Exelon Generation®

10 CFR 50.46

RA-14-072

August 27, 2014

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Oyster Creek Nuclear Generating Station
Renewed Facility Operating License No. DPR-16
NRC Docket No. 50-219

Subject: 10 CFR 50.46 30-Day Report

Reference:

1) Letter from James Barstow (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated May 20, 2014

2) Letter from GE Hitachi Nuclear Energy (GEH) to Exelon Generation Company, LLC, "10 CFR 50.46 Notification 2014-01, Oyster Creek Nuclear Generating Station," dated August 5, 2014

3) Letter from GE Hitachi Nuclear Energy (GEH) to Exelon Generation Company, LLC, "10 CFR 50.46 Notification 2014-02, Oyster Creek Nuclear Generating Station," dated August 5, 2014

4) Letter from GE Hitachi Nuclear Energy (GEH) to Exelon Generation Company, LLC, "10 CFR 50.46 Notification 2014-03, Oyster Creek Nuclear Generating Station," dated August 5, 2014

5) Letter from GE Hitachi Nuclear Energy (GEH) to Exelon Generation Company, LLC, "10 CFR 50.46 Notification 2014-04, Oyster Creek Nuclear Generating Station," dated August 5, 2014

The purpose of this letter is to submit a 30-day 10 CFR 50.46 report for Oyster Creek Nuclear Generating Station (OCNGS). The most recent annual 50.46 Report for OCNGS (Reference 1) provided the cumulative Peak Cladding Temperature (PCT) errors.

Subsequent to the issuance of Reference 1, four vendor notifications of Emergency Core Cooling System (ECCS) model error/changes that are applicable to Oyster Creek have been issued (References 2 through 5). No ECCS-related changes or modifications have occurred at Oyster Creek that affect the assumptions of the ECCS analyses. The vendor notifications are summarized below:

1) Notification 2014-01: SAFER04A E4-Code Changes of Neutral Impact

   Several accumulated observations were docketed on software control tracking tools which led to changes in the evaluation model SAFER04A. These changes are regarded as code maintenance items. Representative sensitivity calculations indicate a PCT change of +10°F for both GNF2 and GE11.

2) Notification 2014-02: SAFER04A E4-Mass Non-Conservatism

   An error was discovered where there was an indication that the expected system mass diverges from the actual calculated system mass. This occurs when upper plenum liquid mass and core spray flow rate is low; system mass is gradually lost due to core spray being discarded, resulting in marginally less ECCS flow credited as reaching the core. Representative sensitivity calculations indicate a PCT change of -30°F for both GNF2 and GE11.

3) Notification 2014-03: SAFER04A E4-Minimum Core DP Model

   Due to calculation of a non-physically low pressure differential (Δp) for droplet flow above a two-phase level in the core, an earlier version of the model imposed a minimum core Δp. It has been observed that for cores with greater voiding (more steam flow), this minimum Δp could be non-conservative, actually driving the steam flow slightly, and offering inappropriate steam cooling benefit above the core two phase level. To correct this error two changes were made to the code including removal of the imposition of the minimum core Δp and the addition of an explicit core Δp calculation without regard to droplet condition. Representative sensitivity calculations indicate a PCT change of +15°F for both GNF2 and GE11.

4) Notification 2014-04: SAFER04A E4-Bundle/Lower Plenum CCFL Head

   A counter current flow limitation (CCFL) is applied on the interface between the hot bundle and the lower plenum. The pressure head applied at that location is based on the liquid water level in the bundle. It was found, upon exercising the routine to define CCFL, the output would replace the pressure head with a value revised by that calculation, resulting in a representation of pressure head slightly different from that of the calculated water level in the bundle. The iteration scheme for CCFL has been fixed in the SAFER04A E4 model so that, consistently, the level head is applied whenever CCFL is calculated in that location. Representative sensitivity calculations indicate a PCT change of +20°F for both GNF2 and GE11.

The net combined impact on PCT of the errors/changes described above is +15°F for the GE11 and GNF2 fuel resulting in a Licensing Basis PCT of 2165°F, which remains below the acceptance criteria of 2200°F.

As discussed in 10 CFR 50.46(a)(3)(i), this 30-day report is required because the absolute magnitudes of the respective temperature changes is greater than 50°F.

Two attachments are included with this letter that provide the current OCNGS 10 CFR 50.46 status. Attachment 1, "Peak Cladding Temperature Rack-Up Sheet," provides information regarding the PCT for the limiting large break LOCA analysis evaluations for OCNGS.

Attachment 2, "Assessment Notes," contains a detailed description for each change or error reported.

There are no commitments contained in this letter. If you have any questions, please contact Tom Loomis at 610-765-5510.

Respectfully,

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

Attachments: 1) Peak Cladding Temperature Rack-Up Sheet
2) Assessment Notes

cc: USNRC Administrator, Region I
USNRC Senior Project Manager, OCNGS
USNRC Senior Resident Inspector, OCNGS

ATTACHMENT 1

10 CFR 50.46
"Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors"

Report of the Emergency Core Cooling System Evaluation Model Changes and Errors

Assessments as of August 27, 2014

Peak Cladding Temperature Rack-Up Sheet

Oyster Creek Nuclear Generating Station

PLANT NAME: Oyster Creek
ECCS EVALUATION MODEL: SAFER/CORCL/GESTR-LOCA
REPORT REVISION DATE: 8/27/14
CURRENT OPERATING CYCLE: 24

ANALYSIS OF RECORD

Evaluation Model:

1. NEDC-23785-1-PA Rev. 1, "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-Of-Coolant Accident Volume II, SAFER - Long Term Inventory Model for BWR Loss-Of-Coolant Analysis," October 1984.

2. NEDC-30996P-A, "SAFER Model for Evaluation of Loss-of-Coolant Accidents for Jet Pump and Non-jet Pump Plants, Volume I, SAFER - Long Term Inventory Model for BWR Loss-of-Coolant Analysis," October 1987.

3. NEDC-30996P-A, "SAFER Model for Evaluation of Loss-of-Coolant Accidents for Jet Pump and Non-jet Pump Plants, Volume II, SAFER Application Methodology for Non-jet Pump Plants," October 1987 (Non-jet Pump Plant - SAFER/CORCL).

4. NEDC-32950P, "Compilation of Improvements to GENE's SAFER ECCS-LOCA Evaluation Model," January 2000.

Calculations:

1. GE-NE-0000-0001-7486-01P, "Oyster Creek Generating Station Loss-of-Coolant Accident Evaluation for GE11," GE Nuclear Energy, dated July 2002.

2. Report 0000-0098-3503-R2, "Oyster Creek Generating Station GNF2 ECCS-LOCA Evaluation," GEH Nuclear Energy, dated November 2010.

3. Report 0000-0138-9259-SRLR, Rev 2, "Supplemental Reload Licensing Report for Oyster Creek Reload 24 Cycle 24," dated October 2012.

Fuel: GE11/GNF2
Limiting Fuel Type: GE11/GNF2
Limiting Single Failure: ADS Valve
Limiting Break Size and Location: 4.66 ft^2 Double-Ended Guillotine (DEG) in a Recirculation Discharge Pipe
Reference Peak Cladding Temperature (PCT) PCT = 2150°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 Report dated May 31, 2013 (See Note 1)	ΔPCT = 0°F
10 CFR 50.46 Report dated May 20, 2014 (See Note 2)	ΔPCT = 0°F
NET PCT (GE11/GNF2)	**2150°F**

B. CURRENT LOCA MODEL ASSESSMENTS

Notification 2014-01 (See Note 3)	ΔPCT = +10°F
Notification 2014-02 (See Note 3)	ΔPCT = -30°F
Notification 2014-03 (See Note 3)	ΔPCT = +15°F
Notification 2014-04 (See Note 3)	ΔPCT = +20°F
Total PCT Change from Current Assessments	$\sum$ΔPCT = +15°F
Cumulative PCT Change from Current Assessments	$\sum \lvert$ΔPCT$\rvert$ = 75°F
NET PCT (GE11/GNF2)	**2165°F**

ATTACHMENT 2

10 CFR 50.46
"Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors"

Report of the Emergency Core Cooling System Evaluation Model Changes and Errors

Assessments as of August 27, 2014

Assessment Notes

Oyster Creek Nuclear Generating Station

1. Prior LOCA Assessment

Updated LOCA/MAPLHGR analyses were performed for both GE11 and GNF2 fuel in support of operating Cycle 24. These analyses maintained the calculated PCT at 2150°F and superseded all prior LOCA assessments. These analyses incorporated all ECCS/LOCA methodology errors and changes known/resolved at that time (as of October 2012).

[Reference: Letter from David P. Helker (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated May 31, 2013.]

2. Prior LOCA Assessment

No vendor notifications of Emergency Core Cooling System (ECCS) model errors/changes applicable to Oyster Creek have been issued since the last 10 CFR 50.46 report (see Note 1). No ECCS related changes or modifications have occurred at Oyster Creek that affect the assumptions in the Oyster Creek LOCA analysis of record.

[Reference: Letter from James Barstow (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated May 20, 2014.]

3. Current LOCA Model Assessment

Subsequent to the 2014 Annual 50.46 report (see Note 2), four vendor notifications were received. The first notification (Reference 1) addresses several accumulated updates to the SAFER04A model. These code maintenance changes result in a PCT change of +10°F for both GNF2 and GE11. The second notification (Reference 2) corrected a logic error that has been isolated, occurring with an indication that the expected system mass diverges from the calculated actual mass. This error affects the ECCS flow credited as reaching the core. Correction of this error results in a -30°F PCT change to both GNF2 and G11. The third notification (Reference 3) addresses an error with the imposed minimum pressure differential (Δp) for droplet flow above a two-phase level in the core. This error can offer an inappropriate steam cooling benefit above the core two phase level. To correct this error, an explicit core Δp calculation is applied without regard to droplet condition resulting in a PCT change of +15°F to both GNF2 and GE11. The forth notification (Reference 4) addresses an incorrect pressure head representation when defining the counter current flow limitation (CCFL). Correction of this error results in a +20°F PCT change to both GNF2 and GE11.

[Reference 1: Letter from GE Hitachi Nuclear Energy (GEH) to Exelon Generation Company, LLC, "10 CFR 50.46 Notification 2014-01, Oyster Creek Nuclear Generating Station," dated August 5, 2014.]

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