Prior to discussing the comments, there is a need to ensure a common understanding of some phrases.

**Regulatory issue summaries** (RIS) are used to (1) document NRC endorsement of the resolution of issues addressed by industry-sponsored initiatives, (2) solicit voluntary licensee participation in staff-sponsored pilot programs, (3) inform licensee of opportunities for regulatory relief, (4) announce staff technical or policy positions not previously communicated to industry or not broadly understood, and (5) address matters previously reserved for administrative letters.

The **Standard Review Plan** (SRP) has been prepared to establish criteria that the US Nuclear Regulatory Commission staff responsible for the review of applications to construct and operate nuclear power plants intend to use in evaluating whether an applicant / licensee meets the NRC’s regulations. The SRP is not a substitute for the NRC’s regulations and compliance with it is not required. However, an applicant is required to identify differences between the design features, analytical techniques, and procedural measures proposed for its facility and the SRP acceptance criteria and evaluate how the proposed alternatives to the SRP acceptance criteria provide an acceptable method of complying with the NRC regulations.

The NRC regulation associated with Leak Before Break (LBB) is found in 10 CFR 50, Appendix A, General Design Criteria (GDC) 4. This regulation is not changing. In reviewing the documents associated with LBB, SRP 3.6.3, “Leak Before Break Evaluation Procedures,” was the last to be revised and Revision 1 was issued in March 2007.

The purpose of the draft RIS, as noted within, is to remind addressees of the regulatory requirements for the application of weld overlays and other mitigation techniques in piping systems approved by the NRC based on LBB technology. The NRC should be commended for taking this step for this issue. This RIS can be a great tool to ensure consistency in addressing this issue. Based on the discussion at the beginning of what a RIS does, it appears that this draft RIS is announcing staff technical or policy positions not previously communicated to the industry or not broadly understood.

In reviewing both Revision 0 and Revision 1 of SRP 3.6.3 there are some changes but not many that are truly significant. Many of the requirements appear to be the same. NUREG-1061, Volume 3 provides acceptable technical procedures and criteria for using LBB analysis. This document was issued in 1984 and has not been revised. Based on this, it does not appear that the regulatory requirements themselves have changed since the mid 1980’s. Revision 1 to SRP 3.6.3 may provide some revised criteria that the staff is going to use in their evaluations of these weld overlays and other mitigation techniques.
It appears that the draft RIS is communicating these revised criterion in Revision 1 of SRP 3.6.3. If this is so, there are several cases in which the position stated in the RIS does not appear to be supported by what is in the SRP or NUREG. It is suggested that the RIS be rereviewed to determine where clarification to the positions stated in the RIS is needed.

The main document of interest providing guidance for LBB analysis is NUREG-0800. NUREG-0800 was issued by the NRC in March, 2007 and presented the basic procedures necessary to submit an application for LBB. It states in Sections III, 11, (C), (ii) and (iii);

(ii) - “Specify the type and magnitude of the loads applied to the piping system (forces, bending and torsional moments), their sources (thermal, deadweight, seismic, and seismic anchor movement), and method of combination. For each pipe size in the piping system, identify the location(s) that have the least favorable combination of stress and material properties for base metal, weldments, nozzles, and safe ends.”

(iii) - Postulate a throughwall flaw at the location(s) specified in subparagraph 11.(C)(ii) above. The size of the flaw should be large enough so that leakage from the flaw during normal operation would be 10 times greater than the minimum leakage the detection system is capable of sensing. If auxiliary leak detection systems are relied on, they should be described. For the estimation of leakage, the normal operating loads (i.e., deadweight, thermal expansion, and pressure) are to be combined based on the algebraic sum of individual values and applied to the leakage flaw size.”

This indicates that the regulator’s position as late as 2007 agrees that flaw locations in support of LBB are determined by the highest stress/low material properties, with no other criteria mentioned. The criteria in NUREG-0800 are also consistent with the LBB criteria stated in NUREG-1061.

RIS Cover Letter
A weld overlay changes the weld geometry of the original weld upon which the LBB analysis was based, thus making the original LBB analysis obsolete.

Response
LBB also includes base material. Applying overlays to one location or to a portion on the system does not make the LBB analysis obsolete. LBB analyzed the piping system and not just individual welds. The least favorable combination of stress and material properties for base metal, weldments, nozzles, and safe ends were analyzed. In general, the weld overlay reduces the stress for a given location and the material properties are improved. Hence, it may be argued that the LBB system analysis is still bounding. The fundamental premise for LBB is that high tensile stresses and poor material properties are the most likely place in the system to support a 10 times the detectable limit flaw. In general applying a weld overlay reduces the stress to a compressive state and improves material properties. LBB requirements do not require fracture
mechanics analyses on the most favorable locations, but only on the least favorable.

**RIS Section 7**
The ASME Code, Sections III or XI, does not contain rules for installing weld overlays, inlays and onlays.

**Response**
A public meeting was held 9/08 with the NRC providing the 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.

**RIS Section 8**
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.

**Response**
Per NUREG-0800 Sections 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.

**RIS Section 8**
A weld overlay changes the weld geometry of the original weld upon which the LBB analysis was based, thus making the original LBB analysis obsolete. 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. Updating the LBB analysis entails calculation of the leakage and fracture mechanics margins for the piping system to ensure that the modified piping system satisfies the licensee's design (i.e. GDC 4).

**Response**
Applying a weld overlay is adding less than 800 pounds to the system is insignificant compared to the several tons weight of the piping. Additionally, stiffening localized areas of large diameter pipe will have an insignificant impact on the natural frequency of the system and seismic response. As discussed above making the piping system stronger does not invalidate the original LBB analysis.

**RIS Section 8**
Thus far, licensees have not demonstrated that it is feasible to determine by inspection (i.e., without performing the leakage and fracture mechanics calculations) whether the piping system modified by overlaid welds will continue to satisfy the plants' design and LBB analyses. For example, licensees have not shown that even if in the original LBB analysis the weld overlay location had higher fracture mechanics and leakage margins than the margins of the limiting location, the original analysis could still be applied based solely on inspection.

**Response**
We agree. The industry should provide a topical report justifying weld overlays and eliminating the need for significant resources from the staff and industry reviewing LBB overlays on a plant by plant basis.
RIS Section 9
The licensee will have to revise the LBB analysis. Applying the criteria of 10 CFR 50.59, “Changes, Tests, and Experiments,” to the weld overlay situation may result in the determination that a license amendment is required. The NRC staff would then review and approve or deny the LBB analyses for weld overlays.

Response
It is the Licensee 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 per 10 CFR 50.59.

RIS Section 9
The LBB method of evaluating the leakage at weld overlay locations would be a departure from the original LBB analysis methodology reviewed and approved by the NRC. The LBB leakage analysis accounts for the resistance to leakage provided by the surface of the postulated idealized through-wall crack. The nature of the crack surface is called the crack morphology and the staff reviews and approves the crack morphology parameter as part of the LBB review. The LBB leakage crack for a weld overlay has different crack morphologies from the morphology used in the original analysis. Although this change in crack morphology results in a change in input parameters, the change is also a change in methodology.

Response
If an uncracked DM weld is mitigated with a weld overlay, a PWSCC flaw will not initiate. In addition, even if the weld is cracked and overlaid, then it is mitigated and a Section XI analysis is required to justify inspection intervals. Considering only fatigue flaws should be acceptable for analysis since PWSCC is mitigated. There appears to be no change in methodology.

Does the introduction of a different material type not previously analyzed having different crack morphologies constitute a change in an NRC approved method? The answer is “No”. There are two criteria in section 4.3.8 of NEI 96-07 that would constitute a departure from a method of evaluation.

One would be by gaining design margin by changing the evaluation basis for elements of a methodology. The analysis performed (even though it may not apply up-to-date analytical tools) is unchanged. There are no aspects of the model that have been revised and they are generally consistent with that previously approved by the NRC staff. The introduction of a different material does not affect an element of the methodology.

The other criteria would be changing from one analytical method to another. The use of industry and Code analyses are again essentially the same and the methodology is not revised. The concern arises when a change in a previously approved input is affected (i.e. damping value or a decay constant) that the NRC has determined must be applied for an acceptable methodology. The use of only certain material properties was not specified by the analysis or established by the NRC as being the only acceptable materials. 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.
RIS Section 10
Some licensees may have already applied weld overlays to piping systems that the NRC staff approved for LBB. Such licensees must follow applicable requirements in 10 CFR 50.55a to apply the weld overlay and in 10 CFR 50.59 to determine if the weld overlay would have constituted a change in the plant's design requiring a license amendment.

Response
It is our understanding that the purpose of a RIS is only to provide information. If there are no changes to regulatory requirements the existing 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.

RIS Section 11
Licensees are expected to make appropriate plans to avoid placing plants in nonconformance with the plants licensing bases as a consequence of weld overlays done during outages. Such plans may include submitting a license amendment to the NRC with sufficient time to allow the agency to complete the licensing action before plant startup.

Response
First draft concluded that emergent weld overlays were not a startup issue. This version suggests there may be a startup issue with planned as well as emergent WOL's. Is there a change? If this is the case, there should be some grace period for plants with spring 2010 outages.