U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-237/85014(DRS)

Docket No. 50-237 License No. DPR-19

Licensee: Commonwealth Edison Company
P. O. Box 767
Chicago, Illinois 60690

Facility Name: Dresden Nuclear Power Station

Inspection At: Morris, Illinois (March 20-23, 1985)
Glen Ellyn, Illinois (April 4, 1985)

Inspection Conducted: March 20-23 and April 4, 1985

Inspector: A. S. Gautam for J. J. Harrison 4/24/85
Date

Approved By: C. C. Williams, Chief
Plant Systems Section J. J. Harrison 4/24/85
Date

Inspection Summary

Inspection on March 20-23 and April 4, 1985 (Report No. 50-237/85014(DRS))
Areas Inspected: Routine, announced inspection by regional inspector of measures taken by licensee to replace an existing Unit 2 125V DC battery power supply with 125V DC power from the Unit 1 HPCI battery. The inspection involved a total of 30 inspector-hours onsite and 3 inspector-hours offsite by one NRC inspector.
Results: Of the areas inspected, two items of noncompliance were identified (failure to have prescribed standards and procedures for accomplishing Class 1E cable field splicing and cable installation - Paragraphs 3.d(2) and 3.d(3); failure to take measures to assure that design basis requirements are translated into specifications, drawings, procedures and instructions - Paragraph 3.f(1)).

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

°L. O. Del George, Assistant Vice President
J. Wujciga, Administrative Assistant Superintendent
* J. Brunner, Technical Staff Supervisor
*°R. Rybak, Nuclear Licensing Administrator
* E. Armstrong, Technical Staff Supervisor
J. Doyle, QC Supervisor
M. Loma, QA Supervisor
J. Jurecki, Staff Assistant Engineer
* R. Deobler, Modification Group Engineer
J. O'Neal, Modification Group Engineer
F. Petrusich, QC Engineer
°G. L. Smith, T.S. Group Leader, Dresden
°E. D. Eenigenburg, Maintenance Manager, CECo NSD
°D. Farrar, Nuclear Licensing
°W. Worden, Operations Manager, BWR
°D. A. Winchester, Quality Assurance, Dresden
°M. S. Tucker, Electrical Engineer, SNED
°W. B. Gancher, Lead Engineer, SNED
°J. E. Hausman, Dresden/Quad Project Engineer, SNED
°A. P. Bielaaski, Isham, Lincoln & Beale, Attorney

Sargent and Lundy

°F. W. Fisher, Senior Electrical Project Engineer

NRC

°J. Streeter, Technical Assistant, DRS
°C. C. Williams, Chief, Plant Systems Section
*°A. S. Gautam, Reactor Inspector
°R. Landsman, Project Manager
°T. Tongue, Senior Resident, Dresden

*Denotes those who attended the interim exit meeting on March 23, 1985.

°Denotes those who attended the exit meeting on April 4, 1985.

2. Review of Dresden Unit 2 Battery Replacement Submittal

During the Unit 2 refueling outage of October 5, 1984 through April 14, 1985, Commonwealth Edison (CECo) discovered a potentially significant degradation of the Unit 2 125V DC battery, and made written notification of the problem via a Part 21 report dated March 4, 1985. Pursuant to a March 13, 1985, letter to Region III, the licensee initiated activities for substituting the power from the degraded Unit 2 battery with power

from an existing 125V Gould FPS-23, 60 cell, Plante battery located in the Unit 1 HPCI building. The licensee plans to continue to use the Unit 2 battery chargers but switch the existing 125V DC supply from the Unit 2 battery to the Unit 1 battery. This Unit 1 power source will be connected to DC loads by running twelve new 600V, 500 KCMIL cables and splicing them to two existing 3/C 5KV, 500 KCMIL cables.

The NRC inspector reviewed the licensee's letter dated March 13, 1985, describing the engineering evaluation and field activities associated with this temporary modification. This review was performed at the Region III office prior to field review. The licensee's submittal was found acceptable as stated, and appeared to address all relevant issues of this modification.

3. Review of Field Activities Regarding Unit 2 125 DC Battery Replacement

The NRC inspector reviewed the licensee's field modification instructions prescribed by Engineering Change Notice (ECN) No. D-85E-01, dated February 28, 1985, and the implementation of the March 13, 1985, safety evaluation and ECN D-85E-01 by Station Traveller Work Request (WR) D42720, Rev. 0, approved March 19, 1985.

The scope of the licensee's field modification activities primarily included:

- Installation of conduit and supports in Unit 2
- Testing of Unit 1 battery
- Installation of (12) - 1/C 500 KCMIL 600V cables
- Splicing of new 600V cables to existing (2) - 3/C 500 KCMIL 5KV cables
- Testing of cables and splices
- Placing Unit 1 battery into Unit 2 service

The inspector reviewed the status of the above activities in the field for the following areas.

a. Evaluation of Battery Loads

The inspector reviewed single line wiring and schematic drawings 12E-2322B1, Rev. B, 12E-1396, Rev. H, 12E-2322, Rev. V, 12E-1485D, Rev. A, and 12E-2685A, Rev. AG, as referenced in ECN D-85E-01, for verification of new and existing wiring connections and loads to the Unit 1 battery.

The Unit 1 battery currently feeds Unit 1 125V DC Distribution Panel No. 5 through cables 11000 and 11001 that connect to a 600 ampere circuit breaker in Unit 1 Compartment C1. The Unit 1 battery loads are to be removed by maintaining the Compartment C1 600A breaker open. The existing 125V DC feed from the Unit 1 battery charger 1C to the Unit 1 battery will be disconnected. The Unit 1 battery will be connected to Unit 2 DC loads via new cables 67662(+)

and 67663(-) that tap off the two input terminals of the Compartment C1 breaker and are spliced to one end of existing cables 11082 and 11083. The other ends of existing cables 11082 and 11083 are spliced to new cables 67660(+) and 67661(-). The new cables 67660 and 67661 are in the Unit 2 Turbine Building and are connected to terminals L1 and L2 of a 400 Amp circuit breaker in Compartment 4 of the 125V DC Main Bus Distribution Panel 2A-1.

Review of ECN D-85E-01 indicated no new loads. The existing Unit 2 battery has a rated eight hour capacity of 498 ampere hours whereas the Unit 1 battery has a rated eight hour capacity of 913 ampere hours. Unit 2 battery chargers will continue to be in service and feed the Unit 1 battery.

During the inspector's review, the following observations were made:

(1) Since there is no apparent change in the Unit 2 load profile, the Unit 1 battery which has a larger capacity will be adequate for Unit 2 DC loads. The licensee's safety evaluation stated the equalizing charge of the Unit 1 battery to be 27 MA for 100 ampere hours of capacity, and apparently the voltage drop due to the new long cable run will not affect the equalizing charge. The licensee reported that the Unit 1 battery will maintain the technical specification charge limit at Bus 2A-1 for a longer time than the Unit 2 battery for the same load profile and increased voltage drop in the cable. The licensee's evaluation for maintaining the technical specification limit could not be verified during this inspection. An NRC review of the licensee's documented load profile evaluation is planned for a subsequent inspection. The licensee agreed to review the provisions of IEEE 450-1975 in regard to performing a service test which determines if a battery can meet the design requirements of connected DC loads. Pending further review this is an open item (235/85014-01).

(2) The inspector informed the licensee that the inadvertent closing of the Unit 1 125 DC Panel 5, Compartment C1, 600 Amp breaker could affect the Unit 2 ESF Division 1 emergency DC power supply from the Unit 1 battery. The licensee was requested to establish a firm physical control such as a lockout of this breaker to avoid any such accident. The licensee agreed to review a physical control, beyond a planned 'out of service' label on this breaker, to prevent the breaker from inadvertently being closed. However, with the Compartment C1 breaker locked open, there is a resultant potential problem with the lack of circuit fault protection for the Unit 1 battery during any shorts in the 125V DC cable runs. Pending review of licensee action, the use of the Compartment C1 breaker is an open item (235/85014-02).

b. Conduit and Supports

ECN D-85E-01, pages 14, 16, 21, 22 and 23 were reviewed for prescribed size, material, bends, length, routing and supports for two Division 1 4" aluminum conduit runs at elevation 534' of the Unit 2 Turbine Building. Conduits and supports had not been installed at the time of inspection. There appeared to be no potential for a separation conflict with the Division 2 raceway. Several conduits without tags, reported by the licensee to be 'Balance of Plant' conduits, were observed at the proposed location of the new 4" conduits. It appeared an adequate (greater than 1") separation would be maintained between these conduits and the new proposed Division 1 conduits. Eight proposed hangers, WCN-19 through 26, specified in ECN D-85E-01, Page 6, had been adequately prescribed in terms of type and size of members, attachments, loading and seismic configuration.

c. Unit 2 Battery Bank Maintenance and Testing

The inspector reviewed the licensee's special procedure SP85-3-25, Rev. 0, for a battery acceptance test to verify battery capacity. This procedure and associated acceptance test reports met the general requirements of IEEE 450-1975 which were referenced in procedure. The licensee tested and documented the Unit 1 HPCI battery to have a capacity of 110.4% of the manufacturer's rated 8 hour capacity of 913 ampere hours. The test required an 8 hour rated discharge current of 114 Amps. No deficiencies were found.

The inspector reviewed the Unit 1 HPCI battery cells, racks, enclosure and associated battery chargers. This review included checking for float voltage, cell cracks, electrolyte leakage; plates of cells for buckling, cracks or plate growth; ambient temperature and ventilation; capacity of two cells selected at random; and terminals and connectors for evidence of corrosion. The inspector made the following observations:

(1) The float voltage on the 125V DC HPCI battery cells was verified on the battery chargers to be 130.2V DC and the rated equalize charge voltage to be 139.8V DC (applied for 24 hours when required per IEEE 450-1975). Both voltages were within limits.

(2) Selected Unit 1 battery cells were inspected and were apparently undamaged, without cracks or electrolyte leakage, plate damage or plate growth. No sediment was visible at bottom of cells and there was no evidence of corrosion on terminals.

(3) The inspector witnessed testing of voltage, specific gravity (SG), temperature and electrolyte levels of cells 44 and 48. The following results were observed:

Cell	SG	Temp.	Volt	Level
44	1.231	69°F	2.22	High
48	1.219	68°F	2.22	High

In accordance with the licensee's special procedure SP85-3-25, Rev.0, for an applied float voltage of 130.2V on the battery, the float voltage per cell was required to be above 2.17V and the normal SG to be 1.210 (IEEE 450-1975) at 77°F. Applying a correction factor of (-) .001 for each 3°F variation below 77°F, the SGs of both cells 44 and 48 were found to be within limits. Electrolytes were at acceptable levels.

(4) The inspector reviewed the ventilation of the Unit 1 HPCI battery room and observed that no instrumentation was installed to measure air flow in the room whereas the Unit 2 battery room was observed to have a flow switch 2-9441-100 for monitoring air flow, measured in inches of water. The inspector questioned this apparent lack of instrumentation for ensuring that the battery area ventilation was adequate and operable during operation. The licensee stated that an alarm existed for damper position which causes a control room typewriter alarm when the damper closes.

The inspector also questioned if the power supply for the Unit 1 battery room ventilation was safety-related. The licensee stated that neither the Unit 1 nor Unit 2 battery room ventilation power supplies were safety-related. The Unit 2 battery ventilation power supply is not considered safety-related based on an analysis in NUREG-0823, Section 4-29.1, which indicates the maximum hydrogen buildup during a loss of ventilation to be below combustible limits. Pending an NRC review of a similar analysis by the licensee for the Unit 1 battery room ventilation, this is an unresolved item (235/85014-03).

(5) The inspector reviewed the seismic mounting of the battery racks and cells. Station Traveller WR D42720, Rev. 0, page 8 or 10, Operation 28, defined activities regarding mounting of rack and cells. It was observed that no specification/standard or vendor drawing was specified on the traveller for verification of cell rack requirements. Activities described in the traveller did not address spacing and material between cells. It was also observed in various cases that cell spacing material was missing in the field. The licensee reported this activity to be incomplete and that a standard existed and would be available at the time of completion of this activity. Pending review of completion of this activity, this is an open item (235/85014-04).

d. Installation of Class 1E Cables, Field Splices and Connections

The inspector reviewed installation activities associated with the following DC feeder cables to Unit 2 125V DC Distribution Panel Main Bus 2 in the Unit 2 Turbine Building:

Cables 67662 and 67663 - 600V, 3 1/C 500 KCMIL, 60' length, ESF Division 1, EPR insulation, neoprene jacket.
Routed from: Splice of cables 11082 and 67662, and splice of cables 11083 and 67663, in cable tray sections 1541A and 1549A located in Unit 1 HPCI Building; To: Unit 1 125V Distribution Panel 5, Compartment C1.
Status: New, installed March 20, 1985.

Cables 11082 and 11083 - 5KV, 3/C 500 KCMIL, 930' length ESF Division 1, EPR insulation, CSPE jacket.
Routed from: Splice of cables 67662 and 11082, and splice of cables 67663 and 11083, in Unit 1 HPCI Building tray 1541A and 1549A; To: Splice of cables 67660 and 11082, and splice of cables 67661 and 11083 in Unit 2 Turbine Building tray 12E-2057.
Status: Installed October 3, 1979.

Cables 67660 and 67661 - 600V, 3 1/C 500 KCMIL, 150' length, ESF Division 1, EPR insulation, neoprene jacket.
Routed from: Splice of cables 11082 and 67660, and splice of cables 11083 and 67661 in Unit 2 Turbine Building tray 12E-2057; To: Unit 2 Turbine Building 125V DC Distribution Panel Main Bus 2, cubicle B01.
Status: Not pulled as of March 23, 1985.

The following areas were reviewed:

(1) The inspector examined cables for type, size, insulation, markings on jacket, ends sealed with heat shrink tubing, electrical characteristics, bend radius and manufacturer Class 1E qualification testing. No deficiencies were found.

(2) Field cable splicing activities were reviewed on Station Traveller WR D42720, Rev. 0, Operations 9, 10 and 12. Six splices had been completed on cables 67662 and 11082, and cables 67663 and 11083. The inspector reviewed ECN D-85E-01 and WR D42720 to identify any specification or standard prescribing instructions for performing the butt splices. The licensee viewed the splicing activity to be within craft capability and had not issued a specification or standard for the six splices. The lack of instructions or specifications for accomplishing the splicing of safety-related cables is an example of a violation of 10 CFR 50, Appendix B, Criterion V (235/85014-04a).

(3) During review of cable installation activities, it was observed that cables 67662 and 67663 had been installed on March 20, 1985, as confirmed by Station Traveller WR D42720, Operation 11. There was no QC witness of this activity. The inspector was concerned that proper procedures may not have been followed during installation. On further review it was reported by the licensee that no cable installation procedures had been prescribed for cable installation activities associated with this modification. The licensee was informed that the manufacturer's Class 1E qualification of these cables was maintained through assurance that the Class 1E integrity would not be compromised in the field during installation. Adequate controls, outlined in cable installation procedures, must therefore be maintained to avoid any field stresses or other damage to cable conductors, insulation and jackets during installation of cable. The licensee was informed that failure to prescribe documented instructions, procedures and controls for installation of safety-related cables was an example of a violation of 10 CFR 50, Appendix B, Criterion V (235/85014-05b).

(4) The inspector was concerned that since no specification/ standard or procedure currently prescribed instructions for installing field splices and cables, the licensee's craft and inspectors may not be trained to satisfactorily accomplish these activities. 10 CFR 50, Appendix B, Criterion II requires the licensee's Quality Assurance program to provide for indoctrination and training of personnel performing activities affecting quality. 10 CFR 50, Appendix B, Criterion XVII, "Quality Assurance Records," requires licensees to maintain records on qualifications of personnel. Documented evidence of such qualifications were not confirmed by the licensee during this inspection. Pending further review this is an unresolved item (235/85014-06).

e. Testing of Cables

It was determined that the licensee plans to perform megger and continuity tests on completed lengths of cables, after splicing, as identified in Station Traveller WR D42720, Operations 13, 14, 15 and 16. The inspector was concerned that since both 930' 5KV cables 11082 and 11083 had been installed since October 1979, and since field splicing was being performed on these cables, megger and continuity tests may not be adequate tests to verify the performance of these cables.

The inspector reviewed the CECO 600V EPR Cable Standard EM-29105 dated January 30, 1981, specifying qualification testing for the installed 600V cable. Since the 5KV cables 11082 and 11083 are now being used for a 600V DC rated application, this standard was considered adequate for the 5KV cables for the present 600V DC application.

According to Standard EM-29105, Section 8.1, each length of cable is to be subjected to a high voltage test prescribed in ICEA S-68-516, which in turn refers to ICEA S-19-81, Paragraph 6.22, for voltage tests on each length of completed cable. S-19-81, Paragraph 6.22.3, requires a DC voltage test of not greater than 3 times the rated AC voltage for 5 consecutive minutes. IEEE 383-1974, Paragraph 1.3 and 2.2, requires qualification testing to be done on a completed cable, which includes any field splices. Since the manufacturer's qualification did not include these splices, the licensee was requested to review the adequacy of current planned tests in view of the concerns identified above. The NRC realizes that this is a temporary modification and that in the event of a loss of the Division I 125V DC battery, Division II emergency power would be available. However, since the existing length of cable in the duct run has been exposed to flooding in the past and since two sets of splices are being made on the completed run of this safety shutdown cable, it is necessary in accordance with 10 CFR 50, Criterion XI that an appropriate test program be established to assure that all testing required to demonstrate that these cables will perform satisfactorily is identified and performed. Pending further review this is an open item (235/85014-07).

f. Review of Cables Associated with Field Splices

During a prior meeting with the Region, the licensee had been questioned concerning the acceptability of proposed cable field splicing. During a review of the safety evaluation, the inspector observed that the licensee had addressed the regional question regarding splicing in the evaluation by stating, "...Splicing the cables in the cable pans is acceptable as all other cables in these pans are not in service and will never be used." During review in the field, the inspector made the following findings:

(1) The inspector observed that some cables in cable trays 1541A and 1549A containing the cables having the six field splices were entering Motor Control Center (MCC) 115 located below the cable trays and were apparently feeding the main bus of this MCC. One compartment of the MCC had a lighted pilot lamp which indicated power for the HPCI building lighting and the HPCI Building lighting was on. The inspector informed the licensee that its March 13, 1985, submittal to the NRC indicated that all cables installed in the same pan as cables having splices were de-energized. The licensee performed a further review and identified a total of 7 energized cables. These cables were 10873, 10874, 10878, 10879, 10880, 10927 and 11348.

The inspector reviewed ECN D-85E-01 and WR D42720 for prescribed instructions and field activities associated with this field modification, but found no requirement for placing the above seven cables out of service. The inspector informed the licensee that failure to take measures to assure

that design basis requirements, as outlined in the March 13, 1985, safety evaluation were correctly translated into specifications, drawings, procedures and instructions was in violation of 10 CFR 50, Appendix B, Criterion III (235/85014-08).

(2) Based on the inspector's finding (235/85014-07) described in Paragraph 3.f(1) above, the NRC informed the licensee that the statement regarding cables installed in the same tray with field splices being 'out of service' was considered a false statement. The licensee stated in the April 4, 1985, meeting that all cables currently in service and associated with the splices would be placed out of service prior to energizing the new 125V DC cables. The licensee also stated during the meeting that all statements made in the SER were intended to reflect plant conditions after the new cables and splices were energized; however, as discussed in Paragraph 3.f(1) the licensee did not have any documented evidence of provisions to assure the disconnection of the subject cables prior to placing the Unit 1 battery into Unit 2 service.

(3) The NRC identified concerns regarding effects on splices due to thermal degradation and maintenance. The licensee issued restrictions on work in cable pans to avoid damage to splices during maintenance.

4. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraphs 3.a(1), 3.a(2), 3.c(5) and 3.e.

5. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. Unresolved items disclosed during the inspection are discussed in Paragraph 3.c(4) and 3.d(4).

6. Exit Interview

The inspectors met with the licensee's representatives (denoted under Paragraph 1) on March 23 and April 4, 1985, and summarized the scope and findings of the inspection. The licensee acknowledged the statements made by the inspectors and agreed to take corrective action on all of the outstanding items of concern. The licensee did not identify any documents or processes in this inspection as proprietary.