



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

January 25, 2019

Mr. Timothy Riti
Senior Project Manager, Regulatory Affairs
Nuclear Energy Institute
1201 F Street, NW, Suite 1100
Washington, DC 20004

SUBJECT: STAFF EVALUATION OF ELECTRIC POWER RESEARCH INSTITUTE
REPORT 3002013039, "EPRI MOV PERFORMANCE PREDICTION
PROGRAM: ADDENDUM 10 TO EPRI 103237-R2: PPM VERSION 4.0
SOFTWARE CHANGES"

Dear Mr. Riti:

By letters dated August 30 and November 8, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML18255A242 and ML18312A273), the Nuclear Energy Institute (NEI) submitted to the Nuclear Regulatory Commission (NRC) staff for review the Electric Power Research Institute (EPRI) topical report (TR) entitled, "EPRI MOV Performance Prediction Program: Addendum 10 to EPRI 103237-R2: PPM [Performance-Prediction Model] Version 4.0 Software Changes."

The EPRI motor-operated valve (MOV) Performance-Prediction Model (PPM) software program is a nuclear safety-related computer code for determining the required thrust or torque to stroke gate, globe, and butterfly valves under design basis conditions. The software was originally developed in 1995 and improved over the years. Improvements included incorporating additional functionality, correcting software errors, incorporating new hand calculation methods, incorporating the software package in a Windows based user interface, adding new features, and incorporating changes related to butterfly valve torque predictions. The successive improvements were categorized by numerical versions 1.0, 2.0, 3.0, 3.1, 3.2, 3.3, 3.4, and 3.5.

Over the years, the NRC staff reviewed and validated software versions 1.0 thru 3.3 and documented these reviews in a series of safety evaluations (SEs). A historical development of the software and the SE progression may be found in Supplement 4 to the final SE of EPRI TR-103237 "EPRI MOV Performance Prediction Program, Revision 2" (ADAMS Accession No. ML090400621).

Version 3.4 of the PPM was issued in December 2008 to address several software error and informational notices, improve the precision of the PPM predictions by tightening criteria, and provide new functionality in the user interface. Version 3.5 of the PPM was issued in December 2011 to address several software error notices, incorporate Système International d'Unités (SI) units of measure, and correct several minor software usability issues related to the user interface. A summary of the software version changes was provided to the NRC staff for review along with examples and supporting documentation of the software version updates (ADAMS Accession Nos. ML14072A043 and ML14176B177).

The NRC staff reviewed the update of EPRI TR-103237 Revision 2 software versions 3.4 and 3.5 and concluded that the changes made were minor in nature in that they corrected coding errors, improved functionality of user interface, improved the overall accuracy, and incorporated fixes to known program inadequacies. The NRC staff also concluded that the changes made in versions 3.4 and 3.5 did not alter the methodology or introduce new methods. Therefore, the staff concluded that versions 3.4 and 3.5 of EPRI TR-103237, Revision 2, was acceptable for referencing in licensing applications and that an updated safety evaluation was not required at that time (ADAMS Accession No. ML15075A012).

The NRC staff reviewed the update of EPRI TR-103237, Revision 2 software version 3.5 to version 4.0. The major change was updating the software from a 32-bit platform to the latest Microsoft 64-bit environment and correcting noted software errors. The four DOS based technical modules:

- 1) SFM – System Flow Model
- 2) BFM – Butterfly Valve Module
- 3) GLBM – Globe Valve Module
- 4) GATM – Gate Valve Module

were recoded from Microsoft QuickBasic to American National Standards Institute (ANSI) C.

A complete line-by-line code review was completed and independently verified by EPRI. Individual unit testing of each new ANSI C module using validation test cases designed to exercise all potential input options was completed comparing the results from each test case to results from the same test case performed with the original Quick Basic module. In all but three test cases, the results were consistent between the two versions.

Three test cases with differences from version 3.5 and 4.0 results were attributable to changes made to correct software errors and variations in the math processors used by the Microsoft Quick Basic and ANSI C compilers. In all cases, the differences were slight and did not significantly affect the overall thrust or torque predictions. Examples of test cases were provided to NRC staff for review to demonstrate that each module matched or exceeded those performed with the original PPM methodology.

The NRC staff has determined that the changes made in version 4.0 do not alter the methodology or introduce new methods. Therefore, the NRC staff concludes that EPRI “MOV Performance Prediction Program: Addendum 10 to EPRI 103237-R2: PPM Version 4.0” is acceptable for referencing in licensing applications and that an updated safety evaluation is not currently required.

In accordance with the guidance on the NRC website, the NRC staff requests that NEI publish accepted proprietary and non-proprietary versions of this TR within three months of receipt of this letter. The accepted versions shall incorporate this letter and the previously issued final SE after the title page. Also, they must contain historical review information.

The accepted versions shall include an “-A” (designating accepted) following the TR identification symbol. If future changes to the NRC’s regulatory requirements affect the acceptability of this TR, NEI and/or licensees referencing it will be expected to revise the TR appropriately or justify its continued applicability for subsequent referencing.

If you have any questions or need additional information, please feel free to contact the NRC project manager, Mr. Joseph Holonich, at 301-415-7297 or joseph.holonich@nrc.gov.

Sincerely,

/RA/

Dennis C. Morey, Chief
Licensing Processes Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Docket No. 99902028

SUBJECT: STAFF EVALUATION OF ELECTRIC POWER RESEARCH INSTITUTE
REPORT 3002023039, "EPRI MOV PERFORMANCE PREDICTION
PROGRAM: ADDENDUM 10 TO EPRI 103237-R2: PPM VERSION 4.0
SOFTWARE CHANGES" DATE: JANUARY 25, 2019

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***Concurred via e-mail**

NRR-106

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