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L-19-075

10 CFR 50.46

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

SUBJECT:

Beaver Valley Power Station, Unit Nos. 1 and 2
Docket No. 50-334, License No. DPR-66
Docket No. 50-412, License No. NPF-732018 Annual 10 CFR 50.46 Report of Changes to or Errors in Emergency Core Cooling
System Evaluation Models

In accordance with Title 10 of the *Code of Federal Regulations*, Part 50, Section 50.46(a)(3)(ii), FirstEnergy Nuclear Operating Company (FENOC) hereby submits the 2018 annual report of changes to or errors in emergency core cooling system evaluation models, or in the application of the models, for the Beaver Valley Power Station, Unit Nos. 1 (BVPS-1) and 2 (BVPS-2).

The attachments provide a summary list and description of each change to or error in the acceptable evaluation models that affects the peak fuel cladding temperature (PCT) calculation for various loss-of-coolant accidents, as well as the estimated PCT effects of the change or error.

There are no regulatory commitments contained in this submittal. If there are any questions or if additional information is required, please contact Mr. Phil H. Lashley, Acting Manager - Nuclear Licensing and Regulatory Affairs, at (330) 315-6808.

Sincerely,



Richard D. Bologna

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Attachments:

1. Summary of 2018 Peak Fuel Cladding Temperature (PCT) Effects for Beaver Valley Power Station (BVPS) Loss-of-Coolant Accident (LOCA) Transients
2. Descriptions of 2018 Emergency Core Cooling System (ECCS) Evaluation Model Changes or Errors

cc: NRC Region I Administrator
NRC Resident Inspector
NRC Project Manager
Director BRP/DEP
Site BRP/DEP Representative

Attachment 1
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Summary of 2018 Peak Fuel Cladding Temperature (PCT) Effects for Beaver Valley
Power Station (BVPS) Loss-of-Coolant Accident (LOCA) Transients
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Beaver Valley Power Station, Unit 1		Large Break LOCA	Small Break LOCA
		PCT or PCT Change	PCT or PCT Change
Licensing Basis PCT at BEGINNING of 2018		1840°F	1895°F
2018 Activity			
EM Changes	None	N/A	N/A
EM Errors	UO ₂ Fuel Pellet Heat Capacity (refer to page 1 of Attachment 2)	N/A	0°F
	Vapor Temperature Resetting (refer to page 2 of Attachment 2)	0°F	N/A
Licensing Basis PCT at END of 2018		1840°F	1895°F

Beaver Valley Power Station, Unit 2		Large Break LOCA	Small Break LOCA
		PCT or PCT Change	PCT or PCT Change
Licensing Basis PCT at BEGINNING of 2018		1839°F	1917°F
2018 Activity			
EM Changes	None	N/A	N/A
EM Errors	UO ₂ Fuel Pellet Heat Capacity (refer to page 1 of Attachment 2)	N/A	0°F
	Vapor Temperature Resetting (refer to page 2 of Attachment 2)	0°F	N/A
Licensing Basis PCT at END of 2018		1839°F	1917°F

Attachment 2
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Descriptions of 2018 Emergency Core Cooling System (ECCS)
Evaluation Model Changes or Errors
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Uranium Dioxide (UO₂) FUEL PELLETT HEAT CAPACITY

Background

A typographical error was discovered in the implementation of the UO₂ fuel pellet heat capacity as described by Equation C-4 of WCAP-8301, "LOCTA-IV Program: Loss-of-Coolant Transient Analysis," June 1974, for fuel rod heat-up calculations within Appendix K Large Break and Small Break LOCA evaluation models. The erroneous formulation results in an overprediction of heat capacity that increases with fuel temperature. The corrected formulation results in a maximum decrease in heat capacity on the order of approximately 1.2 percent for existing analyses of record. This represents a non-discretionary change in accordance with Section 4.1.2 of WCAP-13451, "Westinghouse Methodology for Implementation of 10 CFR 50.46 Reporting," October 1992.

Affected Evaluation Model(s)

1. 1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP
(Applicable to BVPS-1 and BVPS-2)

Estimated Effect

The small over-prediction in UO₂ fuel pellet heat capacity has been evaluated to have a negligible effect on existing large and small break LOCA analysis results due to the small magnitude of the change, leading to an estimated PCT impact of 0 degrees Fahrenheit (°F) for both BVPS-1 and BVPS-2.

VAPOR TEMPERATURE RESETTING

Background

In the WCOBRA/TRAC and WCOBRA/TRAC-TF2 codes, when the vapor temperature is greater than the wall temperature, and several other conditions are met, the vapor temperature is reset to the saturation temperature for heat transfer calculations. It was discovered that this vapor temperature resetting logic results in an inconsistency between the conduction solution and the hydraulic solution, such that energy is not conserved between the two solutions. The correction of this error represents a non-discretionary change in the evaluation model as described in Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1. 1996 Westinghouse Best-Estimate Large Break LOCA Evaluation Model
(Applicable to BVPS-2)
2. 2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM
(Applicable to BVPS-1)

Estimated Effect

Engineering judgement supported by sensitivity calculations showed that correcting this error had minimal impact on LOCA transient calculations, leading to an estimated PCT impact of 0°F for both BVPS-1 and BVPS-2.