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5 December 2019

U.S. Nuclear Regulatory Commission
Washington, DC 20555-001
Attn: Document Control Desk

Re: Interim notification under 10 CFR Part 21 for Rosemount Model 1153 and 1154 Pressure Transmitters

Pursuant to 10 CFR Part 21, section 21.21(a)(2), Rosemount Nuclear Instruments, Inc. (RNII) is writing to provide an interim report related to the treatment of temperature rise due to electronics self-heating in qualified life thermal aging calculations for Model 1153 and 1154 pressure transmitters.

1.0 Identification of items under evaluation:
Rosemount 1153 and 1154 pressure transmitters
(inclusive of 1153 Series B, 1153 Series D, 1154, and 1154 Series H)

2.0 Identification of firm submitting the interim report:
Rosemount Nuclear Instruments, Inc.
8200 Market Boulevard
Chanhassen, MN 55317-9685

3.0 Description of potential deviation under evaluation:
Rosemount Nuclear Instruments, Inc. (RNII) is providing an interim evaluation report on the treatment of temperature rise due to electronics self-heating in qualified life thermal aging calculations on Model 1153 and 1154 pressure transmitters. The evaluation is being conducted to determine if modifications to the currently specified qualified life are warranted.

Qualification programs for 1153 and 1154 pressure transmitters were structured to comply with the requirements of IEEE standard 323-1974 which requires aging to establish a qualified life prior to design basis event testing. Thermal aging is considered a significant aging mechanism, therefore accelerated thermal aging was conducted on type test specimens as described in RNII qualification reports D8300040 and D8700096. These reports document the thermal aging basis for all 1153 and 1154 models identified in section 1.0. *In both type test programs, temperature rise due to electronics self-*

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heating was present during thermal aging and was consistent with expected in service normal operating conditions. Specifically, accelerated thermal aging was performed under the following conditions:

- Type test specimens were energized throughout aging, using power supply voltages of 30VdC (as described in D8300040) or 50Vdc (as described in D8700096). 30Vdc represented nominal power supply voltage and 50Vdc was selected based on the maximum qualified operating voltage of 45Vdc plus 10% margin.
- Electronics housing covers were installed throughout aging consistent with the required qualified installation configuration.
- Type test specimens were pressurized to provide current output between approximately 16mA and 20mA to provide power dissipation and self-heating within the electronics representative of conservative application conditions.

To estimate a qualified life from accelerated thermal aging the Arrhenius methodology is utilized. This approach is endorsed by Regulatory Guide 1.89 Revision 1. The Arrhenius calculation requires both accelerated aging temperature and normal operating temperature inputs to estimate qualified life for a given accelerated aging time. *Although the effects of self-heating were present during thermal aging, the original qualified life calculations did not explicitly include a correction to the temperature inputs for temperature rise associated with self-heating effects.* Inclusion of self-heating temperature rise correction will increase both the normal operating temperature and accelerated temperature inputs to the Arrhenius equation, resulting in a shorter calculated qualified life than if self-heating corrections were not included. For typical pressure transmitter applications, RNII believes the resulting change will be a modest reduction in the calculated qualified life. The amount of qualified life change is dependent on the self-heating temperature rise assumptions used in the calculation, which can vary depending on assumed operating conditions.

RNII has reviewed the actual results of the accelerated thermal aging sequence related to qualification programs documented in qualification reports D8300040 and D8700096 and concluded that margin was available during thermal aging to accommodate a 4°F internal temperature rise correction in the Arrhenius calculation with no reduction in qualified life. *However, as the temperature distribution on 1153 and 1154 electronics is not uniform for all components, this assumption does not envelope all sub-component specific temperatures which may be greater than 4°F.*

4.0 Evaluation summary and timeline for completion:

RNII is reviewing industry convention and regulatory guidance regarding the appropriate use of, and limitations in, accounting for internal temperature rise when calculating qualified life using the Arrhenius methodology for the referenced 1153 and 1154 qualification programs. The evaluation is being conducted to determine if modifications to the currently specified qualified life are warranted.

RNII is also conducting additional analysis of our other nuclear qualified products, including the Rosemount 3150 series pressure transmitters (including 3152N, 3153N, 3154N, and 3155N). In the case of the 3150 series, temperature rise due to electronics self-heating was explicitly accounted for in both the accelerated thermal aging testing and the associated Arrhenius qualified life calculation within each respective IEEE 323 qualification program. The evaluation will assess if the assumptions and methodology used to account for heat rise in these qualification programs was appropriate based on the current review of industry convention and regulatory guidance.

These evaluations are expected to be complete by February 28, 2020.

Rosemount Nuclear Instruments, Inc. is committed to the nuclear industry and we assure you that we are dedicated to the supply of high-quality products and services to our customers. If there are any questions, or you require additional information related to this issue, please contact Nathan Schukei (952)-949-5213 or Paul Schmeling (952) 949-5359.

Sincerely,

Gerard Hanson

Gerard Hanson
Vice President & General Manager
Rosemount Nuclear Instruments, Inc.

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