May 18, 2010

MEMORANDUM TO: Timothy R. Lupold, Chief
Piping and NDE Branch
Division of Component Integrity
Office of Nuclear Reactor Regulation

FROM: John C. Tsao, Sr. Materials Engineer ***/RA/***
Piping and NDE Branch
Division of Component Integrity
Office of Nuclear Reactor Regulation

SUBJECT: STAFF RESPONSE TO PULBIC COMMENTS ON DRAFT REGULATORY INFORMATION SUMMARY ON REGULATORY REQUIREMENTS FOR APPLICATION OF WELD OVERLAYS AND OTHER MITIGATION TECHNIQUES IN LEAK BEFORE BREAK PIPING (TAC No. ME1040)

The U.S. Nuclear Regulatory Commission (NRC) staff met with the industry in the NRC headquarters on February 26, 2010 to discuss the subject draft Regulatory Issue Summary (RIS) and to seek public comments. Mr. James Riley of Nuclear Energy Institute provided comments in his presentation slides (Agencywide Documents Access and Management System (ADAMS) Accession Number ML100640114). Mr. William Sims of Entergy provided his comments in a written document (ADAMS Accession Number ML100620170). The NRC staff also recorded comments from meeting attendees as shown in the enclosure.

Enclosed is the NRC staff's response to the public comments. The NRC staff will revise the draft RIS based on the public comments and will include the response as part of the final version of the RIS.

Enclosures:
1. Staff Response to Public Comments
2. Public Comments

CONTACT: John C. Tsao, NRR/DCI
301-415-2702

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STAFF RESPONSE TO PUBLIC COMMENTS ON DRAFT REGULATORY ISSUE SUMMARY 2010-XX REGULATORY REQUIREMENTS FOR APPLCIATION OF WELD OVERLAYS AND OTHER MITIGATION TECHNIQUES IN PIPING SYSTEMS APPROVED FOR LEAK-BEFORE-BREAK

The U.S. Nuclear Regulatory Commission (NRC) staff met with the industry in the NRC headquarters on February 26, 2010 to discuss the subject draft Regulatory Issue Summary (RIS) and to seek public comments. Mr. James Riley of Nuclear Energy Institute provided comments in his presentation slides (Agencywide Documents Access and Management System (ADAMS) Accession Number ML100640114). Mr. William Sims of Entergy provided his comments in a written document (ADAMS Accession Number ML100620170). The NRC staff also recorded comments raised by meeting attendees during the public meeting as presented in Enclosure 2.

Some comments from different commenters are similar in nature and are grouped as one comment. The comments are divided into technical issues and regulatory issues. The comments are valuable and helpful for the NRC staff to revise the draft RIS. The NRC staff response will be placed in the public domain via the ADAMS and referenced in the final version of the RIS.

BACKGROUND

10 CFR 50, Appendix A, General Design Criterion (GDC) 4 allows the use of analyses reviewed and approved by the Commission to eliminate from the design basis the dynamic effects of the pipe ruptures postulated in Standard Review Plan (SRP) Section 3.6.2. The staff reviews and approves the plant-specific piping system submitted from licensees and applicants to eliminate these dynamic effects. A staff approved leak-before-break (LBB) analysis permits licensees to remove protective hardware such as pipe whip restraints and jet impingement barriers, redesign pipe connected components, their supports and their internals, and other related changes in operating plants. The staff's review ensures that adequate consideration has been given to direct and indirect pipe failure mechanisms and other degradation sources which could challenge the integrity of piping. The staff reviews the direct pipe failure mechanisms and fracture mechanics analyses.

Approval of the elimination of dynamic effects from postulated pipe ruptures is obtained individually for particular piping systems at specific nuclear power units. LBB is applicable only to an entire piping system or analyzable portion thereof. LBB cannot be applied to individual welded joints or other discrete locations. Analyzable portions are typically segments located between piping anchor points. When LBB technology is applied, all potential pipe rupture locations are examined. The examination is not limited to those postulated pipe rupture locations determined from SRP Section 3.6.2.

COMMENTS ON TEHNICAL ISSUES

Public Comment Number 1
On his presentation slide number 3, Mr. Riley stated that the original leak before break (LBB) evaluations analyzed limiting locations which were selected based on worst stresses and material properties (not on margins). In general applying a weld overlay reduced the tensile stresses to a compressive state and improves material properties.

Mr. Sims, on page 3 of his comments, and Mr. Riley, on his presentation slide number 8, noted that RIS Section 8 states that "critical locations would generally include the locations that have the least favorable combination of stress and material properties for base metal, weldments, nozzles and safe ends relative to the leakage and fracture mechanics margins." Mr. Sims stated that per standard review plan (SRP) Sections 3.6.3.III.11(c)(ii) and (iii), the critical locations are always the ones with least favorable stress and material properties with no mention of the relativity to leakage and fracture mechanics margins.

NRC Response:
The NRC staff will remove "generally" from the above statement in RIS Section 8.

SRP Section 3.6.3 identifies an acceptable deterministic LBB evaluation procedure for staff use in evaluating a licensee's LBB analysis. As part of this procedure, for each pipe size in the piping system, the location(s) that have the least favorable combination of stress and material properties for base metal, weldments, nozzles, and safe ends are identified and this/these location(s) are evaluated to ensure the LBB margins for break size and leakage detection are met. This procedure is appropriate when the population of welds is basically the same configuration and the degradation mechanism is the same, such as fatigue, and would bound the locations ensuring the worst case location is analyzed.

However, when a weld overlay is applied to a weld to mitigate PWSCC, this has the potential to change several aspects critical to the LBB evaluation. As SRP Section 3.6.3 states, when LBB technology is applied, all potential pipe rupture locations are examined. Therefore, the locations where weld overlays are applied to mitigate PWSCC need to be analyzed to confirm the welds still meet the required margins for LBB as set forth in SRP Section 3.6.3. Each licensee bears the responsibility for maintaining a current LBB analysis. When changes are needed, the licensee must assess, through the 50.59 process, the need to submit the evaluation to the NRC.

SRP Section 3.6.3.III.11(C)(ii) provides guidance for the review of a licensee LBB analysis to specify the type and magnitude of the loads applied to the piping system, the sources of loads, and method of load combination. For each pipe size in the piping system, the reviewer is to identify the locations(s) that have the least favorable combination of stress and material properties for base metal, weldments, nozzles, and safe ends. SRP Sections 3.6.3.III.11(c)(iii), (iv), (v) specify the margins for leakage, crack size, and load combinations, respectively. The intent of these SRP Sections is to ensure that the lowest (worst) margins of all pipe locations will satisfy the safety margins. The NRC-approved LBB evaluations obtained the lowest and bounding margins for the critical pipe locations to satisfy SRP Section 3.6.3. However, after the weld overlay application, the affected licensees should demonstrate by analysis that the overlaid dissimilar metal weld (DMW) still satisfies the safety margins of SRP Section 3.6.3.

SRP Section 3.6.3.III.11.(C). provides guidance to the staff that the least favorable combination of stress and material properties for base metal, weldments, nozzles, and safe ends needs to satisfy: (a) the leakage from the leakage crack size should be 10 times greater than the minimum leakage the detection system is capable of sensing (a minimum margin of 10 on leakage), (b) the critical crack size should be more than two times than the leakage crack size (a minimum margin of 2 on crack size), and (c) the leakage crack size should not become unstable if 1.4 times the normal plus safe shutdown earthquake loads are applied. The 1.4 margin should be reduced to 1.0 if the deadweight, thermal expansion, pressure, safe shutdown earthquake, and seismic anchor motion loads are combined on individual absolute values.

Public Comment Number 2
On his presentation slide number 4, Mr. Riley, and on page 2 of his comments, Mr. Sims stated that the RIS states that an overlay invalidates or makes the analysis obsolete. The commenters requested the NRC staff clarify whether the entire analysis or only parts of the original LBB evaluation is/are obsolete. The draft RIS implies that every weld in LBB piping needs to be analyzed; however, the original analysis was not performed that way. Mr. Sims stated that the original LBB analysis may still be bounding.

NRC Response:
The NRC staff did not intend to imply that the entire original LBB evaluation is obsolete or invalid as a result of the weld overlay installation on LBB piping. The NRC staff will delete “obsolete” and “invalidate” from the draft RIS. The intent of the RIS is to alert the affected licensees that they need to perform an LBB evaluation to demonstrate that the overlaid DMW in LBB piping satisfies the safety margins of SRP Section 3.6.3.

Public Comment Number 3
In his presentation slide number 4, Mr. Riley, and on page 4 of his comments, Mr. Sims asked the NRC staff to clarify a statement in Section 9 of the draft RIS which states that the LBB evaluation for weld overlays represents a departure from the original LBB methodology.

NRC Response:
In the original LBB evaluation, primary water stress corrosion cracking (PWSCC) was not considered as a degradation mechanism and fatigue was the only degradation mechanism considered and analyzed. Also, the crack model considered only a single material.

The overlaid DMW in LBB piping should be evaluated considering a crack propagating through two different materials—the nickel-based Alloy 52 or 52M weld overlay and the underlying nickel-based Alloy 82/182 DMW. The crack model may need to assume two different degradation mechanisms. The degradation mechanism in the weld overlay will most likely be fatigue because Alloy 52 of the overlay is less susceptible to PWSCC. In the underlying DMW, the degradation mechanism could be fatigue as well as PWSCC, based on operating experience,.as the weld overlay may mitigate, but not completely eliminate, PWSCC. The LBB evaluation should evaluate different material properties and different crack morphology (fatigue and PWSCC) for the crack in the overlaid DMW.

The crack morphology and model between the original LBB evaluation and the evaluation for the overlaid DMW would be different if PWSCC is assumed. Therefore, the LBB evaluation for the overlaid DMW would be different than welds previously evaluated for LBB. The analysis

would thus be a departure from the original LBB evaluation and require a different methodology for evaluation.

Public Comment Number 4
On his presentation slide number 5, Mr. Riley and on page 4 of his comments, Mr. Sims stated that weld overlays mitigate stress corrosion cracking (SCC). If SCC is mitigated, the LBB analysis for an overlay should not have to assume SCC. This would allow licensees to use the original LBB evaluation and crack assumptions. Therefore, this would result in no change in methodology.

NRC Response:
In NRC-approved weld overlay relief requests, the weld overlay design requires crack growth calculations be performed to assess the potential future condition of the overlaid DMW, considering a postulated or actual crack(s) in the original DMW after overlay installation based on PWSCC and fatigue degradation mechanisms. If the DMW was inspected before full structural weld overlay installation and no crack was detected in the original DMW, a flaw of 10 percent depth should be assumed to perform the required crack growth calculation. The 10-percent depth flaw is based on the limitation in the qualification procedures for ultrasonic testing in accordance with the ASME Code, Section XI, Appendix VIII. If a flaw is detected in the original DMW during the pre-installation inspection, the licensee should use the actual depth of the detected flaw to calculate the crack growth. If a pre-installation inspection was not performed, the licensee needs to postulate an initial crack of 75 percent depth in the DMW. After a full structural weld overlay is installed on a DMW, ultrasonic examination of the overlaid DMW is not qualified and will not be able to detect the inner 75 percent region of the DMW thickness. Therefore, the condition in that region of the DMW will not be able to be monitored. By the same token, an LBB evaluation of the overlaid DMW should also assume and include PWSCC in the leakage crack size calculation.

The NRC staff recognizes that the weld overlay will mitigate PWSCC. However, the NRC staff does not believe that once the weld overlay is installed, PWSCC would disappear from the overlaid DMW because Alloy 82/182 weld metal still exists in the LBB piping after weld overlay installation and the crack in the DMW may be in contact with the primary system coolant. The NRC staff believes that there is a probability that the crack in the overlaid DMW may propagate by PWSCC mechanism after the overlay installation. Therefore, PWSCC needs to be evaluated as part of the LBB evaluation.

If the Alloy 82/182 weld metal is completely removed from a DMW and replaced with a weld metal that is less susceptible to PWSCC, PWSCC need not be considered in the LBB evaluation.

Public Comment No. 5
On page 3 of his comments, Mr. Sims questioned the statement in RIS section 7 that reads: “The ASME Code, Section III or XI, does not contain rules for the installation of weld overlays, inlays and onlays.” Mr. Sims stated that a public meeting was held in September 2008 with the NRC providing the ASME Code requirements for a cladding onlay. ASME section XI Code Case N-766 is in the approval process to provide additional guidance for inlays and onlays. On his presentation slide number 8, Mr. Riley also provided a similar comment.

NRC Response:
The NRC staff agrees with the commenters that the ASME Code contains requirements for a cladding onlay and will revise the draft RIS accordingly. The NRC staff notes that it has not approved Code Case N-766, "Nickel Alloy Reactor Coolant Inlay and Onlay for Mitigation of PWR Full Penetration Circumferential Nickel Alloy welds in Class 1 Items Section XI, Division 1" in Regulatory Guide 1.147 at this time.

Public Comment Number 6
On page 3 of his comments, Mr. Sims questioned the statement in RIS section 8 that states that the addition of the weld overlay may change the deadweight loading or the flexibility of the piping system. The commenter stated that applying a weld overlay is adding less than 800 pounds to the piping system and is insignificant compared to the several tons of the piping weight. Additionally, stiffening localized areas of large diameter pipe will have an insignificant impact on the natural frequency of the system and seismic response. The commenter stated further that making the piping system stronger does not invalidate the original LBB analysis.

NRC Response:
The NRC staff agrees with the commenter that 800 pounds of the weld overlay may not affect the piping loads of a large diameter piping (e.g., 30-inch diameter pipe) which is much heavier than 800 pounds. The specific statement in RIS Section 8 reads: "…Recalculation of the piping and nozzle stresses would be needed if the addition of weld overlays substantially changes the deadweight loading or the flexibility of the piping system…". The intent of the statement is that a licensee needs to assess the impact of the weight of the weld overlay on the piping system in accordance with SRP Section 3.6.3. The piping loads used in the original LBB evaluation should be reviewed to determine whether they have been changed. If the piping loads are changed due to the weight of the weld overlay, the margins in the original LBB evaluation may be changed also. The NRC staff believes that when a weld overlay is applied to LBB piping, a licensee needs to re-evaluate the original LBB evaluation to determine by analysis if the overlaid DMW satisfies the safety margins of SRP 3.6.3.

Public Comment Number 7
On page 4 of his comments, Mr. Sims questioned a statement in RIS Section 9 that reads:"...the licensee will have to revise the LBB analysis…". Mr. Sims stated that it is the licensee's responsibility to review the existing LBB analysis to determine if a reanalysis is required and if there is a methodology change. If there is not, an overlay can be installed [for the purposes of maintaining LBB criteria] per Title 10 of the *Code of Federal* Regulations (10 CFR) 50.59.

In addition, Mr. Sims stated that introducing a different material type not previously analyzed having different crack morphologies does not constitute a change in an NRC approved method. Mr. Sims stated further that there are two criteria in Section 4.3.8 of NEI 96-07, ["Guidelines for 10 CFR 50.59 Implementation,"] that would constitute a departure from a method of evaluation. There are no aspects of the [crack] model that have been revised and they [crack models] are generally consistent with that previously approved by the NRC staff. The application of an Alloy 82/182 material with different crack morphology is not an NRC specified input value and does not affect the previously approved analysis.

NRC Response

The NRC staff agrees with Mr. Sims that it is the licensee's responsibility to review the original plant-specific LBB analysis to determine if a reanalysis is required and if there is a methodology change as a result of applying a weld overlay on LBB piping. The intent of the RIS is to clarify what constitutes a change in the LBB methodology and whether a reanalysis is needed. It is the NRC's responsibility to ensure that licensees comply with the LBB regulations.

The NRC staff believes that when a weld overlay is installed on LBB piping, the original LBB methodology will need to be changed because the original LBB methodology did not consider PWSCC as a degradation mechanism and did not consider the effect of Alloy 52 weld overlay on Alloy 82/182 DMW. In calculating critical and leakage crack sizes, the original LBB evaluation considered only base metal. Once a weld overlay is installed on the DMW, the impact of the Alloy 52 weld overlay on Alloy 82/182 weld metal needs to be considered in calculating critical crack and leakage crack sizes. The methodology in the original LBB evaluation would not be applicable to analyze an overlaid DMW because it did not include the appropriate crack model and morphology to analyze the impact of the Alloy 52 weld overlay on the DMW and on the LBB piping. Therefore, the methodology in the original LBB evaluation would be different from a LBB methodology used to analyze the overlaid DMW.

The previously NRC-approved LBB evaluations did not consider PWSCC in the Alloy 82/182 DMW because in the 1980's and 1990's, PWSCC had not been identified as a degradation mechanism for Alloy 82/182 weld metal. However, PWSCC has been found to be a degradation mechanism for Alloy 82/182 weld metal; therefore, PWSCC needs to be addressed in the analysis of an overlaid Alloy 82/182 DMW. A licensee needs to perform an LBB evaluation of the overlaid DMW to determine whether the weld overlay application will or will not affect the original LBB evaluation.

The NRC staff cannot comment on NEI 96-07 because it is not a part of the NRC's LBB regulation. The NRC staff will revise the RIS to clarify this position.

Public Comment Number 8

During the public meeting, a commenter stated that from material properties, the stresses in the DMW should be lower. The thicker pipe after weld overlay would lead to higher margin. The original LBB evaluation should bound the weld overlay application and should not require revision as a result of the weld overlay.

A commenter stated that a stress analysis was performed to find the highest stress location coincident with the poorest material properties. These locations were then selected to postulate a through-wall flaw and finally the SRP Section 3.6.3 margins were calculated for the selected locations. It appears that neither the industry nor the NRC attempted to perform the analyses in the reverse approach of determining the lowest stability margins regardless of stress and material properties as discussed in the draft RIS. The premise behind LBB is that it will take high stress to initiate and propagate a flaw. It appears that the draft RIS as written is in error with the guidance in SRP Section 3.6.3. It would have taken an exhaustive number of fracture mechanics iterations to determine the lowest SRP Section 3.6.3 margins in these analyses. Analyzing the lowest stress, thickest and/or strongest joint could reduce the calculated SRP Section 3.6.3 margins; however, these locations are the least likely to crack and did not require fracture mechanics analyses originally and should not now.

NRC Response
The NRC staff did not intend for licensees to perform exhaustive fracture mechanics calculations and iterations of all points in the LBB pipe. However, General Design Criterion 4 in 10 CFR 50 Appendix A requires that LBB piping must have an extremely low probability of rupture. To demonstrate the extremely low probability of pipe rupture, all points of the LBB pipe should satisfy the safety margins of SRP Section 3.6.3. As SRP Section 3.6.3 states, when LBB technology is applied, all potential pipe rupture locations are examined. In NRC-approved LBB evaluations, licensees in general pick several pipe locations with unfavorable material properties and high stresses to perform fracture mechanics calculation to demonstrate that all locations in the LBB pipe satisfy SRP Section 3.6.3. The LBB regulation does not specify the number of pipe locations to be analyzed. The NRC staff's expectation is that the lowest (worst) margins on crack size and leak rate reported in an LBB evaluation bound all locations in the LBB pipe.

It is possible that the overlaid DMW location may not exhibit margins lower than the lowest (worst) margins reported in the original LBB evaluation because it has been overlaid with extra layers of weldment. However, the licensee is responsible to demonstrate by analysis that the margins at the overlaid DMW location satisfy the margins of SRP Section 3.6.3.

Public Comment Number 9
On his presentation slide number 7, Mr. Riley asked the NRC staff when the Davis Besse LBB license amendment request (LAR) will be approved and will it be a generic approval. If the Davis Besse LAR is approved generically and other licensees can use it, the commenter asked that if a licensee changes input parameters (e.g., leakage detection threshold) from the Davis Besse LAR would that be considered a change in methodology.

In the public meeting, a commenter asked whether a change in the leakage detection capability is considered to be a change in the methodology.

In the public meeting, a commenter stated that the RIS should describe how a change in input parameters leads to a change in the LBB methodology, how a change in the LBB methodology leads to a change in the license basis, and how a change in the license basis leads to requiring a LBB amendment be submitted. The commenter remarked that the RIS is not clear regarding "a change in the methodology."

NRC Response:
By letter dated March 24, 2010, the NRC staff approved the updated LBB evaluation for the weld overlay of the reactor coolant pump nozzles at Davis Besse Nuclear Power Station (Agencywide Documents Access and Management System (ADAMS) Accession number ML100640506). Licensees may use the methodology in the Davis Besse's updated LBB evaluation and review the NRC's safety evaluation as a guide to update their LBB evaluations.

The NRC staff defines the "methodology" to include mathematical equations, crack modeling, assumptions, and certain input parameters that are used to satisfy the LBB analysis specifications in SRP Section 3.6.3. Any changes to these items in the original LBB evaluation to evaluate the overlaid DMW would be considered as a change in the LBB methodology. The NRC staff does not believe the methodology used in the original LBB evaluation can be used to analyze the overlaid DMW without modifications. For example,

Modeling of surface roughness and number of turns for the leakage crack in the overlaid DMW that were not modeled in the original LBB evaluation is considered a change in input parameters, which in this case is a change in the methodology. However, changes to the pipe diameters, thickness, and material properties are not a change in the methodology.

Crack modeling through the weld overlay and underlying DMW should be different from the crack model of the pipe in the original LBB evaluation. This is a change in the methodology.

Use of different surface roughness values and different number of turns for a PWSCC crack in the DMW instead of a fatigue crack in the original LBB evaluation constitutes a change in the methodology because the original LBB evaluations do not consider PWSCC cracks.

A change in the reactor coolant system leakage detection capability is not considered to be a change in the methodology. However, it is a change that needs to be assessed under 10CFR50.59 to determine if a license amendment request needs to be submitted. Also, licensees have submitted license amendment requests regarding changes to the reactor coolant leakage detection systems in their plant technical specifications that affect the original LBB evaluation. For example, the NRC staff has reviewed license amendment requests as a result of technical specification changes in which the plant-specific RCS leakage detection systems changed detection capability from 1 gpm per four hours to 1 gpm per seven hours.

A licensee needs to compare the methodology used in its original plant-specific LBB evaluation to the NRC-approved generic LBB evaluation that considered weld overlays to determine whether there is a change in the methodology. Subsequently, the licensee would perform a 10 CFR 50.59 evaluation to determine whether a license amendment request is needed to be submitted to the NRC for review and approval.

The NRC staff notes that a “no change” in the LBB methodology for the overlaid DMW means that a licensee performs its plant-specific LBB evaluation of an overlaid DMW using the same methodology as is used in an NRC-approved LBB evaluation of an overlaid DMW. If the licensee changes the surface roughness or number of turns in the PWSCC crack from the NRC-approved LBB evaluation of an overlaid DMW, the NRC staff would not consider this to be a change in the LBB methodology.

COMMENTS ON REGULATORY AND PROCESS ISSUES

Public Comment Number 10
On his presentation slide number 6, Mr. Riley asked the NRC staff to clarify why the issue of weld overlay on LBB piping is a compliance backfit as stated in NRC’s slides number 12 presented in the public meeting on February 26, 2010 (ADAMS Accession Number ML100550922). The commenter stated that this seems to be a new interpretation of the regulation.

NRC Response:

It is not the intent of the RIS to provide a new interpretation of the current LBB regulation. Compliance backfit only applies to the plants that have installed weld overlays on their LBB piping in accordance with 10 CFR 50.55a, but have not appropriately addressed the NRC requirements for LBB. For plants that have installed a weld overlay on LBB piping yet not reevaluated the LBB requirements (e.g., re-assess and update its original LBB evaluation), the NRC will not consider the situation a violation or non-conformance with respect to the NRC regulations. However, the licensees are required to take timely and appropriate actions to comply with NRC requirements for piping systems that have been approved for LBB.

After the issuance of the RIS, a licensee that has installed weld overlays on LBB piping, and has submitted a license amendment request with the updated LBB evaluation, will have complied with the LBB regulations.

For a licensee that has installed weld overlays on LBB piping, but has not updated and submitted the LBB evaluation, as necessary, for a long period of time (e.g., 6 months) after the RIS issuance, the NRC may take enforcement action against that licensee on the basis of non-compliance with the current LBB regulations unless the licensee can provide justification that is acceptable to the NRC, and submittal to the NRC was not required.

For a licensee that has not installed, but plans to install weld overlays on LBB piping after the RIS issuance, the NRC expects that the licensee to reevaluate and submit, as necessary, the updated LBB evaluation before application of the weld overlay. The exceptions to the prior submittal would be if the licensee already has an NRC-approved weld overlay relief request or the need to install an urgent weld overlay for which the NRC has provided verbal authorization. For the exceptions, if the licensee does not submit a license amendment request in a timely manner or provide an acceptable justification, the NRC may take enforcement action.

For a licensee that has no plans to install weld overlays on the LBB piping, the RIS does not apply as long as the original LBB evaluation is still valid.

The NRC staff suggests that licensees communicate and engage the NRC staff early to avoid any potential regulatory issues.

Public Comment Number 11
On his presentation slide number 6, Mr. Riley asked the NRC staff to discuss the licensing or enforcement discretion process for the situation when a licensee needs to install emergent weld overlays but the licensee was not able to submit a LBB license amendment request on time.

On page 5 of his comments, Mr. Sims asked a similar question with regard to the emergent weld overlay installation and suggested that there should be a grace period for plants with spring 2010 outages. Mr. Sims also asked whether the LBB license amendment request is a startup issue.

During the public meeting, a commenter asked whether the NRC staff treats the review of the LBB licensee amendment request for an emergent weld overlay as exigent or normal process. A commenter asked in general when to submit the LBB license amendment request for weld overlay application.

NRC Response:
The NRC staff recognizes that there may be cases in which a licensee needs to install weld overlays in an exigent manner, and the licensee was not able to submit a LBB license amendment request on time. In an emergent weld overlay case, the NRC staff would not exercise enforcement action against the licensee. The NRC staff would consider enforcement discretion, meaning potentially no enforcement action. Any enforcement discretion considered by the NRC would be in accordance with the NRC Enforcement Policy, Section VII.B.6.

The NRC staff would consider a grace period for the LBB license amendment request submittal for plants with a refueling outage scheduled for the spring 2010. In the emergent weld overlay situation, the NRC approval of the LBB amendment license request submittal would not be on a critical path for the plant startup. The plant can startup from the refueling outage without receiving the NRC approval of the LBB license amendment request because application of the weld overlay in the LBB piping does not involve a known or outstanding unresolved safety issue.

The NRC staff suggests that the licensee engage with the NRC staff early in the process before an emergent situation arises. If a licensee reaches an emergent situation, that licensee should notify the NRC project manager by telephone or electronic mails of the emergent situation as soon as possible. The NRC staff also suggests that all licensees need to plan ahead of the possibility of submitting an LBB license amendment request even if it is not an emergent weld overlay installation. The NRC staff prefers that licensees submit the LBB license amendment request with the updated LBB evaluation coupled with the weld overlay relief request one year before the actual weld overlay installation.

Public Comment Number 12:
On page 2 of his comments, Mr. Sims stated that it appears that the positions taken in the draft RIS are not supported by SRP Section 3.6.3 or NUREG-1061, Volume 3. The commenter suggested that the draft RIS be re-reviewed to clarify some of the positions in the draft RIS.

NRC Response:
The NRC will revise the draft RIS to incorporate the public comments and to ensure that RIS is consistent with SRP Section 3.6.3.

Public Comment Number 13
On page 3 of his comments, Mr. Sims suggested that the industry should provide a topical report justifying weld overlays and eliminating the need for significant resources from the NRC staff and industry reviewing LBB overlays on a plant-by-plant basis.

NRC Response
The NRC encourages the industry to publish a topical report as soon as possible to address the impact of the application of weld overlays on the original LBB evaluation and the regulatory and technical issues raised by the industry on the draft RIS. The topic report should be submitted for NRC review and approval. If the NRC approves the topical report, licensees may use the topical report to address the issues in the RIS. Depending on how the topical report is prepared and approved by the NRC, it is possible that updating of the original LBB evaluation and the submittal of a license amendment request may be streamlined or the need to submit the

evaluation may be unnecessary if a licensee follows the NRC-approved topical report in evaluating overlaid DMW in LBB piping.

Public Comment Number 14
On page 5 of his comments, Mr. Sims stated that industry understands that the purpose of a RIS is only to provide information. If there are no changes to regulatory requirements the existing 10 CFR 50.59 evaluations should remain valid. However, this RIS implies that if an overlay is installed a revision to the LBB analysis is required with a different methodology and a license amendment would be required. There appears to be a difference in industry and NRC interpretations, but it is unclear where the changes in rules were derived.

NRC Response
The NRC staff believes that if a weld overlay is installed on a LBB pipe, the LBB evaluation of the overlaid DMW would be different from the original LBB evaluation because a different methodology from that of the original LBB evaluation needs to be used to analyze the different geometry, crack morphology, and material properties of an overlaid DMW.

Changing input parameter values (e.g., pipe diameter and material properties) is not a change in methodology. However, use of a completely different set of parameters to analyze a condition or a crack model could be a change in the methodology. The NRC staff believes that when input parameters (e.g., parameters for the PWSCC crack) that are used to analyze an overlaid DMW are different from the input parameters (e.g., parameters for the fatigue crack) used to analyze a pipe without the overlay, it is a change in the LBB methodology.

The NRC staff approved the original LBB evaluation via a license amendment request. Once an LBB evaluation was approved, the licensee incorporated the LBB evaluation in the plant's updated final safety analysis (UFSAR) report as a part of the design basis. The methodology (including input parameters, assumptions, equations, and crack modeling) used in the original LBB evaluation became a part of the design basis (i.e., licensing basis). When a weld overlay is applied to the LBB pipe, the pipe geometry at the DMW is changed. The pipe at the overlaid DMW needs to be reanalyzed under the LBB requirements. As discussed above, the methodology to analyze the overlaid DMW is different from the methodology in the original LBB evaluation. If the methodology has not been reviewed and approved for use by the NRC, then in accordance with 10 CFR 50.59, a license amendment request may be needed to change the licensing basis.

10 CFR 50.59(c)(1) states that a licensee may make changes in the facility without obtaining a license amendment if 50.59(c)(1)(i) and (c)(1)(ii) are met.

Paragraph (c)(1)(i) is related to a change to the technical specifications and paragraph (c)(1)(ii) specifies that changes need not be submitted unless the criteria in paragraph (c)(2) are met. The criterion in Paragraph (c)(2)(viii) applies because an LBB evaluation of the overlaid DMW is a departure from the original LBB evaluation methodology.

It is the licensee's responsibility to perform a 10 CFR 50.59 evaluation and make a determination regarding the submission of a license amendment request.

Public Comment Number 15
On his presentation slide number 2, Mr. Riley suggested that the draft RIS be noticed in the Federal Register for additional public comments to allow the industry more time to review the RIS.

NRC Response:
The NRC staff received many valuable comments from the industry during the public meeting on February 26, 2010. In addition, the NRC staff received comments in a public meeting held on September 30, 2009 on the same issue. The NRC staff has communicated with the industry regarding the draft RIS since early 2009.

The NRC staff understands the industry's comments received in the public meeting on February 26, 2010 and will address all of the industry's comments by either revising the RIS or by responding to specific comments.

Most of the industry's comments are technical in nature relating to the interpretation of the changes to the LBB methodology (assumptions and input parameters) as a result of the weld overlay. However, the intent of the draft RIS is not to provide new regulatory and technical guidance on LBB evaluations, but to clarify the existing LBB regulation (GDC 4, SRP section 3.6.3, and 50.59) in terms of weld overlay installation on LBB piping.

The NRC staff believes that by placing the RIS in the Federal Register asking for additional public comments, the industry will most likely provide similar if not the same comments that had been provided in the public meetings on September 30, 2009 and February 26, 2010. The NRC staff recognizes that there is some likelihood that if the draft RIS is noticed in the Federal Register, the public may provide additional comments that may have not been submitted. However, the NRC staff believes that the major industry concerns on the draft RIS have been captured in the comments received. The NRC staff notes that the RIS does not involve any known and outstanding immediate safety issues.

The NRC staff has decided not to notice the draft RIS in the Federal Register for public comments. The NRC staff will revise the draft RIS to reflect the public comments already received and will respond to the public comments as part of the RIS issuance.

PUBLIC COMMENTS TAKEN DURING THE PUBLIC MEETING
FEBRUARY 26, 2010

1. A meeting attendee stated that it appears that the RIS allows only one method for the LBB evaluation and does not allow alternative methods.

2. A meeting attendee stated that the draft RIS is making conclusions where it should ask for evaluations. Also, the commenter objected to the wording “invalidate” and “obsolete” regarding the original LBB evaluation.

3. A meeting attendee remarked that statements in the draft RIS that invalidating the original LBB analysis appear to be a global statement requiring re-analysis of an entire piping system.

4. According to a meeting attendee, primary water stress corrosion cracking (PWSCC) should not be considered in the LBB analysis. The attendee asked that if it is considered, can a PWSCC evaluation be performed for SRP Section 3.6.3? How can PWSCC be analyzed under SRP Section 3.6.3?

5. A meeting attendee stated that some LBB license amendment requests (LAR) may result from an emergent weld overlay application. Would the NRC treat the review of the emergent LAR as an exigent or a normal review process?

6. A meeting attendee suggested that the RIS describe how a change in input parameters leads to a change in the LBB methodology, how a change in the LBB methodology leads to a change in the license basis, and how a change in the license basis leads to requiring a LBB amendment be submitted. The RIS needs to clarify what constitutes a change in the LBB methodology.

7. A meeting attendee asked whether the use of a different leakage detection capability is considered as using a different methodology.

8. A meeting attendee suggested that the draft RIS need to be clarified/revised regarding ASME requirements on various mitigation techniques.

9. A meeting attended stated that from material properties, the stresses in the DMW should be lower. The thicker pipe after weld overlay would lead to higher a margin than in the original LBB evaluation. Therefore, the original LBB evaluation should bound the weld overlay application and should not be revised as a result of the weld overlay.

10. The industry will prepare a generic topical report to address the weld overlay in the LBB evaluation.

11. A meeting attendee asked when a licensee should submit the LBB amendment request? Some licensees may have performed the updated LBB evaluation, but have not submitted the updated LBB evaluation. The attendee suggested that the RIS provide guidance on whether the updated LBB evaluation needs to be submitted.

ENCLOSURE 2

12. A commenter stated that a stress analysis was performed to find the highest stress location coincident with the poorest material properties. These locations were then selected to postulate a through-wall flaw and finally the SRP Section 3.6.3 margins were calculated for the selected locations. It appears that neither the industry nor the NRC attempted to perform the analyses in the reverse approach of determining the lowest stability margins regardless of stress and material properties as discussed in the draft RIS. The premise behind LBB is that it will take high stress to initiate and propagate a flaw. It appears that the draft RIS as written is in error with the guidance in SRP Section 3.6.3. It would have taken an exhaustive number of fracture mechanics iterations to determine the lowest SRP Section 3.6.3 margins in these generic vendor analyses. Analyzing the lowest stress, thickest and/or strongest joint could reduce the calculated SRP Section 3.6.3 margins; however, these locations are the least likely to crack and did not require fracture mechanics analyses originally and should not now.