POWER AUTHORITY OF THE STATE OF NEW YORK

10 COLUMBUS CIRCLE NEW YORK, N. Y. 10019

(212) 397-6200

March 19, 1980
JPN-80-16

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

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

Subject: James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
Response to NRC Request for Additional Information
for the Containment Purge and Vent System

Dear Sir:

Attached are responses to the NRC Requests for Additional Information attached to your letter of December 19, 1979.

A number of JAF drawings, elementary diagrams, and logic diagrams have been included as part of the responses. The Authority suggests a meeting in which personnel familiar with these drawings and diagrams will be available to provide knowledgeable discussion.

Specific agenda items for such a meeting on containment purging and venting should include system design philosophy, equipment qualifications and the vendor analyses of valve closure capabilities discussed in our letter of February 29, 1980.

It is requested that this technical review meeting be scheduled before April 15, 1980. Arrangements should be made in consultation with our Mr. Paul Reichert (212-397-2944).

Very truly yours,

Paul J. Early
Assistant Chief Engineer-Projects

A034 S/1 oversize DRU to: FILE

8003270434

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) OF DECEMBER 12, 1979 FOR THE CONTAINMENT PURGE AND VENT SYSTEM

RAI-1 With regard to the drywell vent and purge penetration cover grating, discuss the design basis of the grating. In particular:

a. Discuss the design basis for the sizing of the grating mesh pattern;

b. Discuss the ability of the grating to withstand dynamic LOCA forces;

c. Discuss the provisions taken to assure that the metal grating has been properly qualified (e.g., for seismic events); and

d. Describe what routine procedures you use to assure that partial blockage of the grading by debris during normal operation does not affect the ability of the grating to remain in place and perform its function when subjected to LOCA forces.

RESPONSE

1a. Specific design bases for the sizing of the grading mesh are not known, however, its purpose is to prevent loose material from being placed in the penetration.

b&c. The Authority has directed the Architect-Engineer to design a protective grating which is capable of withstanding dynamic LOCA forces and qualified for seismic events.

d. The Authority does a routine inspection to assure that no loose equipment or material is left in the drywell after each outage whenever containment entry is made.

RAI-2 The copies of P & ID's attached to your submittal of August 15, 1979 were illegible. Please provide legible drawings as well as a schematic drawing of the purge system. Please include the isolation valves in this schematic.

RESPONSE

2. Enclosed is Drawing No. 11825-FM-18A-20 "Flow Diagram-Drywell Inerting, C.A.D and Purge-System 27" which provides the requested information.

RAI-3 For the containment purge isolation valves, please specify the differential pressure across the valve for which the maximum leak rate occurs. Provide test results (e.g., from vendor tests of leakage rate versus valve differential pressure) which support your conclusion.

RESPONSE

3. The vendor for the subject valves does not have specific test results for leakage rate versus valve differential pressure. The Authority's leak test for these valves are only done at 60 psia.

RAI-4 Please provide operational justification for utilizing 2 supply and 2 exhaust purge lines for the drywell. Discuss the procedures governing the use of the purge system (e.g., sequence of valve openings, etc.)

RESPONSE

4. The Authority does not use 2 supply lines or 2 exhaust lines simultaneously when containment integrity is required. The Authority's letter of February 29, 1980 describe the use of the purge and vent isolation valves.

RAI-5 The override[a] of one type safety actuation signal (e.g., radiation) must not cause the blocking of any other type of safety actuation signal (e.g., pressure) to isolation valves. Override of a system actuation signal composed of several types of actuation signals is not permitted. It would appear from your August 15, 1979 response that multiple bypasses of safety actuation signals could be initiated by a single override action. In this perspective, please provide drawings and/or sketches which show the point in valve closure logic where the override signal is introduced. Please provide a discussion of whether an override affects a single actuation signal or more than one actuating signal.

(a) The following definition of an override is given for clarity: The signal is still present, and it is blocked in order to perform a function contrary to the signal.

RESPONSE

5. Keylock switches (one for system A, one for System B) are provided to override the system actuation signal for the containment Purge and Vent valves. This override system will be expected to be used only in a post-accident condition for hydrogen control in the long term. The system actuation signal is composed of the following individual safety actuation signals:

   (i) Drywell pressure high ($\geq$2.7 psig)

   (ii) Reactor water level low ($\leq$12.5 in.)

   (iii) Reactor Building common ventilation exhaust radiation high (900 cpm)

   (iv) Both radiation monitors for reactor building common ventilation exhaust (17 RIS-452A & B) failed.

   In the current design, bypasses of multiple safety actuation signals can be initiated by a single override action.

   Logic Diagrams 11825-LSK-27-7A through 7C (enclosed) show the point in valve closure logic where the override signal is introduced. The following electrical elementary diagrams show the circuits for containment vent and purge isolation valves:

Drawing No.	Description
11825-ESK-3E	Control Switch Contact Diagram - Sheet 5
11825-ESK-6MBB	PCP valves 27MOV-113 and 117
11825-ESK-7AH	PCP pilot VV's (Div 1) 27SOV-111,114,115,118
11825-ESK-7AJ	PCP pilot VV's (Div 2) 27SOV-112,113,116,117
11825-ESK-7BB	PCP master interlock circuits
11825-ESK-7CD	Drywell inerting and CAD system "A"
11825-ESK-7CE	Drywell inerting and CAD system
11825-ESK-11AJ	Stdby gas & prim. cont. purge init-CKT (Red)
11825-ESK-11AAK	Stdby gas & prim. cont. purge init. CKT (Blue)

   When the key-lock selector switch is in the "Normal Standby" position, normal containment isolation for the purge and exhaust valves can occur. If the key-lock switch is selected to "Emergency-Manual Override" position, all the safety actuation signals for a containment isolation valve are bypassed and the valve can be opened or closed by momentarily placing the respective control switches in the desired position.

   All selector and control switches for containment vent and purge system isolation valves are located on Primary Containment Purge & Inerting Panel (PCP Panel) or Drywell Inerting and CAD system panel (CAD panel).

RAI-6 Sufficient physical features (e.g., key lock switches) should be provided to facilitate adequate administrative control. Initiating or bypassing a safety function should necessitate a deliberate operator action; e.g., physical features such as switch protective covers or keylock switches would preclude inadvertent and operator action. Your August 15, 1979 letter did not address this concern Please provide information regarding the subject physical features.

RESPONSE

6. All "Emergency-Override" switches are key-lock switches with key removable in "Normal Standby" position only (G.E. type CR-2940 with maintained contacts, Reference 11825-ESK-3E, switch detail AQ6). Whenever a key-lock switch is selected to "Emergency-Override" position, visual and audible alarm indication is provided in the plant main control room.

RAI-7 The overriding or resetting of the isolation actuation signal should not cause the automatic reopening of any isolation or purge valve. Please describe the manual isolation valve control switches and circuits. Of particular interest is switch type, e.g., spring return to neutral position or maintained contact switches.

RESPONSE

7. The opening circuits for containment vent and purge system isolation valves have been designed such that overriding or resetting of the actuation signal will not cause automatic reopening of these valves. Under all conditions of operation, the operator must take deliberate action to open isolation valves by turning the switches momentarily to "Open" position. The control switches for "Open-Close" operation of containment vent and purge system isolation valves are momentary switches, and spring return to Neutral from either position.

RAI-8 The overriding of redundant valves by initiating a signal bypass is not permissible. Each valve should be provided with an independent switch which introduces a bypass or override into the separate control logic for each valve. Based on your submittal, it is unclear whether a single switch can effect the operation of redundant components. Please provide information regarding this concern as well as appropriate drawings and/or schematics.

RESPONSE

8. The overriding of redundant valves (system A and system B) is accomplished by use of separate "Emergency-Override" key-lock switches. But a single override switch for system A will introduce safety actuation system bypass for a number of valves in the A system and a single override switch for system B will introduce safety actuation system bypass for a number of valves in the B system. For example, the override switch for system A on PCP panel will introduce safety actuation system bypass for the following valves:

27AOV-111 - Drywell inerting and purge supply containment isolation valve
27AOV-114 - Drywell inerting and purge exhaust containment isolation valve
27AOV-115 - Suppression chamber inerting and purge supply containment isolation valve
27AOV-118 - Suppression chamber inerting and purge exhaust containment isolation valve

Similarly, the override switch for system B on PCP panel will introduce safety actuation system bypass for the following valves (Blue Bus):

(Reference ESK-6MBB, ESK-7AJ, ESK-7BB)

27AOV-112 - Drywell inerting & purge supply containment isolation valve
27AOV-113 - Drywell inerting and purge exhaust containment isolation valve
27AOV-116 - Suppression chamber inerting and purge supply containment isolation valve
27AOV-117 - Suppression chamber inerting & purge exhaust containment isolation valve
27MOV-113 - PCP exhaust isolation bypass valve
27MOV-117 - PCP exhaust isolation bypass valve

The override switch for system A on "CAD" panel introduces safety actuation system bypass for the following valves (Red Bus):

(Reference ESK-7CD, ESK-7AK)

27SOV-129A - Instrument header isolation valve
27SOV-131A - Drywell isolation valve
27SOV-132A - Suppression chamber isolation valve
27SOV-119A - O_2 Analyzer suppression chamber suction containment isolation valve
27SOV-120A - O_2 Analyzer drywell vent header
27SOV-121A - O_2 Analyzer drywell middle area suction containment isolation valve
27SOV-122A - O_2 Analyzer drywell upper area suction containment isolation valve
27SOV-123A - Air particle detector and gas sampler suction containment isolation valve

27SOV-124A - O_2 Analyzer discharge to suppression chamber containment isolation valve
27SOV-125A - Air particle detector and gas sampler discharge containment isolation valve

The override switch for system B on "CAD" panel introduces safety actuation system bypass for the following valves (Blue Bus):

(Reference ESK-7CE, ESK-7AL)

27SOV-129B - Instrument Header Isolation Valve
27SOV-131B - Drywell isolation valve
27SOV-132B - Suppression chamber isolation valve
27SOV-119B - O_2 Analyzer suppression chamber suction containment isolation valve
27SOV-120B - O_2 Analyzer Drywell vent header suction containment isolation valve
27SOV-121B - O_2 Analyzer Drywell middle area suction containment isolation valve
27SOV-122B - O_2 Analyzer Drywell upper area suction containment isolation valve
27SOV-123B - Air particle detector & gas sampler suction containment isolation valve
27SOV-124B - O_2 Analyzer discharge to suppression chamber containment isolation valve
27SOV-125B - Air particle detector & gas sampler discharge containment isolation valve

RAI-9 The staff is concerned about the possibility of inadvertent defeat of any isolation provision. These concerns are not limited to the question of containment ventilation isolation. Accordingly, please identify all other containment isolation valve circuits that have the same reset or bypass provisions as do the containment ventilation isolation (CVI) system and describe the bypass and reset features for all isolation valves that are different from the CVI system.

RESPONSE

9. a. Manual Override of Safety Actuation Signal
Enclosure 2 of Power Authority letter dated August 15, 1979 to U. S. Nuclear Regulatory Commission (JPN-79-50) presented the review of the design of all safety actuation signal circuits which incorporate a manual override feature.

No change to the list incorporated in this review is necessary.

b. Resetting of Isolation Actuation Signal
The design of control systems for all containment isolation valves is such that Resetting or Override of the isolation signal will not result in the automatic reopening of the containment isolation valve. The operator must take delibrate action to open the valves. CVI system valves use spring return to neutral "OPEN-CLOSE" switches.

Other isolation valves use either "SPRING RETURN TO NEUTRAL" switches or maintained OPEN-CLOSE contact switches. Wherever a maintained contact switch is used, the operator must turn the switch first to "CLOSE" position and then to "OPEN" position to open the valves after a "RESET" action.

RAI-10 The instrumentation and control systems provided to initiate CVI should be designed and qualified as safety grade equipment. In this perspective please discuss the qualifications of control systems including radiation monitoring channels. As a minimum, these components should be qualified for the worst case normal environment expected over the life of the plant as well as the worst case accident environment which occurs during that time post accident during which operability is required. Please include discussions on maximum and minimum temperatures, pressures, relative humidity, radiation dose rate, integrated radiation dose, vibration and seismology.

RESPONSE

10. The Instrumentation and Control Systems provided to initiate CVI are designed and qualified as Safety Grade Equipment. Attached sheets list the qualification data for Safety Actuation signal instruments. The monitoring and control of CVI is accomplished from Primary Containment Purge (PCP) panel and Containment Atmosphere Dilution (CAD) panel. These panels are located in the plant relay room which has controlled environment under all operating conditions. All the equipment used on these panels is industrial grade equipment and is qualified to expected environment of ($\sim$1" water gage), temperature ($40^{o}F$ - $112^{o}F$) Relative Humidity (10-60%) and integrated radiation of $3x10^{o}$ rads. The data pertaining to radiation dose could not be verified. These panels and all the instruments mounted therein were qualified to SSE (Safe Shutdown Earthquake) and 1/2 SSE Seismic Requirements.

EQUIPMENT NUMBER 5PS-12A, 12B, 12C, 12D

FUNCTION Primary Containment Pressure High

MANUFACTURER/P.O. NO. STATIC-O-RING - GE-APED/AP1

LOCATION 12A, 12B Rack 25-5 Elev. 300, 12C, 12D Rack 25-6 Elev. 300 In the Reactor Building

MODEL NO. 12N-AA-5-9-TT

Parameter	Expected Environment (GE DOC. 22A2928 Rev. 2)		Qualification
Pressure	-1.0" to +7.0" Water Gage Static		-2 to +20 psig (1)
Temperature	Normal 70°F Maximum 140°F Minimum 40°F		-65 to 180°F (2)
Relative Humidity	Normal 40% Maximum 90% Minimum 20%		20% to 100% (Weatherproof, Moisture Proof Enclosure)
Radiation (4)	Operating	LOCA	
Dose Rate	.001 Rad/Hr	6.5×10^2 Rad/Hr	NOT AVAILABLE (3)
Integrated	3.5×10^2 Rads	1.7×10^5 Rads	
Seismic (Elev. 300)	Operating OBE	Design Basis DBE	GE qualified this equipment for Seismic but data not available. Also racks 25-5 & 25-6 were qualified
Acceleration g	.097	0.165	
Displacement in	0.029	0.070	

NOTE (1) Data verbally obtained from Manufacturer.
(2) Data in manufacturer's catalog, verified by telephone
(3) Manufacturer has not performed environmental Radiation Testing on any of their switches.
(4) Operating dose integrated over 40 yrs LOCA, integrated for 6 Mo.

EQUIPMENT NUMBER: 2-3-LIS 101A, B, C, D

FUNCTION: Reactor Water Level Low (C12.5") Scram

MANUFACTURER/P.O. NO.: BARTON-GE APED/AP-1

LOCATION: 101A,B, - Rack 25-5-1 Elev. 300, 101C,D Rack 25-6-1 Elev. 300

MODEL NO.: 288A

Parameter	Expected Environment (GE Doc. 22A2928 Rev. 2)		Qualification
Pressure	-1.0" to +7.0 Water Cage Static		No effect till proof (1) pressure of case - very high
Temperature	Normal 70°F Maximum 140°F Minimum 40°F		Qualified -60°F to 200°F Satisfactorily tested till 340°F (1)
Relative Humidity	Normal 40% Maximum 90% Minimum 20%		20% to 100% (1) (Weatherproof, Moisture-proof enclosure)
Radiation (3)	Operating	LOCA	NOTE 2
Dose Rate	.001 Rad/Hr	6.5×10^2 Rad/Hr	3×10^6 Rad/Hr
Integrated Rads	3.5×10^2 Rads	1.7×10^5 Rads	2×10^8 Rads
Seismic (Elev. 300)	Operating OBE	Design Basis DBE	GE qualified this equipment & Racks 25-5-1 & 26-6-1 But qualification data not available
Acceleration g	0.097	0.165	
Displacement in	0.029	0.070	

NOTES (1) Data verbally verified from manufacturer
(2) Dose Rate and Integrated Dose Tests performed by manufacturer a number of times since 1971
(3) Operating dose integrated over 40 years
LOCA dose integrated over 6 months

EQUIPMENT NUMBER: 17 RIS-462A, 4262 in Panels 04-13A, 13B

FUNCTION: Reactor Building Exhaust Radiation Mon.

MANUFACTURER/P.O. NO.: Nuclear Measurements/APO-84

LOCATION: Elev. 344 Ft. 6 In.

MODEL NO.: APM-G25

Parameter	Expected Environment (GE Doc. 22A2928 Rev. 2)		Qualification
Pressure	-1.0" to +7.0" Water Gage Static		0-10 psig (1)
Temperature	Normal 70°F Maximum 140°F Minimum 40°F		104°F (1) 156°F 40°F
Relative Humidity	Normal 40% Maximum 90% Minimum 20%		40% (1) 90% 20% (Moisture Proof Box)
Radiation (2) Dose Rate Integrated	Operating .001 Rad/Hr 3.5×10^2 Rads	LOCA (4) 6.5×10^2 Rad/Hr 1.7×10^5 Rads	Background Rad. of 1.5 Mil Rad/Hr 3" shield around detector
Seismic (Elev. 272) Acceleration g Displacement in	Operating OBE 0.140 0.049	Design Basis DBE 0.257 0.120	DBE - Horizontal g1 = 2.90 (3) Vertical g2 = 1.25 OBE - Horizontal g3 = 2.00 Vertical g4 = 0.95 Shake Test Qualification Manufacturer Report TDR-7573

NOTE: (1) Data in the Spec. - Vendor conformed to.
(2) Integrated Dose Rate - Operating integrated over 40 yrs.
- LOCA integrated over 6 months
(3) Seismic Test was done only for Radiation Monitor 17RIS-456 Refueling Floor Radiation Monitor 17RIS-462A, B use the same monitor and geometry.
(4) System isolated on LOCA.