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U.S. Nuclear Regulatory Commission
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James A. FitzPatrick Nuclear Power Plant
Renewed Facility Operating License No. DPR-59
NRC Docket No. 50-333

Subject: Response to Request for Additional Information by the Office of Nuclear Reactor Regulation to Support Review of James A. FitzPatrick Nuclear Power Plant to Address Secondary Containment Personnel Access Door Openings

References:
1. Letter from J. Barstow (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "License Amendment Request-Proposed Change to the Technical Specifications to Address Secondary Containment Personnel Access Door Openings," dated September 14, 2017
2. Letter from B. Venkataraman (Project Manager, U.S Nuclear Regulatory Commission) to C. Williams (Exelon), "Draft Request for Additional Information License Amendment Request to Revise Technical Specifications to Address Secondary Containment Personnel Access Door Openings," dated January 12, 2018

By letter dated September 14, 2017 (Reference 1), Exelon Generation Company, LLC (Exelon) requested to change the James A. FitzPatrick Nuclear Power Plant (JAF) Technical Specifications (TS). The proposed amendment request would modify TS Surveillance Requirement (SR) 3.6.4.1.3 to acknowledge that Secondary Containment access openings may be open for entry and exit.

On January 12, 2018 (Reference 2), the U.S. Nuclear Regulatory Commission (NRC) identified a request for additional information was necessary to complete the review.

Attachment 1 to this letter contains the NRC's request for additional information immediately followed by Exelon's response.

Exelon has reviewed the information supporting a finding of no significant hazards consideration and the environmental consideration provided to the NRC in Reference 1. The additional information provided in this response does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. Furthermore, the additional information provided in this response does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

There are no commitments contained in this response.

If you should have any questions regarding this submittal, please contact Ron Reynolds at 610-765-5247.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 15th day of March 2018.

David T. Gudger for

James Barstow
Director - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Attachment 1: Response to Request for Additional Information

cc:	USNRC Region I Regional Administrator	w/attachments
	USNRC Senior Resident Inspector – JAF	"
	USNRC Project Manager, NRR – JAF	"
	A. L. Peterson, NYSERDA	"

ATTACHMENT 1

James A. FitzPatrick Nuclear Power Plant
Renewed Facility Operating License No. DPR-59
NRC Docket No. 50-333

Response to Request for Additional Information

SCPB-RAI-1:

Currently, the FitzPatrick SR 3.6.4.1.4 verifies that the secondary containment can be maintained ≥0.25 inch of vacuum water gauge for 1 hour using one SGT subsystem at a flow rate ≤ 6000 cubic feet per minute (cfm). There are no SRs to verify that the secondary containment can be drawn down to the required vacuum within a prescribed time. In addition, the LAR did not provide a specific draw down time applicable to FitzPatrick other than referencing the 97 seconds in the LAR.

Therefore, please state the draw down time applicable to FitzPatrick and discuss how the draw down time is tested periodically at FitzPatrick. In addition, please provide the results of the draw down tests performed during the last three years.

Exelon Response to SCPB-RAI-1:

The LOCA analysis performed for James A. FitzPatrick Nuclear Power Plant (JAF) used Regulatory Guide (RG) 1.3 methodology, and therefore, a drawdown time is not applicable. The discussion in regards to 97 seconds in the LAR is associated with Peak Cladding Temperature (PCT) occuring approximately ninety-seven (97) seconds post-accident. It is an assumption in the Current Licensing Basis (CLB) for JAF that Reactor Building isolation and the start of the Standby Gas Treatment System (SGTS) precludes significant fission product release. See the response to RAI Question ARCB-RAI-1 for more detail regarding inadvertent inner and outer door opening of Secondary Containment.

ARCB-RAI-1:

The FitzPatrick LOCA radiological dose consequence analysis was approved by letter dated December 6, 1996 (ADAMS Accession No. ML010960125), as part of the power uprate application and is reflected in Updated Final Safety Analysis Report (UFSAR) Section 14.8.2.1.1, "Loss of Coolant Accident." The PCT evaluation stated above is part of thermal hydraulic analysis that was used as the basis for the current radiological dose consequence analysis for LOCA at FitzPatrick. The design basis analysis assumptions which, evaluate the LOCA analysis, are in accordance with Regulatory Guide (RG) 1.3, "Assumption Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors," Revision 2 (ADAMS Accession No. ML003739601). RG 1.3, Revision 2, and UFSAR Section 14.8.2.1.1 assume that all the noble gases and 25 percent of the halogens become airborne within the drywell at the time of the accident and are available for release. In addition, the FitzPatrick LOCA analysis assumes that all the noble gases and halogens leaking from the drywell into the reactor building are exhausted to the atmosphere via the SGTS and the main stack. Furthermore, the charcoal filter efficiency of the SGT system is 90 percent. This means that the current FitzPatrick licensing basis for the LOCA analysis assumes:

1. An instantaneous release at the time of the accident,
2. Secondary containment vacuum is establish at the start of the accident by the SGT system (i.e., there is no secondary containment draw down time),
3. The secondary containment is maintained at the required vacuum for the duration of the accident,
4. The amount of release is reduced by the SGT system charcoal and particulate filters,
5. The release occurs from a pathway with an elevated release point (i.e., main stack), and
6. None of the release bypasses the secondary containment.

The simultaneous opening of both an inner and outer secondary containment door, appears to allow a ground level release to occur which bypasses the SGT system which is not consistent with the FitzPatrick licensing basis radiological dose consequence analysis for LOCA.

Therefore, with regard to the current licensing basis radiological dose consequence analysis for LOCA, please demonstrate that the proposed change does not bypass the SGT system and cause a ground level release and that the functional capability of secondary containment is maintained, without an explicit secondary containment drawdown time.

Alternatively, please provide a revised radiological consequence analysis for LOCA that (1) states what assumptions and inputs are changing, (2) provides the technical reasoning for the changes, (3) explains how the brief, inadvertent, simultaneous opening of the secondary containment access doors is accounted for, and (4) demonstrates that the regulatory limits are met.

Exelon Response to ARCB-RAI-1:

Regarding the JAF CLB radiological dose consequence analysis for LOCA, the following demonstrates that the proposed change does not bypass the SGTS and cause a ground level release, and that the functional capability of Secondary Containment is maintained without an explicit Secondary Containment drawdown time.

Licensing Basis Review

Secondary Containment at JAF consists of four systems, which acting in concert limit the release of radioactive substances resulting from postulated accidents to within regulatory limits. These systems are the Reactor Building, the Reactor Building Isolation and Control system, the SGTS, and the Main Stack.

The licensing basis establishes the following requirements for Secondary Containment with respect to Reactor Building performance and SGTS operation:

1. A safety design basis of the Secondary Containment system, as described in the Updated Final Safety Analysis Report (UFSAR) 5.3.2.4, is to limit ground level release of radioactive material so that offsite dose rate may be maintained below 10 CFR 100 values in the event of an accident (including LOCA).

2. The Reactor Building is designed to be sufficiently leak-tight to allow the SGTS to reduce the building pressure to a value at least 0.25 in. H_2O below atmospheric with a flow rate of 3600 cfm (two volumes per day) under neutral wind conditions.

The UFSAR description of Secondary Containment (UFSAR 5.3.3.1) states that the Reactor Building, the Reactor Building Isolation and Control System, and the SGTS provide a negative pressure barrier that minimizes the ground level release of fission products by exfiltration. The Reactor Building and the Reactor Building Isolation and Control System provide a large, low-leakage containment volume providing a holdup time for fission product decay prior to release.

The UFSAR description of SGTS capability (UFSAR 5.3.3.4) states that each of the two fans have the capacity to reduce and hold the building at a minimum sub-atmospheric pressure of 0.25 in. of H_2O with the building isolated. These fans have design flow rates of 6000 cfm.

The Secondary Containment Safety Evaluation (UFSAR 5.3.4) includes the statement:

> "If the leakage rate of the building is low and most of the leakage air is filtered and discharged to the elevated release point (utilizing the SGTS and the main stack), the offsite radiation doses that result from postulated accidents are below 10 CFR 100 limits."

The Safety Evaluation also states that the building is designed for a maximum in-leakage rate of 100%/day at a building sub-atmospheric pressure of 0.25 in. H_2O at neutral wind conditions - there will be a low exfiltration rate at high wind conditions. Building exfiltration under varying wind conditions and system performance assumptions was considered in the Safety Evaluation, however dynamic system response during building isolation and SGTS initiation was not modeled. UFSAR chapter 5 analysis starts with an initial condition of an isolated building (there is an explicit statement that "two redundant, full capacity filtration trains in the SGTS ensure that no direct release of fission products to the environment occurs once the Reactor Building is isolated").

In discussing fission product release to Secondary Containment during a LOCA, the accident analysis states (UFSAR 14.6.1.3.5):

> "Reactor Building (Secondary Containment) isolation and starting of one or both SGT subsystems is assumed to occur prior to significant fission product release from primary containment (Reference 55, 61, 62, and 68). With the Reactor Building isolated and SGTS operating, the standby gas treatment fan maintains the Reactor Building below atmospheric pressure and discharges at a rate of 3.3 volume fractions per day through high efficiency and charcoal filters to the main stack."

The LOCA radiological analysis (UFSAR 14.8.2.1.1) assumes an elevated release through the Main Stack at a SGTS flow rate of 6000 cfm. The Primary Containment atmosphere is assumed to leak at a rate of 1.5% per day with no holdup or mixing in the Reactor Building before processing by SGTS. Engineered Safety Feature leakage to the Secondary Containment atmosphere is assumed to mix uniformly with the Reactor Building atmosphere prior to discharge through the Main Stack after processing by the SGTS. This is consistent with the Regulatory Position of Regulatory Guide 1.3, Revision 2, which is the basis of the LOCA radiological analysis.

<u>Coupled Reactor Building / SGTS Performance</u>

Technical Evaluation EC 622932 was performed to evaluate the ability of the SGTS to maintain the Secondary Containment at sub-atmospheric pressure when the building is isolated, even if both doors in a single airlock are inadvertently opened at the same time. The evaluation demonstrates that when SGTS is able to maintain the building at 0.25 in. H_2O below the outside pressure at a flow rate of 6000 cfm (as required by TS); it will maintain the building approximately 0.004 in. H_2O below the outside pressure with both doors in an airlock open. This may also be understood qualitatively - for the SGTS fans to develop flow they require a source of suction. This source is from the Reactor Building. Therefore, flow must be into the building to permit outflow through the SGTS.

The Technical Evaluation considered recent performance testing of SGTS and the Reactor Building and shows there is considerable margin to Technical Specification limits. Typical performance on an isolated Reactor Building is maintenance of building pressure at -1.35 ± 0.18 in. H_2O below the outside pressure at a flow rate of 5509 ± 224 cfm. Increased leak-tightness does not significantly affect the pressure at which building pressure will stabilize if both doors in an airlock are inadvertently opened, although it will shift the balance of in-flow from pre-existing leakage paths to the open airlock (flow will be biased more to the airlock as building leak-tightness improves).

Therefore, the proposed change does not bypass the SGTS and cause a ground level release. The functional capability of Secondary Containment is maintained without an explicit Secondary Containment drawdown time.

ARCB-RAI-2:

Section 3.0, "Technical Evaluation," in Attachment 1 to the LAR, dated September 14, 2017, states in part:

> Empirical data from two previously reported events in which both secondary containment airlock doors were inadvertently opened simultaneously demonstrates that this condition does not significantly impact the secondary containment differential pressure. Neither of these events resulted in violation of the required secondary containment vacuum requirement (References 3 & 4).

It is not clear to the NRC staff how it was determined that the Secondary Containment differential pressure would be maintained during accident conditions. These reported events are not representative of the conditions present during a LOCA.

Please provide additional information demonstrating how these reported events would apply during LOCA conditions and that the functional capability of Secondary Containment is maintained during accident conditions. The demonstration shall include the brief, inadvertent, simultaneous opening of the Secondary Containment access doors.

Exelon Response to ARCB-RAI-2:

There is no empirical evidence that reported airlock breach events during normal operation are necessarily relevant to accident conditions. Under normal conditions with the building not isolated, pressure is controlled through positioning of inlet, exhaust and recirculation valves in the normal ventilation system. Under accident conditions with an isolated building, pressure is determined by the balance of SGTS flow with in-leakage through pre-existing leakage paths, or in the case of an inadvertently opened airlock, door opening. See the response to RAI Question ARCB-RAI-1 for more detail regarding inadvertent inner and outer door opening of Secondary Containment.