Public Service™

October 12, 1988
Fort St. Vrain
Unit No. 1
P-88318

Public Service
Company of Colorado
P.O. Box 840
Denver, CO 80201-0840

R.O. WILLIAMS, JR.
VICE PRESIDENT
NUCLEAR OPERATIONS

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

Docket No. 50-267

SUBJECT: Response to Request for Additional Information, Generic Letter 88-03 Fort St. Vrain

REFERENCE: 1. PSC letter dated May 27, 1988, Williams to Document Control Desk (P-88115)

2. NRC letter dated June 29, 1988, Michaud to Williams (G-88255)

3. NRC letter dated August 25, 1988, Heitner to Williams (G-88357)

Gentlemen:

Public Service Company of Colorado (PSC) responded to NRC's Generic Letter 88-03 in Reference 1. In Reference 2 the NRC submitted the following request for additional information:

"The emergency water booster pumps P-2109 and P-2110, were not included in the licensee's evaluation of Generic Letter 88-03. Although not used to supply water to the steam generators, these pumps would be used to provide the motive force to drive the helium circulators when using firewater. These pumps are also normally lined up such that two check valves provide the only isolation from the emergency feedwater system. The staff considers the unique aspect of these pumps and the system's configuration to warrant their inclusion in the evaluation of Generic Letter 88-03 for the Fort St. Vrain Nuclear Generating Station."

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PSC Response:

In the request for additional information, a concerr was identified that only two check valves afford protection for the emergency water booster pumps (P-2109 and P-2110) from becoming steam bound. The NRC's Mr. Paul Michaud discussed with PSC personnel the flow path of concern whereby the emergency feedwater header is postulated to cause reverse flow through the emergency condensate header which brings the discharge of P-2109 to emergency feedwater temperature causing P-2109 and/or P-2110 to become steam bound.

The points at which the two helium circulator water turbine drive supply lines (line L21219, loop 1, and line L21325, loop 2) tap off the emergency feedwater header (line L22291, PI-21-5, A-6) could contain hot water (approaching the temperature of the deaerator, approximately 310 degrees F). This is based on emergency feedwater continually flowing through the emergency feedwater header to provide makeup to the Bearing Water Surge Tanks (T-2104 and T-2105) and keeping the backup bearing water system pressurized (requiring 50 to 100 gpm total flow).

For hot water to flow from the emergency feedwater header into one of the helium circulator water turbine drive supply lines and on to the emergency water booster pumps (P-2109 and P-2110), the water would have to flow through approximately 340 feet of piping (based on isometric drawings) varying in size from 10" to 3", which includes a check valve, a stopcheck valve (e.g.; HV-21259 - '1B' circulator), and many elbows, bends, and other flow restrictions.

Water in this path is normally stagnant, since paths off of the helium circulator supply lines from the emergency feedwater header are isolated by block valves preventing back flow into the condensate system. This provides assurance that when water is supplied to a helium circulator water turbine drive via the emergency feedwater header, flow will not be diverted to other systems. Water from the emergency feedwater header does not supply the helium circulator water turbine drives during normal plant operation.

In order to heat up P-2109 or P-2110 to emergency feedwater temperature, water would need to flow through the pump to any of the following:

- through the emergency condensate header back to P-3106 and P-3106S (condensate pumps) which have normally closed valves to prevent flow, HV-3133-2 and HV-3135-2 respectively,

- through the emergency condensate header to loop 1 or loop 2 steam generators which have a normally closed valve (HV-2237 and HV-2238 respectively,) and a check valve (V-2257 and V-2256 respectively) to prevent flow.

- through the emergency condensate header to loop 1 or loop 2 cold reheat lines which have a normally closed valve to prevent flow, HV-2291 and HV-2290 respectively, and

- through the emergency condensate header to system 45 (fire water) which has two normally closed valves to prevent flow, HV-4519 and HV-4518.

- through the emergency condensate header to system 84 (auxiliary boiler feed pumps) which has HV-31121, a normally closed valve to prevent flow.

- through the emergency condensate header to system 45 which has HV-31122, a normally closed valve to prevent flow.

PSC recognizes that check valve leakage is considered to be a generic concern in the nuclear industry, as noted in a recent NRC letter dated August 25, 1988 (G-88357) and NRC Information Notice No. 88-70 dated August 29, 1988.

The NRC letter dated August 25, 1988 notes that the primary cause of premature degradation of check valves is continuous fluctuation of the check valve disc when it is not firmly seated against its back seat by fluid force. However, there is a shut stop check valve (e.g.; HV-21259 - '1B' Circulator) in this path, which is held closed by 90 to 100 psig instrument air, when under conditions of interest. It is highly unlikely this stop check valve would leak quantities of water such that the emergency condensate header could heat up.

Assuming one of the stop check valves isolating the emergency condensate supply to a water turbine drive from the emergency feedwater supply did leak, the only driving force to direct flow of hot water to the emergency condensate header would be leakage of emergency feedwater into the condensate system. This flow path would not direct water to the emergency water booster pumps, but to piping of the condensate system as the emergency water booster pumps are essentially dead ends.

Based on the above it is inconceivable that water at high enough temperature to flash to steam could make its way to the emergency water booster pumps from the emergency feedwater header by means of this flow path.

The emergency feedwater header can be aligned to supply water to either steam generator EES section, and also can be aligned to provide water directly to the Pelton wheel of any of the four helium circulators. The emergency feedwater header does not supply feedwater to the suction of either emergency water booster pump, since there is no need to boost feedwater pressure to drive a helium circulator on its Pelton wheel. Firewater can be lined up to supply the steam generator EES sections via the emergency feedwater header for Safe Shutdown Cooling. In establishing Safe Shutdown Cooling with the emergency feedwater header, firewater would be supplied to the emergency water booster pumps, P-2109 or P-2110, by opening manual valves V-211573 and V-211570.

PSC has evaluated the possibility of feedwater entering the emergency water booster pumps from the emergency feedwater header. The emergency feedwater supply to the helium circulator Pelton wheels is isolated from both emergency water booster pumps by normally shut manual valves V-211574 and V-211571, as well as check valves V-211575, V-211569 (P-2109), and V-211582 (P-2110). A tell-tale drain is positioned between the two normally shut manual valves, V-211574 and V-211571. This configuration is more than adequate to assure hot water from the emergency feedwater header cannot enter either emergency water booster pump, flash to steam, and interfere with proper operation of the pump. The Integrated System Valve Lineup and Checklist for System Operating Procedure 21-02, IVL 21-02, requires operators to verify that V-211574 and V-211571 are closed prior to startup of the system. These measures provide adequate assurance that hot water from the emergency feedwater supply to the helium circulator Pelton wheels can not enter the emergency water booster pumps.

PSC has also evaluated the possibility of feedwater entering the emergency water booster pumps from the normal feedwater header. For feedwater to reach either P-2109 or P-2110, it would have to flow in the wrong direction through check valve V-2257 and then through normally closed motor operated valve HV-2237 (Loop 1), or it would have to flow in the wrong direction through check valve V-2256 and then through normally closed motor operated valve HV-2238 (Loop 2).

HV-2237 (emergency condensate to Loop 1 steam generator EES section) is electrically interlocked with the Loop 1 feedwater block valve, HV-2201, such that HV-2237 cannot be opened unless the normal supply of feedwater is isolated to Loop 1. Likewise, HV-2238 (emergency condensate to Loop 2 steam generator EES section) is electrically interlocked with the Loop 2 feedwater block valve such that HV-2238 cannot be opened unless the normal supply of feedwater is isolated to Loop 2. This provides adequate assurance that hot feedwater will not flow into P-2109 or P-2110, flash to steam, and interfere with proper pump operations.

PSC has evaluated numerous other flow paths for the possibility of hot water or steam ingress to the emergency water booster pumps in addition to the feedwater and emergency feedwater headers. All the flowpaths evaluated contain adequate protection to prevent steam binding of the emergency water booster pumps.

Even if P-2109 and P-2110 were to become steam bound, it is unlikely this would prevent these pumps from performing their safety function during Safe Shutdown Cooling. The Safe Shutdown cooling procedures, which rely upon one of the emergency water booster pumps (SSC-03, SSC-04, and SSC-05) to provide motive power to a helium circulator Pelton wheel, all require depressurization of the steam generator EES section to be utilized for cooldown before 60 minutes into an interruption of forced circulation. The emergency water booster pump would be started no later than 90 minutes after the interruption of forced circulation. The interval between feedwater system depressurization and helium circulator restart (approximately 35 minutes to 1 hour) should permit steam in an emergency water booster pump to condense.

When the emergency water booster pump is started, it is being supplied with relatively cold firewater from a firewater pump (125 psig rated discharge pressure). If any steam were present in the pump it would quickly be condensed by cold water.

PSC considers that steam binding of the emergency water booster pumps has been precluded by design, valve configuration and procedural requirements. PSC has maintained and will continue to maintain these design features and procedural requirements as necessary to preclude steam binding from becoming a problem at FSV.

If there are any questions, please contact Mr. M.H. Holmes at (303) 480-6960.

Sincerely,

R.O. Williams, Jr.
Senior Vice President
Nuclear Operations

ROW/JRJ:jw

cc: Regional Administrator, Region IV
ATTN: Mr. T.F. Westerman
Chief, Projects Section B

Mr. Robert Farrell
Senior Resident Inspector
Fort St. Vrain

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter	)	
	)	
Public Service Company of Colorado	)	Docket No. 50-267
Fort St. Vrain Unit No. 1	)	

AFFIDAVIT

R. O. Williams, Jr. being first duly sworn, deposes and says: That he is Senior Vice President, Nuclear Operations, of Public Service Company of Colorado, the Licensee herein, that he has read the information presented in the attached letter and knows the contents thereof, and that the statements and matters set forth therein are true and correct to the best of his knowledge, information and belief.

R. O. Williams, Jr.
Senior Vice President
Nuclear Operations

STATE OF Colorado)
COUNTY OF Boulder)

Subscribe and sworn to before me, a Notary Public on this 12th day of October, 1988.

Notary Public

My commission expires 9/12, 1992