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

September 17, 1992

Docket No. 50-331

LICENSEE: Iowa Electric Light and Power Company

FACILITY: Duane Arnold Energy Center

SUBJECT: MEETING SUMMARY - DISCUSSION OF INDIVIDUAL PLANT EXAMINATION (IPE) SUBMITTAL AND COMPLIANCE WITH GENERIC LETTER 91-18

On June 25, 1992 a meeting was held at NRC Headquarters in Rockville, Maryland with representatives of the Iowa Electric Light and Power Company (the licensee), at which two topics were discussed. The Duane Arnold Energy Center (DAEC) reviewed its progress in the development of a response to Generic Letter 88-20, "Individual Plant Examination for Severe Accident Vulnerabilities (IPE)" and its associated Supplements, and discussed its intentions in regard to compliance with Generic Letter 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability." Meeting participants included employees of the Iowa Electric Light and Power Company and one of its consultants, an observer from the Nebraska Public Power District (the licensee for Cooper Station), and members of the NRC's Offices of Nuclear Reactor Regulation (NRR) and Nuclear Regulatory Research. A list of attendees is provided in Enclosure 1.

GENERIC LETTER 88-20, "Individual Plant Examination for Severe Accident Vulnerabilities (IPE)"

Generic Letter 88-20 requested licensees to perform a site-specific evaluation to: (1) develop an appreciation of severe accident behavior, (2) understand the most likely severe accident sequences, (3) gain a quantitative understanding of the probability of damage and fission product release, and (4) if necessary, reduce the overall accident probability by modifying hardware and/or procedures.

The licensee gave an overview of its IPE status in which the presenters explained that they have performed a core damage analysis using a Level I probabilistic risk assessment (PRA) and a Level II containment performance analysis using containment event trees (CETs) to characterize Level I end states. These were accomplished using a core group of engineers and evaluators who interfaced extensively with other DAEC organizations. The IPE submittal will be as described in NUREG-1335. All Tier 2 documents will be retained and available on-site for staff inspection.

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CORE DAMAGE ANALYSIS

The core damage analysis methodology used large fault trees and small event trees. Modeling was done down to the component level of detail, and Computer Aided Fault Tree Analysis (CAFTA) codes were used for the modeling and quantification. (CAFTA is a software that is widely used in the industry to build, maintain solve and print, fault and event trees. It converts event trees into fault tree format and then "solves" the fault tree, providing cut sets and probabilities.) The key DAEC design features that influenced the IPE results were: (1) DAEC is a BWR4 with a Mark I containment and has motor driven feedwater pumps, (2) the essential AC power is preconnected to off-site sources, (3) the instrument AC inverters automatically trip on low DC bus voltage, and (4) no water source has the potential to flood essential AC switchgear. The IPE project is being coordinated by a safety analysis group that performed the initiating event review, analyzed the event sequence, maintained the computer models and performed the human reliability analysis. The system engineers maintained the system models and ensured conformance to plant configuration, including ensuring that any plant design changes that could affect the system models were considered. The IPE Review Board was comprised of DAEC personnel from diverse organizations. The Board reviewed the accuracy of the system models and reviewed the models for consistency. Data were analyzed for DAEC specific initiating events, system unavailability, and operator error, and generic component failure. The most probable transients, LOCAs of different leak rates and ATWSs with different initiators, were among the accident sequences analyzed. The results were sorted in various ways. For example, core damage frequency (CDF) by initiator gives the CDF for sixteen different initiators, among which are loss of condenser vacuum, turbine trip with Bypass ATWS, and loss of off-site power. CDF was also measured by damage class. The contribution to core damage by initiator (for initiators such as MSIV closure, ATWS, loss of off-site power, and loss of Division II DC) and contribution to core damage by initiator class (for initiator classes such as transients, LOCAs and ATWS) were also measured.

CONTAINMENT PERFORMANCE ANALYSIS

The containment performance analysis started with a containment ultimate strength analysis. Modular Accident Analysis Program (MAAP) was then used to define the accident progression, and containment event trees were used to quantify the progression. (MAAP is a software that provides best estimates of the timing of vessel breach and containment breach and then estimates the magnitude of radionuclide release.) The containment performance analysis results were appended to the core damage sequence results and release sequences characterized. For the containment strength analysis, the Peach Bottom analysis was scaled to fit the DAEC containment since the structures are similar. The failure probabilities were based on location of the break or leak, pressure, and temperature. The containment event trees (CETs) used fault trees to model the accident phenomena. The results of each CET were quantified based on the Level I end state. Finally, the Level II model was appended to the Level I results.

INSIGHTS GAINED FROM THE IPE

Although DAEC's IPE has not been completed, certain insights have been gained. For example, it has been shown that the decision to continue to use external injection sources, such as the condensate storage tank, for containment heat removal, should be based, at least in part, on the rate of depressurization. In addition, the licensee learned that it is important to depressurize the reactor coolant system in time to effectively use the low pressure injection systems. Elimination of the interdependence between ESW and RHR service water was shown to be so important that the licensee plans hardware modifications during the next refueling outage.

BENEFITS OF IPE ANALYSIS AT DAEC

DAEC has benefitted from their IPE analysis in several different plant operational areas. During a station blackout, conservation of battery life and the maintenance of reactor pressure to operate HPCI/RCIC has been shown to be critical, resulting in revision to the applicable EOPs and AOPs. Preliminary results of the IPE were incorporated into the design of the hard pipe vent. During the recent highly successful refueling outage, the IPE results contributed to better shutdown risk management, when the analysis showed a vulnerability to the ESW system. This finding, combined with management's commitment to minimize shutdown risk, resulted in the routing of a backup supply of ESW. In addition, as a result of a review of the outage schedule for high risk evolutions, the schedule was modified to minimize a period of switchyard vulnerability.

IPE SUMMARY

DAEC gained valuable insights into the more intricate interrelationships among plant systems and components as a result of their IPE. Although there have been no significant findings that warrant immediate NRC management attention, the licensee used the IPE results to assist in shutdown risk management during a refueling outage, as an impetus to revise procedures to prolong operation of HPCI/RCIC during a station blackout and to verify a linkage between ESW and RHR service water that will be removed during the next refueling outage by hardware modifications. (The RHR service water pumps currently require 4 gpm cooling water from the ESW pump. Loss of one ESW pump would result in loss of two RHR service water pumps. The licensee plans to make the RHR service water pumps self-cooling.) Containment heat removal and reactor vessel depressurization were shown to be important operations that perhaps better EOPs can help. Initiators can also be examined to lower the probability of their occurring.

The licensee stated that it intends to meet its August 1992 commitment for the submittal. However, it feels it would produce a higher quality product given an additional 90 days. The NRR Project Manager committed to investigating this possibility and will provide an answer to the licensee as soon as possible. Representatives from the NRC's Office of Regulatory Research stated that they would like to have the best possible product to review, even if it means delaying the submittal, because the higher the quality of the

submittal the lower their net review time probably would be. In addition, with many plants turning in submittals during the August 1992 time frame, all reviews will not be accomplished concurrently. This workload, in combination with having a higher quality product means that a delay in the DAEC submittal would, in all probability, not substantially affect the completion date of the staff's review.

In a letter dated July 31, 1992, the licensee advised the staff that extending the submittal date from August 31, 1992 to November 30, 1992 would allow it to further evaluate the results of the IPE and better assess the plant specific events or sequences that might require additional attention. The licensee indicated that the extension would result in a more thorough and complete analysis of the IPE. The staff's agreement with the proposed extension was communicated to the licensee.

GENERIC LETTER 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability."

Generic Letter 91-18 was issued to ensure consistency by the staff when reviewing operability determinations and resolutions of degraded and nonconforming conditions.

DAEC has completed its initial review of Technical Specifications (TS) allowable out-of-service times (AOTs) of support and supported systems and they have concluded that all TS support system AOTs are less than or equal to the corresponding supported system AOTs. This means that if a support system is out of service, and the corresponding supported system is therefore also declared out of service, the AOT for the support system will expire before the AOT for the supported system expires. The situation in which an AOT for a supported system expires before the AOT of the support system will, therefore, not occur.

The licensee has also determined that most TS support system LCOs are already cascaded. In other words, the action statement for the out-of-service system specifically tells the operator which supported system to check for operability. This precludes a support system causing a supported system to be out of service concurrent with that same supported system in the other train being out of service for an unrelated reason without the operators' knowledge.

The licensee currently performs a substantial amount of maintenance on-line. An internal policy statement which addresses this concern is being proceduralized. Most conditional surveillance testing was deleted by Amendment No. 174 and another amendment request has been submitted to the staff to revise the conditional surveillance testing of the emergency diesel generators. An area of concern in on-line maintenance deals with the performance of Simulated Auto Actuation Tests (SAAs). In these tests, the system injection valve is blocked or a signal is defeated, allowing all components to function without causing an actual injection or spray. During this time, the system is out of service, and this is not recognized by the TS.

The surveillance test procedures contain special precautions that tell the operator which safety function(s) will be defeated during the performance ofthe test. The licensee is evaluating this testing for possible submission of an amendment request.

DAEC's comprehensive TS review to determine if it is in compliance with GL 91-18 will not be complete until later in the year. However, as a result of its initial review, the licensee concluded that it is in compliance with the GL. Guidance dealing with degraded and nonconforming conditions has been drafted and will be proceduralized following a trial use period.

This meeting was another in a series that has been held in recent months to improve communications between the staff and the licensee and maintain an open dialogue on items of concern to both parties. In general, the results have been positive, with the staff being kept better informed of the licensee's intentions and the licensee becoming better acquainted with the staff's expectations.

Sincerely,

original signed by

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Enclosure:
As stated

cc w/enclosure:
See next page

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DATE	9/16/92	9/16/92	9/17/92

OFFICIAL RECORD

DOCUMENT NAME: a:mtgsmry5.wp

ENCLOSURE 1

ATTENDANCE LIST

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DATE: June 25, 1992

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