Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

November 4, 1991

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

Subject: Dresden Nuclear Power Station Units 2 and 3
Response to Electrical Distribution System Functional Inspection (EDSFI) Report 50-237/91-201; 50-249/91-201
NRC Docket Nos. 50-237 and 50-249

Reference:
(a) T.J. Kovach letter dated August 16, 1991 Transmitting Requested Additional Information Regarding the Dresden EDSFI Exit on August 9, 1991

(b) CECo-NRR-Region III Conference call on August 19, 1991

(c) M.H. Richter Letter Dated August 26, 1991 Transmitting Requested Information Regarding the Dresden EDSFI

(d) B.A. Boger Letter Dated September 20, 1991 Transmitting NRC Inspection Report 50-237/91-201; 50-249/91-201

Reference (a) provided responses to a request for additional information regarding 120 V-ac control power, motor operated valve (MOV) terminal voltage calculations, and MOV starting torque at low voltage conditions. Reference (b) discussed Dresden EDSFI issues with respect to 4 kV safety bus degraded voltage, the voltage response of the 4 kV safety buses and system grid to a recent Unit 3 scram, and 120 V-ac contactor testing. Reference (c) presents additional information on the matters discussed during the conference call.

This letter responds to the EDSFI, reference (d), conducted at Dresden Nuclear Station. Attachment A to this letter provides Commonwealth Edison Company's (CECo) response to the cited deviations and unresolved items.

If your staff has any questions or comments regarding this letter, please refer them to Rita Radtke, Compliance Engineer at (708)515-7284.

Very truly yours,

T. J. Kovach
Nuclear Licensing Manager

cc: A. Bert Davis, Regional Administrator - Region III
W. Rogers, Senior Resident Inspector - Dresden
B. Siegel, Project Manager - NRR

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ATTACHMENT A

RESPONSE TO DEFICIENCIES AND UNRESOLVED ITEMS

91-201-01
91-201-02
91-201-03
91-201-04
91-201-05
91-201-09
91-201-06
91-201-07
91-201-08

RESPONSE TO DEFICIENCY 91-201-01
4-kv Circuit Breaker Inadequate Short Circuit Capacity

DESCRIPTION OF CONDITION:

The team determined that several 350 MVA and 250 MVA circuit breakers in the 4-kv system (including safety-related breakers on buses 23 and 24) could receive fault currents in excess of their maximum interrupting rating. In addition, some safety-related 250 MVA and non-safety related 350 MVA breakers could receive fault currents in excess of their momentary ratings. Safety related 250 MVA breakers could experience fault currents as high as 114 percent of their interrupting ratings and 118.4 percent of their momentary ratings.

Failure of certain overdutied breakers to function properly could result in a long-term loss of the preferred power source to a safety bus. However, a safety evaluation provided by the licensee concluded that, because of redundancy and availability of emergency power sources, operability of ESF loads could be maintained.

DISCUSSION

As presented in our response to the Quad Cities EDSFI Inspection Report (Site Inspection Report No. 254/91011(DRS); 265/91007(DRS)), CECo acknowledges the technical concerns underlying Deficiency 91-201-01 and has taken comprehensive actions to address those concerns.

Prior to both the Quad Cities and Dresden EDSFI Inspections, CECo self-identified circuit breaker overduty concerns with the 4 kV electrical distribution system. CECo discussed these issues with the EDSFI team and its plans for addressing the over-duty concern, including short and long term corrective actions.

Since the completion of the Dresden EDSFI, the Auxiliary Power System Enhancement Study has proceeded through the examination of six separate options. Each option has been reviewed for acceptance or rejection based on the expected benefits and estimated cost of each solution. Based on this analysis, one option has been selected for further engineering development.

This option includes the refurbishment of the existing 350 MVA breaker cubicles to increase their short circuit rating and the replacement of the existing 250 MVA, 4kV switchgear with 350 MVA for Dresden buses 23, 24, 33, and 34 and Quad Cities buses 13, 14, 23, and 24. As a part of the engineering development, an outage analysis has been completed to determine that the replacement of a bus could be completed within the allowable work window of existing refueling outage schedules.

In addition to the correction of over-duty concerns, the proposed Auxiliary Power System enhancement will improve overall spare parts and maintenance issues, and will supply the necessary breakers and cubicles to accommodate station black-out (SBO) tie-ins.

The current schedule for the refurbishment of the 350 MVA breaker cubicles is:

1. Dresden Bus 21 December, 1992
2. Dresden Bus 22 December, 1992
3. Dresden Bus 31 Completed
4. Dresden Bus 32 Completed

Current activities associated with the replacement of the 250 MVA breakers include the development of a detailed cost analysis and preliminary engineering work, along with a presentation package for corporate financial review for January / February 1992.

The main feature of the proposed 4 kV system upgrade is to completely remove the existing non-diesel 250 MVA buses which presently experience the over-duty condition. This includes Dresden Unit 2 buses 23 and 24, Dresden Unit 3 buses 33 and 34, Quad Cities Unit 1 buses 13 and 14, and Quad Cities Unit 2 buses 23 and 24. Each set of switchgear would be replaced with 1E qualified switchgear rated at 350MVA. This upgrade would resolve the overduty issue for each bus as it is replaced. Spare breakers and parts would also be purchased to accommodate a rotating maintenance program and to provide a sufficient future source of spare parts for the new switchgear.

The proposed solution can be successfully implemented within ten week refueling outages. The proposed switchgear replacements would take place on a one bus per refueling outage schedule starting in 1993. This staged replacement is required to accommodate the modifications within 10 week outages in the upcoming years. The first switchgear replacements in 1993 would be bus 33 at Dresden during D3R13, and bus 23 at Quad Cities during Q2R12. The remaining bus upgrades would then occur in refueling outages after the SBO modifications are completed. This implementation strategy has four major advantages:

1. The Quad Cities EDSFI response to the NRC for the fault overduty Deviation would offer a technical fix for this design issue, with actual implementation starting in 1993 for both Dresden and Quad Cities.
2. Replacement in 1993 of bus 33 at Dresden and bus 23 at Quad Cities would be completed prior to the first SBO plant tie in work to the 4KV Auxiliary Power System at the two stations. The SBO additions could then take place in the remaining outages prior to January 1, 1996 apart in time from the switchgear replacement. This would avoid having two major jobs being installed in the same system during the same ten week outages. The bus replacements would then continue in 1996 after Dresden and Quad Cities have successfully met the 10CFR50.63 rule.
3. Both of the stations would have an adequate supply of spare parts starting in 1993 for the remaining 250 MVA switchgear in the 4KV System. Any effort to design, qualify and purchase even one or two replacement breakers for the existing buses to create spares would also take at least until 1993 to implement.
4. In addition to the Station Blackout upgrade both Dresden and Quad Cities have other NRC commitments with required implementation dates falling in the 1992 through 1995. Examples of these items include Generic Letter 89-10 Motor Operated Valve upgrades, and replacement of the

Reactor Water Cleanup piping and heat exchangers for Generic Letter 88-01. This strategy puts most of the 4KV bus replacements beyond 1995, and out of refueling outages which already are burdened with these other large resource drains and schedule commitment dates.

RESPONSE TO DEFICIENCY ITEM 91-201-02
Degraded Grid Undervoltage Protection

DESCRIPTION OF CONDITION

Based on the requirements of the Branch Technical Position PSB-1 (below), the licensee should have determined the minimum acceptable starting and running terminal voltages required for acceptable safety-related device operation. Using these as input, the most critical, or bounding voltage requirements and "worst-case" distribution system loading should have been considered in establishing the second level undervoltage protection setpoints. The licensee's setpoint calculation, dated 2/21/84, used an oversimplified methodology and unverified assumptions, and apparently had not been checked or received an independent design review. Second level undervoltage protection was added as a design change to both Units 2 and 3, but there was no indication that the starting and/or running voltages of safety-related devices had been addressed.

As a result of the team's above concern, the licensee performed preliminary calculation NED-E-IC-0050, Revision 0, dated July 22, 1991, "Adequacy of EDG Cooling Water Pump 2 Under Degraded Voltage Conditions," to determine the required voltage levels on 4160 volt bus 29-1 to support starting and running of the assumed "worst-case" motor load. This calculation indicated that 3960 volts was required on 4160 volt bus 29-1 for "worst-case" motor starting and 3850 volts for "worst-case" motor running conditions. Thus the trip setting of the second level undervoltage relay of 3708 volts to 3784 volts, as determined by the licensee's February 21, 1984 calculation, appeared inadequate. The licensee advised the team that the target date was September 30, 1991 for formalizing this calculation, including supporting calculations and analysis as required to demonstrate that it is the bounding case. Similar calculations analyzing 4160 volt buses 28-1, 38-1 and 39-1 were targeted for November 18, 1991 .

DISCUSSION

During the Dresden EDSFI, the NRC performed a review of a preliminary Electrical Load Management System (ELMS) calculation of the auxiliary power system. This preliminary calculation showed that several 480 V-ac Motor Control Centers (MCC) exhibited low voltage conditions. Based on these results, the NRC requested Commonwealth Edison Company (CECo) to verify that the existing degraded voltage relay setpoint (3708 volts on the 4 kV safety bus) was sufficient to start and operate all Class 1E equipment.

CECo performed a preliminary calculation of auxiliary power system voltages for Dresden Unit 2 Division II utilizing the Unit 2 Emergency Diesel Generator Cooling Water Pump (DGCWP) as the most limiting Class 1E load. This load path was selected to support the review activities of the EDSFI inspection team. The DGCWP was selected since it was the largest electrical load on the lowest voltage MCC. The preliminary calculations determined that the minimum 4 kV-ac safety bus voltage necessary to operate the DGCWP is 3850 volts. Additionally, it was further identified that the estimated minimum 4 kV-ac safety bus voltage to assure starting the DGCWP is approximately 3960 volts. Based on these results, compensatory measures were developed to ensure the availability of the DGCWP. These compensatory measures were discussed with NRR and Region III personnel on August 1, 1991, and incorporated into Dresden Operating Order

20-91, Revision 0. On-shift operations personnel were trained on this operating order prior to assuming their shift duties. As a result of the August 17, 1991 Unit 3 scram during main turbine surveillance testing, additional compensatory measures (as defined in Operating Order 22-91) were implemented as discussed in the August 26, 1991 letter from M. H. Richter to NRC (see Attachment B).

As a part of the August 26, 1991 letter, CECo committed to complete the Dresden Unit 2 Division II degraded voltage calculation by September 30, 1991. This calculation was completed. Based, however, on a continuing review of design input additional information regarding actual cable lengths and revised loading tables were developed in early October. This additional information will require a revision to the degraded voltage calculation. The current schedule for completion of degraded voltage calculations is:

A. Dresden Unit 2 Division II January 31, 1992.

B. Dresden Unit 2 Division I January 31, 1992.

C. Dresden Unit 3 Division I January 31, 1992.

D. Dresden Unit 3 Division II January 31, 1992.

Preparation of preliminary loading tables for Dresden Unit 3 and Quad Cities Units 1 and 2 has been completed and is in review. The determination of preliminary cable length information has been initiated for Dresden Unit 3 and Quad Cities Unit 1 and 2.

The following provides an update to the ongoing actions identified in the August 26, 1991 letter.

Actions Identified as "CURRENT" in August 26, 1991 Letter

1. Test all CR106D0 and CR109D0 contactors which have been identified to date from the review of previous walk-down information of the Environmentally Qualified (EQ) Safety related Motor Control Centers (MCC).

   All contactors have been identified and tested as reported in the August 26, 1991 letter.

2. Complete non EQ Safety Related MCC walkdowns to identify any remaining safety-related size 2 contactors.

   All non EQ Safety Related MCC walkdowns to identify any remaining safety-related size 2 contactors have been completed. No additional contactors have been identified.

3. Test all safety-related CR 109DO and CR 106DO contactors found during the walk-down to determine minimum pickup voltage.

   All safety-related CR 109D0 and CR 106D0 contactors identified during walk-downs have been tested for minimum pickup voltage.

4. Develop a Southern Division Load Dispatcher Operating Order to close the 345 yard cross tie breaker after a trip of the Unit 3 generator so that 345 yard voltage will be restored.

   System Planning Department Operating Guide No. 1-2-E, "Station 12, Dresden 345kV and 138kV Bus Operation", Effective 9-06-91, provides direction to close the 345 yard cross tie breaker after a trip of the Unit 3 generator so that 345 yard voltage will be restored.

5. Verify transformer voltage tap settings are correct as modeled in the analysis.

   Tap settings were verified prior to use in the degraded voltage calculations.

6. Modify the existing Station Operating Order to improve 4 kV voltage load by securing a circulating water pump, address closure of the 345 yard crosstie breaker, and increase VARs on the operating unit following a generator trip.

   Station Operating Order No. 22-91 includes securing a circulating water pump, closing the 345 yard cross-tie breaker, and increasing VARs on the operating unit following a generator trip.

7. Perform heightened awareness training with the Station Control Room Engineers and Load Dispatchers.

   A meeting was held between the Dresden Operations personnel and Southern Division Load Dispatchers to heighten awareness of the degraded voltage issue.

Actions Identified as "SHORT TERM" in August 26, 1991 Letter

1. Review Quad Cities and Zion Stations for applicability.

   A. Loading tables are currently under development for Quad Cities Station. Walk-downs of MCC cubicles for determining contactor size have been started.

   B. Loading tables are currently under development at Zion Station. Walk-downs of MCC cubicles for determining contactor size have been started.

2. Procure new '300' series contactors from General Electric Company.

   New General Electric Series '300' contactors are being procured for replacement in Dresden Unit 3 during the current refuel outage.

Actions Identified as "MID TERM ACTIONS" in August 26, 1991 Letter

Mid term actions were defined to be completed between September 1991 and February 1992.

1. Consider performing a test program to obtain a actual motor loading data for varying operating conditions to calibrate the loading models in the ELMS program

   A test program to measure actual motor loading data on selected motors will be finalized and a schedule developed by February, 1992. Direction for this testing is being coordinated between the Technical Staff and Nuclear Engineering Department.

2. Study potential design change alternatives to restore margins.

   A. The following potential design alternative has been proposed to restore margin due to the degraded voltage issue .

      i. Addition of a 3rd level degraded voltage relay to all 4160 V-ac buses. In addition, eliminate 4160 V-ac ECCS pump block motor starting. The purpose of this proposed design alternative is to assure all Class 1E equipment will start and run, if required. The 3rd level protection would immediately trip Class 1E bus feed breakers with a concurrent ECCS signal.

      ii. The existing 2nd level protection will be utilized to alert operators of potential damage to rotating Class 1E motors and to cause a trip of Class 1E bus feed breakers after 5 minutes.

      iii. The existing 1st level protection would continue to protect against the 75 percent of nominal bus voltage with an immediate trip of Class 1E bus feed breakers.

3. Upgrade '100' series (85% rated pickup voltage) to '300' series (75% rated pickup voltage) for all size 2 contactor application.

   Dresden Station is changing out safety-related G.E. Series '100' to Series '300' size 2 contactor in Unit 3 during the current refuel outage. In addition, during the current Unit 2 outage several safety-related G.E. Series '100' size 2 contactors are also being replaced. The completion of the Unit 2 change-out is expected during the next refuel outage.

4. Evaluate the possibility of transformer TAP changes to achieve higher bus voltages.

   A preliminary evaluation of changing transformer TAP settings to achieve higher bus voltages has shown that bus voltages would be improved at low grid voltages. With the same TAP setting at normal grid voltages the resultant bus and MCC voltages and short circuit currents may cause equipment damage. A final disposition of this issue will occur with the finalization of the engineering design of the 4 kV-ac switchgear replacement.

5. Upgrade existing ITE model 27D degraded voltage relay with a ABB model 27N improved accuracy relay.

   Both Dresden and Quad Cities are currently upgrading the ITE model 27D degraded voltage relay with a ABB model 27N. This work will be completed for Dresden Unit 3 during the current refuel outage and Dresden Unit 2 during the next refuel outage.

6. Perform new degraded voltage protection relay setpoint calculations to support Technical Specification changes.

The preliminary schedule developed for completing degraded voltage calculations for the first division of each CECo station is:

A.	Quad Cities	December 31, 1991
B.	Zion	November 30, 1991
C.	LaSalle	Completed prior to current EDSFI
D.	Byron	January 31, 1992
E.	Braidwood	February 28, 1992

This schedule represents the "first step" in the creation of licensing submittal packages to support Technical Specification changes.

7. Assess sensitivity of other electrical devices to degraded voltage condition.

   Subsequent to the issuance of the August 26, 1991 letter, CECo has completed an analysis of the critical 480 V Switchgear 29 voltages for all safety-related loads (not only the Diesel Generator Cooling Water Pump) of Unit 2 Division II. Prior to the submittal of any Technical Specification change associated with degraded voltage, CECo will complete the critical voltage analysis to the 480 V switchgear level for the remaining Divisions and will perform an evaluation of the effects of the proposed degraded voltage solution on other electrical devices including relays, solenoids, and Regulatory Guide 1.97 instrumentation.

8. Utilize the upcoming Unit 3 outage (start date, September 8, 1991) to evaluate equipment, perform testing, and replace components as necessary.

   No special testing is scheduled to be performed during the current Unit 3 refuel outage. Testing to determine motor performance is scheduled to start prior to December 31, 1991 .

RESPONSE TO DEFICIENCY ITEM 91-201-03
Corrective Actions and Reporting of Defects

DESCRIPTION OF CONDITION

The Dresden Unit 2 "ELMS Running Voltage Summary," dated November 9, 1990, which was used as a reference for a later calculation 004-E-012, Revision 0, dated 6/13/91, "MCC Bus Voltages, Dresden Units 2 and 3," indicated running or steady-state voltages for the "worst-case," non-degraded grid condition of 408.5 volts, 380.1 volts and 406.1 volts on the safety-related 480 volt motor control center buses 28-1, 28-3 and 29-2, respectively. Based on the licensee's assumed 12 volt drop between the motor control center buses and motors, as used in their calculation used to determine the second level undervoltage protection relay settings, less than 90 percent of motor nameplate voltage would have been available at motor terminals. NEMA standard MG 1-12.43 states that acceptable operation of AC motors can not be assured with less than 90 percent of rated voltage at their terminals. Licensee engineering and operations personnel were aware of the potential low voltage condition that may render safety related equipment inoperable during an accident. However, the licensee was unable to identify to the team a nonconformance report, or documentation of corrective actions that evaluated this anomaly.

Discussion

The Dresden Unit 2 "ELMS Running Voltage Summary " approved November 7, 1990, indicated that a potential low voltage concern might exist for safety-related 480 volt motor control centers. On January 5, 1991 a meeting was held between corporate engineering, station personnel and Sargent and Lundy to discuss this ELMS ac calculation. During this meeting the potential low voltage concern was reviewed. The assumptions used during this calculation were identified in many cases as conservative. Examples included utilizing maximum BOP AC requirements because actual loads were unknown, and assuming operation of a pump or motor if its status was unknown. It was concluded that verification and refinement of these assumptions through plant walkdowns was required. It was determined at this meeting that Sargent and Lundy would re-perform this calculation utilizing the more realistic input assumptions developed through these walkdowns. Because of the extensive conservatisms in the calculation, adequate margin was believed to exist and re-performing the calculation was not viewed as a high priority task.

In retrospect, the time-frame and level of documentation associated with resolving this issue was inappropriate. CECo recognizes the importance of timely, effective technical issue resolution. In October of 1990, Corporate Engineering implemented procedure ENC-QE-40.1, "Evaluation and Review of Potential Design Concerns for Impact on Plant Operability," to improve CECo responsiveness to issues similar to the degraded voltage issue. This procedure requires prompt resolution of technical concerns and provides the framework for documenting the actions associated with resolving such concerns. In addition, this procedure provides a process for notifying appropriate management if technical concerns are believed to be of a significant nature. This procedure is currently being revised to incorporate Lessons Learned during its first year of use and also to incorporate specific NRC feedback relative to its use. This revision is expected to be complete by December 31, 1991. To address the concerns noted in this Deficiency, training on this procedure will emphasize the need to document and disposition technical issues raised by

preliminary calculations in a time-frame commensurate with their importance to safety. To ensure the effectiveness of the training program and the operability evaluation process, periodic assessments will be performed by our Nuclear Quality Programs organization.

RESPONSE TO DEFICIENCY ITEM 91-201-04
Inadequate Acceptance Criteria for Battery Surveillance

DESCRIPTION OF CONDITION

The 250 and 125 Vdc battery sizing calculations had been performed and new batteries had been installed about 2 years ago. The team noted that the calculations were performed with design margin factors of 1.0 and 1.01, respectively, and an aging factor of 1.0, contrary to standard factors of 1.15 for design margin and 1.25 for aging. Sizing was acceptable for present loading, but this did not allow margin for future battery loading and aging.

Due to the limited margin, the batteries would be inoperable if their capacity was below 100 percent. However, the team noted that the battery test procedures did not reflect this in the acceptance criteria. Given this situation, surveillance tests may not identify conditions where the battery is at lower capacity than that required for the operation of the engineered safety systems.

DISCUSSION

The following acceptance criteria will be incorporated into the Dresden Station 250 Volt Battery Performance Test Procedures prior to the next performance test.

Prior to the start of the performance test of battery capacity, minimum acceptable capacity of the battery shall be determined as follows:

1. Contact the Nuclear Engineering Department for the latest revision of the DC ELMS (Electrical Load Monitoring System) load profile for the Unit 2(3) 250 volt battery.
2. From the latest revision of the DC ELMS, determine the remaining capacity margin of the battery. Remaining capacity margin is defined as the ratio of the actual number of positive plates provided in the battery to the required number of positive plates to meet the design requirement. The required number of positive plates includes a temperature correction for minimum expected electrolyte temperature and an aging factor.
3. The minimum acceptable capacity is determined by subtracting the inverse of the remaining capacity margin determined above from 100%.
4. The minimum acceptable capacity shall be the value determined above, or 80%, which ever is greater.

If the battery capacity as determined by the performance test is below the minimum acceptable capacity determined above, the battery shall be replaced. If the battery capacity as determined by the performance test is above the minimum acceptable capacity but dropped more than 10% of rated capacity from its capacity on the previous performance test, or is below 90% of the manufacturer's rating, then an annual performance test shall be given to the battery.

It should be noted that the existing sizing calculations for the 125 Vdc batteries include a temperature margin factor of 1.08 to account for a minimum expected electrolyte temperature of 65 °F and an aging margin factor of 1.25. The aging factor allows the battery to drop to 80% of rated capacity and still meet the design requirements of the dc system. The total remaining margin between the actual number of positive plates provided in the battery and the required number of positive plates to meet the design requirements (load profile) to a minimum temperature of 65 °F and a minimum acceptable capacity of 80% is approximately 47%. This additional margin represents design margin.

The existing 250 Vdc batteries were sized with a temperature margin factor of 1.08 to account for a minimum expected electrolyte temperature of 65 °F. The battery sizing calculation indicates a total remaining margin of 16.6% between the actual number of positive plates provided in the battery and the required number of positive plates to meet the design requirements (load profile) to a minimum temperature of 65 °F. This translates to a minimum acceptable capacity of 86% for the battery to meet the design requirement. Stated differently, the battery currently has 14% margin for aging and design changes.

Due to the recent failure of the Unit 3 250 Vdc battery service (load profile) test, plant modifications are being performed to reduce the load profile demand (reduce coincident loads) and to add four additional cells to each 250 Vdc battery. These modifications were discussed with NRC Region III and NRR personnel on October 28th at Dresden Station. Once the modifications are implemented, both 250 Vdc batteries will have aging and design margins recommended by IEEE 485. Therefore, the minimum acceptable capacity for the battery will be 80% of rated capacity.

RESPONSE TO DEFICIENCY ITEM 91-201-05
Lack of 480v Coordination

DESCRIPTION OF CONDITION

The team determined that Report SL-4500 dated March 24, 1989 was inadequate to establish that proper coordination exists, and that in fact demonstrated that at several points coordination did not exist. The lack of coordination included devices intended to isolate non-safety circuits from their safety-related supply. Report weaknesses included the following:

1. The report was not a controlled design document and it did not show coordination curve plots for all devices requiring coordination. For example, as-built plots were not provided for load breakers at MCC's 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 28 and 16,078A for bus 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.

In addition to the above weaknesses, the report revealed that there was a loss of coordination at several points on the system. Examples of devices that are not coordinated include:

- Switchgear 28 and 29 feed breakers and the bus tie breakers.
- MCC feed and MCC load circuit breakers.

The team prepared coordination plots for the MCC 29-8 feed breaker and determined that it would not coordinate with the upstream Switchgear 29 feed breaker for faults above approximately 12,000 A. A fault on the non-safety equipment could disable an entire safety division at the 480v level. Because of redundant safety divisions, these conditions do not present an operability concern. However, they represent a design weakness which could diminish the overall capability of the EDS.

The team noted that modifications were in progress to resolve coordination problems. However, since design documents for proposed modifications have not been completed, the team could not fully evaluate the adequacy of these corrective actions. Corrective actions are scheduled to be completed by 9-94.

DISCUSSION

As the EDSFI team noted, modifications are in progress to resolve the coordination problems identified above. In addition, the quality of the calculations supporting the determination of the ability of the breaker equipment to coordinate will be improved. These design calculations will include coordination curve plots

for all devices requiring coordination. The coordination curve plots will identify full load currents, actual or estimated locked rotor current ,and transformer thermal limits (if applicable).

The following table shows the estimated number of safety-related RMS 9 devices that will be changed prior to the end of 1994. It is anticipated that all safety and non-safety RMS 9 devices will be replaced by the end of December, 1995. The completion of the identified modifications will restore coordination to the 480 V-ac safety buses at Dresden Station. This will assure that 480 V-ac coordination will be restored to all buses.

RMS -9 Replacement Schedule

Bus 28	72% changed prior to December 31, 1994
Bus 29	75% changed prior to December 31, 1994
Bus 38	93% changed prior to December 31, 1994
Bus 39	80% changed prior to December 31, 1994

RESPONSE TO DEFICIENCY ITEM 91-201-09
Inadequate Post Modification Testing

DESCRIPTION OF CONDITION:

The team determined that the licensee's procedures controlling modification work and related testing were generally comprehensive. However, the team reviewed four modification packages completed within the last six years, and identified deficiencies for post-modification functional testing in three of the four packages.

Modification M12-2-88-05: Replace Feed Breakers on MCC 28/29-7

Control relay 2871/a, contact T1/M1, should have been verified to trip breaker No. 2971 during the performance of Test Procedure SP 89-1-4, Revision 0, "LPCI Swing Bus." Procedure DAP 5-1, "Plant Design Change Program," Form 5-IF, "Modification Testing Guidelines and Modifications Testing Committee Approval," was approved for Test SP 89-1-4. It required that a construction test be performed to written instructions including acceptance criteria and that a modification test demonstrate the modified components function properly and do not adversely affect the interrelationship with other components. The following discussion indicates non-compliance with these guidelines and lack of documentary evidence that the contact/breaker interaction was tested.

Construction Test Procedures No. 7, Revision 1, "Miscellaneous Breakers/Contactors," and No. 19, Revision 1, "Control Circuits," were used by construction personnel to check out the modification. The procedures required that all devices be functionally checked per schematic diagrams by verifying that individual device contacts would make up. However, the station traveler did not contain documented evidence that specific circuit checkout criteria were met, other than an initial by the operator and Quality Assurance that the construction procedures were performed. The team concluded that this type of documentation did not provide satisfactory assurance that the contact/breaker operability was verified.

Station Nuclear Engineering Department (SNED) specified that the test and acceptance criteria for this modification. However, the testing of CR 2871/a interlock contact T1/M1 was not specified.

The team noted that a technical staff engineer assigned to document the post-modification test failed to identify the omission of the CR 2871/a contact. This could easily have been identified by checking modification boundaries on the schematics against test procedure boundaries.

Modification M12-2/3-82-21: Bypass of Under-frequency Relay in Auto Start Circuitry and Diesel Generator Auto Start During a Loss of Onsite Power

The team determined that M12-2/3-82-21 functional test results were inadequately documented and evaluated to assure that the requirements for procedure steps 8E and 14E (specifying breaker position)

had been satisfied. Additionally, there was no documented evidence to demonstrate the independent operation of contacts 152-2303/b (5/5T), 152-2311/b (5/5T), 152-3312/b (5/5T), and 152-3303/b (5/5T).

Modification M12-2-80-34: Non-Synchronous Closure Logic Installed in Diesel Generator Breaker Control Circuits and Addition of Second Level Undervoltage Relays

The team determined that there were no documented test results to demonstrate (1) the operation of the non-synchronous contact installed in the DG close permissive circuit on breaker Nos. 152-2333 and 152-2422 and (2) independent action of undervoltage relay contacts 127-3-B23-1 (11/12), 127-4-B23-1 (5/6), 127-3-B24-1 (11/12) and 127-4-B24-1 (5/6) to assure energization of relays TDR-24-1 and 427Y1-24-1.

The licensee plans to retest the affected circuit described above and provide additional training in the implementation of the training program.

DISCUSSION

Dresden Station will retest:

1. Modification M12-2-88-05: Contact CR 2871/a.
2. Modification M12-2/3-82-21: Contacts 152-2303/b (5/5T), 152-2311/b (5/5T), 152-3312/b (5/5T), and 152-3303/b (5/5T).
3. Modification M12-2-80-34: Contacts for (1) the non-synchronous contact installed in the DG close permissive circuit on breaker Nos. 152-2333 and 152-2422 and (2) independent action of undervoltage relay contacts 127-3-B23-1 (11/12), 127-4-B23-1 (5/6), 127-3-B24-1 (11/12) and 127-4-B24-1 (5/6) to assure energization of relays TDR-23-1, TDR-24-1, 427Y1-24-1, and 427Y1-24-1, respectively.

Furthermore, Commonwealth Edison in the Engineering Assurance Program Assessment Report No. EA-91-03. Post Modification Acceptance Testing Criteria, dated October 30, 1991, reviewed the post modification testing acceptance criteria provided to the stations by engineering in the modification packages. Based on this assessment, the following recommendations have been proposed by the Engineering Assurance Group.

> "It is recommended that the QE-06 series of procedures be revised to require better documented communication between the engineering groups developing the acceptance testing requirements and the station testing groups. Post Mod testing requirement discussions and documentation could be made a part of the currently required modification meetings, or other specific communication enhancements could be developed utilizing input from the Stations and the NED System Design Groups. It is further recommended that the Modification Approval Letters include a section specifically identifying the test results (if any) that require review by engineering. This section would also specify whether this review was required before acceptance of the modification or for information. The expectation is that engineering will, as a minimum, review the results of important functional testing for modifications to systems or components important to safety or reliability, and that in cases where the acceptance criteria require interpretation, this review may be

to assist in the determination of the reviews to be required. It is also recommended that a tutorial be developed to help engineering determine the need for certain types of less frequently required specialized tests (e.g. pump vibration tests). It is further recommended that this assessment be repeated after an appropriate period of time to assess the effectiveness of the changes made as a result of this recommendation."

Schedules for the implementation of these recommendations will be completed by the end of the 1st quarter of 1992.

RESPONSE TO UNRESOLVED ITEM 91-201-06
Adequacy of cable ampacity not established

DESCRIPTION OF CONDITION

The licensee was unable to provide documentation to establish that cables were properly sized to provide sufficient ampacity. The licensee stated that cable sizing was-established using various architect engineer (AE) standards. The AE standards were based on industry standards; however, the particular industry standards used to develop the AE standards were not identified. As a result, the team could not effectively evaluate cable sizing and cable raceway fill requirements.

The licensee stated that ampacity is being evaluated using the Sargent and Lundy Interactive Cable Engineering (SLICE) program. The approach involves performing a thermal analysis of actual installed configurations to determine adequacy of cable ampacity. However, since this approach involves analyzing actual installed configurations, the validity of the results relies on having complete and accurate information regarding cable routing. Input to the program was based on "cable tabs" which were the routing instructions provided to the installers. The licensee did not have a program to verify the accuracy of routing instructions or their correct implementation. The licensee has agreed to perform a pilot study to verify cable routing to determine if further verification is warranted.

If cable ampacity is not adequate, allowable conductor temperatures could be exceeded. This could, in time, degrade the insulation and its ability to withstand accident conditions.

DISCUSSION

From the original design period through the present, Sargent and Lundy (S&L) has used various revisions of its Standards to conservatively size cables. These S&L Standards were and continue to be based on accepted industry practices and documents in effect at the time of their issue. Due to the level of documentation typically required during the design of early vintage plants, specific reference to the Standard and Revision was not made. Determining the Standard and Revision applicable in the specific time frame requested by the team was not possible. Therefore, to address this concern, the Sargent and Lundy Interactive Cable Engineering (SLICE) program feature which assesses cable ampacity will be utilized to confirm that currently installed power cables are adequately sized to carry their load current.

The initial run of SLICE used a database library with default values for cable ampacity. The default values used are the maximum allowable values for a given cable size as a conservative approach. As such, the SLICE program using these very conservative values, indicated that some routing points were thermally overloaded. Currently, approximately 120 routing points have been identified as potentially thermally overloaded. A more thorough analysis of the overloaded routing points using actual running load currents, as opposed to a maximum rated load current per the S&L library, is currently being performed and is anticipated to be completed by December 31, 1991.

The inspection report states above that the "licensee has agreed to perform a pilot study to verify cable routing to determine if further verification is warranted". More clearly, during the Dresden EDSFI Commonwealth Edison agreed to perform a study on what methods are available to verify existing cable routing. The purpose of this study is to determine if unobtrusive methods are available to determine existing cable routing. The results of this study will provide valuable information in developing a process to ultimately perform cable routing verifications. The current schedule for completion of this study is the end of the 1st quarter 1992.

RESPONSE TO UNRESOLVED ITEM 91-201-07
High Unit 2/3 EDG Room Temperature

DESCRIPTION OF CONDITION

The team found the Unit 2/3 EDG room to be excessively hot during two walkdowns in the week of July 22, 1991. The team was concerned regarding the detrimental effect of very high room temperature on electrical equipment and personnel. The electrical relays for the EDG generator and exciter were rated for a maximum temperature of 122F.

The team noted that Unit 2/3 diesel room was not provided with any forced ventilation during standby mode, unlike the Unit 2 and Unit 3 diesel rooms each of which received a 1,000 cfm flow from the turbine building ventilator, system. Due to heating loads, including room lighting and solar transmission, the Unit 2/3 EDG room temperature could rise above 122F in hot days during standby mode. The cabinets housing the relays could reach even higher temperature than the room temperature.

The licensee agreed to monitor the room temperature during each shift, provide ventilation as appropriate to assure continued operability should the temperature exceed 122F, and evaluate the need for permanent forced ventilation.

DISCUSSION

Temporary Change Number 91-191 to Unit 2/3 Procedure Appendix B, Revision 14, "High Voltage Operators Roundbook" was implemented on August 23, 1991. This Temporary Change Request instructs the High Voltage Operator to record the temperature in the diesel generator room once per shift. If the temperature exceeds 48°C, then Note 7 of the procedure instructs the operator to "run vent fan for a period of time that will reduce the temperature below 46°C".

Based on the results of the trending of EDG room temperature, the station will assess the need for permanent forced ventilation by December 31, 1992. This will allow sufficient time to monitor temperatures through the summer of 1992.

RESPONSE TO UNRESOLVED ITEM 91-201-08
Insufficient Fuel in EDG Day Tanks

DESCRIPTION OF CONDITION:

The UFSAR required that each day tank contain sufficient fuel to support the emergency diesel generator operation for more than four hours at the rated load. The team noted that, with the UFSAR identified fuel consumption rate of 192 gallons per hour, the minimum fuel quantity required in the EGG day tanks was 768 gallons. The team found that the existing setting of the day tank float switch for the auto stop of the transfer pump would limit the fuel inventory in the day tanks to approximately 743 gallons. The licensee found it impractical to raise the float switch to the required level due to the existing physical arrangement of the EDG day tank level instrumentation,.

The licensee stated that it would take the following actions to assure a fuel oil supply of four hours in the EDG day tanks. The operators would maintain 768 gallons of fuel oil within the Unit 2 and Unit 2/3 EDG day tanks by manually overriding the fuel oil transfer pump shutoff setpoint and raising the level at or above 768 gallons. Operators would perform this action at the end of EDG surveillance tests. This action would be taken provided the day tank high level alarm could be set above the 768 gallon level. If the high level alarm could not be set in this position, Dresden station would utilize the same method for assuring a 4 hour day tank fuel oil capacity as described below for the Unit 3 EDG.

The Unit 3 EDG fuel oil day tank fuel oil level could not be manually raised above the EDG fuel oil transfer pump shutoff setpoint. Dresden station would maintain the Unit 3 EDG fuel day tank level at the existing EDG fuel oil transfer pump shutdown setpoint of 42.5 inches, corresponding to 743 gallons of useable fuel oil, or a higher level if physically achievable. The 743 gallons of usable fuel oil could provide a four hour fuel oil supply at a fuel consumption rate of 185.75 gallons/hour. The Unit 3 EDG fuel consumption test of June 1991 indicated a fuel consumption rate of 171.6 gallons/hour. Dresden will monitor the Unit 3 EDG fuel consumption rate on a semi-annual basis to verify that it is maintained at or below 185.75 gallons/hour.

The licensee also plans to evaluate EDG fuel oil day tank level instrumentation design changes as a potential long term action to assure automatic level control of the day tanks.

DISCUSSION

Commonwealth Edison has completed the following actions to assure sufficient fuel supply to the Emergency Diesel Day Tanks.

1. In order to assure that a four hour fuel supply exists for the Unit 2 and Unit 2/3 EDG day tanks, procedure DOS 6600-1 Revision 23 has been issued. This revision added two notes to Step 13 explaining the necessity of filling the day tank to assure that the day tank level will be at the high level cutoff point. Additionally, Step 14.e.1 was added describing the method to manually fill the day tank to the high level cutoff point.

2. Since the Unit 3 EDG day tank can not filled by the method described in DOS 6600-1 Revision 23, the station has agreed to perform semi-annual fuel consumption tests until a modification has been made to allow a four hour day tank fuel supply to exist at an equivalent fuel consumption rate of 185.75 gallons per hour. This semi-annual fuel consumption test is described in Unit 3 SP 91-6-70. It is anticipated that the tracking of the fuel consumption test will be accomplished via an entry into the GSERV tracking system.

In addition, the station has agreed to submit, by November 15, 1991, a Modification Request to implement EDG fuel oil day tank level instrumentation design changes to assure automatic level control of the day tanks.

ATTACHMENT B

AUGUST 26, 1991 LETTER FROM M. H. RICHTER (CECo) TO NRC