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February 5, 1985

United States Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Mr. George W. Knighton, Chief
Licensing Branch 3
Office of Nuclear Reactor Regulation

SUBJECT: Beaver Valley Power Station - Unit No. 2
Docket No. 50-412
PSB Electrical Outstanding Issues

Gentlemen:

This letter forwards responses to the issues listed below which were provided by PSB in a draft SER on June 8, 1984. Responses were provided in four letters (9/7/84, 9/20/84, 10/10/84, and 10/16/84), and subsequently discussed in a meeting on December 14, 1984 for which no minutes have yet been provided. FSAR changes described in these revised responses are intended to be incorporated upon acceptance by PSB. The following items are attached:

Attachment 1: Revised response to Outstanding Issue 183 of the Beaver Valley Power Station Unit No. 2 Draft Safety Evaluation Report, Section 8.2.2.4 (originally provided in letter 2NRC-4-140, 9/7/84).

Attachment 2: Revised response to Outstanding Issue 184 of the Beaver Valley Power Station Unit No. 2 Draft Safety Evaluation Report, Section 8.2.2.5 (originally provided in letter 2NRC-4-150, 9/20/84).

Attachment 3: Revised response to Outstanding Issue 136 of the Beaver Valley Power Station Unit No. 2 Draft Safety Evaluation Report, Section 8.3.1.1 (originally provided in letter 2NRC-4-140, 9/7/84).

Attachment 4: Revised response to Outstanding Issue 196 of the Beaver Valley Power Station Unit No. 2 Draft Safety Evaluation Report, Section 8.3.3.1.3 (originally provided in letter 2NRC-4-140, 9/7/84).

Attachment 5: Revised response to Outstanding Issue 197 of the Beaver Valley Power Station Unit No. 2 Draft Safety Evaluation Report, Section 8.3.1.3 (originally provided in letter 2NRC-4-140, 9/7/84).

Dwng: To PM-Singh, B.

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Attachment 6: Revised response to Outstanding Issue 187 of the Beaver Valley Power Station Unit No. 2 Draft Safety Evaluation Report, Section 8.3.1.5 (originally provided in letter 2NRC-4-150, 9/20/84).

Attachment 7: Revised response to Outstanding Issue 193 of the Beaver Valley Power Station Unit No. 2 Draft Safety Evaluation Report, Section 8.3.1.15 (originally provided in letter 2NRC-4-140, 9/7/84).

Attachment 8: Response to Outstanding Issue of the Beaver Valley Power Station Unit No. 2 Draft Safety Evaluation Report, Section 8.3.3.4.

DUQUESNE LIGHT COMPANY

By E. J. Woolever
E. J. Woolever
Vice President

GLB/wjs
Attachments

cc: Mr. B. K. Singh, Project Manager (w/a)
Mr. G. Walton, NRC Resident Inspector (w/a)

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF ALLEGHENY)

On this 5th day of February, 1985, before me, a Notary Public in and for said Commonwealth and County, personally appeared E. J. Woolever, who being duly sworn, deposed and said that (1) he is Vice President of Duquesne Light, (2) he is duly authorized to execute and file the foregoing Submittal on behalf of said Company, and (3) the statements set forth in the Submittal are true and correct to the best of his knowledge.

Anita Elaine Reiter
Notary Public

ANITA ELAINE REITER, NOTARY PUBLIC
ROBINSON TOWNSHIP, ALLEGHENY COUNTY
MY COMMISSION EXPIRES OCTOBER 20, 1986

ATTACHMENT 1

Response to Outstanding Issue 183 of the
Beaver Valley Power Station Unit No. 2
Draft Safety Evaluation Report

Draft SER Section 8.2.2.4: Independence Between Onsite and Offsite Power Sources

Each of the 4.16 KV Class 1E buses at Beaver Valley is supplied power from preferred offsite and standby onsite circuits. It is the staff position that these circuits should not have common failure modes. Physical separation and independence of these circuits has not been described or analysed in the FSAR.

The applicant by Amendment 3 to the FSAR did not provide a description or analysis that was requested. This item will be pursued with the applicant and the results of the staff review will be reported in a supplement to this report.

Response:

Refer to the response provided for Open Item 182 and drawings 12241-RE-42A, B, C, and D which are attached to the response for a description of cable routing from the preferred offsite supply to each of the 4 KV Class 1E buses (*2AE and *2DF).

The CLASS 1E circuit from each diesel generator (standby onsite circuit) to its Class 1E 4 KV bus is routed in separate, dedicated embedded conduit. NON-CLASS 1E The onsite circuits are routed through the floor from the diesel generator building, elevation 732'-6", to the emergency switchgear rooms in the service building, elevation 730'-6". The service building is directly southwest of and adjacent to the diesel generator building. (Refer to attached drawings 12241-RE-37BJ, 37V.)

All four circuits (two CLASS 1E FROM onsite, two NON-CLASS 1E FROM offsite) which feed the 4 KV Class 1E buses are, therefore, totally independent with each circuit routed in a dedicated conduit. The circuits from the preferred offsite supply approach the Class 1E buses from a higher elevation of the same building (service building, elevation 745'-6") and enter the switchgear at the top, while the circuits from the onsite supply approach the Class 1E buses from an adjacent building (diesel generator building) through the floor and enter the switchgear at the bottom.

INSERT A → Each one of the circuits is also provided with a separate, independent control and relay circuit. ← INSERT B

The above information will be added to FSAR Section 8.2.

OUTSTANDING ISSUE 173

INSERT A

THE NON-CLASS 1E RACEWAYS CARRYING THE OFFSITE POWER TO THE CLASS 1E 4KV BUSSES ARE SEPARATED FROM CLASS 1E RACEWAYS CARRYING THE ONSITE POWER TO THE CLASS 1E 4KV BUSSES IN ACCORDANCE WITH THE GUIDELINES OF REGULATORY GUIDE 1.75.

INSERT B

REFER TO DRAWINGS 12241-RE-1C AND 12241-RE-1F WHICH GIVE DETAILS OF THE CONTROL AND PROTECTIVE RELAYING CIRCUITS FOR THE CLASS 1E 4KV BUSSES. THERE ARE NO COMMON FAILURE MODES FOR THE CONTROL AND PROTECTIVE RELAYING CIRCUITS BASED ON THE FOLLOWING:

1. THE CONTROL AND RELAY CIRCUITS FOR NON-CLASS1E OFFSITE AND CLASS 1E ONSITE SOURCES TO CLASS 1E 4KV BUSSES ARE SEPERATED IN ACCORDANCE WITH THE GUIDELINES OF REGULATORY GUIDE 1.75.
2. CIRCUIT BREAKERS THAT CONNECT THE CLASS 1E 4KV BUSSES TO OFFSITE OR ONSITE POWER SUPPLIES ARE CLASS 1E AND QUALIFIED FOR SEISMIC AND ENVIRONMENTAL CONDITIONS OF ANY DESIGN BASIS EVENT.
3. ELECTRICAL INTERLOCKS ARE PROVIDED TO PREVENT THE AUTOMATIC PARALLELING OF ONSITE AND OFFSITE POWER SUPPLIES.

OUTSTANDING ISSUE 173

INSERT B (CONT.)

4. EACH DIESEL GENERATOR IS LOCATED IN A SEPERATE ROOM OF A SEISMIC CLASS I STRUCTURE. THE DIESEL GENERATORS AND THEIR ASSOCIATED CONTROL PANELS ARE QUALIFIED FOR SEISMIC AND ENVIRONMENTAL CONDITIONS OF ALL DESIGN BASIS EVENTS. THE DIESEL GENERATORS AND ASSOCIATED CONTROL PANELS, POWER AND CONTROL CABLES ARE SEPARATED IN ACCORDANCE WITH THE GUIDELINES OF REGULATORY GUIDE 1.75 AND SATISFY BTP 9.5-1.

ATTACHMENT 2

Response to Outstanding Issue 18 of the
Beaver Valley Power Station Unit No. 2
Draft Safety Evaluation Report

Draft SER Section 8.2.2.5: Use of Automatic Load Tap Changer

Section 8.3.1.1.1 of the FSAR indicates that the system station service transformer specified with an automatic load tap changer.

By Amendment 3 to the FSAR, the applicant, in response to a request for information, indicated that the automatic load tap changer optimizes voltage on the 4160 volt Class 1E buses for any plant load condition and power grid voltage variation. The applicant has further implied that the design is Class 1E and meets all the requirements of a Class 1E system. Design criteria with description and analysis as to the systems compliance with GDC 2, 4, 5, 17, and 18 has not been addressed in the FSAR. This item will be pursued with the applicant and the results of the staff review will be reported in a supplement to this report.

Response:

System station service transformers TR-2A and TR-2B are non-Class 1E transformers that supply offsite (preferred) power to the non-Class 1E 4,160 V buses. The automatic load tap changing capability of these transformers optimizes downstream voltages at Class 1E 4,160 V buses (2AE and 2DF) when electrically connected to the upstream non-Class 1E buses as described in Section 8.3.1.1.

Although testing capability is provided through manual control of the load tap changer (LTC) and voltage indication in the control room, periodic testing is unnecessary because the LTC's are constantly in service. If the LTC does not function properly in automatic, the operator in the control room will be alerted by voltage indication or alarms and can take manual control to restore voltage to normal before protective relaying for the 4KV and emergency buses operates. A preventive maintenance program based on manufacturer's instructions assures continued proper LTC operation. The frequency of preventive maintenance is based on cycles of operation as monitored by an automatic counting system. THE LOAD TAP CHANGERS ARE EXPECTED TO CYCLE DURING EACH STARTUP DUE TO REACTOR COOLANT PUMP STARTS.

THE AUTOMATIC LOAD TAP CHANGERS AT BVPS-2 PROVIDE FOR CONTINUOUSLY OPTIMIZED PLANT BUS VOLTAGES WHICH ARE NOT POSSIBLE AT MOST OTHER PLANTS. FAILURE OF A LTC WOULD RESULT ONLY IN CONDITIONS FOUND TO BE ACCEPTABLE BY THE NRC AT NUMEROUS PLANTS WITHOUT LOAD TAP CHANGERS.

ATTACHMENT 3

Response to Outstanding Issue 186 of the
Beaver Valley Power Station Unit No. 2
Draft Safety Evaluation Report

Draft SER Section 8.3.1.1: Voltage Analysis for Safety-Related Loads

The voltage levels at the safety-related loads should be optimized for the maximum and minimum load conditions that are expected throughout the anticipated range of voltage variations of the offsite power sources. The applicant was requested to perform a voltage analysis and verification by actual measurement in accordance with the guidelines of positions 3 and 4 of branch technical position PSB-1 (NUREG-0800, Appendix 8A).

By Amendment 3 to the FSAR, the applicant indicated that the requested analysis would not be completed before March 15, 1984. Review schedule for subimittal of the analysis, verification of the analysis by actual measurement, and justification for voltages (as determined by analysis) not meeting the specific voltage supply tolerances specified by equipment manufacturers, will be pursued with the applicant and the results of the staff review will be reported in a supplement to this report.

Response:

As discussed in the response to Question 430.11 in Amendment 3 to the FSAR, a voltage and load analysis has been completed for the BVPS-2 system (calculation E-68 entitled "Station Service Voltage and Load Analysis"). The analysis examines voltages at 4,160 V and 480 V load center buses, 480 V MCC buses, and at the terminals of 4,160 V and 480 V load connected loads for both Class 1E and non-Class 1E equipment. The calculations have been performed for both onsite (unit) power supply, with the unit generator operating at minimum, nominal, and maximum voltage, and for offsite (system) power supply, with the system switchyard at minimum and maximum voltage, in accordance with position 3 of BTP PSB-1, under the following conditions of operation:

a. Normal station load
b. Start of largest station 4,160 V motor
c. Start of largest station 460 V motor
d. Accident load with safety injection signal (offsite supply only)
e. Transfer from normal station load, onsite supply, accident load, and/or offsite supply upon accident with safety injection signal

Refer to the attached "Objective" and "Conclusion" summaries which have been excerpted from the calculation.

A voltage and load analysis for light load cases (cold shutdown and refueling) are now being performed and will be completed by March 15, 1985.

* For all conditions as described above, manufacturer voltage tolerance for all Class 1E equipment will be met.

Currently, we are performing voltage analyses for terminal voltages at Class 1E 480 V MCC loads, the Class 1E 120 V AC system, and the Class 1E 125 V DC system in accordance with the following schedule:

1. Terminal voltages at Class 1E 480 V MCC loads -- 12/31/84
2. Class 1E 120 V AC loads -- 3/15/85
3. Class 1E 125 V DC loads -- 3/15/85

THE ABOVE COMMITTED SCHEDULE IS UNCHANGED. AT A MEETING ON JULY 19, 1984, THIS ITEM WAS AGREED TO BE CONFIRMATORY WHEN DLC PROVIDED THE COMMITMENT NOTED PREVIOUSLY IN THIS RESPONSE (*). THAT COMMITMENT WAS FORMALIZED IN ATTACHMENT 3 TO LETTER NO. 2NRC-4-140, DATED SEPTEMBER 7, 1984.

DLC HAS BEEN FORMALLY REQUESTED TO ADDRESS THE ACCEPTABILITY OF CASE "D" OF CALCULATION E-68. DLC HAS REVIEWED THE CALCULATION AND DOES NOT CONSIDER CASE "D" A CREDIBLE EVENT. WITH THE REACTOR OPERATING ABOVE P-8 A REACTOR TRIP WILL OCCUR WITHIN A FEW SECONDS OF ANY REACTOR COOLANT PUMP TRIP. THIS MAKES RESTART OF A REACTOR COOLANT PUMP IMPOSSIBLE AT FULL POWER AND THUS CASE "D" IS NOT CREDIBLE. CALCULATION E-68 WILL BE REVISED ACCORDINGLY.

BASED UPON THE AGREEMENT MADE IN THE JULY 19, 1984 MEETING, THIS ITEM SHOULD NOW BE CONFIRMATORY.

ATTACHMENT 4

Response to Outstanding Issue 196 of the
Beaver Valley Power Station Unit No. 2
Draft Safety Evaluation Report

Draft SER Section 8.3.3.1.3: Protection of Class 1E Equipment from Dynamic Effects

In Section 8.3.1.2 and 8.3.2.2 of the FSAR, it has been stated, in regard to compliance with General Design Criterion (GDC) 4 of Appendix A to 10CFR50, that Class 1E ac and dc power systems are designed to accommodate the effects of the environmental conditions associated with normal operation and postulated accidents and that the structures, the ac and dc systems are housed in, are protected against internally-and-externally-generated missiles, pipe whip, and jet impingement forces systems, and components important to safety have been appropriately protected against dynamic effects in accordance with the requirements of GDC 4.

By Amendment 3 to the FSAR, the applicant did not provide the requested information for an expanded analysis of compliance with GDC 4. This item will be pursued with the applicant and the results of the staff review will be reported in a supplement to this report.

Response:

FROM

All Class 1E ac and dc systems are protected by structures that are designed to withstand any externally generated missiles and all postulated dynamic effects, as addressed in Sections 3.2, 3.3, 3.4, 3.5, 3.7, 3.7B, and 3.7N.

In addition, all Class 1E ac and dc systems are designed to accomodate the environmental conditions associated with normal operation and postulated accidents and are protected against internally generated missiles, pipe whip, and jet impingement forces associated with pipe breaks such that safety functions are not precluded, as addressed in Section 3.5 for missile protection and Sections 3.6, 3.6B, and 3.6N for protection against dynamic effects associated with the postulated rupture of piping.

ATTACHMENT 5

Response to Outstanding Issue 197 of the
Beaver Valley Power Station Unit No. 2
Draft Safety Evaluation Report

Draft SER Section 8.3.3.3.2: Separation of Containment Electrical Penetrations

Section 8.3.1.4 (part 2, Item 2b[5]) of the FSAR stated that containment electrical penetrations meet separation requirements of currently approved design procedures which comply with the intent of IEEE Standard 384-1981 for limited hazard areas. Section 5.5 of IEEE Standard 384-1974 (which is the currently approved NRC guideline for this subject) requires that redundant penetrations be widely dispersed around the circumference of the containment. Recent designs, approved by NRC on this subject, locate redundant electrical penetrations in different rooms or on opposite sides of containment. The Beaver Valley design, however, locates redundant penetrations in a single room in a 21 by 5 matrix with eight feet (center-to-center) between redundant penetrations. The Beaver Valley design does not meet the requirements nor the intent of IEEE Standard 384-1974 (or IEEE Standard 384-1981) as stated in the FSAR.

In response, the applicant, by Amendment 3 to the FSAR, stated that containment electrical penetrations are physically separated over a 120-degree arc of the containment and are located on two distinct building elevations. This statement contradicts the above design description for Beaver Valley Penetrations. This item will be pursued with the applicant and the results of the staff review will be reported in a supplement to this report.

Response:

Refer to SECTION 8.3.1.1.16, NO.5 for a description of the electrical penetration cable separation. The electrical penetrations are designed with a minimum 4'-0" horizontal and vertical separation on centerlines as they are arranged in a 120 degree arc of the containment on two elevations starting with 735'-6" and 755'-6".

The penetrations are also arranged (outside containment) in separate cable vault room groupings defined by distinct fire areas:

CV-1 735'-6" Class 1E (orange, red, and blue) and non-Class 1E penetrations

CV-2 735'-6" Class 1E (purple and green) and non-Class 1E penetrations

CV-3 755'-6" Class 1E (yellow and white) and non-Class 1E penetrations

This arrangement (outside containment) provides for distinctive groupings of Class 1E penetrations to their redundant counterparts. THE FIRE PROTECTION EVALUATION REPORT PROVIDES THE RESULTS OF A REVIEW OF PENETRATION LOCATIONS INSIDE AND OUTSIDE CONTAINMENT. THIS REVIEW SHOWS SATISFACTORY CONFORMANCE WITH BTP 9.5-1.

ATTACHMENT 6

Response to Outstanding Issue 187 of the
Beaver Valley Power Station Unit No. 2
Draft Safety Evaluation Report

Draft SER Section 8.3.1.5: Capability of Diesel to Accept Design Load After Prolonged No Load Operation

Section 6.4.2 of IEEE Standard 6.4.2 of IEEE Standard 387-1977 requires, in part, that the load acceptance test consider the potential effects on load acceptance after prolonged no load or light load operation of the diesel generator. The applicant was requested to provide the results of load acceptance tests or anlaysis that demonstrates the capability of the diesel generator to accept the design accident load sequence after prolonged no load operation.

By Amendment 3 to the FSAR the applicant did not provide the requested test or analysis results. This item will continue to be pursued with the applicant and the results will be reported in a supplement to this report.

Response:

A test which demonstrates satisfactory load acceptance following prolonged no load or light load operation is unnecessary since it would not reflect conditions found as a result of actual diesel operating practices. As stated in the response to question 430.54, routine testing of diesels is not performed at less than 2?% load. In addition, when the diesels start automatically and are not required to load (such as initiated by a safety injection signal with offsite power available) they are normally shutdown upon verifying availability of offsite power. Since testing and automatic starts contribute nearly all of the diesel run time, it can be concluded that no more than a few hours of accumulated no load or light load running will occur. Since the vendor analysis shows that as much as 24 hours of no load operation is acceptable, it would be meaningless to perform a test of operating practices which are many hundreds of percent more conservative than the vendor analysis even assuming no conservatism in the vendor analysis. SINCE BVPS-2 OPERATING PROCEDURES PRECLUDE EXTENDED PERIODS OF NO-LOAD OPERATION, AND SINCE THE DIESELS ARE LOADED AS RECOMMENDED BY THE VENDOR, IT IS CLEAR THAT ACCEPTANCE CRITERION II.4.f.(1) OF SRP 8.3.1 IS MET. DLC REQUESTS THAT THE TESTING REQUIREMENT BE FORWARDED TO DLC AS DESCRIBED IN GENERIC LETTER 84-08 SHOULD THIS REVISED RESPONSE BE FOUND UNACCEPTABLE.

ATTACHMENT 7

Response to Outstanding Issue 193 of the
Beaver Valley Power Station Unit No. 2
Draft Safety Evaluation Report

Draft SER Section 8.3.1.15: Design Provisions for the Use of Replacements for Class 1E Loads

Section 8.3.1.1.4 and Table 8.3-3 of the FSAR indicates that for a number of Class 1E loads, there is a replacement load provided to allow maintenance to be performed while satisfying the single failure criterion. The Beaver Valley design is such that the Class 1E load and its replacement may be connected to the same Class 1E power supply at the same time. It is the staff concern that this simultaneous connection of loads will exceed the capacity of the Class 1E power supplies. Identification of loads involved and design provisions to preclude simultaneous connection will be pursued with the applicant and the results of the staff review will be reported in a supplement to this report.

Response:

Refer to Section 8.3.1.1.4 and Figures 8.3-6, 8.3-7, and 8.3-8 for a description of the use of replacements ("swings") for Class 1E loads and provisions to prevent bus ties.

Cables (green) supplying swing equipment, from the transfer switch to the equipment, are not only routed independently from both safety trains, but also independently from each other. This ensures the indepencence of both safety trains regardless of the trains to which any of the motors are connected.

AS STATED IN FSAR 8.3.1.1.4, ADMINISTRATIVE CONTROLS ASSURE ALIGNMENT OF SWING LOADS TO THE APPROPRIATE POWER SUPPLY. IN ADDITION, CONNECTION OF THE LARGEST SWING LOAD TO THE SAME POWER SUPPLY AS ITS COUNTERPART WILL NOT RESULT IN A LOAD WHICH EXCEEDS THE 160 HOUR RATING OF THE DIESEL GENERATOR.

ATTACHMENT 8

Response to Outstanding Issue of the
Beaver Valley Power Station Unit No. 2
Draft Safety Evaluation Report

Draft SER Section 8.3.3.4: COMPLIANCE WITH THE GUIDELINES OF NUREG 0737 FSAR 8.3.1.1.3, AMENDMENT 9, ADDRESSES THIS ITEM IN DETAIL.