Question 121.6

The response to Request No. 121.3 cited the following references:

3.5-1 Shaffer, D. H., S. C. Chay, D. K. McClain, and B. A. Powell, "Analysis of the Probability of the Generation and Strike of Missiles From a Nuclear Turbine," Mathematics Department, Westinghouse Research Laboratories, March 1974 for Steam Turbine Division Engineering, Westinghouse Electric Corporation (also Appendix 3.5-A, STPEGS PSAR, Docket Nos. 50-498 and 50-499, Amendment 27, July 18, 1975).

3.5-2 Westinghouse Electric Corporation, "Missile Report for Turbines with 40 Inch Last Row Blades at Design, Intermediate and Destructive Overspeeds," (also Appendix 3.5-B, STPEGS PSAR, Docket Nos. 50-498 and 50-499, Amendment 27, July 18, 1975).

3.5-3 Westinghouse Electric Corporation, "The Containment of Disc Burst Fragments by Cylindrical Shells," (also Appendix 3.5-C, STPEGS PSAR, Docket Nos. 50-498 and 50-499, Amendment 27, July 18, 1975); also published as ASME Paper No. 73-WA-Pwr-2 by A. C. Hagg and G. O. Sankey and as Scientific Paper 73-1E7-STGRO-P2, Mechanics Department, Westinghouse Research Laboratories, June 25, 1973, done for Steam Turbine Division Engineering, Westinghouse Electric Corporation by the same authors.

3.5-4 "The Westinghouse Preservice Inspection and Test Programs for Nuclear Turbine Rotors and Discs," Westinghouse Electric Corporation (also Appendix 3.5-D, STPEGS PSAR, Docket Nos. 50-498 and 50-499, Amendment 27, July 18, 1975).

3.5-9 Westinghouse Electric Corporation, "Turbine Disc and Rotor Integrity," Steam Turbine Information Section 17, CT-23989, Revision 1 (May 1977).

The contents in References 3.5-1, 3.5-2, 3.5-3, and 3.5-4 do not contain the specific information needed to evaluate the degree of conformance of the STPEGS turbines with SRP 10.2.3, "Turbine Disk Integrity." Reference 3.5-9 is not on file with the NRC. Provide the information necessary to show the degree of compliance with paragraph II, "Acceptance Criteria," of SRP 10.2.3.

Response

It is Westinghouse Steam Turbine Division's position that all of the guidelines of SRP 10.2.3 have been addressed in the documents submitted. In addition, however, report CT-23989 has previously been submitted to the NRC requesting comment.

Question 032.34

Provide the results of analyses to show that your design of the initiation, actuation and control portions of the Main Steam Isolation Systems will perform their functions assuming any single failure in the instrumentation and control system following a steam line break accident. In this plant, redundant Main Steam Isolation Valves (MSIVs) for each steam line are not provided. Therefore, these analyses must include the initiation, control and actuation system for the Turbine Stop valves and any other valve in the main system downstream of the MSIVs, since they perform the redundant isolation function in each steam line. These analyses shall demonstrate that the initiation control and actuation circuits for both the MSIVs and the Turbine Stop Valve and the valves downstream of the MSIV will meet the Single Failure criterion with respect to isolation of the broken main steam line.

Response

The STPEGS design meets the requirements of Standard Review Plan 10.3, paragraph III.5.d, which states that the design will preclude the blowdown of more than one steam generator assuming a concurrent single component failure and considering that the main turbine stop and control valves are functional. The design is also consistent with the NRC Staff position documented in NUREG-0138, Issue No. 1, "Treatment of Non-Safety Grade Equipment in Evaluations of Postulated Steam Line Break Accidents".

The main turbine stop and control valves are closed within 150 milliseconds after the turbine Emergency Trip System is actuated by the Solid State Protection System (SSPS). As shown on Figure 7.2-17, the turbine is tripped by redundant actuation signals from the SSPS when at least one of the four normally energized solenoid valves in the hydraulic fluid lines is de-energized and causes the hydraulic fluid, which holds the valves open, to be dumped to drain. This arrangement provides redundancy in the initiation, actuation and control of the turbine stop and control valves.

The actuation of the turbine bypass valves is shown in Figure 7.2-11. The turbine bypass system is described in Section 10.4.4. The turbine bypass valves are actuated to close by the SSPS which blocks the steam dump to the condenser. This is accomplished by redundant actuation signals from the SSPS which cause redundant solenoid valves on each bypass valve to de-energize and close the associated bypass valve. Therefore, the required redundancy is provided for the turbine bypass valves.

The MSIVs are discussed in Section 10.3.2.5 which provides the analysis to demonstrate that the initiation, actuation, and control portions meet the single failure criterion.

Question 010.13

It is our position that the power sources for all controls, valve operators, and other supporting systems (e.g., pump lube oil cooling system) associated with the turbine driven auxiliary feedwater pump be independent from AC power. This is to comply with the diversity requirement in attached Branch Technical Position APCSB 10-1. Modify the system design to comply with this position and confirm that the turbine-driven pump lube oil cooler will receive cooling water from the pump recirculation line.

Response

The design of the controls, valve operators, and other supporting systems associated with the turbine driven auxiliary feedwater pump are such that they do not depend on AC power to perform their safety-related function. The turbine-driven pump lube oil cooler will take cooling water from a pump interstage bleed-off connection. The Auxiliary Feedwater System flow sheet is shown on Figure 10.4.9-1.

Question 010.30

Your response to our request 010.13 is not complete. Identify on Figure 10.4.9-1 whether the motor-operated valves are AC or DC operated. If there are any AC-operated valves in the turbine-driven auxiliary feedwater pump discharge or steam supply lines, discuss how they will meet the power diver- sity requirements of Branch Technical Position ASB 10-1.

Response

The motor-operated valves (MOVs) on the turbine-driven Auxiliary Feedwater System (AFW) pump discharge and steam supply lines are as follows:

MOV	Power Supply	Engineered Safety System Train Assignment
MSO143	DC	A, Channel II
XMSO514	DC	A, Channel II
FV-7526	DC	A, Channel II
AF0019	DC	A, Channel II
FV-0143	DC	A, Channel II

Question 040.38

Provide additional description (with the aid of drawings) of the turbine bypass valves and associated controls. In your discussion include the principle of operation, construction and set points, and the malfunctions and/or modes or failure considered in the design of the turbine bypass system. (SRP 10.4.4, Part III, Item 1).

Response

The turbine bypass valves are ASME Section III Class 7 Class 900, size 8 x 6 body and design temperature 6000F. The required air pressure to initiate travel is 19 psig with a l300 psi ÄP across the valve set. The valve is to be mounted in horizontal piping run, with the stem in a vertical position and the operator above valve centerline. Principals of operation are discussed in Sections 7.7.1.1, 7.7.1.4, 7.7.1.8, 7.7.1.8.1, 7.7.1.8.2, 7.7.1.8.3, 7.7.2.1, 7.7.2.3, 7.7.2.5, and 7.7.2.6. The failure modes are discussed in revised Section l0.4.4

A description of the interlocks can be found in Table 7.7-1.

Question 410.18N

Provide a response to the staff's March 10, 1980 letter to near-term operating license applicants concerning your AFW system design (TMI-2 Task Action Plan, NUREG-0737, item II.E.1.1). This response should include the following:

(a) A review of the AFW system design against Standard Review Plan Section 10.4.9, and Branch Technical Position ASB 10-1.

(b) A review of the AFW system design, Technical Specifications and operating procedures against the generic short-term and long-term requirements discussed in the March 10, 1980, letter.

(c) The design basis for the AFW flow requirements and verification that the AFW system will meet these requirements (refer to Enclosure 2 of the March 10, 1980, letter).

Response

(a) Tables Q410.18N-1 and Q410.18N-2 summarize the STPEGS conformance to SRP 10.4.9 and BTP ASB 10-1.

(b) The draft STPEGS Technical Specifications were submitted on June 17, 1985 (reference letter ST-HL-AE-1271 to Mr. Hugh L. Thompson from J. H. Goldberg). Technical Specifications for the AFWS have been prepared and were provided by letter ST-HL-AE-1548 dated January 15, 1986.

(c) The response is provided in Section 7A, item II.E.1.1.

Table 410.18N-1

STANDARD REVIEW PLAN, SECTION 10.4.9

Item	Acceptance Criteria	Related to	STPEGS Position	Reference UFSAR Section
1.	II.2	GDC 2	Conforms	10.4.9.2 & 10.4.9.3
2.	II.2	GDC 4	Conforms	3.5, Table 3.5-1, 3.6 & 10.4.9.2
3.	II.3	GDC 5		Conforms 10.4.9.2[1]
4.	II.4	GDC 19	Conforms	7.4.1, 7.4.1.1 & 10.4.9
5.	II.5 (a)	GDC 34 & 44	Conforms	
	II.5 (b)	GDC 34 & 44	Conforms	10.4.9.1 10.4.9.1, 10.4.9.2, 10.4.9.3 & Table 10.4-3
	II.5 (c)	GDC 34 & 44	Conforms	10.4.9.2 (paragraph 7 & 11), 6.2.4, 10.4.9.3 and Appendix 10A
6.	II.6	GDC 45	Conforms	6.6
7.	II.7	GDC 46	Conforms	10.4.9.4, 14.2 & STPEGS Tech Specs

1. Each unit has an entirely independent Auxiliary Feedwater System.

Table 410.18N-2

BRANCH TECHNICAL POSITION ASB 10-1

Item	ASB 10-1 Position	Related to	STPEGS Position	Reference UFSAR Sections
1.	B.1	Independency & Diversity	Conforms[1]	10.4.9.2
2.	B.2	Diverse & Separate Motive Power	Conforms	10.4.9.2, 7.4.1.1, Table 10.1-1
3.	B.3	Train Separation & Cross-connect	Meets the intent[2]	10.4.9.2, Fig. 10.4.9-1, 10.4.9.1.4, 10.4.9.3
4.	B.4	Redundancy	Conforms	10.4.9.1.4, 10.4.9.3
5.	B.5	AFW Flow Following HELB	Conforms[1]	10.4.9.1.4

1. Operator action is required to open the safety grade steam generator power-operated relief valves for specific events.

2. The STPEGS AFW system with its four independent trains is designed to function (provide the required AFW flow) following a postulated piping failure with or without offsite power available considering, at the same time, any single failure.

   Additionally, the AFW trains are provided with a cross-connect for use during nonsafety-actuated AFW system operation. This allows one, two, three, or four operating pumps to feed any or all four SGs. In addition, the cross-connect valves are provided with manual (locally operated) actuators which would allow any operable AFW pump to be aligned with any effective SG during an extreme accident and failure combination.