



Caldon, Inc.

January 10, 2002

Mr. John A. Zwolinski, Director  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation  
Mail Stop 8 E1  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Re: Caldor Engineering Report: ER-262, Effects of Velocity Profile Changes Measured In-Plant  
On Feedwater Flow Measurement Systems

Dear Mr. Zwolinski:

In light of ongoing NRC, licensee and Caldor efforts related to power uprates, and specifically with respect to Measurement Uncertainty Recovery Uprates, I am enclosing the above referenced report Caldor recently provided to its NRC licensee customers. This report relates to velocity profile changes that influence feedwater flow measurement uncertainties, including ultrasonic flow measurement devices such as our LEFM Check/CheckPlus and LEFM External Systems. Caldor has developed this report in response to recent occurrences of LEFM Check and CheckPlus velocity profile alarms at three nuclear plants to assist Caldor customers in their own evaluations as appropriate.

Caldor has evaluated data from nine plants including the three where the alarms occurred. These plants are equipped with Caldor LEFM chordal systems that measure actual velocity profiles. The data reveal unanticipated changes in feedwater flow velocity profile characteristics in eight of the nine plants. Our report demonstrates that (1) the Caldor chordal feedwater flow measurement systems and their associated analyses set forth in Caldor Topical Reports relied upon for Appendix K Measurement Uncertainty Recovery Uprates already fully account for such changes, (2) the associated generic and plant-specific uncertainty evaluations for uprates that use the Caldor chordal system technology remain bounding and valid, and (3) the velocity profiles are more variable than previously expected and that Caldor's selection of thresholds for these alarms has been overly conservative, leading to the occurrence of nuisance alarms. The new data does not adversely impact Caldor or licensee evaluations supporting the measurement uncertainty uprates that have used Caldor flow measurement systems, but it has made it necessary to change alarm thresholds and alarm logic to eliminate unnecessary alarms.

Because the implication for external ultrasonic flowmeter errors is larger, site-specific evaluations of the potential effects of velocity profile changes on all Caldor LEFM External Systems were also made. These demonstrated that (1) in every case but one the 1% uncertainty characteristic of these instruments accounts for such changes, and (2) in the case where the 1%

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uncertainty was not bounding, it did not lead to an overpower event. Caldon has initiated remedial actions to prevent such an occurrence in the future.

Caldon has provided this material to its customers and we believe the NRC should also be aware of this information in the event additional questions arise. Further, as discussed in the enclosed report, this information could be of interest in the overall context of evaluating feedwater flow measurement uncertainty. For convenience, we have placed a copy of the body of the report on our web site at [www.caldon.net](http://www.caldon.net).

We would be glad to meet with the NRC at your convenience to provide a more detailed briefing or to answer any questions you may have regarding this data. Please note that the enclosed technical paper is non-proprietary.

Please feel free to contact me to set up a meeting and/or if you have any questions.

Sincerely,

A handwritten signature in cursive script, reading "Calvin R. Hastings".

Calvin R. Hastings  
President & CEO

Enclosure

Cc: Brian W. Sheron  
Stuart A. Richards