NUCLEAR ENERGY INSTITUTE

Stephen D. Floyd
SENIOR DIRECTOR,
REGULATORY REFORM
NUCLEAR GENERATION

February 13, 2001

Dr. Ashok C. Thadani
Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Dr. Thadani:

In January 2000, we informed the Commission of the results of an industry survey on candidate regulations for assessment under the task of improving NRC technical requirements using risk-informed, performance-based insights and methods. The results showed that the prime candidate should be 10 CFR 50.46, *Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors.* The industry has been working with your staff to determine the optimum approach for improving 10 CFR 50.46. We understand that the NRC staff is preparing a number of options for NRC management consideration. The purpose of this letter is to provide an industry perspective on the focus of Option 3.

§50.46 is a central element in the NRC regulatory regime. The scope of §50.46 is large. We agree that the best way to assess and improve this regulation is to divide the work into manageable segments. We believe the top priority segment is redefinition of the maximum pipe break size for the large break loss-of-coolant accident (LBLOCA). While other §50.46 segments remain of interest to the industry, it is difficult to assess their potential for improvement until more certainty is achieved in redefining the maximum pipe break size for LBLOCA. As such, individual NSSS owners' groups may decide to work on some of these elements in parallel, but as lower priority activities.

There is a broad range of safety benefits from redefining the maximum pipe break size to be used in LBLOCA analyses. A list of some of the applications and associated benefits of redefining LBLOCA are provided in Enclosure 1.

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The industry's approach for redefining the maximum pipe-break size for the LBLOCA is similar to that already prescribed in 10 CFR 50.55a, *Codes and standards,* and Option B to Appendix J to Part 50, *Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors.* A simple rule change would allow a licensee to use an alternative maximum pipe break size in lieu of the double-ended guillotine break, following NRC review and approval. Enclosure 2 provides a summary of the industry's approach to improving the LBLOCA element in §50.46.

We believe the approach outlined above has garnished significant industry support. Further, this approach offers substantial safety enhancements and a more efficient use of resources than the current rule requirements.

We would be pleased to meet with you to discuss this letter. If you have any questions please contact Tony Pietrangelo at 202-739-8081, arp@nei.org or me at 202-739-8078, sdf@nei.org.

Sincerely

Stephen D. Floyd

Stephen D. Floyd

Enclosures

c. Mr. Samuel J. Collins, Director, Office of Nuclear Reactor Regulation, NRC
Mr. Thomas L. King, Director, Risk Analysis and Applications, NRC

Enclosure 1

List of Potential Applications and Associated Safety Benefits

IMPLEMENATION EXAMPLES	
ITEM	**SAFETY BENEFITS**
a) Accumulator 1) Decrease the number of accumulators required to be operable. 2) Parameters (boron concentration, water volume, cover pressure) - relax acceptable parameter range. 3) Increase AOTs	Reduced chance for inadvertent injection from accumulator. (Not very likely, but more probable than a LBLOCA.) Revision of Tech. Specs. shutdown requirements associated with accumulators would reduce likelihood of forced shutdown and resulting thermal cycle on plant. More realistic Tech. Specs eases operational burdens enabling operators to better focus on safety significant activities Reduces the potential for unnecessary plant shutdowns and reduces the number of operational and thermal transients Wider accumulator parameter bands would reduce periodic adjustments and thus the chances for ECCS valve misalignment
b) Diesel Generator Start Time Increase (Expand to all ECCS response times.)	Reduced wear and tear on diesel from more reasonable testing requirements. Increased diesel reliability – less need for invasive troubleshooting. Reduces the potential for maintenance errors which could result in challenges to the plant's safety systems by reducing the frequency of maintenance and inspection activities
c) Diesel Generator Loading times	Relaxed diesel loading times during an accident response would enhance diesel reliability.
d) Core Peaking Factor Increases (FQ or FdeltaH)	Wider peaking factor bands would result in less operator reactivity manipulations and potentially less adverse excursions
e) Containment Design Calculations 1) Lower Peak Pressure in Analysis Many plants are limited by SLB, but Pa could be lowered since it is driven by LOCA only. 2) Evaluate elimination of sub-compartment analyses with the smaller credible maximum LOCA size.	Worker safety benefit from performing leak rate tests at lower pressure.
f) Modify Spray System 1) Reduce the required flow rate of the sprays, **and**/or relax surveillance requirements. Due to defense in depth concerns, reducing the number of sprays will not be pursued.	Elimination of TS shutdown requirement associated with CS would reduce likelihood of forced shutdown and associated thermal cycle on plant. (Also see item (a) above)
g) Modify Fan Cooler requirements. Reduce the number or increase the AOT. Consider relocating to the Technical Requirements Manual.	See items (a) and (b) above

h) Ultimate Heat Sink – Relax Requirements. Maximum post-LOCA heat loads occur during the injection phase for plants with safety-related containment air recirculation coolers, or at the time of sump recirculation switchover for plants without containment air recirculation coolers.	Increase in operational margins reduce the likelihood of unnecessary plant shutdowns. (see (a) and (b) above)
i) Power Uprates	
j) ECCS Flow Issues 1) Change Flow balancing requirements 2) Decrease system resistance if LBLOCA runout is no longer a credible concern 3) For three train systems, eliminate the need for some ECCS pumps	Increases ECCS effectiveness for more probable events. Reduces operator burden by enhancing focus on more probable events Simplifies configuration management
k) Operator Action Time for RWST Switchover Review the operator-training program to determine if too much emphasis is placed on the LBLOCA.	Reduced operator burden. Operator actions can be improved by better sequencing of operator actions consistent with safety-significant operational needs and scenario progressions. NOTE: does not apply to all designs, some designs and plants have automatic switchover to recirculation
l) Resolution of Sump Debris Issues (show that less (or no) debris is created with the revised LOCA break size to be analyzed)	Reduce worker exposure. ALARA: Potential for avoiding occupational dose from modifications that could result from the sump debris resolution.
m) Resolution of GL 89-10 MOV Issues (change MOV test requirements including closure times and motive forces / valve delta pressure) May be a special treatment requirement. Note that this rule change is not required to risk inform MOV testing.	Reduce worker exposure. ALARA benefits from reduced testing scope. More reliable valves if set for more realistic requirements.
n) Resolution of Containment Purge Valve Issues Relax mini purge valve closure times and leakage rates.	
o) Reduce RWST Boron concentration	Improved material reliability and reduces operator action requirements
p) Improved Fuel Design Issues Consider reducing boron and burnable poison requirements, and lowering enrichments.	
q) Containment EQ Temperature Profile Relaxation	Increased operational margins reduce the potential for unnecessary outages.

Enclosure 2

Industry Approach for Redefining the Maximum Break Size for the Large Break Loss of Coolant Accident (LBLOCA)

A NEI task force is coordinating owners' group activities. The general industry approach has been developed by this task force and consists of the following elements:

- A simple rulemaking that would provide licensee's with the option of adopting a new, optional LBLOCA break size requirement or remaining with the existing requirement. The approach would allow a licensee to use an alternative NRC approved methodology for determining the LBLOCA break-size, and would make conforming amendments to other regulatory requirements, such as Appendix A to Part 50, that use the term double-ended guillotine break.

- The specific rule change would be straightforward. It would add a phrase to §50.46(c)(1), such as, " ... from breaks in pipes in the reactor coolant pressure boundary up to and including a break equivalent in size to the double-ended rupture of the largest pipe in the reactor coolant system, ***or an alternative maximum break size as authorized by the Commission.***" Similar changes will be made to other conforming regulations to assure regulatory consistency. The rule will not prescribe a specific break size.

- The industry's technical approach is a natural extension of the 1987, 10 CFR Part 50 Appendix A, General Design Criterion (GDC) 4, rulemaking that eliminated the consideration of the dynamic effects of postulated ruptures in RCS primary piping. It is based on the NRC approved leak-before-break (LBB) methodology and incorporates insights from probabilistic fracture mechanics. The generic methodology would be documented in the form of generic guidance that would support the rulemaking activities.

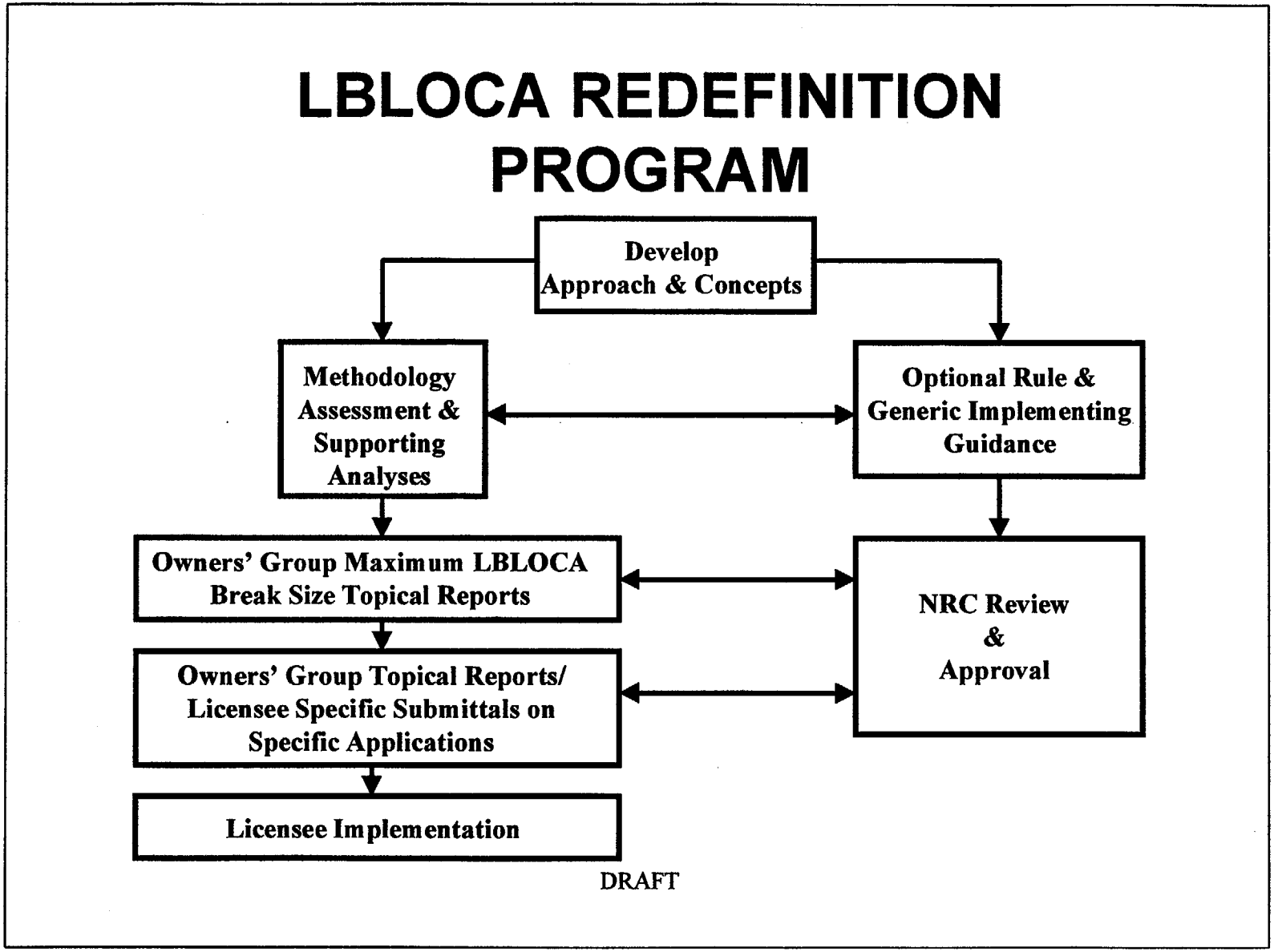
- Using the generic guidance, each owners' group would identify and justify a target value for the break size, to be used in a LOCA analysis. Risk insights (PRA and operating experience) will be utilized to revise the initiating event frequency for the LBLOCA. This break size would become the maximum LBLOCA break for that design. Owners' groups reports and analyses will be reviewed and approved by the NRC.

- A licensee specific submittal or owners' group topical report that describes an implementation methodology for a LBLOCA related will be developed and submitted for NRC approval. Each owners' group will determine the extent and resolution to any overlapping issues with existing owners' group activities. If these have generic implications beyond that owners group they would be

resolved through joint industry efforts.

- Each licensee that chooses to adopt the alternative, risk-informed LBLOCA methodology would prepare a NRC submittal to adjust its design and licensing bases for NRC review and approval, noting any exceptions to the generic methodologies and NSSS topical reports.

The attached figure provides a graphical representation of the industry's approach for redefining the maximum pipe break size for the LBLOCA.


LBLOCA REDEFINITION PROGRAM
Develop Approach & Concepts
Methodology Assessment & Supporting Analyses
Optional Rule & Generic Implementing Guidance
Owners' Group Maximum LBLOCA Break Size Topical Reports
Owners' Group Topical Reports/ Licensee Specific Submittals on Specific Applications
NRC Review & Approval
Licensee Implementation
DRAFT

RESEARCH ACTION ITEM

February 26, 2001 MAIL CONTROL FORM 3:27:56 PM

FROM: Stephen D. Floyd
TO: A. Thadani, Dir RES

RES#: **2001042**
EDO#:
FOIA#:
WITS#:

DESCRIPTION: CANDIDATE REGULATIONS FOR ASSESSMENT UNDER THE TASK OF IMPROVING NRC TECHNICAL REQUIREMENTS USING RISK-INFORMED, PERFORMANCE-BASED INSIGHTS AND METHODS - 10 CFR 50.46, ACCEPTANCE CRITERIA FOR EMERGENCY CORE COOLING SYSTEMS FOR LIGHT-WATER NUCLEAR POWER REACTORS

SPECIAL INSTRUCTIONS: Prepare a response to NEI outlining where any differences may exist between NRC and industry in approach to try to focus future discussions.

DOCUMENT DATE:
DUE TO RES: **March 12, 2001**

RECEIVED BY RES: February 26, 2001
DUE TO EDO:

ASSIGNED TO: **T. King, Dir DRAA**

FOR SIGNATURE OF: **A. Thadani, Dir RES**

COPIES TO:
A. Thadani, Dir RES
M. Federline, DD RES
F. Eltawila, Dir DSA
M. Mayfield, Dir DET
A. Summerour

MILESTONES:	ORIGINAL DUE	CURRENT DUE	COMPLETED
To RES	03/12/2001		
To Stephen D. Floyd	03/15/2001		

printed by ATMIS 2000 the RES action tracking system

ACTION

to PRAB 2/28

to Mary for Action

Routing to:

☐ _____ ☐ _____ ☑ Summerour - Enter in ATMIS; send copy to responsible organization

☑ Flory - Forward to Summerour

CONTROLLED CORRESPONDENCE
RES FRONT OFFICE REVIEW

INPUT FROM DSARE DET

ACTION: Tom - Please prepare a response to NEI outlining where any differences may exist between NRC and industry in approach to try to focus future discussions

WITS/GREEN TICKET #: _____ **DUE DATE:** 3/15/01

ASSIGN TO: ☐ DSARE ☑ DRAA ☐ DET ☐ PMPDAS ☐ F.O.

CONCUR WITH: ☑ NRR ☐ NMSS ☐ OGC ☐ CFO ☐ CIO ☐ ____ ☐ ____

MEET EARLY TO RESOLVE ISSUES WITH CONCURRING OFFICES? ☐ YES ☐ NO

	To Be Reviewed by:	Signature Block:	To Be Signed by:
A. Thadani	☑	☐	☑
M. Federline	☑	☐	☐
J. Murphy	☐	☐	☐
C. Ader	☐	☐	☐

DATE DUE TO F.O.: 3/12

F.O. GUIDANCE: ☐ None. **Specify:** _____