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February 5, 1985

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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Before the Atomic Safety and Licensing Board

In the Matter of )  
 )  
THE CLEVELAND ELECTRIC )  
ILLUMINATING COMPANY, ET AL. )  
 )  
(Perry Nuclear Power Plant, )  
Units 1 and 2) )

Docket Nos. 50-440 *oc*  
50-441 *oc*

APPLICANTS' MOTION FOR SUMMARY  
DISPOSITION OF ISSUE NO. 15

The Cleveland Electric Illuminating Company ("CEI"),  
Duquesne Light Company, Ohio Edison Company, Pennsylvania Power  
Company and The Toledo Edison Company ("Applicants") hereby  
move the Atomic Safety and Licensing Board, pursuant to 10  
C.F.R. § 2.749, for summary disposition in Applicants' favor of  
Issue No. 15, concerning steam erosion. As discussed herein,  
there is no genuine issue of material fact to be heard with re-  
spect to Issue No. 15; and Applicants are entitled to a deci-  
sion in their favor on this contention as a matter of law.

This motion is supported by:

1. "Applicants' Statement of Material Facts As To Which There Is No Genuine Issue To Be Heard on Issue No. 15;"
2. "Affidavit of Richard A. Pender," dated February 1, 1985 ("Pender Affidavit");
3. "Affidavit of Donald H. Stevens," dated February 1, 1985 ("Stevens Affidavit");

*DS02 DS03*

4. Section II.A of "Applicants' Motion for Summary Disposition of Issue 14" (January 14, 1985) (articulating the legal standards applicable to a motion for summary disposition).

#### I. PROCEDURAL BACKGROUND

Issue No. 15 was admitted as a contention in this proceeding in the Licensing Board's Memorandum and Order (Concerning Ohio Citizens for Responsible Energy's Late-Filed Contentions 21-16), LBP-82-98, 16 N.R.C. 1459 (1982). Ohio Citizens for Responsible Energy ("OCRE") is the lead intervenor on this issue. As admitted by the Licensing Board, Issue No. 15 states:

Applicant has not yet demonstrated that it is prepared to prevent, discover, assess and mitigate the effects of steam erosion on components of the Perry Nuclear Power Plant that will be subjected to steam flow.

Id. at 1471.

On November 18, 1982, Applicants filed a motion for directed certification to the Atomic Safety and Licensing Appeal Board challenging the admission of this contention.<sup>1/</sup> The motion, which was supported by the NRC Staff ("Staff"),<sup>2/</sup> was denied by the Appeal Board on December 15, 1983 as interlocutory. Cleveland Electric Illuminating Company (Perry Nuclear Power Plant, Units 1 and 2), ALAB-706, 16 N.R.C. 1754 (1982).

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<sup>1/</sup> Motion for Directed Certification of the Licensing Board's Memorandum and Order of October 29, 1982 (November 18, 1982).

<sup>2/</sup> NRC Staff Response in Support of Applicants' Motion for Directed Certification of the Licensing Board's Memorandum and Order of October 29, 1982 (December 8, 1982).

Discovery on this issue was conducted from January 1983 to June 1983, and included: OCRE's Ninth Set of Interrogatories to the NRC Staff, dated January 31, 1983, to which the Staff responded on March 1, 1983; OCRE's Ninth Set of Interrogatories to Applicants, dated January 31, 1983, to which Applicants responded on March 8, 1983; Applicants' Interrogatories and Request for Production of Documents to OCRE (Third Set), dated January 31, 1983, to which OCRE responded on March 18, 1983; and Applicants' Interrogatories and Request for Production of Documents to OCRE (Fourth Set), dated April 8, 1983, to which OCRE responded on June 1, 1983.<sup>3/</sup> In addition, Applicants filed supplementary answers to OCRE interrogatories on September 23, 1983, February 29, 1984, and November 1, 1984.<sup>4/</sup>

## II. ARGUMENT

### A. Standards for Summary Disposition

The general standards by which motions for summary disposition are judged are set forth in Section II.A of Applicants'

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<sup>3/</sup> On November 16, 1983, OCRE filed a motion to reopen discovery on four issues, including Issue No. 15. That motion was denied in the Licensing Board's Memorandum and Order (OCRE Motion to Reopen Discovery), dated December 20, 1983, without prejudice to OCRE's filing late discovery requests subject to good cause. OCRE has filed no subsequent discovery requests on Issue No. 15.

<sup>4/</sup> Letter from Michael A. Swiger to Susan L. Hiatt (September 23, 1983); Applicants' Supplemental Answers to Interrogatories on Issue Nos. 6, 8 and 15 (February 29, 1984); Letter from Michael A. Swiger to Susan L. Hiatt (November 1, 1984).

Motion for Summary Disposition of Issue 14, dated January 14, 1985, which is incorporated herein by reference.

B. There is No Genuine Issue of Material Fact With Respect to Issue No. 15

Issue No. 15 contends that Applicants have not addressed the effects of steam erosion at the Perry Nuclear Power Plant ("PNPP"). As discussed in the Pender Affidavit and Stevens Affidavit, attached hereto, Applicants have addressed the potential effects of steam erosion; and there is no reasonable basis to believe that steam erosion at PNPP, if it occurs, will affect the health or safety of the public.

OCRE's contention is based on two NRC Information Notices. IE Information Notice No. 82-22 (July 9, 1982) described failures at several nuclear plants in steam and steam line drain piping which apparently resulted from steam erosion. IE Information Notice No. 82-23 (July 16, 1982) reported excessive leakage rates during testing of Main Steam Isolation Valves ("MSIVs") at a number of plants. A few of these failures were attributed to steam erosion.<sup>5/</sup>

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<sup>5/</sup> In its original contention, OCRE further noted that Applicants at that time had not yet submitted their inservice testing program for pumps and valves for the Staff's review, as reflected in Section 3.9.6 of the PNPP SER. Ohio Citizens for Responsible Energy Motion for Leave to File its Contentions 21 through 26, dated August 18, 1982, at 5. OCRE offered no basis for believing pumps are subject to steam erosion; neither was any such basis identified in the course of discovery. The only relevant valves were MSIVs; however, as discussed below, the Pender Affidavit demonstrates that steam erosion is not a contributing factor to MSIV leakage.



Applicants have long been aware of the potential for steam erosion in certain piping systems. Pender Affidavit at ¶ 3. Steam erosion in steam and steam line drain piping systems is the degradation of piping due either to the high velocity impingement of condensed steam droplets on the piping (erosion-corrosion), or the repeated growth and collapse of steam bubbles in the process fluid (flashing fluid erosion). Id. at ¶¶ 7-8. The erosion-corrosion type of steam erosion occurs only in steam piping systems with certain combinations of low quality steam, low temperatures (within a narrow range), and high velocities. Id. at ¶¶ 9-14, 22. Flashing fluid erosion normally occurs downstream of control valves in steam line drain systems, where pressure in the system is usually below the saturation pressure. Id. at ¶ 16. Because steam erosion is a relatively slow process, continuous flow for substantial periods of time is considered a minimum condition of steam erosion. Id. at ¶ 22.

Based on industry experience, as well as CEI's experience with fossil fueled plants, Applicants implemented certain design features in the PNPP steam line drain systems to mitigate the effects of steam erosion. Id. at ¶ 18. These design features were incorporated well before OCRE's raising of its steam erosion contention. Id. at ¶ 4. The design features included using pipe tees with stainless steel target plates and tell tale valves (instead of pipe elbows) at directional changes downstream of control valves, where steam erosion is most

likely to occur in steam line drain systems. They also included replacing piping downstream of control valves with erosion-resistant materials. Id. at ¶¶ 19-21.

In addition, Applicants have performed a comprehensive assessment of steam piping systems at PNPP and have identified those systems in which significant steam erosion may occur. Id. at ¶¶ 5, 22-23. Steam systems potentially subject to significant steam erosion, along with the steam line drain systems in which special design features were incorporated, will be included in a steam erosion inspection program. Id. at ¶¶ 5, 25.

The steam erosion inspection program is based on a prioritization of potential inspection locations to assure periodic inspection of those locations where steam erosion, should it occur, is likely to be most severe. Id. at ¶ 26. For the steam line drain systems (N22, N25 and N26), inspection points are identified downstream of selected control valves. The inspections are expected to confirm the effectiveness of the design features incorporated in these systems to mitigate steam erosion. Id. at ¶ 27. Inspection locations for the two steam systems (N11 and N36) are based on predicted erosion-corrosion rates using the Keller Equation. Id. at ¶¶ 29-33. Inspection points are selected which represent the worst case locations for steam erosion. Should inspection indicate significant steam erosion rates at these locations, the inspection locations will be expanded, as appropriate, to ensure maximum

coverage of susceptible areas of pipe within the system.

Id. at ¶ 34.

Prior to fuel load, an inspection will be conducted to provide baseline information on actual pipe wall thicknesses. The first operational inspection will be conducted within the first three years after plant start-up. This inspection interval will assure that any steam erosion effects are detected before significant degradation can occur. For subsequent inspections, the inspection interval will be based on the results of the previous inspection. In no case will an inspection interval exceed the expected life of a piping system.

Id. at ¶¶ 36-38.

The method used to determine pipe wall thickness for the inspection program is ultrasonic inspection. Id. at ¶ 35. Locations inspected will be considered acceptable if the pipe exceeds its minimum wall thickness and the expected life of the piping is greater than the time until the next scheduled inspection. Id. at ¶ 39. If necessary, piping will be repaired or replaced to ensure that wall thickness is at least as great as the minimum wall thickness required by the applicable piping code. Id. at ¶¶ 39, 31 at n.5.

Even if a piping failure due to steam erosion were to occur at PNPP, industry experience has shown that such failures do not pose a threat to plant safety systems or otherwise affect the health or safety of the public. Id. at ¶ 24. The

PNPP Steam Erosion Hazards Analysis, described in the Stevens Affidavit, confirms that steam erosion at PNPP is not a concern with respect to the public health or safety. See Stevens Affidavit at ¶¶ 3, 10.

The Steam Erosion Hazards Analysis was an extensive study which evaluated the design of PNPP in order to determine effects of postulated piping failures due to steam erosion on the ability of the plant to achieve and maintain safe shutdown. The study reviewed all safety-related systems and components in plant areas containing steam and steam line drain piping. Id. at ¶¶ 3-5. In each area identified, piping failures were postulated which were assumed to prevent the safety-related systems and components within the area from performing their safety functions. Id. at ¶ 6.

As a result of the reviews of individual systems and components, the Steam Erosion Hazards Analysis determined that in each case, either (1) failure of the item could not prevent safe shutdown or maintenance of safe shutdown at FNPP, or (2) the pipe failure postulated for the item was not a credible event. Id. at ¶¶ 6-8. The conclusion of the study was that the design of PNPP assures the ability of the plant to achieve and maintain a safe shutdown condition in the event of any credible failure resulting from the effects of steam erosion. Id. at ¶ 3.

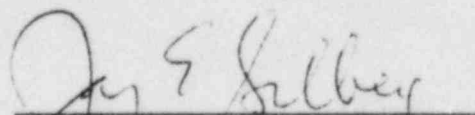


With respect to the MSIVs, a comprehensive study by the BWR Owners Group on MSIV Leakage has determined that steam erosion is not a contributing factor to MSIV leakage. Pender Affidavit at ¶ 41. This conclusion is consistent with the conditions to which the MSIVs will be exposed at PNPP. Id. at ¶ 42. In addition, those portions of the valves which will be subjected to steam flow are overlaid with Stellite, an erosion-resistant material. Id. Thus, steam erosion is not expected to have any significant effects on the MSIVs. Id.

### III. Conclusion

In conclusion, there is no genuine issue of material fact to be heard with respect to Applicants' ability to prevent, discover, assess and mitigate the potential effects of steam erosion at PNPP. Applicants respectfully request that the Licensing Board grant summary disposition of Issue No. 15 in their favor.

Respectfully submitted,

  
Jay E. Silberg, P.C.  
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