PSE&G Public Service Electric and Gas Company

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Robert L. Mittl General Manager
Nuclear Assurance and Regulation

May 24, 1985

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, MD 20814

Attention: Mr. Walter Butler, Chief
Licensing Branch 2
Division of Licensing

Gentlemen:

SAFETY EVALUATION REPORT
OPEN AND CONFIRMATORY ITEM STATUS
HOPE CREEK GENERATING STATION
DOCKET NO. 50-354

Attachment 1 is a current list which provides a status of the open and confirmatory items identified in Sections 1.7 and 1.8 of the Safety Evaluation Report (SER). Items identified as "complete" are those for which PSE&G has provided responses and no confirmation of status has been received from the staff. We will consider these items closed unless notified otherwise. In order to permit timely resolution of items identified as "complete" which may not be resolved to the staff's satisfaction, please provide a specific description of the issue which remains to be resolved.

Enclosed for your review and approval (see Attachment 3) are the resolutions to the SER items listed in Attachment 2. This information will be incorporated, as required, into Amendment 11 of the HCGS FSAR.

Should you have any questions or require any additional information on these items, please contact us.

Very truly yours,

Attachments

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1/1

C D. H. Wagner
USNRC Licensing Project Manager (w/attach.)

A. R. Blough
USNRC Senior Resident Inspector (w/attach.)

M P84 154/04 1/2

Date: 5/24/85

ATTACHMENT 1

Item No.	Subject	Status	R. L. Mittl to A. Schwencer ltr. dated
OI-1	Riverborne Missiles	Completed	1/31/85, 2/22/85, 5/8/85
OI-2	Equipment Qualification	Partial Response	2/1/85, 2/20/85, 2/28/85, 3/1/85
OI-3	Preservice Inspection Program	Partial Response	2/14/85 & 3/19/85
OI-4	GDC 51 Compliance	Completed	3/12/85
OI-5	Solid-State Logic Modules	Open	
OI-6	Postaccident Monitoring Instrumentation	Completed	5/14/85
OI-7	Minimum Separation Between Non-Class IE Conduit and Class IE Cable Trays	Completed	4/4/85
OI-8	Control of Heavy Loads	Closed	1/18/85 (SSER 1)
OI-9	Alternate and Safe Shutdown	NRC Action	
OI-10	Delivery of Diesel Generator Fuel Oil and Lube Oil	Closed	Amendment 8 (SSER 1)
OI-11	Filling of Key Management Positions	Open	
OI-12	Training Program Items		
	(a) Initial Training Program	Completed	1/7/85
	(b) Requalification Training Program	Completed	12/28/84, 4/26/85 (Revised Program)
	(c) Replacement Training Program	Completed	1/7/85
	(d) TMI Issues I.A.2.1, I.A.3.1, and II.B.4	Completed	1/7/85
	(e) Nonlicensed Training Program	Completed	1/7/85
OI-13	Emergency Dose Assessment Computer Model	Completed	1/7/85

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Item No.	Subject	Status	R. L. Mittl to A. Schwencer ltr. dated
OI-14	Procedures Generation Package	Partial Response	1/28/85 & 4/10/85
OI-15	Human Factors Engineering	Completed	4/10/85
C-1	Feedwater Isolation Check Valve Analysis	Open	
C-2	Plant-unique Analysis Report	Completed	1/8/85 & 1/31/85
C-3	Inservice Testing of Pumps and Valves	Open	
C-4	Fuel Assembly Accelerations	Completed	Amendment 8
C-5	Fuel Assembly Liftoff	Completed	Amendment 8
C-6	Review of Stress Report	Open	
C-7	Use of Code Cases	Completed	12/17/84
C-8	Reactor Vessel Studs and Fastners	Completed	5/24/85 Rev. 1
C-9	Containment Depressurization Analysis	NRC Review	
C-10	Reactor Pressure Vessel Shield Annulus Analysis	NRC Review	
C-11	Drywell Head Region Pressure Response Analysis	NRC Review	
C-12	Drywell-to-Wetwell Vacuum Breaker Loads	NRC Review	
C-13	Short-Term Feedwater System Analysis	Complete	4/22/85
C-14	Loss-of-Coolant-Accident Analysis	Completed	3/1/85
C-15	Balance-of-Plant Testability Analysis	Completed	Amendment 8
C-16	Instrumentation Setpoints	Completed	2/15/85
C-17	Isolation Devices	Open	

Item No.	Subject	Status	R. L. Mittl to A. Schwencer ltr. dated
C-18	Regulatory Guide 1.75	NRC Review	
C-19	Reactor Mode Switch	NRC Review	
C-20	Engineered Safety Features Reset Controls	Open	
C-21	High Pressure Coolant Injection Initiation	Open	
C-22	IE Bulletin 79-27	Completed	Amendment 8
C-23	Bypassed and Inoperable Status Indication	NRC Review	
C-24	Logic for Low Pressure Coolant Injection Interlock Circuitry	Open	
C-25	End-of-Cycle Recirculation Pump Trip	Completed	3/1/85
C-26	Multiple Control System Failures	NRC Review	
C-27	Relief Function of Safety/Relief Valves	Completed	2/15/85
C-28	Main Steam Tunnel Flooding Analysis	Completed	5/24/85
C-29	Cable Tray Separation Testing	Completed	4/4/85
C-30	Use of Inverter as Isolation Device	Completed	3/7/85
C-31	Core Damage Estimate Procedure	Open	
C-32	Continuous Airborne Particulate Monitors	Open	
C-33	Qualifications of Senior Radiation Protection Engineer	Open	
C-34	Onsite Instrument Information	Open	
C-35	Airborne Iodine Concentration Instruments	Open	

Item No.	Subject	Status	R. L. Mittl to A. Schwencer ltr. dated
C-36	Emergency Plan Items	Partial Response	11/9/84, 1/16/85, 2/7/85 & 4/4/85
C-37	TMI Item II.K.3.18	Partial Response	3/1/85 & 4/22/85

ATTACHMENT 2

ITEM NO.	SER SECTION	SUBJECT
C-8	5.3.1.5	Reactor vessel studs and fasteners
C-28	8.3.3.1.4	Main steam tunnel flooding analysis

DJD:mr

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ATTACHMENT 3

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SER ITEM NO. C-8 (SER SECTION 5.3.1.5)

REACTOR VESSEL STUDS AND FASTENERS

The reactor vessel studs and fasteners satisfy most of the recommendations of RG 1.65, "Materials and Inspections for Reactor Vessel Closure Studs." The FSAR does not discuss the nondestructive examinations of the bolts and nuts, and the applicant needs to confirm that the Code-specified inspections were performed. This is a confirmatory issue.

RESPONSE

FSAR Section 5.3.1.7 has been revised to provide the information requested above.

The following NSSS item by item assessment of compliance to Regulatory Guide 1.65, Position C.2 is provided for clarification:

- Purchase Specification 21A9340, Revision 1, Paragraph 5.1.4a, requires testing to be done after heat treatment prior to threading.

- ASME III, 1968 plus Winter 1969 Addenda Paragraph N-322 (required by purchase spec.) requires examination in accordance with SA-388.

- Purchase Specification 21A9340, Revision 1, Paragraph 5.3.4, requires magnetic particle or liquid penetrant exam to ASME III, Paragraph N-626 or N-627 be done on the final surface after all forming and heat treatment. Paragraph N-266 and N-267 are equivalent to NB-2583.

- ASME III, 1968 plus Winter 1969 Addenda Paragraph N-325.4 is equivalent to ASME III, 1974, Paragraph NB-2585.

5.3.1.7 Reactor Vessel Fasteners

The reactor vessel closure head (flange) is fastened to the reactor vessel shell flange by multiple sets of threaded studs and nuts. The lower end of each stud is installed in a threaded hole in the vessel shell flange. A nut and washer are installed on the upper end of each stud. The proper amount of preload can be applied to the studs by a sequential tensioning using hydraulic tensioners. The design and analysis of this area of the vessel is in full compliance with all ASME B&PV Code, Section III, Class I requirements. The material for studs, nuts, and washers is SA-540 Grade B24. The maximum reported ultimate tensile strength for the bolting material is less than the 170,000 psi limitation in Regulatory Guide 1.65. Also the Charpy impact test recommendations in Paragraph IV.A.4 of Appendix G to 10 CFR 50 were not specified in the vessel order since the order was placed prior to issuance of Appendix G to 10 CFR 50. However, impact data from the certified materials report shows that all bolting materials have met the Appendix G impact properties. The nondestructive examinations prescribed by the revision of the ASME B&PV Code in effect at the time the fasteners were ordered were conducted by the fabricator. All fasteners were found to be acceptable.

INSERT 1 →

A phosphate coating was applied to threaded areas of studs, nuts and bearing areas of nuts, and washers to act as a rust inhibitor and to assist in retaining lubricant on these surfaces.

5.3.1.8 SRP Rule Review

5.3.1.8.1 Acceptance Criterion II.2

SRP 5.3.1 acceptance criterion II.2 requires that the reactor vessel and its appurtenances be fabricated and installed in accordance with ASME B&PV Code, Section III, Paragraph NB-4100. The manufacturer or installer of such components is required to certify, by application of the appropriate Code symbol and completion of an appropriate data report in accordance with ASME B&PV Code, Section III, Paragraph NA-8000, that the materials used comply with the requirements of NB-2000, and that the fabrication or installation comply with the requirements of NB-4000.

The HCGS RPV and appurtenances were manufactured in accordance with the 1968 edition of the ASME B&PV Code, Section III, which does not have NB-designated subarticles. In light of HCGS's compliance with 1968 ASME B&PV Code, Section III, and information

SER ITEM 9

INSERT 1 TO PAGE 5.3-11

Regulatory Guide 1.65 defines acceptable materials and testing procedures with regard to reactor vessel closure and stud bolting for light-water-cooled reactors. The design and analysis of these reactor vessel bolting materials is in full compliance with ASME Code Section III, 1968 Edition Class 1 requirements which do not have NB-designated subarticles.

In relationship to regulatory position C.2 of Regulatory Guide 1.65, the bolting materials were ultrasonically examined in accordance with ASME Section III, N-322 after final heat treatment and prior to threading. The specified requirement for examination according to SA-388 was complied with. Straight beam examination was performed on 100 percent of cylindrical surfaces, and from both ends of each stud using a 3/4 maximum diameter transducer. In addition to the Code required notch, the reference standard for the radial scan contains a 1/2-inch diameter flat bottom hole with a depth of 10 percent of thickness, and the end scan standard contains a 1/4 diameter flat bottom hole 1/2 inch deep. Also, angle beam examination was performed on the outer cylindrical surface in both axial and circumferential directions. Any indication greater than the indication from the applicable calibration feature is unacceptable. A distance-amplitude correction curve per N-325 was used for the longitudinal wave examination. Surface examinations were performed on the studs and nuts after final heat treatment and threading, as specified in the regulatory guide, in accordance with N-626 or N-627 of the applicable ASME Code.

Specifications for ordering replacement/spare nuts and studs are in compliance with Regulatory Guide 1.65.

SER ITEM NO. C-28 (SER SECTION 8.3.3.1.4)
MAIN STEAM TUNNEL FLOODING ANALYSIS

By letter dated September 28, 1984, the applicant provided the results of a separation analysis that addressed protection of all Class 1E equipment from external hazards. On the basis of the results of this analysis, the staff concludes that all Class 1E equipment is protected from external hazards, meets GDC 2, 4, and 17, and is acceptable with one exception. The one exception involves a flooding hazard in the main steam tunnel. A feedwater line break will cause flooding and may cause failure of some Class 1E motor-operated valves and temperature elements. For each of these items, the applicant has stated that there is a primary and backup protective device located in the hazard-free area. The applicant has committed to perform an analysis to verify that, after both the primary and backup protective devices open as a result of failure of the nonprotected equipment together with the worst case single failure, the plant can be safely shut down. If the analysis shows the plant cannot be safely shutdown the applicant has committed to provide protection. On the basis of these commitments, the staff concludes that the design meets the protection requirements of GDC 2, 4, and 17 and is acceptable. This item is confirmatory pending receipt and review of the applicant's analysis.

Response

The attached report entitled, "Main Steam Tunnel Flooding Analysis," for Hope Creek Generating Station, dated April 1985, documents the above hazards analysis and concludes that none of the components which are flooded and are not qualified for submergence are required for safe shutdown of the plant, nor will their failure prevent safe shutdown. Because the equipment/systems that are required to safely shutdown the plant are single-failure proof, no single failure can prevent safe shutdown.

MAIN STEAM TUNNEL FLOODING ANALYSIS

HOPE CREEK GENERATING STATION

PUBLIC SERVICE ELECTRIC & GAS CO.

APRIL 1985

PREPARED BY BECHTEL POWER CORP.

PURPOSE

The Hope Creek Safety Evaluation Report (SER) requires submittal for NRC staff review a hazards analysis for effect of a feedwater line break in the main steam tunnel (MST) on the plant's ability to safely shut down. (SER Section 8.3.3.1.4 - Confirmatory Item No. 28)

METHODOLOGY

The analysis was conducted in the following manner:

1. Identify all Class 1E equipment and components in the main steam tunnel, Room 4316, that will be subject to the worst case submergence which results from a break in a main feedwater line. (Flood level is Elevation 126' of this room).

2. Identify the safety channel and safety function/system of each equipment or component identified.

3. Determine if the equipment or component is qualified for submergence. If not, determine if the equipment or component circuit has a primary and backup protective device located in a hazard-free area.

4. Determine if the plant can be safely shut down after both the primary and backup protective device open as a result of the failure of the unprotected equipment or component together with the worst case single failure.

ANALYSIS

The Class 1E equipment and components which will be subjected to flooding are identified on the attached table. This table also provides information on safety channel, safety function/system, submergence qualification and location of the primary and backup protective devices. The evaluation of safe shutdown after loss of the equipment/components not qualified for submergence is as follows:

A. Motor Operated Valves (MOVs)

   1. 1AB-HV-F071 - Main Steam drain line isolation downstream of the outboard MSIVs. This valve is not required to mitigate the consequences of a feedwater line break or any other pipe break which could cause flooding of the main steam tunnel, nor is it required for safe shutdown.

   2. 1KP-HV-5829A&B, -5834A&B, -5835A&B, -5836A&B, and 5837A&B - MSIV sealing system gas supply valves. These valves are only required to mitigate the consequences of a LOCA. Should any valve(s) spuriously open, upstream piping is protected from overpressurization by check valves (See FSAR Figure 6.7-1). These valves have no safe shutdown function.

A. Motor Operated Valves (MOVs) - Cont'd

3. 1AE-HV-F039 - RWCU return to feedwater. This valve is powered from AC motor control center 10B242, Channel D. The supply line to the RWCU system has a containment inboard isolation valve (1BG-HV-F001) powered from the Channel A source and an outboard isolation valve (1BG-HV-F004) powered from 10B242. Neither these valves nor their power supplies are located in the MST. There is no single failure which can prevent both supply isolation valves from closing. They will close automatically on low level in the RPV.

B. Solenoid Operated Valves

1KL-PDV-5825A&B - MSIV sealing system supply valves. See discussion of item A.2 above.

C. Thermocouples

The thermocouples provide input to the MSIV isolation logic which closes the MSIVs on high temperature in the MST. Closure of the MSIVs is not required to mitigate the consequences of a feedwater line break or to safely shut down the reactor. Closure of the MSIVs will not prevent safe shutdown of the reactor.

CONCLUSION

As discussed above, none of the components which are flooded and are not qualified for submergence are required for safe shutdown of the plant, nor will their failure prevent safe shutdown. Because the equipment/systems that are required to safely shutdown the plant are single-failure proof, no single failure can prevent safe shutdown.

CLASS 1E EQUIPMENT AND COMPONENTS ANALYZED

EQUIPMENT/ COMPONENT No.	SAFETY CHANNEL	SAFETY FUNCTION/SAFETY SYSTEM	QUALIFIED FOR SUBMERGENCE	LOCATION OF PRIMARY/BACKUP PROTECTIVE DEVICE
1SK-TE-N010A (Thermocouple)	RPS W	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C609 - Primary 10C410 - Backup (1)
1SK-TE-N012A (Thermocouple)	RPS W	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C609 - Primary 10C410 - Backup (1)
1SK-TE-N016 (Thermocouple)	RPS W	None (alarm and indication)/ Steam Leak Detection	No	10C609 - Primary 10C410 - Backup (1)

CLASS 1E EQUIPMENT AND COMPONENTS ANALYZED

EQUIPMENT/ COMPONENT No.	SAFETY CHANNEL	SAFETY FUNCTION/ SAFETY SYSTEM	QUALIFIED FOR SUBMERGENCE	LOCATION OF PRIMARY/BACKUP PROTECTIVE DEVICE
1SK-TE-N010B (Thermocouple)	RPS X	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C611 - Primary 10C411 - Backup (1)
1SK-TE-N012B (Thermocouple)	RPS X	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C611 - Primary 10C411 - Backup (1)
1SK-TE-N010C (Thermocouple)	RPS Y	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C609 - Primary 10C410 - Backup (1)
1SK-TE-N012C (Thermocouple)	RPS Y	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C609 - Primary 10C410 - Backup (1)
1SK-TE-N010D (Thermocouple)	RPS Z	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C611 - Primary 10C411 - Backup (1)
1SK-TE-N012D (Thermocouple)	RPS Z	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C611 - Primary 10C411 - Backup (1)
1AB-HV-F071 (Motor operated valve)	C	Main Steam lines downstream drain isolation	"	10B232 (2)

CLASS 1E EQUIPMENT AND COMPONENTS ANALYZED

EQUIPMENT/ COMPONENT No.	SAFETY CHANNEL	SAFETY FUNCTION/ SAFETY SYSTEM	QUALIFIED FOR SUBMERGENCE	LOCATION OF PRIMARY/BACKUP PROTECTIVE DEVICE
1KL-PDV-5825B (Solenoid valve)	C	MSIV Outboard Seal Gas Supply	No	1YF403 (2)
1KP-HV-5829B (Motor operated valve)	C	MSIV Outboard Seal Gas Supply	No	10B232 (2)
1KP-HV-5834B (Motor operated valve)	C	MSIV Outboard Seal Gas Supply	No	10B232 (2)
1KP-HV-5835B (Motor operated valve)	C	MSIV Outboard Seal Gas Supply	No	10B232 (2)
1KP-HV-5836B (Motor operated valve)	C	MSIV Outboard Seal Gas Supply	No	10B232 (2)
1KP-HV-5837B (Motor operated valve)	C	MSIV Outboard Seal Gas Supply	No	10B232 (2)

CLASS 1E EQUIPMENT AND COMPONENTS ANALYZED

EQUIPMENT/ COMPONENT No.	SAFETY CHANNEL	SAFETY FUNCTION/ SAFETY SYSTEM	QUALIFIED FOR SUBMERGENCE	LOCATION OF PRIMARY/BACKUP PROTECTIVE DEVICE
1KL-PDV-5825A (Solenoid Valve)	D	MSIV Inboard Seal Gas Supply	No	1YF404 (2)
1KP-HV-5829A (Motor operated valve)	D	MSIV Inboard Seal Gas Supply	No	10B242 (2)
1KP-HV-5834A (Motor operated valve)	D	MSIV Inboard Seal Gas Supply	No	10B242 (2)
1KP-HV-5835A (Motor operated valve)	D	MSIV Inboard Seal Gas Supply	No	10B242 (2)
1KP-HV-5836A (Motor operated valve)	D	MSIV Inboard Seal Gas Supply	No	10B242 (2)
1KP-HV-5837A (Motor operated valve	D	MSIV Inboard Seal Gas Supply	No	10B242 (2)
1AE-HV-F039 (Motor operated valve)	D	RWCU Discharge to Feedwater Isolation	No	10B242 (2)

CLASS 1E EQUIPMENT AND COMPONENTS ANALYZED

EQUIPMENT/ COMPONENT No.	SAFETY CHANNEL	SAFETY FUNCTION/ SAFETY SYSTEM	QUALIFIED FOR SUBMERGENCE	LOCATION OF PRIMARY/BACKUP PROTECTIVE DEVICE
1AB-HV-F019 (Motor operated valve)	D	Steam Lines Drain Outboard Isolation	Yes	10B242 (3)
1AB-HV-F067A (Motor operated valve	D	Main Steam Line A Outboard Drain	Yes	10B242 (3)
1AB-HV-F067B (Motor operated valve)	D	Main Steam Line B Outboard Drain	Yes	10B242 (3)
1AB-HV-F[illegible] (Motor [illegible] valve)	D	Main Steam Line C Outboard Drain	Yes	10B242 (3)
1AB-HV-F067D (Motor operated valve	D	Main Steam Line D Outboard Drain	Yes	10B242 (3)

(1) Opening the backup protective device de-energizes the associated RPS channel which may result in a reactor trip. This is a safe condition.

(2) Opening the primary and backup protective devices does not affect any component other than the identified component.

(3) For qualified operators, only primary protection device location is provided.

K68/15-8