

TMI-10-052  
May 14, 2010

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

Three Mile Island Nuclear Station, Unit 1  
Renewed Facility Operating License No. DPR-50  
NRC Docket No. 50-289

Subject: 10 CFR 50.46 Report

Reference: 1) Letter from David P. Helker (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Report," dated May 15, 2009

The purpose of this letter is to submit the 10 CFR 50.46 reporting information for Three Mile Island Nuclear Station (TMI), Unit 1. The most recent annual 50.46 Report for TMI, Unit 1 (Reference 1) provided the cumulative Peak Cladding Temperature (PCT) errors for the most recent fuel designs.

Since the Reference 1 report was issued, no vendor notifications of Emergency Core Cooling System (ECCS) model error/changes that are applicable to TMI, Unit 1 have been issued through May 13, 2010. Also, no ECCS-related changes or modifications have occurred at TMI, Unit 1 that affect the assumptions of the ECCS system. With the incorporation of the Enhanced Once Through Steam Generators (EOTSGs) and retirement of the Mark-B9 fuel type, the Mark-B-HTP is now the limiting fuel bundle for the Small Break Loss of Coolant Accident (SBLOCA) analysis, and the Mark B-12 is the limiting fuel bundle for the Large Break Loss of Coolant Accident (LBLOCA) analysis.

Two attachments are included with this letter that provide the current TMI, Unit 1, 10 CFR 50.46 status. Attachment 1 ("Peak Cladding Temperature Rack-Up Sheets") provides updated information regarding the PCT for the limiting SBLOCA and LBLOCA analyses. Attachment 2, "Assessment Notes," contains a detailed description for each change or error reported.

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No new regulatory commitments are established in this submittal. If any additional information is needed, please contact Tom Loomis at (610) 765-5510.

Respectfully,



David P. Helker  
Manager - Licensing & Regulatory Affairs  
Exelon Generation Company, LLC

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

cc: S. J. Collins, USNRC Administrator, Region I  
P. J. Bamford, USNRC Project Manager, TMI, Unit 1  
D. M. Kern, USNRC Senior Resident Inspector, TMI, Unit 1

**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**

**Assessments as of May 13, 2010**

**Peak Cladding Temperature Rack-Up Sheets**

**TMI, Unit 1**

PLANT NAME: Three Mile Island Nuclear Station, Unit 1  
ECCS EVALUATION MODEL: Small Break Loss of Coolant Accident (SBLOCA)  
REPORT REVISION DATE: 5/13/10  
CURRENT OPERATING CYCLE: 18

### ANALYSIS OF RECORD (AOR)

Evaluation Model: BWNT<sup>1</sup>  
Calculation: AREVA NP, 86-9111507-000, August 2009 (Mark-B-HTP with EOTSGs)  
Fuel: Mark-B12, Mark-B-HTP  
Limiting Fuel Type: Mark-B-HTP  
Limiting Single Failure: Loss of One Train of ECCS

Limiting Break Size and Location: 0.07 ft<sup>2</sup> Break in Cold Leg Pump Discharge Piping

Reference Peak Cladding Temperature (PCT) PCT = 1444°F

### MARGIN ALLOCATION

#### A. PRIOR LOSS OF COOLANT ACCIDENT (LOCA) MODEL ASSESSMENTS

|                            |                           |
|----------------------------|---------------------------|
| New Analysis (see note 11) | $\Delta PCT = 0^{\circ}F$ |
|----------------------------|---------------------------|

NET PCT PCT = 1444°F

#### B. CURRENT LOCA MODEL ASSESSMENTS

|      |                           |
|------|---------------------------|
| None | $\Delta PCT = 0^{\circ}F$ |
|------|---------------------------|

NET PCT PCT = 1444°F

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<sup>1</sup> The BWNT EM is based on RELAP5/MOD2-B&W.

PLANT NAME: Three Mile Island Nuclear Station, Unit 1  
ECCS EVALUATION MODEL: Large Break Loss of Coolant Accident (LBLOCA)  
REPORT REVISION DATE: 5/13/10  
CURRENT OPERATING CYCLE: 18

## ANALYSIS OF RECORD (AOR)

Evaluation Model: BWNT<sup>2</sup>  
Calculation: Framatome ANP 86-5011294-00, March 2001 (Mark-B12)  
AREVA NP, 86-9111507-000, August 2009 (Mark-B-HTP with EOTSGs)  
Fuel: Mark-B12, Mark-B-HTP  
Limiting Fuel Type: Mark-B12  
Limiting Single Failure: Loss of One Train of ECCS

Limiting Break Size and Location: Guillotine Break in Cold Leg Pump Discharge Piping

Reference Peak Cladding Temperature (PCT) PCT = 1989°F

## MARGIN ALLOCATION

### A. PRIOR LOCA MODEL ASSESSMENTS

|   |                             |
|---|-----------------------------|
| 10 CFR 50.46 report dated June 5, 2000 (see note 1)         | $\Delta PCT = 0^{\circ}F$   |
| 10 CFR 50.46 report dated June 11, 2001 (see note 2)        | $\Delta PCT = 0^{\circ}F$   |
| 10 CFR 50.46 report dated June 6, 2002 (see note 3)         | $\Delta PCT = 0^{\circ}F$   |
| 10 CFR 50.46 report dated June 19, 2003 (see note 4)        | $\Delta PCT = 0^{\circ}F$   |
| 10 CFR 50.46 report dated June 1, 2004 (see notes 5 and 12) | $\Delta PCT = -35^{\circ}F$ |
| 10 CFR 50.46 report dated May 16, 2005 (see note 6)         | $\Delta PCT = 0^{\circ}F$   |
| 10 CFR 50.46 report dated May 9, 2006 (see note 7)          | $\Delta PCT = 0^{\circ}F$   |
| 10 CFR 50.46 report dated May 16, 2007 (see note 8)         | $\Delta PCT = 0^{\circ}F$   |
| 10 CFR 50.46 report dated May 15, 2008 (see note 9)         | $\Delta PCT = 0^{\circ}F$   |
| 10 CFR 50.46 report dated May 15, 2009 (see note 10)        | $\Delta PCT = 0^{\circ}F$   |

NET PCT PCT = 1954°F

### B. CURRENT LOCA MODEL ASSESSMENTS

|                    |                           |
|--------------------|---------------------------|
| None (see note 11) | $\Delta PCT = 0^{\circ}F$ |
|--------------------|---------------------------|

NET PCT PCT = 1954°F

<sup>2</sup> The BWNT EM is based on RELAP5/MOD2-B&W.

**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**

**Assessments as of May 13, 2010**

**Peak Cladding Temperature Rack-Up Sheets**

**TMI, Unit 1**

**Assessment Notes**

1. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated June 5, 2000 reported new LBLOCA and SBLOCA analyses to support operations at 20% steam generator tube plugging conditions for Mark-B9 fuel.

2. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated June 11, 2001 reported evaluations for LBLOCA and SBLOCA model changes which resulted in 0°F PCT change.

3. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated June 6, 2002 reported a new LBLOCA analyses to support operations with Mark-B12 fuel. For SBLOCA, an increase in SBLOCA PCT of 42°F for Mark-B9 fuel was reported due to increase in emergency feedwater temperature and is already included in the reported Reference Peak Cladding Temperature, therefore a 0°F PCT change is assigned. This analysis is applicable to both Mark-B12 fuel and Mark-B9 fuel.

4. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated June 19, 2003 reported evaluation for a LBLOCA model change which resulted in 0°F PCT change. SBLOCA was not impacted.

5. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated June 1, 2004 reported evaluation for LBLOCA and SBLOCA model changes which resulted in 0°F PCT change. An error correction in containment pressure input resulted in a reduction in PCT for the LBLOCA analysis.

6. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated May 16, 2005 reported evaluations for LBLOCA model changes which resulted in a 0°F PCT change. LOCA oxygen/hydrogen recombination was considered and the PCT effect was determined to be 0°F. SBLOCA was not impacted.

7. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated May 9, 2006 reported evaluations for LOCA model changes which resulted in a 0°F PCT change. Reported changes included operation with no APSR pull and batch 18 fuel design changes. These were applicable for SBLOCA and LBLOCA.

8. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated May 16, 2007 reported an evaluation for a LOCA model change which resulted in a 0°F PCT change. The reported evaluation considered the effect on the containment pressure response for LOCA due to GSI-191 related reactor building sump screen replacement. The evaluation resulted in 0°F impact for both LBLOCA and SBLOCA PCTs.

## 9. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated May 15, 2008 reported evaluations for LOCA model changes which resulted in a 0°F PCT change. Reported changes included the impact of a RELAP5 pin pressure calculation logic limitation which resulted in a SBLOCA PCT impact of 0°F, and an energy deposition factor error which resulted in a LBLOCA PCT impact of 0°F.

## 10. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated May 15, 2009 reported no evaluations or PCT penalties for either SBLOCA or LBLOCA.

## 11. Current LOCA Model Assessment

With the Cycle 18 reload, all Mark-B9 fuel types were discharged from the core. Currently, the limiting fuel type is Mark-B12 for LBLOCA and Mark-B-HTP for SBLOCA, as analyzed in a mixed core of Mark-B12 and Mark-B-HTP. For LBLOCA, the limiting fuel type PCT is 1954°F, which is a change from the previously limiting fuel type PCT of 2058°F. AREVA has evaluated the impact of a mixed core of Mark-B-HTP and Mark-B12 fuel types along with implementation of EOTSGs beginning with Cycle 18 operation. AREVA has concluded that a previously analyzed LBLOCA for a mixed core of Mark-B-HTP and Mark-B12 fuel types remain bounding and applicable. For SBLOCA, the mixed core of Mark-B12 and Mark-B-HTP was evaluated and a new PCT of 1444°F was calculated for the limiting Mark-B-HTP fuel type, which bounds the Mark-B12 fuel type. This analysis also includes consideration of the effect of reduced EFW wetting associated with the new EOTSGs. Note that the changes in PCT are because of changes in limiting fuel type only.

## 12. Current LOCA Model Assessment

With the change in limiting fuel type from Mark-B9 to Mark-B12, the 25°F reduction in PCT for the LBLOCA analysis reported in 2004 was updated to be a 35°F reduction in PCT as appropriate for the new limiting fuel type. This PCT reduction was originally reported in the TMI 2004 annual 10 CFR 50.46 report.