Clinton Power Station
Change to Secondary Containment Design Basis to Credit Fuel Building Railroad Airlock

Pre-Application Meeting
January 31, 2022

Exelon Generation®

Agenda

- Introduction and Opening Remarks
- Objectives
- Background
- Overview of Secondary Containment Design and Licensing Basis
- Proposed License Amendment Request
- Supporting Analyses
- Timeline for Submittal
- Summary

Objectives

- Brief the NRC on Exelon Generation Company, LLC's (EGC's) proposed license amendment request to change the secondary containment design basis to credit the Fuel Building Railroad Airlock (FBRA)
- Ensure a common understanding of the proposed change and scope of the planned submittal
- Summarize the activities already performed
- Discuss timing of submittal
- Obtain NRC feedback prior to formal submittal

Background

- In March 2020, a 10 CFR 50.59 evaluation was completed to support a revision to the definition of the secondary containment boundary at the FBRA
  - Change involved using the FBRA and outer door as the secondary containment boundary when the inner door is open and no adverse weather conditions exist
  - Evaluation included specific, situational control of the FBRA inner door to ensure tornado protection when required
- NRC reviewed the 10 CFR 50.59 evaluation discussed above as part of a baseline inspection that was completed on June 30, 2021
- NRC issued a Green finding and Severity Level IV non-cited violation of 10 CFR 50.59(d)(1) for the failure to provide a written evaluation describing the basis for determining that the change did not require a license amendment

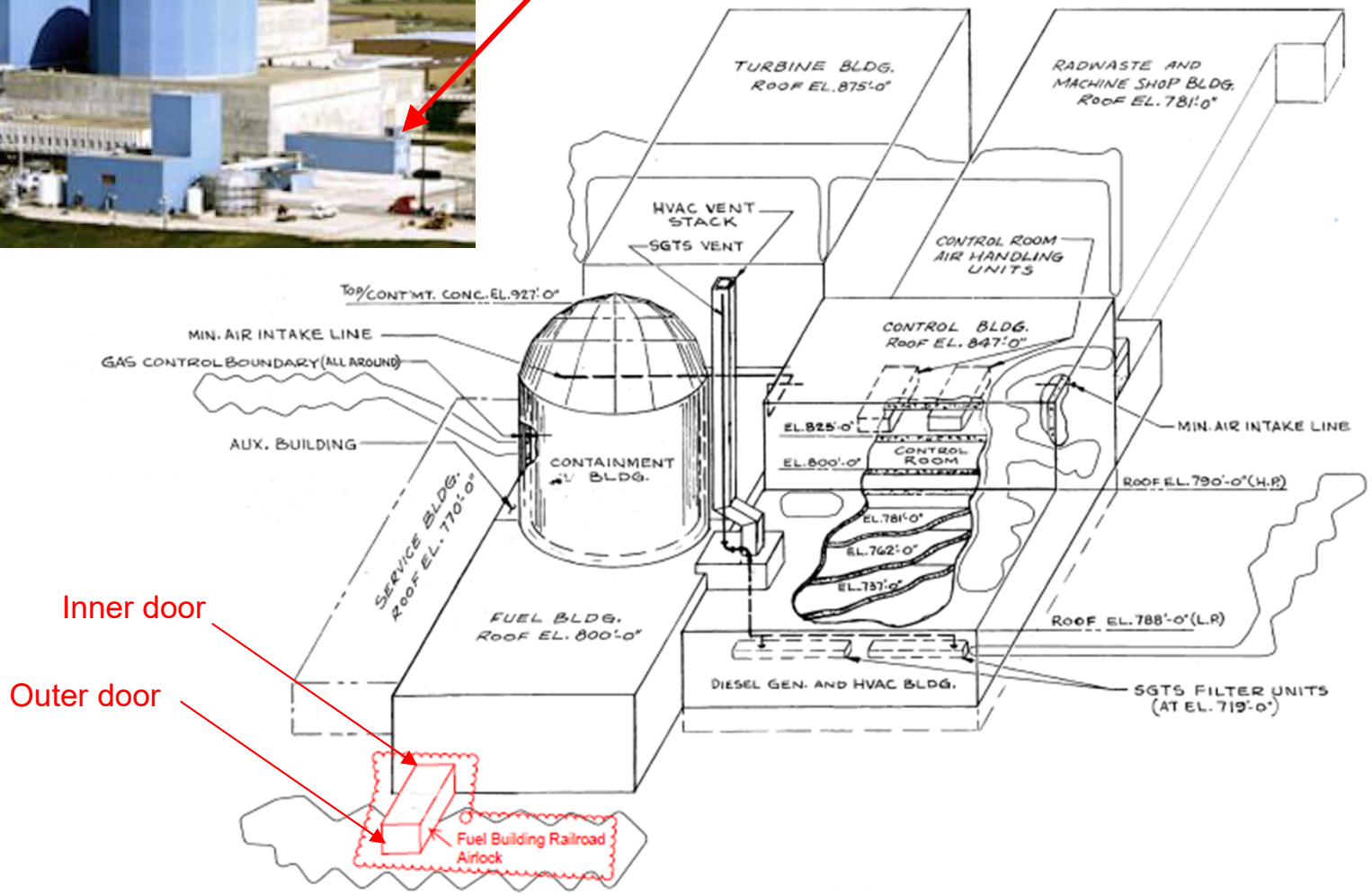
Background

- Excerpts from violation:
  - *This change involved utilizing the FBRA and outer door as the secondary containment boundary when the inner door is open and no adverse weather conditions exist. In the event of a severe weather or radioactive release occurrence, the licensee credited dedicated personnel to close the FBRA inner door. This operator action was necessary because the licensee determined that the FBRA meets all requirements of Seismic Category I structures and the secondary containment except for protection from tornadoes. However, no written evaluation was provided describing adequate basis for determining that this change would not result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety.*
  - *The licensee relied on these operators' manual actions because the licensee determined that the FBRA meets all requirements of Seismic Category I structures and the secondary containment except for protection from tornado wind and tornado missile. However, there was no evaluation of the manual actions, which is a change in its own right as to whether the use of these actions was acceptable and [would] not result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety.*

Secondary Containment

- Secondary containment is a structure that completely encloses the primary containment, except for the upper personnel hatch
- Secondary containment consists of:
  - Containment gas control boundary (CGCB)
  - CGCB extension (i.e., siding within the auxiliary building)
  - Fuel building
  - Emergency Core Cooling System (ECCS) Residual Heat Removal heat exchanger rooms, the ECCS pump rooms, the Reactor Water Cleanup pump room
  - Main steam pipe tunnel
- The function of the secondary containment is to contain, dilute, and hold up fission products that may leak from primary containment following a design basis accident

Secondary Containment



Containment Gas Control Boundary

- The CGCB is a limited leakage structure which surrounds the containment structure above the Auxiliary and Fuel Buildings
- Conforms to the shape of the containment and is separated from it by a distance of approximately four feet
- Constructed of metal siding and supported by structural steel framing attached to the containment
- The CGCB is a fission product barrier only, designed to be held under a negative pressure equivalent to 1/4-inch of water when infiltration flow rates are being passed through the Standby Gas Treatment (SGT) system, following a design basis loss-of-coolant accident
- The CGCB is a Seismic Category I structure capable of withstanding all CPS natural phenomena except the tornado and external missiles
  - Siding is designed to fail for wind speeds of 200 mph, which is less than the design basis tornado

Proposed License Amendment Request

- Secondary containment design basis currently does not include the FBRA structure as part of the secondary containment boundary
  - FBRA inner door (i.e., the door that serves as the interface between the Fuel Building and the FBRA) currently forms part of the secondary containment boundary
- Each time the FBRA inner door is opened (i.e., when CPS Unit 1 is in Mode 1, 2, or 3), the secondary containment is declared inoperable
  - Technical Specifications require restoration to operable status within four hours
  - Imposes a burden on plant operations, especially during Independent Spent Fuel Storage Installation (ISFSI) cask loading campaigns where large dry casks are moved into and out of the Fuel Building
  - If movement of a cask is stalled such that it prevents closure of the inner door within four hours, a unit shutdown would be required
- Proposed change revises the definition of the secondary containment boundary at the FBRA to ensure that both secondary containment capability and tornado protection are maintained when required
  - FBRA and FBRA outer door (i.e., the door that serves as the interface between the FBRA and the outside environment) will be the secondary containment boundary when no adverse weather conditions exist
  - Design will incorporate a manual action to close the inner door in the event of severe weather or radioactive release

Supporting Analyses

- EGC has performed evaluations to verify that the FBRA, including the outer door, meets the requirements for Seismic Category I structures (except for tornado protection) and the secondary containment
- The following activities were performed:
  1. Assessed the FBRA against the CPS design and licensing basis requirements for secondary containment. Based on the results of the assessment (including physical inspections of the FBRA structure), necessary analyses and physical modifications were done to ensure the FBRA meets the design and licensing requirements of the secondary containment.
  2. Revised design basis analyses to evaluate the addition of the FBRA volume and ISFSI cask heat load has on the secondary containment temperature and pressure profile, on the ability of the SGT system to meet secondary containment requirements, and on the environmental qualification for equipment within the secondary containment and on post-accident dose.
  3. Evaluated the FBRA structural steel, siding, and roofing for required loads to meet Seismic Category I requirements, including normal wind loads and SSE. The structural steel is evaluated for tornado loads while the siding and roofing are evaluated to blow off in a tornado.
  4. Inspected the FBRA for verification that the as installed siding and roof panels meet the requirements of design specification K-2950 and the original design drawings. Deviations were either repaired or evaluated.
  5. Performed material testing to verify the FBRA siding meets secondary containment material requirements.
  6. Performed SGT system drawdown testing to ensure the functional capability of the secondary containment was maintained with the inner door open and outer door closed.
  7. Identified that the FBRA inner and outer doors are electrically interlocked, which meets the requirements of USAR Section 6.2.3.2 for secondary containment access openings.

Supporting Analyses (cont.)

- Evaluations concluded that the FBRA, including the outer door, meets the requirements for Seismic Category I structures and the secondary containment, with the exception of tornado wind and missile loads
- Scope of proposed license amendment request is limited to incorporating, into the secondary containment design basis, the manual action to close the inner door in the event of severe weather or radioactive release
  - Include FBRA as part of the secondary containment boundary
  - Other activities supporting the extension of the secondary containment boundary have been reviewed in accordance with 10 CFR 50.59 with a determination that prior NRC review and approval is not required
- SGT system has been demonstrated to perform its required design functions with the additional volume and leakage provided by the FBRA
- Design of the secondary containment remains consistent with the regulatory requirements associated with the postulated occurrence of tornados
- Manual actions associated with the operation of the inner door are being incorporated into the design to ensure the secondary containment integrity
- SSCs that are provided with tornado protection which are co-located within the secondary containment structures are unaffected
- No SSCs required for a response to a tornado are protected by the FBRA structure

Timeline for Submittal

- Proposed Schedule
  - Q1, 2022: LAR submittal
  - Requesting one year review and approval

Summary

- Proposed change revises the secondary containment boundary to include the FBRA and FBRA outer door
  - Inner door continues to serve as the secondary containment boundary for tornado missile protection
  - FBRA and FBRA outer door will be credited to perform the secondary containment boundary functions to contain, dilute, and hold up fission products that may leak from primary containment following a design basis accident
- Similar to the current licensing basis function of the CGCB
  - Serve as a fission product barrier only
  - Not designed to withstand the effects of tornados and tornado missiles
- NRC approval is needed to incorporate the manual action to close the FBRA inner door, in the event of severe weather or radioactive release, into the design basis for the secondary containment
- No changes to Technical Specifications are required

Open Discussion