



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

June 17, 2015

LICENSEE: Exelon Generation, LLC

FACILITY: Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT UNIT NOS. 1 AND 2 -
SUMMARY OF MAY 19, 2015, MEETING WITH EXELON GENERATION
COMPANY, LLC, REGARDING CHEMICAL EFFECTS TESTING FOR
RESOLUTION OF GENERIC LETTER 2004-02, "POTENTIAL IMPACT OF
DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN
BASIS ACCIDENTS AT PRESSURIZED-WATER REACTORS" (TAC NOS.
MC4672 AND MC4673)

On May 19, 2015, a Category 1 public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and representatives of Exelon Generation, LLC (or the licensee), at NRC Headquarters, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. The purpose of the meeting was to discuss chemical effects testing for the resolution of Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors," for the Calvert Cliffs Nuclear Power Plant (Calvert Cliffs). The meeting notice and agenda, dated May 4, 2015, is available in the Agencywide Documents Access and Management System (ADAMS) Accession No. ML15124A804. A list of attendees is provided as Enclosure 1.

The licensee presented information regarding a methodology to demonstrate head loss margin to account for chemical effects and uncertainties, a chemical effects head loss experiment (CHLE) protocol, the emergency sump strainer bypass calculation, and the status of their chemical effects testing to resolve GL 2004-02. The licensee's slides can be viewed at ADAMS Accession No. ML15140A101.

The licensee presented information on the updated parameters for their document CA08075, Revision 0, "Emergency Sump Strainer Fiber Bypass" (ADAMS Accession No. ML15096A012). The discussion focused on the bypass fractions, the amount of fiber used in the experiments, and the time it takes for the velocities across the strainer modules in the plant to equalize. The NRC staff gave the licensee feedback, as well as raised questions and concerns about certain parts of the licensee's approach to resolving GL 2004-02. Overall, the NRC staff believes that there are no major issues with the fiber bypass testing because the test methodologies and extrapolation of the results to plant conditions were conducted similarly to other licensee bypass evaluations that have been accepted by the staff.

The licensee then discussed CCNPP-CHLE-017, Revision 0, "Head Loss Margin to Address Minimal Chemical Effects and Uncertainties for Calvert Cliffs Nuclear Power Plant" (ADAMS Accession No. ML15096A010). The licensee stated that the overall approach of the head loss margin evaluation to account for chemical effects and uncertainties is to demonstrate that there are minimal chemical effects, establish debris bed head loss, and apply margin to the non-

chemical head loss to account for uncertainty. The licensee also presented a comparison of the summer 2010 test runs to the current plant design basis debris load. This demonstrated that the design basis cases have higher fiber content, higher calculated precipitate load, and lower particulate load than the tested cases. The basis for the licensee's calculation of margin to account for minimal chemical effects was depicted graphically as well. Based on 2010 strainer testing, the licensee determined that chemical precipitate additions of up to approximately 10% of the bounding design precipitate load have minimal impact on pre-chemical effects debris head loss. The licensee also stated that an uncertainty factor of 4.5 times the non-chemical head loss would bound head loss increase due to "minimal chemical effects."

During discussion of CHLE-017, the NRC staff questioned the licensee on which test runs would be used to establish the debris bed head loss. The staff noted that it did not agree with the statement that head loss increase due to chemical precipitates in 2010 strainer testing is more conservative than expected with the current design basis debris load. The staff noted that it is not opposed to the licensee's approach of applying margin to account for uncertainty given a minimal chemical effects test result, but more detail on the licensee's approach is needed. The staff stated that providing margin in terms of head loss rather than a bump-up factor would be easier to review.

The NRC staff noted that a graph of head loss over time including annotations of significant steps or events during the test would be useful. The staff also stated that the licensee should provide the limiting criteria (e.g., head loss, deaeration) and margin during the post-LOCA mission time so that the staff could better understand the limiting plant-specific conditions. The licensee stated that all of the previous test results from 2008 and 2010 would be used to establish head loss. The licensee stated there is a calculation that better ties the results of the tests to how the conventional head loss was determined. This calculation might better help the staff understand the licensee's methodology.

The licensee continued with a discussion of CCNPP-CHLE-002, Revision 0, "Chemical Effects Head Loss Experiment (CHLE) Test Protocol," for Calvert Cliffs (ADAMS Accession No. ML15119A129). The licensee discussed the final testing protocol for the design basis debris loads, test procedures, modifications to the test loop, and the pre-buffer borated water spray regime. A graph was presented that shows the sensitivity of the debris bed to chemical precipitate. The NRC staff agreed that these test results demonstrated sensitivity to detection of chemical precipitates. Schematics showing the layout of the testing facility were also presented.

Next, the licensee presented a status of the chemical effects testing at Alden Labs. The licensee initiated the first integrated test on April 17, 2015, and the detector bed head loss immediately started to increase. The head loss increased to 10.25 feet, and was rising, when the test was terminated. The licensee observed a darker fluid in the vertical test loop, and determined from further investigation that the water contained burnt binder from the baked Nukon, degraded marinade, and degraded inorganic zinc coated coupons. Samples have been sent to a different laboratory for further chemical analysis.

The NRC staff was also interested in the status of the ongoing chemical effects testing being performed by the licensee. The staff noted that when the licensee attempts to determine what caused the large head loss, it is important to correctly distinguish between conventional debris and chemical effects. The licensee and the staff agreed that it would be beneficial to have

additional discussions after the analysis has been completed on the head loss test. This will allow a more useful discussion on what may have caused the large head loss during the test run, and how the licensee plans to proceed with additional testing.

The licensee concluded their presentation with a brief discussion on the status of their risk-informed approach to GL 2004-02 resolution. The licensee indicated that they are scheduled to complete their risk-informed approach in 2nd quarter 2015, and that they will still pursue this even if their deterministic approach is successful.

Members of the public were in attendance. Public meeting feedback forms were not received although feedback from the public was received. Comments received included: a member of the public noting that he could not hear some of the speakers over the phone. He stated that he informed the phone operator and lodged a complaint with the Commission. In addition, the member of the public queried the staff on whether foreign material was accounted for in the strainer analyses for a post loss of coolant accident. The member of the public also suggested that foreign material could cause an accident similar to the accident at Three Mile Island.

Please direct any inquiries to me at 301-415-2549, or Alexander.Chereskin@nrc.gov.

A handwritten signature in black ink, appearing to read 'Alex Chereskin', written in a cursive style.

Alexander N. Chereskin, Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-317 and 50-318

Enclosures:

1. List of Attendees

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LIST OF ATTENDEES

MAY 19, 2015, MEETING WITH EXELON GENERATION, LLC TO

DISCUSS CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1, AND 2

CHEMICAL EFFECTS TESTING FOR GL 2004-02 RESOLUTION

U.S. Nuclear Regulatory Commission

A. Chereskin
M. Yoder
S. Smith
P. Klein
M. Diaz-Colon
L. Robinson
A. Guzzetta
G. Kulesa
A. Obodoako*
J. Stang*

Exelon Generation, LLC

K. Greene
A. Elliot

Sargent and Lundy (on behalf of Exelon Generation, LLC)

H. Kopke

MPR Associates (on behalf of Exelon Generation, LLC)

E. Federline
S. Kinsey

Enercon Services (on behalf of Exelon Generation, LLC)

C. Sellers

Members of the Public

M. Lewis*
T. Sande
B. Stair

Enclosure

*via teleconference

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/RA/

Alexander N. Chereskin, Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-317 and 50-318

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1. List of Attendees

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ADAMS Accession Nos. Meeting Notice: ML15124A804

Meeting Summary: ML15154B557 Handouts: ML15140A101

OFFICE	NRR/DORL/LPLI-1/PM	NRR/DORL/LPLI-1/LA	NRR/DSS/SSIB
NAME	ACHereskin	KGoldstein	VCusumano
DATE	06/09/2015	06/09/2015	06/10/2015
OFFICE	NRR/DE/ESGB	NRR/DORL/LPLI-1/BC(A)	NRR/DORL/LPLI-1/PM
NAME	GKulesa	MDudek	ACHereskin
DATE	06/11/2015	06/17/2015	06/17/2015

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