50-440

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 15, 1998

LICENSEE: Cleveland Electric Illuminating Company

FACILITY: Perry Nuclear Power Plant, Unit No. 1

SUBJECT: SUMMARY OF NOVEMBER 19, 1998 MEETING ON FEEDWATER ISOLATION PROVISIONS

On November 19, 1998, NRC staff met with representatives of Cleveland Electric Illuminating Company (CEI) in Rockville, Maryland. The purpose of the meeting was to discuss proposed changes to the design and licensing basis of the containment isolation provisions for the feedwater system. A list of the meeting participants is included as Enclosure 1. The meeting handouts are included in Enclosure 2.

Isolation provisions for the feedwater penetrations take credit for three isolation valves. Two piston lift check valves are located immediately inside and outside of the containment penetration. A third, motor-operated gate valve is located further upstream, outside of containment. The current licensing basis relies on a water seal provided by the feedwater leakage control system (FWLCS). The FWLCS injects water between the two check valves and also between the outside check valve and gate valve. Due to the need for operator action to initiate this system and the time to fill the piping volume between the valves, the water seal will not be provided until approximately one hour following the postulated accident. In addition, for long-term isolation provisions for a postulated feedwater line break inside containment, reliance is placed upon the motor-operated gate valve to close.

The feedwater check valves have typically failed to pass the local leak rate tests required by 10 CFR 50, Appendix J. As a result, the licensee has expended considerable resources in terms of both dollars and man-rems to refurbish these valves during outages. The licensee's submittal of September 9, 1998, proposed changes to the design and licensing basis for the isolation provisions of the feedwater system. These changes included: 1) elimination of the feedwater check valves from the USAR listing of containment isolation valves; 2) elimination of local leak rate tests for the feedwater check valves; 3) performance of periodic boroscopic examination of the feedwater check valve seats to ensure functional operability; 4) rerouting of the feedwater leakage control system to inject into the stem of the motor-operated gate valves; and 5) introducing a second electrical supply to the motor-operated gate valves. The licensee stated that these changes would represent improvements to the currently approved containment isolation provisions.

The licensee and staff have different opinions regarding the current licensing basis for the feedwater isolation provisions. As described in the licensee's submittal of September 9, 1998, the licensee considers the licensing basis to only include a single barrier (i.e., the motor-operated gate valve). This is due, in part, to the staff's agreement that check valve leakage will not contribute to offsite accident source; the only contributor to the accident source from the feedwater lines is water leakage past the gate valves. In addition, the licensee interprets Supplement 7 to the Perry Safety Evaluation Report (NUREG-0887) as the staff's conclusion that the gate valve will not fail to close; whereas, the staff considers the licensing basis to

include the three valves discussed above along with the water seal. This difference in opinion was not resolved.

The staff noted that a single, 100% reliable isolation barrier would be precedent setting and would conflict with the requirements of General Design Criterion 56. The staff further stated that it is not their intent to assume any containment isolation barrier to have 100% reliability and thus, not be subject to a single active failure. The staff believes that the licensee's request will require exemptions from both GDC 56 and the local leak rate testing requirements of Appendix J to 10 CFR 50.

The staff questioned the licensee's proposal to terminate local leak rate testing of the feedwater check valves. The licensee has established a 1 gpm leakage rate limit on the feedwater check valves and, as discussed above, these valves typically fail their "as-found" local leak rate tests. As-found leakage values are typically on the order of 10 gpm. The staff questioned the failure mode and whether the leakage rates would further deteriorate over time if local leak rate testing was not performed. When the licensee indicated that visual inspection of the "as found" condition did not identify any apparent signs of degradation, the staff questioned the value of performing boroscopic examinations of the check valve seats.

The staff voiced its concern about maintaining a water seal in the feedwater piping. Failure to maintain a water seal would establish an air leakage path thus mandating pneumatic testing of the check valves. The staff questioned whether increasing the leakage limits for the check valves above 1 gpm would be beneficial. The licensee stated that the leakage control system piping is small and that flow is nearly choked. Therefore, increasing flow rates is not a practical solution.

Discussion focused on the link between containment isolation and offsite dose limits. The source of water for the feedwater leakage control system is the suppression pool which may be highly contaminated following an accident. The licensee stated that if the gate valve failed to close, check valve leakage past the gate valve could potentially result in an unacceptable offsite dose. However, since the licensee believes that the licensing basis assumes the gate valves will close, leakage rates of the check valves are not important since they don't contribute to dose. In this regard, the licensee contends that the check valves are not necessary for containment isolation.

The staff concluded that the licensee's proposal was not acceptable. The staff cited 1) a conflict between a single isolation barrier and GDC 56; 2) a conflict between elimination of the local leak rate testing of the feedwater check valves and Appendix J to 10 CFR 50; and 3) rerouting of the feedwater leakage control system would create an air leakage path through the check valves that would not be tested.

The staff recognized the generic problems that the BWR6/Mark III owners are having with local leak rate testing of feedwater check valves. Therefore, the staff suggested the licensee consider submitting a one-time scheduler exemption from the local leak rate testing requirements of Appendix J for their April 1999 refueling outage. This would provide the staff with an appropriate time frame to address the problem generically. Any exemption request would need to ensure that the water seal was maintained, include a cost/benefit analysis, and

be risk informed. The risk study would need to address the impact of not testing the feedwater check valves and the probability that the gate valves would not close.

The staff stressed that any long term solution would require a second isolation barrier. The licensee stated that the next system valve upstream of the gate valve would be located outside of the steam tunnel in the turbine building. Questions regarding missile protection and seismic class were discussed.

In conclusion, both the staff and the licensee stated a need to address this issue at their next, respective management level. When asked if the licensee would prefer to modify their existing submittal or receive a formal denial of the existing submittal, the licensee said they would contact us.

Original signed by:

Douglas V. Pickett, Senior Project Manager
Project Directorate III-2
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-440

Enclosures: List of Meeting Participants
Meeting Handouts

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MEETING ATTENDEES

NRC AND CLEVELAND ELECTRIC ILLUMINATING COMPANY

FEEDWATER ISOLATION PROVISIONS

NOVEMBER 19, 1998

CLEVELAND ELECTRIC ILLUMINATING CO.

Robert W. Schrauder
Henry L. Hegrat
Bradley S. Ferrell
Cal Heintz
Richard Dame
Thomas Shega

SCIENTECH - NUS

Dave Studley

NRC

Carl Berlinger
Jack Kudrick
Ed Throm
Stuart Richards
Doug Pickett
Lawrence Burkhart

ILLINOIS POWER COMPANY

Dan Korneman

Enclosure 1

Perry Nuclear Power Plant

Feedwater Penetration Improvement During RFO7

NRC Meeting November 19, 1998

ENCLOSURE 2

Feedwater Penetration Improvement

- **Meeting Goal: to provide information to support NRC approval of the amendment**
- **Project Goal: to improve the overall performance of the Feedwater Penetrations**
  - » **Reduce actual dose to plant workers**
  - » **Improve protection of the public**
  - » **Provide a risk-informed level of protection to achieve the above goals**

Feedwater Penetration Improvement

Current Configuration:

- **Gate valve seats have been very leak tight - no rework**
- **Offsite doses are mitigated by closure of the gate valves (licensing post-LOCA dose calcs only consider the gate valve leakage, not the checks)**
- **Check valve leakage criteria of < 1 gpm is required to meet the current FWLCS design function of filling the pipe within one hour, not for dose calc reasons**
- **Workers were exposed to > 5 rem to work on the check valve seats in RFO6; plus dose from testing**

Feedwater Penetration Improvement

- **Benefits of new design**
  - » **Improves the probability of the Feedwater lines getting a water seal within the currently licensed period of time after a LOCA due to relocated FWLCS**
  - » **Improves the probability of closure of the currently licensed high integrity gate valves, after a LOCA/LOOP/Div. 1 failure, due to new provisions for an alternate power supply**
  - » **Reduces the dose received by workers who have been performing maintenance and testing of the checks**
  - » **Proposal continues to provide protection for a postulated Feedwater Line Break Outside Containment**

Feedwater Penetration Improvement

- **Other options considered**
  - » **Add Soft-seats to the Check Valves, and maintain the current licensing basis**
  - » **Maintain current FWLCS injection point, and increase allowable Check Valve leakage**
  - » **Design & install a new "sister" gate valve in each line**
  - » **Many other options were also considered**

Other Options Considered (continued)

- **Add Soft-seats to the Check Valves, and maintain the current licensing basis**
  - » **Still would need to test checks, and would need to replace seats each refuel outage due to EQ**
  - » **Still would see leakage > 1 gpm (EPRI)**
  - » **Wouldn't have the extra recovery time for actuation of FWLCS**

Feedwater Penetration Improvement

Other Options Considered (continued)

- **Maintain current FWLCS injection point, and increase allowable Check Valve leakage**
  - » **Would not be able to get enough FWLCS flow into the pipe (would require installation of new, larger diameter Class 1 connections to pass the flow in order to fill the pipe within an hour, which is not feasible due to the design of the penetration and of the valves)**
  - » **Still would need to test checks**
  - » **Would have potential for releasing post_LOCA suppression pool (FWLCS) water from containment**
  - » **Using outside clean water source would flood containment**

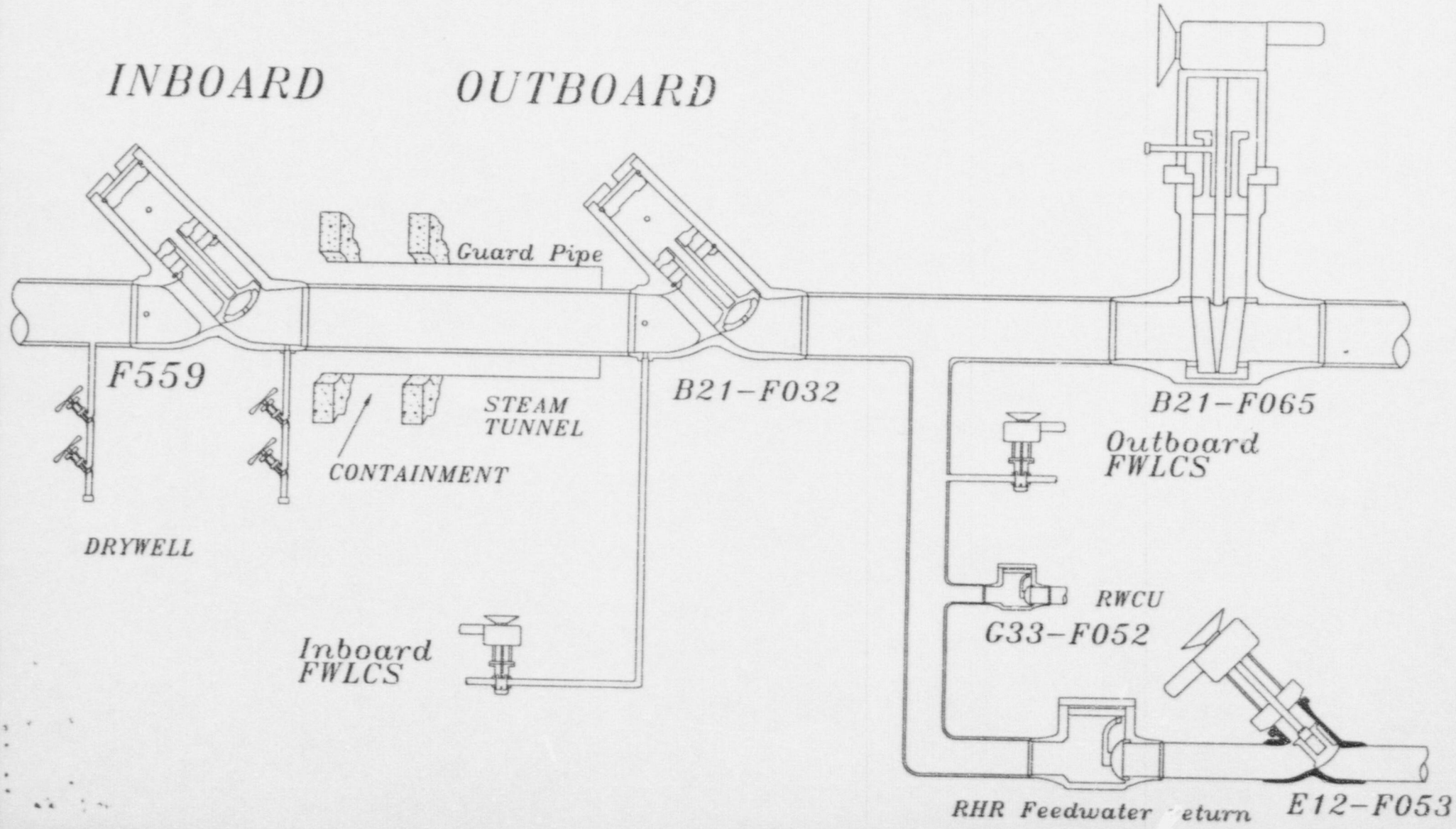
Other Options Considered (continued)

- **Design & install a new gate valve in each line**
  - » **Still would need to test checks**
  - » **Would provide very little benefit to the post-LOCA reliability of the penetration as compared to the proposed change (proposed change will provide an alternate power supply to the existing gate valves)**
  - » **Would not factor in to the analysis of the Feedwater line break outside containment**
  - » **Would be a high dose job, and extremely expensive**
  - » **The cost-benefit ratio does not justify this change**

Feedwater Penetration Improvement

FirstEnergy Docketed Letter Contents

- **Provide design summary of alternate power supply**
- **Provide results of operator action review**
- **Provide results of the dose calc sensitivity analysis**
- **Provide results of a risk-informed review on the proposed License Amendment**
- **Provide several updated USAR pages**
  - » Add page from Table 3.2-1 NOTES about the third valve with high leak tight integrity.
  - » Revise page describing fill time on the bonnet, and adding the word "approximately".
  - » Editorial change to cross out words that should have been crossed out in the first submittal.
  - » Revise page describing "both" subsystems being interlocked, to show that only one is interlocked.
  - » Add page from "Feedwater Line Break Outside Containment", describing dose calc result, to show the impact of check valve leakage on the calc (showing it remains bounded by the Main Steam Line Break Outside Containment calc).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F559
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CONTAINMENT
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B21-F065
Outboard FWLCS
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