



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

August 25, 2000

Mr. Robert P. Powers, Senior Vice President
Indiana Michigan Power Company
Nuclear Generation Group
500 Circle Drive
Buchanan, MI 49107

**SUBJECT: DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2 - SUMMARY OF
AUGUST 15, 2000, PUBLIC MEETING REGARDING LEAK-BEFORE-BREAK
EVALUATION OF PRESSURIZER SURGE LINE (TAC NO. MA9734)**

Dear Mr. Powers:

This letter summarizes the meeting held on August 15, 2000, between members of Indiana Michigan Power Company (the licensee) and the Nuclear Regulatory Commission (NRC) related to the pressurizer surge line leak-before-break (LBB) evaluation for Donald C. Cook (D. C. Cook), Units 1 and 2. The meeting was held at the NRC headquarters in Rockville, Maryland. This meeting was open for public observation. Enclosure 1 provides a list of meeting attendees.

Your staff presented information related to the purpose of the meeting, background of the issue with the pressurizer surge line pipe restraints, and the forthcoming LBB submittal, summary, and schedule. A copy of the handouts used by your staff is provided in Enclosure 2.

Your staff presented background information regarding the high-energy line break program reconstitution, where it was identified that the pressurizer surge line whip restraint calculation was "non-conservative." In particular, your staff discussed the complexity involved in modifying the Unit 2 restraints as well as the high dose received during the field work. Your staff also discussed the Unit 1 strategy to use the LBB application in order to reduce worker dose during Unit 1 restart efforts. The NRC staff raised a number of questions during this section of the presentation.

The next portion of the presentation related to the LBB analysis, the forthcoming LBB submittal, and a discussion of the requested review schedule. Your staff presented an overview of the following:

- assessment performed to address the potential piping degradation mechanisms which could affect the LBB analysis,
- information on the properties of the surge line materials, and
- some detail on the flaw assessment methodology used in the LBB analysis leak.

The principal NRC staff comment regarding this portion of the presentation cautioned that the results of recent NRC staff reviews have indicated that the methodology to be included in your forthcoming submittal (the use of a "limit load" methodology with "Z" factors to address the generally lower toughness of shielded metal arc welds) may not be adequately conservative to address issues related to thermal aging of stainless steel weld materials. Then, your staff discussed the margin requirements contained in the Westinghouse WCAP-15434, Revision 1 "Technical Justification for Eliminating Pressurizer Surge Line Rupture as the Structural Design Basis for D.C. Cook Units 1 and 2 Nuclear Plants." In addition, your staff stated that WCAP-15434 is consistent with other licensee submittals, addresses draft standard review plan Section 3.6.3, "Leak-Before-Break Evaluation Procedures," addresses NUREG-1061 Volume 3 guidance on LBB evaluations, and your forthcoming submittal addresses NRC staff requests for additional information (RAIs) from other licensees. The NRC staff reaffirmed that detailed information for more than one "limiting" location would be expected in the forthcoming submittal since this information was requested of other licensees in previous RAIs.

Next, your staff summarized the presentation, stating that the forthcoming submittal is consistent with other licensee submittals. Your staff stated that the forthcoming submittal will be docketed on August 22, 2000. Your staff requested that this submittal be approved by December 1, 2000, to meet the Unit 1 restart plan.

The NRC staff stated that it understood the licensee's request for expedited review of this submittal to support the Unit 1 restart. The NRC staff noted it intends to make every effort to support such a review schedule; however, the NRC staff cannot assure the licensee at this time that the review will be completed prior to December 1, 2000. This assurance cannot be made at this time due to the complexity of this type of review and the resource impact of other high priority reviews. The NRC staff noted that the time necessary to complete the review would be strongly influenced by the timeliness and acceptable quality of the licensee's original submittal and the licensee's responsiveness to any other questions that may be raised in the course of the NRC staff's review. The NRC staff encouraged the licensee to continue to consider contingencies in the event that this review is found to be inadequate to support LBB qualification of the surge lines or this review will not be able to be completed by December 1, 2000.

Following the completion of your staff's presentation, the NRC staff requested the following information be contained in the forthcoming submittal:

- For the three highest stress locations, provide complete analysis results including critical flaw size, leakage flaw size, and assessment of margin.
- Confirm that D. C. Cook complies with Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection System," and make a statement to that effect.

R. Powers

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and the enclosures will be available for public inspection at the Commission's Public Document Room, the Gelman Building, 2120 L Street, NW., Washington, DC, and accessible electronically through the ADAMS Public Electronic Reading Room link at the NRC Web site (<http://www.nrc.gov>).

If you have any questions regarding this matter, please contact me at 301-415-1446.

Sincerely,

/RA/

John G. Lamb, Project Manager, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-315 and 50-316

- Enclosures: 1. Attendee List
- 2. Licensee Handouts

cc w/encls: See next page

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In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and the enclosures will be available for public inspection at the Commission's Public Document Room, the Gelman Building, 2120 L Street, NW., Washington, DC, and accessible electronically through the ADAMS Public Electronic Reading Room link at the NRC Web site (<http://www.nrc.gov>).

If you have any questions regarding this matter, please contact me at 301-415-1446.

Sincerely,

A handwritten signature in black ink that reads "John G. Lamb". The signature is written in a cursive style with a large, prominent initial "J".

John G. Lamb, Project Manager, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-315 and 50-316

Enclosures: 1. Attendee List
2. Licensee Handouts

cc w/encls: See next page

Donald C. Cook Nuclear Plant, Units 1 and 2

cc:

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ATTENDANCE LIST FOR AUGUST 15, 2000, MEETING

<u>NAME</u>	<u>ORGANIZATION</u>
John Stang	NRC/NRR
John G. Lamb	NRC/NRR
Matthew A. Mitchell	NRC/NRR
Claudia Craig	NRC/NRR
Keith Wichman	NRC/NRR
Bill Bateman	NRC/NRR
B.P. Jain	NRC/NRR
Ron Smith	Indiana Michigan Power Company
Scott Greenlee	Indiana Michigan Power Company
Brian McIntyre	Indiana Michigan Power Company
Mike Rencheck	Indiana Michigan Power Company
Srtyananda Chakrabarti	Indiana Michigan Power Company
Warren Bamford	Westinghouse
Dulal Bhowonick	Westinghouse

NRC/NRR = Nuclear Regulatory Commission/Office of Nuclear Reactor Regulation

ENCLOSURE 1

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American Electric Power

Meeting With

Nuclear Regulatory Commission

**Discussion of
Pressurizer Surge Line
Leak Before Break Evaluation**

August 15, 2000

Agenda

- Agenda/Purpose S. Greenlee
- Background S. Greenlee
- Leak Before Break Submittal R. Smith
- Summary S. Greenlee
- Schedule B. McIntyre

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Background

Scot Greenlee

Director - Design Engineering

Problem Identification

- High Energy Line Break Program Reconstitution
 - Identified pressurizer surge line whip restraint calculation as “non-conservative”
 - New calculation indicated need for modifications
- Options
 - Analyze pipe whip consequences
 - Obtain leak before break approval
 - Modify restraints (**Approach for Unit 2**)

Unit 2 Timeline

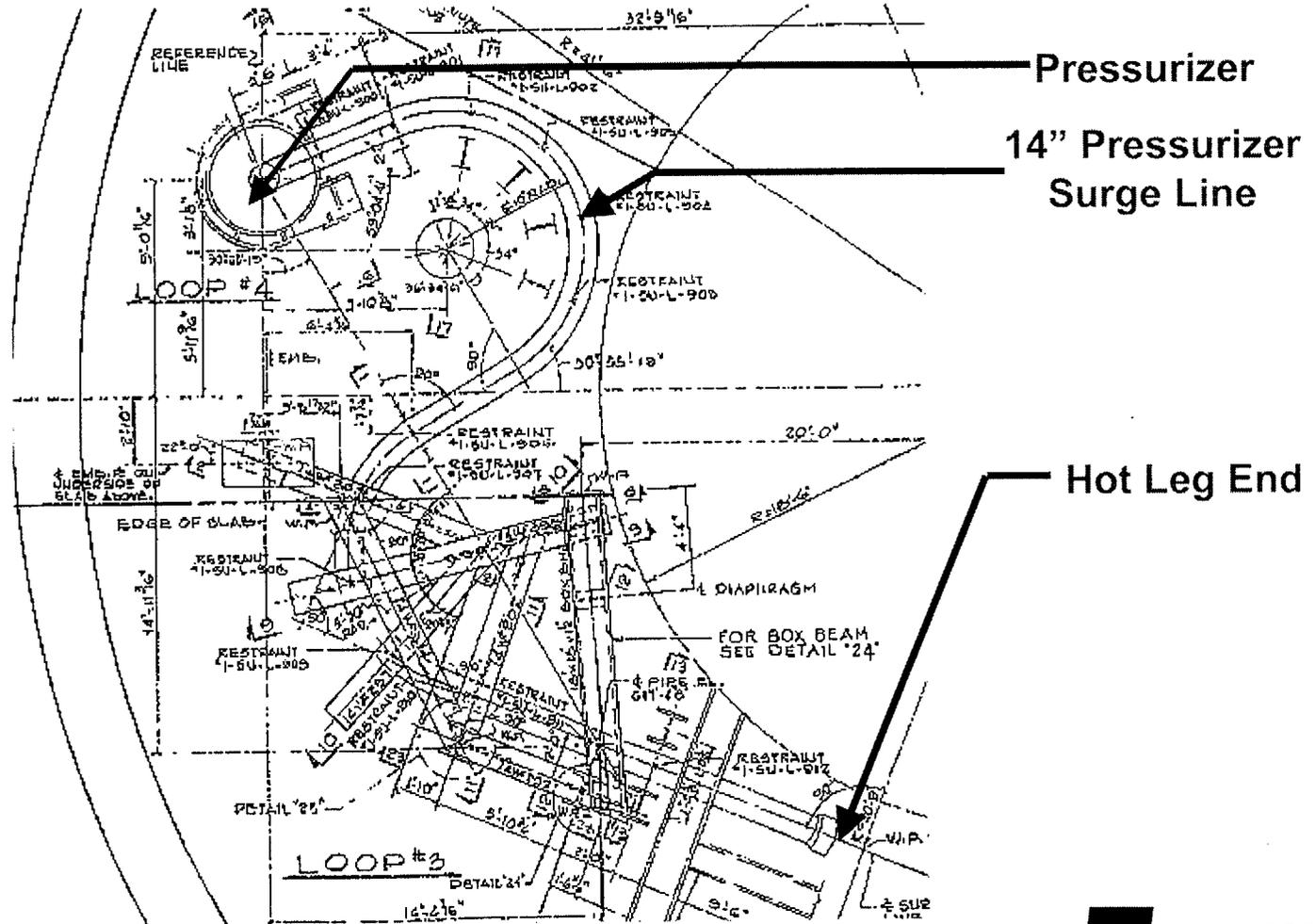
- Calculation Review Complete 6/30/1999
- Modification Authorized 8/24/1999
- Design Complete 1/13/2000
- Installation Start 3/7/2000
- Installation Complete 5/21/2000

Unit 2 Modification Experience

- High Dose - 21 Rem
- Complex Design - 4.5 Months to Develop
- Difficult Implementation - 6,600 Person-hours

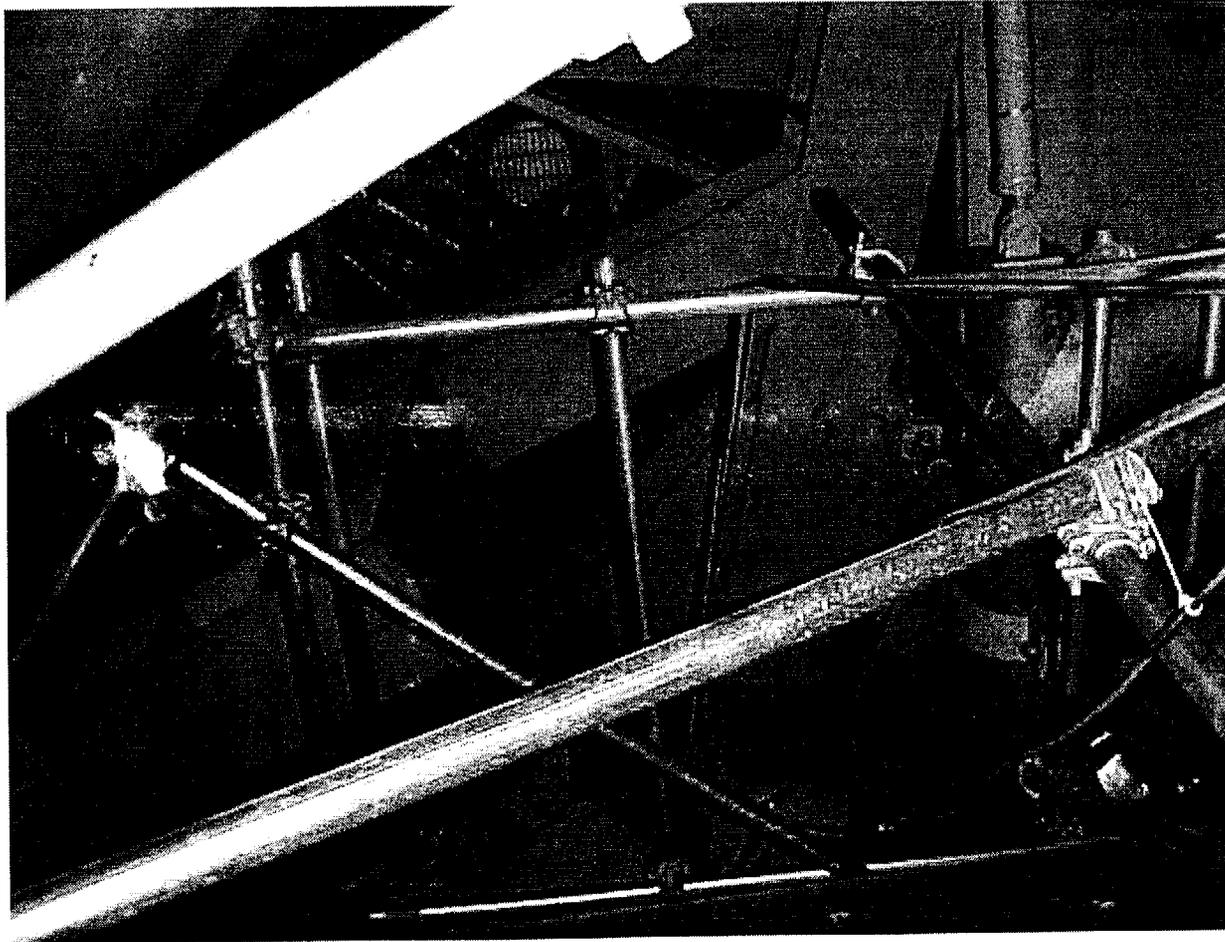
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Surge Line Layout



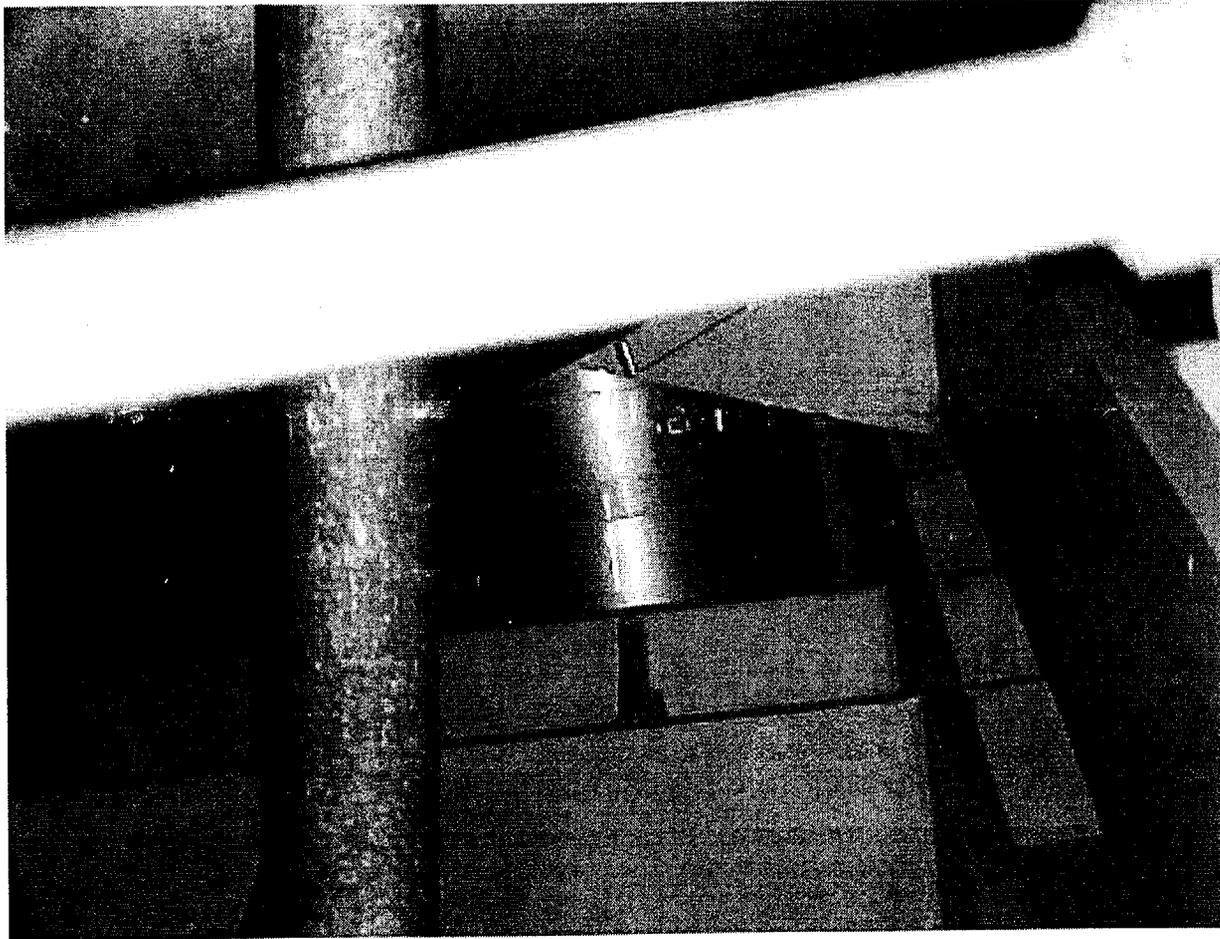
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Surge Line Layout



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Surge Line Layout



Unit 1 Strategy

- Leak Before Break Application - Selected Approach

- Contingencies
 - Analyze pipe whip consequences
 - Reanalyze Unit 1 configuration

- Contingencies Will Impact Restart Dose - May Impact Schedule

Submittal Approach

- Forwards WCAP-15434
 - Provides LBB evaluation
 - Follows recommendations and criteria from proposed Standard Review Plan 3.6.3 and NUREG-1061, Volume 3
- Consistent with Submittals by Other Plants
- Includes Responses to RAI for Another Plant
- Addresses Additional NRC Questions

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Leak Before Break Submittal

Ron Smith

Manager - Structural Engineering

WCAP-15434

- Operating History
- Materials and Properties
- Leak Before Break Analysis

Operating History

- Erosion / Corrosion
 - No erosion / corrosion history in Westinghouse plants
- Water Hammer
 - Precluded by surge line design
- High Cycle Fatigue
 - Stresses below endurance limit
- Low Cycle Fatigue
 - Thermal stratification (Bulletin 88-11) addressed in WCAP-12850 and WCAP-12850, Supplement 1
 - Crack growth is negligible

Materials and Properties

- Line Constructed of Forged Stainless Steel -
A376/TP316
 - Properties determined from D.C. Cook certified material test reports

- Weld Procedures
 - Gas Tungsten Arc
 - Shielded Metal Arc

Leak Before Break Analysis

■ Overview of LBB Analysis

- Applied loads calculation
- Limiting location identification
- Leakage flaw size at limiting location
- Critical flaw size at limiting location
- Margin assessment at limiting location

Leak Before Break Analysis

■ Applied Loads Calculation

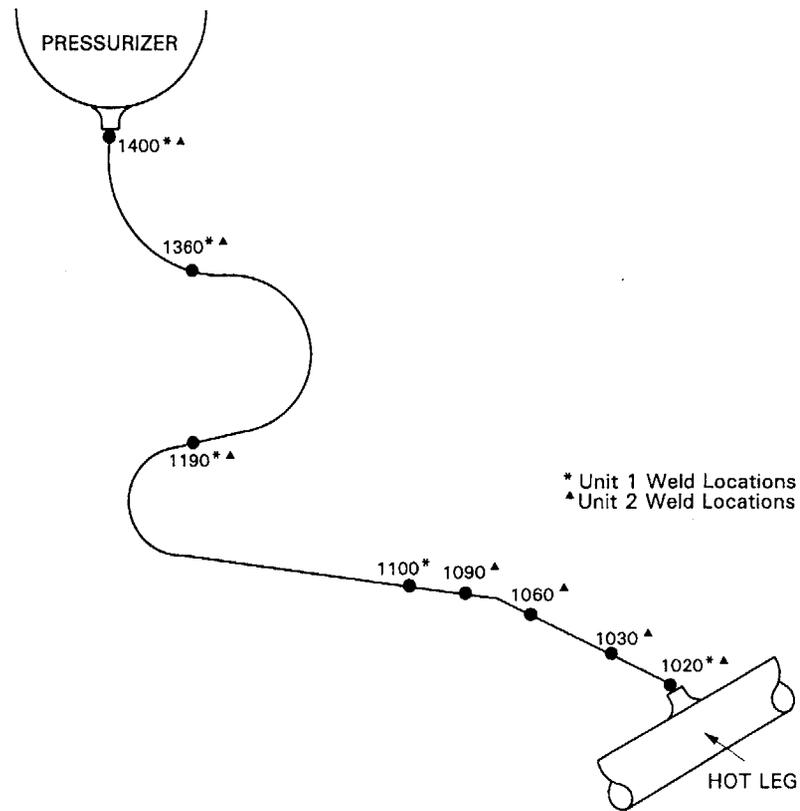
- Normal operating loads for leak rate evaluation
 - » Three cases considered
 - » Uses algebraic sum method
- Faulted loads for crack stability analysis
 - » Four cases considered
 - » Uses absolute sum method

Leak Before Break Analysis

- Limiting Location Identification (Hot Leg Nozzle to Pipe Weld)
- Leakage Flaw Size at Limiting Location
 - D. C. Cook meets GL 84-04 criteria for leakage detection of 1 gpm in four hours (NRC approval dated November 22, 1985)
 - Flaw size calculated for 10 times leak detection capability (10 gpm)
 - Calculation uses normal operating load cases and average material properties

Leak Before Break Analysis

PIPE 14" Schedule 160
Wall thickness = 1.406"



Leak Before Break Analysis

■ Critical Flaw Size at Limiting Location

– Calculation:

- » Uses faulted load cases and lower bound base metal tensile properties
- » Stability analysis based on limit load method with weld corrected for toughness

■ Margin Assessment at Limiting Location

- Margin between leakage flaw and critical flaw: at least two for all cases

Leak Before Break Analysis

- Margin Requirements Satisfied
 - Factor of 10 for leakage
 - Factor of 2 for flaw size
 - Margin on loads using absolute summation method of faulted load combination
- WCAP-15434 Consistent With Other Submittals

RAI Responses

- Addressed in Supplemental Westinghouse Letter
 - Torsional loads
 - » Loads included in the moment summation
 - » Impact is insignificant
 - Stress information for additional locations
 - » Three highest stress locations provided

Additional NRC Questions

- **Address Thermal Aging of Weld Material**
 - Toughness correction factor applied in Section 5.3 of WCAP-15434

- **Discuss Thermal Aging of Cast Materials**
 - Pipe sections constructed of forged stainless steel

Additional NRC Questions

- Plant Normal Operating Temperatures and Pressures
 - Included in submittal
- Safe Shutdown Earthquake Acceleration Level
 - Included in submittal
- Effects of Thermal Fatigue
 - Addressed in WCAP-12850 and WCAP-12850, Supplement 1

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Summary

Scot Greenlee

Director - Design Engineering

Summary

- Submittal
 - Addresses SRP 3.6.3, NUREG-1061, Volume 3, RAI to another plant, and NRC questions
 - Consistent with other plant requests

- LBB Methodology Applicable to D.C. Cook Surge Line

- LBB Methodology will Reduce Radiological Exposure and Outage Cost

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Schedule

Brian McIntyre

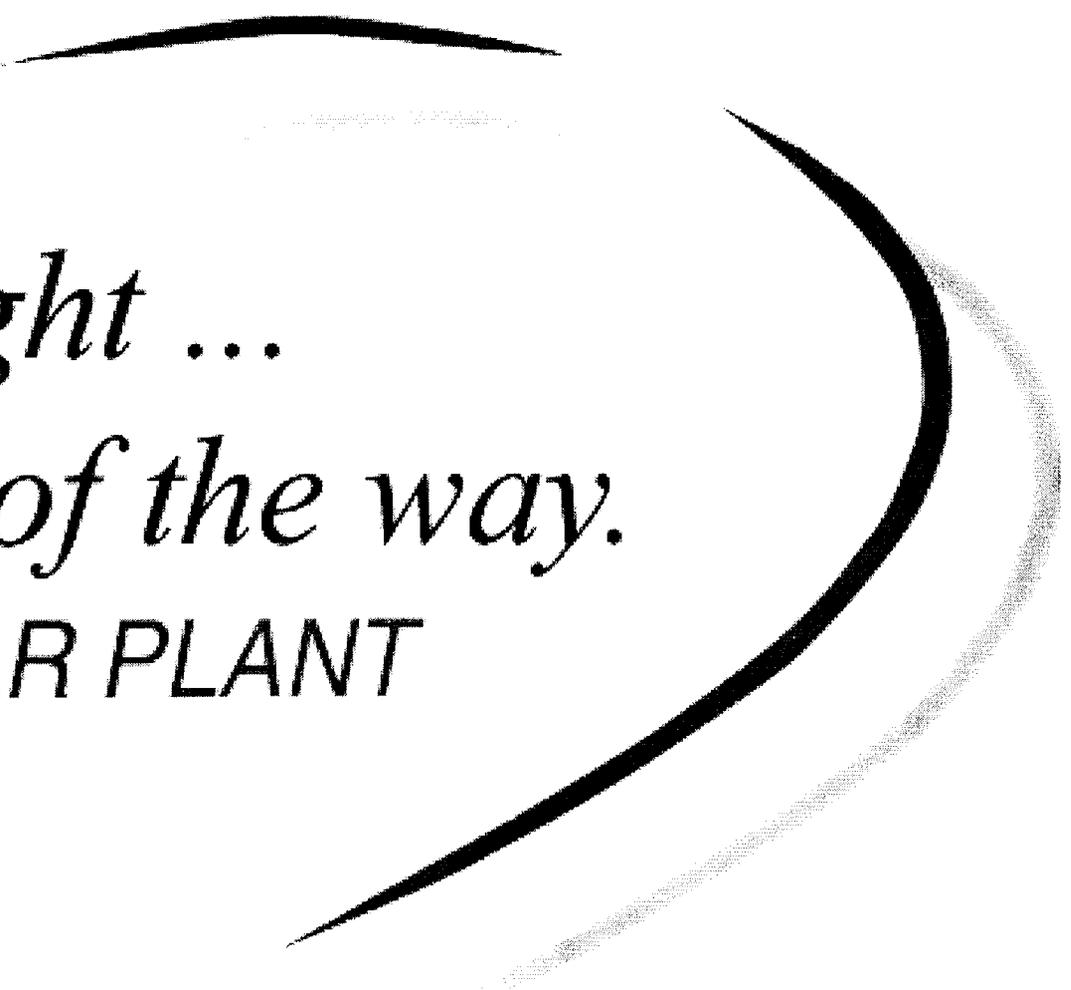
Director - Regulatory Affairs (Acting)

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Schedule

- Submittal - August 22, 2000

- Approval Requested by December 1, 2000



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