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U.S. Nuclear Regulatory Commission
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SUBJECT: James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
Hardened Wetwell Vent Capability

Reference: NRC letter, R. A. Plasse to R. E. Beedle, "Request for Additional Information - Hardened Wetwell Vent Capability for the James A. FitzPatrick Nuclear Power Plant (TAC No. M82364)," dated July 2, 1992.

Dear Sir:

In a May 19, 1992 conference call with the NRC staff, the Authority agreed to provide additional information regarding the FitzPatrick wetwell vent design. The referenced letter details the specific information requested by the NRC in order to resolve the outstanding concerns of Generic Letter 89-16 for the FitzPatrick plant. This letter provides the Authority's response to these three concerns.

1) Perform the calculation to confirm the minimum heat removal capability of the hardened vent and provide the results to the NRC staff.

Response:

This calculation has been performed. The calculation determined that one percent decay heat (24.36 MW) produces 25.183 lbm/sec of steam at 44 psig (the PCPL pressure) by evaporation from the suppression pool, at a rate of 269.964 ft^3/sec. This is the volumetric flow rate of the vent necessary to prevent one percent decay heat from causing pressure to continue to increase within the containment. Assuming a vent effluent of pure nitrogen (the initial gas contained in the wetwell), a vent mass flow rate of 44.21 lbm/sec is required. Although the actual vent effluent would be a mixture of nitrogen and other gases, primarily steam, the higher density of nitrogen leads to conservative results in this calculation.

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The venting procedure directs venting through parallel 6 and 12 inch lines. This parallel path, as well as each individual path, were evaluated for their ability to pass the required flow rate. Venting through the 6 inch line alone is capable of passing 17 lbm/sec, which is insufficient for reducing the containment pressure. The 12 inch line alone is capable of passing 71 lbm/sec, which is significantly greater than the 44.2 lbm/sec required. The combined flow through both lines is 78 lbm/sec. The calculation concludes that venting through the combined flow path or only through the 12 inch line is sufficient to remove one percent decay heat. Therefore, the FitzPatrick design fully meets the BWROG hardened wetwell vent heat removal design criteria.

Because the vent path can pass significantly more flow than required (approximately 60% margin for venting through the 12 inch line alone) ample vent capacity is available to support the planned 4% power uprate. This will be formally documented.

2) The vent path at FitzPatrick for the wetwell may include up to 7 different valves. Assurance of vent operation is vital to the success of the hardened vent operation. Provide confirmation that the valves used in the vent path are capable of operation up to the PCPL (44 psig).

Response:

The operability of the wetwell vent containment isolation valves (27AOV-117 and 118) were factored into the determination of the primary containment pressure limit (PCPL). These large diameter butterfly valves required modification of the shaft to disk pin to ensure their ability to open and close against a differential pressure of 44 psig (the PCPL).

The small diameter containment isolation bypass valves (27MOV-117 and 123) have design pressures in excess of the PCPL. 27MOV-117 is designed to operate against a differential pressure of 56 psig, the primary containment design pressure. 27MOV-123 was originally designed for a PWR primary coolant system application with a design differential pressure of 1621 psig. These two valves are opened to depressurize the containment following conduct of the primary containment integrated leakage rate test (PCILRT) from an initial pressure of 45 psig. Therefore, their ability to open from a pressure in excess of the PCPL is periodically demonstrated.

The parallel 6 and 12 inch valves further downstream in the vent path (27MOV-121 and 120) were designed to operate aagainst a differential pressure of 10" W.G. The mandatory opening sequence for the vent valves requires these valves to be opened before the containment isolation valves to ensure that the valves which can handle the PCPL pressure are opened last.

The only other valve in the vent path is one of the standby gas treatment system (SGTS) inlet isolation valves (01-125MOV-14A, B). Since the vent procedure requires one train of the SGTS to be in service prior to venting, this valve will already be open prior to opening any of the other valves in the vent path and will not be exposed to significant differential pressure.

Therefore, the FitzPatrick design meets the BWROG hardened wetwell vent criteria of being capable of operating up to the PCPL.

3) PASNY must demonstrate how the existing equipment meets the intent of the criteria for providing radiation monitoring equipment. A discussion should be provided in timing, sensitivity, and ranges of the installed equipment. During the May 1992 conference call, PASNY indicated that this information has been provided in response to NUREG-0737 and would be summarized to fulfill the needs of this criteria.

Response:

The existing containment high range radiation monitor (CHRM) and post accident sampling system (PASS) can be used to assess the radiological consequences of venting. These two monitoring systems were installed specifically to assess severe accident conditions and will be operable under the environmental conditions expected to be present when venting is required.

The CHRM provides indication in the control room of the gamma radiation dose rate in the drywell. The location of the CHRM detectors, 27RE-104A and B, was requested by the NRC in the May 19 conference call. 27RE-104A is located in the south quadrant of the drywell at elevation 290'4", and 27RE-104B is located in the east quadrant at elevation 288'4". These elevations place the CHRM detectors in the spherical section of the drywell, 10 and 8 feet respectively above the equator line. These detectors had been previously repositioned to more accurately monitor the radiological conditions within the drywell. The Authority has determined that a severe accident source term of 100% noble gas and 25% halogen airborne plus 50% halogen and 1% fission product in liquid form will result in a CHRM reading of approximately 10^6 R/hr immediately after plant shutdown. This is well within the CHRM measurement range of 1 to 10^8 R/hr.

The PASS system takes direct samples of the drywell atmosphere, wetwell atmosphere, reactor coolant and suppression pool for laboratory analysis. The time it takes from making the decision to operate PASS until the sample analysis is completed is within the three hour criterion of NUREG-0737. This duration is primarily a result of administrative controls, including pre-job ALARA reviews and briefings, not the actual sample collection and analysis time.

The results of PASS analyses and CHRM readings can be used to estimate core damage and fission product sources using Emergency Plan Implementing Procedure EAP-44, "Core Damage Estimation." One of the ten core damage categories is determined based upon the results of the analysis. In addition, offsite dose can be estimated directly from the CHRM readings using Emergency Plan Implementing Procedure EAP-4, "Dose Assessment Calculations." In this calculation, the CHRM reading is correlated to a radioactivity concentration (Ci/cc) in the containment atmosphere. Then, dividing by the vent flow rate (cc/sec) and considering the scrubbing effects of the suppression pool, a release rate (Ci/sec) can be determined. Once field readings are obtained, the release rate can be refined by back calculation. This accident monitoring equipment meets the intent of the BWROG criteria to provide radiation monitoring of the vent effluent.

If you have any questions, please contact Mr. J. A. Gray, Jr.

Very truly yours,

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