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March 28, 1984

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 2
Docket No. 50-412
Open Item/Question Response

Gentlemen:

This letter forwards responses to the issues listed below. Duquesne Light Company plans to incorporate the responses to the FSAR questions into FSAR Amendment 6. The following items are attached:

Attachment 1: Response to Open Item 64 of the Beaver Valley Power Station Unit No. 2 Draft Safety Evaluation Report.

Attachment 2: Response to Open Item 67 of the Beaver Valley Power Station Unit No. 2 Draft Safety Evaluation Report.

Attachment 3: Response to FSAR Questions 430.97 and 430.100 (Power Systems Branch) forwarded by your letter dated September 19, 1983.

Attachment 4: Response to FSAR Question 480.26 (Containment Systems Branch) contained in your letter dated January 9, 1984.

DUQUESNE LIGHT COMPANY

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

KAT/wjs
cc: Mr. H. R. Denton, Director NRR
Mr. D. Eisenhut, Director Division of Licensing
Mr. G. Walton, NRC Resident Inspector
Mr. M. Lacitra, Project Manager

SUBSCRIBED AND SWORN TO BEFORE ME THIS 28th DAY OF March, 1984.

Anita Elaine Reiter
Notary Public

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

A001

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF ALLEGHENY)

On this 28th day of March, 1984, 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 Open Item 64 of
Beaver Valley Power Station Unit No. 2
Draft Safety Evaluation Report

Draft SER Section 7.3.3.12 Steam Generator Level Control and Protection

Three steam generator level channels are used in a two-out-of-three logic for isolation of feedwater on high steam generator level. One of the three level channels is used for control. This design for actuation of feedwater isolation does not meet the requirements of Paragraph 4.7 of IEEE 279, "Control and Protection System Interaction," in that the failure of the level channel used for control could require protective action and the remainder of the protection system channels would not satisfy the single-failure criterion. The applicant has not responded to this concern. This is an open item.

Response:

Each steam generator (S/G) has three protection grade level transmitters (LT), each of which feeds a Hi-hi bistable (B/S) and a Low-low bistable. One of the LT's, 2FWS*LT476 (on S/G A, for example), also provides a signal to the feedwater control system. Section 4.7.3 of IEEE Std. 279-1971 states in part:

> "Where a single random failure can cause a control system action that results in a generating station condition requiring protective action and can also prevent proper action of a protection system channel designed to protect against the condition, the remaining redundant protection channels shall be capable of providing the protective action even when degraded by a second random failure."

In previous FSAR review meetings, the ICSB reviewer has expressed concern that a failure of LT 476 would cause a transient for which protection would not be provided. This is not a concern if the LT fails high because the core is protected against low level by the diverse trip on high steam/feed rate conincident with low S/G level from the other LT's. The concern arises in the case that the transmitter fails low and causes the S/G to overfill. A safety analysis of "Feedwater System Malfunction Causing an Increase in Feedwater Flow" is presented in the Beaver Valley Unit 2 Final Safety Analysis Report. IEEE Std. 279-1971 is not applicable to this portion of the system design because this condition does not require protective action as the core remains above the DNB limits (see FSAR 15.1.2.2). Additionally, the plant has been analyzed for steam line break accidents (FSAR 15.1.5) and the DNB design limit is met in this case also. Therefore, the concern resulting from the overfill of the S/G is one of protection of the turbine, a commercial concern. As IEEE 279 is applicable to ". . . the safety-related functional performance . . . of protection systems . . .," it is not applicable to this function. Nevertheless, the standard Westinghouse design for this system uses three high-quality, safety grade level transmitters to provide indication

and S/G automatic initiation functions. In the many reactor-years' experience of operating this design, no known event of S/G overfill has occurred.

Still, in order for a steam generator overfill event to occur, several very specific failures must occur in a very short period of time. The initiating failure must be that of the controlling channel (LT 476) failing low such that the S/G level begins to rapidly rise. Should the other two channels be operating properly, the hi-hi S/G level turbine trip and feed water pump trip would function to terminate the transient. Should one of the other channels fail high, the same action would occur when the operating channel reached the hi-hi setpoint. If one of the other channels failed low, the reactor would be tripped by the low-low S/G level trip and feedwater would isolate 14 seconds later on low T avg. coincident with P-4.

One case can be postulated where automatic system protection is not provided. In order for this to happen, two very specific failures would need to occur within a short time period. The controlling channel (LT 476) would have to fail low causing the feed regulating valve to open and S/G to fill, and the high level bistable on one of the other level channels (LT 474 or 475) would have to fail to turn off upon receiving the appropriate analog signal. The failure of the high level bistable in the "on" position would be extremely unusual. If these two specific failures were to occur, then it is conceivable that without operator action, a steam generator might overfill.

However, this rare set of failures is protected against by the following process. Beaver Valley Unit 2 Technical Specifications require a channel check every 12 hours which would detect any channel failure. Additionally, the technical specifications require a channel functional test every 31 days to detect any inoperable bistable. Thus, the above described scenario of very specific component failures and failure modes must occur in a short time frame resulting in an extremely low probability event. Even considering this case, this event is very easily diagnosed. Table 1 lists alarms which would actuate as a result of this transient and Westinghouse analysis shows that the operator has greater than ten minutes to isolate feedwater before steam generator overfill could occur. Since this event is a standard malfunction used in reactor operator training courses, it is apparent that this ten minute time span is sufficient for operator action and is consistent with other assumptions made in safety analyses in the Beaver Valley Unit 2 FSAR.

In conclusion, IEEE Std. 279-1971 is not applicable to the S/G high level event. The analysis presented in the Beaver Valley Unit 2 FSAR demonstrated that there is adequate core protection against DNB for excessive feedwater flow transients. In addition, recent plant-specific analyses conducted by Westinghouse on double failures in the Steam Generator Level Control and Protection Systems for Beaver Valley Unit 2 have shown that, when one considers the transient response including actuation of other protective functions, the protection and control systems design of Beaver Valley Unit 2 provides adequate protection against excessive feedwater flow transients resulting in a steam generator overfill event.

TABLE 1

TIME SEQUENCE OF ALARMS AND ANNUNCIATORS FOR A FEEDWATER CONTROL MALFUNCTION WITHOUT REACTOR TRIP

Core Condition	Event	Time (sec)
1. Beginning of Life	Bistable 476 A	0
	Channel 476, lo-lo SG level	0
	Low level deviation alarm	0
	Feedwater Control Valve fully open, loop 1	9
	Channel 475, hi-hi SG level	143
	Bistable 475C	143
2. End of Life	Bistable 476 A	0
	Channel 476, lo-lo SG level	0
	Low level deviation alarm	0
	Feedwater Control Valve fully open, loop 1	9
	Channel 475, hi-hi SG level	146
	Bistable 475C	146

ATTACHMENT 2

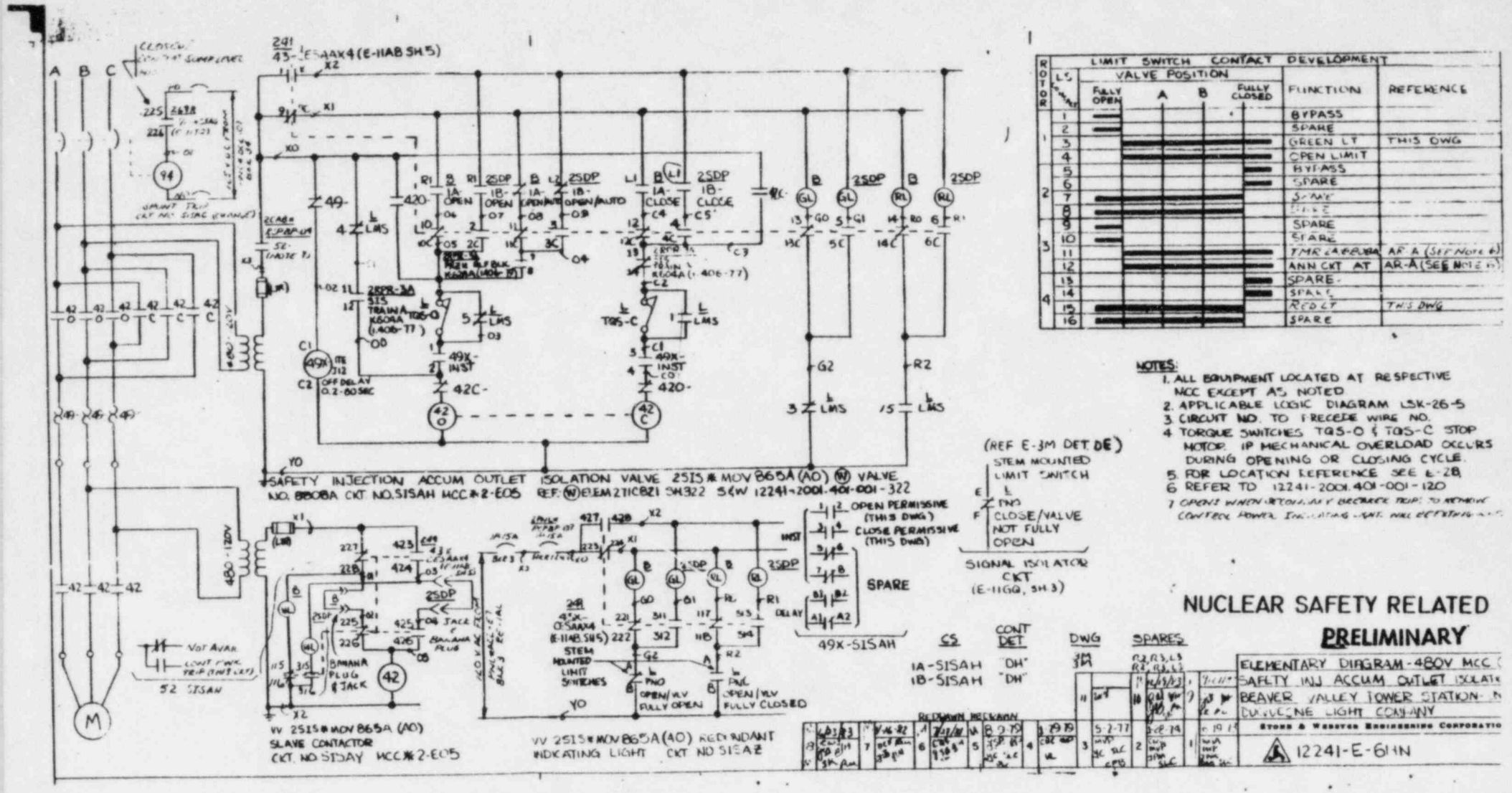
Response to Open Item 67 of
Beaver Valley Power Station Unit No. 2
Draft Safety Evaluation Report

Draft SER Section 7.3.3.15 Power Lockout for Motor-Operated Valves

Certain motor-operated valves, such as those for cold-leg accumulator isolation, require power lockout (removal) to meet the single-failure criterion. The power lockout scheme used by the applicant uses an additional, manually controlled (via removable banana plugs) contactor. The staff has concluded that a short or relay failure in this circuitry could constitute a nondetectable failure and thus violate the single-failure criterion. The staff has expressed this concern to the applicant and considers this item open subject to its review of the applicant's pending response.

Response:

The circuitry for motor control on these valves will be modified as shown on the attached figure 12241-E-6HN to provide a white indicating light powered from the secondary side of the slave contactor control transformer. Under normal plant operating conditions, this white light will be extinguished. When power is applied to the slave contactor, the light will be energized indicating that power is available.



ROTOR	LS	VALVE POSITION: FULLY OPEN	A	B	FULLY CLOSED	FUNCTION	REFERENCE
1	1					BYPASS	
	2					SPARE	
	3					GREEN LT	THIS DWG
	4					OPEN LIMIT	
2	5					BYPASS	
	6					SPARE	
	7					SPARE	
	8					SPARE	
3	9					SPARE	
	10					SPARE	
	11					TMR ALARM	AR-A (SEE NOTE 6)
	12					ANN CKT AT	AR-A (SEE NOTE 7)
4	13					SPARE	
	14					SPARE	
	15					RED LT	THIS DWG
	16					SPARE	

NOTES:
1. ALL EQUIPMENT LOCATED AT RESPECTIVE MCC EXCEPT AS NOTED
2. APPLICABLE LOGIC DIAGRAM LSK-26-5
3. CIRCUIT NO. TO RECEIVE WIRE NO.
4. TORQUE SWITCHES TQS-O & TQS-C STOP MOTOR IF MECHANICAL OVERLOAD OCCURS DURING OPENING OR CLOSING CYCLE.
5. FOR LOCATION REFERENCE SEE E-28
6. REFER TO 12241-2001-401-001-120
7. OPENS WHEN SETPOINT IS EXCEEDED. TRIPS TO NORMAL CONTROL POWER INDICATING LIGHT WILL EXTINGUISH

	CS	CONT DET	DWG	SPARES
1A-SISAH		"DH"		
1B-SISAH		"DH"		

NUCLEAR SAFETY RELATED

PRELIMINARY

ELEMENTARY DIAGRAM - 480V MCC
SAFETY INJ ACCUM OUTLET ISOLATE
BEAVER VALLEY POWER STATION - N
DUQUESNE LIGHT COMPANY

STONE & WEBSTER ENGINEERING CORPORATIO

12241-E-61N

ATTACHMENT 3

Respone to FSAR Questions 430.97 and 430.100

Question 430.97 (Section 9.5.6)

Provide a discussion of the measures that have been taken in the design of the standby diesel generator air starting system to preclude the fouling of the air start valve or filter with moisture and contaminants such as oil carryover and rust (SRP 9.5.6, Part III).

Response:

Refer to the response to Question 430.100.

Question 430.100 (Section 9.5.6)

A study by the University of Dayton has shown that accumulation of water in the starting air system has been one of the most frequent causes of diesel engine failure to start on demand. Condensation of entrained moisture in compressed air lines leading to control and starting air valves, air start motors, and condensation of moisture on the working surfaces of these components has caused rust, scale, and water itself to build up and score and jam the internal working parts of these vital components thereby preventing starting of the diesel generators.

In the event of loss of offsite power, the diesel generators must function since they are vital to the safe shutdown of the reactor(s). Failure of the diesel engines to start from the effects of moisture condensation in air starting systems and from other causes have lowered their operational reliability to substantially less than the desired reliability of 0.99 as specified in Branch Technical Position ICSB (PSB) 2, "Diesel Generator Reliability Testing," and Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units used as Onsite Electrical Power Systems at Nuclear Power Plants."

In an effort toward improving diesel engine starting reliability, we require that compressed air starting system designs include air dryers for the removal of entrained moisture. The two air dryers most commonly used are the dessicant and refrigerant types. Of these two types, the refrigerant type is the one most suited for this application and, therefore, is preferred. Starting air should be dried to a dew point of not more than 50°F when installed in a normally controlled 70°F environment, otherwise, the starting air dew point should be controlled to at least 10°F less than the lowest expected ambient temperature.

Revise your design of the diesel engine air starting system accordingly, describe this feature of your design. Also expand your FSAR to discuss the procedures that will be followed to ensure the dryers are working properly and the frequency of checking/testing (SRP 9.5.6, Parts II and III).

Response

The University of Dayton study which concluded that water accumulation was a leading cause of diesel starting failures was based upon analysis of Licensee Event Reports (LER) issued from 1969 through 1977. Improvements in industry practices since that time, and the success of such practices must also be considered. During the first year of operation (1976-1977) at BVPS-1, two failures of the diesel generators to start because of moisture were reported via LER. To prevent further occurrences, a system of periodic blowdown as well as blowdowns prior to testing was implemented. No moisture related start failures have occurred which resulted in LER's in the seven years since (approximately 1/6 of the expected plant life). In addition, a more recent study by the Institute for Nuclear Power Operations used 450 diesel related LER's issued since January 1980 to analyze failure data. this study shows that only 5% of the more recent failures were due to moisture. Improved operation and maintenance practices applied by the industry when the moisture problem first became apparent on an industry-wide basis in the late 1970's is undoubtedly part of the reason for this improvement. Such practices at BVPS-1 have proven to be highly successful.

As described in FSAR 9.5.6, the method of starting the diesels used at BVPS-2 involves admission of air directly into the engine's cylinders. This eliminates the need for air start motors used on some other designs which are, as stated in NUREG/CR 0660, more susceptible to moisture related damage. Another important design feature which allows these diesels to be more tolerant of any starting system failure is the redundancy of the start systems. Each diesel is provided with redundant starting system components to enhance its starting reliability as stated in FSAR 9.5.6.

In accordance with GDC 17, sufficient independence and redundancy is provided to assure performance of safety functions assuming a single failure. Loss of a single diesel generator is considered in the safety analyses. As demonstrated at BVPS-1, loss of a diesel due to moisture is a rarity when appropriate operating and maintenance practices are applied. Coincident loss of both diesels due to moisture would be even less likely and is prevented in part by the independence of the air starting systems.

The use of operating procedures similar to those in use at BVPS-1 should provide diesel reliability similar to that of BVPS-1. Additionally, periodic testing will confirm the availability of the diesels. Thus, it cannot be concluded that installation of the air dryers, as requested by the NRC, would provide substantial additional protection which is required for the public health and safety. Therefore, this proposed backfit is not justified under 10CFR50.109.

ATTACHMENT 4

Response to FSAR Question 480.26

Question 480.26 (Section 6.2.2)

Provide a table listing quantities and locations of the various types of insulation employed inside the containment. Specify this for each containment subcompartment, for both components and piping systems 8-inches in diameter and larger.

Response:

The information requested requires significant extra effort to produce and would not be justified because the guidance of Reg. Guide 1.82 was used as the basis of sump design. The Reg. Guide indicates that an assumed 50% blockage is conservative and, as with other Reg. Guides, it indicates that it provides methods acceptable to the staff. DLC is aware of unissued draft versions of the SRP 6.2.2 as well as NUREG 0897 and Reg. Guide 1.82 which appear to be the source of the question. If so, it appears that this issue could be interpreted as an unauthorized backfit since these new criteria which are still unissued came about well after issuance of the construction permit and even after docketing of the operating license application. In addition, assuming that the staff is justified in using new unissued material to base the question on, the draft NUREG 0897 and several other NUREG/CR's conclude that the only plants for which the 50% blockage is not conservative are those having large quantities of fiberous insulation. As pointed out in previous responses to questions 480.2 and 730.1, BVPS-2 has a minimal amount of such insulation.