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ComEd

August 24, 1995

TPJ Ltr. #95-0095

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Dresden Nuclear Power Station Units 2 and 3 Response to Request for Comments on Review of Preliminary Accident Sequence Precursor Analysis of an Operational Condition at Dresden Unit 2.

Reference: (a) J. F. Stang letter to D. L. Farrar, dated July 20, 1995 transmitting request for comments on Preliminary Accident Sequence Precursor Analysis of an Operational Condition at Dresden Unit 2.

The enclosed Attachment is ComEd's response to the request for comments on the technical adequacy of the preliminary Accident Sequence Precursor (ASP) analysis of improperly set feed breakers at Dresden Station. The main focus of the comments is to provide additional information on plant configuration, and discuss the modeling assumptions used by the NRC.

The main points in Attachment A are as follows:

> The preliminary NRC analysis defines an "Importance" value for the event as the resulting increase in core damage probability. The "Importance" value estimate given in the preliminary NRC analysis for this event is approximately **2.3E-06.** The preliminary NRC analysis showed that approximately 97% of the "Importance" value of this event would result from the increased probability that a Station Blackout (SBO) could occur following a dual-unit Loss of Offsite Power (LOOP) initiating event.
>
> The preliminary NRC analysis appears to be based on a generic BWR PRA model. Although an Isolation Condenser is partially included, this model is overly conservative for Dresden because it gives no credit for the Isolation Condenser in an extended Station Blackout event. Credit should be given for continued availability of the Isolation Condenser beginning with a procedure revision that was effective on August 17, 1993. Consequently, a duration of 5-1/2 months should be used for the condition modeled in the preliminary NRC analysis instead of a full year.
>
> The preliminary NRC analysis used a failure to recover offsite power probability of 2.1 E-01 that appears to be based on an implicit assumption that Dresden Station has a single switchyard. Dresden Station actually has two switchyards, however. In

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contrast with the preliminary NRC analysis, the Dresden IPE analysis credited the two switchyards and, based on guidance in NUREG-1032, estimated a probability of 2.05 E-02 for failure to recover offsite power.

The net impact of reducing the duration of the condition modeled to 5-1/2 months and using the Dresden IPE analysis value for failure to recover offsite power (based on the station having two switchyards) is to lower the "Importance" value for an SBO following a dual-unit LOOP from **2.3 E-06** to approximately **1.0 E-07.**

Note that under current Nuclear Energy Institute (NEI) guidelines, an "Importance" below 1.0 E-06 is not risk significant. Similarly, Enclosure 1 of the referenced letter indicates that the NRC's ASP program uses a 1.0 E-06 documentation limit.

If your staff has any questions concerning this letter, please refer them to Peter Holland, Dresden Station Regulatory Assurance Supervisor, at (815) 942-2920, extension 2714.

Sincerely,

T. P. Joyce

Thomas P. Joyce
Site Vice President
Dresden Station

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Attachments:

A. "Comments on Preliminary Accident Sequence Precursor (ASP) Analysis of Operational Event at Dresden Unit 2 in June 1994."

B. DGA-12, "Partial or Complete Loss of AC Power," Revision 15.

C. DGA-13, "Loss of 125 VDC Battery Chargers with Simultaneous Loss of Auxiliary Electrical Power," Revision 04.

D. Calculation Note DR-CN-92-006, Revision 0, "Recovery of Power Probabilities for Dresden IPE."

cc: H. J. Miller, Regional Administrator, Region III
J. F. Stang, Project Manager, NRR (Unit 2/3)
P. B. Erickson, Project Manager, NRR (Unit 1)
M. N. Leach, Senior Resident Inspector, Dresden
File: NRC LER 50-237/94018

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COMMENTS ON PRELIMINARY ACCIDENT SEQUENCE PRECURSOR ANALYSIS OF OPERATIONAL EVENT IN JUNE 1994

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Attachment A

Comments on Preliminary Accident Sequence Precursor (ASP) Analysis of Operational Event at Dresden Unit 2 in June 1994

1. **Does the "Event Description" section accurately describe the event as it occurred?**

   The "Event Description" section is accurate.

2. **Does the "Additional Event-Related Information" section provide accurate additional information concerning the configuration of the plant and the operation of and procedures associated with relevant systems?**

   The "Additional Event-Related Information" section is limited to a discussion of AC and DC power sources.

   This section does not discuss the Isolation Condenser system or its operation during a Loss of Offsite Power (LOOP) event. Diesel-driven pumps are available to provide makeup water to the Isolation Condenser even with a complete loss of AC power. Relevant procedures include DGA-12, "Partial or Complete Loss of AC Power," and DGA-13, "Loss of 125 VDC Battery Chargers with Simultaneous Loss of Auxiliary Electrical Power." Pertinent procedure revisions (i.e., those in effect at the time of the June 1994 event) are enclosed as Attachments B and C, as requested in the "Guidance for Licensee Review of Preliminary ASP Analysis."

   Revision 15 of DGA-12 given in Attachment B has been superseded, but the current revision retains the provision for reactor cooldown through the use of the Isolation Condenser if a total loss of AC power occurs. Revision 15 of DGA-12 provided for use of a diesel-driven fire pump (two are normally available) to provide makeup water to the Isolation Condensers. Subsequently, two diesel-driven pumps capable of providing clean demineralized makeup water to the Isolation Condensers became operational after the June 1994 event, and the current revision of DGA-12 provides for use of these new pumps; the current revision of DGA-12 also provides for use of the diesel-driven fire pumps as a backup source of makeup water.

   The revision of DGA-13 given in Attachment C has been superseded, but the current revision retains the provision for operator actions to prevent isolation of the Isolation Condenser due to 125 VDC battery depletion.

3. **Does the "Modeling Assumptions" section accurately describe the modeling done for the event? Is the modeling of the event appropriate for the events that occurred or that had the potential to occur under the event conditions? This also includes assumptions regarding the likelihood of equipment recovery.**

Modeling Summary

The preliminary ASP analysis assumed that an extended station blackout (SBO) would lead to core damage. An extended SBO refers to a Loss of Offsite Power (LOOP) event in which offsite power is not recovered prior to station battery depletion after 4 hours.

The preliminary ASP analysis defines an "Importance" value for the event as the resulting increase in core damage probability. The preliminary ASP analysis concluded that the main impact of this event would be the increased probability that a Station Blackout (SBO) could occur following a dual-unit Loss of Offsite Power (LOOP) initiating event. The "Importance" calculated in the preliminary ASP analysis is **2.3E-06** for this dual-unit LOOP event.

Note that under current Nuclear Energy Institute (NEI) guidelines on PRA applications, a temporary plant change giving a core damage probability increase below 1.0 E-06 is not risk significant. Similarly, the NRC's ASP program uses a 1.0 E-06 documentation limit.

LOOP Modeling

The modeling of the LOOP sequences in the preliminary analysis is overly conservative because the analysis does not credit the Isolation Condenser system for extended station blackout (SBO) events. Although the response tree given in the preliminary analysis appears to include an Isolation Condenser node, it follows the HPCI node. The tree appears to be incorrectly based on an implicit assumption that the Isolation Condenser would be used only if off-site power were recovered but HPCI fails.

Isolation Condenser Modeling

The Dresden Individual Plant Examination (IPE), Ref. 1, conservatively assumed that the 125 VDC Battery would be depleted before the 250 VDC Battery during an extended SBO. Due to the design of the Isolation Condenser isolation logic, this assumption results in isolation of the Isolation Condenser during an extended SBO. Furthermore, the Dresden IPE did not credit possible manual recovery actions to restore the Isolation Condenser should it isolate. The preliminary ASP analysis is therefore consistent with the original PRA model developed for the Dresden IPE with respect to giving no credit for the Isolation Condenser during an extended SBO.

Prior to the June 1994 Dresden 2 event, however, enhancements were incorporated in procedure DGA-13, "Loss of 125 VDC Battery Chargers with Simultaneous Loss of Auxiliary Electrical Power," Rev. 04, effective August 17, 1993; this revision is enclosed as Attachment C. These enhancements detail operator actions to prevent isolation of the Isolation Condenser due to battery depletion. Subsequently, the ComEd PRA model for Dresden was revised to credit the possibility of operator action (as directed by DGA-13, Revision 4) in preventing isolation of the Isolation Condenser.

The Dresden PRA model also credits availability of two diesel-driven pumps to provide makeup to the Isolation Condenser during an extended SBO. (The pumps available at the time of the June 1994 Dresden 2 event and discussed in Attachment B were the diesel-driven fire pumps. Installation of two diesel-driven clean demineralized water makeup pumps was completed shortly after the event, giving a total of four diesel-driven pumps capable of providing makeup water during an extended SBO.)

In summary, the ComEd PRA models assumed that the Isolation Condenser would isolate (and not be recovered) for an extended SBO event prior to August 17, 1993. After that date, however, the possibility of operator action to prevent isolation of the Isolation Condenser is credited in the plant response tree. Crediting the availability of the Isolation Condenser after battery depletion would significantly reduce the importance of extended SBO sequences. Therefore, the model used in the preliminary ASP analysis should not be applied to plant conditions after August 17, 1993, but is consistent with the Dresden IPE model for plant conditions before August 17, 1993.

Duration of Condition

The preliminary ASP analysis assumed that the condition involving the trip setting for the MCC 28-3 breaker had a one-year duration and that an extended SBO would lead to core damage.

The condition involving the trip setting for the MCC 28-3 breaker began in March 1993, as discussed in the Licensee Event Report (LER). As detailed in the "Isolation Condenser Modeling" section above, however, the preliminary ASP analysis modeling approach should only be applied through August 17, 1993. A more realistic duration of the condition for the ASP analysis, therefore, would be approximately 5-1/2 months. This conclusion, by itself, indicates that the Importance should be multiplied by a factor of approximately 0.46.

Probability of Failing to Recover Offsite Power

The preliminary ASP analysis estimated a probability of 2.1 E-01 for failure to recover offsite power prior to battery depletion after 4 hours. This estimate appears to be based on data in NUREG-1032 and an assumption that the station has a single switchyard.

This estimate in the preliminary ASP analysis is overly conservative for Dresden Nuclear Power Station, however, because Dresden has two switchyards, one tied to the 345 kV grid, and the other tied to the 138 kV grid. (A less significant modeling difference between the preliminary ASP analysis and the Dresden IPE is the "mission time" for recovering offsite power. The preliminary ASP analysis assumed that core damage would occur if power was not recovered within 4 hours, while the Dresden IPE used 6 hours for the IPE quantification.) The Dresden IPE analysis, based on NUREG-1032 as detailed in Attachment D, estimated a probability of 2.05 E-02 for failure to recover offsite power. This conclusion, by itself, indicates that the Importance should be multiplied by a factor of approximately 0.098.

Net Impact of Comments on Duration of Condition and Probability of Failing to Recover Offsite Power

The comments detailed above indicate that the Importance given in the preliminary ASP analysis should be corrected by applying the multipliers given above, specifically,

Revised Importance = Preliminary Importance x (0.46) x (0.098)
(for dual-unit LOOP)

= 2.3 E-06 x 0.46 x 0.098

= 1.0 E-07

This revised Importance for the dual-unit LOOP event tree discussed in the preliminary ASP analysis is well below the 1.0 E-06 documentation limit used in the ASP program.

Summary

Although the preliminary ASP analysis gave an estimated Importance (increase in core damage probability) that exceeded the ASP documentation limit of 1.0 E-06, consideration of station procedures and switchyard configuration indicates that the Importance estimate should be revised to approximately 1.0 E-07, well below the ASP documentation limit.

REFERENCES:

1. Commonwealth Edison Company, Dresden Nuclear Power Station Units 2 and 3, Individual Plant Examination Submittal Report, January 1993.