UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
CLEVELAND ELECTRIC ILLUMINATING COMPANY, et al.	)	Docket Nos. 50-440 50-441 (OL)
	)	
(Perry Nuclear Power Plant, Units 1 and 2)	)	

SUNFLOWER ALLIANCE ET AL. RESPONSE TO APPLICANTS' SECOND SET OF INTERROGATORIES AND REQUEST FOR PRODUCTION OF DOCUMENTS

Intervenor Sunflower Alliance et al. hereby files its response to Applicants' Second Set of Interrogatories, dated May 3, 1982, pertaining to Issue #4. So as to conserve its scarce resources, this Intervenor will not repeat herein the Interrogatories propounded it; the Interrogatories will be answered in the same order and numeration encountered.

1. Sunflower Alliance et al. considers the 30° Sector Steam Methodology Confirmation Tests described in NEDO-24712 to be deficient for the following reasons:

   (a) Use of the 30° sector does not adequately represent realistic core conditions. As indicated at p. 4-1 of NEDO-24712, spray distribution in the center 2 feet of the core is affected by both sector size and the influence of the walls on the sides of the sector. Obviously the reactor core can only be realistically modeled by the use of a full 360° sector, as is

essentially admitted at p. 4-1.

(b) The tests do not simulate steam flow in the bypass region. See Section 3.5 and Appendix B of NEDO-24712. Because of this lack of realistic modeling, the data generated by the tests are of little value, particularly at high steam flow rates: "(I)t is expected for high steam flows that the stagnant bypass would act as an atypical sink to collect the small drops that are levitated and diverted by the high vapor velocities through the upper tieplate openings." (p. 3-12); "a facility modification to include bypass steam injection would be required to obtain meaningful data at high steam flows for comparison with the prediction methodology." (p. B-2). The present facility design is "judged" to be acceptable, but no bases for these judgements are given (pp. 3-12 and B-2).

(c) The variation of core spray distribution with system pressure has not been adequately investigated. Based on tests at system pressures of 29.5 psia, 44.1 psia, and 73.5 psia, it is concluded at p. 8-1 of NEDO-24712 that "calculated spray distributions can be used over a range of pressures." This conclusion seems unsubstantiated; even over the limited range of pressures tested, some effects were observed. Extrapolating these results to the wide range of pressures possible in accident conditions is not justified by any analyis. (For examples of the pressures possible in accident

conditions, see p. 16 of NUREG/CR-2540; for the three accident sequences analyzed therein, pressures range from 56 to 1200 psia.)

(d) The tests did not investigate any possible effects on core spray distribution due to non-condensible gases (e.g., hydrogen), or to varying gas temperatures. (NUREG/CR-2540 at p. 16 indicates that for the 3 accident sequences analyzed, gas (steam and hydrogen) temperatures range from 460 to 2500 °F.) The effects of these realistic accident conditions should be considered.

(e) BWR Core Spray Distribution apparently first became an area of concern following tests in Europe which showed that in steam "partial or complete collapse of the spray cone and/or a shift in the average direction of flow" could occur. These effects were the most severe for nozzles producing a small, high-velocity droplet. (NUREG-0371, TAP A-16) These test results were confirmed by tests performed by General Electric (see Topical Report Evaluation for NEDO-24712). However, NEDO-24712 does not describe either the European tests or GE's confirmatory tests. Consequently, this Intervenor cannot judge whether the 30° sector steam test, as described in NEDO-24712, is an adequate methodology by which to study this phenomenon. (This situation, incidentally, has not been enhanced by the Applicants' refusal to provide to Intervenors certain GE documents pertaining to ECCS evaluation models,

e.g., NEDO-20566, 10 CFR Part 50 Appendix K LOCA Analysis Model.)

(f) The tests do not produce meaningful data for steam flows exceeding 20,000 lb/hr. See p. 5-9: "core spray methodology evaluations cannot be performed in this facility for steam updraft flows above that value." See also p. 8-1: "(b)eyond that value (20,000 lb/hr), the present facility cannot be used for distribution prediction confirmation."

One would therefore question whether steam flows exceeding 20,000 lb/hr are ever encountered in accident conditions. Table 1.3-1 of the FSAR indicates that the steam flow under normal operating conditions is 15.4 million lb/hr. NUREG/CR-2540 at p. 16 indicates that, for the 3 BWR accident sequences analyzed, steam flow varies from 600 to 354,000 lb/hr. Other accident sequences, the conditions of which are presented graphically as they vary with time at pp. C-51 to C-80 of that document, also have steam flow rates in excess of 20,000 lb/hr for substantial periods of time in the accident.

It is thus quite clear that the 30° sector steam test does not produce meaningful data for those conditions which are likely to be present during an accident.

(g) The analysis in Appendix B of NEDO-24712 on Vapor Flow Effects on Drop Trajectories Very Near the Bundle Upper Tieplate may be incomplete and/or deficient. The drop size distributions were calculated for only

two of the three nozzle types used in the facility. This Intervenor asks why the third nozzle was not evaluated. Comparison of calibration data with predictions indicates that the actual drop distribution contains more small drops, with the result that drop diversion occurs at lower steam velocity than predicted.

2. The documents relied upon are:

NUREG/CR-2540, "A Method for the Analysis of Hydrogen and Steam Releases to Containment During Degraded Core Cooling Accidents", prepared by P. Cybulskis, Battelle Columbus Laboratories, for the NRC, February 1982.

NUREG-0371, "Approved Task Action Plans for Category A Generic Activities", Vol. 1, No. 1, Rev. 1. (TAP A-16) December 1977.

Topical Report Evaluation for NEDO-24712, attached to January 30, 1981 letter from R. Tedesco, NRC, to G. Sherwood, GE.

Since these are NRC documents readily available to the Applicants, they will not be provided herewith.

3. No such persons were identified.

4. See response to Interrogatory #1. In addition, Sunflower Alliance et al. agrees with GE and the NRC that the data will "have to be applied to each different reactor size and design for which the full-reactor-core, post-LOCA spray distribution is to be determined" (February 3, 1978 letter from Eisenhut and Ross, NRC, to G. Sherwood, GE). Apparently this has not been done. The facility described in NEDO-24712 is a simulated BWR/6-218; the steam profile simulated was based on a typical BWR/6-218 end-of-cycle core radial power distribution (p. 4-6). Perry is a

238 size BWR/6. It appears to be questionable whether this application will ever be accomplished; as is indicated in various issues of the NRC's Weekly Information Report, this program is facing a severe funding shortage. The 30° SSTF may be dismantled. The analysis of existing SSTF data "has been adversely impacted by a potential GE overrun and by loss of key staff at GE." This Intervenor also notes that it is stated in the February 3, 1978 letter that GE agreed to conduct tests using a range of steam flows representative of LOCA conditions. As was discussed in subpart (f) of the response to Interrogatory #1, th tests performed have not met this criterion.

5. The documents relied upon are:

   February 3, 1978 letter from Eisenhut and Ross, NRC, to G. Sherwood, GE.

   Enclosure E, from Office of Nuclear Regulatory Research, of the Weekly Information Reports (for the Commissioners, from T.A. Rehm, EDO) for the weeks ending: June 12, 1981; September 18, 1981; October 2, 1981; October 23, 1981; December 11, 1981; January 15, 1982; February 19, 1982; and March 19, 1982.

   Since these are NRC documents readily available to the Applicants, they will not be provided herewith.

6. No such persons were identified.

7. Sunflower Alliance et al. disagrees with the following statements given in the February 3, 1978 letter:

   (a) at p. 2 of the letter, that there is a considerable safety margin between available and required spray flow for BWR/1 through BWR/5 models. The Weekly Information Report for the week ending November 27,

1981, Enclosure E, states that tests in Japan show low Emergency Core Cooling spray flow rates reaching central bundles in BWR/4 and 5 models. This new information indicates that the safety margin may not be as large as was thought.

(b) the statement at p. 1 of the letter, "(w)e believe that this overall empirical approach should result in a representation of the full reactor core spray distribution that would exist following a LOCA." The acceptance of the 30° sector methodology would seem to contradict the following statement found in NUREG-0371, TAP A-16: certain core-wide phenomena (swirling, vortex, and redistribution) "would not be discovered without actual large scale, multi-nozzle experiments in steam at pressures typical of BWR upper plenum following a LOCA." This Intervenor questions whether core-wide phenomena could be adequately studied using a 30° sector rather than a full 360° core.

(c) at p. 2 of the letter: "we believe there is a sufficient technical basis to permit continued plant operation and licensing in the interim period while these additional tests and information are being developed." The following statement, found in NUREG-0371, TAP A-16, indicates that the NRC never intended to limit plant operation if BWR core spray distribution posed a serious safety problem: "(i)f such concerns regarding safety of continued plant operation are

found, it might become necessary to grant exemption to certain of the requirements of 10 CFR 50.46 if plant operation is to continue while the Plan is completed." Obviously, Sunflower Alliance does not consider waiving the regulations to permit continued plant operation to be an appropriate response to the discovery of a problem that may compromise plant safety.

The copy of the February 3, 1978 letter supplied to Intervenors by Applicants is incomplete; the letter refers to an attachment, "Requests for Additional Information," which was not included. For this reason, response to this Interrogatory should not be considered complete; Sunflower Alliance et al. reserves the right to supplement this response when it has obtained said attachment.

8. The documents relied upon were identified therein.

9. No such persons were identified.

10. We take issue with the Staff's conclusion (p. 1 of the January 30, 1981 letter and p. 5 of the Topical Report Evaluation) that the SSTF tests constitute an adequate confirmation of the GE spray distribution methodology. This disagreement is based upon the reasons discussed in the responses to Interrogatories 1, 4, and 7. In addition, the points of concern identified at p. 5 of the Topical Report Evaluation were not adequately resolved, particularly those concerns pertaining to the large uncertainty bands and the variations with steam flow and pressure. No analysis was given supporting the Staff's conclusion

that these concerns are apparently resolved.

We would note that we agree with the Staff that "application of the methodology to actual plant configurations, including treatment of prediction uncertainties, remain unresolved" (p. 1 of letter); it probably will remain so for some time for the reasons discussed in the response to Interrogatory #4.

11. All documents relied upon were identified in previous responses.

12. No such persons were identified.

Daniel D. Wilt, Esq.
Attorney for Sunflower Alliance Inc. et al
7301 Chippewa Rd.
Brecksville, Ohio 44141
(216) 526-23250

PROOF OF SERVICE

The undersigned does hereby certify that a copy of the Response to Applicant's Second Set of Interrogatories has been sent to all persons listed on the Service List on this 28 th day of May, 1982.

Daniel D. Wilt, Esq.
Attorney for Sunflower Alliance Inc., et al

Note:

Per agreement with Counsel for Applicant, Sunflower Alliance Inc. has been granted leave to answer the Second Set of Interrogatories beyond the 14 day time limit set forth in the regulation s.

AFFIDAVIT

I, Susan L. Hiatt, being duly sworn depose and say that the answers set forth in the foregoing SUNFLOWER ALLIANCE ET AL. RESPONSE TO APPLICANTS' SECOND SET OF INTERROGATORIES AND REQUEST FOR PRODUCTION OF DOCUMENTS are true to the best of my knowledge, belief, and information.

Susan L. Hiatt

Susan L. Hiatt

Sworn to and subscribed before me this 28 day of May, 1982.

Daniel Pelks

Notary Public

DANIEL ... NOTARY PUBLIC ... STATE OF OHIO
My commission has no expiration date.