

TECHNICAL EVALUATION REPORT

Evaluation of Utility Response to Supplement 1 to  
NRC Bulletin 90-01: Callaway

Docket No. 50-483

Alan C. Udy

Published February 1994

EG&G Idaho, Inc.  
Idaho National Engineering Laboratory  
Idaho Falls, Idaho 83415

Prepared for the  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555  
Under DOE Contract No. DE-AC07-76ID01570  
FIN No. L1695, Task No. 11  
TAC No. M85368

### SUMMARY

This report documents the EG&G Idaho, Inc., review of the Union Electric Company submittals that respond to Supplement 1 to NRC Bulletin 90-01 for the Callaway Plant. This NRC Bulletin provides information regarding the loss of fill-oil in certain pressure and differential pressure transmitters manufactured by Rosemount, Inc. This report finds the licensee conforms to the requested actions and the reporting requirements of the Supplement.

FIN No. L1695, Task No. 11  
B&R No. 320-19-15-05-0  
Docket No. 50-483  
TAC No. M85368

## PREFACE

This report is supplied as part of the "Technical Assistance in Support of the Instrumentation and Controls Systems Branch." It is being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Reactor Controls and Human Factors, by EG&G Idaho, Inc., DOE/NRC Support Programs Unit.

## CONTENTS

SUMMARY .....	ii
PREFACE .....	iii
1. INTRODUCTION .....	1
2. NRC SPECIFIED REQUESTED ACTIONS .....	4
3. EVALUATION .....	7
3.1 Evaluation of Licensee Response to Reporting Requirements .	7
3.2 Evaluation of Licensee Response to Requested Actions .....	8
4. CONCLUSIONS .....	12
5. REFERENCES .....	13

Evaluation of Utility Response to Supplement 1 to  
NRC Bulletin 90-01: Callaway

1. INTRODUCTION

The NRC issued Bulletin 90-01 on March 9, 1990 (Reference 1). That Bulletin discussed certain Rosemount pressure and differential pressure transmitter models identified by the manufacturer as prone to fill-oil leakage. The bulletin requested licensees to identify whether these transmitters were or may later be installed in safety-related systems. Actions were detailed for licensee implementation for identified transmitters installed in a safety-related system. These same actions apply to identified transmitters presently held in inventory for later installation in a safety-related system.

With the gradual leakage of fill-oil, the transmitter would not have the long term accuracy, time response, and reliability needed for its intended safety function. Further, this condition could go undetected over a long period. Redundant instrument channels are subject to the same degradation mechanism. This increases the potential for a common mode failure. Thus, this potential failure mechanism raised concern for the reliability of reactor protection systems (RPS), engineered safety features (ESF) actuation systems, and anticipated transient without scram (ATWS) mitigating systems. To achieve high functional reliability, there must be a low probability of component failure while operating, with any failures readily detectable.

Supplement 1 to NRC Bulletin 90-01 (Reference 2) was issued on December 22, 1992. The Supplement informed licensees of NRC staff activities regarding the subject transmitters, and noted continuing reports of transmitter failures. The NRC requested licensee action to resolve the issue. The Supplement also updated the information contained in the original bulletin. The licensee was requested to review the information and determine if it was applicable at their facility. Further, the licensee was requested to modify their actions and enhanced surveillance monitoring programs to conform with the direction given. Finally, the licensee was instructed to

determines whether proposed surveillance methods are adequate to determine fill-oil loss-caused degradation of the transmitter. Finally, this report addresses the interval of surveillance proposed by the licensee for any transmitters included in the enhanced surveillance monitoring program.

Many transmitter failures were attributed to the use of stainless steel "O"-rings between the sensing module and the process flanges. Rosemount improved the manufacturing process for transmitters manufactured after July 11, 1989. Those improvements included a limit of the torque applied to the flange bolts. This limits the stress caused in the sensing module by the "O"-ring. Post-production screening, including pressure testing the sensing module for this potential latent defect, was also implemented at that time. Therefore, as described in Supplement 1 of NRC Bulletin 90-01, those Rosemount transmitters manufactured after July 11, 1989, are not subject to this review, if so identified by the licensee.

justification can be based on high functional reliability provided by redundancy or diversity.

c. For boiling water reactors (BWR)--

For those identified transmitters having a normal operating pressure greater than 500 psi and less than or equal to 1500 psi, and are installed as part of reactor protection trip systems, ESF actuation systems, or ATWS mitigating systems, either replace the transmitter, or monitor monthly with an enhanced surveillance monitoring program, until the transmitter reaches the designated (by Rosemount) psi-month criterion (60,000 psi-month or 130,000 psi-month, depending on the transmitter range code).

For transmitters that provide signals to the RPS or ATWS trips for high pressure or low water level, the enhanced surveillance must be monthly. For other transmitters in this classification, enhanced surveillance on a refueling (not exceeding 24 months) basis is acceptable. Under this option, justification must be based on the service record and the specific safety function of the transmitter. That justification can be based on high functional reliability provided by redundancy or diversity.

For pressurized water reactors (PWR)--

For those identified transmitters having a normal operating pressure greater than 500 psi and less than or equal to 1500 psi, and are installed as part of reactor protection trip systems, ESF actuation systems, or ATWS mitigating systems, either replace the transmitter, or monitor with an enhanced surveillance monitoring program, until the transmitter reaches the designated (by Rosemount) psi-month criterion (60,000 psi-month or 130,000 psi-month, depending on the transmitter range code) on a refueling (not exceeding 24 months) basis.

d. For those identified transmitters having a normal operating pressure greater than 500 psi and less than or equal to 1500 psi, and are installed as part of a safety-related system other than reactor protection trip systems, ESF actuation, or ATWS mitigating systems, either replace the transmitter or monitor with an enhanced surveillance monitoring program, until the transmitter reaches the designated (by Rosemount) psi-month criterion (60,000 psi-month or 130,000 psi-month, depending on the transmitter range code) on a refueling (not exceeding 24 months) basis.

### 3. EVALUATION

The licensee responded to Supplement 1 of NRC Bulletin 90-01 with submittals dated February 23, 1993, July 7, 1993, and January 11, 1994. Those responses were compared to the Bulletin Reporting Requirements and Requested Actions. The licensee reviewed 117 Rosemount Model 1153, Series B and D, transmitters for applicability of the Requested Actions of the Supplement. Of that number, 60 are safety-related for pressure boundary integrity purposes only, exempt from further review. The purpose of NRC Bulletin 90-01 is to identify and repair, before compromising the safety function of the transmitter, those Rosemount transmitters where the safety-related signal deteriorates due to the loss of fill-oil. Therefore, the exclusion of those 60 transmitters (that do not provide a safety-related signal) from review for the Requested Actions of the Supplement is appropriate.

#### 3.1 Evaluation of Licensee Response to Reporting Requirements

The licensee states, in Reference 3, that the only Requested Action detailed in Supplement 1 of NRC Bulletin 90-01 necessary is replacement of one sensor module. Included with that statement is clarification, interpretation, and constraints placed on that commitment. The licensee described the specific actions taken to implement the Requested Actions and the associated schedule for completion. The submittals identify where no licensee action is taken and provides evaluation and justification supporting the position that the action is not necessary.

The licensee stated that the Requested Actions are complete in Reference 3. The licensee stated that BG-FT-0215A was replaced with a new transmitter on May 7, 1993, in Reference 4. The replacement transmitter was manufactured after July 11, 1989, and is exempt from the requirements of the Supplement. Reference 5 notes that the replacement of seven auxiliary feedwater pump discharge flow transmitters was completed on December 15, 1993.



The licensee states seven auxiliary feedwater pump discharge flow transmitters do not normally operate at pressure. Reactor operation normally precludes operation of the auxiliary feedwater system, and the pressure these Rosemount transmitters routinely observe is zero. However, the normal auxiliary feedwater system operating pressure of this ESF system is between 1000 psi and 1100 psi. This pressure is observed by transmitters AL-FT-0001, AL-FT-0002, AL-FT-0003, AL-FT-0004, AL-FT-0007, AL-FT-0009, and AL-FT-0011, during reactor startup, reactor shutdown, and system testing. Thus, these seven transmitters, as defined by the normal system operating pressure, are mid-pressure transmitters. With minimum time exposure to pressure, these transmitters will not soon exceed the established psi-month maturity threshold. The Supplement states a high working pressure is the dominating cause of loss of fill-oil in the subject Rosemount transmitters.

In Reference 4, the licensee committed to an enhanced surveillance monitoring program for these 7 transmitters. The program ran until each transmitter (or sensing module) was replaced with a unit manufactured after July 11, 1989. This satisfies the Requested Actions of the Supplement. In Reference 5, the licensee documented that the last auxiliary feedwater pump discharge flow transmitters was replaced on December 15, 1993.

#### 3.2.4 Licensee Response to Requested Action 1.d

The licensee states there are eight Rosemount transmitters from this transmitter classification at the Callaway Plant. Five of these have sensor modules manufactured after July 11, 1989, and are excluded from the Requested Actions. The other three transmitters have exceeded the 60,000 psi-month criterion established by Rosemount and endorsed by the NRC. At the discretion of the licensee, these three transmitters are no longer participating in an enhanced surveillance monitoring program. See Section 3.2.5.

The licensee states, in Reference 3, they "will maintain a high degree of confidence for detecting failures caused by a loss of fill-oil and will maintain a high degree of reliability for these transmitters, commensurate with their safety significance." Reference 5 adds further details to the information from Reference 3. That confidence is through training of reactor operators and instrument and control personnel. Licensed operators receive training to recognize symptoms of a transmitter that has lost fill-oil. This training is part of requalification program, and includes simulator training. Additionally, all calibration data for each transmitter are retrievable. Those Technical Specification controlled transmitters (that is, those transmitters with safety-related functions) have their calibration data trended under procedure IDP-ZZ-00013. Thus, the licensee is confident that any future degradation of low pressure transmitters is detectable in a timely manner.

### 3.2.7 Enhanced Surveillance Monitoring Program

The licensee took action to upgrade suspected Rosemount transmitters. Additionally, the licensee used an enhanced surveillance monitoring program for seven auxiliary feedwater pump discharge flow transmitters up till the replacement of those transmitters. The monitoring satisfied the Supplement requirements.

## 5. REFERENCES

1. NRC Bulletin No. 90-01: "Loss of Fill-oil in Transmitters Manufactured by Rosemount," March 9, 1990, OMB No. 3150-0011.
2. NRC Bulletin No. 90-01, Supplement 1: "Loss of Fill-oil in Transmitters Manufactured by Rosemount," December 22, 1992, OMB No. 3150-0011.
3. Letter, Union Electric (D. F. Schnell) to NRC, "NRC Bulletin 90-01, Supplement 1: Loss of Fill-Oil in Transmitters Manufactured by Rosemount," February 23, 1993, ULNRC-2766.
4. Letter, Union Electric (D. F. Schnell) to NRC, "NRC Bulletin 90-01, Supplement 1: Loss of Fill-Oil in Transmitters Manufactured by Rosemount," July 7, 1993, ULNRC-2817.
5. Letter, Union Electric (D. F. Schnell) to NRC, "NRC Bulletin 90-01 and Supplement 1: Loss of Fill-Oil in Transmitters Manufactured by Rosemount," January 11, 1994, ULNRC-2936.

**BIBLIOGRAPHIC DATA SHEET**

(See instructions on the reverse)

EGG-ERTP-10817

2. TITLE AND SUBTITLE

Evaluation of Utility Response to Supplement 1 to  
NRC Bulletin 90-01: Callaway

3. DATE REPORT PUBLISHED

MONTH  
February

YEAR  
1994

4. FIN OR GRANT NUMBER  
L1695

5. AUTHOR(S)

Alan C. Udy

8. TYPE OF REPORT

Technical Evaluation

7. PERIOD COVERED (Indicate Dates)

6. PERFORMING ORGANIZATION - NAME AND ADDRESS (If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if institution, provide name and mailing address.)

DOE/NRC Support Programs  
EG&G Idaho, Inc.  
P.O. Box 1625  
Idaho Falls, ID 83415-3870

9. SPONSORING ORGANIZATION - NAME AND ADDRESS (If NRC, use "None as above"; if institution, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)

Division of Reactor Controls and Human Factors  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

10. SUPPLEMENTARY NOTES

11. ABSTRACT (200 words or less)

This report documents the EG&G Idaho, Inc., review of the Union Electric Company submittals that respond to Supplement 1 to NRC Bulletin 90-01 for the Callaway Plant. This NRC bulletin provides information regarding the loss of fill-oil in certain pressure and differential pressure transmitters manufactured by Rosemount, Incorporated. This report finds the licensee conforms to the requested actions and the reporting requirements of the supplement.

12. KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)

Rosemount Transmitters  
Loss of Fill-Oil  
NRC Bulletin 90-01, Supplement 1

13. AVAILABILITY STATEMENT

Unlimited Distribution

14. SECURITY CLASSIFICATION

(This Page)  
Unclassified

(This Report)  
Unclassified

15. NUMBER OF PAGES

18. PRICE