NRC FORM 680
(11-2002)
NRCMD 10.159

U.S. NUCLEAR REGULATORY COMMISSION

DIFFERING PROFESSIONAL OPINION

FOR PROCESSING USE ONLY

1. DPO CASE NUMBER: DPO-2006-003

2. DATE RECEIVED: 5/3/2006

INSTRUCTIONS: *Prepare this form legibly and submit three copies to the address provided in Block 14 below.*

3. NAME OF SUBMITTER	4. POSITION TITLE	5. GRADE
Melvin C Shannon	Senior Resident Inspector	14

6. OFFICE/DIVISION/BRANCH/SECTION	7. BUILDING	8. MAIL STOP	9. SUPERVISOR
USNRC/ Region II/ DRP/ Branch 1/ Oconee			Mike Ernstes/Charlie Payne

10. DESCRIBE THE PRESENT SITUATION, CONDITION, METHOD, ETC., WHICH YOU BELIEVE SHOULD BE CHANGED OR IMPROVED.
(Continue on Page 2 or 3 as necessary.)

The licensee was allowed to use Leak Before Break (LBB) to install a cross tie header between the ECCS low pressure injection Train A and Train B headers. Prior to implementation of the modification, the inspector expressed a concern to NRR management that the modification would be contrary to GDC 35 requirements to provide suitable redundancy and isolation capability. The license ammendment was subsequently approved and the licensee implemented the modification. With the LPI cross tie in place, a failure of the high energy line portion of the LPI piping inside containment would render both trains of LPI inoperable and the break could not be isolated from either train without performing a containment entry to manually isolate the break area. Discussion with Oconee engineering indicated that the initial piping failure would cause enough LPI piping movement to cause another piping failure in the LPI cross tie header resulting in a loss of all LPI flow.

11. DESCRIBE YOUR DIFFERING OPINION IN ACCORDANCE WITH THE GUIDANCE PRESENTED IN NRC MANAGEMENT DIRECTIVE 10.159.
(Continue on Page 2 or 3 as necessary.)

After detailed review, it appears to me that LBB is not appropriate for use when dealing with containment design, ECCS or environmental qualification. This issue was discussed in the 1987 final rulemaking which revised GDC 4 to allow use of LBB. In the analysis of issues section, specifically Issue 4, the licensees proposed that "Leak Before Break technology should be extended to relax pipe rupture requirements for containment design, ECCS and E.Q." The Commission Response stated that "The Commission plans to consider whether E.Q. requirements can be modified based upon LBB technology. The Commission does not intend to consider near term changes to ECCS and containment design..."

It is my opinion that the staff should not expand the use of LBB technology without prior Commission approval, especially when the Commission clearly stated that it was not considering changes at that time.

The use of LBB and the subsequent installation of the Train A/Train B cross tie header means that Oconee no longer meets GDC 34 and GDC 35 (suitable redundancy and isolation capability) and cannot meet 10 CFR 50.46. This is

12. Check (a) or (b) as appropriate:

- [x] a. Thorough discussions of the issue(s) raised in item 11 have taken place within my management chain; or
- [ ] b. The reasons why I cannot approach my immediate chain of command are:

SIGNATURE OF SUBMITTER	DATE	SIGNATURE OF CO-SUBMITTER *(if any)*	DATE
Melvin C Shannon	05/03/2006		

13. PROPOSED PANEL MEMBERS *ARE (in priority order)*:
1. Joe Lenahan, DRS Region II
2. Gary Hammer, NRR OWFN
3. Doug Starkey, OE OWFN

14. Submit this form to:
Differing Professional Opinions Program Manager
Office of:
Mail Stop:

15. ACKNOWLEDGMENT

THANK YOU FOR YOUR DIFFERING PROFESSIONAL OPINION. It will be carefully considered by a panel of experts in accordance with the provisions of NRCMD 10.159, and you will be advised of any action taken. Your interest in improving NRC operations is appreciated.

SIGNATURE OF DIFFERING PROFESSIONAL OPINIONS PROGRAM MANAGER (DPOPM): Renee Pedersen

PER AGREEMENTS NET: [x] YES [ ] NO

DATE OF ACKNOWLEDGMENT: 5/12/2006

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Section 10

The licensee was allowed to use Leak Before Break (LBB) to install a cross tie header between the ECCS low pressure injection Train A and Train B headers. Prior to implementation of the modification, the inspector expressed a concern to NRR management that the modification would be contrary to GDC 35 requirements to provide suitable redundancy and isolation capability. The license ammendment was subsequently approved and the licensee implemented the modification. With the LPI cross tie in place, a failure of the high energy line portion of the LPI piping inside containment would render both trains of LPI inoperable and the break could not be isolated from either train without performing a containment entry to manually isolate the break area. Discussion with Oconee engineering indicated that the initial piping failure would cause enough LPI piping movement to cause another piping failure in the LPI cross tie header resulting in a loss of all LPI flow.

Section 11

After detailed review, it appears to me that LBB is not appropriate for use when dealing with containment design, ECCS or environmental qualification. This issue was discussed in the 1987 final rulemaking which revised GDC 4 to allow use of LBB. In the analysis of issues section, specifically Issue 4, the licensees proposed that "Leak Before Break technology should be extended to relax pipe rupture requirements for containment design, ECCS and E.Q." The Commission Response stated that "The Commission plans to consider whether E.Q. requirements can be modified based upon LBB technology. The Commission does not intend to consider near term changes to ECCS and containment design..."

It is my opinion that the staff should not expand the use of LBB technology without prior Commission approval, especially when the Commission clearly stated that it was not considering changes at that time.

The use of LBB and the subsequent installation of the Train A/Train B cross tie header means that Oconee no longer meets GDC 34 and GDC 35 (suitable redundancy and isolation capability) and cannot meet 10 CFR 50.46. This is because the initial failure of the high pressure portion of the LPI injection header would/could cause a failure of LPI piping such that all LPI injection flow would be lost.

Detailed Discussion

Detailed Discussion of Issue

Prior to installation of the LPI header cross tie modification, in order to meet the single active failure criteria of GDC 34 and GDC 35, the licensee had to rely on manual actions. These actions included sending operators into potentially high radiation and high temperature areas to realign the LPI system. These actions were necessary due to a lack of LPI flow instrumentation needed to diagnose the break area. Due to system design, even after realignment, a significant portion of the available LPI flow would continue to be lost out the break area and both LPI headers would have to be throttled.

To resolve the operator burden issue above, the licensee decided that installation of a LPI crosstie header would be a viable success path. However, the inspector finds it hard to see how the criteria for suitable redundancy and isolation capability were met since the LPI trains are presently cross

tied with a 10 inch header. Discussions with engineering indicated that a break on one header could affect the other header structurally, so elimination of the postulated break was needed. LBB break on the LPI header was requested and granted. It appeared to the inspector that installation of motor operated isolation valves instead of manual valves in the LPI cross tie header and/or installation of non-restraining piping supports in the vicinity of the LPI header flow orifices could have been added to the modification to resolve the structural issues and LBB would not have been needed. The present design would require a containment entry in order to seperate the LPI Train A and Train B headers.

The inspector considered the use of LBB as improper based on the following:

The B&W Owners Group provided an analysis titled "Leak Before Break Evaluation of Margins Against Full Break for RCS Primary Piping of B&W Designed NSS, dated September 1985. This report stated that "the applicability of the LBB concept as discussed in this report focuses on the integrity of the RCS primary piping and does not seek to reduce or redefine GDC-4 LOCA design criteria or qualifications for containment design, release of radioactive materials, and emergency core cooling systems". Based on this statement it appears that it was not intended for LBB to be used to eliminate RCS breaks that could affect the containment structure, containment integrity or the function of the ECCS.

Letters from the NRC to the B&W Owners Group and Oconee, dated December 12, 1985 and February 18, 1986, titled "Safety Evaluation of B&W Owners Group Reports Dealing With Elimination of Postulated Pipe Breaks in PWR Primary Main Loops", both stated "By means of deterministic fracture analyses, the B&W Owners Group contends that postulated double ended guillotine breaks of the primary loop reactor coolant piping will not occur and therefore need not be considered as a design basis for installing protective devices such as pipe whip restraints to guard against the dynamic effects associated with such postulate breaks. No other changes in design requirements are addressed within the scope of the referenced reports; e.g. no changes to the definition of a LOCA nor its relationship to the regulations addressing design requirements for ECCS (10 CFR 50.46), containment (GDC 16, 50), other engineered safety features and the conditions for environmental qualification of equipment (10 CFR 50.49)."

The Federal Register for October 27, 1987, documented the Final Rule for modification of GDC 4. In Section II, Final Rule, it was stated that "For the present, the rule allows the removal of plant hardware which it is believed negatively affects plant performance and safety, while not affecting emergency core cooling systems, containments, and environmental qualification." It also states that "This rulemaking will introduce an inconsistency into the design basis by excluding the dynamic effects of postulated pipe ruptures while still retaining nonmechanistic pipe rupture for emergency core cooling systems, containments, and environmental qualification."

In the LBB case that was granted at Oconee, the piping was not RCS piping, it was actually the high pressure piping of the core flood system and LPI injection system. So basically, the LBB technology was used on ECCS piping.

In Section II, Scope of Rulemaking, it was stated that "dynamic effects of pipe ruptures in nuclear power plants may be excluded from the design basis..." and "Dynamic effects of pipe rupture covered by this rule are missile generation, pipe whipping, pipe break reaction forces, jet impingement forces, decompression waves within the ruptured pipe and dynamic or nonstatic pressurization in cavities, subcompartments and compartments." It went on to state that "However, cavities, subcompartments, and compartments necessary to the containment function are not

affected by this modification."

It went on to document in this section that "To retain high safety margins, the application of leak before break technology to various piping systems should not decrease the capability of containments to perform their function of isolating the outside environment from potential leaks, breaks, of malfunctions within containment."

Pipe rupture requirements for containment design are the dynamic affects such as jet impingement missile generation, pipe whip, pressurization...etc. The inspector has concluded that same logic would hold true for the emergency core cooling system, that is jet impingement, pipe whip,...etc, from a LOCA should not affect the reliability or functioning of the ECCS systems.

Conclusion:

It appears that the ECCS (LPI injection headers) should be protected from the dynamic affects of postulated breaks in the high pressure portion of the LPI injection headers (actually part of the RCS boundary) and that the use of the LBB criteria was not appropriate. Prior Commission approval was needed.

It is the inspectors opinion that the risk of RCS break and loss of both LPI trains poses a threat to plant safety and the use of LBB should not have been approved. Installation of motor operated cross tie isolation valves or addition of non-restraining piping supports would have resolved the issue without use of LBB. This would not have been an unreasonable or expensive request.

Assessment of consequences if position is not adopted:

Oconee will not be able to mitigate a Large Break Loss of Coolant Accident (LPI Injection header break) if the break causes a loss of additional LPI piping.

Commission decisions are meaningless if lower level NRC staff are allowed to continue to disregard those decisions. The staff should develop additional guidance for future uses of LBB technology.