ROSEMOUNT Measurement
Control
Analytical
Valves

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December 1, 1989

Mr. Thomas Murley
Office of Nuclear Reactor Regulation
United States Nuclear Regulating Commission
Washington, D.C. 20555

Re: Notification Under 10CFR21 on Rosemount Model 710 Trip/Calibration units and 414 E/F reistance bridges.

Dear Mr. Murley,

Rosemount has continued testing and analyzing components (precision resistors) similar to those reported in our August 17, 1989 and October 10, 1989 letters to you. Extended testing was done to assure that Rosemount had identified all affected lots. The final result of our extended testing indicates that additional components also may exhibit premature long term degradation. Rosemount has manufactured and shipped Model 710DUs (known as 710 masters and slaves) and Model 414E/Fs with these components. Our records indicate we have not had any failures of these units due to this component degradation, however we are reporting because of the potential our tests have shown. The product model number, serial number and purchase order number for the affected hardware shipped to utilities will be provided in an attachment to those customers. The identified degradation of these components may result in equipment output errors, failure of the product to provide an alarm and/or failure of the product in an alarmed state (see Appendix A).

Rosemount has described the effect on our products of such component degradation in Appendix A, however, we do not have complete information on the effect of that degradation in relationship to the application of the product.

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We are providing the required information as follows:

1. Name and address of the individual providing information:

   Mr. Stephen J. Wanek
   Vice President Operations
   Rosemount Inc.
   12001 Technology Drive
   Eden Prairie, MN 55344

2. Identification of the items supplied:

   Model 710DU Rosemount master/slave trip cards and
   Model 414E/F resistance bridges.

3. Identification of the firm supplying the item:

   Rosemount Inc.
   12001 Technology Drive
   Eden Prairie, MN 55344
   ATTN: Mr. Stephen J. Wanek

4. Nature of the failure and potential safety hazard:

   Under certain combinations of humidity, temperature, power, and duration, the suspect component will increase resistance value and can fail in an electrically 'open' state. In the Model 710 these conditions may cause shifts of varying magnitudes in the trip point, high gross fail setpoint, low gross fail setpoint or the reset differential. In this case, the alarm may activate above or below the selected setpoint. The degradation could also result in a failure of the gross fail low or high to activate. In this case, though an alarm condition exists, no alarm would be activated. This degradation may also cause the gross fail low to inadvertently activate. In the Model 414E/F the component degradation will cause errors of varying magnitude in the final resistance bridge output.

5. The corrective action which is taken, the name of the individual or organization responsible for that action and the length of time that will be taken to complete that action:

Rosemount has identified the cause of the problem as an unrequested, vendor initiated process change in the manufacture of the precision resistors. The effect of this process change was not detected by quality tests at the vendor nor by testing done by Rosemount at component and assembly levels.

This extended review of the parts was initiated after Rosemount discovered a problem with similar parts (reference August 17, 1989 and October 10, 1989 letters to Nuclear Regulatory Commission). Rosemount has concluded our final extended testing and review indicates a report of the additional trip units and resistance bridges is necessary.

The vendor has returned to the original process and Rosemount has verified that newly built resistors no longer exhibit the problem. We have implemented piece part testing and criteria that will provide quality parts.

Mr Stephen Wanek is responsible for further action on this matter.

6. Any advice related to the potential failure of the item:

Attached hereto is copy of information concerning the potential failures. This includes further technical information found in Appendix A. Warranty/replacement information will be provided in a separate attachment (Appendix B) at a later date.

We have expanded exhaustive efforts to determine the extent of this problem and eliminate the problem from new manufacture. All current information is provided in the attachment (Appendix A). We have urged customers to thoroughly review the identified product(s) delivered to their plant sites as they relate to the technical attachment. The customers must then make a determination of the safety considerations for their specific applications.

Rosemount will either repair these specific units or provide a kit to repair the units at the plant site.

Rosemount has a strong commitment to the nuclear industry and wants to assure you that we are dedicated to supplying quality products and services to our customers. Please contact Mark Van Sloun, Business Unit Manager, (612) 828-3484 should you have questions on this issue.

Sincerely,

ROSEMOUNT INC.

Stephen J. Wanek
Vice President Operations

SJW:JES

Enc: Appendix A

APPENDIX A

TECHNICAL ATTACHMENT

INTRODUCTION

A problem with precision resistors was discovered originally during failure analyses conducted on non nuclear industry units returned to another Rosemount division from the field. Precision resistors from the same lots are used within products supplied to the nuclear industry. Rosemount initiated and recently completed extended testing of further lots to assure we had identified all affected lots. We have clearly identified the cause of, extent of, and solution to the problem. Corrective action has been implemented on all products presently being shipped. The difficulty was traced to a family of precision resistors which exhibit premature long term degradation. These resistors are critical to the operation of our Trip/calibration and resistance bridges. We have found that, given certain combinations of humidity, temperature, power and duration, these resistors increase in value, and in some cases fail altogether, resulting in an "open" state. Shifts in resistance value in most cases will cause errors of varying magnitude in the final product output.

SENSITIVITY TO THE ENVIRONMENT

We are unable to comment on the degree of sensitivity to be expected from field operation.

We have established and conducted tests for screening the piece parts that are a function of specific environments. The recently completed test is the exposure of the precision resistors to 95% relative humidity at 85 degrees C, four hour soak, followed by a 24 hour period of typical application power. This exposure results in a varying failure rate of the resistors manufactured with the new process.

Standard design practice calls for using these resistors at no more than 50 percent de-rated power. Typically, we use these resistors at 10 to 15 percent of the rated power limit in our applications.

Humidity and temperature levels to be expected in the field are best estimated by you for each specific application. It should also be noted that these resistors are typically conformal coated once installed in the product. It is generally accepted that conformal coating should provide some additional protection against degradation from humidity.

Perhaps with this background, you can relate your application specifics to the above information

ROOT CAUSE OF THE PROBLEM

The cause of the problem has been identified as unrequested, vendor initiated, process changes in the manufacture of these precision resistors. These process changes were not made known to Rosemount and their effect was not detected by quality tests at the Vendor, incoming inspection tests by us, nor was it detected during the manufacturing/burn-in/acceptance testing of the final product. We initially reported that a process change occurred in Sept. 1988. Rosemount conducted further tests to verify the extent of the problem. Our final test results and further conversation with the manufacturer have caused us to move that date to December 1985.

After a return by the vendor to the original process, Rosemount verified that newly built resistors no longer exhibited the problem.

We have implemented piece part testing and criteria that will provide the quality products that you expect from us.

DISPOSITION OF UNITS IN THE FIELD

While we have been able to test individual resistors for acceptability, it is not considered feasible to test a field product to cause a suspect product to shift value or to fail altogether.

In considering the proper disposition of units in the field, we believe the following items are of importance:

- There have been no reported failures on Model 710DUs or Model 414E/Fs due to this component degradation.
- The effect of a resistor changing value on the final products output will be influenced by the field humidity, temperature, power conditions and duration.
- In the Model 414 E/F degradation of the precision resistor will cause errors of varying magnitude in the final resistance bridge output.
- In the Model 710 Master/Slave the effect of degradation of a precision resistor will depend on where that resistor is located in the circuit. The following are descriptions of the possible effects:

The reset differential may be reduced without an effect on the accuracy or operation of the units. The low gross fail may not activate on a low current or it may inadvertently activate in a non restorable state. The high gross fail may not activate. Errors may occur in the trip point, low gross fail or high gross fail settings.

SUMMATION

We urge you to consider the foregoing in conjunction with the safety resulting from the use of this product in your application. In any case, Rosemount believes that you must consider increasing the frequency of your calibration/recalibration schedules for those specific products and your using systems which incorporate those products that have been identified by serial number in Attachment A.