

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-412/85-23

Docket No. 50-412

License No. CPPR-105

Priority --

Category B

Licensee: Duquesne Light Company
Robinson Plaza Building No. 2
Suite #210, PA, Route 60
Pittsburgh, Pennsylvania 15205

Facility Name: Beaver Valley Power Station, Unit 2

Inspection At: Shippingport, Pennsylvania

Inspection Conducted: October 28 - November 1, 1985

Inspectors: Michael J. Schaeffer
M. Schaeffer, Reactor Engineer

12/3/85
date

Leonard S. Cheung
L. Cheung, Reactor Engineer

12/3/85
date

Approved by: C. Anderson for
C. Anderson, Chief, Plant System Section,
Engineering Branch, DRS

12/3/85
date

Inspection Summary: Inspection on October 28 - November 1, 1985 (Report No. 50-412/85-23)

Areas Inspected: A routine unannounced inspection consisting of work observation, work in progress, completed work activities, and documentation relative to the installation of instruments and electrical equipment to ascertain whether these activities are being accomplished in accordance with NRC requirements and licensee FSAR commitments. Additionally, the inspectors reviewed the status of previously identified inspection findings. The inspection involved 73 inspector hours onsite by two region-based inspectors.

Results: One violation was identified (failure to incorporate instrument tube slope requirements on design drawings released for construction - 10 CFR 50, Appendix B, Criterion III).

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DETAILS

1.0 Persons Contacted

1.1 Duquesne Light Company

- *J. Bajuszik, Director, Construction Services
- R. Coupland, Director, Quality Control
- *D. Denning, Assistant Director Quality Control
- E. Horvath, Senior Project Engineer
- J. Hultz, Construction Engineer
- *G. Kaloz, Quality Control Engineer
- *C. Majumdar, Assistant Director Quality Control
- *D. Rohm, Assistant Director Quality Control
- C. Schultz, Procedure Review Committee Chairman

1.2 Stone and Webster Engineering Corporation

- *W. Baranowski, Assistant Project Engineering Manager
- *P. Bienich, Assistant Superintendent of Engineering
- *A. Dasenbrock, Resident Manager
- *D. Lessard, Assistant Superintendent Site Engineering Group
- *R. Wittschen, Licensing Engineer

1.3 United States Nuclear Regulatory Commission

- G. Walton, Senior Resident Inspection
- L. Prividy, Resident Inspector

*Denotes those personnel present at exit meeting.

2.0 Facility Tour

The inspector observed work activities in progress, completed work and plant status in several areas during a general inspection of the site. The inspector examined work items for obvious defects or noncompliance with NRC requirements or licensee commitments. Particular note was taken regarding the presence of quality control inspectors and indications of quality control activities through visual evidence such as inspection records, material identifications, nonconformance and acceptance tags. In addition, the inspector interviewed craft and supervisory personnel encountered in the work area.

No violations were identified.

3.0 Licensee Actions on Previous Inspection Findings

(Closed) 10 CFR 50, Appendix B, Criterion I Violation 85-05-02. Electrical Panel Internal Wiring Separation. This violation resulted when SWEC engineering personnel were inspecting internal wiring for cable separation requirements in accordance with Regulatory Guide 1.75 in numerous

safety-related equipment cubicles without involving Site Quality Control. In performing this review, the Site Engineering Group (SEG) was given field construction procedure FCP-422.1 to verify various inspection attributes.

The inspector reviewed Inspection Plan IP-10.2.4 titled "Backfit Inspection Program - Color Separation Inside Equipment", dated September 20, 1985. This inspection plan was generated to include direct SQC inspection inside equipment for color separation requirements that SEG has identified as potential problems. Review of several inspection reports revealed that DLC SQC is currently independently addressing internal cable separation requirements in accordance with approved procedures.

This item is considered closed.

(Closed) Unresolved Item 85-05-05, Separation of Electrical Panel Internal Wiring. Previously, FSAR Volume 1, Section 1.8 specified the licensee's commitment to Regulatory Guide 1.75, Revision 2. In addition, paragraph 8.3.1.4 of the FSAR (Amendment 3) stated, "Wiring within control switchboards and instrumentation cabinets has been specified to meet the requirements of IEEE Standard 384-1974." IEEE 384, paragraph 5.6.2, Internal Separation, requires a 6 inch minimum separation to be used unless barriers are installed. Presently paragraph 8.3.1.4 of the FSAR, issued December, 1984, (Amendment 9) states, ".... the minimum separation distance between redundant class 1E circuits and between class 1E and non-class 1E circuits, internal to control panels and cabinets is as follows: For Exposed Contacts and Terminals 6 inches; For Wire Bundles 1 inch."

Stone and Webster Engineering Corporation has evaluated the equipment with the potential for color separation criteria violations and revised their Electrical Installation Specification 2BVS-931 to incorporate Safety Evaluation Report (SER) commitments.

The inspector reviewed the SER dated October, 1985 which reflects NRR's position on separation requirements and verified that these commitments were incorporated in the applicable DLC documents. Paragraph 8.3.3.3.6 in the SER describes various separation configurations that are now acceptable for the licensee to implement at the project. Specifically, the SER on pages 8-17, configuration no. 5, states in part, ".... configuration consists of control and instrument cables inside panels on a typical arrangement. The tests of this configuration conclude that for control and instrument cables inside panels, 1 inch of space with unwrapped cables or zero inch of space with both cables wrapped is adequate protection. This conclusion of zero inch of space with both cables wrapped also applies to panel supply feeder cables operating at 125 V dc or 120 V ac."

The following DLC/SQC documents were reviewed by the inspector to verify incorporation of this SER conclusion:

- IP-8.5.4; Acceptance Inspection of Equipment Internal Wiring and Component Modification, dated August 22, 1985;
- IP-8.5.2; Scheduled Cable Termination Acceptance, dated August 9, 1985.

Construction and DLC Site Quality Control have been retrained to perform their function in internal equipment color separation requirements. Additionally, the inspector discussed the referenced documents with various craft and SQC personnel and positive feedback was evident by their responses.

This item is considered closed.

(Closed) 10 CFR 50, Appendix B, Criterion XVII Violation 85-07-09, Inability to retrieve calculations showing cable sidewall pressure. This violation was identified during an NRC Construction Team Inspection (CTI) conducted in March, 1985. SWEC could not produce cable pulling calculations which would show that cable side wall bearing pressure was taken into consideration when calculating allowable cable pulling tensions.

SWEC has generated Engineering Design and Coordination Report E&DCR-2P4712C dated June 17, 1985, revised Electrical Installation Specification 2BVS-931 to include Appendix P, titled "Cable Pulling Tensions". Appendix P contains, 1) the instructions for filling out the Cable Pull Tension Form (CPTF), 2) Sample completed CPTF which includes sidewall pressure values, and 3) tables which describe the maximum cable pull lengths between pull points for the various service classes of cable used at the site. In addition, prior to pulling cable, a CPTF is prepared by SWEC Construction and DLC/SQC independently, then calculated values are compared with manufacturer's requirements to ensure that they meet the acceptance criteria.

The inspector witnessed the proper implementation of revised specification 2 BVS-931, FCP-431 and IP-8-4.1 for the calculation of pull tension (utilizing sidewall pressure as a criteria), incorporating pull tension requirements into the CPTF and into the actual field construction cable pull and into the inspection criteria of the cable pull.

The small number of cables where SWEC anticipated difficulty in establishing acceptance have been resolved per E&DCR 2PS-3952B using a 2500 volt megger test. These cables were located in duct no. 2DC973016.

The inspector witnessed a bulk cable pull consisting of twenty eight (28) differently sized instrumentation cables that were being pulled into conduit 2CX300RB1. The conduit had a total of 320 degrees worth of bends.

The inspector reviewed the DLC SQC inspectors cable pull tickets and attribute sheets from the Inspection Plan IP-8.4.1. An additional review was made of SWEC construction CPTF's to verify that the maximum allowable pulling tension calculations were in accordance with 2BVS-931 and Field Construction Procedure FCP-431. No violations of limiting cable sidewall pressure were identified.

This item is considered closed.

(Closed) Unresolved Item 85-07-07, Document Inconsistencies for Medium Voltage Terminations. This item resulted when the inspector discovered that inconsistent torquing requirements were in design documents for 4KV terminations.

The inspector reviewed the following documents and verified that "Required Bolting Torques and Washer Sizes" were now consistent:

- 2BVS-931, Electrical Installation, dated October 10, 1985;
- IP-8.5.2, Scheduled Cable Termination Acceptance, dated August 1, 1985;
- FCP-432, Cable Pulling, Change Notice No. CN-432-17;
- SECO Drawing No. 1.2.3.4.AG, revision 31.

This item is considered closed.

(Closed) 10 CFR 50, Appendix B Criterion X violation 85-04-02, pertaining to insufficient spatial separation of redundant channel instrument impulse lines.

The affected instruments are 2CCP*FT-117A1 and 2CCP*FT-117B1, which supply signals to indicators 2CCP*FI-117A1 and 2CCP*RI-117B1 respectively, located on the Main Control Board. No safety-related actuation functions are performed by these signals.

The licensee's Hazards Analysis Group performed safety evaluation on the separation deficiency of these two instruments and the result were documented in a memo from D. P. Lessard to J. M. Spizuoco (both of Stone and Webster) dated February 21, 1985. The response to this memo was dated April 19, 1985. The results indicated that these two instruments were not essential for the hazardous event postulated from high energy lines, therefore, 4 feet separation requirements can be exempted. The NRC inspector measured the distance of separation between the impulse lines to be 23" center to center. The NRC inspector did not identify any further deficiencies regarding this issue.

As part of the effort to close out this violation, the licensee QC performed a reinspection of all previously installed/inspected redundant instrument impulse lines for possible separation deficiencies. The reinspection results were documented in Inspection Reports ME-AA-14000 and ME-AA-14001. Report ME-AA-14001 identified two additional redundant instruments (2CCP*LT-100A and 2CCP*LT-100B), whose impulse lines did not meet the separation requirements. The separation deficiency was documented and dispositioned (requiring rework) by the licensee in their Nonconformance and Disposition Report No. 7758.

This item is considered closed.

(Closed) 10 CFR 50 Appendix B Criterion III violation 85-04-03, pertaining to instrument line vent valves not connected to common discharges, which failed to meet the requirements of Installation Specification 2BVS-977.

The affected valves are high point vent valves in the impulse lines of instrument 2CHS*FT-110. Operation of the high point vent valve is relatively infrequent (only in the process of bringing a system to operational status), and therefore the possibility of personal contact with the effluent is low.

The licensee revised their installation specification 2BVS-977 through E&DCR No. 2PS-4109. In "Instrument Valve" subsection of 2BVS-977, after the paragraph "All vents and drains shall have tubing in the vicinity of the vent or drain," the following statement was added: "This paragraph does not apply to high point vents installed in tubing runs."

The inspector considered this approach reasonable and this item is closed.

(Closed) 10 CFR 50 Appendix B, Criterion V violation 85-04-04, pertaining to redundant instrument impulse lines being supported by the same hangers. (Hanger Nos. TSA (80 and 189)).

The affected instruments are 2CCP-FT-117A2 and 2CCP-FT-117B2 (Component Cooling Water Flow Measurements). The two transmitters are functionally non-safety-related. They supply signals to non-safety-related computer inputs and to non-safety-related indicators on the Main Control Board.

According to the licensee, the 3-valve manifolds for the affected instruments were incorrectly tagged as 2CCP*FT-117A2 and B2, per their Engineering Field Action Request (EFAR) - 294 dated October, 1984. This tagging error resulted in the violation for these two instruments. The incorrect tags were replaced by new tags (2CCP-FT-117A2 and B2) per EFAR-294A dated February 28, 1985.

In addition, the licensee revised their installation specification 2BVS-977 to include a definition for "Redundant Impulse Lines". This definition clarifies the fact that only the impulse lines for safety related redundant instruments (i.e. instrument performing safety-related functions) require physical separation and separated supports. Since 2CCP-FT-117A2 and 2CCP-FT-117B2 does not perform safety related functions, separation requirements do not apply to them.

This item is closed.

4.0 Electrical Components/Systems--Work Observations

The inspector verified that the direct current distribution system was in conformance with FSAR commitments. Verification included checks to show that the Class 1E dc power system installation had met the electrical independence and separation requirements between redundant trains and channels.

4.1 Batteries, Battery Chargers, Vital Bus Inverters and DC Distribution

The inspector examined two of the four redundant Class 1E battery rooms, BAT*2-3, BAT*2-4, verifying that:

- they were procured in accordance with specification requirements;
- installed in accordance with DLC SQC equipment installation records;
- the battery interconnecting linkages were clean and free of corrosion, and the terminals were coated with no-oxide lubricant;
- they were installed in locked rooms and the keys to the room were controlled in accordance with approved administrative procedures;
- the rooms were well illuminated and the lighting system consisted of explosion proof fixtures;
- the room ventilation system appeared to be operating properly; and,
- the rooms were identified in accordance with the approved engineering drawings.

The inspector found that each battery room was very clean. The lead-calcium cell jars were found to have been wiped down, making electrolyte level easily visible. The battery racks were mounted in accordance with approved engineering drawings. The racks were painted and the inspector could see no signs of pitting or corrosion from electrolyte spillage.

No violations were identified during the tour of the battery rooms and during the review of installation records.

The inspector examined battery chargers/static inverters UPS*VITBUS-2-3 and UPS*VITBUS-2-4 which are fed from 480 V unit substations 480VUS*2-8 and 480VUS*2-9 respectively. Verification included:

- Installation in accordance with the design drawings and installation records;
- Proper functioning of the filtration and ventilation system;
- Current calibration labels on ammeters, voltmeters, and frequency meters;
- Sizing of circuit breakers, and switches were in accordance with approved engineering drawings; and
- No evidence of leaky capacitors or poor workmanship concerning the internal circuitry.

No violations were identified.

5.0 Electrical Cables/Terminations--Work Observations/Records Review

The inspector selected a number of cables associated with the dc power distribution system and physically verified that the routing, color coding, cable size, type, and terminations were in accordance with approved engineering drawings and the DLC SQC cable pull tickets and associated inspection attribute sheets. The cables selected and associated routings were:

<u>CABLE NO.</u>	<u>FROM</u>	<u>TO</u>
2EHS AOL210	480VUS*2-8	MCC*2-E07
2VBA30L002	MCC*2-E07	UPS*VITBS2-3
2VBB3BL600	UPS*VITBS2-3	BAT*BKR2-3
2VBB3BL601	BAT*BKR2-3	BAT*2-3
2EHSBPL210	480VUS*2-9	MCC*2-E06
2VBA4PL001	MCC*2-E06	UPS*VITBS2-4
2VBB4YL602	UPS*VITBS2-4	BAT*BKR2-4
2VBB4YL601	BAT*BKR2-4	BAT*2-4

The orange and purple train power cables were found to conform to inspection criteria used for acceptance.

No violations were identified.

6.0 Instrumentation Components/System--Work Observations

6.1 The inspector examined work performance, partially completed work and completed work pertaining to the installation of safety related level and flow transmitters and associated tubing to determine whether the requirements of applicable specifications, NRC requirements and licensee commitments were met in the area of design drawing, installation and quality control inspections.

Items examined for this determination include:

- Safety related instruments 2FWE*FT100A,B,C auxiliary feedwater flow transmitters, located in Safeguard Building, floor elevation 741'.
- Safety related level instrument 2RCS*LT460, pressurizer level transmitter, located in the Reactor Containment at floor elevation 735'6".
- Safety related instruments 2CCP*FT117A1 and B1, located in Cable Vault at floor elevation 718'6".
- Stone and Webster Isometric Drawings -
 RK-313AC-1-5 (for 2FWE*FT100C);
 RK-313AA (for 2FWE*FT100A);
 RK-313AB (for 2FWE*FT100B); RK-3265-1-1 and RK-3265-2-1 (for 2RCS*LT460); RK-3032-1-6 sheet 1 (for 2CCP*FT117A1);
 RK-303AB-1-6 sheet 1 (for 2CCP*FT117B1).
- Stone and Webster Instrument Installation Specification 2BVS-977, Rev. 2, dated April 24, 1985.

6.2 In reviewing the isometric drawings, the inspectors noticed that the impulse lines of transmitters 2FWE*FT100C, 2CCP*FT117B1 and 2RCS*LT460 did not specify the slope as required by specification 2BVS-977. The inspector measured numerous portions of these impulse lines with lengths greater than 18" and noted they were installed with slopes less than 1/8" per foot. Some of the lines have a zero slope.

Installation Specification 2BVS-977 as revised per Engineering and Design Coordination Report (E&DCR) No. 2PS-4083, dated September 24, 1985, states in part, "..... all instrument impulse lines are to be installed at an average slope of 1/2 inch per foot minimum, which may

be relaxed to $\frac{1}{4}$ inch per foot minimum with prior engineering approval, to eliminate construction interferences. All instrument lines must have the required average slope except a) where necessary, tube runs 1 foot 6 inches or less in length may be installed with zero slope

The licensee was informed that this was a violation of 10 CFR 50, Appendix B, Criterion III. This states, in part, that "Measures shall be established to assure that the design basis for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions" (412/85-23-01)

7.0 Independent Measurements

The inspectors performed independent measurements to verify the installation data for instruments and power cables. For the instrument installations identified in Section 6.0, the inspectors measured the slopes of the impulse lines, distances between seismic clamps and bending radii for the impulse lines, specific lengths of each section of tubing runs, verified the correctness of the instrument valve flow directions, and the instrument mounting configurations. For the instrument and power cables, and cable terminations identified in Section 5.0, the inspector verified the correctness of the cable terminations, cable type, color-coding and sizes, and cable bending radii not smaller than specified.

8.0 Exit Meeting

The inspector met with licensee and construction representatives (denoted in paragraph 1.0) at the conclusion of the inspection on November 1, 1985 at the construction site.

The inspector summarized the scope of the inspection, the inspection findings and confirmed with the licensee that the documents reviewed by the team did not contain any proprietary information. The licensee agreed that the inspection report may be placed in the Public Document Room without prior licensee review for proprietary information (10 CFR 2.790).

At no time during this inspection was written material provided to the licensee by the team.