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10 CFR 50.46(a)(3)

PSLTR: #01-0122

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

Dresden Nuclear Power Station, Units 2 and 3
Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

Subject: Plant Specific ECCS Evaluation Changes – 10 CFR 50.46 Report

- References
- 1) Letter from S. N. Bailey (U. S. NRC) to O. D. Kingsley (Exelon Generation Company, LLC), "Issuance of Amendments," dated November 2, 2001
 - 2) Letter from R. M. Krich (Commonwealth Edison Company) to U. S. NRC, "Request for License Amendment for Power Uprate Operation," dated December 27, 2000
 - 3) Letter from Preston Swafford (Exelon Generation Company, LLC) to U. S. NRC, "Plant Specific ECCS Evaluation Changes – 10 CFR 50.46 Annual Report," dated July 10, 2001

In accordance with 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," paragraph (a)(3)(ii), Exelon Generation Company (EGC), LLC, formerly Commonwealth Edison (ComEd) Company, is reporting a change to the evaluation model used for evaluating the emergency core cooling system (ECCS) performance and the peak cladding temperature (PCT) at Dresden Nuclear Power Station (DNPS), Unit 2. In addition, changes to the PCT are being reported for DNPS, Unit 3.

In Reference 1, the NRC approved changes to the Technical Specifications (TS) for DNPS to allow a change in fuel vendors from Framatome ANP (formerly Siemens Power Corporation (SPC)) to General Electric (GE) Company and a transition to GE14 fuel. In accordance with these changes, the GE SAFER/GESTR ECCS evaluation model was used for DNPS, Unit 2 Cycle 18 (D2C18), instead of the SPC evaluation model used for the previous cycle (D2C17). In Reference 2, ComEd requested changes to the TS and operating license to permit operation at uprated power. Approval of this amendment request is pending. The change in evaluation models, along with the transition to GE14 fuel and the expected operation at uprated power levels has resulted in a significant change to PCT for the fuel.

As of November 8, 2001, DNPS Unit 2 has implemented the change in ECCS models and the GE14 fuel transition for D2C18. For D2C17, the PCT of record, based on the Framatome ANP evaluation method, was 2051 degrees F, as reported in Reference 3. The calculated PCT for

Appl

D2C18, based on the GE evaluation model, is 2110 degrees F. This is a change of more than 50 degrees F and is being reported in accordance with 10 CFR 50.46(a)(3)(ii). The attachment to this letter provides details regarding this change.

DNPS Unit 3 will implement the change in ECCS evaluation model and the fuel transition in October 2002. However, based on the current Framatome ANP LOCA model assessments, a change in the current PCT for DNPS Unit 3 is being provided in the attachment to this letter. Unless there are significant changes to the DNPS Unit 2 and 3 PCT, the next report in accordance with 10 CFR 50.46 for both DNPS units will be provided within twelve months from the date of this letter.

If there are any questions or comments concerning this letter, please contact Mr. D. F. Ambler at (815) 416-2800.

Respectfully,



Preston Swafford
Site Vice President
Dresden Nuclear Power Station

Attachment 1: Dresden Nuclear Power Station, Unit 2 10 CFR 50.46 Report
Attachment 2: Dresden Nuclear Power Station, Unit 3 10 CFR 50.46 Report
Attachment 3: Dresden Nuclear Power Station, Units 2 and 3 10 CFR 50.46 Report
Assessment Notes

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Dresden Nuclear Power Station

Attachment 1
Dresden Nuclear Power Station Unit 2
10CFR50.46 Report

PLANT NAME: Dresden Nuclear Power Station, Unit 2
ECCS EVALUATION MODEL: SAFER/GESTR-LOCA
REPORT REVISION DATE: 11/26/2001
CURRENT OPERATING CYCLE: 18

ANALYSIS OF RECORD

Evaluation Model: The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident, Volume III, SAFER/GESTR Application Methodology, NEDE-23785-1-PA, General Electric Company, Revision 1, October 1984.

Calculations:

"SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis for Dresden Nuclear Station 2 and 3 and Quad Cities Nuclear Station Units 1 and 2," NEDC-32990P, Revision 1, GE Nuclear Energy, September 2001.

Fuel: 9x9-2, ATRIUM-9B and GE14
Limiting Fuel Type: GE14
Limiting Single Failure: Diesel Generator
Limiting Break Size and Location: 1.0 Double-Ended Guillotine in a Recirculation Suction Pipe

Reference Peak Cladding Temperature (PCT) (See Note 2) PCT = 2110°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

None (See Note 16)	$\Delta PCT = 0^{\circ}F$
Net PCT	2110 °F

B. CURRENT LOCA MODEL ASSESSMENTS

None (See Note 16)	$\Delta PCT = 0^{\circ}F$
Total PCT change from current assessments	$\sum \Delta PCT = 0^{\circ}F$
Cumulative PCT change from current assessments	$\sum \Delta PCT = 0^{\circ}F$
Net PCT	2110 °F

Attachment 2
Dresden Nuclear Power Station Unit 3
10CFR50.46 Report

PLANT NAME: Dresden Nuclear Power Station, Unit 3
 ECCS EVALUATION MODEL: EXEM BWR
 REPORT REVISION DATE: 11/26/2001
 CURRENT OPERATING CYCLE: 17

ANALYSIS OF RECORD

Evaluation Model: Advanced Nuclear Fuels Corporation Methodology for Boiling Water Reactors EXEM BWR Evaluation Model, ANF-91-048(P)(A), January, 1993.

Calculations:

1. "Dresden LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM-9B and 9x9-2 Fuel," EMF-98-007 (P), Siemens Power Corporation, January 1998 (See Note 1).
2. "LOCA Break Spectrum Analysis for Dresden Units 2 and 3," EMF-97-025 (P), Revision 1, Siemens Power Corporation, May 1997.

Fuel: 9x9-2 and ATRIUM-9B
 Limiting Fuel Type: 9x9-2
 Limiting Single Failure: LPCI Injection Valve
 Limiting Break Size and Location: 1.0 Double-Ended Guillotine (DEG) in a Recirculation Suction Pipe

Reference PCT (See Note 2)

PCT = 1920°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 report dated July 10, 1997 (See Note 3)	$\Delta PCT = 0^\circ F$
10 CFR 50.46 report dated July 10, 1998 (See Note 4)	$\Delta PCT = 16^\circ F$
10 CFR 50.46 report dated July 10, 1999 (See Note 5)	$\Delta PCT = 20^\circ F$
10 CFR 50.46 report dated July 10, 2000 (See Note 6)	$\Delta PCT = 0^\circ F$
10 CFR 50.46 report dated July 10, 2001 (See Note 7)	$\Delta PCT = 10^\circ F$
Net PCT	1966 °F

B. CURRENT LOCA MODEL ASSESSMENTS

Incorrect pellet dish volume terms in RDX2LSE fuel swelling calculation (see Note 8)	$\Delta PCT = 0^\circ F$
Reconciliation of RODEX2-2A numerical iteration scheme (see Note 9)	$\Delta PCT = 1^\circ F$
Incorrect HUXY gadolinia conductivity model (see Note 10)	$\Delta PCT = -3^\circ F$
Incorrect calculation start time for the BULGEX code (see Note 11)	$\Delta PCT = 0^\circ F$
Incorrect constant used in the rupture temperature calculation (see Note 12)	$\Delta PCT = 1^\circ F$
Incorrect Zircaloy heat of reaction (see Note 13)	$\Delta PCT = 3^\circ F$
Incorrect recirculation discharge piping diameter (see Note 14)	$\Delta PCT = 0^\circ F$
Incorrect implementation of LPCS pump flow uncertainty (see Note 15)	$\Delta PCT = 5^\circ F$
Total PCT change from current assessments	$\Sigma \Delta PCT = 7^\circ F$
Cumulative PCT change from current assessments	$\Sigma \Delta PCT = 13^\circ F$
Net PCT	1973 °F

Attachment 3
Dresden Nuclear Power Station Units 2 and 3
10 CFR 50.46 Report Assessment Notes

1. Analysis of Record

The 50.46 report dated July 10, 1997, noted that the analyses of record were EMF-97-031 (P), Revision 1 and EMF-97-031 (P) respectively for Units 2 and 3. These reports were reissued in January 1998, as EMF-98-007 (P), Supplement 2 and EMF-98-007 (P) respectively.

2. Reporting of Different Peak Cladding Temperatures for Each Unit

Dresden Units 2 and 3 are being maintained under separate analyses of record.

[References: "SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis for Dresden Nuclear Station 2 and 3 and Quad Cities Nuclear Station Units 1 and 2," NEDC-32990P, Revision 1, GE Nuclear Energy, September 2001.

"Dresden LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM-9B and 9x9-2 Fuel," EMF-98-007(P), Siemens Power Corporation, January, 1998.]

3. Prior LOCA Model Assessment

The 1997 LOCA model assessment was a new baseline analysis for Dresden Units 2 and 3. Therefore, there is no PCT change.

[Reference: Letter from J. S. Perry (JSPLTR #97-0131) (ComEd) to USNRC, "Dresden Nuclear Power Station Units 2 and 3, Plant Specific ECCS Evaluation Changes - 10CFR50.46 Report DPR-19 and DPR-25, NRC Docket Nos. 50-237 and 50-249," July 10, 1997.]

4. Prior LOCA Model Assessment

The 50.46 report dated July 10, 1998, assessed the impact of plant parameter changes and errors in the LOCA evaluation model. Calculations were performed to determine the PCT changes for both units.

[Reference: Letter from J.M. Heffley (JMHLTR #98-0199) (ComEd) to USNRC "Dresden Nuclear Power Station Units 2 and 3, Plant Specific ECCS Evaluation Changes - 10CFR50.46 Annual Report DPR-19 and DPR-25, NRC Docket Nos. 50-237 and 50-249," July 10, 1998.]

5. Prior LOCA Model Assessment

The 50.46 report dated July 10, 1999, assessed the impact of errors in the LOCA evaluation model. The PCT reported was based on estimates by Siemens Power Corporation. SPC also calculated the PCT for the new ATRIUM fuel loaded into the D3C16 core.

[Reference: Letter from J.M. Heffley (JMHLTR #99-0080) (ComEd) to USNRC "Plant Specific ECCS Evaluation Changes - 10CFR50.46 Annual Report," July 10, 1999.]

6. Prior LOCA Model Assessment

The 50.46 report dated July 10, 2000, assessed the impact of plant parameter changes in the LOCA evaluation model, new fuel loaded into the D2C17 core and the effects of loading D3C16 offset fuel next to the non-offset fuel. The assessments identified zero °F impact on PCT.

[Reference: Letter from Preston Swafford (PSLTR: #00-0099) (ComEd) to USNRC, "Plant Specific ECCS Evaluation Changes - 10CFR50.46 Annual Report," July 10, 2000.]

Attachment 3
Dresden Nuclear Power Station Units 2 and 3
10 CFR 50.46 Report Assessment Notes

7. Prior LOCA Model Assessment

The 50.46 report dated July 10, 2001 assessed impact of errors in Framatome ANP LOCA analysis model and new fuel loaded into the Dresden Unit 3 Cycle 17 core.

[Reference: Letter from Preston Swafford (PSLTR: #01-0074) (Exelon) to USNRC, "Plant Specific ECCS Evaluation Changes – 10 CFR 50.46 Annual Report," July 10, 2001.]

8. Incorrect pellet dish volume terms in RDX2LSE fuel swelling calculation

The equation used in RDX2LSE to calculate the dish volume for swelling accommodation has an error resulting in the underestimation of the dish volume. The underestimation could affect predicted temperatures and gap conductances at moderate to high burnups.

[References: Letter from D. Garber (Framatome ANP) to F. W. Trikur (Exelon), "10 CFR 50.46 PCT Reporting for Dresden Units," DEG:01:149, September 20, 2001.

Letter from D. Garber (SPC) to R. J. Chin (ComEd), "Transmittal of Condition Report 8266 and Associated Part 21 Evaluation Report," DEG:00:029, January 27, 2000.]

9. Reconciliation of RODEX2-2A numerical iteration scheme

Framatome ANP created a new RODEX2-2A code by merging the RODEX2-2A code for rod mechanical design analyses and the RDX2LSE code for safety analyses. The previous codes used the same NRC approved models and they are equivalent but contained some differences in iteration schemes. The new code has reconciled the differences in iteration schemes.

[Reference: Letter from D. Garber (Framatome ANP) to F. W. Trikur (Exelon), "10 CFR 50.46 PCT Reporting for Dresden Units," DEG:01:149, September 20, 2001.]

10. Incorrect HUXY gadolinia model

In 1998, Framatome ANP discovered that the NRC approved gadolinia model was not incorporated into the RDX2LSE code. Additional investigation for the condition report revealed that the HUXY code contained the same error.

[References: Letter from D. Garber (Framatome ANP) to F. W. Trikur (Exelon), "10 CFR 50.46 PCT Reporting for Dresden Units," DEG:01:149, September 20, 2001.

Letter from D. Garber (SPC) to R. J. Chin (ComEd), "Transmittal of Condition Report 6419 with Part 21 Evaluation Report," DEG:98:024, January 26, 1998.]

11. Incorrect calculation start time for the BULGEX code

During the evaluation of a new version of the HUXY code to correct a user message, it was discovered that the BULGEX subroutine needed to be initiated at a much earlier time.

[References: Letter from D. Garber (Framatome ANP) to F. W. Trikur (Exelon), "10 CFR 50.46 PCT Reporting for Dresden Units," DEG:01:149, September 20, 2001.

Letter from D. Garber (FRA-ANP) to F. W. Trikur (Exelon), "Transmittal of 10 CFR 50.46 Reporting for LaSalle Units, Condition Report 9008, and CMR 2156," DEG:01:108, January 17, 2001.]

Attachment 3
Dresden Nuclear Power Station Units 2 and 3
10 CFR 50.46 Report Assessment Notes

12. Incorrect constant used in the rupture temperature calculation

The rupture temperature calculation over 950 °C in BULGEX incorrectly and non-conservatively rounds a constant parameter term.

[References: Letter from D. Garber (Framatome ANP) to F. W. Trikur (Exelon), "10 CFR 50.46 PCT Reporting for Dresden Units," DEG:01:149, September 20, 2001.

Letter from D. Garber (FRA-ANP) to F. W. Trikur (Exelon), "Transmittal of 10 CFR 50.46 Reporting for LaSalle Units, Condition Report 9008, and CMR 2156," DEG:01:108, January 17, 2001.]

13. Incorrect Zircaloy heat of reaction

The heat of reaction for zircaloy in the HUXY code is incorrect. The heat of reaction as a function of temperature does not account for the variation of the zircaloy heat capacity in the alpha-beta transformation temperature range.

[References: Letter from D. Garber (Framatome ANP) to F. W. Trikur (Exelon), "10 CFR 50.46 PCT Reporting for Dresden Units," DEG:01:149, September 20, 2001.

Letter from D. Garber (SPC) to R. J. Chin (ComEd), "Transmittal of Condition Report 8168 R/1, with Part 21 Evaluation Report," DEG:99:349, December 22, 1999.]

14. Incorrect Dresden Unit 3 recirculation discharge piping diameter

The discharge piping diameter used in the analysis was incorrect. The impact on PCT due to correction in discharge piping diameter was determined to be insignificant.

[References: Letter from D. Garber (Framatome ANP) to F. W. Trikur (Exelon), "10 CFR 50.46 PCT Reporting for Dresden Units," DEG:01:149, September 20, 2001.

Letter from D. Garber (SPC) to R. J. Chin (ComEd), "Transmittal of Condition Report 8550 Revision 1," DEG:00:175, July 17, 2000.]

15. Incorrect implementation of Low Pressure Core Spray (LPCS) pump flow uncertainty

The definition of the end of blowdown for Unit 3 was different from Unit 2. The end of blowdown is the criterion used to start reflood calculation. Framatome recalculated the PCT for Unit 3 using the same criterion as Unit 2 and reported an increase of 5 °F in PCT.

[References: Letter from D. Garber (Framatome ANP) to F. W. Trikur (Exelon), "10 CFR 50.46 PCT Reporting for Dresden Units," DEG:01:149, September 20, 2001.

Letter from D. Garber (SPC) to R. J. Chin (ComEd), "Disposition of Inconsistencies in Modeling LPCS Flow Uncertainty in Dresden LOCA Analysis," DEG:00:200, August 23, 2000.]

16. Prior and current LOCA assessments

A new LOCA analysis was performed to support extended power uprate and transition to GE14 fuel. Therefore, there is no prior or current assessment penalty.

[Reference: "SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis for Dresden Nuclear Station 2 and 3 and Quad Cities Nuclear Station Units 1 and 2," NEDC-32990P, Revision 1, GE Nuclear Energy, September 2001].