

Clinton Power Station License Amendment Request Extension of Secondary Containment

NRC Pre-Application Meeting
December 9, 2015



Agenda

1. Meeting Objective
2. General Plant Layout
3. Design of Secondary Containment
4. Need for Amendment
5. Proposed License Amendment
6. Basis for Approval
 - i. Compliance with GDC-2 - Tornado Missile Protection
 - ii. Compliance with 10 CFR 50.67 - Post-LOCA Dose Calculations
 - iii. Environmental Qualification
7. Schedule
8. Questions

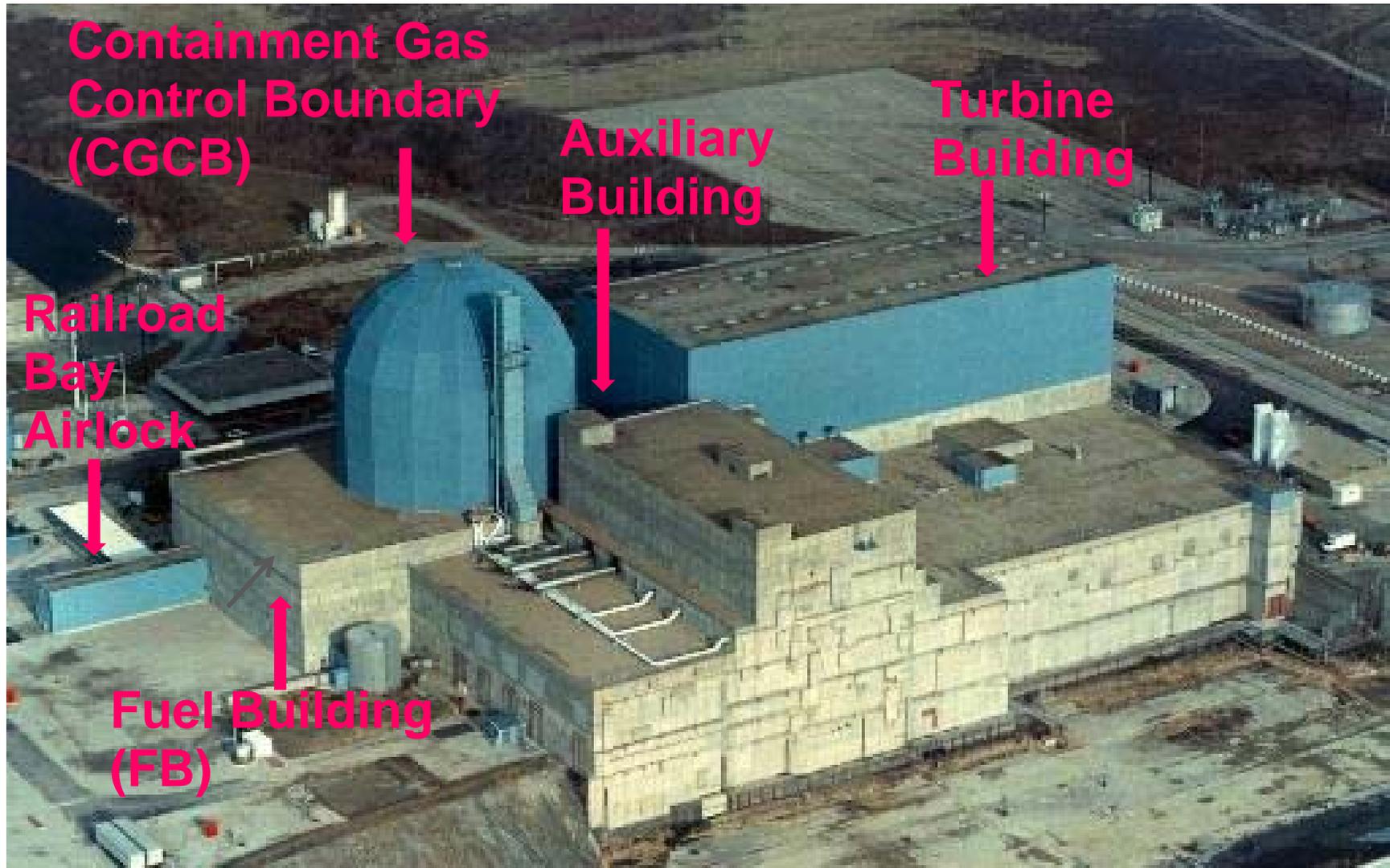
Objective

Present information to the NRC staff describing a proposed License Amendment Request (LAR) for Clinton Power Station (CPS).

License amendment will enable CPS to implement a design change necessary for dry cask storage (DCS) activities at the station.

Obtain feedback and answer any questions from the NRC staff on the proposed LAR and associated analyses.

General Plant Layout



General Plant Layout



Secondary Containment Design

1. Secondary containment is a structure that completely encloses the primary containment and consists of:
 - i. The CGCB;
 - ii. The Fuel Building (FB);
 - iii. The emergency core cooling system (ECCS) Residual Heat Removal heat exchanger rooms;
 - iv. The ECCS pump rooms;
 - v. The Reactor Water Cleanup pump room; and
 - vi. The main steam pipe tunnel.

2. The CGCB is a limited leakage structure constructed of steel framing and siding which surrounds the containment structure above the auxiliary and fuel buildings, as well as other areas in the Auxiliary Building. The CGCB is a fission product barrier only, designed to be held under a negative pressure following a design basis LOCA.

3. The secondary containment, in conjunction with the Standby Gas Treatment System (SGTS) is designed to limit the total effective dose equivalent (TEDE) within the guidelines of 10 CFR 50.67.

4. The secondary containment boundary is sufficiently leak tight such that the SGTS will maintain the secondary containment at a negative pressure equivalent to $\frac{1}{4}$ inch of water within a specified time frame following a design basis LOCA.

Secondary Containment Design (cont.)

1. The secondary containment structure, including the CGCB, is of Seismic Category I design.
2. All civil structures classified as Seismic Category I are designed for the effects of CPS natural phenomena such as tornado, wind loads, external missiles, floods, etc., with the exception of the CGCB.
3. The CGCB is a Seismic Category I structure capable of withstanding all CPS natural phenomena, except tornado missiles. However, the steel framing for the CGCB is designed to withstand the effects of tornado wind loading.
4. This design was reviewed and approved as part of initial plant licensing in NUREG-0853, "Safety Evaluation Report related to the operation of Clinton Power Station, Unit No. 1."
5. In all instances, the Seismic Category I structures and structural components are designed for the vertical and horizontal accelerations associated with both the Safe Shutdown Earthquake (SSE) and the Operating Basis Earthquake (OBE).

Need for License Amendment

December 2014 Engineering Change (EC)

1. Applied NRC-approved licensing basis of CGCB to the Fuel Building (FB) Railroad (RR) Bay Airlock to establish a new secondary containment boundary to:
 - i. Enhance safety by ensuring ingress and egress would not result in secondary containment inoperability;
 - ii. Minimize repeated entries into secondary containment Technical Specification LCO (i.e., a 4-hour Completion Time) during DCS activities; and
 - iii. Avoid unnecessary initiation of plant shutdown if DCS activities require inner door to remain open for greater than four hours.
2. Revised secondary containment short term pressure response (drawdown time) and long-term temperature analyses for larger volume and incremental heat load.
 - i. Assessed increased design temperatures on environmental qualification of SSCs in secondary containment.

Need for License Amendment (cont.)

August 2015 NRC Integrated Inspection Report

Region III inspection of DCS calculations and analyses:

...identified that EC did not address all required Seismic Category I loading conditions, specifically the loads from tornado generated missiles applied to the FB Railroad Airlock Bay structure.

Unresolved Item (URI) opened.

November 2015 NRC Integrated Inspection Report

Failure to provide a written evaluation showing that a change to the secondary containment did not require a license amendment to eliminate the need for tornado missile protection.

URI closed to Severity Level IV NCV of 10 CFR 50.59(d)(1), "Changes, Tests, and Experiments."

Proposed License Amendment

Proposed change will:

Revise USAR Sections 6.2.3 and 6.5.1 to include the FB RR Bay Airlock as part of secondary containment.

Revise USAR 3.8.4.3 to identify that design basis of the FB RR Bay Airlock is consistent with the design basis of the CGCB and does not require tornado missile protection.

Revise USAR Section 6.2.3 to increase the allowable time for SGTS to achieve and maintain the secondary containment at the required negative pressure equivalent.

Revise USAR Section 15.6.5 to incorporate results of new post-LOCA dose calculations.

Basis for Approval

1. Inner door of FB RR Bay Airlock designed and licensed as Seismic Category I structure capable of withstanding all CPS natural phenomena.
2. CPS validated ability of the FB RR Bay Airlock structure to meet Seismic Category I requirements, with the exception of tornado missiles.
3. Evaluation indicated that the structural frame, siding, roofing, and exterior door are capable of withstanding the required seismic loads.
4. Inspection and testing of the siding and roofing also confirmed installation to the design specification values required for structural integrity (i.e., yield and tensile strength).
5. Based on these evaluations, CPS determined that the FB RR Bay Airlock is designed and built consistent with the licensing basis and construction quality of the CGCB.

Basis for Approval (cont.)

Compliance with GDC-2 for Tornado Missiles

With the exception of ingress and egress into the FB, the inner door will remain closed; Current administrative controls ensure that inner door will not be opened during adverse weather conditions.

1. Deterministic tornado-missile assessment is in progress, assuming that the inner door is open during a design basis tornado.
2. Assessment is consistent with requirements and regulatory positions in Regulatory Guide 1.76, "Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants," Revision 1.

Intent is to validate missile strikes to SSCs within vulnerable areas do not impact safe shutdown capability

Basis for Approval (cont.)

Compliance with 10 CFR 50.67 Dose Limits

1. Additional heat load due to loaded cask, as well as a larger secondary containment volume, impact the post-LOCA short-term pressure response in secondary containment.
2. CPS analyzed the post-LOCA pressure response, assuming the higher heat load and added volume.
3. Analysis validated that SGTS will conservatively achieve and maintain the required negative pressure within 19 minutes (i.e., seven minutes greater than the current design value).
4. CPS is currently evaluating the impact of increased drawdown time on post-LOCA radiation doses at the boundary of the exclusion area, the boundary of the low population zone (LPZ), and the Control Room.

Basis for Approval (cont.)

Compliance with 10 CFR 50.67 Dose Limits

1. Evaluation in-progress, utilizing the same calculational methodology that was used to support approval of an alternative source term methodology (i.e., as approved in Amendment 167 to the CPS Facility Operating License) in September 2005.
2. Preliminary results indicate that the post-LOCA radiation doses will remain within the 10 CFR 50.67 limits.

Increased Secondary Containment Drawdown Time Post-LOCA Radiation Doses (TEDE) (Rem)				
	Original AST drawdown time (12 minutes)	12-month operating cycle revision	Revised drawdown time (19 minutes)	10 CFR 50.67 Limits
Exclusion Area Boundary	17.11	17.31	17.31	25
LPZ Boundary	7.33	7.37	7.42	25
Control Room	4.70	4.73	4.84	5

Basis for Approval (cont.)

Environmental Qualification

1. Additional heat load results in temperature increases ranging from 0° to 6° F, relative to design temperature of 148° F.
2. Evaluated EQ impact of conservative temperature increases on safety-related equipment in 15 affected environmental zones within secondary containment (i.e., environmental zones with a projected rise in temperature during DCS activities).
3. Identified 43 EQ binders applicable to the 15 affected environmental zones.
4. For all safety-related equipment in the affected environmental zones, the equivalent aging bounds the postulated aging requirement that is due to the increased heat load during DCS activities.

Schedule

DCS dry-run demonstrations are scheduled to start on June 15, 2016;

The loading campaign is scheduled to start on August 15, 2016

Submit license amendment request by January 20, 2016.

Request review and approval by August 2, 2016.