BWR OWNERS' GROUP

Stephen D. Floyd, Chairman
(919) 546-6901

c/o Carolina Power & Light Company • 411 Fayetteville Street • Raleigh, NC 27602

BWROG-9023
February 16, 1990

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, DC 20555

Attention: Charles E. Rossi, Director
Division of Operational Events Assessment

Subject: BWR OWNERS' GROUP COMMENTS ON DRAFT NRC BULLETIN NO. 90-XX, LOSS OF FILL OIL IN ROSEMOUNT TRANSMITTERS

Reference: SD Floyd to CE Rossi, "Draft NRC Bulletin No. 90-XX, Loss of Fill Oil in Rosemount Transmitters", February 8, 1990

This letter formally transmits BWR Owners' Group concerns and comments regarding the draft Bulletin. The referenced letter transmitted draft comments. Those comments have now been reviewed by a substantial number of the BWROG utilities and have been approved for transmittal to the Staff with minor revisions relative to the draft comments.

Several overview comments are included in this letter, and more specific comments on the contents of the draft Bulletin are enclosed in the attachment. These comments are a compilation of BWR utility concerns regarding the draft Bulletin. It is our understanding that you plan to issue the Bulletin next week. I hope that these comments will be considered prior to issuing the Bulletin in final form.

GENERAL COMMENTS

The NRC has not specifically addressed the effectiveness of programs already implemented by the industry to address the issue of loss of fill oil in Rosemount transmitters. Although the NRC held meetings with Rosemount to discuss hardware issues, no meetings were held with industry Owners' Groups to discuss the impact on system reliability, or to discuss the results of the BWR Owners' Group program and our plans to further respond to this issue. The BWR Owners' Group has been working to address this concern regarding the performance of Rosemount transmitters since May, 1989. The BWROG Committee was formed to:

1) Evaluate the use of Rosemount 1153 and 1154 transmitters identified by NRC Information Notice 89-42

2) Develop guidelines for the use of installed Rosemount transmitters

3) Provide guidance to revise calibration procedures

Plans were also made for the results of the Committee to be coordinated with all utilities owning nuclear plants via the "Inter-Owners' Group," an informal Committee established among the four NSSS Vender Owners' Groups to exchange operational information.

G002
1/1

GENERAL COMMENTS (continued)

The loss of fill-oil issue for Rosemount transmitters, subsequent to correcting the specific concerns associated with known defective transmitter lots, does not result in failure rates significantly different than that found with other safety-related equipment. Failure of safety-related equipment over time is expected, and is factored into the design and testing programs for the facility. Therefore, with the replacement of the transmitters from the suspect lots of 1153s and 1154s, there is no justification for backfit. In particular, no evidence is presented that would justify a backfit, pursuant to the requirements of 50.109, for any model 1151 or 1152 transmitters.

The "Requested Actions" do not take into account the service conditions under which the transmitters are applied, even though past experience has shown that failure is directly related to service conditions. The NRC has stated that "the rate at which fill-oil leaks is application and pressure dependent." They provide no evidence that low pressure service has resulted in failures, or at what pressures failures could be expected.

The time frames provided for in the "Requested Actions" are extremely ambitious for the scope of work being proposed. If transmitter replacement is required, guidance should be provided regarding the priority to be applied when deciding which to replace first. The manufacturer's supply of transmitters is small compared to the potential numbers needed for all BWR and PWR units. Provision should be made in this Bulletin for all utilities to replace high priority transmitters before starting to replace lower priority transmitters.

SUMMARY

It appears from review of the draft Bulletin that the NRC may not be fully aware of the BWR Owners' Group program to address this issue or the agreement to share the results of the program with PWR Owners' Groups. The draft Bulletin does not seem to acknowledge the technical basis for industry recommendations and actions, but instead has expanded the scope of Bulletin into areas that are inconsistent with operating experience, system and hardware design.

Yours very truly,

Stephen D. Floyd

S. D. Floyd, Chairman
BWR Owners' Group

cc: BWROG Executive Oversight Committee.
BWROG Rosemount Transmitter Committee
BWROG Primary Representatives
FJ Miraglia, NRC
DN Grace, RRG Chairman
RJ Bell, NUMARC
R Galor, EPRI
E Shankle, INPO
LS Gifford, GE-Rockville
GJ Beck, BWROG Vice Chairman
T Price, NUMARC
M VanSloun, Rosemount
JM Weiss, EPRI
SJ Stark, GE

ATTACHMENT

SPECIFIC COMMENTS

PAGE 2 COMMENTS

If Rosemount transmitters manufactured after July 1989 are acceptable to the NRC based on the indentification and correction of the failure mechanism by Rosemount (i.e., the force used to clamp the stainless steel O-ring in place), then it follows based on Rosemount's technical review and quantification of forces, that the elastomer O-ring can not produce the required internal stresses to fracture the glass-to-metal seal.

The additional axial force from the metal O-ring has been identified as the root cause of the glass-to-metal seal failure of some transmitters during assembly. Operational calibration drift rate history has shown that leak rates are constant with time, present at installation, and proportional to static pressure, which supports Rosemount's leak rate model. The occurance of transmitter failure is a product of operating pressure and the time in service (pressure x time), or PSI-months. The pressure x time product necessary to reach a specified low failure rate is relatively well quantified based on the leak size distribution from the early life high pressure PWR failures. However, until the magnitude of an "acceptably low" failure rate is agreed upon, setting an acceptable pressure x time product limit is not possible.

The July 11 resumption of production without 10CFR restrictions was based on identification of large axial forces as the root cause of glass-to-metal seal failures. Metal O-rings and 1153 clamping forces were a major source of these forces. The elastomer O-rings used on 1151, 1152, and 1153As do not produce large axial forces, and there have been no confirmed glass-to-metal seal failures in over 18,000 model 1152 transmitters shipped since 1975 (which use the same failure reporting system as 1153s). Therefore, it is reasonable to conclude that this root cause should not apply to 1151 and 1152's. Indeed, low failure rates confirm this conclusion.

Based on a telephone discussion with Rosemount a "loss of fill-oil from a glass-to-metal seal failure" has <u>not</u> been confirmed in any 1152 transmitters. Rosemount still contends that no common failure mode exists for 1151/1152's. NRC should either present data which indicates a 1151/1152 problem or delete relsted requirements from this Bulletin.

Since Rosemount states there is no problem in 1151/1152's, there is no fix that should be performed. In the case of 1151's, the Bulletin requires the Nuclear Industry to abandon one of the most field-proven transmitters on the market. Rosemount has also said there is an important dissimilarity between the 1151/1152 and the 1153/1154 sensing capsules, namely the use of a steel O-ring which was the root cause of the high incidence of seal failure. (Reference: Technical Bulletin #1 page 2, page 10.)

It is unclear what is meant by "safety-related"; only ECCS/RPS control loops? What about Reg. Guide 1.97 Category 2 applications, e.g., containment spray flow verification?

What does "manner comparable" mean? This appears to imply a less serious problem assessment. This is a particular problem for 1152 transmitters, many of which are in safety-related or Regulatory Required applications.

The last sentence of paragraph 2 implies that the NRC expects Rosemount engineering/manufacturing changes on the model 1151 and 1152 transmitters. This has not been done and we do not have any indication from Rosemount it will be done because it is not warranted.

Rosemount has not made any changes to the 1152 line, but the industry is being forced to substitute 1153 or 1154 transmitters. This could be construed as a forced modification. Replacing commercial grade 1151s and 1152s with another model is a modification with a negative cost/benefit ratio since there is no confirmed Model 1152 glass-to-metal seal failure, and Model 1151 glass-to-metal seal failures are considered random based on available data.

Paragraph 2 on Page 2 is based on the statement "failures of both Model 1151 and 1152 transmitters due to loss of fill-oil from a glass to metal seal failure have been confirmed". Is this true? What is the source of information? NPRDS is not a good source of this detailed data. No one but Rosemount could make that assessment, and only after analyzing the sensing capsules. Possible arguments are:

1. A mechanistic failure mode is <u>not</u> present in 1151, 1152 since the synthetic O-ring mitigates the force on the glass/metal seal as implied in Rosemount Bulletin #1.

2. The number of failures due to oil leakage is small compared to electronics failure, therefore there is no common cause concern for 1151, 1152 due to the failure frequency.

3. Model 1151 transmitters are considered the "Cadillac" of commercial grade instruments. Over 2 million have been sold with a good historical base.

4. Essentially the NRC in this Bulletin is saying that further use of the 1151 and 1152 in safety-related applications is forbidden since there is no replacement-in-kind from Rosemount.

5. Once again, only the identified common mode failure of slow loss of oil is of concern. Most other oil losses happen so fast they shouldn't affect plant safety since they are readily detectable.

PAGE 3 - COMMENTS

Paragraph 1

Bullet 1; change "a slow setpoint drift" to "a transmitter output drift."

Paragraph 2

Bullet 3; add "that the drift must be continuous in the same direction." If the direction of drift changes with each calibration, it is not indicative of oil loss.

The Bulletin states "slow setpoint drift of 1/4% per month" as one of the symptoms.

1. What does slow mean? Is this implying monthly surveillance? How long does a 1/4% trend need to last?

2. What about Technical Bulletin #4 criteria for cumulative drift.

3. MOST IMPORTANTLY, this could be interpreted as a requirement to do a monthly full span calibration check.

Last Paragraph

The Bulletin seems to be endorsing the bases of Technical Bulletin #4 testing. This implies the NRC agrees with the assessment of the root cause of transmitter failure. Is it the intent of the bulletin to accept supporting methodology for identifying which transmitters don't need enhanced surveillance?

The NRC recognizes in page two that the rate at which a transmitter fails is pressure and time dependent; they disregard this at the bottom of page 3 and further recommend that these transmitters that are in Reactor Protection System (RPS) or Engineered Safety Feature (ESF) systems be replaced at the "earliest possible opportunity". Knowing that the failure mechanism of loss-of-oil begins at the factory, any of the SUSPECT LOT transmitters that have been installed for an extended period of time at high pressure and have exhibited no signs of oil loss have obviously not leaked oil and should therefore no longer be considered SUSPECT and not require replacement.

PAGE 4 COMMENTS

The sentence reading ..."utilize transmitters that may be susceptible to loss of fill oil" is a serious concern. This could imply that Rosemount and Gould/Schlumberger or any oil-filled transmitters are included in the scope of the Bulletin.

By the reference to GDC 21, the transmitters not used in protection systems should not be covered by this IE Bulletin.

The disposition of transmitters not in identified SUSPECT Lots is unclear. If the monitoring described on pages 5-6 is to be followed this should be clearly described.

Requested Actions, Item #1:

This will be very difficult to complete within 60 days. Some non-Rosemount transmitters with Rosemount capsules must be disassembled. This cannot be done without impacting plant operation. This also may require substantial radiation doses. Instead, a physical inspection is suggested for next refueling shutdown.

What is the definition of safety-related equipment, especially 1151 and 1152 transmitter applications? The present draft appears to distinguish between Tech. Spec. and non-Tech. Spec. instruments. Is the intent of the Bulletin to address transmitters in safety-related systems or just reactor protection or engineered safety features actuation systems?

This IE Bulletin does not appear to give the option of placing new sensing capsules in old Rosemount housings by the utilities. This would be useful to expedite changeout.

The requirement to identify transmitters from intermediary suppliers, or provided as a part of another component is resource intensive. Rosemount should be able to supply a list of these sources.

Unauthorized remanufactures or refurbishments of Rosemounts should be outside the scope of the bulletin.

PAGE 5 - COMMENTS

A 90-day period is insufficient to review and trend transmitter calibration records. Based on 150 Model 1151 through 1153 transmitters, one utility estimates based on 30 manhours each, that retreival of historical data and plotting would require approximately 4500 manhours or 2-1/4 manyears.

Clarification is needed of the criteria on which to base a conclusion that a transmitter is not exhibiting symptoms (ie, what is sufficient?).

On-line operability determination and entering an LCO based solely on the on-line testing is not reasonable. Provision for suspect/planned off-line confirmation must be allowed. Calibrating is the only alternative to review if the utility doesn't have continuous monitoring. This is an unnecessary activity once a baseline is established.

The 120-day duration to develop and implement an enhanced surveillance program to monitor transmitters for loss of fill-oil should be lengthened to 180 days minimum.

For item 3, the word "should" implies the utility may address each option but need only choose what type of monitoring is appropriate. Is this a correct interpretation?

PAGE 6 - COMMENTS

Paragraph 3b

The enhanced monitoring program described on page 5-6 is unclear. Specifically in item (d) it includes sensor response time testing for routine channel calibration activities. The apparent intent of this item is to check for transmitter sluggishness, and not the detailed Time Response Testing required for certain transmitters in the plant. There is a significant difference in performing Time Response Tests and a "quick" check for sluggishness.

We must also have a more clear definition of the term "ENHANCED". Perhaps the word supplemental could be used. Note: One utility estimates that if continuous on-line monitoring were required, it may cost roughly $20K per transmitter. Costs for other utilities may differ.

Paragraph 3d

Sensor response time testing is not as effective in detecting potential transmitter failures as on-line monitoring and normal calibration (Rosemount testing validates this position).

The following revision is suggested: "Inclusion of observation for sluggish transmitter response into routine channel calibration activities."

Regarding the statement "Inclusion of sensor response time testing into routine channel calibration activities":

1) It is a significant concern that this recommendation could be construed as a requirement. This item should be restated to clarify the benefit of time response testing as a diagnostic tool, but should not specifically recommend inclusion of time response testing into every routine calibration.

2) This should be removed or modified. Response time testing is very difficult to do in a plant environment; test equipment is very bulky, and adds to Man-Rem. Also this method has been shown by ISA to be unsatisfactory due to inadequacies/limitations of test equipment. Furthermore, Rosemount Technical Bulletin #4 shows that this method is no more effective than the others, and in fact is only recommended for bench applications (e.g., prior to installation).

Paragraph 3e

Some clarification is required. Noise analysis is application dependent and the data is difficult to analyze.

Rosemount Technical Bulletin No. 4 states that the results from testing were "encouraging for transmitters that operate near their trip points and that are on a process with sufficient process noise. If either of these conditions are not met, amplitude versus frequency data may not detect a failure until after the unit has lost ability to respond." Due to interpretation difficulties, Rosemount has not provided guidelines for this method and indicates that a transmitter could be in a failed condition for a significant period of time without being detected.

Paragraph 4

The requirement to replace all transmitters from the suspect manufacturing lots "at the earliest appropriate opportunity" is not entirely justified. A number of transmitters in this category have been installed for greater than 3-1/2 years, have maintained normal calibration accuracy, and satisfactorily passed their time response testing (where applicable). Since the mode of failure of the sensing cell is present at manufacturing, and since these transmitters have not exhibited oil loss symptoms to date, it is concluded that if any of these cells are leaking it is at an extremely slow rate.

Under these circumstances, a program to closely monitor and trend process noise and/or drift on these transmitters is at least as conservative and prudent as replacing them with new units with no operating experience. This is especially true of lower range code transmitters which have been determined by Rosemount to exhibit detectable early indications of an oil loss. For the high range code transmitters, the failure mode is more abrupt and thereby lends itself to early detection of a failure by a monitoring program which employs a short period between observations.

Item 4

Based upon the PSI-months concept there is no rationale for transmitter removal except for downtrended operation.

Availability of replacement transmitters may be a limiting factor.

Item 5

Feasibility of JCO's is not warranted until a transmitter exhibits oil loss symptoms.

There is a significant difference between a "basis for continued plant operation (BCO)" and a JCO. A BCO does not imply mandatory shutdown if unable to comply with the requirements of the Bulletin; it is similar to a safety evaluation.

PAGE 7 COMMENTS

Paragraph 1:

Implies that BCO must be continually updated until all 1151, 1152, 1153 and 1154's are replaced. This is unreasonable.

PAGE 8 COMMENTS

Paragraph 1

The 120 days for compliance should be changed to 180 days. According to the draft Bulletin, total replacement appears to be the only final answer with no recourse. Some statement regarding a re-look after "x" months when more information or data is available would be appropriate.

PAGE 9 COMMENTS

Last Paragraph

Doesn't this backfit requirement automatically give utility licensing a 30-day review period for comments to this draft IE Bulletin?

PAGE 10 COMMENTS

Paragraph 1

As presently written, the burden hours would be significantly in excess of 100 person-hours.

The NRC estimated average burden hours per licensee response is extremely low for the effort required. One utility presently has approximately 550 Rosemount transmitters installed in safety-related or important-to-safety applications, of which 54 are from the suspect manufacturing lots identified by Rosemount. A very large majority of these units have been installed for greater than three years and many for greater than six years. This represents well in excess of 2,000 calibration records to retrieve from historical files and review. Each transmitter will require a calculation to determine the turn-down ratio and then a review of the as-found and as-left data for each calibration. In addition, since most transmitters are not calibrated at the zero point (ie, elevated or suppressed zero, or reverse cal of a level transmitter) each drift calculation will require an extrapolation to the zero point in order to compare actual values to the limits presented in Rosemount's Technical Bulletin 4.

The justification for continued operation alone will require well in excess of 100 manhours, and the monitoring and trending programs which are already implemented will need to be significantly expanded to include non-suspect lots, low pressure service applications, and intermittent service applications.

It is estimated that a thorough response to the requested actions for both stations will require a full time engineer and a full time clerk at both stations. In addition, our licensing, procurement, System Engineering, Maintenance, and Operations departments will all be involved to a significant extent. A more accurate estimate of burden hours would be 2 Man Years.