

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-237/91038(DRS); No. 50-249/91042(DRS)

Docket Nos. 50-237; 50-249 Licenses No. DPR-19; No. DPR-25

Licensee: Commonwealth Edison Company
Opus West III
1400 Opus Place
Downers Grove, IL 60515

Facility Name: Dresden Nuclear Power Station
Units 2 and 3

Inspection At: Morris, IL 60450

Inspection Conducted: December 2-6, 1991

Inspector: Ronald N. Gardner for 12/20/91
D. S. Butler Date

Approved By: Ronald N. Gardner 12/20/91
R. N. Gardner, Chief Date
Plant Systems Section

Inspection Summary

Inspection on December 2-6, 1991 (Reports No. 50-237/91038(DRS);
No. 50-249/91042(DRS))

Areas Inspected: Routine, announced inspection to follow up
previously identified Electrical Distribution Safety Functional
Inspection (EDSFI) concerns (Temporary Instruction 25111).

Results: In the area that was reviewed, the following items were
identified: one violation for failure to include appropriate
acceptance criteria in post modification test procedures
(Paragraph 2.i.); one deviation from FSAR commitments (Paragraph
2.a.); four unresolved items (Paragraphs 2.b., 2.c., 2.e., and
2.f.); and three open items (Paragraphs 2.b., 2.g., and 3.0.).

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

- *C. Schroeder, Station Manager
- *L. Gerner, Superintendent, Technical Services
- *J. Kotowski, Superintendent, Production
- *G. Smith, Assistant Superintendent, Operations
- *D. VanPelt, Assistant Superintendent, Maintenance
- *K. Peterman, Supervisor, Regulatory Assurance
 - B. Viehl, Supervisor, NED
 - J. Harrington, Nuclear Quality Programs (NQP)
- *J. Gates, Assistant Supervisor, Technical Staff
- *R. Stachniak, Performance Improvement (PI)
- *K. Deck, Onsite Nuclear Safety
 - W. Morgan, Nuclear Operations
- *D. Karsala, PI
- *T. Gallaher, NQP
- *R. Ralph, Technical Staff
- *B. Adams, Regulatory Assurance (RA)
- *D. Lowenstein, RA
 - R. Falbo, RA

Illinois Department of Nuclear Safety (IDNS)

- *R. Zuffa, Illinois Resident Inspector

U. S. Nuclear Regulatory Commission (NRC)

- *R. Gardner, Chief, Plant Systems Section
- *W. Rogers, Senior Resident Inspector
- *M. Peck, Resident Inspector
- *D. Liao, Reactor Engineer

The NRC inspector also contacted and interviewed other licensee personnel.

*Denotes those present at the exit interview on December 6, 1991.

2. Licensee Action on Previous Inspection Findings

The purpose of this inspection was to follow up deficiencies previously identified in Electrical Distribution System Functional Inspection (EDSFI) Reports No. 50-237/91201 and No. 50-249/91201. A number of the EDSFI concerns will be closed in this report based on additional inspections conducted and a review of licensee commitments documented in the licensee's November 4, 1991, response to the EDSFI

report. The remaining concerns will be assigned a tracking number associated with this report. The attached appendix contains the complete list of items discussed in this report and their status.

a. Deficiency No. 91-201-01: Inadequate Short Circuit Capacity of 4kV Circuit Breakers

The EDSFI team determined that 350MVA and 250MVA circuit breakers, including safety related breakers on bus Nos. 23 and 24, in the 4kV system could experience fault currents up to 114 percent (overduty) of their maximum interrupting rating. These conditions are contrary to Final Safety Analysis Report (FSAR) Section 8.2.2.2 which states, "All protective circuit breakers are sized according to standard electrical industry practice where maximum interrupting capability of the circuit breakers exceed the available line to line or 3 phase short circuit current taking into account the impedances of the generator, transformers and other electrical system components." The inspector considered the overduty condition relative to maximum breaker interrupting ratings to be a deviation (237/91038-01(DRS); 249/91042-01(DRS)) from the commitment made in FSAR Section 8.2.2.2.

The licensee performed a safety evaluation and concluded, based on redundancy and availability of emergency power sources, that operability of emergency safety feature (ESF) loads could be maintained. The EDSFI team concurred with the licensee's determination.

b. Deficiency No. 91-201-02: Inadequate Calculation to Determine Degraded Grid Relay Trip Setpoint

The EDSFI team determined that the degraded voltage setpoint may be set too low to adequately protect safety related motors during a LOCA concurrent with a degraded grid voltage that hovers above the degraded voltage relay setpoint.

The licensee committed in their November 4, 1991, response to the Dresden EDSFI report to complete the degraded voltage calculations for both units by January 31, 1992. The safety significance of this item will be determined following NRC review of the calculations. This is considered an unresolved item (237/91038-02(DRS); 249/91042-02(DRS)).

The licensee reported the degraded voltage deficiency in Licensee Event Report (LER) No. 91-021. Until the degraded voltage calculations are completed and a

proper setpoint has been established, the licensee has implemented compensatory measures to take manual actions to ensure safety related equipment will start and run. This LER will remain open (237/91021-LL) pending further NRC review of degraded voltage concerns at Dresden.

c. Deficiency No. 91-201-03: Failure to Take Prompt Corrective Action

The EDSFI team identified that the licensee was aware of the potential for degraded voltage conditions on safety related motor control centers (MCCs) Nos. 28-1, 28-3, and 29-2. This was documented in Dresden Unit 2 "ELMS Running Voltage Summary," dated November 9, 1990. However, the licensee was unable to identify to the EDSFI team a nonconformance report, or documentation of corrective actions that evaluated this deficiency. The safety significance of this item will be determined following NRC review of the degraded voltage calculations to be completed January 31, 1992. This is considered an unresolved item (237/91038-03(DRS); 249/9102-03(DRS)).

d. Deficiency 91-201-04: Inadequate Acceptance Criteria for Battery Surveillance

The EDSFI team was concerned that the 250 Vdc and 125 Vdc battery performance test surveillance procedures did not contain adequate acceptance criteria to determine the batteries were inoperable if their capacity was below 100 percent. The team noted that the 250 Vdc and 125 Vdc battery sizing calculations were performed with design margin factors of 1.0 and 1.01, respectively, and an aging factor of 1.0. IEEE 485 recommends using a design margin of 1.15 and 1.25 for aging.

The 250 Vdc battery sizing calculation indicates a total remaining margin of 16.6 percent between the actual number of positive plates provided in the battery (10 plates) and the required number of positive plates to meet the design requirement (8 plates). This translates (1/1.166) to a minimum acceptable battery capacity of 86 percent for the battery to remain operable. The 125 Vdc battery sizing calculation indicates a total remaining margin of 47 percent. This translates (1/1.147) to a minimum acceptable battery capacity of 68 percent.

The inspector reviewed surveillance test procedure Nos. DEP 8300-20 (August 1989), "250 Volt Station Battery

Performance Test," and DEP 8300-19 (August 1989), "125 Volt Station Battery Performance Test" and determined the procedures did contain adequate acceptance criteria. The 250 Vdc battery was to be declared inoperable if its capacity was found to be less than 90 percent and the 125 Vdc battery inoperable if less than 80 percent. Based on the above, this item is considered closed.

e. Deficiency 91-201-05: Lack of 480 Vac Coordination

The EDSFI team determined that report No. SL-4500, dated March 24, 1989, did not demonstrate that proper electrical coordination existed between 480 Vac components. The following concerns were identified:

- (1) The report was not a controlled design document and did not contain coordination curve plots for all devices requiring coordination. For example, as-built plots were not provided for load breakers at MCC Nos. 29-3, 29-5, and 29-6.
- (2) Important information necessary to show adequate coordination with equipment characteristics was omitted from the coordination curve plots including motor damage curves, maximum inrush current, full load currents, locked rotor current and cable thermal limits.
- (3) The maximum fault current shown on coordination plots was 15,500A. This value is below the fault currents determined in calculation 6558-EAD-3 of 16,329A for bus No. 28 and 16,078A for bus No. 29. In addition, this value does not include motor contributions from the 480V buses, which may affect coordination for bus tie breakers and MCC load breakers.
- (4) Lack of coordination was noted between switchgear Nos. 28 and 29 feed breakers and the bus tie breakers.
- (5) Lack of coordination was noted between several MCC feed and MCC load circuit breakers.

The EDSFI team noted that modifications were in progress to resolve coordination problems. The licensee was replacing older electro-mechanical trip current sensing devices with new solid state models (RMS 9). The replacement schedule appeared to be based on breaker preventive maintenance schedules that extend into late 1995.

The safety related buses at Dresden also supply power to nonsafety loads. The NRC is also concerned that a faulted, miscoordinated nonsafety load could cause the loss of safety related equipment. At the time of this inspection, the proposed modifications to improve coordination had not been completed. This item is considered an unresolved item (237/91038-04(DRS); 249/91042-04(DRS)) pending NRC review of the licensee's corrective actions.

f. Unresolved Item 91-201-06: Adequacy of Cable Ampacity was not Established

The licensee was unable to provide documentation to establish that cables were properly sized. The Sargent and Lundy Interactive Cable Engineering (SLICE) program was run to determine if currently installed power cables were adequately sized to carry their load current. Approximately 120 routing points were identified as potentially thermally overloaded. Analysis of each routing point is currently in progress. In addition, the licensee committed to perform a pilot study to randomly verify the SLICE routing information. This is considered an unresolved item (237/91038-05(DRS); 249/91042-05(DRS)) pending NRC review of the routing point overload analysis and the pilot program results.

g. Unresolved Item 91-201-07: High Unit 2/3 EDG Room Temperature

The EDSFI team found the Unit 2/3 EDG room to be excessively hot. The diesel room was not provided with any forced ventilation when in standby mode. The Unit 2 and Unit 3 diesel rooms each receive 1,000 cfm of air flow when in standby. The electrical relays for the EDG generator and exciter are rated for a maximum temperature of 122°F. The licensee committed to monitor the 2/3 EDG room temperature each shift. If the temperature exceeded 118.4°F, the operator was instructed to start the vent fan for a period of time to reduce the temperature below 114.8°F. The licensee plans to trend the 2/3 EDG room temperatures during the summer of 1992 and to assess the need for permanent forced ventilation at that time. This is considered an open item (237/91038-06(DRS)) pending NRC review of the licensee's assessment.

h. Unresolved Item 91-201-08: Insufficient Fuel in EDG Day Tanks

The EDSFI team was concerned that insufficient fuel was being maintained in the day tanks to provide EDG operation for four hours at rated load. The FSAR fuel consumption rate was 192 gallons per hour. Therefore, 768 gallons of fuel was required in the day tank. The fuel transfer pump automatic stop was set at 743 gallons (185.75 gallons per hour). The licensee provided the inspector fuel consumption tests that were performed prior to the EDSFI. The following fuel consumptions were determined:

°Unit 2	184.43 gallons per hour
°Unit 3	171.67 gallons per hour
°Units 2/3	183.74 gallons per hour

In each case, sufficient fuel was maintained in the days tanks.

The licensee plans to evaluate EDG fuel oil day tank level instrumentation design changes as a long term action to assure four hours of fuel will be automatically maintained in the day tanks. In addition, the licensee committed to perform semiannual fuel consumption tests for all EDGs. Based on the above, this item is considered closed.

i. Deficiency 91-201-09: Inadequate Post Modification Testing

The EDSFI team determined that contact T1/M1 of control relay 2871/a had not been tested during post-modification testing of Modification No. M12-2-88-05, "Replace Feed Breakers on MCC 28/29-7." Procedure DAP 5-1, "Plant Design Change Program," required a test be performed to written instructions including acceptance criteria that demonstrated the modified component functioned properly and did not affect the interrelationship with other components. Special test procedure No. SP-89-1-4, Revision 0, "LPCI Swing Bus," did not include acceptance criteria that verified contact T1/M1 would trip breaker No. 2971. In addition, construction testing did not contain documented evidence that specific circuit checkout criteria had been met.

Failure of the licensee's post modification test procedure to include appropriate acceptance criteria is a violation (237/91038-07(DRS); 249/91042-07(DRS)) of 10 CFR 50, Appendix B, Criterion V.

The licensee plans to retest the affected circuits described above in accordance with Dresden's Safety Related Contact Testing Adequacy Program.

3. 250 Volt Battery Testing

On October 14, 1991, CECO removed the Dresden Unit 3 250 Vdc battery from service in preparation for a service test. Prior to this date, the licensing basis for Dresden only required a rated load discharge test (performance test) each refueling outage to demonstrate battery operability. The service test was performed utilizing the original battery sizing profile. During the first minute of the test, when subjected to a load of 1017 amperes, the battery voltage decreased to 209.1 volts (acceptance criteria was 210 volts).

On October 18, 1991, following a recharge of the battery, a performance test was performed to determine whether the service test failure was due to battery degradation. The test demonstrated that battery capacity was 96%. This value was within 10% of the previous test which satisfied the acceptance criteria specified in IEEE 450.

On October 20, 1991, the licensee developed a new worst case load profile based on a large break LOCA and HPCI in standby. The NRC's review of this profile questioned the licensee's methodology for addressing the potential coincidence of random loads. The NRC also questioned the licensee's decision not to address the potential effects of HPCI being in test. The profile indicated the main turbine emergency bearing oil pump (EBOP) would start at 57 seconds into the event and a cycling of the HPCI valves due to reactor high water level could occur at 62 seconds into the event. Since plant operators had been trained to manually start the EBOP pump on a turbine trip and since the cycling of the HPCI valves, depending on break size, could occur simultaneously with the start of the EBOP pump, these loads were considered to be random. The controlling profile segment was the one to two minute period. Adding the current resulting from the cycling HPCI valves and the EBOP pump starting current would cause the profile peak to be greater than 1200 amperes, which exceeds the battery sizing calculation first minute current (1017 amperes).

The licensee developed another load profile which had a first minute peak current of 910 amperes. This profile was based on a large break LOCA with HPCI in test. To meet this profile, the licensee modified the HPCI system adding interposing relays in the HPCI valve circuits to prevent coincident operation of the HPCI valves. In addition, plant procedures were modified to delete the instructions to plant

operators to manually start the EBOP pump. On November 1, 1991, a service test was performed utilizing the revised load profile. The battery maintained a voltage of 211.76 volts during the first minute and maintained a voltage of greater than 210 volts for the remainder of the four hour test. Subsequently, the licensee identified a small break LOCA profile with HPCI in standby that had the potential to produce a 953 ampere current peak 6 minutes into the profile. This peak exceeds the large break LOCA first minute current of 910 amperes. The licensee considered this momentary current peak to be of such short duration (60 milliseconds or less) that equipment would not be adversely affected. In addition, the licensee also considered the profile to be conservative, based on momentary loads having to be considered for a full minute in the test profile.

In addition to the HPCI modifications and the plant procedure modifications described above, the licensee's corrective actions include increasing the existing battery size from 116 cells to 120 cells, and a commitment to install a new nonsafety related 250 Vdc battery to supply the EBOP pump. The licensee reported this item in LER No. 91-013. This LER will remain open (249/91013-LL) pending NRC review of the licensee's corrective actions.

4. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the NRC, and which involve some action on the part of the NRC or licensee or both. Open items discussed during this inspection are discussed in Paragraphs 2.b., 2.g., and 3.

5. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations, or deviations. Unresolved items disclosed during this inspection are discussed in Paragraphs 2.b., 2.c., 2.e., and 2.f.

6. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) following the inspection on December 6, 1991, to discuss the scope and findings of the inspection. The inspector also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. Licensee representatives did not identify any such documents or processes as proprietary.

APPENDIX A

<u>Concern Number</u>	<u>Title</u>	<u>Status</u>
a. Deficiency 91-201-01	Inadequate Short Circuit Capability of 4kV Circuit Breakers	237/91038-01 249/91042-01
b. Deficiency 91-201-02	Inadequate Calculation to Determine Degraded Grid Relay Trip Setpoint	237/91038-02 249/91042-02
c. Deficiency 91-201-03	Failure to Take Prompt Corrective Action	237/91038-03 249/91042-03
d. Deficiency 91-201-04	Inadequate Acceptance Criteria for Battery Surveillances	Closed
e. Deficiency 91-201-05	Lack of 480 Volt Coordination	237/91038-04 249/91042-04
f. Unresolved Item 91-201-06	Adequacy of Cable Ampacity was not Established	237/91038-05 249/91042-05
g. Unresolved Item 91-201-07	High Unit 2/3 EDG Room Temperature	237/91038-06
h. Unresolved Item 91-201-08	Insufficient Fuel in EDG Tanks	Closed
i. Deficiency 91-201-09	Inadequate Post Modification Testing	237/91038-07 249/91042-07

<u>Licensee Event Report</u>	<u>Title</u>	<u>Status</u>
a. 91-013-0	250 Volt DC Battery Discharge Voltage Decreased Below Design Basis Limit	249/91013-LL
b. 91-021-0	Improper Setpoint of Second Level Undervoltage Relays Due to Management Deficiency	237/91021-LL