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April 5, 1982

Mr. R. C. Haynes
Regional Administrator, Region I
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406

SUSQUEHANNA STEAM ELECTRIC STATION
FINAL REPORT OF DEFICIENCIES INVOLVING
ROSEMOUNT MODELS 1151 AND 1152 PRESSURE TRANSMITTERS
WITH TYPE "A" OR "D" ELECTRONICS
ERs 100450/100508
PLA-1049

FILE 821-10



Reference: PLA-844 dated June 17, 1981

Dear Mr. Haynes:

This letter serves to provide the Commission with a final report on two deficiencies involving Rosemount Models 1151 and 1152 pressure transmitters with Type "A" or "D" electronics. One deficiency involves the potential failure of diodes on the amplifier board and the second deficiency relates to an ambiguous transmitter output signal.

Mr. A. R. Sabol of PP&L originally reported the deficiency involving potential diode failure on April 10, 1981 to Mr. L. Narrow of NRC Region I in accordance with the provisions of 10 CFR 50.55(e).

The referenced PLA-844 provided the Commission with an interim report on the potential failure of diodes on Rosemount transmitter amplifier boards. Attachment 1 to this letter is the final report on this deficiency and it provides the basis for PP&L's conclusion that the condition is not reportable.

Attachment 2 to this letter is a report providing the information required by 10 CFR 50.55(e) relating to the ambiguous output signal of Rosemount Models 1151 and 1152 pressure transmitters with Type "A" or "D" electronics. This deficiency was originally identified by Rosemount under the provisions of 10 CFR 21 and was also the subject of NRC IE Bulletin 80-16.

On June 17, 1980 Mr. A. R. Sabol of PP&L advised Mr. J. Durr of the NRC that PP&L considered the ambiguous transmitter output signal to be potentially reportable under 10 CFR 50.55(e). PP&L's further evaluation, as presented in Attachment 2, has resulted in the determination that the use of Rosemount Model 1151 transmitters with Type "A" electronics used in the Main Steam Isolation Valve - Leakage Control System represents a potential safety hazard and is therefore reportable under the provisions of 10 CFR 50.55(e).

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SSES

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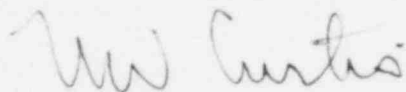
Mr. R. C. Haynes

PLA-1049

File 821-10

We trust the Commission will find this report to be satisfactory.

Very truly yours,



N. W. Curtis

Vice President-Engineering & Construction-Nuclear

JS:sab

Attachment

cc: Mr. Richard C. DeYoung (15)
Director-Office of Inspection & Enforcement
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Washington, D.C. 20555

Mr. G. McDonald, Director
Office of Management Information & Program Control
U. S. Nuclear Regulatory Commission
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Mr. R. A. Ward
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Minneapolis, MN 55435

FINAL REPORTSUBJECT:

Rosemount Models 1151 and 1152 pressure transmitters with Type "A" or "D" electronics containing amplifier boards with potentially defective Zener diodes.

DESCRIPTION:

Rosemount model 1151 and 1152 pressure transmitters with "A" or "D" electronics provide safety related control and indication signals in many systems in both units at the Susquehanna Steam Electric Station.

Rosemount identified and provided information on the diode problem in their letter to Bechtel dated February 9, 1981. Rosemount reported that the problem surfaced during the zero recalibration of some transmitters. A few of the transmitters exhibited an instability in the transmitter output. The instability was attributed to a defective Zener diode (1N 2620) on the amplifier board. The instability presents itself as noise with values up to 4% of the output signal. The unstable diodes are subject to a potential failure mode which will result in the transmitter having a 12 to 14mA fixed output. Further investigation into the problem by Rosemount concluded that the defective diodes were installed in amplifier boards shipped to Canada and that this problem does not exist in the United States. (Rosemount letter to Bechtel dated 12/15/81).

CAUSE:

The manufacturer of the diode determined that water trapped in the diode during the manufacturing of the diode produced this instability. The trapped moisture creates a condition conducive to gold migration which would cause the instability and could cause internal shorting. The internal shorting would cause the transmitter to have a 12 to 14mA fixed output.

SAFETY IMPLICATION:

Since it has been determined that defective diodes were not installed in the transmitters supplied to the Susquehanna Steam Electric Station there is no safety impact and this is not a reportable item.

CORRECTIVE ACTION:

No corrective actions required; however, the Bechtel supplied "Q" Rosemount transmitters are being replaced due to environmental qualification concerns unrelated to the subject Zener Diodes. The qualification of the GE supplied "Q" Rosemount Transmitters is being addressed as a part of the PP&L Program for assuring proper environmental qualification of class 1E equipment.

FINAL REPORTSUBJECT:

Rosemount Model 1151 and Model 1152 Pressure Transmitter using Type A or Type D output electronics.

DESCRIPTION OF DEFICIENCY:

IE Bulletin 80-16 reported that the subject transmitters may produce an ambiguous output signal when exposed to forward or reverse pressures in excess of 140% of the transmitter's upper range limit. This ambiguity is manifested in an on-scale reading when the indication should be pegged high (or low for reverse pressures).

This deficiency was the subject of a 10 CFR 21 reportability submittal by the manufacturer. Although the submittal only referenced the Rosemount Model 1152 design, the conditions as described therein can also be present in the Model 1151 transmitter. Model 1151 transmitters were, therefore, included in the PP&L review.

Original design of SSES included the use of Model 1151-A transmitters in the following areas:

- (1) Main Steam Isolation Valve - Leakage Control System (MSIV-LCS)
- (2) Drywell and Suppression Chamber Pressure indication
- (3) Flow indication from reactor bottom drain to RWCU and reactor head spray from RHR

ANALYSIS OF SAFETY IMPLICATIONS:

- (1) Thirteen Model 1151 transmitters using Type A output electronics were furnished by General Electric for the Main Steam Isolation Valve-Leakage Control System isolation logic. As a consequence of the potential transmitter malfunction described in IE Bulletin 80-16 combined with an MSIV isolation, the MSIV-LCS isolation logic could be defeated (i.e., establish system permissive allowing for manual initiation). If it is then assumed that an operator initiates the MSIV-LCS, the system will be exposed to process pressures well in excess of design conditions. This could result in failure of the MSIV-LCS causing a release of contaminated steam into the reactor building.

Although the series of events necessary to cause MSIV-LCS failure are not considered probable, the potential for transmitter failure and its adverse affect on the safe operation of SSES does exist. This condition is therefore considered reportable under the provisions of 10 CFR 50.55(e).

- (2) Four Model 1151 transmitters with Type A electronics were originally furnished by Bechtel Engineering for Unit 1 and Unit 2 control room indication of Drywell and Suppression Chamber pressures. However, as a result of revised design requirements due to NUREG-0737 these four transmitters are scheduled to be replaced prior to fuel load in accordance with DCP-615 & DCP-664. This condition is therefore not considered to be reportable under 10 CFR 50.55(e).
- (3) Two Q-Passive Model 1151 transmitters with Type A electronics provide flow indication for the RWCU reactor vessel bottom drain and the RHR reactor vessel head spray.

Under design basis accident conditions, excessive differential pressure across the transmitters can cause an erroneous flow indication in the main control room.

As Q-passive instruments, they are not required to operate under DBA conditions. In both cases, reliable backup information is available for proper accident assessment and mitigation. Therefore, the use of these transmitters is not reportable under 10 CFR 50.55(e).

CORRECTIVE ACTION:

- (1) The thirteen affected Model 1151 transmitters with Type A electronics used in the Unit 1 MSIV-LCS have been replaced by General Electric with transmitters which have Type E electronics. The Unit 2 MSIV-LCS was originally equipped with transmitters containing Type E electronics.

Rosemount Type E electronics are not subject to the generic failures associated with Types A and D electronics.
- (2) As a result of the Drywell and Suppression Chamber pressure transmitters being replaced in accordance with NUREG-0737 design modifications, no further corrective action is required.
- (3) Because the RWCU reactor vessel bottom drain & RHR reactor head spray flow transmitters are not required to operate in order to assess or mitigate the consequences of the design basis accidents which may result in their failure, no corrective actions are anticipated.

All Model 1151 transmitters furnished for Q-Functional service will be included in the PP&L Program for assuring proper environmental qualification of Class 1E equipment.