

CATEGORY 1

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PARRISH, J.V. Washington Public Power Supply System
RECIP. NAME RECIPIENT AFFILIATION
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SUBJECT: Provides response to request for addl info on GL 95-07,
"Pressure Locking & Thermal Binding of Safety-Related Power
Operated Gate Valves."

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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October 15, 1996
GO2-96-200

Docket No. 50-397

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Subject: WNP-2, OPERATING LICENSE NO. NPF-21
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION -
GENERIC LETTER 95-07, "PRESSURE LOCKING AND THERMAL
BINDING OF SAFETY-RELATED POWER OPERATED GATE VALVES"
(TAC NO. M93539)

- References:
1. Letter GO2-96-027, dated July 12, 1996, JV Parrish (SS) to NRC, "Final Response to Generic Letter 95-07, 'Pressure Locking and Thermal Binding of Safety-Related Power Operated Gate Valves' (TAC No. M93539)"
 2. Letter GI2-96-221, dated September 4, 1996, TG Colburn (NRC) to JV Parrish (SS), "Request for Additional Information - Generic Letter 95-07, 'Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves,' for the Washington Public Power Supply System (WPPSS) Nuclear Project No. 2 (WNP-2) (TAC NO. M93539)"

The Supply System hereby provides the responses to the three requests for additional information included in the Reference 2 enclosure. The attachment to this letter provides the detailed response information.

Two of the three requests were for valve actuator capability calculations. The following responses contain descriptions of the calculations including the methodology and critical assumptions and summaries of the results, which we believe provide the necessary information for NRC staff review. Further, we are prepared to provide any additional information necessary. The Supply System does not, as a rule, docket engineering calculations because of the additional burden it places on the plant when a calculation becomes a licensing basis document, particularly when revisions are necessary. The calculations; however, are available for NRC review onsite.

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RESPONSE TO GENERIC LETTER 95-07 REQUEST FOR ADDITIONAL INFORMATION

Should you have any questions or desire additional information regarding this matter, please call me or L. C. Fernandez at (509) 377-4147.

Respectfully,



J. V. Parrish
Chief Executive Officer
Mail Drop 1023

Attachment

Responses to the Requests for Additional Information

cc: LJ Callan - NRC RIV
KE Perkins, Jr. - NRC RIV, Walnut Creek Field Office
NS Reynolds - Winston & Strawn
TG Colburn - NRR
DL Williams - BPA/399
NRC Sr. Resident Inspector - 927N

STATE OF WASHINGTON)
COUNTY OF BENTON)

Subject: Generic Letter 95-07
Additional Information

I, J. V. PARRISH, being duly sworn, subscribe to and say that I am the Chief Executive Officer for the WASHINGTON PUBLIC POWER SUPPLY SYSTEM, the applicant herein; that I have the full authority to execute this oath; that I have reviewed the foregoing; and that to the best of my knowledge, information, and belief the statements made in it are true.

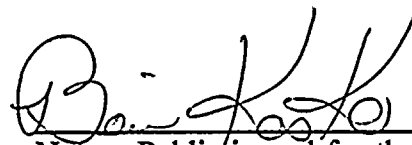
DATE 10/15, 1996



J/V. Parrish
Chief Executive Officer

On this date personally appeared before me J. V. PARRISH, to me known to be the individual who executed the foregoing instrument, and acknowledged that he signed the same as his free act and deed for the uses and purposes herein mentioned.

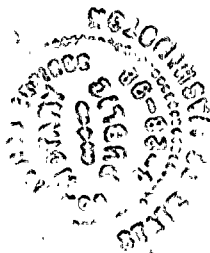
GIVEN under my hand and seal this 15 day of October 1996.



Notary Public in and for the
STATE OF WASHINGTON

Residing at Kennewick WA

My Commission Expires 4/28/98





RESPONSE TO GENERIC LETTER 95-07 REQUEST FOR ADDITIONAL INFORMATION

Attachment

Responses to the Requests for Additional Information

RESPONSE TO GENERIC LETTER 95-07 REQUEST FOR ADDITIONAL INFORMATION

Attachment
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Request No. 1

Regarding valve HPCS-V-4, High Pressure Core Spray Injection, the WPPSS [Supply System] submittal states that the HPCS pump will relieve pressure locking in 2.6 seconds, and that a capability evaluation demonstrates capability to open the valve during the short transient. The NRC staff believes that reliance on pump pressure to relieve a pressure locked condition is uncertain. This is because the valve actuator may be damaged due to operation at locked rotor conditions between the time the valve is initially called upon to open, the pump is started and the pressure in the vicinity of the valve builds up sufficiently to relieve the pressure locked condition. Please provide information on how this uncertainty is addressed for WNP-2. In addition, please provide the capability evaluation, including thrust requirement and actuator capability calculations, for our review.

Response

The HPCS-V-4 capability evaluation, ME-02-96-21, evaluated the potential for damage due to pressure locking conditions during transients which require the valve to open for HPCS injection. The evaluation concluded that, although the open thrust loads exceed the credited motor gearing capability at reduced voltage, the SB-4 actuator and valve can withstand the increased thrust. It is acceptable for the motor gearing capability at reduced voltage to be less than the open thrust loads if the required thrust to unseat the valve is less than the structural thrust limit of the actuator and valve. The capability evaluation showed that the required thrust to unseat and open the valve under pressure locking conditions is well below the calculated valve structural limit of 256,193 lb. Thus, it was concluded that the valve and actuator would not be damaged. HPCS-V-4 is a parallel sliding disc gate valve and the methodology for the thrust calculations is relatively straightforward. The required thrust is the summation of the reaction forces at both the upstream and downstream discs with the measured static unseating thrust minus stem piston effect. The total required thrust to open the valve was calculated to be 185,469 lb. A valve factor of 0.5 was used in the thrust margin calculation and is based on dynamic test data. Even if the valve factor degrades to as high as 0.7, sufficient thrust margin still exists to provide confidence that the valve will open under pressure locking conditions.

The circuit breaker for the HPCS-V-4 actuator motor has an instantaneous trip setting that is well above the rated locked rotor current. Also, the thermal overloads for the actuator motor are sized to provide a minimum of 8 to 9 seconds at rated locked rotor current conditions before tripping power to the actuator motor. Thus, the actuator motor will continue to provide valve opening thrust well after the 2.6 seconds it takes for the HPCS pump to relieve the pressure locking conditions.

Based on the above discussion, sufficient margin exists to provide assurance that the valve and actuator for HPCS-V-4 are capable of withstanding the thrust loads required to open the valve under pressure locking conditions. Furthermore, the circuit breaker and thermal overloads for the actuator motor will ensure that the motor will operate for a minimum of 8 to 9 seconds at rated locked rotor current conditions. Since the pressure locking conditions only last 2.6 seconds, the actuator is capable of either opening the valve on demand or "riding out" the

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Attachment

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pressure locking conditions and opening the valve when the pressure locking conditions are relieved.

Request No. 2

Regarding valve RCIC-V-31, Reactor Core Isolation Cooling Suppression Pool Suction, the licensee's submittal states that a capability evaluation demonstrates valve capability under pressure locked conditions. Please provide this capability evaluation, including thrust requirement and actuator capability calculations, for our review.

Response

The RCIC-V-31 capability evaluation, ME-02-96-23, determined that the pressure locking load due to valve bonnet pressurization can be overcome by the thrust capability of the actuator. The valve could experience pressure locking when the bonnet is initially pressurized due to system back leakage and a subsequent RCIC initiation causes a rapid downstream depressurization. The thrust capability of the actuator (including the effects of degraded voltage and degraded stem factor) provides an approximate 30% margin for opening the valve with the bonnet pressurized to the suction relief valve pressure setting (116 psig). This margin is typical for safety-related motor-operated gate valves under design basis conditions and is considered acceptable. The methodology used to calculate the opening thrust requirement is consistent with NUREG/CP-046, "Workshop on Gate Valve Pressure Locking and Thermal Binding." Further conservatism was incorporated into the methodology by the addition of a wedge piston effect load. The total required thrust to open the valve was calculated to be 10,244 lb.

Request No. 3

In addition, the NRC staff believes that valve RCIC-V-31 may be potentially susceptible to thermally-induced pressure locking through heat transfer from the suppression pool during a design basis event. Please address this issue. If applicable, please provide for our review any heat transfer analyses completed to address this concern.

Response

The following qualitative evaluation of the susceptibility of RCIC-V-31 to thermally induced pressure locking is provided:

For a large break loss of coolant accident (LOCA), the reactor will depressurize rapidly, allowing low pressure coolant injection and spray (LPCI and LPCS) to provide makeup to the reactor vessel. Therefore, RCIC contribution for a large break LOCA would not be significant nor necessary. For a small break LOCA, a longer reactor depressurization time is assumed and the suppression pool would be cooled by the Residual Heat Removal (RHR) system in the suppression pool cooling mode. Analysis performed for power uprate resulted in a bulk suppression pool temperature of less than 200°F for a LOCA with suppression pool cooling. Thus, only a very gradual heatup of the RCIC-V-31 bonnet is expected prior to suction

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- Attachment

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switchover from the CST to the suppression pool. Any increase in bonnet pressure due to the gradual heatup of the bonnet is expected to be of the same magnitude as the pressure locking event discussed in the response to Request No. 2 above. As concluded in the previous response, the actuator for RCIC-V-31 has sufficient capability to overcome the pressure locking load.

RCIC-V-31 does not have an active open safety function since there are no conditions within the current WNP-2 licensing basis where RCIC suction from the suppression pool is required for event mitigation. Based on the current screening criteria, all valves without an active open safety function are screened out of the GL 95-07 population. However, RCIC-V-31 was not screened out because Technical Specifications require RCIC to automatically align to the suppression pool if the condensate storage tank (CST) is unavailable or at a low level. This automatic switchover function is not safety-related and only maintained for Anticipated Transient Without Scram (ATWS) mitigation. The actual CST volume is double that which is credited in the WNP-2 Individual Plant Examination (IPE) analysis for RCIC and HPCS. This realistically precludes any possibility of ever needing to switch the RCIC suction from the CST to the suppression pool. The Station Blackout procedure also states that the CST is the preferred suction source for RCIC.