsules can be used to gather data on fluence, spectrum, temperature, and neutron flux during the license renewal period.

Attachment 7

STATUS OF BABCOCK AND WILCOX PLANT-SPECIFIC (INTEGRATED)
SURVEILLANCE CAPSULES

PLANT	CAPSULE ID	TARGET FLUENCE	STATUS	NOTES
OCONEE 1	F,E,A,C B		TESTED REMOVED	1
OCONEE 2	C,A,E B,D,F TM2-LG1 A5		TESTED REMOVED TESTED TESTED	1 /
OCONEE 3	A,B,D C,E,F L1 CR3-LG2		TESTED REMOVED TESTED TESTED	1 /
TMI 1	E, C B,D,F A CR3-LG1 TM2-LG2		TESTED REMOVED NOT TESTED TESTED TESTED	1 2
CRYSTAL RIVER 3	B,C,D,F A, E		TESTED REMOVED	1
ANO 1	E,B,A,C D, F		TESTED REMOVED	1
DAVIS-BESSE 1	F,B,A,D C, E		TESTED REMOVED	1

NOTES:

1. Capsule contains only base metal specimens, or weld data already exists at the expected/received capsule fluences or data is available at fluences greater than the expected/received capsule fluences, so will be disposed of in accordance with the March 17, 2000, letter from D.L. Howell to the USNRC Document Control Desk.

2. Withdrawn and Stored

3. Irradiated in Davis-Besse

Attachment B

SUMMARY TABLE OF PROPOSED CHANGES

PAGE NO.	LINE(S) NO.	PROPOSED CHANGE AND REASON
1	13	Add "participating" prior to the words "Westinghouse plants." Not all Westinghouse plants having B&W-fabricated reactor vessels participated in the program.
1	14	Change "nine" to "six." As of April 10, 2001, the submittal date of Supplement 4 of BAW-1543, Revision 4, there were six Westinghouse-designed plants with B&W-fabricated reactor vessels participating in the program.
1	16	Change "16" to "13" for accuracy (see above comments).
1	17	Add "about" prior to "550°F" for accuracy.
1	25	Change "is being" to "was" for accuracy.
2	17	Change "archive specimens" to "stored capsules" for clarification.
3	11	Delete "and test." OC1-D was a standby capsule with no commitment for testing.
3	18	Delete "and test." OC3-F was a standby capsule with no commitment for testing.
3	21	Change "the B&WOG" to "NMC" for accuracy.
4	11, 12, 14	Change "fourth" to "fifth" for accuracy.
7	5, 6	Under the fifth column entitled "Notes," omit note 3 for consistency. None of the other capsule irradiation locations are noted.
7	6	Under the second column entitled "Capsule ID," omit Capsule ID "F." This capsule was unable to be removed and is still in the reactor.
7	7	Under the second column entitled "Capsule ID," Omit Capsule ID "A," or substitute with "W1."
7	17	Omit note 3 for consistency.

Duke Energy Company Oconee 1, 2, 3
Entergy Operations, Inc. ANO-1
Florida Power Corporation Crystal River 3



AmerGen Energy Company, LLC
FirstEnergy Nuclear Operating Company
Framatome ANP

TMI-1
D-B

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January 5, 2005
OG :05:1859
NRC:05:001

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U.S. Nuclear Regulatory Commission
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Supporting Materials for Review of BAW-1543(NP), Revision 4, Supplement 5, "Supplement to the Master Integrated Reactor Vessel Surveillance Program"

- Ref.: 1. Letter, James F. Mallay (Framatome ANP), to Document Control Desk (NRC), "Request for Review and Approval of BAW-1543(NP), Revision 4, Supplement 5, 'Supplement to the Master Integrated Reactor Vessel Surveillance Program'," OG:03:1838, NRC:03:091, December 19, 2003.
- Ref.: 2. Letter, James F. Mallay (Framatome ANP) to Document Control Desk (NRC), "Response to RAI on BAW-1543(NP), Revision 4, Supplement 5, 'Supplement to the Master Integrated Reactor Vessel Surveillance Program'," OG:04:1847, NRC:04:030, July 7, 2004.
- Ref.: 3. Letter, James F. Mallay (Framatome ANP) to Document Control Desk (NRC), "Supporting Materials for Review of BAW-1543(NP), Revision 4, Supplement 5, 'Supplement to the Master Integrated Reactor Vessel Surveillance Program'," OG:04:1855, NRC:04:068, November 30, 2004.

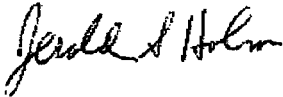
On behalf of the B&W Owners Group Reactor Vessel Working Group, Framatome ANP (FANP) requested the NRC's review and approval for referencing in licensing actions the topical report BAW-1543(NP), Revision 4, Supplement 5, "Supplement to the Master Integrated Reactor Vessel Surveillance Program," (Reference 1). Our response to a Request for Additional Information was provided in Reference 2. A supplemental request for clarification of the contents of Table VIII of the report was discussed in a telephone call on November 23, 2004 (Reference 3). A second request for further clarification of the contents of Table VIII was discussed in a telephone call on December 1, 2004, between Mr. Brian Hall of FANP and Ms. Meena Khanna of the NRC.

Framatome ANP, Inc. B&W Owners Group
3315 Old Forest Road
Lynchburg, VA 24501
Phone: 434-832-3635 Fax: 434-832-4121

Attachment I provides a revised Table VIII that clarifies how Oconee Unit 2, Oconee Unit 3 and TMI are meeting the minimum number of capsules to be withdrawn and tested in accordance with ASTM E185-82. This table completely replaces the table submitted in Reference 3.

We would appreciate your timely review.

Very truly yours,

A handwritten signature in black ink, appearing to read "Jerald S. Holm". The signature is fluid and cursive, with the first name "Jerald" being more prominent than the last name "Holm".

Jerald S. Holm, Director
Regulatory Affairs

Enclosure

cc: D. G. Holland
B&WOG Reactor Vessel Working Group
Project 693

Attachment 1

Comparison of the Plant-Specific Surveillance Capsules with ASTM E 185 Requirements

Table VIII. Comparison of the Plant-Specific Surveillance Capsules with ASTM E 185 Requirements

Plant	ASTM E 185-82 5 Capsule Program Requirement				
	1.5 EFPY or Fluence > 5E18 $\Delta RT_{NDT} \approx 50^\circ F$	3 EFPY or Fluence Midway Between First and Third Capsule	6 EFPY or T/4 EOL Fluence	15 EFPY or 1S EOL Fluence	EOL or 1-2 Times EOL Fluence (Capsule may be held w/o testing)
Oconee-1	F-I/T	(a)	E-I/T	A-I/T	C-I/T
Oconee-2	C-I/T	A-I/T	TMI2-LG1/T	E-I/T	A5/T
Oconee-3	A-I/T	B-I/T	L1/T	D-I/T	CR3-LG2/T
TMI-1	E-I/T	W1/T	CR3-LG1/T	C-I/T	TMI2-LG2/T
Crystal River-3	B-I/T	(a)	C-I/T	D-I/T	F-I/T
ANO-1	E-I/T	(a)	B-I/T	A-I/T	C-I/T
Davis-Besse	F-I/T	(a)	B-I/T	D-I/T	A-I/T
Point Beach-1	V-I/T	S-I/T	T-I/T	R-I/T	P-I/NT
Point Beach-2	V-I/T	T-I/T	R-I/T	S-I/T	P-I/NT
Surry-1	T-I/T	W-I/T ^(b)	V-I/T	X-I/T	S,U-R
Surry-2	X-I/T	W-I/T ^(b)	V-I/T	Y-I/T	S-I/T ^(b) , T-R
Turkey Point-3	T-I/T	V-I/T	S-I/T	X-I/T	U,W-R
Turkey Point-4	T-I/T	S-I/T	X-R	V-R	U,W-R

Legend: I/T = Irradiated and tested

I/NT = Irradiated and not tested

R = In reactor

^(a) Only 4 capsules required per ASTM E185-82.

^(b) Only dosimetry evaluated.

Duke Energy Company
Entergy Operations, Inc.
Florida Power Corporation

Oconee 1, 2, 3
ANO-1
Crystal River 3



AmerGen Energy Company, LLC
FirstEnergy Nuclear Operating Company
Framatome ANP

TMI-1
D-B

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November 30, 2004
NRC:04:068
OG:04:1855

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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Supporting Materials for Review of BAW-1543(NP), Revision 4, Supplement 5, "Supplement to the Master Integrated Reactor Vessel Surveillance Program"

- Ref.: 1. Letter, James F. Mallay (Framatome ANP) to Document Control Desk (NRC), "Request for Review and Approval of BAW-1543(NP), Revision 4, Supplement 5, 'Supplement to the Master Integrated Reactor Vessel Surveillance Program'," OG:03:1838, NRC:03:091, December 19, 2003.
- Ref.: 2. Letter, James F. Mallay (Framatome ANP) to Document Control Desk (NRC), "Response to RAI on BAW-1543(NP), Revision 4, Supplement 5, 'Supplement to the Master Integrated Reactor Vessel Surveillance Program'," OG:04:1847, NRC:04:030, July 7, 2004.

On behalf of the B&W Owners Group Reactor Vessel Working Group, Framatome ANP requested the NRC's review and approval for referencing in licensing actions the topical report BAW-1543(NP), Revision 4, Supplement 5, "Supplement to the Master Integrated Reactor Vessel Surveillance Program," (Reference 1). Our response to a Request for Additional Information was provided in Reference 2. A supplemental request for clarification of the contents of Table VIII of the report was discussed in a telephone call on November 23, 2004.

Attachment 1 provides a revised Table VIII that clarifies how Oconee Unit 2, Oconee Unit 3 and TMI are meeting the minimum number of capsules to be withdrawn and tested in accordance with ASTM E185-82. This table completely replaces the table submitted in Reference 1.

We will appreciate your timely review.

Very truly yours,

James F. Mallay, Director
Regulatory Affairs

cc: D. G. Holland
B&WOG Reactor Working Vessel Group
Project 693

Framatome ANP B&W Owners Group
3315 Old Forest Road
Lynchburg, VA 24501
Phone: 434-832-2981 Fax: 434-832-4121

Attachment 1

Table VIII. Comparison of the Plant-Specific Surveillance Capsules with ASTM E 185 Requirements

Plant	ASTM E 185-82 5 Capsule Program Requirement				
	1.5 EFPY or Fluence > 5E18 $\Delta RT_{NDT} \approx 50^\circ F$	3 EFPY or Fluence Midway Between First and Third Capsule	6 EFPY or T/4 EOL Fluence	15 EFPY or IS EOL Fluence	EOL or 1-2 Times EOL Fluence (Capsule may be held w/o testing)
Oconee-1	F-I/T	E-I/T	A-I/T	C-I/T	B-I/NT
Oconee-2	C-I/T	A-I/T	TM12-LG1/T	E-I/T	A5/T
Oconee-3	A-I/T	B-I/T	L1/T	D-I/T	CR3-LG2/T
TMI-1	E-I/T	W1/T	CR3-LG1/T	C-I/T	TM12-LG2/T
Crystal River-3	B-I/T	C-I/T	D-I/T	F-I/T	A-I/NT
ANO-1	E-I/T	B-I/T	A-I/T	C-I/T	D-I/NT
Davis-Besse	F-I/T	B-I/T	A-I/T	D-I/T	C-I/NT
Point Beach-1	V-I/T	S-I/T	T-I/T	R-I/T	P-I/NT
Point Beach-2	V-I/T	T-I/T	R-I/T	S-I/T	P-I/NT
Surry-1	T-I/T	W-I/T*	V-I/T	X-I/T	S,U-R
Surry-2	X-I/T	W-I/T*	V-I/T	Y-I/T	S-I/T*;T-R
Turkey Point-3	T-I/T	V-I/T	S-I/T	X-I/T	U,W-R
Turkey Point-4	T-I/T	S-I/T	X-R	V-R	U,W-R

Legend: I/T = Irradiated and tested

I/NT = Irradiated and not tested

R = In reactor

* Only dosimetry evaluated.

Duke Energy Company
Entergy Operations, Inc.
Florida Power Corporation

Oconee 1, 2, 3
ANO-1
Crystal River 3



AmerGen Energy Company, LLC
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TMI-1
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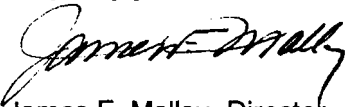
Response to RAI on BAW-1543(NP), Revision 4, Supplement 5, "Supplement to the Master Integrated Reactor Vessel Surveillance Program"

Ref.: 1. Letter, James F. Mallay (Framatome ANP), to Document Control Desk (NRC), "Request for Review and Approval of BAW-1543(NP), Revision 4, Supplement 5, 'Supplement to the Master Integrated Reactor Vessel Surveillance Program'," OG:03:01838, NRC:03:091, December 19, 2003.

Ref.: 2. Memo, Drew Holland (NRC), to James F. Mallay (Framatome ANP), "Request for Additional Information Regarding Topical Report BAW-1543," May 26, 2004.

On behalf of the B&W Owners Group Reactor Vessel Working Group, Framatome ANP requested the NRC's review and approval for referencing in licensing actions the topical report BAW-1543(NP), Revision 4, Supplement 5, "Supplement to the Master Integrated Reactor Vessel Surveillance Program." In Reference 2, the NRC requested additional information to facilitate the completion of its review. The response to this request, which is non-proprietary, is contained in the attachment to this letter.

Very truly yours,



James F. Mallay, Director
Regulatory Affairs

Enclosure

cc: D. G. Holland
B&WOG Reactor Vessel Working Group
Project 693

Framatome ANP B&W Owners Group
3315 Old Forest Road
Lynchburg, VA 24501
Phone: 434-832-2981 Fax: 434-832-2475

Attachment A

Response to RAI related to BAW-1543, Revision 4, Supplement 5

I. Appendix H to Title 10 of the Code of Federal Regulations Part 50 (Appendix H to 10 CFR Part 50), Paragraph III.C, "Requirements for an Integrated Surveillance Program" allows licensees with plants that have similar design and operating features to implement an integrated surveillance program with the approval of the Director of the Office of Nuclear Reactor Regulation. The Babcock and Wilcox (B&W) MIRVP was established in 1977 to provide a basis for sharing information between B&W designed and fabricated plants. In 1988, the MIRVP was expanded to include Westinghouse designed plants with B&W fabricated reactor vessels. In the introduction of BAW-1543, Revision 4, Supplement 5 (page 2) the licensee states that the Westinghouse-designed, B&W reactor vessel fabricated plant surveillance capsule withdrawal schedules are not MIRVP commitments, but merely reflect the current plans of these reactor vessel working group member plants.

Question 1. *If the Westinghouse designed plants' withdrawal schedules are not commitments, explain how each plant that participates in the MIRVP meets Appendix H requirements for an integrated surveillance program.*

Response 1. The Westinghouse designed plants (Point Beach 1 & 2, Surry 1 & 2, and Turkey Point 3 & 4) have their own surveillance programs that meet the requirements of 10CFR50 Appendix H. The Westinghouse plant owners participate in the MIRVP in order to share and use the limiting Linde 80 weld information generated in the MIRVP. However, in the Point Beach license renewal application (currently under review) Nuclear Management Company commits to using data from MIRVP capsules currently being irradiated.

Question 2. *Explain how the MIRVP is incorporated into each individual plant's licensing basis (i.e. is the surveillance capsule withdrawal schedule in the Technical Specifications or the final safety analysis report?).*

Response 2. The Turkey Point 3 & 4 UFSAR states that when the two MIRVP capsules that contain the SA-1101 weld (the same heat contained Turkey Point 3 & 4) are tested, the data will be evaluated and considered as appropriate. The Surry 1 & 2 UFSAR states that their withdrawal schedule is consistent with the guidelines of the MIRVP. The Point Beach 1 & 2 UFSAR cites the MIRVP as a supplement to the Point Beach 1 & 2 plant specific surveillance programs.

The B&W designed units (Oconee 1, 2, & 3, Arkansas Nuclear One 1, Davis-Besse, Crystal River 3, and Three Mile Island 1) meet 10CFR50 Appendix H through the MIRVP as documented in their respective UFSARs. In addition, the MIRVP is cited in the Arkansas Nuclear One 1 and the Oconee 1, 2, & 3 license renewal application and SERs in the Reactor Vessel Integrity Section. Also, the owners of some of the B&W designed plants cite the MIRVP in their Reactor Coolant System Pressure/Temperature Limit Sections of their Technical Specifications.

Question 3. *Due to recent reviews of license renewal applications, the staff has identified the need for license conditions with regard to reactor vessel surveillance programs for the period of extended operation. This license condition specifies that applicants will be required to submit any changes to surveillance capsule withdrawal schedules to the NRC for review and approval during the period of extended operation. For clarity, the staff requests that the applicant remove the following statement on page 3 of BAW-1543, Revision 4, Supplement 5: "The owners of plants that have been granted license renewal have made no commitments to test or use information from the capsules that continue to be irradiated under the MIRVP." Future applicants may wish to take credit for information obtained from the MIRVP as opposed to using plant specific information in order to meet the requirements of Appendix H to 10 CFR Part 50. If you conclude that the statement is relevant and should be maintained in the topical report, provide justification for this conclusion.*

Response 3. The statement will be removed upon issuance of the approved version of BAW-1543 Revision 4, Supplement 5.

Duke Energy Company Oconee 1, 2, 3
Entergy Operations, Inc. ANO-1
Florida Power Corporation Crystal River 3



AmerGen Energy Company, LLC
FirstEnergy Nuclear Operating Company
Framatome ANP

TMI-1
D-B

Working Together to Economically Provide Reliable and Safe Electrical Power

December 19, 2003
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NRC:03:091

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ATTN: Chief, Planning, Program and Management Support Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

**Request for Review and Approval of BAW-1543(NP), Revision 4, Supplement 5,
"Supplement to the Master Integrated Reactor Vessel Surveillance Program"**

Ref.: 1. Letter, James F. Mallay (Framatome ANP) to Document Control Desk (NRC),
"Removal of Surveillance Capsules at Crystal River, Unit 3," NRC:03:071,
October 22, 2003.

On behalf of the B&W Owners Group Reactor Vessel Working Group, Framatome ANP requests the NRC's review and approval for referencing in licensing actions the topical report BAW-1543(NP), Revision 4, Supplement 5, "Supplement to the Master Integrated Reactor Vessel Surveillance Program."

This supplement addresses the capsules contained in the Crystal River Unit 3 holder tube position that could not be removed and disposed of as described in Reference 1. These two capsules are standby capsules and are not required to fulfill the commitments in the reactor vessel surveillance program. Also, they are not relied on as part of any license renewal action. The requirements of 10CFR50 Appendix H have already been met using other capsules in the B&WOG Master Integrated Reactor Vessel Surveillance Program.

A CD is enclosed that contains a non-proprietary copy of BAW-1543(NP), Revision 4, Supplement 5.

We will appreciate your timely review.

Very truly yours,

James F. Mallay, Director
Regulatory Affairs

Enclosures

cc: J. W. Foster
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**SUPPLEMENT TO THE
MASTER INTEGRATED REACTOR VESSEL
SURVEILLANCE PROGRAM**

by

J. B. Hall

**B&W Document No. 43-1543S-08
(See Section 2 for document signatures)**

Prepared for

B&W Owners Group Reactor Vessel Working Group

**Dominion Generation
Duke Energy Corporation
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SUMMARY

The Master Integrated Reactor Vessel Surveillance Program (MIRVP) was initiated in 1977 for the B&W 177-FA Plants. Its purpose was to augment the existing reactor vessel surveillance programs and to provide a basis for sharing information between plants. All of the early vintage B&W manufactured reactor vessels were fabricated using the submerged arc welding process and particular consumables which resulted in welds that are sensitive to fast neutron exposures. The welds in these early vintage B&W manufactured reactor vessels are referred to as the Linde 80 class of materials. In 1988, the MIRVP was further modified to include a series of plants with the Westinghouse Nuclear Steam Supply System (NSSS) for which B&W manufactured the reactor vessels. These vessels have virtually identical welds as were used in the B&W 177-FA plants. The overall objective of the MIRVP is to provide the data necessary to assure compliance with Federal Regulations.^(a) Individual B&W Owners Group Reactor Vessel Working Group members may cite this document, as needed, in support of their reactor vessel surveillance program, which must meet the requirements of 10 CFR 50 Appendix H.

This document is a supplement to the base document, "Master Integrated Reactor Vessel Surveillance Program," BAW-1543.^(b) Both the base document and the current supplement are used to document the progress of the MIRVP, especially the withdrawal schedule of the RVSP capsules. The last full revision to the base document reviewed and approved by the NRC is Revision 4.^(c) This document is being revised due to a commitment made by the B&W Owners Group to the U.S. Nuclear Regulatory Commission when the OC1-D and OC3-F capsules could not be removed from Crystal River Unit 3.^(d) The last supplement to this document reviewed and approved by the NRC is BAW-1543A, Revision 4, Supplement 4.^(e)

^(a) Title 10, Code of Federal Regulations, Part 50, "Domestic Licensing of Production and Utilization Facilities", Vol. II, U.S. Nuclear Regulatory Commission, Washington, D.C.

^(b) L.S. Harbison, "Master Integrated Reactor Vessel Surveillance Program," BAW-1543, Revision 4, B&W Nuclear Technologies, Inc., Lynchburg, Virginia, February 1993.

^(c) Nuclear Regulatory Commission Safety Evaluation Report, "Babcock & Wilcox Owners Group (B&WOG) Reactor Vessel Working Group Report," BAW-1543, Revision 4, Supplement 2, "Supplement to the Master Integrated Reactor Vessel Surveillance Program" (TAC No. M98089), July 11, 1997.

^(d) James F. Mallay, Regulatory Affairs, B&W Owners Group to Document Control Desk, Chief, Planning, Program and Management Support Branch, "Removal of Surveillance Capsules at Crystal River, Unit 3," OG:03:1837; NRC:03:071, Project No. 693, October 22, 2003.

^(e) Nuclear Regulatory Commission Safety Evaluation Report, "Safety Evaluation for BAW-1543, Revision 4, Supplement 4, "Supplement to the Master Integrated Reactor Vessel Surveillance Program," (TAC No. MB1859), October 19, 2001.

SUMMARY OF REVISIONS

Section	Description
Summary	Updated to reflect current revision.
Section 1	Included revision statement for Supplement 5 changes. References to changes made in Supplement 4 were deleted. The last sentence on page 3 was deleted.
Table II	Added Point Beach Unit 2 Supplemental Capsule. Updated status of Turkey Point Unit 3 Capsule X and Surry Unit 2 Capsule Y.
Table III	Changed “End of Thirteenth Fuel Cycle” to “Withdrawal Not Planned” for capsules OC1-D and OC3-F. Updated status of capsules slated for disposal.
Table IV	Updated status of capsules.
Table V	Added Point Beach Unit 2 Supplemental Capsule. Updated status of Turkey Point Unit 3 Capsule X and Surry Unit 2 Capsule Y. Corrected Surry Unit 2 Capsule Y final capsule location.
Table VI	Changed Time of Removal from “End of Cycle 13” to “Not Planned” for capsules OC1-D and OC3-F. Changed status of capsule DB1-LG2 to “Testing in progress” from “will be disposed.” Fluence was revised for TMI1-C.
Table VII	Added Point Beach Unit 2 Supplemental Capsule. Updated status of Turkey Point Unit 3 Capsule X and Surry Unit 2 Capsule Y.
Table VIII	Updated status of Turkey Point Unit 3 Capsule X and Surry Unit 2 Capsule Y. Removed standby capsule column and changed capsules for the B&W designed plants to show compliance with ASTM E185 using only tested capsules.
Table IX	Updated license expiration dates and Peak EOL fluence values to reflect license renewal approvals.

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1.0 INTRODUCTION

The B&W Owners Group (B&WOG) document, BAW-1543, Revision 4, reports the essential features of a Master Integrated Reactor Vessel Surveillance Program (MIRVP) for all operating B&W 177-FA plants and those Westinghouse-designed plants having B&W-fabricated reactor vessels.⁽¹⁾ This supplementary document to BAW-1543, Revision 4, contains surveillance capsule insertion and withdrawal schedules for the B&W 177-FA plants and the Westinghouse-designed plants participating in the B&WOG Reactor Vessel Working Group (RVWG). In addition, the insertion and withdrawal schedules for the B&WOG supplementary capsules are provided. This document, Supplement 5, is a revision to and replaces Supplement 4 in its entirety.

Table I and Table II are listings of plant-specific surveillance capsules and directs the reader to the appendices of BAW-1543, Revision 4, where additional information can be found on material and capsule specifications. These tables also provide a listing of surveillance capsule reports. Table I provides information for the B&W plant-specific capsules and Table II provides information for the Westinghouse plant-specific capsules. Table II was revised by updating the status of capsule TP3-X and adding the Point Beach Unit 2 supplemental capsule.

Table III and Table IV provide capsule insertion and withdrawal schedules for B&W host plants Crystal River Unit 3 and Davis-Besse, respectively. Table III was revised by changing the withdrawal time of capsules OC1-D and OC3-F.

Table V provides capsule insertion and withdrawal schedules for the Westinghouse-designed plants participating in the RVWG. The Westinghouse-designed plant withdrawal schedules listed in Table V are not MIRVP commitments, but merely reflect the current plan of these RVWG member plants. Table V was revised by updating the status of capsule TP3-X and adding the Point Beach Unit 2 supplemental capsule.

Table VI and Table VII summarize the status of all MIRVP capsules for B&W and Westinghouse-designed plants, respectively. These tables state whether the capsules have been withdrawn or are still being irradiated. For capsules that have been withdrawn and tested, the appropriate surveillance capsule report number has been listed. For those capsules that are being irradiated, the target and expected fluences are listed along with the insertion and/or withdrawal date. The Westinghouse-designed plant withdrawal schedules listed in Table VII are not MIRVP commitments, but merely reflect the current plan of these RVWG member plants. Table VI was revised by changing the withdrawal time for capsules OC1-D and OC3-F. Table VII was revised by updating the status of capsule TP3-X and adding the Point Beach Unit 2 supplemental capsule.

Table VIII shows the conformance of the RVWG member plant-specific surveillance programs to the requirements of ASTM E 185-82.⁽⁴⁾ Table VIII was revised by updating the status of capsule TP3-X.

Table IX lists licensing dates and anticipated reactor vessel peak end-of-life fluences. License expiration dates and Peak EOL fluence values were updated to reflect license renewal approvals.

**Table I. B&W 177-FA Plant-Specific Reactor Vessel
Surveillance Program - Detailed Summary**

Capsule	Type	Table of Material Specifications ^(a)	Table of Capsule Specifications ^(b)	Irradiation Site	Report Date	Report
Oconee Unit 1 Topical Report BAW-10006A, Revision 3 ⁽⁵⁾						
A	I	A-1	D-1	OC1/CR3	Aug. 84	BAW-1837 ⁽⁶⁾
B	II	A-1	D-1	OC1/CR3	----	----
C	I	A-1	D-1	OC1/CR3	Oct. 88	BAW-2050 ⁽⁷⁾
D	II	A-1	D-1	OC1/CR3	----	----
E	I	A-1	D-1	OC1	Sept. 77	BAW-1436 ⁽⁸⁾
F	II	A-1	D-1	OC1	Sept. 75	BAW-1421, Rev. 1 ⁽⁹⁾
Oconee Unit 2 Topical Report BAW-10006A, Revision 3						
A	I	A-2	D-2	OC2/CR3	Dec. 81	BAW-1699 ⁽¹⁰⁾
B	II	A-2	D-2	OC2/CR3	----	----
C	I	A-2	D-2	OC2	May 77	BAW-1437 ⁽¹¹⁾
D	II	A-2	D-2	OC2/CR3	----	----
E	I	A-2	D-2	OC2/CR3	Oct. 88	BAW-2051 ⁽¹²⁾
F	II	A-2	D-2	OC2/CR3	----	----
Oconee Unit 3 Topical Report BAW-10100A ^{(c)(13)}						
A	V	A-3	D-3	OC3	Jul. 77	BAW-1438 ⁽¹⁴⁾
B	VI	A-3	D-3	OC3/CR3	Oct. 81	BAW-1697 ⁽¹⁵⁾
C	V	A-3	D-3	OC3/CR3	----	----
D	VI	A-3	D-3	OC3/CR3	May 92	BAW-2128, Rev. 1 ⁽¹⁶⁾
E	V	A-3	D-3	OC3/CR3	----	----
F	VI	A-3	D-3	OC3/CR3	----	----
Three Mile Island Unit 1 Topical Report BAW-10006A, Revision 3						
A	I	A-4	D-4	TMI1/TMI2	---- ^(d)	BAW-2042 ⁽¹⁷⁾
B	II	A-4	D-4	TMI1/CR3	----	----
C	I	A-4	D-4	TMI1/CR3	Mar. 86	BAW-1901 ⁽¹⁸⁾
D	II	A-4	D-4	TMI1/CR3	----	----
E	I	A-4	D-4	TMI1	Jan. 77	BAW-1439 ⁽¹⁹⁾
F	II	A-4	D-4	TMI1/CR3	----	----

^(a) Refer to BAW-1543, Revision 4, Appendix A.

^(b) Refer to BAW-1543, Revision 4, Appendix D.

^(c) The Oconee Unit 3 capsules were fabricated before BAW-10100A was published; however, it is the Oconee Unit 3 program that is described in BAW-10100A.

^(d) Capsule used for Three Mile Island Unit 2 capsule requalification.

**Table I (cont'd). B&W 177-FA Plant-Specific Reactor Vessel
Surveillance Program - Detailed Summary**

Capsule	Type	Table of Material Specifications ^(a)	Table of Capsule Specifications ^(b)	Irradiation Site	Report Date	Report
Crystal River Unit 3 Topical Report BAW-10100A						
A	III	A-5	D-5	CR3	-----	-----
B	IV	A-5	D-5	CR3	Jun. 82	BAW-1679, Rev. 1 ⁽²⁰⁾
					Mar. 82	BAW-1718 ⁽²¹⁾
C	III	A-5	D-5	CR3	Mar. 86	BAW-1898 ⁽²²⁾
D	IV	A-5	D-5	CR3	Mar. 86	BAW-1899 ⁽²³⁾
					Apr. 86	BAW-1914 ⁽²⁴⁾
E	III	A-5	D-5	CR3	-----	-----
F	IV	A-5	D-5	CR3	Sept. 88	BAW-2049 ⁽²⁵⁾
					Oct. 93	BAW-2172 ⁽²⁶⁾
Arkansas Nuclear One Unit 1 Topical Report BAW-10006A, Revision 3						
A	I	A-6	D-6	ANO1/DB1	Jul. 84	BAW-1836 ⁽²⁷⁾
B	II	A-6	D-6	ANO1/DB1	Nov. 81	BAW-1698 ⁽²⁸⁾
C	I	A-6	D-6	ANO1/DB1	Oct. 89	BAW-2075, Rev. 1 ⁽²⁹⁾
D	II	A-6	D-6	ANO1/DB1	-----	-----
E	I	A-6	D-6	ANO1	Apr. 77	BAW-1440 ⁽³⁰⁾
F	II	A-6	D-6	ANO1/DB1	-----	-----
Davis-Besse Topical Report BAW-10100A						
A	III	A-8	D-8	DB1	Jun. 89	BAW-1882, Rev. 1 ⁽³¹⁾
B	IV	A-8	D-8	DB1	May 84	BAW-1834 ⁽³²⁾
					Jun. 85	BAW-1867 ⁽³³⁾
C	III	A-8	D-8	DB1	-----	-----
D	IV	A-8	D-8	DB1	Dec. 90	BAW-2125 ⁽³⁴⁾
					Oct. 93	BAW-2208 ⁽³⁵⁾
E	III	A-8	D-8	DB1	-----	-----
F	IV	A-8	D-8	DB1	Jan. 82	BAW-1701 ⁽³⁶⁾
					Mar. 82	BAW-1719 ⁽³⁷⁾

^(a) Refer to BAW-1543, Revision 4, Appendix A.

^(b) Refer to BAW-1543, Revision 4, Appendix D.

**Table II. Westinghouse Plant-Specific Reactor Vessel
Surveillance Program - Detailed Summary**

Capsule	Type	Table of Material Specifications ^(a)	Table of Capsule Specifications ^(b)	Report Date	Report
Point Beach Unit 1 WCAP-7513 ⁽³⁸⁾					
N	IV	A-10	D-10	----	----
P	IV	A-10	D-10	----	----
R	III	A-10	D-10	Aug. 78	WCAP-9357 ⁽³⁹⁾
S	IV	A-10	D-10	Nov. 76	WCAP-8739 ⁽⁴⁰⁾
T	III	A-10	D-10	Dec. 84	WCAP-10736 ⁽⁴¹⁾
V	III	A-10	D-10	Jun. 73	BCL Report ⁽⁴²⁾
Point Beach Unit 2 WCAP-7712 ⁽⁴³⁾					
N	IV	A-11	D-11	----	----
P	IV	A-11	D-11	----	----
R	V	A-11	D-11	Dec. 79	WCAP-9635 ⁽⁴⁴⁾
S	V	A-11	D-11	Aug. 91	BAW-2140 ⁽⁴⁵⁾
T	IV	A-11	D-11	Aug. 78	WCAP-9331 ⁽⁴⁶⁾
V	V	A-11	D-11	Jun. 75	BCL Report ⁽⁴⁷⁾
Suppl.	Suppl.	(c)	(c)	Jan. 03	ATI -021-030-2003-1 ⁽⁷⁶⁾
Surry Unit 1 WCAP-7723 ⁽⁴⁸⁾					
S	VI	A-12	D-12	----	----
T	VII	A-12	D-12	Jun. 75	BCL Report ⁽⁴⁹⁾
U	VI	A-12	D-12	----	----
V	VII	A-12	D-12	Feb. 87	WCAP-11415 ⁽⁵⁰⁾
W	VI	A-12	D-12	Mar. 79	BCL-585-8R ⁽⁵¹⁾
X	VII	A-12	D-12	Apr. 98	BAW-2324 ⁽⁵²⁾
Y	VI	A-12	D-12	----	----
Z	VII	A-12	D-12	----	----

^(a) Refer to BAW-1543, Revision 4, Appendix A.

^(b) Refer to BAW-1543, Revision 4, Appendix D.

^(c) This Westinghouse designed capsule contains Charpy, compact fracture toughness and tensile specimens fabricated from Linde 80 welds SA-1101 (Heat 71249), WF-67 (Heat 72442), and WF-182-1 (Heat 821T44).

**Table II (cont'd). Westinghouse Plant-Specific Reactor Vessel
Surveillance Program - Detailed Summary**

Capsule	Type	Table of Material Specifications ^(a)	Table of Capsule Specifications ^(b)	Report Date	Report
Surry Unit 2 WCAP-8085 ⁽⁵³⁾					
S	VIII	A-13	D-13	Dec. 96	WCAP-14810 ⁽⁵⁴⁾
T	VIII	A-13	D-13	----	----
U	VIII	A-13	D-13	----	----
V	VIII	A-13	D-13	Jun. 87	WCAP-11499 ⁽⁵⁵⁾
W	VIII	A-13	D-13	Feb. 81	BCL-585-026 ⁽⁵⁶⁾
X	VIII	A-13	D-13	Sept. 75	BCL Report ⁽⁵⁷⁾
Y	IX	A-13	D-13	Feb. 03	WCAP-16001 ⁽⁷⁹⁾
Z	IX	A-13	D-13	----	----
Turkey Point Unit 3 WCAP-7656 ⁽⁵⁸⁾					
S	VI	A-14	D-14	May 79	SwRI-02-5131 ⁽⁵⁹⁾
T	VII	A-14	D-14	Dec. 75	WCAP-8631 ⁽⁶⁰⁾
U	VI	A-14	D-14	----	----
V	VII	A-14	D-14	Aug. 86	SwRI-06-8575 ⁽⁶¹⁾
W	VI	A-14	D-14	----	----
X	VII	A-14	D-14	Sept. 02	WCAP-15916 ⁽⁷⁵⁾
Y	VI	A-14	D-14	----	----
Z	VI	A-14	D-14	----	----
Turkey Point Unit 4 WCAP-7660 ⁽⁶²⁾					
S	VI	A-15	D-15	May 79	SwRI-02-5380 ⁽⁵⁹⁾
T	VII	A-15	D-15	Jun. 76	SwRI-02-4221 ⁽⁶³⁾
U	VI	A-15	D-15	----	----
V	VII	A-15	D-15	----	----
W	VI	A-15	D-15	----	----
X	VII	A-15	D-15	----	----
Y	VI	A-15	D-15	----	----
Z	VI	A-15	D-15	----	----

^(a) Refer to BAW-1543, Revision 4, Appendix A.

^(b) Refer to BAW-1543, Revision 4, Appendix D.

**Table III. Capsule Insertion and Withdrawal Schedule
for Crystal River Unit 3**

Holder Tube	Location in Holder Tube	Insert	Withdraw	Capsule Status ^(a)
Installed at Initial Fuel Load				
XW	Top	CR3-B (WC ^(b))		
XW	Bottom	CR3-D (WC)		
End of First Fuel Cycle (1A)				
WZ	Top	CR3-LG1 (WC)	CR3-B (WC)	Tested
WZ	Bottom	CR3-LG2 (WC)		
ZY	Top	CR3-C (W ^(c))		
ZY	Bottom	CR3-A (W)		
YZ	Top	OC2-A (W)		
YZ	Bottom	OC1-A (W)		
YX	Top	OC2-E (W)		
YX	Bottom	OC3-D (W)		
XW	Top	CR3-E (W)		
WX	Top	OC3-B (W)		
WX	Bottom	CR3-F (WC)		
End of First Fuel Cycle (1B)				
No changes.				
End of Second Fuel Cycle				
YZ	Top	OC1-C (W)	OC2-A (W)	Tested
WX	Top	TMI1-C (W)	OC3-B (W)	Tested
End of Third Fuel Cycle				
No changes.				
End of Fourth Fuel Cycle				
YZ	Bottom	OC1-B	OC1-A (W)	Tested
WZ	Top	None	CR3-LG1 (WC)	Tested
WZ	Bottom	None	CR3-LG2 (WC) (WZ now empty)	Tested

**Table III (cont'd). Capsule Insertion and Withdrawal Schedule
for Crystal River Unit 3**

Holder Tube	Location in Holder Tube	Insert	Withdraw	Capsule Status ^(a)
End of Fifth Fuel Cycle				
WX	Top	OC3-C (W)	TMI1-C (W)	Tested
XW	Bottom	TMI1-B	CR3-D (WC)	Tested
ZY	Top	OC3-F (W)	CR3-C (W)	Tested
WZ	Top	OC2-B	None	
WZ	Bottom	CR3-LG2 (WC) (WZ no longer empty)	None	
End of Sixth Fuel Cycle				
YX	Top	TMI2-D ^(d)	OC2-E (W)	Tested
WX	Bottom	TMI1-F	CR3-F (WC)	Tested
YZ	Top	TMI2-LG1 (WC)	OC1-C (W)	Tested
YZ	Bottom	TMI2-LG2 (WC)	OC1-B	1
End of Seventh Fuel Cycle				
XW	Bottom	TMI2-D ^(d) from YX top	TMI1-B	1
YX	Top	A2 (WC)	TMI2-D ^(d) to XW bottom	---
YX	Bottom	A4 (WC)	OC3-D (W)	Tested
WZ	Top	OC3-E (W)	OC2-B	1
End of Eighth Fuel Cycle				
ZY	Bottom	OC1-D	CR3-A (W)	2
XW	Top	None	CR3-E (W)	2
XW	Bottom	None	TMI2-D ^(d) (XW now empty)	---
WX	Top	OC2-F	OC3-C (W)	2
WX	Bottom	TMI1-D	TMI1-F	1
End of Ninth Fuel Cycle				
YZ	Top	OC2-D	TMI2-LG1 (WC)	Tested
WZ	Bottom	TMI2-D ^(d)	CR3-LG2 (WC)	Tested
End of Tenth Fuel Cycle				
No changes.				
End of Eleventh Fuel Cycle				
WX	Top	None	OC2-F	2
WX	Bottom	None	TMI1-D (WX now empty)	2

**Table III (cont'd). Capsule Insertion and Withdrawal Schedule
for Crystal River Unit 3**

Holder Tube	Location in Holder Tube	Insert	Withdraw	Capsule Status ^(a)
End of Twelfth Fuel Cycle				
YZ	Top	None	OC2-D	2
YZ	Bottom	None	TM12-LG2 (WC) (YZ now empty)	3
WZ	Top	None	OC3-E (W)	2
WZ	Bottom	None	TM12-D ^(d) (WZ now empty)	2
End of Thirteenth through Sixteenth Fuel Cycles				
No changes.				
End of Seventeenth Fuel Cycle				
YX	Top	None	A2 (WC)	4
YX	Bottom	None	A4 (WC) (YX now empty)	4
Withdrawal Not Planned				
ZY	Top	None	OC3-F (W)	2
ZY	Bottom	None	OC1-D	2

- (a) 1 = Capsule has been disposed of in accordance with Reference 2.
 2 = Capsule will be disposed of at the convenience of the B&WOG in accordance with Reference 2.
 3 = Capsule removed, specimens will be tested, dosimetry evaluated, and thermal monitors evaluated.
 4 = Capsule to be removed, specimens will be tested, dosimetry evaluated, and thermal monitors evaluated.
- (b) (WC) = Capsule contains weld metal and compact fracture toughness specimens.
- (c) (W) = Capsule contains weld metal specimens.
- (d) Dummy capsule.

**Table IV. Capsule Insertion and Withdrawal Schedule
for Davis-Besse**

Holder Tube	Location in Holder Tube	Insert	Withdraw	Capsule Status ^(a)
Installed at Initial Fuel Load				
WZ	Top	AN1-B		
WZ	Bottom	RS1-B (WC ^(b))		
ZY	Top	TE1-B (WC)		
ZY	Bottom	TE1-F (WC)		
YZ	Top	AN1-A (W ^(c))		
YZ	Bottom	AN1-C (W)		
YX	Top	RS1-D (WC)		
YX	Bottom	TE1-C (W)		
XW	Top	TE1-D (WC)		
XW	Bottom	RS1-C (W)		
WX	Top	TE1-A (W)		
WX	Bottom	RS1-F (WC)		
End of First Fuel Cycle				
WZ	Top	DB1-LG1 (WC)	AN1-B	Tested
WZ	Bottom	RS1-E (W)	RS1-B (WC)	Tested
ZY	Bottom	DB1-LG2 (WC)	TE1-F (WC)	Tested
End of Second Fuel Cycle				
YX	Top	RS1-A (W)	RS1-D (WC)	Tested
End of Third Fuel Cycle				
YZ	Top	AN1-D	AN1-A (W)	Tested
ZY	Top	TE1-E (W)	TE1-B (WC)	Tested
End of Fourth Fuel Cycle				
YX	Top	AN1-F	RS1-A (W)	2
WZ	Top	RS1-F from WX bottom	DB1-LG1 (WC)	Tested
WX	Top	None	TE1-A (W)	Tested
WX	Bottom	None	RS1-F to WZ top (WX now empty)	---
End of Fifth Fuel Cycle				
WZ	Top	None	RS1-F (WC)	Tested
WZ	Bottom	None	RS1-E (W) (WZ now empty)	2
YZ	Top	TMI2-C ^(d)	AN1-D to XW bottom	---
YZ	Bottom	TMI2-E ^(d)	AN1-C (W)	Tested
XW	Bottom	AN1-D from YZ top	RS1-C (W)	2

**Table IV (cont'd). Capsule Insertion and Withdrawal Schedule
for Davis-Besse**

Holder Tube	Location in Holder Tube	Insert	Withdraw	Capsule Status ^(a)
End of Sixth Fuel Cycle				
XW	Top	None	TE1-D (WC)	Tested 1
XW	Bottom	None	AN1-D (XW now empty)	
YZ	Top	A3 (WC)	TMI2-C ^(d)	---
YZ	Bottom	A1 (WC)	TMI2-E ^(d)	---
WZ	Top	L2 (WC)		
WZ	Bottom	L1 (WC)		
End of Seventh Fuel Cycle				
YX	Top	EPRI Capsule ^(d)	AN1-F	1
YX	Bottom	A5	TE1-C (W)	2
WX	Top	IBSP-2 ^(d)		
WX	Bottom	IBSP-1 ^(d) (WX no longer empty)		
End of Eighth through Tenth Fuel Cycles				
No changes.				
End of Eleventh Fuel Cycle				
ZY	Top	None	TE1-E (W)	2
ZY	Bottom	None	DB1-LG2 (WC) (ZY now empty)	4
YX	Top	None	EPRI Capsule ^(d)	---
YX	Bottom	None	A5 (WC) (YX now empty)	Tested
End of Twelfth Fuel Cycle				
YZ	Top	Dummy-L2 (WC)	A3 (WC)	Tested
WZ	Top	None	L2 (WC) to YZ top	---
WZ	Bottom	None	L1 (WC) (WZ now empty)	Tested
WX	Top	None	IBSP-2 ^(d)	---
WX	Bottom	None	IBSP-1 ^(d) (WX now empty)	---
End of Thirteenth through Sixteenth Fuel Cycles				
No changes.				

**Table IV (cont'd). Capsule Insertion and Withdrawal Schedule
for Davis-Besse**

Holder Tube	Location in Holder Tube	Insert	Withdraw	Capsule Status ^(a)
End of Seventeenth Fuel Cycle				
YZ	Top	None	Dummy-L2 (WC)	2
YZ	Bottom	None	A1 (WC) (all holder tubes empty)	3

- (a) 1 = Capsule has been disposed of in accordance with Reference 2.
 2 = Capsule will be disposed of in accordance with Reference 2.
 3 = Capsule to be removed, specimens will be tested, dosimetry evaluated, and thermal monitors evaluated.
 4 = Testing in Progress.
- (b) (WC) = Capsule contains weld metal and compact fracture toughness specimens.
- (c) (W) = Capsule contains weld metal specimens.
- (d) Not part of the B&WOG MIRVP.

Table V. Capsule Insertion and Withdrawal Schedule for the Westinghouse Plant-Specific RVSPs

Nuclear Plant	Capsule Location ^(a)	Capsule Identification ^(b)	Insert	Withdraw	Capsule Status ^(c)
Point Beach Unit 1	13°	V (WC)	----	EOC-1	Tested
	13°	R (WC)	----	EOC-5	Tested
	23°	T (WC)	----	EOC-11	Tested
	33°	S (W)	----	EOC-3	Tested
	23°	P (W)	----	EOC-21	Removed/Stored
	33°	N (W)	----	EOL	2, 4, 5
Point Beach Unit 2	13°	V (WC)	----	EOC-1	Tested
	13°	R (WC)	----	EOC-5	Tested
	23°	T (W)	----	EOC-3	Tested
	33°	S (WC)	----	EOC-16	Tested
	23°	P (W)	----	EOC-22	Removed/Stored
	33°	N (W)	----	EOL	2, 4, 5
	13°	Suppl. (W)	EOC-25	EOC-33	1
Surry Unit 1	15°	T (WC)	----	EOC-1	Tested
	15°	V (WC)	----	EOC-8	Tested
	35°	W	----	EOC-4	Tested ^(d)
	25°	S	----	EOL	2, 4
	25°	X (WC)	----	EOC-12	----
	15°	X (WC)	EOC-12	EOC-14	Tested
	25°	Z (WC)	----	EOC-12	3a
	15°	Z (WC)	EOC-12	EOL	2, 4, 5
	35°	Y	----	EOC-14	3b
	15°	Y	EOC-14	EOL	4, 5
	45°	U	-----	EOC-12	3a
	25°	U	EOC-12	EOL	4, 5
Surry Unit 2	15°	X (W)	----	EOC-1	Tested
	15°	V (W)	----	EOC-8	Tested
	25°	W (W)	----	EOC-4	Tested ^(d)
	25°	Y (WC)	----	EOC-12	----
	15°	Y (WC)	EOC-12	EOC-17	Tested
	25°	U (W)	----	EOC-22	2, 5
	35°	Z (WC)	----	EOC-12	3a
	25°	Z (WC)	EOC-12	EOL	4, 5
	35°	T (W)	----	EOC-17	3b
	15°	T (W)	EOC-17	EOL	4, 5
	45°	S (W)	----	EOC-13	6
	15°	W1 (WC) ^(e)	EOC-10	EOC-14	Tested

**Table V (cont'd). Capsule Insertion and Withdrawal Schedule for
the Westinghouse Plant-Specific RVSPs**

Nuclear Plant	Capsule Location ^(a)	Capsule Identification ^(b)	Insert	Withdraw	Capsule Status ^(c)
Turkey Point Unit 3	0°	T (WC)	----	EOC-1	Tested
	10°	S	----	EOC-4	Tested
	20°	V (WC)	----	EOC-9	Tested
	0°	X (WC)	----	EOC-21	Tested
	30°	U	----	EOLEx	7
	30°	Y	----	EOLEx	7
	40°	W	----	EOLEx	7
	40°	Z	----	EOLEx	7
Turkey Point Unit 4	0°	T (WC)	----	EOC-1	Tested
	10°	S	----	EOC-3	Tested
	0°	X (WC)	----	EOC-27	1
	20°	V (WC)	----	EOL	8
	30°	U	----	EOLEx	7
	30°	Y	----	EOLEx	7
	40°	W	----	EOLEx	7
	40°	Z	----	EOLEx	7

Notes:

- (a) Capsule locations are relative with regard to quadrant; e.g., 0° is equivalent to 90°, 180°, or 270°.
- (b) W = Capsule contains weld metal specimens.
WC = Capsule contains weld metal and WOL specimens.
- (c) 1 = Capsule to be removed, specimens will be tested, dosimetry evaluated, and thermal monitors evaluated.
2 = Capsule to be removed and placed in storage. Dosimetry may be evaluated at this time.
3a = Capsule reinserted in higher lead factor location.
3b = Capsule to be reinserted in higher lead factor location.
4 = Capsule to be maintained in location to EOL.
5 = Standby capsule to be removed at 1-2 times the vessel EOL fluence.
6 = Capsule was evaluated for dosimetry and placed in storage.
7 = The last capsule will not be withdrawn prior to the 55th year.
8 = Standby EOL capsule, as needed.
- (d) Only dosimetry was evaluated.
- (e) HUPCAP, not a plant-specific capsule.

Table VI. Summary Status of the B&W Surveillance Capsules

Capsule ID	Capsule Contents		Status/ Location	Fluence, n/cm ² (x10 ¹⁹)		Time of Removal	Comments
	Weld Metal	Fracture Toughness Specimens		Target	Expected/Received		
OC1-F	---	---	Tested	----	0.057	----	Reported in BAW-1421, Rev. 1 ⁽⁹⁾ ; fluence corrected in BAW-1436 ⁽⁸⁾
OC1-E	X	---	Tested	----	0.150	----	Reported in BAW-1436 ⁽⁸⁾
OC1-B	---	---	Removed	----	0.700 ^(a)	----	Has been disposed ⁽²⁾
OC1-A	X	---	Tested	----	0.895	----	Reported in BAW-1837 ⁽⁶⁾
OC1-C	X	---	Tested	----	0.986	----	Reported in BAW-2050 ⁽⁷⁾
OC1-D	---	---	CR3-ZY	N/A	1.163 ^(b)	Not Planned	Disposal at convenience of B&WOG ⁽²⁾
OC2-C	X	---	Tested	----	0.102 ^(c)	----	Reported in BAW-1437 ⁽¹¹⁾
OC2-A	X	---	Tested	----	0.337	----	Reported in BAW-1699 ⁽¹⁰⁾
OC2-B	---	---	Removed	----	0.562 ^(d)	----	Has been disposed ⁽²⁾
OC2-E	X	---	Tested	----	1.210	----	Reported in BAW-2051 ⁽¹²⁾
OC2-D	---	---	Removed	----	0.803 ^(b)	----	Will be disposed ⁽²⁾
OC2-F	---	---	Removed	----	0.803 ^(b)	----	Will be disposed ⁽²⁾
OC3-A	X	---	Tested	----	0.081 ^(c)	----	Reported in BAW-1438 ⁽¹⁴⁾
OC3-B	X	---	Tested	----	0.312	----	Reported in BAW-1697 ⁽¹⁵⁾
OC3-C	X	---	Removed	----	0.783 ^(b)	----	Will be disposed ⁽²⁾
OC3-D	X	---	Tested	----	1.45	----	Reported in BAW-2128, Rev. 1 ⁽¹⁶⁾
OC3-E	X	---	Removed	----	1.262 ^(b)	----	Will be disposed ⁽²⁾
OC3-F	X	---	CR3-ZY	N/A	1.723 ^(b)	Not Planned	Disposal at convenience of B&WOG ⁽²⁾
TMI1-E	X	---	Tested	----	0.107	----	Reported in BAW-1439 ⁽¹⁹⁾
TMI1-B	---	---	Removed	----	0.444 ^(d)	----	Has been disposed ⁽²⁾
TMI1-C	X	---	Tested	----	0.882 ^(e)	----	Reported in BAW-1901 ⁽¹⁸⁾
TMI1-A	X	---	Removed	----	Unknown	----	Held in storage - reported in BAW-2042 ⁽¹⁷⁾
TMI1-D	---	---	Removed	----	0.816 ^(b)	----	Will be disposed ⁽²⁾
TMI1-F	---	---	Removed	----	0.631 ^(b)	----	Has been disposed ⁽²⁾

Table VI (cont'd). Summary Status of the B&W Surveillance Capsules

Capsule ID	Capsule Contents		Status/ Location	Fluence, n/cm ² (x10 ¹⁹)		Time of Removal	Comments
	Weld Metal	Fracture Toughness Specimens		Target	Expected/Received		
CR3-B	X	X	Tested	-----	0.117	-----	Reported in BAW-1679, Rev. 1 ⁽²⁰⁾ and BAW-1718 ⁽²¹⁾
CR3-C	X	---	Tested	-----	0.656	-----	Reported in BAW-1898 ⁽²²⁾
CR3-D	X	X	Tested	-----	0.750	-----	Reported in BAW-1899 ⁽²³⁾ and BAW-1914 ⁽²⁴⁾
CR3-F	X	X	Tested	-----	1.08	-----	Reported in BAW-2049 ⁽²⁵⁾ and BAW-2172 ⁽²⁶⁾
CR3-A	X	---	Removed	-----	1.240 ^(b)	-----	Will be disposed ⁽²⁾
CR3-E	X	---	Removed	-----	1.240 ^(b)	-----	Will be disposed ⁽²⁾
AN1-E	X	---	Tested	-----	0.0727	-----	Reported in BAW-1440 ⁽³⁰⁾
AN1-B	---	---	Tested	-----	0.428	-----	Reported in BAW-1698 ⁽²⁸⁾
AN1-A	X	---	Tested	-----	1.03	-----	Reported in BAW-1836 ⁽²⁷⁾
AN1-C	X	---	Tested	-----	1.46	-----	Reported in BAW-2075, Rev. 1 ⁽²⁹⁾
AN1-D	---	---	Removed	-----	0.760 ^(d)	-----	Has been disposed ⁽²⁾
AN1-F	---	---	Removed	-----	0.783 ^(b)	-----	Has been disposed ⁽²⁾
TE1-F	X	X	Tested	-----	0.196	-----	Reported in BAW-1701 ⁽³⁶⁾ and BAW-1719 ⁽³⁷⁾
TE1-B	X	X	Tested	-----	0.592	-----	Reported in BAW-1834 ⁽³²⁾ and BAW-1867 ⁽³³⁾
TE1-A	X	---	Tested	-----	1.29	-----	Reported in BAW-1882, Rev. 1 ⁽³¹⁾
TE1-D	X	X	Tested	-----	0.962	-----	Reported in BAW-2125 ⁽³⁴⁾ and BAW-2208 ⁽³⁵⁾
TE1-C	X	---	Removed	-----	1.593 ^(d)	-----	Will be disposed ⁽²⁾
TE1-E	X	---	Removed	-----	1.267 ^(b)	-----	Will be disposed ⁽²⁾

Table VI (cont'd). Summary Status of the B&W Surveillance Capsules

Capsule ID	Capsule Contents		Status/ Location	Fluence, n/cm ² (x10 ¹⁹)		Time of Removal	Comments
	Weld Metal	Fracture Toughness Specimens		Target	Expected/Received		
CR3-LG1	X	X	Tested	-----	0.500-0.779	-----	Reported in BAW-1910P ⁽⁶⁴⁾
CR3-LG2	X	X	Tested	-----	1.19-1.95	-----	Reported in BAW-2254P ⁽⁶⁵⁾
DB1-LG1	X	X	Tested	----	0.661-1.03	-----	Reported in BAW-1920P ⁽⁶⁶⁾
DB1-LG2	X	X	Removed	-----	1.621 ^(b)	-----	Testing in Progress.
TM12-LG1	X	X	Tested	-----	0.585-0.992	-----	Reported in BAW-2253P ⁽⁶⁷⁾
TM12-LG2	X	X	Removed	-----	1.520 ^(b)	-----	Currently being tested and evaluated.
A1	X	X	DB1-YZ	3.000	2.441 ^(b)	End of Cycle 17	-----
A2	X	X	CR3-YX	3.000	2.370 ^(b)	End of Cycle 17	-----
A3	X	X	Tested	-----	1.166	-----	Reported in BAW-2412 ⁽⁶⁸⁾
A4	X	X	CR3-YX	3.000	2.370 ^(b)	End of Cycle 17	-----
A5	X	X	Tested	-----	0.637-1.042	-----	Reported in BAW-2360P ⁽⁶⁹⁾
L1	X	X	Tested	-----	1.26	-----	Reported in BAW 2400 ⁽⁷⁰⁾
L2	X	X	DB1-YZ	1.700	2.441 ^(b)	End of Cycle 17	-----

(a) BAW-1543, Revision 3⁽³⁾(b) BAW-2108, Revision 1⁽⁷¹⁾(c) NUREG CR-4816, Volumes 1 & 2⁽⁷²⁾(d) BAW-2108⁽⁷³⁾(e) Fluence revised in 86-5021026-01⁽⁷⁷⁾

Table VII. Summary Status of the Westinghouse Surveillance Capsules

Capsule ID	Capsule Contents		Status/ Location ^(a)	Fluence, n/cm ² (x10 ¹⁹)		Time of Removal	Comments
	Weld Metal	Fracture Toughness Specimens		Target	Expected		
PB1-N	X	X	33°	4.500	4.500	End of Life	Standby
PB1-P	X	---	Removed	----	----	----	Held in Storage
PB1-R	X	X	Tested	----	----	----	Reported in WCAP-9357 ⁽³⁹⁾
PB1-S	X	---	Tested	----	----	----	Reported in WCAP-8739 ⁽⁴⁰⁾
PB1-T	X	X	Tested	----	----	----	Reported in WCAP-10736 ⁽⁴¹⁾
PB1-V	X	X	Tested	----	----	----	Reported in BCL report dated 6/73 ⁽⁴²⁾
Suppl.	X	X	13°	4.988	4.988	End of Cycle 33	Supplemental
PB2-N	X	---	33°	5.000	5.000	End of Life	Standby
PB2-P	X	---	Removed	----	----	----	Held in storage
PB2-R	X	X	Tested	----	----	----	Reported in WCAP-9635 ⁽⁴⁴⁾
PB2-S	X	X	Tested	----	----	----	Reported in BAW-2140 ⁽⁴⁵⁾
PB2-T	X	---	Tested	----	----	----	Reported in WCAP-9331 ⁽⁴⁶⁾
PB2-V	X	X	Tested	----	----	----	Reported on BCL report dated 6/75 ⁽⁴⁷⁾
S1-S	---	---	25°	3.900	3.900	Remain for Lifex	Standby ^(b)
S1-T	X	X	Tested	----	----	----	Reported in BCL reported dated 6/75 ⁽⁴⁹⁾ (d)
S1-U	---	---	45°/25°	3.000	3.000	Remain for Lifex	Standby, transferred to 25° at EOC-12
S1-V	X	X	Tested	----	----	----	Reported in WCAP-11415 ⁽⁵⁰⁾ (d)
S1-W	---	---	Dosimetry	----	----	----	Reported in BCL-585-8R ⁽⁵¹⁾
S1-X	X	X	Tested	----	----	----	Reported in BAW-2324 ⁽⁵²⁾
S1-Y	---	---	35°	4.300	4.300	Remain for Lifex	Standby, transferred to 15° at EOC-14
S1-Z	X	X	25°/15°	5.200	5.200	End of Life	Standby, transferred to 15° at EOC-12

Table VII (cont'd). Summary Status of the Westinghouse Surveillance Capsules

Capsule ID	Capsule Contents		Status/ Location ^(a)	Fluence, n/cm ² (x10 ¹⁹)		Time of Removal	Comments
	Weld Metal	Fracture Toughness Specimens		Target	Expected		
S2-S	X	---	Dosimetry	----	----	----	Evaluated for dosimetry only. Results reported in WCAP-14810 ⁽⁵⁴⁾
S2-T	X	---	35°	3.800	3.800	End of Life	Standby, transfer to 15° at EOC-17
S2-U	X	---	25°	3.600	3.600	End of Cycle 22	Standby
S2-V	X	---	Tested	----	----	----	Reported in WCAP-11499 ⁽⁵⁵⁾
S2-W	X	---	Dosimetry	----	----	----	Reported in BCL-585-026 ⁽⁵⁶⁾
S2-X	X	---	Tested	----	----	----	Reported in BCL report dated 9/75 ⁽⁵⁷⁾
S2-Y	X	X	Tested	----	----	----	Reported in WCAP-16001 ⁽⁷⁹⁾
S2-Z	X	X	35°/25°	3.400	3.400	Remain for Lifex	Standby, transferred to 25° at EOC-12
S2-W1	X	X	Tested	----	----	----	Reported in BAW-2350P ⁽⁷⁴⁾
TP3-S	---	---	Tested	----	----	----	Reported in SwRI-02-5131 ⁽⁵⁹⁾
TP3-T	X	X	Tested	----	----	----	Reported in WCAP-8631 ⁽⁶⁰⁾
TP3-U	---	---	30°	----	----	End of Lifex	Standby ^(c)
TP3-V	X	X	Tested	----	----	----	Reported in SwRI-06-8575 ⁽⁶¹⁾
TP3-W	---	---	40°	----	----	End of Lifex	Standby ^(c)
TP3-X	X	X	Tested	----	----	----	Reported in WCAP-15916 ⁽⁷⁵⁾
TP3-Y	---	---	30°	----	----	End of Lifex	Standby ^(c)
TP3-Z	---	---	40°	----	----	End of Lifex	Standby ^(c)
TP4-S	---	---	Tested	----	----	----	Reported in SwRI-02-5380 ⁽⁵⁹⁾
TP4-T	X	X	Tested	----	----	----	Reported in SwRI-02-4221 ⁽⁶³⁾
TP4-U	---	---	30°	----	----	End of Lifex	Standby ^(c)
TP4-V	X	X	20°	----	----	End of Life	Standby
TP4-W	---	---	40°	----	----	End of Lifex	Standby ^(c)
TP4-X	X	X	0°	3.850	3.850	End of Cycle 27	Standby
TP4-Y	---	---	30°	----	----	End of Lifex	Standby ^(c)
TP4-Z	---	---	40°	----	----	End of Lifex	Standby ^(c)

^(a) All locations are relative with regard to quadrant; e.g., 0° is equivalent to 90°, 180°, or 270°.

^(b) To be withdrawn at EOC-17 if cavity dosimetry is not installed.

^(c) The last capsule will not be withdrawn prior to the 55th year.

^(d) Fluence revised in 86-5020802-01⁽⁷⁸⁾

Table VIII. Comparison of the Plant-Specific Surveillance Capsules with ASTM E 185 Requirements

Plant	ASTM E 185-82 5 Capsule Program Requirement				
	1.5 EFPY or Fluence > 5E18 $\Delta RT_{NDT} \approx 50^\circ F$	3 EFPY or Fluence Midway Between First and Third Capsule	6 EFPY or T/4 EOL Fluence	15 EFPY or IS EOL Fluence	EOL or 1-2 Times EOL Fluence (Capsule may be held w/o testing)
Oconee-1	F-I/T	(a)	E-I/T	A-I/T	C-I/T
Oconee-2	C-I/T	A-I/T	TMI2-LG1-I/T	E-I/T	A5-I/T
Oconee-3	A-I/T	B-I/T	L1-I/T	D-I/T	CR3-LG2-I/T
TMI-1	E-I/T	W1-I/T	CR3-LG1-I/T	C-I/T	TMI2-LG2-I/T
Crystal River-3	B-I/T	(a)	C-I/T	D-I/T	F-I/T
ANO-1	E-I/T	(a)	B-I/T	A-I/T	C-I/T
Davis-Besse	F-I/T	(a)	B-I/T	D-I/T	A-I/T
Point Beach-1	V-I/T	S-I/T	T-I/T	R-I/T	P-I/NT
Point Beach-2	V-I/T	T-I/T	R-I/T	S-I/T	P-I/NT
Surry-1	T-I/T	W-I/T ^(b)	V-I/T	X-I/T	S,U-R
Surry-2	X-I/T	W-I/T ^(b)	V-I/T	Y-I/T	S-I/T ^(b) ;T-R
Turkey Point-3	T-I/T	V-I/T	S-I/T	X-I/T	U,W-R
Turkey Point-4	T-I/T	S-I/T	X-R	V-R	U,W-R

Legend: I/T = Irradiated and tested

I/NT = Irradiated and not tested

R = In reactor

^(a) Only 4 capsules required per ASTM E185-82.

^(b) Only dosimetry evaluated.

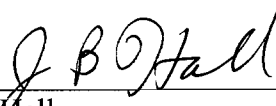
Table IX. Peak End-of-Life Inside Surface Fluences and Significant Licensing Dates

Plant	Date Construction Permit Issued	Date Operating License Issued	License Expiration	Peak EOL IS Fluence, n/cm ² (E > 1 MeV)
Oconee-1	November 6, 1967	February 6, 1973	February 5, 2033 ^(a)	1.31E+19
Oconee-2	November 6, 1967	October 6, 1973	October 5, 2033 ^(a)	1.28E+19
Oconee-3	November 6, 1967	July 19, 1974	July 18, 2034 ^(a)	1.26E+19
TMI-1	May 18, 1968	April 19, 1974	April 19, 2014	8.16E+18
Crystal River-3	September 25, 1968	December 3, 1976	December 2, 2016	8.03E+18
ANO-1	December 6, 1968	May 21, 1974	May 20, 2034 ^(a)	1.44E+19
Davis-Besse	March 24, 1971	April 22, 1977	April 22, 2017	1.07E+19
Point Beach-1	July 19, 1967	October 5, 1970	October 5, 2010	2.85E+19
Point Beach-2	July 25, 1968	March 8, 1973	January 7, 2013	3.12E+19
Surry-1	June 25, 1968	May 25, 1972	May 24, 2032 ^(a)	5.40E+19
Surry-2	June 25, 1968	January 29, 1973	January 28, 2033 ^(a)	5.34E+19
Turkey Point-3	April 27, 1967	July 19, 1972	July 19, 2032 ^(a)	4.50E+19
Turkey Point-4	April 27, 1967	April 10, 1973	April 10, 2033 ^(a)	4.50E+19

(a) Includes 20 year license renewal term.

2.0 CERTIFICATION

This supplement to BAW-1543, Revision 4, is an accurate description of the capsule irradiation plan for the Master Integrated Reactor Vessel Surveillance Program.




J. B. Hall
Materials and Structural Analysis Unit

6-30-05

Date

This report has been reviewed and is an accurate description of the revised master integrated reactor vessel surveillance program.

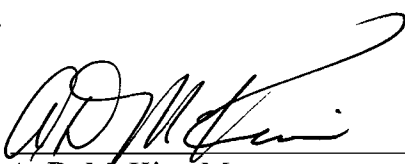


H. P. Gunawardane
Materials and Structural Analysis Unit

7/25/05

Date

Verification of independent review.




A. D. McKim, Manager
Materials and Structural Analysis Unit

7/25/2005

Date

This report has been approved for release.



W. R. Gray
Program Manager

7/28/02

Date

3.0 REFERENCES

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Summary of Change Pages

SUMMARY OF REVISIONS

Section	Description
Summary	Updated to reflect current revision.
Section 1	Included revision statement for Supplement 5 changes. References to changes made in Supplement 4 were deleted. <u>The last sentence on page 3 was deleted.</u>
Table II	Added Point Beach Unit 2 Supplemental Capsule. Updated status of Turkey Point Unit 3 Capsule X and Surry Unit 2 Capsule Y.
Table III	Changed “End of Thirteenth Fuel Cycle” to “Withdrawal Not Planned” for capsules OC1-D and OC3-F. Updated status of capsules slated for disposal.
Table IV	Updated status of capsules.
Table V	Added Point Beach Unit 2 Supplemental Capsule. Updated status of Turkey Point Unit 3 Capsule X and Surry Unit 2 Capsule Y. Corrected Surry Unit 2 Capsule Y final capsule location.
Table VI	Changed Time of Removal from “End of Cycle 13” to “Not Planned” for capsules OC1-D and OC3-F. Changed status of capsule DB1-LG2 to “Testing in progress” from “will be disposed.” Fluence was revised for TMI1-C.
Table VII	Added Point Beach Unit 2 Supplemental Capsule. Updated status of Turkey Point Unit 3 Capsule X and Surry Unit 2 Capsule Y.
Table VIII	Updated status of Turkey Point Unit 3 Capsule X and Surry Unit 2 Capsule Y. <u>Removed standby capsule column and changed capsules for the B&W designed plants to show compliance with ASTM E185 using only tested capsules.</u>
Table IX	Updated license expiration dates and Peak EOL fluence values to reflect license renewal approvals.

Table VIII shows the conformance of the RVWG member plant-specific surveillance programs to the requirements of ASTM E 185-82.⁽⁴⁾ Table VIII was revised by updating the status of capsule TP3-X.

Table IX lists licensing dates and anticipated reactor vessel peak end-of-life fluences. License expiration dates and Peak EOL fluence values were updated to reflect license renewal approvals. ~~The owners of plants that have been granted license renewal have made no commitments to test or use information from the capsules that continue to be irradiated under the MIRVP.~~

Table VIII. Comparison of the Plant-Specific Surveillance Capsules with ASTM E 185 Requirements

Plant	ASTM E 185-82 5 Capsule Program Requirement					
	1.5 EF PY or Fluence > 5E18 $\Delta RT_{NDT} \approx 50^\circ F$	3 EF PY or Fluence Midway Between First and Third Capsule	6 EF PY or T/4 EOL Fluence	15 EF PY or IS EOL Fluence	EOL or 1-2 Times EOL Fluence (Capsule may be held w/o testing)	Standby (1-2 Times IS EOL Fluence)
Oconee-1	F-I/T	(a) E-I/T	E X-I/T	A E -I/T	C B -I/NT	D -R
Oconee-2	C-I/T	A-I/T	TMI2-LG1 B -I/NT	E-I/T	A5 D -I/NT	F -I/NT
Oconee-3	A-I/T	B-I/T	L1 E -I/NT	D-I/T	CR3-LG2 E -I/NT	R -R
TMI-1	E-I/T	W1 E -I/T	CR3-LG1 A -I/NT	C D -I/NT	TMI2-LG2 A -I/NT	B -I/NT
Crystal River-3	B-I/T	(a) C -I/T	C D -I/T	D A -I/T	F A -I/NT	E -I/NT
ANO-1	E-I/T	(a) B -I/T	B A -I/T	A E -I/T	C D -I/NT	F -I/NT
Davis-Besse	F-I/T	(a) B -I/T	B A -I/T	D-I/T	A E -I/NT	E -I/NT
Point Beach-1	V-I/T	S-I/T	T-I/T	R-I/T	P-I/NT	N-R
Point Beach-2	V-I/T	T-I/T	R-I/T	S-I/T	P-I/NT	N-R
Surry-1	T-I/T	W-I/T (b)	V-I/T	X-I/T	S,U-R (b)	Y,Z-R
Surry-2	X-I/T	W-I/T (b)	V-I/T	Y-I/T	S-I/T*, T-R	U,Z-R
Turkey Point-3	T-I/T	V-I/T	S-I/T	X-I/T	U,W-R	Y,Z-R
Turkey Point-4	T-I/T	S-I/T	X-R	V-R	U,W-R	Y,Z-R

Legend: I/T = Irradiated and tested

I/NT = Irradiated and not tested

R = In reactor

(a) Only 4 capsules required per ASTM E 185-82.

(b) * Only dosimetry evaluated.