September 20, 1982

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 (Operating License)
(Perry Nuclear Power Plant, Units 1 and 2)	

OHIO CITIZENS FOR RESPONSIBLE ENERGY
MOTION TO COMPEL DISCOVERY ON STAFF AND APPLICANTS

Ohio Citizens for Responsible Energy ("OCRE") hereby moves the Licensing Board for an order compelling Staff and Applicants to answer certain interrogatories identified below and in "NRC Staff Further Partial Response to Second Set of Interrogatories to NRC Staff by the Sunflower Alliance," dated September 8, 1982 and "Applicants' Answer to Sunflower Alliance, Inc. et al. Second Set of Interrogatories to Applicants," dated August 20, 1982. [1] These interrogatories pertain to Issue #6. OCRE has combined herein the Staff and Applicants' responses because their objections are similar, and so, consequently, are OCRE's arguments in favor of compelling discovery. The portion of this motion pertaining to the Staff is within the 10 day time period of 10 CFR 2.740(f). Extensions of time in which to file the portion of this motion pertaining to Applicants were obtained in accordance with the Licensing Board's order during the July 13, 1982 conference call. The undersigned OCRE Representative

[1] Intervenors have moved the Licensing Board for a redesignation of lead intervenor on Issue #6 from Sunflower Alliance to OCRE. The Licensing Board granted this motion on September 17, 1982.

conferred with counsel for Applicants on August 27, 1982 and with counsel for Staff on September 17, 1982; agreement could not be reached on the scope of Issue #6 as it affects the relevance of the interrogatories specified below. It therefore becomes necessary for the Licensing Board to resolve these disputes.

The Licensing Board has previously addressed this matter, both in the August 13, 1982 conference call and in the August 18, 1982 Order concerning Sunflower Alliance's first Motion to Compel. The dispute there centered on whether interrogatories pertaining to the consequences of ATWS were relevant to Issue #6, which reads:

> Applicant should install an automated standby liquid control system to mitigate the consequences of an anticipated transient without scram.

The Licensing Board ruled that only the differential consequences resulting from the use of the manual as opposed to the automated SLCS are relevant and instructed intervenors to resubmit the interrogatories, revised according to the Board's ruling. Because Applicants have maintained that there is no difference in actuation time of both the manual and automated SLCS (see "Applicants' Answers to Sunflower Alliance, Inc. First Round Discovery Requests," dated February 5, 1982, specifically, the responses to Interrogatories 56-59), intervenors have considered the resubmission of those interrogatories to be a rather pointless endeavor.

Instead, OCRE believes that the comments of the Chairman during the August 13, 1982 conference call provide the basis for expanding the scope of discovery on Issue #6 (Tr. 723-724):

> (The) essential risk here is if intervenors were to establish that there would be a very lengthy delay before the ATWS is mitigated, you might at that time have to reconsider what we have just said, because they would have established that the consequences of an unmitigated ATWS are relevant.
>
> If they were to establish that there was substantial possibility of lack of mitigation for other systems, and it was sufficiently credible, then we would have to inquire further into the consequences.

OCRE intends to establish herein that a lengthy time delay before the ATWS is mitigated by the manual SLCS is likely and that other mitigation systems are only partially effective in lessening the consequences of ATWS. Specifically:

1. It should be recalled that ATWS is the dominant source of accident risk for BWRs (NUREG/CR-0400, p. 46; NUREG/CR-1659, Vol. 4, p. 6-26); the most likely result of an ATWS at a BWR is a core meltdown (NUREG-0460, Vol. 3, p. 21).
2. For most ATWS sequences, severe power and pressure surges occur within seconds. Rapid mitigation is required to avoid damage to fuel, reactor coolant pressure boundary, and the containment integrity.
   (a) Dr. Richard Webb has calculated that MSIV closure ATWS with failure of the recirculation pump trip (RPT) will produce a 10,000% power surge within 7 seconds (<u>The Accident Hazards of Nuclear Power Plants</u> , p. 27 - attached).
   (b) General Electric has calculated, for the same event, only with the RPT, that for the BWR/6, neutron flux peaks at 790% near 4 seconds. Peak pressure occurs at 8 seconds. (NEDO-24222, Vol. 1, p. 4-57)
   (c) GE also estimates that for many ATWS events, some fuel may experience transition boiling, usually within seconds

(NEDO-24222, Vol. 2. pp. 3-275 to 3-306). The Staff considers the number of failed fuel rods to be equal to the number of rods experiencing transition boiling (NUREG-0460, Vol. 2, p. XVI-67).

3. The RPT feature only partially mitigates ATWS (46 FR 57522, November 24, 1981 (Proposed Rule on ATWS)). GE admits that the ultimate solution to an ATWS event must involve the insertion of negative reactivity, either through ARI scram or the SLCS (NEDO-24222, Vol. 1, p. 4-55).

4. The SLCS is the system of last resort. It is common knowledge that the SLCS, if it is to be manually operated, will not be actuated in time, if at all.

   (a) "The liquid boron poison system designed to stop the chain reaction might not act fast enough . . ." NUREG/CR-0400, p. 47.

   (b) "BWR reactor operators may be subject to a strong disincentive to actuate the Standby Liquid Control (SLC) system because of the costly nature of spurious SLC actuations. They may also be inclined to override an autostart of the SLC if they doubt that an ATWS indication is genuine or the failure of the scram system is irreparable." 46 FR 57529, November 24, 1981. Proposed rule on ATWS, "Hendrie Rule".

   (c) The 4 volumes of NUREG-0460 continually stress the unreliable nature of manual SLCS actuation. E.g., "analyses show that manual actuation is too slow and the capacity of the SLCS too small to adequately control the core power level following an ATWS event.

Therefore, the core might not remain covered because the steam generation rate exceeded the ECC system's capacity or resulted in the failure of the suppression pool even if the recirculation pumps tripped" (NUREG-0460, Vol. 1, p. 36).

(d) GE's design for the automatic SLCS includes a 2 minute time delay "to allow for operator interruption in the event of spurious initiation after an actual scram has been confirmed." NEDO-24222, Vol. 1, p. 3-3.

(e) "The SLCS is used only in the highly improbable event that not enough control rods can be inserted in the reactor core to accomplish shutdown and cooldown in the normal manner." General Electric, NEDO-24222, Vol. 1, p. A7.2-35.

(f) IE Bulletin 80-17 requires BWR licensees to review their emergency operating procedures to assure that operator actions include, if there is scram failure, tripping the recirculation pumps, inserting the control rods manually, or if this is unsuccessful, repeatedly resetting the RPS and scramming the reactor, venting the scram air header, and manually opening or bypassing the SDIV vent and drain valves. SLCS initiation is required if scram is still unsuccessful and RPV water level cannot be maintained or suppression pool temperature cannot be maintained below the scram limit.

(g) The Staff's "BWR Scram Discharge System Safety Evaluation," dated December 1, 1980, p. 28, indicates that, because of an excessive number of alarms and indicators which may confuse operators, unclear operating procedures, and

numerous activities which may divert operators, "reliance on the operator to successfully carry out a manual scram within a limited time frame (2 minutes) may not be assured."

(h) GE, in the description of the inadvertant safety/relief valve opening transient (NEDO-24222, Vol. 1, p. A7.1-7), implies that even a normal control rod scram is to be avoided if the situation can be controlled otherwise.

(i) The Electric Power Research Institute, in its analysis of ATWS, makes the assumption that "(m)anual reactor trips were not considered as an alternate to automatic reactor trips because the operator would not be expected to respond as quickly as required." EPRI, "ATWS: A Reappraisal" Part II Vol. II p. 18.

EPRI also states that "(t)he failure of the recirculation pump trip and the liquid poison injection is dominated by the probability that the operator will fail to initiate the liquid poison injection system. Based on the analysis of operator performance in similar situations as discussed in Appendix II (of RSS, WASH-1400) this probability has been estimated to lie between 10^{-1} and 10^{-2} with a median value of 3×10^{-2}." EPRI, "ATWS: A Reappraisal" Part II, Vol. 1, p. 30.

(j) The June 1980 partial scram failure at Browns Ferry 3 illustrates that excessive delay may occur before the reactor is made subcritical. Four scrams (3 manual, one automatic) were required before all control rods were inserted. The time that elapsed from the initial unsuccessful scram until all control rods were inserted was approximately 15 minutes. (BWR Scram Discharge System

Safety Evaluation, December 1, 1980, p. 1) Although this incident was not an ATWS, since it occurred during a manual scram for routine maintenance and not in response to a transient, it indicates that manual actions may not be taken in a timely manner.

(k) Applicants believe that the costs of an inadvertant SLCS actuation are extremely large: $10½ million for downtime with an additional $½ to 1 million for cleanup (see Applicants' answer to interrogatory 23 of Sunflower's Second Set, dated August 20, 1982).

(l) The BWR Owners Group, in its review of the Perry control room and procedures in January 1982, indicated that SOP-C41, concerning SLCS actuation, was unclear in that it stated that the system is to be used only if there is a loss of reactivity control. However, the methods for assessing the loss of reactivity control are not discussed (p. 4-25 of PNPP Control Room Evaluation).

The above factors clearly establish that the SLCS will probably not be actuated in a timely manner, if at all, in the event of ATWS. Therefore, in accordance with the Licensing Board's statements during the August 13, 1982 conference call, the consequences of an unmitigated ATWS and the reliability of other ATWS mitigation features become relevant to Issue #6.

ANALYSIS OF INDIVIDUAL INTERROGATORIES

I. APPLICANTS' ANSWERS

Interrogatory 4 This should be answered since the SDV is a source of common-mode failure for the scram system. Accumulation

of water in the SDV was the cause of the June 1980 Browns Ferry 3 partial scram failure. Reducing the risk of ATWS is a two-fold endeavor: reducing its probability and reducing its consequences. SDV modifications would reduce its probability. If the probability of ATWS is sufficiently reduced, mitigation features may not be necessary.

Interrogatory 5 Applicants should answer the question as it relates to other mitigation systems as well. An assessment of Applicants' total ATWS mitigation program is needed to estimate the risk of ATWS at Perry.

Interrogatory 6 Applicants should answer this question since scram failure should be clearly defined, especially if scram failure is a prerequisite to SLCS operation. If control room operators are to manually scram individual control rods, it is useful to know just how many rods may have to be handled in this manner to determine if this is a proper, timely solution.

Interrogatory 7 This question should be answered, since different transients have different consequences, different frequencies of occurrence, and different requirements for rapid mitigation. It should be established whether the most likely transients have the most severe consequences or require rapid mitigation.

Interrogatory 8 Applicants should answer the question, since the mode of scram system failure may preclude the use of ATWS mitigation measures other than the SLCS. E.g., failure of the SDV will render manual scrams and ARI scrams useless.

Interrogatory 9 Applicants should answer the question, since the reliability of the RPS (including ARI) is an important factor in assessing the risk of ATWS and the likelihood of success of ARI and manual scrams in the event of ATWS.

Interrogatory 11 Applicants should answer the question, since the probability of ATWS (and Applicants' methods of assessing same) is an important factor in determing the risk of ATWS, and in addition, a knowledge of Applicants' views of the chances of ATWS provides insight into whether ATWS will be promptly recognized and mitigated.

Interrogatory 12 See discussion of Interrogatory 9.

Interrogatory 13 OCRE believes that Applicants have more detailed information than was provided here. See, e.g., the BWR Owners Group evaluation of the Perry control room in January 1982, in which individual standard operating procedures (SOPs), including one specifically addressed to SLCS operation, were available. Applicants should provide all information regarding operator actions, and the instruments, procedures, and general information on the decision-making process to be used by operators in actuating the SLCS. The answer as it stands lacks sufficient specificity. In addition to being vague, the Applicants make a crucial assumption: that the backup scram systems (presumably ARI) will work. OCRE wants to know what operator actions are to be taken in the event these backup systems fail as well.

Interrogatory 15 Applicants should answer the question. Although the RPT is a partial mitigation of ATWS, its rapid initiation is crucial to preventing extremely severe power/pressure surges that could rupture the reactor coolant pressure boundary.

Interrogatory 16 See discussion above.

Interrogatory 17 Applicants should answer the question. Since RPT, ARI, and the SLCS together form a backup scram system, it is important that systems meet the appropriate criteria if they are to be reliable.

Interrogatory 18 Applicants should answer the question. The analyses performed by General Electric to determine the efficacy of the ATWS mitigation systems (e.g., NEDO-24222) are based on various computer codes. If these are erroneous, then the analyses are obviously unreliable.

Interrogatory 19 Applicants should answer the question for parts of the scram system and backup systems other than the SLCS. Loss of electric power represents a source of common mode failure. It is thus appropriate to ask what parts of the scram system (and backups) are dependent upon electric power.

Interrogatory 20 Applicants should answer the question. IE Bulletin 80-17 indicates that operators are expected, in the event of ATWS, to manually scram the control rods. If manual scram attempts are to be the first priority, rather than SLCS initiation, it becomes relevant to ask how long this takes and whether it is effective.

Interrogatory 21 This interrogatory deals with the consequences of ATWS and thus should be answered. General Electric analyses indicate that power oscillations may occur during several ATWS events even with mitigation by RPT, ARI or SLCS. NUREG-0460 indicates that the effect of such oscillations are not well understood (Vol. 4, p. A-67).

Interrogatory 28 This is similar to interrogatory 72 of Sunflower's first set, which the Licensing Board requested Applicants to answer (Order concerning Motion to Compel, August 18, 1982, p. 7). Applicants have refused to do so (Applicants' Additional Answer, August 24, 1982). OCRE thus offers Applicants this further

opportunity to comply with the Board's order. If Applicants again object, OCRE believes that sanctions against Applicants are appropriate.

Interrogatory 31 Applicants should answer the question. NUREG-0460 indicates that even an automated SLCS may have insufficient capacity to bring the reactor subcritical, with only the 86 gpm flow rate proposed by Applicants. Using natural boron would require a flow rate of 300-400 gpm, thus necessitating modifications to SLCS piping. However, using other neutron poisons, e.g., gadolinia or enriched boron, would permit the use of the present 86 gpm injection rate. (See SECY-80-409, p. D-13)

II. STAFF'S ANSWERS

Interrogatory 4 See discussion of Interrogatory 6 to Applicants.

Interrogatory 6 See discussion of Interrogatory 8 to Applicants.

Interrogatory 9 See discussion of Interrogatory 15 to Applicants.

By agreement with counsel for Staff, OCRE intends to re-submit the remaining interrogatories to which Staff objects, rephrased so as to eliminate the objectionable nature.

Respectfully submitted,

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ATTACHMENT

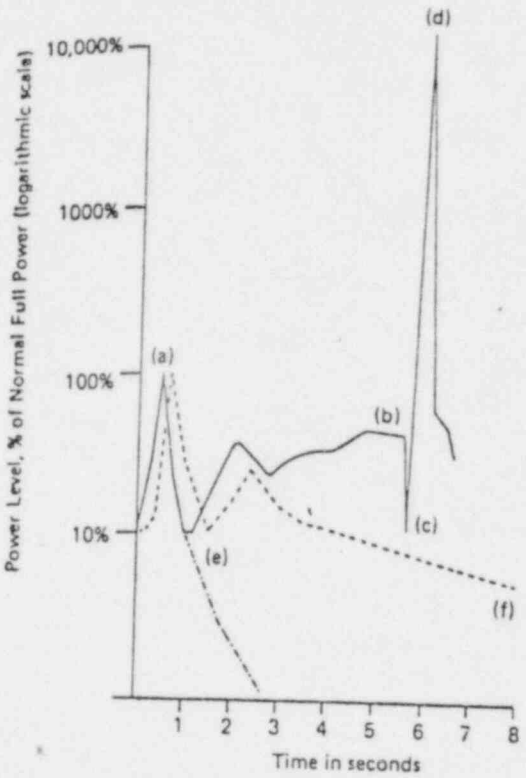

Figure 8. BWR steam valve closure accident without SCRAM and assuming that coolant recirculation pumps are not turned off. (Core power level versus time)

a. Power excursion caused by steam valve closure
b. Fuel melting
c. Power level drops momentarily due to negative reactivitity effect of the initial fuel melting and discharge.
d. Catastrophic Nuclear Runaway (Autocatalytic)--Results in core explosion, 8,000° F peak fuel temperature. Autocatalytic reactivity effect due to the "Roman candle" effect upon initial fuel melting. (Assuming reactor pressure rises 500 psi in one second, due to Roman candle effect.) Source: Author
e. Power level if the SCRAM occurs.
f. Dashed curve shows results of Brookhaven National Lab. calculation. They assume that the coolant pumps are turned off (no SCRAM). No fuel melting then occurs, and reactor power is then controlled. Source: BNL 17608, fig. VIII-5.

CERTIFICATE OF SERVICE

This is to certify that copies of the foregoing OHIO CITIZENS FOR RESPONSIBLE ENERGY MOTION TO COMPEL DISCOVERY ON STAFF AND APPLICANTS were served by deposit in the U.S. Mail, first class, postage prepaid, this 21st day of September, 1982 to those on the service list below.

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