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RBG-46724

August 17, 2007

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: License Amendment Request
LAR 2007-10, One-time Extension of the Integrated Leak Rate Test Interval
River Bend Station, Unit 1
Docket No. 50-458
License No. NPF-47

REFERENCES:

1. License Amendment Request (LAR 2005-01) Dated March 8, 2005, for a One-time Extension of the Integrated Leak Rate Test Interval (TAC No. MC6328)

2. Supplement to Amendment Request LAR 2005-01 Dated January 17, 2006, for a One-time Extension of the Integrated Leak Rate Test Interval (TAC No. MC6328)

3. NRC Approval Dated February 9, 2006, of Additional Extension of Appendix J, Type A Integrated Leakage Rate Test Interval (TAC NO. MC6328 / Amendment 150).

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Entergy Operations, Inc. (Entergy) hereby requests an amendment for River Bend Station, Unit 1 (RBS) to administrative Technical Specification 5.5.13 regarding Containment Integrated Leak Rate Testing (ILRT). The change clarifies the statement that the ILRT Program is in accordance with Regulatory Guide 1.163 by noting an exception taken to the interval guidance in NEI 94-01, Revision 0. The effect of this change will be the allowance to extend the currently approved interval (Reference 3) by an additional four months, for performance of the next ILRT during the next scheduled refueling outage.

River Bend Station Technical Specification Section 5.5.13 requires that the next ILRT be conducted by December 14, 2007. The ILRT is currently planned for the next refuel outage (RF 14). The original scheduled start for RF 14 was October 14, 2007. The start date for RF 14 has been moved beyond December 14, 2007. A revision to the Technical Specifications is needed to permit the ILRT to be performed during this refueling outage. The reason for this extension request is to avoid the hardship of a plant shutdown that would be required for the

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conduct of the ILRT under the current Tech Spec requirement. The estimated duration of an additional outage to perform the ILRT prior to December 14, 2007, is seven days.

The RF 14 start date has been re-scheduled to allow for maintenance on key plant systems while online in the fall of 2007; and for planning of radiation source term dose reduction activites in RF 14. The need to perform this work was not recognized until recently. Moving the outage date will allow RBS to achieve improved reliability and have key equipment issues addressed upon restart from RF 14. Maintenance activities planned for prior to the refuel outage include significant improvements to plant's normal circulating water cooling towers and feed water system. Without this maintenance prior to the outage, these improvements in plant equipment reliability would not be realized until the next fuel cycle. The radiation source term dose reduction activities being planned for RF 14 are estimated to reduce radiation dose by approximately 185 person REM in RF 14. Without the additional time needed to plan these activities for RF 14, this dose savings would not be realized.

This request is made on a risk-informed basis as described in Regulatory Guide 1.174. This revision evaluates risk based on a test interval of 15 years, 8 months. The current interval approved by the NRC in Amendment 150 (Ref. 3) is 15 years, 4 months. The attached technical justification for this request provides a risk evaluation using a methodology that has been found acceptable for other similar requests.

The proposed change has been evaluated in accordance with 10 CFR 50.91(a)(1) using criteria in 10 CFR 50.92(c) and it has been determined that this change involves no significant hazards considerations.

The proposed change does not include any new commitments.

RBS has identified this change as affecting planning for the upcoming refueling outage and on that basis requests approval of this proposed change by December 13, 2007. Once approved, the amendment shall be implemented within 60 days. This request is similar to Reference 1 for RBS recently approved by the NRC in Reference 3. Although this request is neither exigent nor emergency, your prompt review is requested.

Attachment 1 contains the Analysis of Proposed Technical Specification Change with the 10 CFR 50.91(a)(1) evaluation, Attachment 2 contains information on the Containment Conditions and Attachment 3 contains a markup of the affected Technical Specification.

If you have any questions or require additional information, please contact Bill Brice at 601-368-5076.

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 17, 2007.

Sincerely,

Director, Nuclear Safety Assurance
River Bend Station - Unit 1

JCR/WBB

Attachments:

1. Analysis of Proposed Technical Specification Change
2. Containment Evaluation
3. Proposed Technical Specification Change

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bcc: File Nos.: G9.5, G9.42
RBF1-07-0148
RBG-46724

Attachment 1

RBG-46724

Analysis of Proposed Technical Specification Change

1.0 DESCRIPTION

This letter is a request to amend Operating License NPF-47 for River Bend Station Unit 1 (RBS).

The proposed change will revise the RBS Administrative Technical Specification for the Integrated Leak Rate Testing (ILRT) Program to add an exception to the commitment to follow the guidelines of Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program." The effect of this request will be a one-time extension of the interval since the last ILRT to 15 years and 8 months. This request is made for a one-time extension of the interval.

Prior to 2003, the frequency of the ILRT was 10 years. On March 5, 2003, RBS received approval of license amendment 131 which approved an extension of the ILRT due date frequency from 10 to 15 years. The due date with this amendment was August 14, 2007. RBS recognized a need for a second amendment to allow conduct of the ILRT in RF 14 with an October 2007, start date. A four month extension was requested from NRC, and approval was granted in Amendment 150 on February 9, 2006. This set the current due date for the ILRT at December 14, 2007. The primary reason for this extension was to allow the test to be conducted in RF 14. This outage was scheduled for a longer duration than RF 13 due to the need for a generator rewind in RF 14. With the rewind being the critical path, the ILRT would not have to be conducted on critical path. When this amendment was requested, a four month extension was requested to allow for some delay in the start of RF 14. However, based on the current scheduled start date for RF 14, this extension will no longer support performing the ILRT in RF 14.

2.0 PROPOSED CHANGE

The proposed change will revise the RBS Operating License to change Technical Specification 5.5.13 to modify the exception to the commitment to follow the guidelines of Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program." The exception is taken to the interval guidance in NEI 94-01, Revision 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR 50, Appendix J." The NEI document is endorsed in the regulatory guide. The effect of this request will be an extension of the test interval from 15 years and 4 months to 15 years and 8 months.

The ILRT is planned for the next refuel outage (RF 14). The original scheduled start date for RF 14 was October 14, 2007. The start date for RF 14 has been moved beyond December 14, 2007. A revision to the Technical Specifications is needed to change the required due date for the ILRT to coincide with the date of the refuel outage. The reason for this extension request is to avoid a plant shutdown that would be required for the conduct of the ILRT under the current Tech Spec requirement.

RBS proposes to revise TS 5.5.13 by revising the second sentence from:

> This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, except that the next Type A test performed after the August 15, 1992, Type A test shall be performed no later than December 14, 2007.
>
> to:
>
> This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, except that the next Type A test performed after the August 15, 1992, Type A test shall be performed no later than April 14, 2008.

Regulatory Guide 1.163 endorses NEI 94-01, Revision 0 (1995), which in turn references ANSI/ANS-56.8-1994, "Containment System Leakage Testing Requirements." However, as stated in NEI 94-01, the test intervals in ANSI/ANS 56.8-1994 are not performance-based. Therefore, licensees intending to comply with Option B in the amendment to Appendix J should establish test intervals based upon the criteria in NEI 94-01, rather than using the test intervals specified in ANSI/ANS-56.8-1994.

In summary, the proposed change would represent a one-time extension to the ILRT interval for an additional 4 months from the currently approved 15 years and 4 months.

3.0 BACKGROUND

RBS has applied for and received a one time extension to the ILRT test interval to 15 years. Subsequently, RBS applied for and received a similar one time extension to the Drywell Bypass Test (DWBT) test interval to 15 years. Following this, a similar request was made and granted for a one time extension to the ILRT test interval to 15 years 4 months. This submittal does not include the DWBT because the interval is adequate to do the test in conjunction with the ILRT in the desired outage. Because the previously submitted DWBT and ILRT analyses included both the ILRT and DWBT extensions, it was also used as the basis for this submittal. This submittal is a modification to the most recent submittal to account for an additional 4 months.

RBS is a General Electric Boiling Water Reactor (BWR) design plant. It is a BWR-6 with a Mark III containment. The Mark III containment consists of a drywell structure enclosed within the primary containment. The reinforced concrete cylindrical drywell structure houses the reactor system. The drywell is designed to divert the energy released during a design basis large break loss of coolant accident (LOCA). The drywell communicates with the primary containment through a series of horizontal vents in the drywell wall. The vents are covered both inside and outside the drywell by water from the annular shaped suppression pool. The pool forms a seal between the drywell and the primary containment.

The cylindrical, freestanding steel primary containment structure encloses the drywell and the suppression pool which fills the bottom 20 feet of the annular volume outside the drywell. The Primary Containment vessel is enveloped by an open annulus area and a concrete Shield Building. The Shield Building serves as a secondary containment, but has no pressure control function.

During a LOCA, blowdown from the reactor coolant system will uncover the drywell to containment vents allowing flow to the primary containment through the suppression pool water. The suppression pool serves as a heat sink for the energy released during a large break LOCA. The drywell contains the reactor coolant system and other high energy piping systems. The design is discussed further in Section 6.2 of the RBS Updated Final Safety Analysis Report (USAR).

ILRTs for BWR-6/Mark III plants have been required of operating nuclear plants to ensure the public health and safety in the event of an accident that would release radioactivity into the containment. Conservative design and construction practices have led to very few ILRTs exceeding their required acceptance criteria. The DWBT has been historically associated with the ILRT frequency because the plant line-ups are similar and the same equipment is used to perform both tests.

The NRC had previously allowed the extension of test frequency from three times in ten years to once in ten years based on performance. The changes were based for the most part on NUREG 1493, "Performance Based Containment Leak-Test Program," dated September 1995, the NUREG stated that an interval between ILRTs of up to twenty years would contribute an imperceptible increase in risk. Testing frequencies for the ILRT are performance-based as allowed by 10 CFR 50, Appendix J, Option B. The ILRT test interval at RBS has previously been extended on a one time basis to once in 15 years and 4 months as approved in amendment 150.

4.0 TECHNICAL ANALYSIS

An evaluation of extending the RBS DWBT surveillance frequency from once in 10 years to once in 15 years was performed using a slightly modified version of the method used by Grand Gulf Nuclear Station (GGNS) to support their DWBT one time extension. The GGNS evaluation was based on the ILRT methodologies previously accepted by the NRC. The RBS evaluation assumed that the DWBT frequency was being adjusted in conjunction with the ILRT frequency, which had already been extended to once in 15 years. Three cases (a base case and two sensitivity cases) were constructed for this analysis. The DWBT extension included the ILRT extension that had previously been approved by the Nuclear Regulatory commission (NRC). The subsequent ILRT request for a 15 years 4 months also included the DWBT extension as part of the analysis and used the same cases. These cases have been modified again to reflect an additional four months (for a total interval of 15 years 8 months) for both the ILRT and the DWBT. The case descriptions are provided in Section 4.3.2

This evaluation combined the risks associated with extending the test intervals of both the ILRT and the DWBT. The current evaluation is a modified version of that evaluation and recalculated the risks to account for an additional 4 months for a total of 15 years and 8 months for both the DWBT and the ILRT. This is conservative because no extension is needed for the DWBT. This was done to allow easy comparison of the numbers and allow for review of a document that is very similar to the previous submittal. The major changes are to the proposed interval Tables and the associated summaries.

A summary of the results from all cases is provided in Section 4.7. The comparisons of the three risk metrics used in this calculation (the total dose risk, Large Early Release Frequency (LERF) and Conditional Containment Failure Probability (CCFP)) are summarized in Tables 4.7-1 through 4.7-3.

4.1 Inputs and Assumptions

The following inputs and assumptions were used in this calculation:

4.1.1 PRA Model

The RBS Level 1, Revision 4, PRA model was used for this evaluation. Based on the RBS Level 1 PRA model, Revision 4 results, the baseline total Core Damage Frequency (CDF) value is 3.33E-6/yr at a truncation of 1E-13/yr.

The previous version of this calculation (Reference 3 of this attachment) used the RBS Level 1 Revision 3B model for the baseline CDF value. Revision 4 is an update of the Revision 3B model. The major differences include:

Addition of Interfacing System Loss of Coolant Accident (ISLOCA)

Updated Anticipated Transient without SCRAM (ATWS) modeling

Updated Human Reliability Analysis

Updated Generic and Plant Specific Failure Data

Updated Loss of Offsite Power (LOOP) Analysis

Improved Common Cause Failure Analysis

Revision of success criteria for containment heat removal by way of the unit coolers was changed in Rev 4. In Rev 3B for containment heat removal to be successful only one containment unit cooler was required and containment venting was not credited. In the Revision 4 model the success criteria for containment heat removal was changed. In Revision 4 two containment unit coolers are necessary for containment heat removal. In addition, unlike in Rev 3B, credit is given for containment venting. Containment heat removal can be accomplished by venting as long as one containment unit cooler is available.

4.1.2 ILRT Test Intervals

The base case for the evaluation is the original commitment interval of 3 tests in 10 years. The current interval for ILRT is now 1 test in 15 years 4 months. Note that RBS had already received approval for a one-time extension of the ILRT interval to 1 in 15 years. However, this analysis assumes the current interval is 1 test in 10 years. The proposed interval for ILRT is 1 test in 15 years and 8 months.

4.1.3 Containment Leakages for EPRI Accident Classes

The maximum containment leakage for EPRI Class 1 (the EPRI containment failure classes are defined in the next section) sequences is 1 L_a based on the previously approved methodology.

The maximum containment leakage for EPRI Class 3a sequences is 10 L_a based on the previously approved methodology.

The maximum containment leakage for EPRI Class 3b sequences is 35 L_a based on the previously approved methodology. EPRI Class 3b is conservatively categorized as LERF based on the previously approved methodology.

Containment leakage due to EPRI Classes 4 and 5 are considered negligible based on the previously approved methodology.

EPRI Classes 2 and 6 are defined for large containment isolation failure and other isolation failures, respectively. Both classes would have large containment leakages due to the isolation failures; however, they are not affected by the ILRT/DWBT interval extension. Class 7 is defined as severe accident. Typically a containment leakage of 100 L_a is conservatively assumed.

Because EPRI Class 8 sequences are containment bypass sequences, potential releases are directly to the environment. However, the containment structure does not impact the release magnitude.

4.1.4 DWBT Data and Characterization of Leakages

RBS has performed three ILRTs during the period of its Operating License. The two most recent ILRTs were performed in August 1992 and May 1989. These tests were successful and on this basis, RBS currently has a fifteen-year 4 month interval in which to perform the next ILRT. Structural degradation of containment is a gradual process that occurs due to the effects of pressure, temperature, radiation, chemical, or other factors. Such effects are identified and corrected when the containment is periodically inspected to verify structural integrity under the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI (ASME XI), Subsection IWE.

Since the start of commercial operation, RBS has performed five full DWBTs. Base drywell leakage (DWL_b) is assumed to be 800 scfm, which bounds all the RBS DWBT results (see Table 4.1-1 below).

Table 4.1-1 RBS Drywell Bypass Leakage Test Results

Test Date	Leakage Rate SCFM
Dec-87	602
Jun-89	141
Nov-90	345
Aug-92	754
Jun-94	421

The characterization of increased leakage associated with DWBTs was based on the ILRT methodologies. That is, the leakage for a small pre-existing leak is assumed to be less than 10 DWL_b (or 8000 scfm) and the leakage for a large pre-existing leak is assumed to be less than 35 DWL_b (or 28,000 scfm). This is considered conservative. Even though the drywell design differential pressure is 25 psid, the limiting sustained differential pressure between the drywell and the containment is 3.1 psi resulting from a small steam line break inside the drywell. On the other hand, a large line break on the reactor coolant system would generate a higher internal drywell pressure but rapidly depressurize the reactor vessel, thus quickly terminating the blowdown. The drywell bypass test pressure of 3 psid is based on the pressure difference caused by a small line break. The leakage flow associated with the allowable bypass leakage area ($A/\sqrt{K}$) of 1.0 ft^2 corresponds to 40,110 scfm, which bounds the assumed leakage for a large pre-existing leak.

4.1.5 Credit of Availability of Containment Unit Cooler

Containment pressure is controlled to its design pressure as long as the containment unit coolers operate. Since the leakage for both DWBT leakage categories is below the design value of 40,110 scfm, the assumption will be made that as long as containment unit coolers operate, there will be no impact on the containment's existing leakage category. Also, the timing of containment unit cooler operation will not be adversely impacted with this assumption.

If containment unit coolers do not operate, the assumption is that any increased drywell leakage above DWL_b will lead to containment failure. This assumption results in an increase in the frequency of EPRI Class 7 sequences rather than Class 3a or 3b. This is considered a conservative assumption, since not all accident sequences without unit coolers will lead to containment failure. Also RBS Level 1 PRA calculations show that it would take approximately 16 hours to reach the containment failure pressure (53.7 psia) without any containment heat removal system. Operator actions performed according to the Emergency Operating Procedures (EOPs) such as containment venting would further delay the time to containment failure. Therefore, the additional frequency of EPRI Class 7 sequences likely does not

contribute to the LERF because of the time duration involved. However, for simplicity and consistency with the GGNS DWBT extension submittal, the additional frequency of EPRI Class 7 sequences was conservatively assumed to be LERF.

4.1.6 Credit for Availability of Reactor Depressurization

In the base case, no credit for the availability of reactor pressure vessel (RPV) depressurization was taken. However, if the RPV can be successfully depressurized before vessel breach, there will be no concern associated with drywell bypass through the pre-existing drywell leakage path since there will be no driving force for the postulated bypass leakage flow. This statement is consistent with the discussion in RBS USAR section 6.2 on the severity of large and small line breaks on reactor coolant system. Also, drywell bypass is not a concern for transient initiated events as there is no steam release into the drywell. The total contribution from transient or loss of offsite power (LOSP) initiating events is greater than 99% of the total core damage frequency (CDF). Therefore, for severe accident scenarios that are not initiated by LOCA-type events, depressurization of the vessel and the subsequent release of steam to the suppression pool effectively remove the potential for significant drywell bypass following vessel failure.

RPV depressurization will release a large amount of heat into the suppression pool, which poses a challenge to the containment heat removal systems. However, the thermal hydraulic calculations supporting the RBS accident sequences development has already considered the limiting case for the heat addition into the containment suppression pool. Moreover, the containment pressurization will take a long period of time before failure occurs if no containment heat removal system is available, which then would not result in large early releases to the environment.

Therefore, the availability of RPV depressurization could be credited for mitigating the impact of increased drywell bypass. This is evaluated in Case 3 as a sensitivity.

4.1.7 Accident Doses

The DWBT extension analysis baseline accident doses are based on those utilized in the original ILRT extension analyses, which was based on RBS Level 1 PRA Model Revision 3. No significant impact on the accident dose rates was expected for the model changes between Revision 3 and the model Revision 4.

4.2 Methodologies

RBS has already received NRC approval for the one time extension on the ILRT interval, which was based on a methodology similar to the approved Crystal River ILRT methodology. While the RBS method was tailored to the RBS specific PSA definitions and analysis, a sensitivity study as part of the RBS ILRT analysis had also been performed to show the difference in results between the RBS method and the Crystal River method.

For the analysis of this one-time extension on the RBS DWBT interval, the previously approved RBS ILRT method is not followed. This is due to the additional complexity associated with consideration of the DWBT. The GGNS DWBT methodology, which was modified from both the approved Crystal River ILRT method and the NEI interim guidance ILRT method, is used in this analysis. The DWBT extension evaluation methodology derived from the NEI Interim Guidance ILRT methodology will be called *the Modified NEI Interim Guidance Method*.

Since the GGNS DWBT methodologies were modified from the existing ILRT methodologies, both the ILRT and DWBT methodologies are discussed in the following sections.

4.2.1 The NEI Interim Guidance ILRT Method

EPRI developed the alternate methodology for NEI in order to provide interim guidance to licensees for developing uniform risk impact assessments supporting one-time extensions of ILRT surveillance intervals. This guidance improves on previous methods in three areas. These areas include:

- a more realistic treatment of the increase in probability of leakage,
- more correct treatment and additional data for determining the probability of leaks detectable by ILRT, and
- the inclusion of provisions for utilizing NUREG-1150 dose calculations.

This methodology incorporates the following steps.

1) Quantify the baseline (nominal three year ILRT interval) risk in terms of frequency per reactor year for the EPRI accident classes of interest.

2) Determine the containment leakage rates for applicable cases, 3a and 3b.

3) Develop the baseline population dose (man-rem) for the applicable accident classes.

4) Determine the population dose rate (man-rem/year) by multiplying the dose calculated in step 3 by the associated frequency calculated in step 1.

5) Determine the change in probability of leakage detectable only by ILRT, and associated frequency for the new surveillance intervals of interest. Note that with increases in the ILRT surveillance interval, the size of the postulated leak path and the associated leakage rate are assumed not to change, however the probability of leakage detectable only by ILRT does increase.

6) Determine the population dose rate for the new surveillance intervals of interest.

7) Evaluate the risk impact (in terms of population dose rate and percentile change in population dose rate) for the interval extension cases.

8) Evaluate the risk impact in terms of LERF.

9) Evaluate the change in conditional containment failure probability.

4.2.2 Containment Failure Classes

EPRI TR-104285 identifies eight classes of containment failure. Per the NEI interim guidance, Class 3 is divided into two parts for this analysis. The classes along with a summary description are listed in Table 4.2-1.

Table 4.2-1 Containment Failure Classes from EPRI TR-104285

Class Number	Description
1	Containment intact: accident sequences do not lead to failure; not affected by changes to ILRT leak testing frequencies.
2	*Failure of isolation system to operate from common cause or power failure;*
3a	Small pre-existing leak in containment structure or liner; identifiable by ILRT; affected by ILRT testing frequency.
3b	Large pre-existing leak in containment structure or liner; identifiable by ILRT; affected by ILRT testing frequency.
4	Type B tested components fail to seal; not affected by ILRT testing frequency.
5	Type C tested components fail to seal; not affected by ILRT leak testing frequencies.
6	Failure to isolate due to valves failing to stroke closed; not affected by ILRT
7	Failure induced by severe accident phenomena; not affected by ILRT testing frequency.
8	Containment Bypass; not affected by ILRT testing frequency (ISLOCA, MSIV leakage)

The RBS ILRT evaluation grouped the containment failures into the above eight classes in order to be consistent with previous submittals. The frequency, person-rem (or man-rem) and person-rem/yr for the given accident classes from the original ILRT analysis are listed in Table 4.2-2. Although the total CDF value in Table 4.2-2 was based on the Revision 3 PRA model which differs from the Revision 4 model CDF used in this evaluation, the percentages of the accident class contributions, the included Source Term Categories (STCs) and their characteristics in each accident class are not expected to have significantly changed between the Revision 3 and Revision 4 PRA models.

Table 4.2-2 RBS Accident Classes

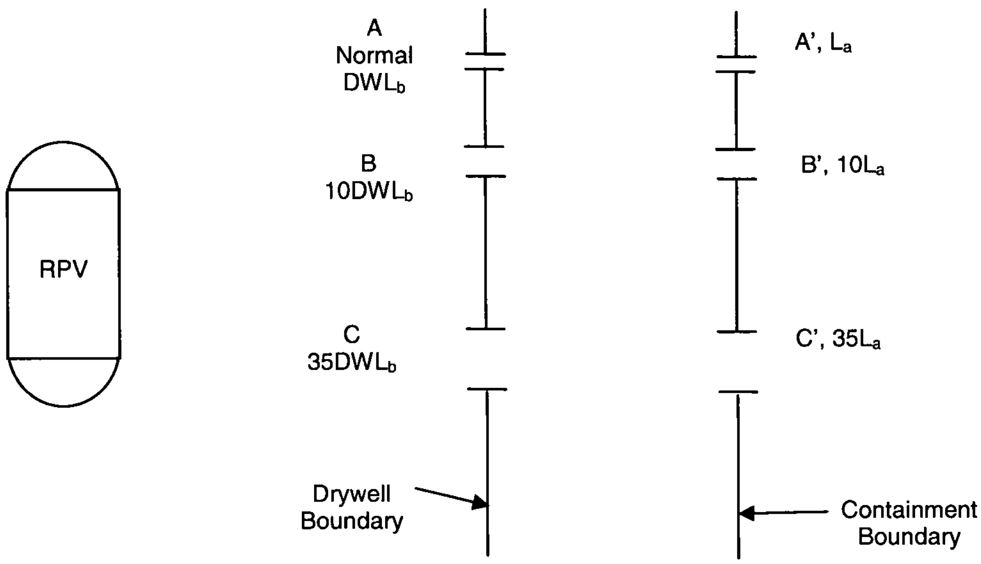
Class	STCs Included in Class	Frequency	% Freq	Person-Rem	Person-Rem/yr	% Risk
1. No failure	60, 18, 6, 72	1.01E-06	10.69%	6.92E+05	6.99E-01	0.35%
2. Large Isolation Failure	52 (LG)	1.35E-09	0.01%	2.16E+08	2.92E-01	0.15%
3a. Small Preexisting Liner Breach	N/A	N/A	N/A	N/A	N/A	N/A
3b. Large Preexisting Liner Breach	22b, 23b, 34b, 76b, 35b, 77b, 35La	N/A	N/A	N/A	N/A	N/A
4. Small Isolation Failure (Type B Test)	Not currently evaluated	N/A	N/A	N/A	N/A	N/A
5. Small Isolation Failure (Type C Test)	Not currently evaluated	N/A	N/A	N/A	N/A	N/A
6. Containment Isolation Failure	52 (SM)	1.07E-06	11.32%	4.90E+07	5.24E+01	26.35%
7. Severe Accident	54, 50, 22, 23, 34, 76, 35, 77, 97, 31, 104	7.37E-06	77.98%	1.98E+07	1.46E+02	73.15%
8. Bypass	Included above	N/A	N/A	N/A	N/A	N/A
Total		**9.45E-06**	**100.00%**	**N/A**	**1.99E+02**	**100.00%**

4.2.3 DWBT Methodology

The primary difference in the methodology used to evaluate the extension of the DWBT is in the determination of the conditional probability of an existing drywell leak. The same failure frequencies, accident doses, consequence calculations, and acceptance criteria will be used. The analysis will be performed assuming that both the ILRT and the DWBT are on the same frequencies.

With the Mark III containment, the drywell is completely enclosed by the outer containment. As such, drywell leakage does not leak directly to the environment but is further mitigated by the outer containment leakage barrier. Because of this "dual" containment, there are several possible leakage path combinations that must be considered. The drywell can be intact (base leakage assumed), it can have a small pre-existing failure (10 times base leakage), or it can have a large pre-existing failure (35 times base leakage). The probability of each of these

drywell failure categories is assumed to be the same as the equivalent categories for the ILRT evaluations. This results in at least nine combinations of drywell and containment leakage sizes. See the figure below.



For GGNS, the assignment of each of these combinations to an original containment failure category depends on the consideration of the availability of the containment spray system, which has similar effects in reducing the containment pressure as the containment unit coolers at RBS. If containment sprays are available, the combination of drywell and containment leakage is categorized based on the containment leakage category. If containment sprays are not available, the combination of drywell and containment leakage is assumed to result in containment failure (Class 7) except for the combinations with base drywell bypass leakage. The combinations with base drywell leakage (DWL_b) are assumed to have the same categories as the base case ILRT evaluation. Table 4.2-3 summarizes the classification of combinations into the EPRI accident classes.

Table 4.2-3 DWBT and ILRT Leakage Combination Accident Classes

Leakage Combinations	DW Bypass Leakage	Containment Leakage	EPRI Class Assignment
AA'	1 DWL_b	1 L_a	1
AB'	1 DWL_b	10 L_a	3a
AC'	1 DWL_b	35 L_a	3b
BA'1 CS Available	10 DWL_b	1 L_a	1
BA'2 CS Not Available	Note 1	Note 1	7
BB'1 CS Available	10 DWL_b	10 L_a	3a
BB'2 CS Not Available	Note 1	Note 1	7
BC'1 CS Available	10 DWL_b	35 L_a	3b
BC'2 CS Not Available	Note 1	Note 1	7
CA'1 CS Available	35 DWL_b	1 L_a	1
CA'2 CS Not Available	Note 1	Note 1	7
CB'1 CS Available	35 DWL_b	10 L_a	3a
CB'2 CS Not Available	Note 1	Note 1	7
CC'1 CS Available	35 DWL_b	35 L_a	3b
CC'2 CS Not Available	Note 1	Note 1	7

Note 1: Containment failure assumed to occur.

The probability for each combination in Table 4.2-3 is determined by multiplying the conditional probabilities for DWBT and ILRT category by each other. For those cases where containment spray is a factor the probability of the combination of DWBT and ILRT is multiplied by the probability that containment spray is available or is not available as applicable.

The other change in the methodology to address the DWBT is the need to increase the containment failure due to phenomenology class (Class 7) frequency for the extended test frequencies. This is done in a manner similar to the method applied to Class 3a and 3b. That is, the Class 1 frequency is also adjusted downward for the Class 7 frequency increase in order to maintain the same total CDF. The DWBT frequency extension will be evaluated using the NEI Interim Guidance methodology's conditional leak size probabilities.

The remaining portions of the DWBT methodologies are identical to that of alternate ILRT methodology.

4.3 DWBT Extension Evaluation

Although RBS has already received approval of the one-time extension on ILRT interval to 1 in 15 years 4 months, the case descriptions in the following sub-sections still denote the test interval of 1 in 10 years as "current" and the test interval of 1 in 15 years and 8 months as "proposed" for consistency with the GGNS methodology.

Note:
For simplicity, the captions for the "proposed" case in some of the tables in this section are changed to "1 in 15*," which actually are for the extended interval of 1 in 15 years and 8 months.

4.3.1 Modifications to GGNS DWBT Methodology

The GGNS methodology for DWBT extension evaluation is used in this analysis. The main modifications to the GGNS methodology are as follows:

- RBS credits the containment unit coolers to mitigate the adverse effects of the increased drywell leakages instead of the containment spray credited in the GGNS evaluation. Containment spray has dual functions by reducing the containment pressure and scrubbing the fission products from the containment atmosphere while containment unit coolers were designed mainly to reduce containment pressure. However, the GGNS method does not credit the containment spray for scrubbing. Thus the effects of crediting containment unit coolers and containment spray are the same.

- The RBS base case for DWBT extension evaluation uses EPRI Class 1 frequency to calculate the Class 3a, Class 3b and additional Class 7 frequencies. The GGNS method base cases used the total CDF for the calculation, which was conservative since more Class 1 frequencies would be re-categorized into Class 3a, 3b or Class 7 frequencies. Such a conservative approach was not considered to be appropriate for the RBS evaluation. Since the RBS Class 1 frequency only consists of about 10% of the total CDF, the calculated Class 3a, 3b and additional Class 7 frequencies will always exceed the Class 1 frequency if the total CDF was used for the calculations. Since it is assumed that the total CDF does not change with the increased DWBT/ILRT leakages, in order to maintain total CDF, some of the CDF contributions from more severe classes such as Classes 2, 6 or 7 would have to be re-categorized to Class 3a or 3b, which was not considered appropriate.

For the calculation of conditional probabilities of combined DWBT/ILRT leakage, the drywell leakage probabilities are calculated in a manner to maximize the impact of the increased drywell leakage due to the DWBT interval extension. For example, the drywell leakage probability for leakage combinations CA', CB' and CC' with a test interval of 1 in 15 years is calculated as 0.02 (probability for large DWBT leakages using the industry data) * 5 (probability increase factor for changing the test interval from 3 in 10 years to 1 in 15 years) = 0.1. The drywell leakage probability for leakage combinations BA', BB', and BC' with a test interval of 1 in 15 years is then calculated as (1 – 0.1) = 0.9. Multiplying the 3a probability for small DWBT leakages using the industry data (0.292) times the probability increase factor for changing the test interval from 3 in 10 years to 1 in 15 years (5) would result in a probability of 1.46. This probability would exceed the total possible probability of 1. This method maximizes the impact on LERF since the 3b category is increased by the maximum amount while still ensuring that the total probability does not exceed 1.

4.3.2 RBS DWBT Extension Evaluation Cases

For the RBS DWBT extension evaluation, a base case and 2 sensitivity cases have been constructed. Table 4.3-1 lists the descriptions of the three cases. More detailed discussions for these cases are included in Sections 4.4 through 4.6.

Cases #2 and #3 were constructed to address an NRC Request for Additional Information (RAI) on the GGNS extension submittal to use the DWBT leakage probabilities calculated from the industry data. Although RBS had no DWBT failure in its plant history, the failure probabilities were evaluated with a plant-specific base leakage rate (i.e., 800 scfm for RBS) on the industry DWBT data without considering the differences among the plant designs and operation histories. To reduce the extra conservatism introduced by the using of the industry data, Case #3 credited the RPV depressurization along with crediting the containment unit coolers.

Table 4.3-1 RBS DWBT Extension Evaluation Case Descriptions

Case #	Case Descriptions					
	Case	**Source of DWBT Data**	**Frequency Used for Classes 3a, 3b, 7 Calculations**	**Class 1 Frequency**	**Crediting Containment Unit Coolers**	**Crediting Reactor Depressurization**
1	Base	Same as ILRT	Class 1	Rev. 4	X	
2	Sensitivity	Industry Data	Class 1	Rev. 4	X	
3	Sensitivity	Industry Data	Class 1	Rev. 4	X	X

4.3.3 Frequencies and Accident Dose Rates for the Containment Failure Classes

The frequencies and accident dose rates used in this analysis are listed in Table 4.3-4. It is reasonable to assume that the frequency fractions for the containment failure classes with Rev. 4 model are similar to the ones with Rev. 3. This simplification removed the burden to do a full-scope Level 2 PRA model update for the Rev. 4 Level 1 model.

<u>Frequencies</u>

The baseline total CDF value for Level 1 Rev. 4 PRA model is 3.33E-06/yr. The frequencies in Column "Frequency with Rev. 4 Model" in Table 4.3-4 are calculated by multiplying this baseline CDF value with the corresponding frequency fractions from Table 4.2-2.

Accident Dose Rates

Based on RBS USAR Section 2.1.3.1 through 2.1.3.4, the expected 2030 populations are listed as follows.

Table 4.3-2 RBS USAR Expected 2030 Populations

Locations	Population	Reference
LPZ	1613	USAR Section 2.1.3.4
10 Mile Radius	42770	USAR Section 2.1.3.1
50 Mile Radius	1491919	USAR Section 2.1.3.2

The Person-Rem (or Man-Rem) values for containment failure classes were based on the RBS Design Basis Accident (DBA) LOCA doses and were consistent with other DWBT/ILRT submittals. The accident dose rates without containment failure were conservatively assumed to be the DBA LOCA dose (about 3 Rem whole body at the Low Population Zone (LPZ)). For this calculation, the dose rates listed in Table 4.3-3 were used.

For more conservatism, the population within the 10 mile radius was assumed to be concentrated at the 5 mile radius. Half of the population within 50 mile radius was assumed to be concentrated at the 10 mile radius and the other half was assumed to be on the 30 mile radius.

Table 4.3-3 RBS DBA LOCA Dose Rates

Location	Dose Rates (Rem)	Comment
LPZ	3	From the RBS ILRT Analysis. Based on the DBA LOCA dose rates. DBA LOCA LPZ dose is approximately 3 Rem whole body.
5 Mile	0.9	From the RBS ILRT Analysis. Based on the DBA LOCA dose rates. Calculated as 30% of LPZ dose.
10 Mile	0.33	From the RBS ILRT Analysis. Based on the DBA LOCA dose rates. Calculated as 11% of LPZ dose.
30 Mile	0.09	From the RBS ILRT Analysis. Based on the DBA LOCA dose rates. Calculated as 3% of LPZ dose.

Therefore, the no-containment-failure Class 1 Person-Rem (Man-Rem) was calculated as:

Class 1 Person-Rem = 3 * 1613 + 0.9 * (42770-1613) + 0.33 * (1491919-42770) / 2 + 0.09 * (1491919-42770) / 2
= 3.46E5

Since Class 3a and Class 3b were assumed to have a leakage of 10 La and 35 La, the Person-Rem values were calculated as:

Class 3a Person-Rem= Class 1 Person-Rem * 10 = 3.46E6
Class 3b Person-Rem= Class 1 Person-Rem * 35 = 1.21E7

The Class 6 or Class 7 Person-Rem was assumed to be 100 x (Class 1 Person-Rem):

Class 6 Person-Rem = Class 1 Person-Rem * 100 = 3.46E7
Class 7 Person-Rem = Class 1 Person-Rem * 100 = 3.46E7

Although the Class 6 Person-Rem value in the RBS ILRT Submittal is slightly higher than the above value, the total dose contribution from Class 6 and Class 7 in this analysis is much higher than the total contribution in the RBS ILRT Submittal. The Class 2 Person-Rem value was obtained from the RBS ILRT Submittal.

Table 4.3-4 Frequencies and Accident Dose Rates

Class	% Frequency	Frequency with Rev. 4 Model	Person-Rem
1. No failure	10.69%	3.56E-07	3.46E+05
2. Large Isolation Failure	0.01%	4.76E-10	2.16E+08
3a. Small Preexisting Liner Breach	N/A	N/A	3.46E+06
3b. Large Preexisting Liner Breach	N/A	N/A	1.21E+07
4. Small Iso Failure (Type B Test)	N/A	N/A	N/A
5. Small Iso Failure (Type C Test)	N/A	N/A	N/A
6. Containment Isolation Failure	11.32%	3.77E-07	3.46E+07
7. Severe Accident	77.98%	2.60E-06	3.46E+07
8. Bypass	N/A	N/A	N/A
Total	**100.00%**	**3.33E-6**	**N/A**

4.3.4 DWBT Data Assessment

With the limited DWBT data, the DWBT leakage probabilities were assumed to be the same as the ones used in the ILRT extension evaluation methodologies for the base case. This approach is considered to be appropriate since no DWBT failure has occurred at RBS during its plant history.

Table 4.3-5 Baseline Drywell Leakage Probabilities in DWBT Evaluation

DWBT Extension Evaluation Method	DW Leakage Probability – Small Leakage	DW Leakage Probability – Large Leakage
Modified NEI Interim Guidance	2.7E-2	2.7E-3

Per the NRC's RAI on the GGNS extension submittal, the drywell leakage probabilities derived from the industry data are also used as a sensitivity case in the DWBT extension.

A limited set of data is available for Mark III plants. Data from other BWR containment types (e.g., Mark II's) is not considered applicable because of the differences in drywell configuration and free volume. A summary of Mark III drywell bypass leakage test results categorized in accordance with the RBS DWBT extension evaluation leakage assumptions is provided in the following table.

Table 4.3-6 A Summary of the Mark III DWBT Results

Plant	DWBT Leakages		Total
	Small	Large	Tests
Plant 1	0	0	6
Plant 2	6	0	7
Plant 3	1	0	6
Plant 4	0	0	5
Total	**7**	**0**	**24**

The test results were classified as "Small" if the leakage was greater than the base DWB leakage (DWL_b) assumed in the RBS DWBT evaluation (800 scfm) but less than 10 x DWL_b. Results would have been classified as "Large" if the test leakage had been greater than 10 x DWL_b (8000 scfm). It should be noted that none of the above test results were considered failures of the drywell bypass test as there was considerable margin in each of the tests. The above is a categorization of the test results in relation to the assumed base leakage and the 3a and 3b leakage categories.

A review of all the DWBT results for the domestic Mark III plants leads to the conclusion that the maximum observed leakage rate, 2599 scfm, is well within the leakage rate assigned for Category 3b leakage (28,000 scfm) and that the majority of the leakage rate results (17 of 24)

are represented by the value assigned to Category 1. (The RBS maximum DWBT result is only 754 scfm)

Even though the data is sparse, an estimate of the Category 3a and 3b probabilities can be calculated using the data. Using a Chi Squared upper bound (95% confidence) value is not considered to be appropriate since it will give a bounding value that is not representative of RBS operation. The use of the mean for the 3a Category (7/24 = 0.292) is considered more appropriate for a realistic evaluation. Since there have been no Category 3b occurrences, the Jeffreys non-informative is more appropriate for the 3b Category. Use of the Jeffreys non-informative is based on the following justification from the NEI Interim Guidance.

> "Application of the Jeffreys non-informative prior is one of a number of statistical analysis approaches to estimating probabilities when no failures have been experienced. The approach was used in NUREG-1150 and more recently in NUREG/CR-5750. NUREG/CR-5750 is now the preferred source of initiating event data, which also involves rare event approximations. The selected approach is more conservative than many of the referenced approaches. (See for example Lipow, M. and Welker, E. "Estimating the Exponential Failure Rate From Data With No Failure Events", Proceedings of the 1974 Annual Reliability and Maintainability Symposium, Los Angeles CA January 29-31, 1974.) The principle exception being the Chebychev upper bound. However, the Chebychev upper bound is specifically selected when a 95% confidence interval is desired. Regulatory Guide 1.174 decision criteria are designed for use with mean values rather than upper bound estimates. We believe, given the information available at this time, that the Jeffreys non-informative prior provides a reasonable balance between conservatism in light of uncertainty and yet meets the intent of Regulatory Guide 1.174. Further, application of the Jeffreys non-informative prior is consistent with NUREG-1150, a reference applied in this interim guide and previous ILRT documents related to this question, namely EPRI TR-1044285 and NUREG-1493."

The Category 3b probability is calculated below using the Jeffreys non-informative prior.

$$Category\ 3b\ Leak\ \Pr obability = \frac{Number\ of\ Occurrences(0) + \frac{1}{2}}{Number\ of\ Tests + 1}$$

$$= \frac{(0) + \frac{1}{2}}{24 + 1} = 2.0E - 02$$

To summarize, the base Category 3a leak probability based on the industry data is estimated as 2.92E-01 and the Category 3b leak probability is estimated as 2.0E-02. These values are considered conservative but are used along with the Modified EPRI Interim Guidance Method to perform a sensitivity analysis. This is documented in the following sections.

4.3.5 Availability of Containment Unit Cooler

The availability of a containment unit cooler (UC) was determined using the RBS Level 1 Revision 4 PRA model. The inadequate containment cooling by unit coolers, as modified in Revision 4, gate in the fault tree model was solved and the resulting cutsets were delete-termed from the overall Revision 4 PRA results cutset file to obtain the cutsets which do not have events which would fail the unit coolers. The unit coolers would be available for each of these

cutsets. The total frequency for these cutsets is 6.15E-7/year. Therefore, the probability that a unit cooler is available is determined as follows:

$$P_{UC\ Available} = \text{Frequency of cutsets with UC available/Overall CDF} = 6.15E\text{-}7 / 3.33E\text{-}6 = 18.46\%$$

The probability that containment UC is not available is:

$$P_{UC\ Unavailable} = 1 - P_{UC\ Available} = 81.54\%$$

These values were used in the determination of combined leakage probabilities. They are conservative since there is no consideration of the recovery of containment unit coolers. The UC availability strongly depends on the Div I and II diesel generator power after loss of offsite power (LOSP) and the standby service water system (SSW), which are the dominant contributors to RBS core damage frequencies.

4.3.6 Availability of Containment Unit Cooler or Reactor Depressurization

The availability of containment unit cooler (UC) or reactor depressurization (DEP) was determined in a similar manner as the availability of containment unit cooler in the previous section. A gate was developed for inadequate containment cooling provided by unit coolers and the failure of reactor depressurization. This gate was solved with the appropriate flag files and the resultant cutset was saved. This cutset file was then delete-termed from the overall Revision 4 total CDF cutset to obtain a file representing the RBS core damage frequency with either a containment unit cooler or depressurization available. This cutset file includes cutsets that do not have events which would fail both containment unit coolers and reactor depressurization.

The probability that a containment unit cooler or reactor depressurization is available is determined as follows:

$$P_{UC\ or\ DEP\ Available} = \text{Frequency of cutsets with UC or DEP available/Overall CDF} = 3.06E\text{-}6 / 3.33E\text{-}6 = 91.81\%$$

The probability that both UC and DEP are not available is:

$$P_{UC\ and\ DEP\ Unavailable} = 1 - P_{UC\ or\ DEP\ Available} = 8.19\%$$

4.4 Case 1: Base Case with Modified NEI Interim Guidance Method

This base case was performed with the Modified NEI Interim Guidance Method.

4.4.1 Frequency Calculations

The method of combining the probability of DWBT leakage and the probability of containment leakage has been discussed in Section 4.2.3 for the GGNS DWBT methodology.

The conditional probability of the different combinations of DWB and ILRT leakage are calculated using a probability of 2.7E-2 for a small leak and 2.7E-3 for a large leak. The probability that a containment unit cooler is available is also factored in for certain combinations.

The probability increase factor from the baseline interval (3 in 10 years) to the current interval (1 in 10 years) and the proposed interval (1 in 15 years and 8 months) are 3.33 and 5.22 respectively based on the NEI Interim Guidance Methodology. The probability increase factors are calculated as follows:

- Probability Increase Factor from base to current = (Current Interval / 2) / (Base Interval / 2) = (10*12 / 2) / (36 / 2) = 3.33
- Probability Increase Factor from base to proposed = (Proposed Interval / 2) / (Base Interval / 2) = ((15*12+8) / 2) / (36 / 2) = 5.22

The following tables calculate the conditional probabilities of the combined leakage for the baseline, current and proposed DWBT intervals. The frequencies of Classes 3a, 3b, and 7 are then calculated with the total contribution from different leakage combinations.

Table 4.4-1 Conditional Probability of Combined Leakage for Baseline Interval (Case 1)

Leakage Combinations	DW Bypass Leakage	CTMT Leakage	DW Leakage Prob	Prob of UC	CTMT Leakage Prob	Combined Prob	EPRI Class Assign-ment
AA'	1 DWL_B	1 La	0.97	NA	0.97	9.41E-01	1
AB'	1 DWL_B	10 La	0.97	NA	2.7E-02	2.62E-02	3a
AC'	1 DWL_B	35 La	0.97	NA	2.7E-03	2.62E-03	3b
BA'1 UC Available	10 DWL_B	1 La	2.7E-02	18.46%	0.97	4.84E-03	1
BA'2 UC Not Available			2.7E-02	81.54%	0.97	2.14E-02	7
BB'1 UC Available	10 DWL_B	10 La	2.7E-02	18.46%	2.7E-02	1.35E-04	3a
BB'2 UC Not Available			2.7E-02	81.54%	2.7E-02	5.94E-04	7
BC'1 UC Available	10 DWL_B	35 La	2.7E-02	18.46%	2.7E-03	1.35E-05	3b
BC'2 UC Not Available			2.7E-02	81.54%	2.7E-03	5.94E-05	7
CA'1 UC Available	35 DWL_B	1 La	2.7E-03	18.46%	0.97	4.84E-04	1
CA'2 UC Not Available			2.7E-03	81.54%	0.97	2.14E-03	7
CB'1 UC Available	35 DWL_B	10 La	2.7E-03	18.46%	2.7E-02	1.35E-05	3a
CB'2 UC Not Available			2.7E-03	81.54%	2.7E-02	5.94E-05	7
CC'1 UC Available	35 DWL_B	35 La	2.7E-03	18.46%	2.7E-03	1.35E-06	3b
CC'2 UC Not Available			2.7E-03	81.54%	2.7E-03	5.94E-06	7

The overall baseline conditional probabilities for Classes 3a, 3b and 7 are then calculated as follows:

- Class 3a Probability = 2.62E-2 + 1.35E-4 + 1.35E-5 = 2.63E-2
- Class 3b Probability = 2.62E-3 + 1.35E-5 + 1.35E-6 = 2.63E-3
- Change in Class 7 Probability = 2.14E-2 + 5.94E-4 + 5.94E-5 + 2.14E-3 + 5.94E-5 + 5.94E-6 = 2.42E-2

The baseline frequencies for Classes 3a, 3b and 7 are calculated by multiplying the overall conditional probabilities with the non-containment-failure (NCF) Class 1 frequency.

- Class 3a Frequency = 2.63E-2 * 3.56E-07 = 9.38E-9
- Class 3b Frequency = 2.63E-3* 3.56E-07 = 9.38E-10
- Change in Class 7 Frequency = 2.42E-2 * 3.56E-07 = 8.63E-9

Table 4.4-2 Conditional Probability of Combined Leakage for Current Interval (Case 1)

Leakage Combinations	DW Bypass Leakage	CTMT Leakage	DW Leakage Prob	Prob of UC	CTMT Leakage Prob	Combined Prob	EPRI Class Assign-ment
AA'	1 DWL_B	1 La	0.90	NA	0.90	8.12E-01	1
AB'	1 DWL_B	10 La	0.90	NA	9.0E-02	8.11E-02	3a
AC'	1 DWL_B	35 La	0.90	NA	9.0E-03	8.11E-03	3b
BA'1 UC Available	10 DWL_B	1 La	9.0E-02	18.46%	0.90	1.50E-02	1
BA'2 UC Not Available			9.0E-02	81.54%	0.90	6.61E-02	7
BB'1 UC Available	10 DWL_B	10 La	9.0E-02	18.46%	9.0E-02	1.50E-03	3a
BB'2 UC Not Available			9.0E-02	81.54%	9.0E-02	6.60E-03	7
BC'1 UC Available	10 DWL_B	35 La	9.0E-02	18.46%	9.0E-03	1.50E-04	3b
BC'2 UC Not Available			9.0E-02	81.54%	9.0E-03	6.60E-04	7
CA'1 UC Available	35 DWL_B	1 La	9.0E-03	18.46%	0.90	1.50E-03	1
CA'2 UC Not Available			9.0E-03	81.54%	0.90	6.61E-03	7
CB'1 UC Available	35 DWL_B	10 La	9.0E-03	18.46%	9.0E-02	1.50E-04	3a
CB'2 UC Not Available			9.0E-03	81.54%	9.0E-02	6.60E-04	7
CC'1 UC Available	35 DWL_B	35 La	9.0E-03	18.46%	9.0E-03	1.50E-05	3b
CC'2 UC Not Available			9.0E-03	81.54%	9.0E-03	6.60E-05	7

The overall current case conditional probabilities for Classes 3a, 3b and 7 are then calculated as follows:

- Class 3a Probability = 8.11E-2 + 1.50E-3 + 1.50E-4 = 8.27E-2
- Class 3b Probability = 8.11E-3 + 1.50E-4 + 1.50E-5 = 8.27E-3
- Change in Class 7 Probability = 6.61E-2 + 6.60E-3 + 6.60E-4 + 6.61E-3 + 6.60E-4 + 6.60E-5 = 8.07E-2

The current case frequencies for Classes 3a, 3b and 7 are calculated by multiplying the overall conditional probabilities with the non-containment-failure (NCF) Class 1 frequency.

- Class 3a Frequency = 8.27E-2 * 3.56E-07 = 2.95E-8
- Class 3b Frequency = 8.27E-3 * 3.56E-07 = 2.95E-9
- Change in Class 7 Frequency = 8.07E-2 * 3.56E-07 = 2.88E-8

Table 4.4-3 Conditional Probability of Combined Leakage for Proposed Interval (Case 1)

Leakage Combinations	DW Bypass Leakage	CTMT Leakage	DW Leakage Prob	Prob of UC	CTMT Leakage Prob	Combined Prob	EPRI Class Assign-ment
AA'	1 DWL_B	1 La	0.84	NA	0.84	7.14E-01	1
AB'	1 DWL_B	10 La	0.84	NA	1.4E-01	1.19E-01	3a
AC'	1 DWL_B	35 La	0.84	NA	1.4E-02	1.19E-02	3b
BA'1 UC Available	10 DWL_B	1 La	1.4E-01	18.46%	0.84	2.20E-02	1
BA'2 UC Not Available			1.4E-01	81.54%	0.84	9.71E-02	7
BB'1 UC Available	10 DWL_B	10 La	1.4E-01	18.46%	1.4E-01	3.67E-03	3a
BB'2 UC Not Available			1.4E-01	81.54%	1.4E-01	1.62E-02	7
BC'1 UC Available	10 DWL_B	35 La	1.4E-01	18.46%	1.4E-02	3.67E-04	3b
BC'2 UC Not Available			1.4E-01	81.54%	1.4E-02	1.62E-03	7
CA'1 UC Available	35 DWL_B	1 La	1.4E-02	18.46%	0.84	2.20E-03	1
CA'2 UC Not Available			1.4E-02	81.54%	0.84	9.71E-03	7
CB'1 UC Available	35 DWL_B	10 La	1.4E-02	18.46%	1.4E-01	3.67E-04	3a
CB'2 UC Not Available			1.4E-02	81.54%	1.4E-01	1.62E-03	7
CC'1 UC Available	35 DWL_B	35 La	1.4E-02	18.46%	1.4E-02	3.67E-05	3b
CC'2 UC Not Available			1.4E-02	81.54%	1.4E-02	1.62E-04	7

The overall proposed case conditional probabilities for Classes 3a, 3b and 7 are then calculated as follows:

- Class 3a Probability = 1.19E-1 + 3.67E-3 + 3.67E-4 = 1.23E-1
- Class 3b Probability = 1.19E-2 + 3.67E-4 + 3.67E-5 = 1.23E-2
- Change in Class 7 Probability = 9.71E-2 + 1.62E-2 + 1.62E-3 + 9.71E-3 + 1.62E-3 + 1.62E-4 = 1.26E-1

The proposed case frequencies for Classes 3a, 3b and 7 are calculated by multiplying the overall conditional probabilities with the non-containment-failure (NCF) Class 1 frequency.

- Class 3a Frequency = 1.23E-1 * 3.56E-7 = 4.39E-8
- Class 3b Frequency = 1.23E-2 * 3.56E-7 = 4.39E-9
- Change in Class 7 Frequency = 1.26E-1 * 3.56-7 = 4.50E-8

The class frequencies for different DWBT intervals are summarized in the following table. Class 2 and Class 6 frequencies were kept the same as the original ones without considering the DWBT intervals. Class 1 and Class 7 frequencies were calculated as following:

- Class 1 Frequency = Original NCF Freq – (Class 3a + Class 3b + Change in Class 7)
- Class 7 Frequency = Original Class 7 + Change in Class 7

Table 4.4-4 Class Frequencies for Different DWBT Intervals (Case 1)

Class	3 in 10	1 in 10	1 in 15*
1. No failure	3.37E-07	2.95E-07	2.63E-07
2. Large Isolation Failure	4.76E-10	4.76E-10	4.76E-10
3a. Small Preexisting Liner Breach	9.38E-09	2.95E-08	4.39E-08
3b. Large Preexisting Liner Breach	9.38E-10	2.95E-09	4.39E-09
4. Small Iso Failure (Type B Test)	N/A	N/A	N/A
5. Small Iso Failure (Type C Test)	N/A	N/A	N/A
6. Containment Isolation Failure	3.77E-07	3.77E-07	3.77E-07
7. Severe Accident	2.61E-06	2.63E-06	2.64E-06
8. Bypass	N/A	N/A	N/A
Total Frequency	**3.33E-06**	**3.33E-06**	**3.33E-06**

4.4.2 Accident Dose Rate Calculations

As indicated before, the evaluation of the DWBT extension used the accident dose estimates from the evaluation of the ILRT extension. The detailed calculation and a summary of the accident release (person-rem) and the risk (person-rem/year) calculated for each class is contained in Table 4.4-5 and Table 4.4-6.

Table 4.4-5 Detailed Accident Release and Risk Calculations (Case 1)

Class 1 - Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+05	3.46E+05	3.46E+05
Frequency	3.37E-07	2.95E-07	2.63E-07
Person-Rem/Yr	1.17E-01	1.02E-01	9.10E-02

Class 2 - Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	2.16E+08	2.16E+08	2.16E+08
Frequency	4.76E-10	4.76E-10	4.76E-10
Person-Rem/Yr	1.03E-01	1.03E-01	1.03E-01

Class 3a Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+06	3.46E+06	3.46E+06
Frequency	9.38E-09	2.95E-08	4.39E-08
Person-Rem/Yr	3.25E-02	1.02E-01	1.52E-01

Class 3b Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	1.21E+07	1.21E+07	1.21E+07
Frequency	9.38E-10	2.95E-09	4.39E-09
Person-Rem/Yr	1.14E-02	3.57E-02	5.32E-02

Class 6 Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+07	3.46E+07	3.46E+07
Frequency	3.77E-07	3.77E-07	3.77E-07
Person-Rem/Yr	1.31E+01	1.31E+01	1.31E+01

Class 7 Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+07	3.46E+07	3.46E+07
Frequency	2.61E-06	2.63E-06	2.64E-06
Person-Rem/Yr	9.03E+01	9.10E+01	9.15E+01

Change in Class 7 Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+07	3.46E+07	3.46E+07
Frequency	8.63E-09	2.88E-08	4.50E-08
Person-Rem/Yr	2.99E-01	9.95E-01	1.56E+00

Table 4.4-6 Summary of Accident Release and Risk Calculations (Case 1)

Class	Base	1 in 10	1 in 15*
1. No failure	1.17E-01	1.02E-01	9.10E-02
2. Large Isolation Failure	1.03E-01	1.03E-01	1.03E-01
3a. Small Preexisting Liner Breach	3.25E-02	1.02E-01	1.52E-01
3b. Large Preexisting Liner Breach	1.14E-02	3.57E-02	5.32E-02
4. Small Iso Failure (Type B Test)	N/A	N/A	N/A
5. Small Iso Failure (Type C Test)	N/A	N/A	N/A
6. Containment Isolation Failure	1.31E+01	1.31E+01	1.31E+01
7. Severe Accident	9.03E+01	9.10E+01	9.15E+01
8. Bypass	N/A	N/A	N/A

TOTAL Person-Rem/Yr:	1.036E+02	1.044E+02	1.050E+02
Change from BaseLine Person-Rem/yr:		7.76E-01	1.40E+00
Change from 1 in 10 to 1 in 15*:			6.20E-01
% increase from Base:		0.75%	1.35%
% Change from 1 in 10 to 1 in 15*:			0.59%
ILRT/DWBT Contribution	0.33%	1.09%	1.68%

4.4.3 Changes in LERF and CCFP Calculations

The change in LERF for extending the DWBT interval is the increase due to the change in the large pre-existing leak class, Class 3b, and the increase in the portion of Class 7 due to DWBT.

As in the previous evaluations, the Class 3a leak size is too small to be considered a LERF. This increase is documented below.

Table 4.4-7 Change in LERF (Case 1)

	Base	1 in 10	1 in 15*
Class 3b Frequency	9.38E-10	2.95E-09	4.39E-09
Change in Class 7 Frequency	8.63E-09	2.88E-08	4.50E-08
Total LERF	9.56E-09	3.17E-08	4.94E-08
Change from Base		2.21E-08	3.99E-08
Change from 1 in 10 to 1 in 15*			1.77E-08

The change in CCFP is considered to be the change in containment failure probability given an accident. This can be calculated as follows:

CCFP = 1 – (Frequency of NCF) / CDF
Frequency of NCF = Class 1 frequency + Class 3a frequency

The calculations for each DWBT option are summarized below.

Table 4.4-8 Change in CCFP (Case 1)

	Class 1 Freq	Class 3a Freq	NCF Freq	Total CDF	CCFP	Change from base	Change from Current
Baseline	3.37E-07	9.38E-09	3.47E-07	3.33E-06	89.60%		
1 in 10	2.95E-07	2.95E-08	3.24E-07	3.33E-06	90.26%	0.66%	
1 in 15*	2.63E-07	4.39E-08	3.07E-07	3.33E-06	90.80%	1.20%	0.53%

4.4.4 Summary of Results

Table 4.4-9 provides a summary of the results for the extension of the DWBT frequency (in conjunction with the ILRT extension).

Table 4.4-9 Summary of DWBT Extension Evaluation Case 1 Results

	3 in 10yr	1 in 10yr	1 in 15*yr
Total Risk	103.6	104.4	105.0
DWBT/ILRT Risk Contribution (%)	0.33%	1.09%	1.68%
% Change from Base		0.75%	1.35%
% Change from Current			0.59%
LERF value due to DWBT/ILRT	9.56E-09	3.17E-08	4.94E-08
Change from Base		2.21E-08	3.99E-08
Change from Current			1.77E-08
CCFP	89.60%	90.26%	90.80%
Change from Base		0.66%	1.20%
Change from Current			0.53%

Based on the above results, the extension of the DWBT (in conjunction with an extension of the ILRT) surveillance interval from either the baseline interval (3 in 10 years) or the current interval (once in 10 years) to once in 15 years and 8 months does not pose a significant increase in risk to the public. The LERF value is within Region 3 of Regulatory Guide 1.174 (very small) guidance and is considered acceptable.

4.5 Case 2: Sensitivity Case with Modified NEI Interim Guidance Method and Industry DWBT Data

This sensitivity case was performed with the Modified NEI Interim Guidance Method to address the impact of using the industry DWBT data per NRC request during the GGNS submittal review.

4.5.1 Frequency Calculations

The method of combining the probability of DWBT leakage and the probability of containment leakage has been discussed in Section 4.2.3 for the GGNS methodology.

The conditional probability for each of the different combinations of DWB and ILRT leakage is calculated using the following probabilities:

- A probability of 0.292 for a small drywell leak and 0.02 for a large drywell leak by using the Mark III DWBT historical data (see the details in Section 4.3.4);
- A probability of 2.7E-2 for a small containment leak and 2.7E-3 for a large containment leak

The probability that a containment unit cooler is available is also factored in for certain combinations.

The probability increase factor from the baseline interval (3 in 10 years) to the current interval (1 in 10 years) and the proposed interval (1 in 15 years and 8 months) are 3.33 and 5.22 respectively based on the NEI Interim Guidance Methodology. The probability increase factors are calculated as following:

- Probability Increase Factor from base to current = (Current Interval / 2) / (Base Interval / 2) = (10*12 / 2) / (36 / 2) = 3.33
- Probability Increase Factor from base to proposed = (Proposed Interval / 2) / (Base Interval / 2) = ((15*12 + 8) / 2) / (36 / 2) = 5.22

The following tables calculate the conditional probabilities of the combined leakage for the baseline, current and proposed DWBT intervals. The frequencies of Classes 3a, 3b, and 7 are then calculated with the total contribution from different leakage combinations.

Table 4.5-1 Conditional Probability of Combined Leakage for Baseline Interval (Case 2)

Leakage Combinations	DW Bypass Leakage	CTMT Leakage	DW Leakage Prob	Prob of UC	CTMT Leakage Prob	Combined Prob	EPRI Class Assign-ment
AA'	1 DWL_B	1 La	0.69	NA	0.97	6.68E-01	1
AB'	1 DWL_B	10 La	0.69	NA	2.7E-02	1.86E-02	3a
AC'	1 DWL_B	35 La	0.69	NA	2.7E-03	1.86E-03	3b
BA'1 UC Available	10 DWL_B	1 La	2.9E-01	18.46%	0.97	5.23E-02	1
BA'2 UC Not Available			2.9E-01	81.54%	0.97	2.31E-01	7
BB'1 UC Available	10 DWL_B	10 La	2.9E-01	18.46%	2.7E-02	1.45E-03	3a
BB'2 UC Not Available			2.9E-01	81.54%	2.7E-02	6.42E-03	7
BC'1 UC Available	10 DWL_B	35 La	2.9E-01	18.46%	2.7E-03	1.45E-04	3b
BC'2 UC Not Available			2.9E-01	81.54%	2.7E-03	6.42E-04	7
CA'1 UC Available	35 DWL_B	1 La	2.0E-02	18.46%	0.97	3.58E-03	1
CA'2 UC Not Available			2.0E-02	81.54%	0.97	1.58E-02	7
CB'1 UC Available	35 DWL_B	10 La	2.0E-02	18.46%	2.7E-02	9.97E-05	3a
CB'2 UC Not Available			2.0E-02	81.54%	2.7E-02	4.40E-04	7
CC'1 UC Available	35 DWL_B	35 La	2.0E-02	18.46%	2.7E-03	9.97E-06	3b
CC'2 UC Not Available			2.0E-02	81.54%	2.7E-03	4.40E-05	7

The overall baseline conditional probabilities for Classes 3a, 3b and 7 are then calculated as follows.

- Class 3a Probability = 1.86E-2 + 1.45E-3 + 9.97E-5 = 2.01E-2
- Class 3b Probability = 1.86E-3 + 1.45E-4 + 9.97E-6 = 2.01E-3
- Change in Class 7 Probability = 2.31E-1 + 6.42E-3 + 6.42E-4 + 1.58E-2 + 4.40E-4 + 4.40E-5 = 2.54E-1

The baseline frequencies for Classes 3a, 3b and 7 are calculated by multiplying the overall conditional probabilities with the non-containment-failure (NCF) Class 1 frequency.

- Class 3a Frequency = 2.01E-2 * 3.56E-7 = 7.17E-9
- Class 3b Frequency = 2.01E-3 * 3.56E-7 = 7.17E-10
- Change in Class 7 Frequency = 2.54E-1 * 3.56E-7 = 9.05E-8

Table 4.5-2 Conditional Probability of Combined Leakage for Current Interval (Case 2)

Leakage Combinations	DW Bypass Leakage	CTMT Leakage	DW Leakage Prob	Prob of UC	CTMT Leakage Prob	Combined Prob	EPRI Class Assign-ment
AA'	1 DWL_B	1 La	0.00	NA	0.90	0.00E+00	1
AB'	1 DWL_B	10 La	0.00	NA	9.0E-02	0.00E+00	3a
AC'	1 DWL_B	35 La	0.00	NA	9.0E-03	0.00E+00	3b
BA'1 UC Available	10 DWL_B	1 La	9.3E-01	18.46%	0.90	1.55E-01	1
BA'2 UC Not Available			9.3E-01	81.54%	0.90	6.86E-01	7
BB'1 UC Available	10 DWL_B	10 La	9.3E-01	18.46%	9.0E-02	1.55E-02	3a
BB'2 UC Not Available			9.3E-01	81.54%	9.0E-02	6.85E-02	7
BC'1 UC Available	10 DWL_B	35 La	9.3E-01	18.46%	9.0E-03	1.55E-03	3b
BC'2 UC Not Available			9.3E-01	81.54%	9.0E-03	6.85E-03	7
CA'1 UC Available	35 DWL_B	1 La	6.7E-02	18.46%	0.90	1.11E-02	1
CA'2 UC Not Available			6.7E-02	81.54%	0.90	4.90E-02	7
CB'1 UC Available	35 DWL_B	10 La	6.7E-02	18.46%	9.0E-02	1.11E-03	3a
CB'2 UC Not Available			6.7E-02	81.54%	9.0E-02	4.89E-03	7
CC'1 UC Available	35 DWL_B	35 La	6.7E-02	18.46%	9.0E-03	1.11E-04	3b
CC'2 UC Not Available			6.7E-02	81.54%	9.0E-03	4.89E-04	7

The overall current case conditional probabilities for Classes 3a, 3b and 7 are then calculated as follows.

- Class 3a Probability = 0.0 + 1.55E-2 + 1.11E-3 = 1.66E-2
- Class 3b Probability = 0.0 + 1.55E-3 + 1.11E-4 = 1.66E-3
- Change in Class 7 Probability = 6.86E-1 + 6.85E-2 + 6.85E-3 + 4.90E-2 + 4.89E-3 + 4.89E-4 = 8.15E-1

The current case frequencies for Classes 3a, 3b and 7 are calculated by multiplying the overall conditional probabilities with the non-containment-failure (NCF) Class 1 frequency.

- Class 3a Frequency = 1.66E-2 * 3.56E-7 = 5.92E-9
- Class 3b Frequency = 1.66E-3 * 3.56E-7 = 5.92E-10
- Change in Class 7 Frequency = 8.15E-1 * 3.56E-7 = 2.90E-7

Table 4.5-3 Conditional Probability of Combined Leakage for Proposed Interval (Case 2)

Leakage Combinations	DW Bypass Leakage	WW Leakage	DW Leakage Prob	Prob of UC	WW Leakage Prob	Combined Prob	EPRI Class Assign-ment
AA'	1 DWL_B	1 La	0.00	NA	0.84	0.00E+00	1
AB'	1 DWL_B	10 La	0.00	NA	1.4E-01	0.00E+00	3a
AC'	1 DWL_B	35 La	0.00	NA	1.4E-02	0.00E+00	3b
BA'1 UC Available	10 DWL_B	1 La	9.0E-01	18.46%	0.84	1.40E-01	1
BA'2 UC Not Available			9.0E-01	81.54%	0.84	6.17E-01	7
BB'1 UC Available	10 DWL_B	10 La	9.0E-01	18.46%	1.4E-01	2.33E-02	3a
BB'2 UC Not Available			9.0E-01	81.54%	1.4E-01	1.03E-01	7
BC'1 UC Available	10 DWL_B	35 La	9.0E-01	18.46%	1.4E-02	2.33E-03	3b
BC'2 UC Not Available			9.0E-01	81.54%	1.4E-02	1.03E-02	7
CA'1 UC Available	35 DWL_B	1 La	1.0E-01	18.46%	0.84	1.63E-02	1
CA'2 UC Not Available			1.0E-01	81.54%	0.84	7.20E-02	7
CB'1 UC Available	35 DWL_B	10 La	1.0E-01	18.46%	1.4E-01	2.72E-03	3a
CB'2 UC Not Available			1.0E-01	81.54%	1.4E-01	1.20E-02	7
CC'1 UC Available	35 DWL_B	35 La	1.0E-01	18.46%	1.4E-02	2.72E-04	3b
CC'2 UC Not Available			1.0E-01	81.54%	1.4E-02	1.20E-03	7

The overall proposed case conditional probabilities for Classes 3a, 3b and 7 are then calculated as follows.

- Class 3a Probability = 0.0 + 2.33E-2 + 2.72E-3 = 2.60E-2
- Class 3b Probability = 0.0 + 2.33E-3 + 2.72E-4 = 2.60E-3
- Change in Class 7 Probability = 6.17E-1 + 1.03E-1 + 1.03E-2 + 7.20E-2 + 1.20E-2 + 1.20E-3 = 8.15E-1

The proposed case frequencies for Classes 3a, 3b and 7 are calculated by multiplying the overall conditional probabilities with the non-containment-failure (NCF) Class 1 frequency.

- Class 3a Frequency = 2.60E-2 * 3.56E-7 = 9.27E-9
- Class 3b Frequency = 2.60E-3 * 3.56E-7 = 9.27E-10
- Change in Class 7 Frequency = 8.15E-1 * 3.56E-7 = 2.90E-7

The class frequencies for different DWBT intervals are summarized in the following table. Class 2 and Class 6 frequencies were kept the same as the original ones without considering the DWBT intervals. Class 1 and Class 7 frequencies were calculated as follows:

- Class 1 Frequency = Original NCF Freq – (Class 3a + Class 3b + Change in Class 7)
- Class 7 Frequency = Original Class 7 + Change in Class 7

Table 4.5-4 Class Frequencies for Different DWBT Intervals (Case 2)

Class	3 in 10	1 in 10	1 in 15*
1. No failure	2.58E-07	5.93E-08	5.56E-08
2. Large Isolation Failure	4.76E-10	4.76E-10	4.76E-10
3a. Small Preexisting Liner Breach	7.17E-09	5.92E-09	9.27E-09
3b. Large Preexisting Liner Breach	7.17E-10	5.92E-10	9.27E-10
4. Small Iso Failure (Type B Test)	N/A	N/A	N/A
5. Small Iso Failure (Type C Test)	N/A	N/A	N/A
6. Containment Isolation Failure	3.77E-07	3.77E-07	3.77E-07
7. Severe Accident	2.69E-06	2.89E-06	2.89E-06
8. Bypass	N/A	N/A	N/A
Total Frequency	3.33E-06	3.33E-06	3.33E-06

4.5.2 Accident Dose Rate Calculations

As indicated before, the evaluation of the DWBT extension will use the accident dose estimates from the evaluation of the ILRT extension. The detailed calculation and a summary of the accident release (person-rem) and the risk (person-rem/year) calculated for each class is contained in Table 4.5-5 and Table 4.5-6.

Table 4.5-5 Detailed Accident Release and Risk Calculations (Case 2)

Class 1 - Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+05	3.46E+05	3.46E+05
Frequency	2.58E-07	5.93E-08	5.56E-08
Person-Rem/Yr	8.92E-02	2.05E-02	1.92E-02

Class 2 - Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	2.16E+08	2.16E+08	2.16E+08
Frequency	4.76E-10	4.76E-10	4.76E-10
Person-Rem/Yr	1.03E-01	1.03E-01	1.03E-01

Class 3a Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+06	3.46E+06	3.46E+06
Frequency	7.17E-09	5.92E-09	9.27E-09
Person-Rem/Yr	2.48E-02	2.05E-02	3.21E-02

Class 3b Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	1.21E+07	1.21E+07	1.21E+07
Frequency	7.17E-10	5.92E-10	9.27E-10
Person-Rem/Yr	8.69E-03	7.17E-03	1.12E-02

Class 6 Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+07	3.46E+07	3.46E+07
Frequency	3.77E-07	3.77E-07	3.77E-07
Person-Rem/Yr	1.31E+01	1.31E+01	1.31E+01

Class 7 Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+07	3.46E+07	3.46E+07
Frequency	2.69E-06	2.89E-06	2.89E-06
Person-Rem/Yr	9.31E+01	1.00E+02	1.00E+02

Change in Class 7 Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+07	3.46E+07	3.46E+07
Frequency	9.05E-08	2.90E-07	2.90E-07
Person-Rem/Yr	3.13E+00	1.01E+01	1.01E+01

Table 4.5-6 Summary of Accident Release and Risk Calculations (Case 2)

Class	Base	1 in 10	1 in 15*
1. No failure	8.92E-02	2.05E-02	1.92E-02
2. Large Isolation Failure	1.03E-01	1.03E-01	1.03E-01
3a. Small Preexisting Liner Breach	2.48E-02	2.05E-02	3.21E-02
3b. Large Preexisting Liner Breach	8.69E-03	7.17E-03	1.12E-02
4. Small Iso Failure (Type B Test)	N/A	N/A	N/A
5. Small Iso Failure (Type C Test)	N/A	N/A	N/A
6. Containment Isolation Failure	1.31E+01	1.31E+01	1.31E+01
7. Severe Accident	9.31E+01	1.00E+02	1.00E+02
8. Bypass	N/A	N/A	N/A

TOTAL Person-Rem/Yr:	1.064E+02	1.132E+02	1.133E+02
Change from BaseLine Person-Rem/yr		6.85E+00	6.86E+00
Change from 1 in 10 to 1 in 15*:			1.44E-02
% increase from Base:		6.43%	6.45%
% Change from 1 in 10 to 1 in 15*:			0.01%
ILRT Contribution	2.98%	8.90%	8.92%

4.5.3 Changes in LERF and CCFP Calculations

The change in LERF for extending the DWBT interval is the increase due to the change in the large pre-existing leak class, Class 3b, and the increase in the portion of Class 7 due to DWBT. As in the previous evaluations, the Class 3a leak size is too small to be considered a LERF. This increase is documented below.

Table 4.5-7 Change in LERF (Case 2)

	Base	1 in 10	1 in 15*
Class 3b Frequency	7.17E-10	5.92E-10	9.27E-10
Change in Class 7 Frequency	9.05E-08	2.90E-07	2.90E-07
Total LERF	9.12E-08	2.91E-07	2.91E-07
Change from Base		2.00E-07	2.00E-07
Change from 1 in 10 to 1 in 15*			3.35E-10

The change in CCFP is considered to be the change in containment failure probability given an accident. This can be calculated as follows:

CCFP = 1 – (Frequency of NCF) / CDF
Frequency of NCF = Class 1 frequency + Class 3a frequency

The calculations for each DWBT option are summarized below.

Table 4.5-8 Change in CCFP (Case 2)

	Class 1 Freq	Class 3a Freq	NCF Freq	Total CDF	CCFP	Change from base	Change from Current
Baseline	2.58E-07	7.17E-09	2.65E-07	3.33E-06	92.05%		
1 in 10	5.93E-08	5.92E-09	6.52E-08	3.33E-06	98.04%	5.99%	
1 in 15*	5.56E-08	9.27E-09	6.48E-08	3.33E-06	98.05%	6.00%	0.01%

4.5.4 Summary of Case 2 Results

Table 4.5-9 provides a summary of the results for the extension of the DWBT frequency (in conjunction with the ILRT extension) for Case 2.

Table 4.5-9 Summary of DWBT Extension Evaluation Case 2 Results

	3 in 10yr	1 in 10yr	1 in 15*yr
Total Risk	106.4	113.2	113.3
DWBT/ILRT Risk Contribution (%)	2.98%	8.90%	8.92%
% Change from Base		6.43%	6.45%
% Change from Current			0.01%
LERF value due to DWBT/ILRT	9.12E-08	2.91E-07	2.91E-07
Change from Base		2.00E-07	2.00E-07
Change from Current			3.35E-10
CCFP	92.05%	98.04%	98.05%
Change from Base		5.99%	6.00%
Change from Current			0.01%

Based on the above results, the extension of the DWBT (in conjunction with an extension of the ILRT) surveillance interval from the current interval of once in 10 years to once in 15 years and 8 months does not pose a significant increase in risk to the public. The LERF value is within Region 3 of Regulatory Guide 1.174 (very small) guidance and is considered acceptable.

On the other hand, the extension of the DWBT (in conjunction with an extension of the ILRT) surveillance interval from the baseline interval of 3 in 10 years to once in 15 years and 8 months would result in relatively larger increases in all three risk metrics. However, the change in LERF still falls into the small range as defined by RG 1.174. As shown in the calculations for the current and proposed case conditional probabilities for combination of leakage in Section 4.5.1, all the NCF Class 1 frequency has been virtually turned into the change in Class 7 frequency except that 18.46% of the Class 1 frequency remains Class 1 by crediting containment unit cooler availability. This is very conservative due to the conservative drywell leakage probabilities estimated from the industry data and the embedded conservatism in the GGNS methodology.

4.6 Case 3: Sensitivity Case with Modified NEI Interim Guidance Method, Industry DWBT Data and Crediting Reactor Depressurization

This sensitivity case was performed with the Modified NEI Interim Guidance Method to address the impact of using the industry DWBT data per NRC request. The availability of either a containment unit cooler or reactor depressurization was credited for this sensitivity case.

4.6.1 Frequency Calculations

The method of combining the probability of DWBT leakage and the probability of containment leakage has been discussed in Section 4.2.1 for the GGNS methodology.

The conditional probability of the different combinations of DWB and ILRT leakage are calculated using the following probabilities:

- A probability of 0.292 for a small drywell leak and 0.02 for a large drywell leak by using the Mark III DWBT historical data (see the details in Section 4.3.4);
- A probability of 2.7E-2 for a small containment leak and 2.7E-3 for a large containment leak

The probability that a containment unit cooler or reactor depressurization is available is also factored in for certain combinations.

The probability increase factor from the baseline interval (3 in 10 years) to the current interval (1 in 10 years) and the proposed interval (1 in 15 years and 8 months) are 3.33 and 5.22 respectively based on the NEI Interim Guidance Methodology.

The following tables calculate the conditional probabilities of the combined leakage for the baseline, current and proposed DWBT intervals. The frequencies of Classes 3a, 3b, and 7 are then calculated with the total contribution from different leakage combinations.

Table 4.6-1 Conditional Probability of Combined Leakage for Baseline Interval (Case 3)

Leakage Combinations	DW Bypass Leakage	CTMT Leakage	DW Leakage Prob	Prob of UC or DEP	CTMT Leakage Prob	Combined Prob	EPRI Class Assign-ment
AA'	1 DWL_B	1 La	0.69	NA	0.97	6.68E-01	1
AB'	1 DWL_B	10 La	0.69	NA	2.7E-02	1.86E-02	3a
AC'	1 DWL_B	35 La	0.69	NA	2.7E-03	1.86E-03	3b
BA'1 UC or DEP Available	10 DWL_B	1 La	2.9E-01	91.81%	0.97	2.60E-01	1
BA'2 UC&DEP Not Available			2.9E-01	8.19%	0.97	2.32E-02	7
BB'1 UC or DEP Available	10 DWL_B	10 La	2.9E-01	91.81%	2.7E-02	7.23E-03	3a
BB'2 UC&DEP Not Available			2.9E-01	8.19%	2.7E-02	6.45E-04	7
BC'1 UC or DEP Available	10 DWL_B	35 La	2.9E-01	91.81%	2.7E-03	7.23E-04	3b
BC'2 UC&DEP Not Available			2.9E-01	8.19%	2.7E-03	6.45E-05	7
CA'1 UC or DEP Available	35 DWL_B	1 La	2.0E-02	91.81%	0.97	1.78E-02	1
CA'2 UC&DEP Not Available			2.0E-02	8.19%	0.97	1.59E-03	7
CB'1 UC or DEP Available	35 DWL_B	10 La	2.0E-02	91.81%	2.7E-02	4.96E-04	3a
CB'2 UC&DEP Not Available			2.0E-02	8.19%	2.7E-02	4.42E-05	7
CC'1 UC or DEP Available	35 DWL_B	35 La	2.0E-02	91.81%	2.7E-03	4.96E-05	3b
CC'2 UC&DEP Not Available			2.0E-02	8.19%	2.7E-03	4.42E-06	7

The overall baseline conditional probabilities for Classes 3a, 3b and 7 are then calculated as follows.

- Class 3a Probability = 1.86E-2 + 7.23E-3 + 4.96E-4 = 2.63E-2
- Class 3b Probability = 1.86E-3 + 7.23E-4 + 4.96E-5 = 2.63E-3
- Change in Class 7 Probability = 2.32E-2 + 6.45E-4 + 6.45E-5 + 1.59E-3 + 4.42E-5 + 4.42E-6 = 2.55E-2

The baseline frequencies for Classes 3a, 3b and 7 are calculated by multiplying the overall conditional probabilities with the non-containment-failure (NCF) Class 1 frequency.

- Class 3a Frequency = 2.63E-2 * 3.56E-7 = 9.37E-9
- Class 3b Frequency = 2.63E-3 * 3.56E-7 = 9.37E-10
- Change in Class 7 Frequency = 2.55E-2 * 3.56E-7 = 9.09E-9

Table 4.6-2 Conditional Probability of Combined Leakage for Current Interval (Case 3)

Leakage Combinations	DW Bypass Leakage	CTMT Leakage	DW Leakage Prob	Prob of UC or DEP	CTMT Leakage Prob	Combined Prob	EPRI Class Assign-ment
AA'	1 DWL_B	1 La	0.00	NA	0.90	0.00E+00	1
AB'	1 DWL_B	10 La	0.00	NA	9.0E-02	0.00E+00	3a
AC'	1 DWL_B	35 La	0.00	NA	9.0E-03	0.00E+00	3b
BA'1 UC or DEP Available	10 DWL_B	1 La	9.3E-01	91.81%	0.90	7.72E-01	1
BA'2 UC&DEP Not Available			9.3E-01	8.19%	0.90	6.89E-02	7
BB'1 UC or DEP Available	10 DWL_B	10 La	9.3E-01	91.81%	9.0E-02	7.71E-02	3a
BB'2 UC&DEP Not Available			9.3E-01	8.19%	9.0E-02	6.88E-03	7
BC'1 UC or DEP Available	10 DWL_B	35 La	9.3E-01	91.81%	9.0E-03	7.71E-03	3b
BC'2 UC&DEP Not Available			9.3E-01	8.19%	9.0E-03	6.88E-04	7
CA'1 UC or DEP Available	35 DWL_B	1 La	6.7E-02	91.81%	0.90	5.51E-02	1
CA'2 UC&DEP Not Available			6.7E-02	8.19%	0.90	4.92E-03	7
CB'1 UC or DEP Available	35 DWL_B	10 La	6.7E-02	91.81%	9.0E-02	5.51E-03	3a
CB'2 UC&DEP Not Available			6.7E-02	8.19%	9.0E-02	4.91E-04	7
CC'1 UC or DEP Available	35 DWL_B	35 La	6.7E-02	91.81%	9.0E-03	5.51E-04	3b
CC'2 UC&DEP Not Available			6.7E-02	8.19%	9.0E-03	4.91E-05	7

The overall current case conditional probabilities for Classes 3a, 3b and 7 are then calculated as follows.

- Class 3a Probability = 0.0 + 7.71E-2 + 5.51E-3 = 8.26E-2
- Class 3b Probability = 0.0 + 7.71E-3 + 5.51E-4 = 8.26E-3
- Change in Class 7 Probability = 6.89E-2 + 6.88E-3 + 6.88E-4 + 4.92E-3 + 4.91E-4 + 4.91E-5 = 8.19E-2

The current case frequencies for Classes 3a, 3b and 7 are calculated by multiplying the overall conditional probabilities with the non-containment-failure (NCF) Class 1 frequency.

- Class 3a Frequency = 8.26E-2 * 3.56E-7 = 2.94E-8
- Class 3b Frequency = 8.26E-3 * 3.56E-7 = 2.94E-9
- Change in Class 7 Frequency = 8.19E-2 * 3.56E-7 = 2.92E-8

Table 4.6-3 Conditional Probability of Combined Leakage for Proposed Interval (Case 3)

Leakage Combinations	DW Bypass Leakage	WW Leakage	DW Leakage Prob	Prob of UC or DEP	WW Leakage Prob	Combined Prob	EPRI Class Assignment
AA'	1 DWL_B	1 La	0.00	NA	0.84	0.00E+00	1
AB'	1 DWL_B	10 La	0.00	NA	1.4E-01	0.00E+00	3a
AC'	1 DWL_B	35 La	0.00	NA	1.4E-02	0.00E+00	3b
BA'1 UC or DEP Available	10 DWL_B	1 La	9.0E-01	91.81%	0.84	6.95E-01	1
BA'2 UC&DEP Not Available			9.0E-01	8.19%	0.84	6.20E-02	7
BB'1 UC or DEP Available	10 DWL_B	10 La	9.0E-01	91.81%	1.4E-01	1.16E-01	3a
BB'2 UC&DEP Not Available			9.0E-01	8.19%	1.4E-01	1.03E-02	7
BC'1 UC or DEP Available	10 DWL_B	35 La	9.0E-01	91.81%	1.4E-02	1.16E-02	3b
BC'2 UC&DEP Not Available			9.0E-01	8.19%	1.4E-02	1.03E-03	7
CA'1 UC or DEP Available	35 DWL_B	1 La	1.0E-01	91.81%	0.84	8.10E-02	1
CA'2 UC&DEP Not Available			1.0E-01	8.19%	0.84	7.23E-03	7
CB'1 UC or DEP Available	35 DWL_B	10 La	1.0E-01	91.81%	1.4E-01	1.35E-02	3a
CB'2 UC&DEP Not Available			1.0E-01	8.19%	1.4E-01	1.21E-03	7
CC'1 UC or DEP Available	35 DWL_B	35 La	1.0E-01	91.81%	1.4E-02	1.35E-03	3b
CC'2 UC&DEP Not Available			1.0E-01	8.19%	1.4E-02	1.21E-04	7

The overall proposed case conditional probabilities for Classes 3a, 3b and 7 are then calculated as follows.

- Class 3a Probability = 0.0 + 1.16E-1 + 1.35E-2 = 1.29E-1
- Class 3b Probability = 0.0 + 1.16E-2 + 1.35E-3 = 1.29E-2
- Change in Class 7 Probability = 6.20E-2 + 1.03E-2 + 1.03E-3 + 7.23E-3 + 1.21E-3 + 1.21E-4 = 8.19E-2

The proposed case frequencies for Classes 3a, 3b and 7 are calculated by multiplying the overall conditional probabilities with the non-containment-failure (NCF) Class 1 frequency.

- Class 3a Frequency = 1. 29E-1 * 3.56E-7 = 4.61E-8
- Class 3b Frequency = 1. 29E-2 * 3.56E-7 = 4.61E-9
- Change in Class 7 Frequency = 8.19E-2 * 3.56E-7 = 2.92E-8

The class frequencies for different DWBT intervals are summarized in the following table. Class 2 and Class 6 frequencies were kept the same as the original ones without considering the DWBT intervals. Class 1 and Class 7 frequencies were calculated as follows:

- Class 1 Frequency = Original NCF Freq – (Class 3a + Class 3b + Change in Class 7)
- Class 7 Frequency = Original Class 7 + Change in Class 7

Table 4.6-4 Class Frequencies for Different DWBT Intervals (Case 3)

Class	3 in 10	1 in 10	1 in 15*
1. No failure	3.37E-07	2.95E-07	2.76E-07
2. Large Isolation Failure	4.76E-10	4.76E-10	4.76E-10
3a. Small Preexisting Liner Breach	9.37E-09	2.94E-08	4.61E-08
3b. Large Preexisting Liner Breach	9.37E-10	2.94E-09	4.61E-09
4. Small Iso Failure (Type B Test)	N/A	N/A	N/A
5. Small Iso Failure (Type C Test)	N/A	N/A	N/A
6. Containment Isolation Failure	3.77E-07	3.77E-07	3.77E-07
7. Severe Accident	2.61E-06	2.63E-06	2.63E-06
8. Bypass	N/A	N/A	N/A
Total Frequency	3.33E-06	3.33E-06	3.33E-06

4.6.2 Accident Dose Rate Calculations

As indicated before, the evaluation of the DWBT extension will use the accident dose estimates from the evaluation of the ILRT extension. The detailed calculation and a summary of the accident release (person-rem) and the risk (person-rem/year) calculated for each class is contained in Table 4.6-5 and Table 4.6-6.

Table 4.6-5 Detailed Accident Release and Risk Calculations (Case 3)

Class 1 - Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+05	3.46E+05	3.46E+05
Frequency	3.37E-07	2.95E-07	2.76E-07
Person-Rem/Yr	1.17E-01	1.02E-01	9.56E-02

Class 2 - Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	2.16E+08	2.16E+08	2.16E+08
Frequency	4.76E-10	4.76E-10	4.76E-10
Person-Rem/Yr	1.03E-01	1.03E-01	1.03E-01

Class 3a Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+06	3.46E+06	3.46E+06
Frequency	9.37E-09	2.94E-08	4.61E-08
Person-Rem/Yr	3.24E-02	1.02E-01	1.60E-01

Class 3b Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	1.21E+07	1.21E+07	1.21E+07
Frequency	9.37E-10	2.94E-09	4.61E-09
Person-Rem/Yr	1.14E-02	3.57E-02	5.59E-02

Class 6 Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+07	3.46E+07	3.46E+07
Frequency	3.77E-07	3.77E-07	3.77E-07
Person-Rem/Yr	1.31E+01	1.31E+01	1.31E+01

Class 7 Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+07	3.46E+07	3.46E+07
Frequency	2.61E-06	2.63E-06	2.63E-06
Person-Rem/Yr	9.03E+01	9.10E+01	9.10E+01

Change in Class 7 Person-Rem/Yr Calculation

	Base Case	1 in 10	1 in 15*
Person-Rem	3.46E+07	3.46E+07	3.46E+07
Frequency	9.09E-09	2.92E-08	2.92E-08
Person-Rem/Yr	3.15E-01	1.01E+00	1.01E+00

Table 4.6-6 Summary of Accident Release and Risk Calculations (Case 3)

Class	Base	1 in 10	1 in 15*
1. No failure	1.17E-01	1.02E-01	9.56E-02
2. Large Isolation Failure	1.03E-01	1.03E-01	1.03E-01
3a. Small Preexisting Liner Breach	3.24E-02	1.02E-01	1.60E-01
3b. Large Preexisting Liner Breach	1.14E-02	3.57E-02	5.59E-02
4. Small Iso Failure (Type B Test)	N/A	N/A	N/A
5. Small Iso Failure (Type C Test)	N/A	N/A	N/A
6. Containment Isolation Failure	1.31E+01	1.31E+01	1.31E+01
7. Severe Accident	9.03E+01	9.10E+01	9.10E+01
8. Bypass	N/A	N/A	N/A

	Base	1 in 10	1 in 15*
TOTAL Person-Rem/Yr:	1.036E+02	1.044E+02	1.045E+02
Change from BaseLine Person-Rem/yr		7.74E-01	8.46E-01
Change from 1 in 10 to 1 in 15*:			7.16E-02
% increase from Base:		0.75%	0.82%
% Change from 1 in 10 to 1 in 15*:			**0.07%**
ILRT Contribution	0.35%	1.10%	1.17%

4.6.3 Changes in LERF and CCFP Calculations

The change in LERF for extending the DWBT interval is the increase due to the change in the large pre-existing leak class, Class 3b, and the increase in the portion of Class 7 due to DWBT. As in the previous evaluations, the Class 3a leak size is too small to be considered a LERF. This increase is documented below.

Table 4.6-7 Change in LERF (Case 3)

	Base	1 in 10	1 in 15*
Class 3b Frequency	9.37E-10	2.94E-09	4.61E-09
Change in Class 7 Frequency	9.09E-09	2.92E-08	2.92E-08
Total LERF	1.00E-08	3.21E-08	3.38E-08
Change from Base		2.21E-08	2.38E-08
Change from 1 in 10 to 1 in 15*			1.67E-09

The change in CCFP is considered to be the change in containment failure probability given an accident. This can be calculated as follows:

CCFP = 1 – (Frequency of NCF) / CDF
Frequency of NCF = Class 1 frequency + Class 3a frequency

The calculations for each DWBT option are summarized below.

Table 4.6-8 Change in CCFP (Case 3)

	Class 1 Freq	Class 3a Freq	NCF Freq	Total CDF	CCFP	Change from base	Change from Current
Baseline	3.37E-07	9.37E-09	3.46E-07	3.33E-06	89.61%		
1 in 10	2.95E-07	2.94E-08	3.24E-07	3.33E-06	90.28%	0.66%	
1 in 15*	2.76E-07	4.61E-08	3.22E-07	3.33E-06	90.33%	0.71%	0.05%

4.6.4 Summary of Case 3 Results

Table 4.6-9 provides a summary of the results for the extension of the DWBT frequency (in conjunction with the ILRT extension) for Case 3.

Table 4.6-9 Summary of DWBT Extension Evaluation Case 3 Results

	3 in 10yr	1 in 10yr	1 in 15*yr
Total Risk	103.6	104.4	104.5
DWBT/ILRT Risk Contribution (%)	0.35%	1.10%	1.17%
% Change from Base		0.75%	0.82%
% Change from Current			0.07%
LERF value due to DWBT/ILRT	1.00E-08	3.21E-08	3.38E-08
Change from Base		2.21E-08	2.38E-08
Change from Current			1.67E-09
CCFP	89.61%	90.28%	90.33%
Change from Base		0.66%	0.71%
Change from Current			0.05%

Based on the above results, the extension of the DWBT (in conjunction with an extension of the ILRT) surveillance interval from the current interval of once in 10 years to once in 15 years and 8 months does not pose a significant increase in risk to the public. The LERF value is within Region 3 of Regulatory Guide 1.174 (very small) guidance and is considered acceptable.

4.7 Results Summary

Tables 4.7-1 through 4.7-3 provide a summary of all the DWBT (in conjunction with an extension of the ILRT) extension evaluation cases.

Table 4.7-1 Summary of DWBT Extension Evaluation Results (Total Risk)

Case #	Total Risk (Person-Rem/yr)			DWBT/ILRT Contribution			% Change from Base		% Change from Current
	Base (3 in 10)	Current (1 in 10)	Proposed (1 in 15*)	Base (3 in 10)	Current (1 in 10)	Proposed (1 in 15*)	Current (1 in 10)	Proposed (1 in 15*)	
1	103.6	104.4	105.0	0.33%	1.09%	1.68%	0.75%	1.35%	0.59%
2	106.4	113.2	113.3	2.98%	8.90%	8.92%	6.43%	6.45%	0.01%
3	103.6	104.4	104.5	0.35%	1.10%	1.17%	0.75%	0.82%	0.07%

Table 4.7-2 Summary of DWBT Extension Evaluation Results (LERF)

Case #	LERF due to DWBT/ILRT			Change from Base		Change from Current
	Base (3 in 10)	Current (1 in 10)	Proposed (1 in 15*)	Current (1 in 10)	Proposed (1 in 15*)	
1	9.56E-09	3.17E-08	4.94E-08	2.21E-08	3.99E-08	1.77E-08
2	9.12E-08	2.91E-07	2.91E-07	2.00E-07	2.00E-07	3.35E-10
3	1.00E-08	3.21E-08	3.38E-08	2.21E-08	2.38E-08	1.67E-09

Table 4.7-3 Summary of DWBT Extension Evaluation Results (CCFP)

	CCFP			Change from Base		Change from Current
	Base (3 in 10)	Current (1 in 10)	Proposed (1 in 15*)	Current (1 in 10)	Proposed (1 in 15*)	
1	89.60%	90.26%	90.80%	0.66%	1.20%	0.53%
2	92.05%	98.04%	98.05%	5.99%	6.00%	0.01%
3	89.61%	90.28%	90.33%	0.66%	0.71%	0.05%

5.0 Monitoring Drywell Leakage

On January 29, 1996, the NRC issued an amendment to the RBS (Amendment 87 to Facility Operating License No. NPF-47 Docket No. 50-458) that revised the TS SR 3.6.5.1.3 to allow a performance-based drywell bypass leakage surveillance test. Per the NRC request, RBS committed to qualitatively assess the leaktightness of the drywell once each operating cycle.

The assessment is performed once each cycle. It involves trending drywell pressure vs. containment pressure. Because of normal air system leakage in containment, RBS must periodically vent the containment. By trending drywell pressure changes vs. containment pressure changes and observing the time it takes for the pressure to recover, a gross evaluation of drywell integrity is determined. This assessment provides reasonable assurance that the drywell can perform its safety function; that is, remain operable.

6.0 Conclusion

An evaluation of extending the RBS ILRT and DWBT surveillance frequencies from once in 10 years to once in 15 years and 8 months has been performed using the modified GGNS DWBT evaluation methodologies which were based on the ILRT methodologies. This evaluation assumed that the DWBT frequency was being adjusted in conjunction with the ILRT frequency, which has already been extended to once in 15 years at RBS. Three cases, one base case and two sensitivity cases, have been analyzed. The case descriptions are provided in Section 4.3.2. A summary of the results from all cases is provided in Section 4.7.

The change from the previous interval (1 in 10 years) to the proposed one (1 in 15 years and 8 months) is not risk significant based on the guidance of Regulatory Guide 1.174. The resulting changes in the three risk metrics are summarized as follows:

- The maximum total dose risk percentage change for Cases 1 through 3 is 0.59%.
- The maximum LERF change due to DWBT/ILRT interval extension for Cases 1 through 3 is 1.77E-8/yr.
- The maximum CCFP change due to DWBT/ILRT interval extension for Cases 1 through 3 is 0.53%.

The most realistic case is Case 1 with the modified NEI interim guidance method. Based on the Case 1 results, the change from the baseline interval (3 in 10 years) to the proposed one (1 in 15 years and 8 months) is not risk significant with the resulting changes in the three risk metrics as follows:

- The total dose risk percentage change for Case 1 is 1.35%.
- The LERF change due to DWBT/ILRT interval extension for Case 1 is 3.99E-8/yr.
- The CCFP change due to DWBT/ILRT interval extension for Case 1 is 1.20%.

Therefore, the results from these analyses indicate that the proposed extension of the DWBT frequency has a minimal impact on plant risk and is acceptable.

7.0 REGULATORY ANALYSIS

7.1 Applicable Regulatory Requirements/Criteria

The proposed changes have been evaluated to determine whether applicable regulations and requirements continue to be met.

Entergy has determined that the proposed changes do not require any exemptions or relief from regulatory requirements, other than the TS, and do not affect conformance with any General Design Criterion (GDC) differently than described in the Updated Safety Analysis Report (USAR.)

The requirement to perform a drywell bypass leakage rate test is derived from 10 CFR 50.36. 10 CFR 50.36(c)(3), "Surveillance requirements," requires the inclusion in the TS, "tests, calibrations or inspections to assure that the necessary quality of systems and components is maintained, that facility operation will be with safety limits, and that the limiting conditions for operation will be met."

10 CFR 50.36(c)(5), "Administrative controls," requires that "provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner" will be included in the TS. The Appendix J Testing Program is included in this section. 10 CFR 50, Appendix J, Option B, Section V.B, "Implementation" requires that the implementation document used to develop a performance-based leakage testing program be included by general reference in the TS.

As the proposed change is for test interval extensions, Entergy is justifying the request on a risk-informed basis in accordance with Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis." The proposed change has been found to satisfy the key principles identified in RG 1.174 for risk-informed changes. Those principles are;

- the change satisfies current regulations
- the change is consistent with the defense-in-depth philosophy
- the change maintains sufficient safety margins
- the increase in risk is small and is consistent with the NRC Safety Goal Policy Statement
- the impact of the proposed change will be monitored using performance measurement strategies (as a part of the current performance-based testing program).

7.2 No Significant Hazards Consideration

Entergy Operations, Inc. has evaluated whether or not a significant hazards consideration is involved with the proposed amendments by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

Entergy Operations, Inc. is proposing to revise the RBS Operating License to change Technical Specification 5.5.13 to modify the exception to the commitment to follow the

guidelines of Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program." The exception is taken to the interval guidance in NEI 94-01, Revision 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR 50, Appendix J." The NEI document is endorsed in the regulatory guide. The effect of this request will be an extension of the test interval from 15 years 4 months to 15 years and 8 months.

Entergy Operations, Inc. has evaluated whether or not a significant hazards consideration is involved with the proposed amendments by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed amendment to TS 5.5.13 allows a one-time extension to the current interval for the ILRT. The current interval of 15 years 4 months, based on past performance, would be extended on a one-time basis to 15 years and 8 months from the date of the last test. The proposed extension to the ILRT cannot increase the probability of an accident since there are no design or operating changes involved and the test is not an accident initiator. The proposed extension of the test interval does not involve a significant increase in the consequences since analysis has shown that, the proposed extension of the ILRT and DWBT frequency has a minimal impact on plant risk. Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The proposed extension to the interval for the ILRT does not involve any design or operational changes that could lead to a new or different kind of accident from any accidents previously evaluated. The tests are not being modified, but are only being performed after a longer interval. The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   An evaluation of extending the ILRT DWBT surveillance frequency from once in 10 years to once in 15 years and 8 months has been performed using methodologies based on the approved ILRT methodologies. This evaluation assumed that the DWBT frequency was being adjusted in conjunction with the ILRT frequency. This analysis used realistic, but still conservative, assumptions with regard to developing the frequency of leakage classes associated with the ILRT and DWBT. The results from

this conservative analysis indicates that the proposed extension of the ILRT frequency has a minimal impact on plant risk and therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, Entergy concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

7.3 Environmental Considerations

The proposed amendment does not involve, (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

8.0 PRECEDENCE

This request is based on a request that extended the DWBT interval for RBS from once in ten years to once in 15 years (Reference 2) and a subsequent request which extended the ILRT test interval from once in 15 years (Reference 3) to once in 15 years and 4 months.

9.0 REFERENCES

1. Letter from Mr. J. C. Roberts to USNRC Dated May 12, 2003 -- One-time Extension of the Integrated Leak Rate Test and Drywell Bypass Test for Grand Gulf Nuclear Station (TAC No. MB8940).

2. License Amendment Request (LAR 2004-02) Dated February 16, 2004, for a One-time Extension of the RBS Drywell Bypass Test Interval (TAC No. MC2071)

3. License Amendment Request (LAR 2005-01) Dated March 8, 2005, for a One-time Extension of the RBS Integrated Leak Rate Test Interval (TAC No. MC6328).

Attachment 2

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Containment Evaluation

REFERENCES:

1. License Amendment Request (LAR 2005-01) Dated March 8, 2005, for a One-time Extension of the Integrated Leak Rate Test Interval (TAC No. MC6328)

2. Supplement to Amendment Request LAR 2005-01 Dated January 17, 2006, for a One-time Extension of the Integrated Leak Rate Test Interval (TAC No. MC6328)

3. NRC Approval Dated February 9, 2006, of Additional Extension of Appendix J, Type A Integrated Leakage Rate Test Interval (TAC NO. MC6328 / Amendment 150).

In Amendment 150 (Ref. 3) NRC approved a 4 month extension to the ILRT interval for River Bend Station. This attachment provides supplemental information related to the Containment ISI Program and the Appendix J Program, corresponding to Reference 2 supporting Amendment 150.

The summary below provides a status of the program subsequent to these submittals.

1. Changes to the Containment ISI Program

There have been no changes to the Containment ISI Program since the supplemental information (Ref. 2) was provided to support the previous submittal (Ref. 1). However, it is anticipated that the current Containment ISI interval will be extended as allowed under 10CFR50.55a and IWE-2412 to coincide with the proposed date for completing RF 14.

2. Containment Inspection (Appendix J & Containment ISI Required Examination and Testing)

Since the previous submittal (Ref. 1) and the supplemental information (Ref. 2), no General Visual Examinations of the containment surfaces were performed. In accordance with RG 1.163, this General Visual Examination of both containment surfaces must be performed three times during a 10-year testing interval and one of them must be conducted prior to an ILRT. For the current interval, RBS has performed two inspections and the third inspection will be performed during the coming refueling outage (RF 14) prior to the ILRT.

The last containment inspection was performed in RF 12, October 2004, and no indications or problems were found.

3. Bellows Testing

No test was performed for bellows since the previous submittal (Ref. 1) and the supplemental information (Ref. 2). The next bellows tests will be performed in the coming refueling outage (RF 14).

Attachment 3

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Proposed Technical Specification Change

5.5 Programs and Manuals

5.5.11 Technical Specifications (TS) Bases Control Program (continued)

c. The Bases Control Program shall contain provisions to ensure that the Bases are maintained consistent with the USAR.

d. Proposed changes that do not meet the criteria of either Specification 5.5.11.b.1 or Specification 5.5.11.b.2 above shall be reviewed and approved by the NRC prior to implementation. Changes to the Bases implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71(e).

5.5.12 DELETED

5.5.13 Primary Containment Leakage Rate Testing Program

A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, except that the next Type A test performed after the August 15, 1992, Type A test shall be performed no later than ~~December 14, 2007~~ (APRIL 14, 2008).

The peak calculated containment internal pressure for the design basis loss of coolant accident, P_a, is 7.6 psig.

The maximum allowable primary containment leakage rate, L_a, at P_a, shall be 0.325% of primary containment air weight per day.

The Primary Containment leakage rate acceptance criterion is $\leq 1.0\ L_a$. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are $\leq 0.60\ L_a$ for the Type B and Type C tests and $\leq 0.75\ L_a$ for Type A tests.

The provisions of SR 3.0.2 do not apply to test frequencies specified in the Primary Containment Leakage Rate Testing Program.

The provisions of SR 3.0.3 are applicable to the Primary Containment Leakage Rate Testing Program.
