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EVALUATION OF UTILITY RESPONSE TO
SUPPLEMENT 1 TO NRC BULLETIN 90-01:
WNP-2

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TECHNICAL EVALUATION REPORT

Evaluation of Utility Response to Supplement 1 to
NRC Bulletin 90-01: WNP-2

Docket No. 50-397

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SUMMARY

This report documents the EG&G Idaho, Inc., review of the Washington Public Power Supply System submittals that respond to Supplement 1 to NRC Bulletin 90-01 for WNP-2. 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.

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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.

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Evaluation of Utility Response to Supplement 1 to
NRC Bulletin 90-01: WNP-2

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

respond to the NRC. The Requested Actions in Supplement 1 to NRC Bulletin 90-01 supersede the original NRC Bulletin 90-01 Requested Actions.

In responding to Supplement 1 to NRC Bulletin 90-01, the licensee is directed to address three items.

1. A statement either committing the licensee to take the NRC Bulletin 90-01, Supplement 1, Requested Actions or taking exception to those actions.
2. Addressing the actions committed to in the above statement, provide:
 - a. a list of the specific actions, including any justifications, to be taken to complete the commitment,
 - b. a schedule for completion, and
 - c. after completion, a statement confirming the actions committed to are complete.
3. A statement identifying the NRC Bulletin 90-01, Supplement 1, Requested Actions not taken, along with an evaluation providing the basis for exemption.

In implementing the replacement option of the NRC Requested Actions, plant shutdown exclusively for replacing the transmitters is not required. This allowance infers that replacements can be scheduled. With replacement in a timely manner, enhanced surveillance monitoring for interim operation is not required.

The Washington Public Power Supply System, the licensee for the Washington Nuclear Project-2 (WNP-2), responded to Supplement 1 of NRC Bulletin 90-01 with a letter dated March 8, 1993 (Reference 3). The licensee provided additional information on May 23, 1994 (Reference 4). This technical evaluation report evaluates the completeness of these submittals. It also 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 program.

Many Rosemount transmitter failures have been 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 of 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.

2. NRC SPECIFIED REQUESTED ACTIONS

The NRC staff specified the following Requested Actions of licensees of operating reactors.

1. Review plant records and identify the following Rosemount transmitters (if manufactured before July 11, 1989) that either are used in or may be used in either safety-related or ATWS mitigating systems.

- Rosemount Model 1153, Series B
- Rosemount Model 1153, Series D
- Rosemount Model 1154

Following identification, the licensee is to establish the following:

- a. For those identified transmitters having a normal operating pressure greater than 1500 psi, and are installed as part of reactor protection trip systems, ESF actuation systems, or ATWS mitigating systems, either replace the transmitter in an expedited manner, or monitor monthly, for the life of the transmitter, using an enhanced surveillance program.

If the identified transmitter exceeds the 60,000 psi-month or the 130,000 psi-month criterion (depending on the range code of the transmitter) established by Rosemount, 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.

- b. For those identified transmitters having a normal operating pressure greater than 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 quarterly, for the life of the transmitter, using an enhanced surveillance program.

If the identified transmitter exceeds the 60,000 psi-month or the 130,000 psi-month criterion (depending on the range code of the transmitter) established by Rosemount, 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.

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.

- e. Those transmitters having a normal operating pressure greater than 500 psi and less than or equal to 1500 psi, and have accumulated sufficient psi-month operating history to exceed the criterion established by Rosemount, may be excluded from the enhanced surveillance monitoring program at the discretion of the licensee. However, the licensee should retain a high level of confidence that a high level of reliability is maintained and that transmitter failure due to loss of fill-oil is detectable.
 - f. Those transmitters having a normal operating pressure less than or equal to 500 psi may be excluded from the enhanced surveillance monitoring program at the discretion of the licensee. However, the licensee should retain a high level of confidence that a high level of reliability is maintained and that transmitter failure due to loss of fill-oil is detectable.
2. Evaluate the enhanced surveillance monitoring program. The evaluation is to ensure the measurement data has an accuracy commensurate with the accuracy needed to compare the data to the manufacturers drift data criteria. It is this comparison that determines the degradation threshold for loss of fill-oil failures of the subject transmitters.

The Supplement also states the NRC may conduct audits or inspections in the future to verify compliance with the established requirements.

3. EVALUATION

The licensee provided a response to Supplement 1 of NRC Bulletin 90-01 on March 8, 1993. The licensee provided additional information on May 23, 1994. Those responses were compared to the Bulletin Reporting Requirements and Requested Actions as described below. The licensee indicates they have 64 Rosemount transmitters that are subject to the Requested Actions of the Supplement.

3.1 Evaluation of Licensee Response to Reporting Requirements

In Reference 3, the licensee describes how they will take the Requested Actions detailed in Supplement 1 of NRC Bulletin 90-01. Included with those statements are clarification, interpretation, and the limits placed on those commitments. The licensee described the specific actions taken to implement the Requested Actions and the associated schedule for completion.

In Reference 4, the licensee stated that the Requested Actions are complete. This included the replacement of two Rosemount transmitters during the spring of 1993. Together, the licensee submittals conform with the Reporting Requirements of Supplement 1 of NRC Bulletin 90-01. The submittals identify where no licensee action is taken and provides evaluation and justification supporting the position that the action is not necessary.

3.2 Evaluation of Licensee Response to Requested Actions

Supplement 1 of NRC Bulletin 90-01 requested licensee action to resolve the issue of fill-oil leakage in Rosemount transmitters. In this Technical Evaluation Report, the Requested Actions and associated transmitter criteria are summarized in Section 2 of this report. The licensee identified a total of 64 Rosemount transmitters that are in the scope of this review. The licensee response is discussed in the following sections.

3.2.1 Licensee Response to Requested Action 1.a

The licensee states there are no Rosemount transmitters from this transmitter classification at WNP-2.

3.2.2 Licensee Response to Requested Action 1.b

The licensee states there are no Rosemount transmitters from this transmitter classification at WNP-2.

3.2.3 Licensee Response to Requested Action 1.c

In Reference 3, the licensee states there are two Rosemount transmitters from this transmitter classification at WNP-2. The licensee notes that these transmitters, RRC-FT-14A and RRC-FT-14C, are scheduled for replacement during refueling outage 8 (Spring 1993). In Reference 4, the licensee informed the NRC that this replacement is complete.

3.2.4 Licensee Response to Requested Action 1.d

The licensee states there is one Rosemount transmitter from this transmitter classification at WNP-2. This transmitter, RFW-DPT-4B, provides a signal representing the reactor pressure vessel level to the reactor feedwater control system. The licensee states this transmitter will continue under the enhanced surveillance program. The frequency for monitoring this transmitter is every refueling outage (24 months).

This commitment fulfills Requested Action 1.d of the Supplement and is acceptable.

3.2.5 Licensee Response to Requested Action 1.e

The licensee states there are 16 Rosemount transmitters from this classification at WNP-2. All have exceeded the 60,000 psi-month maturity criterion established by Rosemount and endorsed by the NRC. The licensee states these transmitters will remain part of the enhanced surveillance monitoring program. This gives continued assurance that these transmitters remain highly reliable, as required by the Supplement.

3.2.6 Licensee Response to Requested Action 1.f

The licensee states there are 45 Rosemount transmitters from this classification at WNP-2. The licensee states these transmitters will remain part of the enhanced surveillance monitoring program. This gives continued assurance that these transmitters remain highly reliable, as required by the Supplement.

These 45 transmitters include some transmitters that observe pressure beyond 500 psi during system testing, yet are normally not subject to pressure. These transmitters include transmitters associated with the high pressure core spray system and the standby liquid control system. The accumulated psi-month operational history is small. The total number of transmitters included in this sub-classification was not identified by the licensee. With minimum time at pressure, these transmitters will not soon exceed the established Rosemount psi-month criteria that establishes the transmitter is at risk of losing sufficient fill-oil to degrade the output signal. Rosemount Technical Bulletin No. 4 notes that transmitters in this type of 'standby' service are acceptable without enhanced surveillance. As the licensee includes these 'standby' service transmitters in their enhanced surveillance monitoring program, the licensee's actions regarding these transmitters is acceptable.

3.2.7 Enhanced Surveillance Monitoring Program

The licensee determined, in consultation with Rosemount, that calibration data taken to two decimal places provides the required data accuracy for comparison to the Rosemount drift data criteria. The licensee states their calibration instrumentation has an accuracy meeting this requirement.

In Reference 4, the licensee notes that their enhanced surveillance monitoring program uses transmitter calibration data. This data comes from the performance of normal calibration procedures. A computer is programmed to chart the historical cumulative zero and span shifts. These shifts are compared to the drift limits established by Rosemount for each transmitter, based on the transmitter range code. This program methodology is based on the technical information described in Rosemount Technical Bulletin No. 4.

Based on the licensee description of their enhanced surveillance monitoring program, we find the enhanced surveillance monitoring program for WNP-2 acceptable.

4. CONCLUSIONS

Based on our review, we find that the licensee has completed the reporting requirements of Supplement 1 of NRC Bulletin 90-01. Further, the licensee conforms to the requested actions of Supplement 1 to NRC Bulletin 90-01.

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, Washington Public Power Supply System (G. C. Sorensen) to NRC, "Response to IEB 90-01, Supplement 1," March 8, 1993, GO2-93-055.
4. Letter, Washington Public Power Supply System (J. V. Parrish) to NRC, "Response to Request for Additional Information," May 23, 1994, GO-94-124.

ENCLOSURE 3

SALP INPUT

FACILITY NAME: WNP-2

SUMMARY OF REVIEW

The staff completed its review of the licensee's response to Nuclear Regulatory Commission Bulletin 90-01, Supplement 1, submitted by Washington Public Power Supply System for WNP-2. We find the licensee's response for this item acceptable.

NARRATIVE DISCUSSION OF LICENSEE PERFORMANCE - FUNCTIONAL AREA

The initial response provided to the staff was supplemented with additional information to meet the requested actions.

Author: D. Spaulding
Date: July 18, 1994