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W3F1-2016-0008

February 3, 2016

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

SUBJECT: Control Element Assembly Drop Times Commitment Response
Waterford Steam Electric Station, Unit 3
Docket No. 50-382
License No. NPF-38

- REFERENCES:
1. W3F1-2015-0040, License Amendment Request to Revise Control Element Assembly Drop Times, July 2, 2015 [ADAMS Accession Number ML15197A106].
 2. W3F1-2015-0079, Control Element Assembly Drop Times License Condition, October 8, 2015 [ADAMS Accession Number ML15281A223].
 3. NRC License Amendment 246, Control Element Assembly Drop Times, November 13, 2015 [ADAMS Accession Number ML15289A143].

Dear Sir or Madam:

On July 2, 2015, Entergy Operations, Inc. (Entergy) requested an amendment to revise the Control Element Assembly (CEA) drop times associated with Technical Specification 3.1.3.4 for Waterford Steam Electric Station Unit 3 (Waterford 3) [Reference 1]. In this letter (W3F1-215-0040), Attachment 7 contained regulatory commitments. The following two commitments were made and required to be completed within 60 days of the Control Element Assembly (CEA) drop time test:

Commitment #1: The Cycle 21 CEA drop time surveillance data will be provided to the NRC to confirm the conclusion of no further degradation.

Commitment #2: The Cycle 21 CEA drop time data will be analyzed to validate CEA insertion curve remains within the analysis requirements.

Commitment #2 was changed to a license condition [Reference 2]. This license condition was approved in NRC license amendment 246 [Reference 3]. Operating license paragraph 2.C.20 was amended to read as follows:

Control Element Assembly Drop Time Curve Validation (Amendment 246)

Prior to Cycle 21 Mode 2 operation, the licensee shall verify the control element assembly drop time test data demonstrates faster control element assembly drop times than the drop time curve provided in Table 15.0-5 of the Final Safety Analysis Report, as amended.

Attachment 1 to this letter provides the CEA drop time data and analysis to demonstrate compliance with the commitment and license condition requirements. Attachment 2 contains a new commitment to provide information resulting from a new causal analysis to the NRC.

If you have any questions or require additional information, please contact John Jarrell, Regulatory Assurance Manager, at 504-739-6685.

I declare under penalty of perjury that the foregoing is true and correct. Executed on February 3, 2016.

Sincerely,



MRC/JPJ/wjs

Attachments:

1. CEA Drop Time Information
2. List of Regulatory Commitments

cc: Mr. Marc L. Dapas
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**Attachment 1 to
W3F1-2016-0008
CEA Drop Time Information**

Introduction

On July 2, 2015, Entergy Operations, Inc. (Entergy) requested an amendment to revise the Control Element Assembly (CEA) drop times associated with Technical Specification 3.1.3.4 for Waterford Steam Electric Station Unit 3 (Waterford 3) [Reference 1]. In this letter (W3F1-215-0040), Attachment 7 contained regulatory commitments. The following two commitments were made and required to be completed within 60 days of the Control Element Assembly (CEA) drop time test:

Commitment #1: The Cycle 21 CEA drop time surveillance data will be provided to the NRC to confirm the conclusion of no further degradation.

Commitment #2: The Cycle 21 CEA drop time data will be analyzed to validate CEA insertion curve remains within the analysis requirements.

Commitment #2 was changed to a license condition [Reference 5]. This license condition was approved in NRC license amendment 246 [Reference 6]. Operating license paragraph 2.C.20 was amended to read as follows:

Control Element Assembly Drop Time Curve Validation (Amendment 246)

Prior to Cycle 21 Mode 2 operation, the licensee shall verify the control element assembly drop time test data demonstrates faster control element assembly drop times than the drop time curve provided in Table 15.0-5 of the Final Safety Analysis Report, as amended.

Commitment

Commitment #1: The Cycle 21 CEA drop time surveillance data will be provided to the NRC to confirm the conclusion of no further degradation.

The Technical Specification (TS) 3.1.3.4 arithmetic average of all CEA drop times to 90% insertion must be ≤ 3.2 seconds (3200 milliseconds). Table 1 provides the Cycle 19, 20, and 21 average CEA drop times to 90% insertion.

Table 1. Cycle 19-21 Average CEA Drop Times

	Average CEA Drop Time to 90% Insertion			
	Cycle 19	Cycle 20-1	Cycle 20-2	Cycle 21
Time (ms)	2941	3024	2967	3063

Letter W3F1-2015-0040 [Reference 1] Attachment 1 Section 3 provided the apparent and potential causes of the longer average CEA drop times. The first potential cause identified was due to a change in Control Element Drive Mechanisms (CEDM) release time between the original and replacement CEDMs causing a delay in the start of the CEA drop. Figure 1 shows the average CEA drop times for Cycle 21 versus the UFSAR Table 15.0-5 curve used in the UFSAR Chapter 15 analyses. The overall insertion rate is consistent with the UFSAR Table 15.0-5 curve but the CEA insertion start time was longer than that assumed in the analysis (Figure 2). This indicates the causal

mechanism is associated with the release of the CEAs from the CEDM and is consistent with the potential cause described in W3F1-2015-0040. Since the original causal analysis only had the delay in the release of the CEAs as a potential cause, additional analysis is required to determine the specific failure mechanism(s) that is causing the delay. This adverse condition has been entered into the Waterford 3 corrective action program [CR-WF3-2015-9518] and a causal analysis is in progress. A new commitment is being initiated (Attachment 2) to provide the results of the causal analysis in order to demonstrate no further degradation to the average CEA drop time. The preliminary causal analysis results indicate additional testing will be required during the next refuel outage to eliminate potential failure mechanisms, thus the commitment response date is after the next outage.

License Condition

Operating License Condition 2.C.20: Prior to Cycle 21 Mode 2 operation, the licensee shall verify the control element assembly drop time test data demonstrates faster control element assembly drop times than the drop time curve provided in Table 15.0-5 of the Final Safety Analysis Report, as amended.

Commitment #2 is addressed by operating license condition 2.C.20. Cycle 21 CEA drop time data was compared against the UFSAR Table 15.0-5 curve. The analysis of the Cycle 21 data identified an adverse condition with respect to the UFSAR Table 15.0-5 curve. UFSAR Table 15.0-5 CEA movement begins at 600 milliseconds. The Cycle 21 data showed the average CEA movement did not begin until approximately 685 milliseconds. Figure 1 shows the average CEA drop times. Figure 1 Curve 1 is from the Cycle 21 test data and each data point is 50 milliseconds. Figure 1 Curve 2 is based upon the UFSAR Table 15.0-5 data. Figure 1 Curve 3 is based upon the increased CEA drop time analysis provided in letter W3F1-2015-0061 [Reference 2]. W3F1-2015-0061 Table 3.0-1 Curve 3 provided an average CEA drop time curve with a CEA holding coil decay time of 800 milliseconds. Figure 2 provides an expanded view of the CEA drop time curves during the period in which UFSAR Table 15.0-5 curve was exceeded. This shows that only a small time period was exceeded and the contingency analysis provided in W3F1-2015-0061 remained bounding. This condition was entered into the Waterford 3 corrective action program [CR-WF3-2015-9269].

The UFSAR limiting accidents that were identified in letter W3F1-2015-0061 were chosen to evaluate the increased CEA drop time impact due to the possible cause of increased CEDM release time. The analyses demonstrated the change in peak primary pressure, peak secondary pressure, minimum DNBR, fuel failure, fuel rod radial average enthalpy, and fuel rod centerline enthalpy results for the limiting events modeling a 0.8 second (800 milliseconds) delay time are negligible or minimal. All results remain within the acceptance criteria. This meant that the W3F1-2015-0040 conclusions remained valid even if the CEA insertion start time were to increase to 0.8 seconds.

NRC operating license amendment 246 [Reference 6] Enclosure 2 Section 3.3.3.4 stated the following:

Therefore, the NRC staff concludes that results of the reanalysis discussed in Section 3.3.2 of this safety evaluation remain valid even if the CEA holding coil decay time were to increase to 0.8 seconds.

Based upon the UFSAR limiting accidents results, it can be reasonably concluded that the Waterford 3 design basis can be updated under the 10CFR50.59 process with no adverse impact to the conclusions contained in NRC operating license amendment 246.

References

1. W3F1-2015-0040, License Amendment Request to Revise Control Element Drop Times, July 2, 2015 [ADAMS Accession Number ML15197A106].
2. W3F1-2015-0061, Supplement to Revise Control Element Assembly Drop Times Associated with Technical Specification 3.1.3.4, August 13, 2015 [ADAMS Accession Number ML15226A346].
3. NRC CEA Drop Time Submittal Request for Additional Information, August 26, 2015 [ADAMS Accession Number ML15232A275].
4. W3F1-2015-0062, Control Element Assembly Drop Times Submittal Request for Additional Information, September 23, 2015 [ADAMS Accession Number ML15268A019].
5. W3F1-2015-0079, Control Element Assembly Drop Times License Condition, October 8, 2015 [ADAMS Accession Number ML15281A223].
6. NRC License Amendment 246, Control Element Assembly Drop Times, November 13, 2015 [ADAMS Accession Number ML15289A143].

Figure 1. Average CEA Drop Times
Average CEA Drop Times

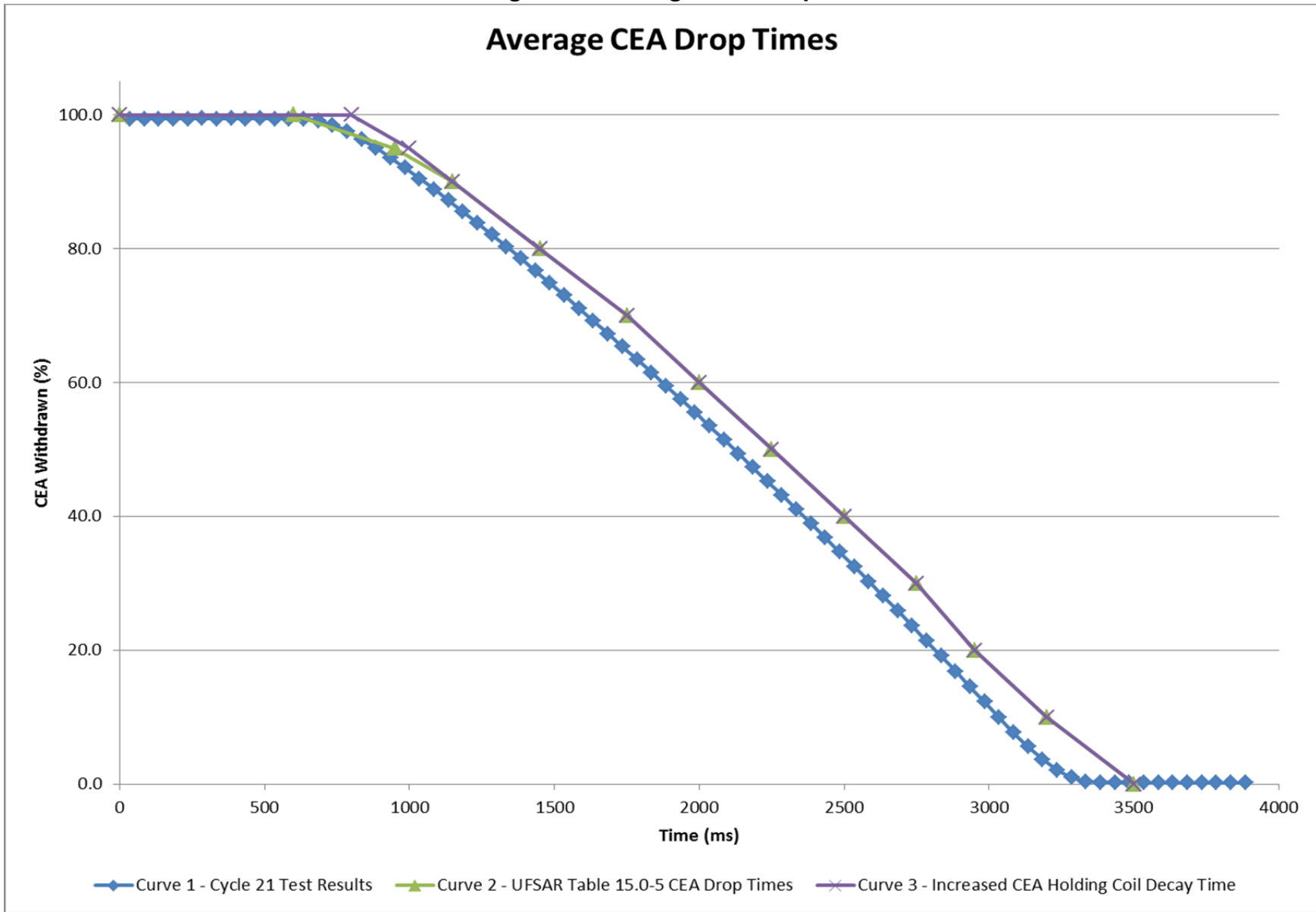
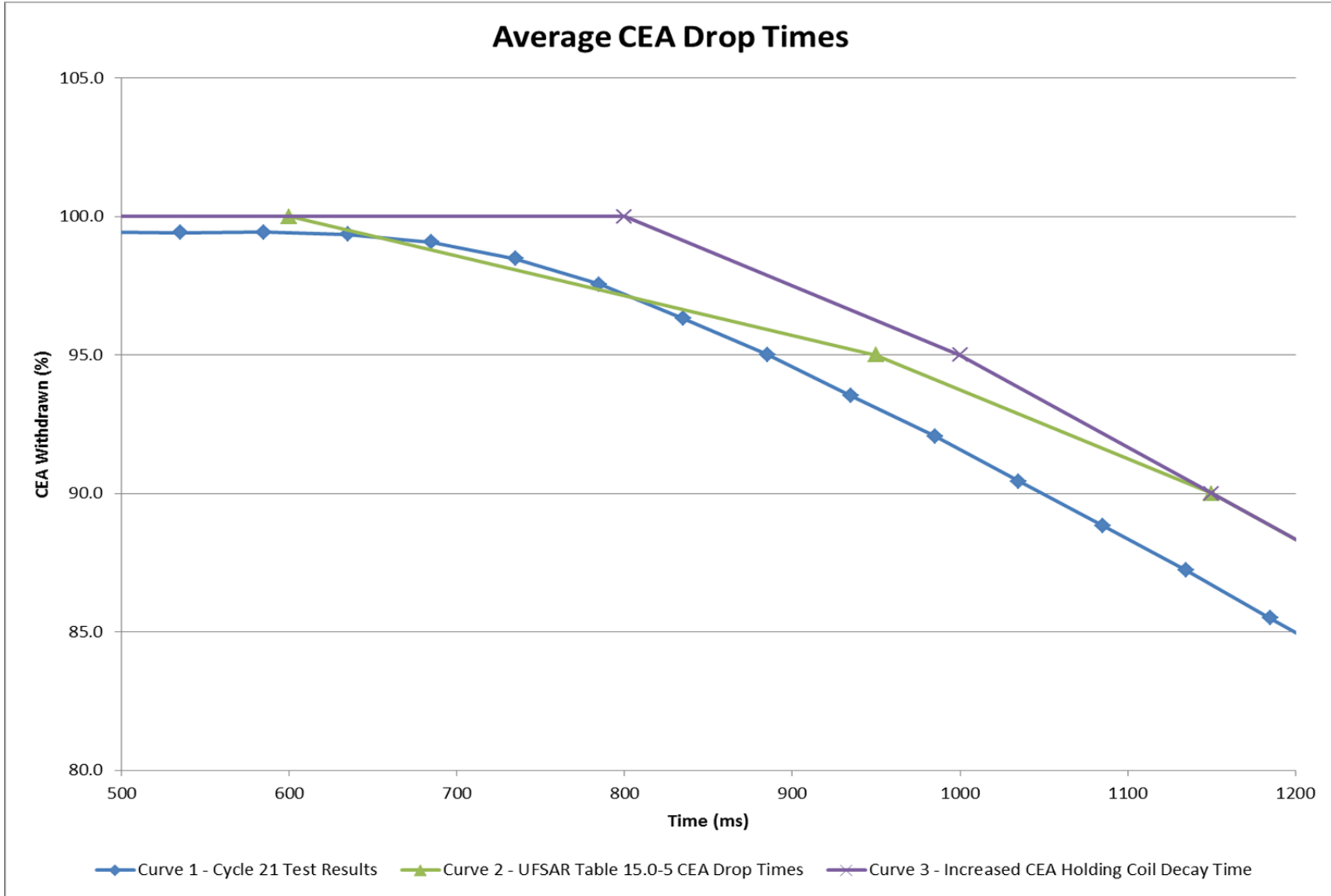


Figure 2. Average CEA Drop Times



Attachment 2 to

W3F1-2016-0008

List of Regulatory Commitments

List of Regulatory Commitments

This table identifies actions discussed in this letter for which Entergy commits to perform. Any other actions discussed in this submittal are described for the NRC's information and are not commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
Summary of CR-WF3-2015-9518 causal analysis will be provided to the NRC to demonstrate no further degradation to the average CEA drop time.	X		Within 60 days of completion of Refuel 21.