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10 CFR 50.4

ComEd

August 25, 2000

PSLTR: #00-0113

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Dresden Nuclear Power Station, Units 2 and 3
Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

Subject: Request for Additional Information Regarding Individual Plant Examination of External Events

Reference:

(1) Letter from U.S. NRC to O. D. Kingsley (ComEd), "Request for Additional Information Regarding the Individual Plant Examination of External Events (IPEEE) for Dresden Nuclear Power Station, Units 2 and 3," dated December 14, 1998

(2) Letter from J. M. Heffley (ComEd) to U. S. NRC, "Final Report – Individual Plant Examination of External Events (IPEEE) Generic Letter 88-20, Supplement 4," dated December 30, 1997

(3) Letter from P. Swafford (ComEd) to U. S. NRC, "Request for Additional Information Regarding Individual Plant Examination of External Events," dated March 30, 2000

The purpose of this letter is to provide the Commonwealth Edison (ComEd) Company, Dresden Nuclear Power Station (DNPS) response to fire question number 9 from the Request for Additional Information regarding our submittal of the Individual Plant Examination of External Events (IPEEE). Reference 1 requested that we provide additional information to the NRC regarding four (4) seismic and twelve (12) fire questions regarding our submittal in Reference 2. In Reference 3, we provided all requested information except our final response to fire question number 9 and stated that we would provide the response in a separate submittal. This response was originally scheduled for submission on July 31, 2000. In a telephone conference on July 31, 2000, DNPS noted that this response would be delayed until August 31, 2000. Attachment 1 to this letter contains our response to fire question number 9.

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Should you have any additional questions regarding this letter, please contact Mr. Dale Ambler, Regulatory Assurance Manager, at (815) 942-2920 extension 3800.

Respectfully,

Preston Swafford
Site Vice President
Dresden Nuclear Power Station

Attachment 1 - Response to Fire Question #9

cc: Regional Administrator, Region III
NRC Senior Resident Inspector, Dresden Nuclear Power Station

# ATTACHMENT 1
# Response to Fire Question #9

NRC Question #9:

Section 4.2 and Appendix C of NUREG-1407, and GL 88-20, Supplement 4 [R.6], request that documentation be submitted with the IPEEE submittal with regard to the Fire Risk Scoping Study (FRSS) [R.7] issues, including the basis and assumptions used to address these issues, and a discussion of the findings and conclusions. NUREG-1407 also requests that evaluation results and potential improvements be specifically highlighted. Control system interactions involving a combination of fire-induced failures and high probability random equipment failures were identified in the FRSS as potential contributors to fire risk.

The issue of control systems interactions is associated primarily with the potential that a fire in the plant (e.g., the main control room (MCR)) might lead to potential control systems vulnerabilities. Given a fire in the plant, the likely sources of control systems interactions could happen between the control room, the remote shutdown panels, and shutdown systems. Specific areas that have been identified as requiring attention in the resolution of this issue include:

(a) Electrical independence of the remote shutdown control systems: The primary concern of control systems interactions occurs at plants that do not provide independent remote shutdown control systems. The electrical independence of the remote shutdown panels and the evaluation of the level of indication and control of remote shutdown control and monitoring circuits need to be assessed.

(b) Loss of control equipment or power before transfer: The potential for loss of control power for certain control circuits as a result of hot shorts and/or blown fuses before transferring control from the MCR to remote shutdown locations needs to be assessed.

(c) Spurious actuation of components leading to component damage, loss-of-coolant accident (LOCA), or interfacing systems LOCA: The spurious actuation of one or more safety-related to safe-shutdown-related components as a result of fire-induced cable faults, hot shorts, or component failures leading to component damage, LOCA, or interfacing systems LOCA, prior to taking control from the remote shutdown panels, needs to be assessed. This assessment also needs to include the spurious starting and running of pumps as well as the spurious repositioning of valves.

(d) Total loss of system function: The potential for total loss of system function as a result of fire-induced redundant component failures or electrical distribution system (power source) failure needs to be described.

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*Please provide a description of the control and instrumentation functions that are provided at each remote shutdown station. For each such function indicate whether or not it can be isolated from damage in the main control room. Has the IPEEE identified or considered any scenarios that might not be mitigated by the remote stations? Provide an evaluation of the reliability of the remote shutdown stations that includes consideration of spurious actuations that might result from fire-induced cable faults, hot shorts, or component failures. Include in this evaluation the potential for such faults to lead to component damage (including damage to MOVs per Information Notice 92-18), a LOCA or Interfacing system LOCA, prior to taking control from the remote shutdown panels, spurious starting and running of pumps, and repositioning of valves. Describe how your procedures provide for transfer of control to the remote station(s). Provide an evaluation of whether loss of control power due to hot shorts and/or blown fuses could occur prior to transferring control to the remote shutdown locations and identify the risk contribution of these types of failures (if these failures are screened, please provide the basis for the screening).*

ComEd Response:

NRC's specific RAI question is broken into 5 parts below. The Dresden Nuclear Power Station (DNPS) response is provided after each part.

*Provide a description of the control and instrumentation functions that are provided at each remote shutdown station.*

*For each such function indicate whether or not it can be isolated from damage in the MCR.*

<u>Response:</u> DNPS does not rely on a single remote shutdown panel or shutdown station for fire safe shutdown. Fire safe shutdown given a Control Room fire is addressed through operator actions in various areas of the plant. Dresden Safe Shutdown Procedure (DSSP) 0100-CR, "Hot Shutdown Procedure – Control Room Evacuation," is used in the event of a Control Room fire requiring Control Room evacuation. A description of the control and instrumentation functions provided at each remote shutdown station is provided in DNPS's Safe Shutdown Analysis, Fire Protection Report (FPR), Volume 2, Amendment 12, Section 7, Tables 7.3-1 through 7.3-3.

According to the DNPS FPR, control functions are provided for strategic remote shutdown stations. These stations include isolation switches at 4KV switchgear (i.e., safe shutdown support), isolation and transfer switches for Isolation Condenser valves (i.e., decay heat removal), and isolation and transfer capability for Diesel Generator Cooling Water (i.e., safe shutdown support). These functions can be isolated from damage in the Control Room. Other control and instrumentation functions will be independently isolated and operated through procedural steps after evacuation. The remaining equipment relied upon to achieve safe shutdown is ensured to be available by isolating it from potential spurious operations. Isolation of remaining equipment can be achieved by removing power and manually placing it in an analyzed position.

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Instrumentation functions are not provided at remote shutdown stations. Process monitoring for safe shutdown is performed by utilizing available local instrumentation as required by the SSA.

*Has the IPEEE identified or considered any scenarios that might not be mitigated by the remote shutdown stations.*

Response: No, the DNPS IPEEE did not identify any scenarios that might not be mitigated by the remote shutdown stations. However, failure of equipment controlled through remote shutdown stations was considered. For Control Room fire scenarios, the IPEEE-Fire assumed a 50% success rate when relying upon DNPS Safe Shutdown Procedure (DSSP) 0100-CR, "Hot Shutdown Procedure – Control Room Evacuation." For fires outside the Control Room, the IPEEE-Fire assumed failure of remote station actions with two exceptions. These exceptions were for two key operator actions related to the Alternate 125 Vdc Batteries and the Alternate 125Vdc Battery Charger. These actions were discretely modeled using realistic failure probabilities.

*Provide an evaluation of the reliability of the remote shutdown stations that includes consideration of spurious actuations that might result from fire induced cable faults, hot shorts, or component failures.*

> *Include in this evaluation the potential for such faults to lead to component damage (including damage to MOVs per IN 92-18), a LOCA or interfacing system LOCA prior to taking control from the remote shutdown panels, spurious starting and running of pumps, and repositioning of valves*

Response: DNPS modeled operator response to fire in terms of EOPs, except for Control Room fire scenarios. The IPEEE-Fire did not credit local actions involving remote shutdown stations. Fire induced hot shorts and spurious operations were assumed to occur. The results showed that the risk of spurious actuations resulting from fire induced cable faults, hot shorts or component failures were very low.

Based on SSA Amendment 12, the risk of spurious breaker operation is minimized by procedures that control verification of breaker status prior to loading. Fire induced cable faults are addressed in Section 5.5 of FPR Volume 2, Safe Shutdown Analysis (SSA), Amendment 12. This section states that any equipment called upon for use to power safe shutdown loads has been demonstrated available based on the equipment's ability to tolerate the faults (e.g. fail safe) or through design or administrative provisions to cope with the faults (e.g. operator actions). Non-safe shutdown loads are addressed by pulling the control power fuses on the switchgear for non-safe shutdown loads and manually tripping the breaker associated with these loads. Based on the isolation of power and the ability to control safe shutdown operations independent of the fire and the demonstration of independence of the equipment required to achieve hot shutdown, the reliability of equipment controlled at safe shutdown remote locations for post-fire safe shutdown is acceptable. Spurious operation of pumps is prevented through electrical isolation prescribed in the procedure.

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The IPEEE-Fire modeled EOPs and did not credit success of discrete remote station operations. The results of this modeling showed that the risk of spurious equipment operation was low enough such that modeling of DSSPs was not needed.

The potential for faults leading to component damage (including damage to MOVs per IN 92-18), a LOCA or interfacing system LOCA prior to taking control from the remote shutdown stations, spurious starting and running of pumps, and repositioning of valves is considered very low. The safe shutdown analysis considered cable faults and identified modifications and actions to mitigate potential spurious operations including high/low pressure interfaces. Additionally, the Station performed modifications to address the issues described within IN 92-18, thus minimizing the risk of fire induced cable faults inducing certain circuit configurations resulting in component damage. Based on these analyses and modifications cable faults leading to component damage or the possibility of a fire induced LOCA or interfacing system LOCA (ISLOCA), have been minimized. Following implementation of the required manual actions, a loss of inventory greater than makeup capability is not credible.

The possibility of a fire induced LOCA or ISLOCA was further reviewed in Revision 1 to the DNPS IPEEE-Fire, Section 4.8.1. Section 4.8.1 addresses "Containment Bypass," analysis which resulted in an upper bound CDF value for the fire induced ISLOCA event of 1E-8 per reactor year, per line (e.g. core spray line). This estimate is considered conservative because the fire frequency used to estimate ISLOCA CDF assumed any fire anywhere in the zone damaged the cable(s) associated with applicable MOV(s). Additional analysis was not performed to determine if a temporary spurious actuation could be recovered or a seal-in circuit exists which would keep the valve open after circuit failure progressed to an open circuit.

*Describe how your procedures provide for transfer of control to the remote station(s).*

Response: DNPS does not use a single remote shutdown panel or station. Detailed procedures prescribe manual actions and local controls required for shutdown. Given a severe fire in the Control Room, Operators would manually scram the reactor and perform these fundamental actions in the control room: 1) Inhibit Automatic Depressurization System (ADS), 2) Place the Electromatic Relief Valves (ERVs), Target Rock and Main Steam Isolation Valves (MSIVs) switches to close and, 3) Open the reactor inlet isolation valve for initiation of the Isolation Condenser before reporting to the safe shutdown staging area to perform shutdown activities outside of the Control Room. Where necessary, local control panels have been installed to ensure component operation can be adequately performed outside the Control Room. Other control is achieved and maintained by the closing or opening of breakers and by manual operation of equipment. Operating breakers ensures power is appropriately aligned to mitigate and/or isolate fire consequences and manually operating equipment such as valves and pumps ensures correct positioning when control power is removed upon successful completion of the action.

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*Provide an evaluation of whether loss of control power due to hot shorts and/or blown fuses could occur prior to transferring control to the remote shutdown locations and identify the risk contribution of these types of failures (if the failures are screened, please provide the basis for the screening).*

Response: Operators in the control room manually scram the reactor and perform these actions:1) Inhibit Automatic Depressurization System (ADS), 2) Place the Electromatic Relief Valves (ERVs), Target Rock and Main Steam Isolation Valves (MSIVs) switches to close and, 3) Open the reactor inlet isolation valve for initiation of the Isolation Condenser before reporting to the safe shutdown staging area to perform shutdown activities outside of the Control Room. A detailed procedure then outlines the actions required by the various operators to achieve hot shutdown through manual actions and local control.

It is realized that a blown fuse can interrupt local control. Blown fuses are addressed in SSA Section 5.4 Amendment 12. The safe shutdown procedures have steps to ensure that the breakers/fuses are operable and local control is obtainable. Hot shorts are not a concern because in the event of a fire, equipment and cabling for post fire safe-shutdown remains independent of the concerned fire zones. Fire induced cable faults are addressed in Section 5.5 of FPR Volume 2, Safe Shutdown Analysis (SSA), Amendment 12. This section states that any equipment called upon for use to power safe shutdown loads has been demonstrated available based on the equipment's ability to tolerate the faults (i.e., fail safe) or through design or administrative provisions to cope with the faults (i.e., operator actions). Non-safe shutdown loads are addressed by pulling the control power fuses on the switchgear for non-safe shutdown loads and manually tripping the breaker associated with these loads.

Per Section 4.5.3 of the upgraded IPEEE-Fire March 2000 submittal, the upgraded fire analysis considered three potential fire induced cable failure modes – open circuit, short circuit, and hot shorts. A key feature of the analysis is that spurious equipment actuation is considered for all three failure modes. Although the risk contribution of these types of failures is not readily quantifiable, the risk contribution is significantly less than the contribution from the Control Room fire scenarios. Tables 4-20, 4-21, and 4-22 of the IPEEE-Fire March 2000 submittal show that these scenarios contribute 42% of Unit 2 CDF and 23 % of Unit 3 CDF. These scenarios are however, dominated by the assumed 50% failure rate for the use of DSSP 0100-CR, "Hot Shutdown Procedure – Control Room Evacuation." The contribution due to hot shorts is included in the deterministic failure of equipment affected by fire through mapping to equipment linked in the fault tree model. The risk contribution of other Control Room fire scenarios (not involving Control Room evacuation) is small for both units. This remaining risk contribution includes various types of failures including Control Room operator error and deterministic and probabilistic failures of equipment.