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May 13, 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
Fire Protection Draft SER Open Items

Gentlemen:

Duquesne Light Company (DLC) met with the NRC on October 4, 1984, to discuss the status of the Draft SER Open Items on Fire Protection. The Auxiliary Systems Branch (ASB) discussed concerns relating to safe shutdown and alternate shutdown capabilities (Draft SER Open Items FP-4 and FP-5). Following this meeting, ASB informally transmitted these concerns to DLC as questions 410.57 through 410.61. Attached are the DLC responses to these informal questions. The responses discuss DLC methodology to achieve safe shutdown in the event of a single exposure fire in any plant fire area, including a discussion regarding associated circuits.

DLC proposes to meet with ASB during the week of May 20 to discuss the attached concerns and responses. Please advise DLC of the date when the suggested meeting can be conducted.

If you have any questions, please contact Mr. E. T. Eilmann at (412) 787-5141.

SUBSCRIBED AND SWORN TO BEFORE ME THIS

10th DAY OF May, 1985.

Anna M. Frattone
Notary Public

DUQUESNE LIGHT COMPANY

By

J. V. Carey
Vice President

ETE/wjs
Attachment

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

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COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF BEAVER)

On this 10th day of May, 1985, before me, a
Notary Public in and for said Commonwealth and County, personally appeared
J. J. Carey, 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.

Anna M. Fattore
Notary Public

BEAVER VALLEY POWER STATION - UNIT 2
RESPONSES TO AUXILIARY SYSTEMS
BRANCH REQUEST FOR ADDITIONAL INFORMATION

Question 410.57

Section 2.5.3 of the Beaver Valley Unit 2 Fire Protection Evaluation Report indicates that the postulated control room fire is limited to the ignition of one train of safety-related panel wiring. Section 7.4.1.3 of the FSAR indicates that a control room fire is not postulated to generate spurious or unwanted control signals which would prevent establishing hot standby from the emergency shutdown panel (ESP). In addition to above, Figure A5-15 - alternate shutdown panel, contains a note that states "To date, an exposure fire is not postulated in the control room, only loss of habitability."

Standard Review Plan, Section 9.5.1, which incorporates the criteria of Appendix R to 10 CFR 50 requires that the fire hazards analysis include exposure fires which could damage both trains of safe shutdown systems if they are located in a single fire area and not sufficiently separated. Further, the assumptions that spurious or unwanted control signals will not result from fire damage is not consistent with the SRP criteria. Based on the above criteria for the control room:

- a. Revise your submittal "Fire Protection Evaluation Report" and identify any necessary modifications to assure that fires will not affect the safe shutdown capability as indicated by the above criteria, or
- b. Provide justification for your position and identify any resulting deviation from the above criteria.

Response:

The FPER will be revised to postulate the unlikely event of a main control room exposure fire. The BVPS-2 design is such that a main control room fire is highly improbable due to the following:

- Continuous manning of the main control room and the ability of these personnel to combat a limited fire (common control room with BVPS-1).
- Local automatic fire detection in main control room (early warning system) as well as smoke detectors located inside the main vertical board.
- Portable fire extinguishers are available in the main control room with fire hose racks located in the immediate adjacent stairwells.

- Small amount of in-situ combustibles along with administrative controls to limit transient combustibles.

The FPER clearly demonstrates that the BVPS-2 plant can attain safe or alternative shutdown within 72 hours, in the event of a single exposure fire postulated in any one of the plant fire areas. The FPER complies with the requirements of BTP CMEB 9.5-1 for both safe and alternative shutdown capabilities. All necessary plant modifications to ensure that a single exposure fire will not affect safe shutdown capability will be addressed in the FPER.

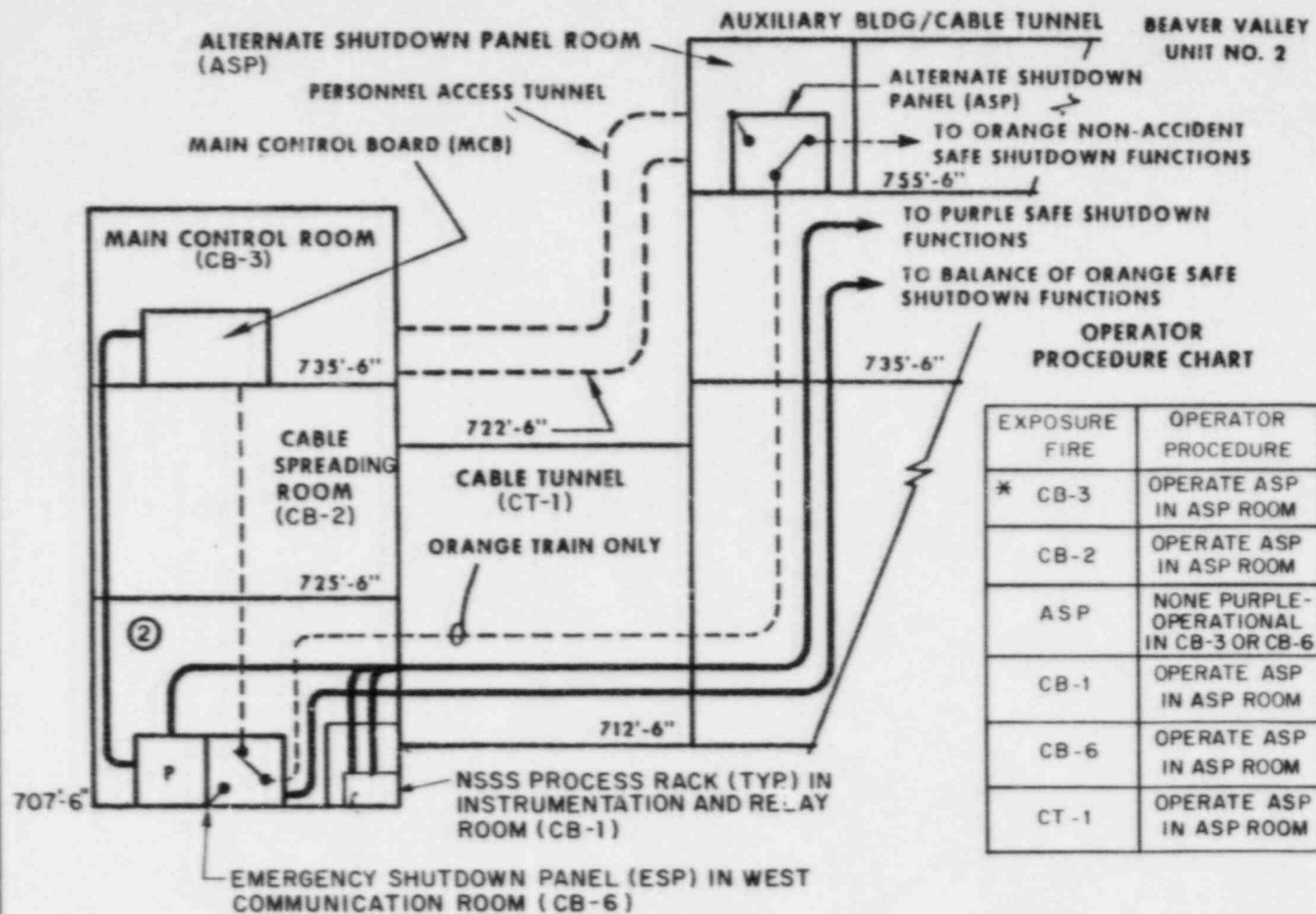
Section 7.4.1.3 of the FSAR properly states that the main control board, although not necessarily remaining operable, shall not be affected because of loss of the main control room to the extent that the control board generates spurious or unwanted control signals which could prevent establishing hot standby from the emergency shutdown panel (ESP). The design of the ESP is such that any spurious or unwanted control signals will not inhibit an operator's capability to control those circuits which are on the ESP. Transfer to the ESP allows complete electrical independence of this panel regardless of previous or ongoing spurious or unwanted signals. The same design exists for those circuits on the alternate shutdown panel (ASP). FPER Sections 3.1.3 and 3.3.1 provide additional detail as to when the panels would be used to attain safe shutdown.

The ESP is used after evacuation of the main control room due to "loss of habitability." This loss of habitability includes that caused by excessive smoke from a limited fire in the main control room. (Refer to the response to Question 410.59 for additional information).

The ASP will be utilized for evacuation of the main control room due to an "exposure fire", which potentially disables control of required safe shutdown equipment and associated HVAC equipment.

All requirements of SRP 9.5.1 for ensuring that a safe shutdown is attained within 72 hours in the event of a single exposure fire are fully complied with and described in detail in the FPER with the one exception of the spurious signal analyses which is addressed in the response to Question 410.58.

Figure A5-15 of Appendix A5 of the FPER has been revised (attached) to indicate that the ASP room (alternative shutdown area) is used in the event of an exposure fire in the main control room (CB-3), as well as during an exposure fire in any of the previously mentioned four fire areas, i.e.; CB-1, CB-2, CB-6, and CT-1.



EXPOSURE FIRE	OPERATOR PROCEDURE
* CB-3	OPERATE ASP IN ASP ROOM
CB-2	OPERATE ASP IN ASP ROOM
ASP	NONE PURPLE-OPERATIONAL IN CB-3 OR CB-6
CB-1	OPERATE ASP IN ASP ROOM
CB-6	OPERATE ASP IN ASP ROOM
CT-1	OPERATE ASP IN ASP ROOM

LOCATION	ORDER OF PLANT SAFE SHUTDOWN PREFERENCE
CB-3	MAIN CONTROL ROOM
CB-6	EMERGENCY SHUTDOWN PANEL
ASP	ALTERNATE SHUTDOWN PANEL

* THE ESP WILL BE UTILIZED DUE TO "LOSS OF HABITABILITY" INCLUDING THAT CAUSED BY EXCESSIVE SMOKE FROM A LIMITED FIRE IN THE MAIN CONTROL ROOM (CB-3)

FIGURE A5-15
ALTERNATIVE SHUTDOWN CAPABILITY
COMPLIANCE TO BTP CMEB 9.5-1
BEAVER VALLEY POWER STATION-UNIT 2
FIRE PROTECTION EVALUATION REPORT

BEAVER VALLEY POWER STATION - UNIT 2
RESPONSE TO AUXILIARY SYSTEMS
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Question 410.58

Describe the details of your proposed design to demonstrate that you satisfy the criteria of Section C.5.b and C.5.c of Branch Technical Positions CMEB 9.5.1 by providing the following information:

- a. Describe the methodology used to verify that proper separation is provided for the safe shutdown capability in accordance with the guidelines of C.5.b of Branch Technical Position CMEB 9.5.1. Provide the area arrangement drawings showing the safe shutdown system including the cable routing.
- b. Address the means you will provide for assuring the proper functioning of your safe shutdown capability, assuming fire induced failures in the associated circuits. Attachment 1 identifies our concerns with associated circuits. This attachment also provides guidance for reviewing the associated circuits of concern and the additional information we need. Your response should specifically address Part II.C of this attachment.

In evaluating your response in Part II.C of this attachment regarding spurious actuation of equipment, the staff intends to utilize the following guidelines:

- a. The safe shutdown capability should not be adversely affected by any one spurious actuation or signal resulting from a fire in any plant area; and
- b. The safe shutdown capability should not be adversely affected by a fire in any plant area which results in the loss of all automatic function (signals, logic) from the circuits located in the area in conjunction with one worst case spurious actuation or signal resulting from the fire; and
- c. The safe shutdown capability should not be adversely affected by a fire in any plant area which results in simultaneous spurious actuation of all valves in high-low pressure interface lines.

Response:

- a) The BVPS-2 design basis meets all requirements for safe shutdown capability in the event of a single exposure fire in any plant fire area. In all areas, except for Fire Areas CB-1, CB-2, CB-6, CT-1, and CB-3, this is accomplished by complying with one of the three methods outlined in Section 3.5.1 of the FPER. For exposure fires in CB-1, CB-2, CB-6, CT-1, and CB-3, the BVPS-2 design basis meets the requirement by an alternative shutdown capability utilizing the ASP.

The details of the BVPS-2 design that demonstrate compliance with the criteria of Sections C.5.b and C.5.c of BTP CMEB 9.5-1 are described in Section 3 of the FPER. The methodology for meeting these criteria was to meet all requirements for safe shutdown capability. This approach was provided, as detailed in Sections 3.1.1 and 3.1.2 of the FPER, for the majority of the plant fire areas which are all bounded by three hour fire resistance-rated barriers. In many cases, redundant safe shutdown equipment was initially located in different fire areas. The routing of cables to these safe shutdown equipment were designed, in many cases, such that they also ran through different fire areas, i.e., orange and purple train cables, each routed in their respective safe shutdown fire areas. Where cables required routing in fire areas containing safe shutdown equipment/cables of both redundant trains, automatic fire detection and suppression, twenty foot horizontal separation with no intervening combustibles, and/or three hour or one hour cable wrapping methods were identified for each fire area. If compliance to safe shutdown capability (Section C.5.b of BTP CMEB 9.5-1) was not feasible, then the requirements of an alternative shutdown capability (Section C.5.c of BTP CMEB 9.5-1) were met as addressed by Section 3.1.3 of the FPER. The alternate shutdown panel (ASP) was designed to allow the plant to achieve and maintain safe shutdown for an exposure fire in fire areas CB-1, CB-2, CB-3, CB-6, CT-1.

Fire area drawings are provided in Appendix A1 of the FPER and show the bounds of each fire area. Each fire area is described in Section 3.5.b of the FPER listing all safe shutdown equipment, means of providing protection (if required), and the means of achieving shutdown, i.e., the control station which an operator would man during/following an exposure fire in the fire area.

BVPS-2 does not utilize individually produced fire area drawings, but uses equivalent sources of controlled documentation, such as:

- A. Area arrangement drawings (piping, mechanical, and electrical) which are utilized to clearly depict the bounds of each fire area (see Appendix A1 of FPER).
- B. Each fire area, as outlined in Section 3.5.2 of the FPER, lists the shutdown equipment located in that area.
- C. Appendix A4 of the FPER comprises a total listing of shutdown equipment per system code.
- D. Appendix A2 of the FPER lists all equipment and components which are controlled from the alternate shutdown panel.

In addition, a listing of all safe shutdown cables, provided by fire area, is included in Appendix A3 of the FPER indicating every safe shutdown cable including its unique identification number, equipment on both the power supply and load end of that cable, its in-place protection, if required, e.g., one or three hour fire-rated cable wrap, etc, and whether that cable was rerouted through that subject fire area. The list of these safe shutdown cables is developed by indicating all required cables necessary to provide power, control, or instrumentation for identified safe shutdown components and systems. The cable listing is a result of a combination of BVPS-2 electrical production drawings, specific cable and raceway computer reports which indicate each cable and its associated raceway(s), and a manual tracking of these cables through all plant fire areas. As such, Appendix A3 provides a cable listing by fire area.

b) BVPS-2 safe shutdown capability assuming fire induced failures in associated circuits is addressed in Sections 3.1.4, 3.1.5, 3.1.6, and 3.1.7 of the FPER. Specifically, the concern of Part IIC of Attachment 1 entitled "Information Required", is described in the FPER as follows:

- 1) The methodology and description of plant electrical equipment used to assess the potential of associated circuits adversely affecting safe shutdown capability with circuits which share a common power supply or common enclosure is detailed in Sections 3.1.5 and 3.1.6, respectively, of the FPER.
- 2) Hot shorts, open circuits, or shorts to ground concerns of associated circuits are also described in Sections 3.1.4, 3.1.5, 3.1.6, and 3.1.7 of the FPER.

Spurious Signal Analysis

An analysis, in accordance with plant fire areas, will be performed on all associated circuits to demonstrate that no single spurious signal resulting from a fire-induced failure of any cables (i.e., hot shorts, open circuits, or shorts to

ground) will prevent the plant from achieving safe shutdown within 72 hours or cause a fire initiated LOCA through the high-low pressure system interface. The analysis will address the three guidelines contained in Question 410.58. The methodology, assumptions, and scope of this additional analysis is as follows:

1. All nonprotected, safe shutdown circuits for fire areas which utilize alternative shutdown capability (i.e., those not meeting C.5.b of BTP CMES 9.5-1) will be reviewed to determine whether spurious signals could prevent safe shutdown within 72 hours. The following guidelines will apply:
 - One spurious signal or actuation is postulated in any of the nonprotected circuits affected by a fire.
 - No automatic functions will be considered to take place to achieve safe shutdown.
 - If affected by a fire, simultaneous spurious operation will be postulated of all valves in any one flow path in high-low pressure interfaces of the reactor coolant system.
2. Each postulated spurious signal or actuation will be evaluated assuming that the signal/actuation is generated as soon as the fire occurs and the signal/actuation is carried through to completion, i.e., valve movement, pump start, interlock energized, etc.
3. The next step of the evaluation will be to determine if safe shutdown can be achieved under the conditions resulting from the spurious signal plus the loss of all other unprotected components in the fire area. Alternative shutdown capability, protected components within the fire area, and safe shutdown components outside the fire area will all be considered in achieving safe shutdown.
4. Operator action to trip specific, nonprotected, Class 1E circuits will be considered as a method of combating the effects of spurious signals provided sufficient time is available. All instances of operator action, including the allowable time periods, used in the analysis will be identified and documented in the FPER.
5. If, as a result of the above analysis, circuits are identified which could affect safe shutdown caused by fire-induced spurious signals, these circuits will be protected using one of the methods already described in Section 3.5.1 of the FPER.

BEAVER VALLEY POWER STATION - UNIT 2
RESPONSE TO AUXILIARY SYSTEMS
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Question 410.59

Aside from the fact that the emergency shutdown panel (ESP) is capable of controlling two safety-related trains while the alternate shutdown panel (ASP) is only capable of controlling one shutdown train, the applicant should identify and describe all functional differences and limitations of the two shutdown panels in attaining and maintaining either a hot or cold shutdown conditions. Also, identify the conditions for which these panels will be utilized.

Response:

Table 7.4-1 of the FSAR provides a listing of all equipment that may be controlled and instrumentation that may be monitored from the ESP. Table 7.4-2 of the FSAR and Appendix A2 of the FPER lists equipment that may be controlled and instrumentation that may be monitored from the ASP.

The ASP room, alternative control area for an exposure fire in CB-1, CB-2, CB-3, CB-6, and CT-1, will be fully capable of providing all necessary control and instrumentation for the equipment required for cold shutdown.

The ESP room will be used as the safe shutdown control area if the main control room experiences a loss of habitability. The major difference between the ESP and ASP is that the ESP can control both safety-related trains and the ASP can control only one protected safety-related train (orange).

Either the ESP or ASP can be used to bring the plant to a safe shutdown condition. A loss of offsite power (LOOP) condition must be considered at each location of shutdown. The ESP is used for evacuation of the main control room (loss of habitability) and must also consider redundancy and independence (single failure criterion) of systems required for safe shutdown (GDC 19 and SRP Section 7.4). The ASP is used for safe shutdown with respect to fire protection. The only consideration for an ASP shutdown is whether or not an exposure fire exists in the instrumentation and relay room (CB-1), cable spreading room (CB-2), west communication room [ESP station] (CB-6), the cable tunnel (CT-1), or the main control room (CB-3).

A sampling of major differences between the ESP and ASP is as follows:

1. The controls for the following green (swing) train pumps are not on the ASP:
 - a) 2SWS*P21C Service water pump

- b) 2CCP*P21C Component cooling water pump
 - c) 2CHS*P21C Charging pump
2. The equipment control and instrumentation for the following system related items are not on the ASP:
- a) Residual Heat Removal System
 - 2RHS*FCV605A Residual heat removal bypass valve
 - 2RHS*HCV758A Residual heat exchanger outlet valve
 - 2RHS*MOV750A RHS cross connection valve
 - 2RHS-FI605A1 Residual heat bypass flow
 - 2RHS-FI606A1 Residual heat flow
 - 2RHS-TI606A RHR heat exchanger outlet temp
 - b) Reactor Coolant System
 - 2RCS-PI444A Pressurizer pressure, process control
 - 2RCS-TI430A RCS cold leg loop 3 temp
 - 2RCS-TI433A RCS hot leg loop 3 temp
 - c) Chemical and Volume Control System
 - 2CHS-FI122A1 Charging pump flow
 - 2CHS-LI112A Volume control tank level
 - 2CHS-LI115A Volume control tank level
 - d) Feedwater System
 - 2FWE*HCV100A Aux feed pump header to stm gen
 - 2FWE-FI100C Stm gen aux feedline flow
 - 2FWE-LI497C Stm gen 21C wide range level indication
 - e) Steam System
 - 2SVS*PCV101C Atmospheric steam dump valve 21C
 - 2MSS-PI496A Stm gen 21C, steam pressure

BEAVER VALLEY POWER STATION - UNIT 2
RESPONSES TO AUXILIARY SYSTEMS
BRANCH REQUEST FOR ADDITIONAL INFORMATION

Question 410.60

The applicant's submittal does not indicate whether repairs are required to achieve cold shutdown. The applicant shall identify any required repairs. It is our position that systems and components used to achieve and maintain hot standby conditions must be free of fire damage and capable of maintaining such conditions without repairs. Systems and components used to achieve and maintain cold shutdown should be either free of fire damage or the fire damage to such systems should be limited such that repairs can be made and cold shutdown achieved within 72 hours. Attachment 2 (Memorandum from R. Mattson to R. Vollmer dated July 2, 1982) provides additional guidance regarding allowable repairs to achieve cold shutdown.

Response:

At this point in time, repairs are not required for systems and components used to achieve and maintain hot standby and cold shutdown. However, as we proceed with our spurious signal analysis, if repairs become necessary, they will be identified and outlined in detail, in the FPER.

BEAVER VALLEY POWER STATION - UNIT 2
RESPONSES TO AUXILIARY SYSTEMS
BRANCH REQUEST FOR ADDITIONAL INFORMATION

Question 410.61

The applicant should provide a commitment to develop and implement alternate shutdown procedures prior to fuel load. These procedures should address manpower requirements and manual actions to accomplish shutdown. A summary of the operator actions needed for safe shutdown should be provided for our review.

Response:

Alternative shutdown procedures will be developed and implemented prior to fuel load. These procedures will address the operator actions required to accomplish safe shutdown. The procedures are in the early stage of development and all operator actions have not yet been determined. Once the procedures have been developed, they will be made available for staff review.