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May 6, 1980
JPN-80-26

Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. Thomas A. Ippolito, Chief
Operating Reactors Branch No.3
Division of Operating Reactors

Subject: James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
Containment Purge and Vent System Isolation
Valve Operability

References: 1) Letter, Darrell G. Eisenhut (NRC) to All Light Water Reactors dated September 27, 1979
2) Letter, Thomas A. Ippolito (NRC) to George T. Berry (PASNY) dated October 22, 1979
3) Letter, Paul J. Early (PASNY) to Thomas A. Ippolito (NRC) dated November 26, 1979
4) Letter, Thomas A. Ippolito (NRC) to George T. Berry (PASNY) dated December 19, 1979
5) Letter, Paul J. Early (PASNY) to Thomas A. Ippolito (NRC) dated February 29, 1980
6) Letter, Paul J. Early (PASNY) to Thomas A. Ippolito (NRC) dated March 19, 1980

Dear Sir:

Enclosed are the results of an analysis of Containment Vent and Purge System large isolation valve operability conducted and provided to the Authority by Fisher Controls Company. Fisher conducted this analysis with consideration of the operability guidelines provided by the NRC letter of September 27, 1979 and after having met with the NRC. The analysis results show that no limitation of valve opening is necessary. The enclosed information is the result of the "consultation with the valve supplier" required by the NRC letter of October 22, 1979. Thus, the Authority

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is in compliance with the NRC Interim Position 2a contained in the October 22, 1979 letter.

Discussion of Results

Fisher has used a simplifying and very conservative assumption that the total containment pressure is seen across each isolation valve and that it is seen throughout the valve travel from fully open to closed. Consideration was given to LOCA induced stresses in valve parts and the ability of valve operators to overcome resisting torque.

Drywell

The temperature (285°F) and pressure (39 psig) used in the analysis of valves in lines coming from the drywell envelope all values obtained from the most recent analysis of containment response to DBA for the duration of such an accident. The lowest maximum allowable differential pressure for protection of valve internals identified is 40 psid. Table 1 shows that sufficient operator torque is available for closure. Therefore no limitation on valve travel is required.

Suppression Chamber

The pressure (22 psig) used in the analysis of valves is the lines coming from the suppression chamber is that obtained from the most recent analysis of containment response to DBA at 8 seconds into such an accident. Required closure time for these valves per the Technical Specifications is 5 seconds. The peak suppression chamber pressure over the first 30 seconds of a DBA is approximately 27 psig. The lowest maximum allowable differential pressure for protection of valve internals identified is 48.7 psid. Therefore, valve integrity is assured. The torque requirement analysis indicates a large margin of available torque vs required operator torque for a LOCA differential pressure of 22 psid. It is expected that available torque would be sufficient for closure even against 27 psid. The assumed suppression chamber temperature of 270°F is conservative.

Conformance with NRC Interim Position of October 22, 1979

As indicated in the Authority's letter of February 29, 1980, step have been taken to minimize the use of purge and vent valves. (NRC Condition 1)

This letter and the enclosure show compliance with NRC Condition 2a.

Regarding NRC Condition 2b, the only area of disagreement relates to the JAF Emergency Manual Override which the Authority has committed not to use without prior NRC approval. The Authority is concerned that the NRC position (1) does not take into account the separation of override logic for redundant isolation valves and that (2) unquestioned compliance with the NRC position may preclude post-LOCA purging which is part of the design basis for JAF. The Authority has provided a substantial amount of information on the override feature in our letter of March 19, 1980 responding to the request for additional information in the NRC's letter of December 19, 1979. We suggested, at that time, a meeting to discuss this information and we now reiterate that suggestion.

Very truly yours,

Paul J. Early
Vice President and Assistant
Chief Engineer-Projects

FISHER CONTROLS COMPANY

MARSHALLTOWN, IOWA 50158

AUTOMATIC CONTROL EQUIPMENT
SINCE 1880

Reply to: FISHER CONTROLS COMPANY, R. A. Engel Technical Center, P.O. Box 11, Marshalltown, Iowa 50158

April 22, 1980

Power Authority of the State of New York
10 Columbus Circle
New York, New York 10019

Attention: Mr. Paul Reichert

Subject: James A. Fitzpatrick Nuclear Power Plant
Containment Vent and Purge Isolation Valves
24" 9222 Butterfly Valves; S/N: BF171050 thru 53
20" 9222 Butterfly Valves; S/N: BF171054 thru 57

Gentlemen:

1. Attached is the analysis printout data substantiating the capability of the subject valves to close from the full open angle of 90° against the stated LOCA conditions for each size valve. A brief explanation of this analysis follows:

   a. The horizontal column labeled "DP" shows the allowable differential pressure across the valve, for various opening angles, (listed at the bottom of the page) for the valve construction.

      Note that for the 20 inch valves, the allowable differential pressure for all angles of opening are greater than the accident condition of 22 psid. The same is true for the 24 inch valves with an accident condition of 39 psid. Therefore, both the 20 inch and 24 inch valves may continue to operate at a 90° open angle.

   b. The actuator torque listings provided on the printout sheets do not apply because these torque values are for the maximum allowable ΔP values at each angle. The appropriate torque values for flow into the plate valve disc were manually calculated using the specified LOCA differential pressure conditions.

   c. The analysis for the 20 inch valves was done using material strength values for 270° rather than the identified LOCA condition of 115°F. This difference in temperatures does not have a significant effect on the output for this case.

2. These valves are provided with Bettis actuators with an air operation signal of 90-120 psig. With this air signal range in mind, the 20 inch valves should have a Bettis type 732C-SR80 actuator and the 24 inch valves should have a Bettis type 733C-SR80 actuator.

a. The torque requirement for the 20 inch valves are calculated to be 3,831 in.-lb. torque required at 0° and 5,618 in.-lb. at 90°. The Bettis catalog data indicates an available actuator torque of 8,200 in.-lb. at 0° valve opening and 16,400 in.-lb. at 90° valve opening for a Bettis type 732C-SR80 actuator. This indicates that the stated Bettis will be adequate to close the 20 inch valve in the case of a LOCA condition.

b. The torque requirements for the 24 inch valves are listed for each 10° valve increments in Table 1. These torques are based on a 39 psid differential pressure across the valve. The available actuator torque values for the Bettis type 733C-SR80 actuator are also listed in Table 1. These available torques are based upon the published data of 12,900 in.-lb. at 0° and 25,700 in.-lb. at 90° along with a graph showing approximate torque vs. valve rotation for spring return actuators. It is noted that the available torque always exceeds the total calculated torque required through the complete rotation of the valve. Therefore, from a torque consideration, the valve can safely close from a 90° position during the LOCA condition of 39 psid.

3. It should be noted the the subject valves are capable of closing from fully open due to various factors. The LOCA conditions of 39 psid differential pressure at 285°F for the 24 inch valves and 22 psid differential pressure at 115°F for the 20 inch valves are not as severe of a case as some that Fisher has previously investigated. The subject valves are constructed with higher strength shafts which allow higher stresses due to LOCA conditions. A plate disc is used for each valve allowing for lesser dynamic torque effects at larger angles than that for a cast disc. These major factors allow the subject valves to close from fully open rather than requiring a maximum valve opening of less than 90° as has been the case of some other nuclear containment vent valves.

4. This should answer the questions that you had about the subject valves.

Sincerely,

FISHER CONTROLS COMPANY

David L. Cerny
Design Engineer

DLC:km

Encl.: 1. Analysis Printout for S/N: BF171054-57, P-96940-05/08, dated 2-7-80, 1 page
2. Analysis Prinout for S/N: BF171050-53, P-96940-01/04, dated 2-7-80, 1 page.

cc - Larry Fleetwood
Dick Baumann

Table 1: Angle of Opening Vs. Allowable Pressure Differential for 24" 9200 Containment Ventilation Valves

S/N 171050, 51, 52, & 53

ANGLE	ΔP	REQUIRED ACTUATOR TORQUE (IN-LB)*	APPROXIMATE ACTUATOR TORQUE AVAILABLE (IN-LB)**
0	--	8,489	12,900
10	74	5,100	11,223
20	74	6,658	10,191
30	74	6,658	10,191
40	74	6,658	10,965
50	74	8,478	11,610
60	62	11,482	13,545
70	41	15,196	15,480
80	40	15,561	19,350
90	40	15,561	25,700

* Sized using 39 psid differential pressure

** Actuator torque values are for a Bettis 733C-SR80

DATE 2-7-80 BY _____ REF. NO. S/A BF171054-57

VALVE TYPE 9200 SIZE 20" TEMP 270° SHAFT MATL 17-4 BUSH. MATL #5(BRONZE)

DISC TO SHAFT CONNECTION PINNED DRIVE TO SHAFT CONNECTION KEYED

SHAFT STRENGTH FCTR %	100.000	100.000	100.000	100.000	100.000	100.000
BUSH. STRENGTH FCTR %	50.000	50.000	50.000	50.000	50.000	50.000
DISC TO SHAFT CONC FCTR	.500	.500	.500	.500	.500	.500
DRIVE TO SHAFT CONC FCTR	.750	.750	.750	.750	.750	.750
INPUT						
D	19.000	19.000	19.000	19.000	19.000	19.000
DP [illegible]	79.300	79.300	79.300	70.500	49.500	48.700
Lo	.600	.600	.600	.600	.600	.600
Ts	.000	.000	.000	.000	.000	.000
Ti	.000	.000	.000	.000	.000	.000
m	.000	.000	.000	.000	.000	.000
DIF	48.000	82.000	191.000	439.000	1030.000	1280.000
P1	79.300	79.300	79.300	70.500	49.500	48.700
DPe fact	.260	.350	.250	.130	.110	.090
GENERATED VARIABLES						
St	52500.000	52500.000	52500.000	52500.000	52500.000	52500.000
Ss	26250.000	26250.000	26250.000	26250.000	26250.000	26250.000
Sb	5000.000	5000.000	5000.000	5000.000	5000.000	5000.000
OUTPUT						
ds TORK & BEND (St)	1.109	1.128	1.155	1.162	1.094	1.092
ds TORK & BEND (Ss)	1.134	1.160	1.214	1.259	1.222	1.221
ds TORK & SHEAR (Ss)	1.185	1.237	1.300	1.367	1.312	1.308
ds DISC CONNECT (Ss)	1.003	1.209	1.360	1.396	1.500	1.500
ds DRIVE CONNECT (Ss)	1.026	1.154	1.288	1.389	1.365	1.365
ds BUSH LOAD (Sb)	1.500	1.500	1.500	1.414	1.185	1.175
ds SPECIFIED	1.500	1.500	1.500	1.500	1.500	1.500
TOT ACTUATOR TORK REQ	5525.780	7199.469	8991.160	10651.647	10991.639	10978.347
ACTUAL BUSH LOAD	5000.235	5000.235	5000.235	4445.354	3121.230	3079.762
	15°	20° AND	60°	60°	75°	90° - 90°

DATE 2-7-60 BY ____ SUBJECT S/N 171050/53

VALVE TYPE 4200 SIZE 24" TEMP 285°F SHAFT MATL 17-4 BUSH MATL #5 (BRONZE)

DISC TO SHAFT CONNECTION PINNED DRIVE TO SHAFT CONNECTION KEYED

SHAFT STRENGTH FCTR %	100.000	100.000	100.000	100.000	100.000	100.000
BUSH STRENGTH FCTR %	50.000	50.000	50.000	50.000	50.000	50.000
DISC TO SHAFT CONC FCTR	.500	.500	.500	.500	.500	.500
DRIVE TO SHAFT CONC FCTR	.750	.750	.750	.750	.750	.750
INPUT						
D	23.000	23.000	23.000	23.000	23.000	23.000
DF (Actuator Thrust Force)	73.700	73.700	73.700	62.300	41.500	40.000
Lo	.700	.700	.700	.700	.700	.700
Ys	.000	.000	.000	.000	.000	.000
Yi	.000	.000	.000	.000	.000	.000
n	.000	.000	.000	.000	.000	.000
DTF	85.000	146.000	340.000	783.000	1910.000	2410.000
PI	73.700	73.700	73.700	62.300	41.500	40.000
Dfe fact	.260	.350	.250	.180	.110	.090
GENERATED VARIABLES						
St	52500.000	52500.000	52500.000	52500.000	52500.000	52500.000
Ss	26250.000	26250.000	26250.000	26250.000	26250.000	26250.000
Sb	5000.000	5000.000	5000.000	5000.000	5000.000	5000.000
OUTPUT						
ds TORK & BEND (St)	1.295	1.318	1.353	1.344	1.259	1.251
ds TORK & BEND (Ss)	1.312	1.358	1.424	1.462	1.419	1.416
ds TORK & SHEAR (Ss)	1.292	1.414	1.527	1.582	1.515	1.511
ds DISC CONNECT (Ss)	1.186	1.417	1.698	1.759	1.751	1.750
ds DRIVE CONNECT (Ss)	1.201	1.371	1.518	1.615	1.586	1.584
ds BUSH LOAD (Sb)	1.750	1.750	1.750	1.600	1.313	1.289
ds SPECIFIED	1.750	1.750	1.750	1.750	1.750	1.750
TOT ACTUATOR TORK RQ (Actuator Thrust)	8883.522	11452.122	14445.[illegible]	16708.375	15813.753	15734.130
ACTUAL BUSH LOAD	5003.104	5033.104	5033.104	4229.218	2817.216	2715.389

10° 20°-40° 50° 60° 70° 80°-90°