POWER AUTHORITY OF THE STATE OF NEW YORK

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August 15, 1979
JPN-79-50

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
Justification for Continued Containment Purging
During Normal Plant Operation

Dear Sir:

This letter provides a completed response to your letter of November 29, 1978 regarding containment purging during normal plant operation, and supplements our letter of March 2, 1979 (JPN-79-10).

The Authority has chosen to justify unlimited purging during normal plant operation. Enclosure 1 provides an item by item response to Branch Technical Position CSB 6-4 and the expected duration of purging and venting during normal operation.

Enclosure 2 provides the results of a review of the design of all safety actuation signals circuits which incorporate a manual override feature per the requirements of your November 29, 1973 letter, page 4, paragraph 2. No design or proceedural changes are believed necessary as a result of this review.

Very truly yours,

Paul J. Early
Assistant Chief Engineer-Projects

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ENCLOSURE 1

CONTAINMENT PURING DURING PLANT OPERATING

Basis for Using Purge and Vent System

The Drywell Inerting, C.A.D., and Purge system are designed so that during shutdown operations the drywell and suppression chamber air volumes can be changed out three times every hour. Hence, the use of the 20 inch and 24 inch purge and vent lines. The main basis for purging and venting during normal reactor operation is set by JAFNPP Technical Specifications paragraph 3.7.A. which requires the containment atmosphere to be reduced and maintained below 4 percent oxygen by purging with nitrogen gas. This paragraph requires that the inerting phase be complete within 24 hours of placing the reactor in the "run mode" following a shutdown. Deinerting the containment atmosphere may begin 24 hours prior to a shutdown. Inerting and deinerting during normal reactor operation allows access for inspection of the RCPB when the Reactor Coolant System is at or approaching operating temperature and pressures without undue risk because (1) containment isolation in the event of a LOCA can be achieved (2) the probability of LOCA during these limited periods of time is remote and (3) the incremental radiological effects in the event of a LOCA are relatively small. The basis for the inerting requirement is outlined in the JAFNPP FSAR.

The JAFNPP Technical Specifications further require that during reactor operation, a differential pressure between the drywell and the suppression chamber be maintained at equal to or greater than 1.7 psid. This is normally accomplished by venting the suppression chamber via the 20 inch suppression chamber exhaust valves to the Standby Gas Treatment System. This operation is accomplished as required during normal plant operation.

The JAFNPP Technical Specifications and Inservice Testing Program also require monthly cycling of the suppression chamber to drywell vacuum breakers. This is accomplished by equalizing the drywell/suppression chamber pressures using the drywell vent valves.

No other plant operation requires the use of the purge and vent valves.

Response to Requirements of N.R.C. Branch Technical Position CSB 6-4, Paragraph B

B.1.a Valve Qualification, Design Capabilities, and Testing

The drywell and suppression chamber purge and exhaust valves were analyzed originally to assure the ability of the valves themselves to withstand a seismic event. Additionally the valves were included in the seismic analysis of the containment isolation portion of the vent and purge piping to verify that the piping system is adequately supported to assure integrity during a seismic event.

Regarding capabilities under LOCA conditions, the vendor of the purge and exhaust valves, Fisher Controls, Inc. provided the following table relating maximum differential pressure the valves

can safely withstand when closing against valve position as shown below:

Valve Position Open in Degrees	Maximum Pressure Drop (psi) 20" Valves	24" Valves
10	135	130
20-40	125	120
50	115	105
60	60	60
70	38	40
80-90	30	21

The pressures above were compared against those that could be anticipated within the containment in the event of a LOCA. (See JAFNPP FSAR Figure 14.6-8). The conclusions reached are that the 20 inch purge and vent valves installed in the suppression chamber will withstand, during closure from full open position, the maximum pressure developed during a LOCA. In addition, the drywell purge valves will close sufficiently prior to the drywell reaching peak pressures such that these valves will also be able to close even assuming unrealistically that the entire drywell pressure is seen across the valves.

Seat leakage test at containment design pressure and operability test under non-LOCA conditions are periodically performed for the purge and exhaust valves.

B.1.b Use of a Single Purge and Vent Line

Inerting and deinerting of the containment are the only two operations in which more than a single purge and vent line have been used. The required limit of 24 hours for inerting and deinerting can be met with the use of a single vent and single purge line.

B.1.c Size of Purge and Vent Lines

This response provides detailed justification for the use of the 20 and 24 inch purge and vent lines.

B.1.d Engineered Safety Features Criteria for Containment Isolation Portion of Purge and Vent System

The isolation section of the purge and vent system presently installed at the JAFNPP meets the standards appropriate to engineered safety features. The piping and valves in the isolation portion were designed, procured and installed in accordance with Q-1 piping criteria, as defined by Appendix G to the FSAR. Redundant "fail closed" air operated isolation valves are installed in each purge and vent line. Redundant instrumentation circuits are provided to assure closure of at least one air operated valve in each purge and vent line during an accident.

The power supply for the two normally closed motor operated valves is from the redundant energency MCC buses assuring closure of these valves if required. Each isolation valve, both motor and air operated, has the ability to be individually operationaly tested as well as leak tested. The details and further amplification of the above is contained in the FSAR.

B.1.e Instrumentation and Control Systems

The containment purge supply and exhaust isolation valves are automatically closed in the event of high radiation in the reactor building exhaust, high drywell pressure or low reactor water level. There are two independent instrument and control systems, assuring closure of at least one of the two isolation valves in each purge and vent line in the event of an accident. There are 4 independent sensors and 2 circuits for both the high drywell pressure and low reactor water level and 2 sensors and circuits for the high radiation in the reactor building exhaust. The valves may also be manually controlled open provided no containment isolation signal is present.

Installed in the valve control circuits is a key lock selector switch which in the "Normal Standby" position allows normal containment isolation. If the switch is placed in the "Emergency-Manual Override" position, the automatic close signals are bypassed and the isolation valves may be opened or closed by momentarily placing the respective control switch in the desired position. The valve will then travel to either the fully open or fully closed position.

The key switches are installed to permit containment purging after an accident, even though the containment isolation signal is still present. Administrative controls are provided governing the use of the key switches assuring that they are always in the "normal standby" position. Administrative controls governing the use of the "Emergency Manual Override" position are provided in Procedure F-SP-2, Post LOCA Venting of Containment and Operation of the Main Steam Leakage Collection System. Alarm indications are provided in the Control Room if the key lock switches are in the "Emergency Manual Override" position.

B.1.f Isolation Valve Closure Times

The closure times for the valves in the purge and vent system is specified in the JAFNPP Technical Specifications paragraph 3.7.D as 5 seconds.

B.1.g Provision for Preventing Debris from Reaching Isolation Valves

Figure 1 provides the drywell vent and purge penetration cover metal grating pattern. A similar grating is believed to exist in the suppression chamber, however flying debris is considered less likely in this area.

B.2 Purge and Vent System Use for Temperature and Humidity Control

The purge and vent system installed at the JAFNPP is not utilized, in any of its operational modes, to control the temperature and humidity of the containment. This function is provided by the Primary Containment Cooling and Ventilation System.

B.3 Atmosphere Cleanup System Within Containment

The existing system installed at JAFNPP meets the intent of CSB 6-4, paragraph B.3.

Any radioactivity contained in the atmosphere of the containment during purging and venting operation would be handled by the

Standby Gas Treatment System before final release to the environment via the main stack. All the equipment associated with the venting system is contained within the reactor building. In the unlikely event of any leakage from the primary containment, the secondary containment would function in its normal manner to limit the radiological release to the environment. See FSAR paragraph 4.2.3.7 for additional details.

B.4 Isolation Valve Operability and Leak Test

The purge and vent isolation valves undergo operability and leak testing in accordance with the technical specifications and inservice inspection program requirements. The requirements are for leak testing during refueling outage but not less than every two years, and for operability testing every month. The vent and purge valves are accessible during normal reactor operation for leak testing.

B.5.a Radiological Consequences of Venting During a LOCA

The radiological consequences of a LOCA occuring during purging was addressed relative to site boundary doses using the same assumptions reported in the Safety Evaluation Report and also assuming that 5000 lbs of primary coolant, at the maximum activity level permitted by JAFNPP Technical Specifications, is purged from the containment before the isolation valves close. The 5000 lbs is based on the assumption that all 20" and 24" containment isolation valves in the purge and vent lines are open at the onset of the LOCA. The pressures used in calculating the release were the maximum that would be experienced in the drywell and suppression chamber at the time equal to or less than 5 seconds. The basis for the pressures used is JAFNPP FSAR Figure 14.6-3. Additionally, the release is assumed to be reactor coolant as saturated steam at the maximum drywell pressure occuring within the first 5 seconds of the LOCA.

In evaluating the radiological consequences of a LOCA, releases through the vent valves were released to the environment by the main stack via the Standby Gas Treatment System (SGTS). Releases through the purge valves were released to the environment via the Vent and Purge Supply Fan piping.

The analysis indicated an additional 2.5 REM-thyroid would result from the purging operation over and above the normal 2 hour LOCA dose of 3 REM-thyroid specified in Safety Evaluation Report. The total of 38.5 REM-thyroid is well below the criteria set forth in 10CFR100.

B.5.b Protection of Structures and Safety-Related Equipment Downstream of Purge System Isolation Valves

The Authority has analyzed the safety related systems downstream of the isolation valves. The Nitrogen Purge System piping components and in line instrumentation were all designed for 150 psig, which is well above the maximum containment pressure that would be reached during a LOCA. The SGTS filter assemblies have been reviewed from the standpoint of potential damage due to the LOCA because of the limited design pressure drop across the filter train. Based upon this review flow will be rerouted away from the 12 inch line containing valve MOV 120 and shown on JAFNPP FSAR Figure 5.3-2 to a 6 inch, suitably qualified line as shown in the drawings attached. Following this action SGTS integrity and operability is maintained during a LOCA.

B.5.c <u>ECCS Backpressure Considerations</u>

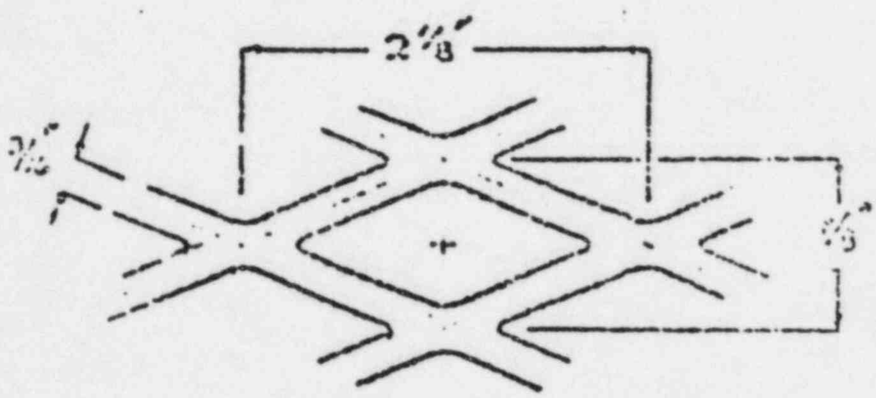
Containment backpressure is not necessary for effective operation of ECCS system in the JAFNPP.

B.5.d <u>Leakage Rates of Purge and Vent Isolation Valves</u>

The installed valves are tested as required by JAFNPP Technical Specifications for both frequency and acceptability. (See JAFNPP Tech Spec parg 4.7 for details). These requirements are in accordance with 10CFR50, Appendix J. To minimize occupational exposure, no leak testing is conducted during normal reactor operation.

Figure 1

Metal Grating Patttern - Penetration Grating Covers, Drywell Vent and Purge



Approximately 1/32" thick

POOR ORIGINAL

ENCLOSURE 2

REVIEW OF SAFETY ACTUATION SYSTEMS WITH MANUAL OVERRIDE FEATURES

Manual override of a safety actuation signal is possible in the following systems:

A. RHR

B. Reactor Protection

C. Primary Containment Isolation

D. Core Spray

E. RCIC

F. HPCI

G. ADS

Each override and bypass is described in the following tabulation by system. None of these overrides or bypasses to deviate from the NRC requirements of Reg. Guide 1.47 relative to administrative control and annunciation. The use of these overrides and bypasses is in accordance with NRC requirements, plant operating procedures, and site administrative controls, hence no modifications are recommended.

A. RHR System

1. Testing of the Hi Drywell/Low Reactor Water Level Trip logic (Test switch in TEST and test jack plugged in) will bypass automatic start signal to diesel generators. Start signal from other safety circuits will cause the diesel to start. This condition is annunicated.

2. Manual override of top of active fuel interlock for transfer to containment spray is possible by means of a keylock switch.

3. The suction valve alignment for the RHR pumps is controlled manually by keylock switches. Improper alignment will prevent start of RHR pump.

4. An RHR pump may be stopped manually after it has been started by a safety actuation signal. Pump will restart automatically only if safety actuation signal is re-initiated, and the logic has been reset and then reinitiated.

B. Reactor Protection

1. Manual override of the Scram Trip-Discharge Volume High Water Level is accomplished by a keylock switch (one for both trains) when the reactor system mode switch is in the shutdown or refuel position. Annuciation for this

has been provided.

C. Primary Containment Isolation

1. Keylock switches (one for system A, one for system B) can be utilized to bypass the containment isolation signal to the following valves:

   a. Drywell inerting and purge supply containment isolation valve.

   b. Suppression chamber inerting and purge supply containment isolation valve.

   c. Drywell inerting and purge exhaust containment isolation valve.

   d. Suppression chamber inerting and pruge exhaust containment isolation valve.

   e. Drywell purge and inerting exhaust containment isolation bypass valve.

   f. Suppression chamber purge and inerting exhaust containment isolation bypass valve.

2. Keylock switches (one for system A, one for system B) can be utilized to bypass the containment isolation signal to the isolation valves in the sample streams to oxygen analyzers and air particle detector and gas samplers.

D. Core Spray System

1. Testing of the Hi Drywell/Low Reactor Water Level Trip logic (Test switch in TEST and test jack plugged in) will bypass automatic start signal to diesel generators. Start signal from other safety circuit will cause the diesel to start. This condition is annunciated.

2. The core spray pump suction valves are controlled by keylock switches.

3. A core spray pump may be stopped manually after it has been started by a safety actuation signal. Pump will restart automatically only if safety actuation signal is re-initiated, and the logic has been reset and then reinitiated

4. Similarly, core spray inboard and outboard motor operated valves may be closed manually after a safety actuation signal.

E. RCIC (Not Considered a Safety System)

1. The RCIC System may be tripped manually.

2. A pushbutton is provided to isolate the steam supply to the RCIC turbine driven pump. This pushbutton may only be used after the system has been initiated by a safety actuation signal. Once tripped, the trip must be reset

locally.

F. HPCI

1. The HPCI System may be tripped manually.

2. A pushbutton is provided to isolate the steam supply to the HPCI turbine driven pump. This pushbutton may only be used after the system has been initiated by a safety actuation signal.

G. ADS

1. Safety actuation signal to valves in ADS is bypassed as long as RESET pushbutton is depressed. When the push-button is released the valves will respond to the safety actuation signal following a 2 min. time delay. The valves may be operated in this manner repeatedly.