TUELECTRIC

Log # TXX-89666
File # 10110
907.3
Ref. # 10CFR50.55(e)

November 13, 1989

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Executive Vice President

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446
DEFECTIVE ROSEMOUNT 1153 AND 1154 TRANSMITTERS
SDAR: CP-89-007 (FINAL REPORT - UNIT 1)
(INTERIM REPORT - UNIT 2)

Gentlemen:

On March 20, 1989, TU Electric verbally notified the NRC of a potential deficiency involving the potential failure of Rosemount transmitters (Models 1153 and 1154). The last report on this issue was logged TXX-89518, dated July 21, 1989. After further evaluation, it was concluded that this issue does not meet the criteria for reportability pursuant to 10CFR50.55(e) or 10CFR21 for Unit 1. The review for Unit 2 is pending. This is a final report for Unit 1 and an interim report of a potentially reportable deficiency pursuant to 10CFR50.55(e) for Unit 2.

On February 7, 1989, Rosemount, Inc. notified TU Electric pursuant to 10CFR21 of potential failures in certain groups of Rosemount Model 1153 and 1154 transmitters due to loss of fill fluid. Information received on May 10, 1989, provided additional details on the potential failures, expanding the scope of the issue to include all Rosemount Model 1153 and 1154 transmitters, even though a strong correlation to certain groups (manufacturing lots) was still evidenced. The May 10, 1989, submittal indicated that the fill fluid loss was related to seal failure at a metal-to-glass interface inside the detector. The seal failures were believed to be related to tensile stresses generated by the use of a metal O-ring in the 1153 and 1154 transmitters. The geometry of certain detectors was found to intensify the tensile stress and higher failure rates observed in some detectors was attributed to this geometry. IE Notice 89-42 titled, "Failure of Rosemount Models 1153 and 1154 Transmitters," was issued by the NRC to provide additional information and a summary of meetings held with Rosemount on April 13, 1989.

On September 8, 1989, an additional transmittal by Rosemount was received by TU Electric. This transmittal confirmed the cause of the fill fluid loss to be metal-to-glass seal failures attributed to forces applied to the sensor combined with a variation in the metal-to-glass seal process. This transmittal also discussed process improvements incorporated in the production of 1153 and 1154 modules. Rosemount considered these improvements sufficient to justify eliminating the concern for transmitters produced after July 11, 1989.

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Subsequent to the September 8, 1989 letter, Rosemount representatives visited CPSES to discuss this issue. At this meeting, Rosemount confirmed that the geometry of certain transmitters contributed to stress intensification resulting in metal-to-glass seal failures.

Based on the information obtained from the sources described above, the potential failures of Rosemount transmitters may be characterized as follows:

- Failures result from a loss of fluid from the transmitter.

- Fill fluid does not leak to the process fluid.

- Most failures have typically occurred in the first 36 months of operation (exposure to process pressure).

- Simultaneous failures of redundant transmitters due to common operation transients or conditions (sudden pressure changes, temperature extremes, etc.) have not been observed.

- The loss of fill fluid will not initially be detectable, but continued fluid loss will eventually result in slow instrument response or span and zero shifts that are detectable.

- The primary concern is changed response time to step changes in process pressure.

- Failures to date correlate to certain manufacturing lots. For all range codes of Model 1153 and 1154 transmitters, regardless of manufacturing lot, range codes 5 (0-750 inches H_2O) and 9 (0-3000 psig) transmitters have experienced the highest failure rate. The combined failure rate of range code 5 and 9 transmitters is greater than 1% while the combined failure rate for other range codes is less than 0.5%. This has been attributed by Rosemount to the geometry of range codes 5 and 9 transmitters.

TU Electric has evaluated the applicability of the above information to the utilization of Rosemount 1153 and 1154 transmitters at CPSES for Unit 1. The February 7, 1989, transmittal of the 10CFR21 Notification to TU Electric included a list of 34 transmitters shipped to CPSES that were from the manufacturing lots experiencing higher failure rates (suspect lots). Thirty-three (33) of these transmitters were range codes 5 and 9 transmitters and one was a range code 4 transmitter. Review of the utilization of the 34 transmitters discussed above established that only two of these transmitters are utilized in Unit 1. These two transmitters are the single range code 4 and one range code 5 transmitter. The range code 4 transmitter is utilized in the Service Water System to provide a flow/no-flow indication where instrument accuracy and response time is not a significant consideration. This transmitter is categorized as a D2 variable in accordance with the CPSES Accident Monitoring

design as described in Section 7.5 of the CPSES FSAR. Other instruments are available to provide indication of lost service water flow, such as the service water pump motor status indication and component cooling water (CCW) high temperature alarms. The range code 5 transmitter is Class 1E and is utilized to provide an alarm in the event the CCW flow to the containment spray heat exchanger is low when the containment spray heat exchanger isolation valves are open. This alarm is not relied upon in the accident analysis for any manual operator actions and is secondary to other indications of a loss of CCW. In summary, neither instrument is utilized in an application where a loss of function would be adverse to the safety of plant operations.

It should be noted that the percentage of failures for all range codes of Model 1153 and 1154 transmitters included failures in the suspect lots. When transmitter failures outside the suspect lots are considered, these percentages are much smaller, and provide reasonable assurance that for CPSES Unit 1, a failure in a Rosemount Model 1153 or 1154 transmitter would be infrequent.

Nevertheless, as an additional conservative measure, a review was conducted of the Unit 1 applications of Model 1153 and 1154 transmitters that are utilized in Class 1E or Accident Monitoring applications. A total of 78 transmitters were identified. Thirty-four of these transmitters (including the single range code 5 transmitter from a suspect lot previously discussed) were Class 1E transmitters that did not serve an Accident Monitoring function. None of these transmitters were utilized to provide a primary input to an automatic Reactor Trip Signal or Engineered Safety Features Actuation Signal. The remaining transmitters were Class 1E or non-Class 1E transmitters utilized in an Accident Monitoring application (including the single range code 4 transmitter from a suspect lot previously discussed). Due to their higher incidence of failures, a review of the range codes 5 and 9 transmitters in these applications was conducted. It was concluded that a condition adverse to the safety of plant operations would not develop as a result of an infrequent transmitter failure because of the degree of redundancy and diversity required to comply with the Accident Monitoring design, normal operating conditions that would make slow instrument response or span/zero shifts noticeable, or applications where slow instrument response were not a concern.

As previously discussed, a September 8, 1989, transmittal by Rosemount indicated that the loss of fill fluid mechanism is sufficiently understood such that process improvements have eliminated this concern for transmitters produced after July 11, 1989. In addition, Rosemount indicated they are continuing to study the situation with regard to units currently in operation, and will provide future technical bulletins to assist in detecting

transmitters that may fail due to a loss of fill fluid. TU Electric will continue to evaluate any additional information provided by Rosemount, pertinent operating experience gained from Unit 1, and industry experience when available. In the event of any developing information or trends that would suggest the potential for more than infrequent transmitter failures, Unit 1 transmitter applications will be reevaluated, and if applicable, reports will be filed pursuant to appropriate regulations.

The Nuclear Operations Defective Items List (NODIL) controlling procurement activities will be updated to prohibit the purchase of Rosemount Model 1153 or 1154 transmitters manufactured prior to July 11, 1989, for new or replacement applications, without a specific Engineering review for the concerns of this issue. Rosemount Model 1153 and 1154 transmitters currently in stores and originating from the suspect lots identified by the February 7, 1989, Rosemount transmittal will not be utilized in a Class 1E or Accident Monitoring application, without a specific Engineering review for the concerns of this issue.

The evaluation of this issue for Unit 2 will be completed prior to Unit 2 fuel load.

Sincerely,

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