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NUCLEAR ENGINEERING & SERVICES DEPARTMENT

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

Subject: Limerick Generating Station, Units 1 and 2
Peach Bottom Atomic Power Station, Units 2 and 3
Supplemental Response to NRC Bulletin No. 90-01,
"Loss of Fill-Oil in Transmitters Manufactured by
Rosemount"

Gentlemen:

In a letter from Rosemount, Inc., dated October 31, 1990, the nuclear industry was notified that additional Rosemount Models 1153 and 1154 pressure transmitters were identified as having been manufactured in lots exhibiting high failure fractions due to loss of fill-oil. This letter is being submitted to voluntarily supplement our response to NRC Bulletin No. 90-01, "Loss of Fill-Oil in Transmitters Manufactured by Rosemount," for Limerick Generating Station (LGS), Units 1 and 2 and Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. Although not specifically required by NRC Bulletin No. 90-01, this letter provides information concerning the additional transmitters identified by Rosemount in the October 31, 1990 Rosemount letter, for LGS, Units 1 and 2 and PBAPS, Units 2 and 3. The additional information herein is consistent with the reporting requirements contained in NRC Bulletin No. 90-01 for the transmitters originally listed in Rosemount's Master Suspect Transmitter List (issued December 22, 1989) and required by NRC Bulletin No. 90-01 to be evaluated.

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Philadelphia Electric Company (PECo) received NRC Bulletin No. 90-01 on March 20, 1990, and we provided the following responses.

1) By letter dated July 13, 1990, we submitted our response to NRC Bulletin No. 90-01 for LGS, Units 1 and 2 and PBAPS, Units 2 and 3. That response provided the details of the program we developed to monitor and analyze the Rosemount Model 1153, Series B and D, transmitters installed in safety-related or Anticipated Transient Without Scram (ATWS) applications at LGS and PBAPS.

2) By letter dated October 16, 1991, we provided a supplemental response to our July 13, 1990 letter, indicating the results of further analysis of calibration records for 30 Rosemount Model 1153, Series B and D transmitters that had exhibited symptoms indicative of loss of fill-oil.

On October 31, 1990, Rosemount issued Addendum 1 and Addendum 2 to the Rosemount Technical Bulletin No. 4 Master Suspect Transmitter List (i.e., specified in NRC Bulletin No. 90-01 as the "suspect lots") identifying additional transmitters manufactured in lots exhibiting high failure fraction due to loss of fill-oil. Both Addendum 1 and Addendum 2 were based on completed failure analysis of additional Models 1153 and 1154 pressure transmitters using the same criteria as was used to generate the original Master Suspect Transmitter List. Addendum 1 included all suspect transmitters identified from December 22, 1989 through April 20, 1990. Addendum 2 included all suspect transmitters identified from April 20, 1990 through October 31, 1990.

We have reviewed the transmitters listed in Addendum 1 and Addendum 2 and have identified 14 transmitters utilized in either safety-related or ATWS applications at LGS, Units 1 and 2 and PBAPS, Units 2 and 3, that had been reported in our July 13, 1990 response to NRC Bulletin No. 90-01 as being non-suspect lot transmitters. Although this supplemental report is not specifically required by NRC Bulletin No. 90-01, this letter provides information regarding these additional 14 transmitters consistent with the reporting requirements contained in NRC Bulletin No. 90-01 for the transmitters originally listed in Rosemount's Master Suspect Transmitter List.

Upon reviewing the Requested Actions and Reporting Requirements for Operating Reactors contained in NRC Bulletin No. 90-01, we have determined that Requested Action No. 2, Requested Action No. 5, and Reporting Requirement Nos. 1.a and 1.c are affected by Rosemount's identification of additional transmitters manufactured in lots exhibiting high failure fractions due to loss of fill-oil. Consequently, our response is limited to providing supplemental information for Reporting Requirement Nos. 1.a and 1.c and Requested Action Nos. 2 and 5. Reporting Requirement Nos. 1.a and 1.c and Requested Action Nos. 2 and 5 have been restated below followed by our voluntary supplemental response for LGS, Units 1 and 2 and PBAPS, Units 2 and 3.

REPORTING REQUIREMENT 1

Provide, within 120 days after receipt of this Bulletin, a response that provides the following information:

a) Confirms that Items 1, 2, 3, 4, and 5 of the Requested Actions for Operating Reactors have been completed.

c) Identifies the system in which the Model 1153 Series B, 1153 Series D, and Model 1154 transmitters from the manufacturing lots that have been identified by Rosemount as having a high failure fraction due to loss of fill-oil are utilized and provides a schedule for replacement of these transmitters which are in use in the reactor protection or engineered safety feature actuation systems.

SUPPLEMENTAL RESPONSE TO REPORTING REQUIREMENT 1.a

Requested Action Items 1, 2, 3, 4, and 5 as specified in NRC Bulletin No. 90-01 have been completed as was reported in our initial letter dated July 13, 1990. The identification by Rosemount of additional transmitters manufactured in lots exhibiting high failure fractions, as listed in Addendum 1 and Addendum 2 to the Master Suspect Transmitter List in the October 31, 1990 Rosemount letter, does not affect our response to Requested Action Items 1, 3, and 4 as initially reported. However, our initial response to Requested Action Item 2 is affected. Our supplemental response to requested Action Item 2 for LGS and PBAPS is provided below.

REQUESTED ACTION ITEM 2

Determine whether any transmitters identified in Item 1 are from the manufacturing lots that have been identified by Rosemount as having a high failure fraction due to loss of fill-oil. Addresses are requested not to utilize transmitters from these suspect lots in the reactor protection or engineered safety feature actuation systems; therefore, addressees are requested to develop and implement a program to replace, at the earliest appropriate opportunity, transmitters from these suspect lots in use in reactor protection or engineered safety feature actuation systems.

SUPPLEMENTAL RESPONSE TO REQUESTED ACTION ITEM 2

LGS Unit 1

Two (2) transmitters listed in the October 31, 1990 Rosemount letter, Addendum 1 and Addendum 2, are utilized in LGS Unit 1. Neither transmitter is used in reactor protection or engineered safety feature actuation systems, and are therefore, not scheduled to be replaced. The two transmitters are installed in the following active safety-related applications.

System		Function
Residual Heat Removal(RHR)	-	"B" RHR Loop flow indication
Redundant Reactivity Control System (RRCS)	-	Mitigate the consequences of an Anticipated Transient without SCRAM (ATWS) event

The "B" RHR Loop flow transmitter is used to provide indication of the RHR loop flow. This transmitter is not used to actuate or trip the RHR system or any reactor protection or engineered safety feature actuation system. Consequently, the "B" Loop of RHR will automatically start and inject into the reactor vessel as previously evaluated, irrespective of the operability of the "B" RHR Loop flow transmitter. This "B" RHR Loop flow transmitter is used to indicate RHR "B" Loop flow in accordance with the guidance provided in Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," Rev. 2. The transmitter is normally pressurized to nominally 100 psig and is intermittently operated during routine surveillance testing at a RHR pump discharge pressure of less than 500 psig. This transmitter is the only transmitter on the "B" RHR loop providing flow indication; however, other indirect methods do exist to confirm loop flow in the event this transmitter failed (i.e., pump discharge pressure and valve positioning). The historical data for the "B" RHR Loop flow transmitter has been reviewed and the transmitter has not exhibited symptoms indicative of loss of fill-oil. Accordingly, the transmitter is considered operable. This transmitter is included in the enhanced monitoring program developed in response to NRC Bulletin No. 90-01 and described in our letter dated July 13, 1990, to readily identify transmitters exhibiting symptoms indicative of loss of fill-oil. If in the future, the transmitter is identified by the enhanced monitoring program as exhibiting symptoms indicative of loss of fill-oil, the appropriate operability acceptance criteria will be applied to confirm transmitter operability or appropriate corrective action in accordance with the monitoring program.

The RRCS Reactor Vessel water level transmitter is used to provide an input signal corresponding to reactor vessel water level to the RRCS. The RRCS functions to mitigate the consequences of an ATWS event by automatically initiating ATWS systems and mitigation (i.e., Alternate Rod Insertion, Reactor Recirculation Pump trip, and Standby Liquid Control System Injection) in response to a set of select plant conditions when reactor vessel low water level is detected. The RRCS transmitter is not part of the reactor protection or engineered safety feature actuation system. Consequently, the RRCS Reactor Vessel level transmitter is not used to actuate or trip a reactor protection or engineered safety feature actuation system. The transmitter is normally pressurized to a nominal 1000 psig. The historical data for the RRCS Reactor Vessel water level transmitter has been reviewed and the transmitter has not exhibited symptoms indicative of loss of fill-oil. Accordingly, the transmitter is considered operable. However, the failure of this transmitter, by itself, would not result in the initiation of an ATWS system. This transmitter is included in the enhanced monitoring program developed in response to NRC Bulletin No. 90-01 to readily identify transmitters exhibiting symptoms indicative of loss of fill-oil. If in the future, the transmitter is identified by the enhanced monitoring program as exhibiting symptoms indicative of loss of fill-oil, the appropriate operability acceptance criteria will be applied to confirm transmitter operability or appropriate corrective action will be taken in accordance with the monitoring program.

LGS Unit 2

Ten (10) transmitters listed in the October 31, 1990 Rosemount letter, Addendum 1 and Addendum 2, are utilized in LGS Unit 2. The ten transmitters monitor main steam line (MSL) flow to initiate isolation of the main steam lines when high steam flow is detected. These transmitters are safety-related and are utilized in an engineered safety feature actuation system.

The MSL flow transmitters are used to provide an input signal corresponding to MSL flow to the Primary Containment and Reactor Vessel Isolation Control System (PCRVICS). The PCRVICS automatically initiates closure of the Main Steam Isolation Valves (MSIVs) when high main steam line flow is detected. A total of sixteen (16) transmitters monitor MSL flow. The transmitters are divided among four instrument channels A, B, C, and D (i.e., four transmitters per channel). The instrument channels are arranged as two trip logics so that a one-out-of-two taken twice actuation logic (Channels A or C and Channels B or D) will automatically initiate closure of the MSIVs. High MSL flow sensed by any one of the four transmitters in the instrument channel will cause a trip of the respective instrument channel. The PCRVICS is an engineered safety feature; hence, the MSL flow transmitters are used to actuate an engineered safety feature system. The MSL flow transmitters are normally pressurized to a nominal 1000 psig.

The historical data for the ten (10) MSL flow transmitters has been reviewed and the transmitters have not exhibited symptoms indicative of loss of fill-oil. Accordingly, the transmitters are considered operable. These transmitters are included in the enhanced monitoring program developed in response to NRC Bulletin No. 90-01 to readily identify transmitters exhibiting symptoms indicative of loss of fill-oil. If in the future, any of these transmitters are identified by the enhanced monitoring program as exhibiting symptoms indicative of loss of fill-oil, the appropriate operability acceptance criteria will be applied to confirm transmitter operability or appropriate corrective action will be taken in accordance with the monitoring program.

PBAPS Unit 3

Two (2) transmitters listed in the October 31, 1990 Rosemount letter, Addendum 1 and Addendum 2, are utilized in PBAPS Unit 3. The two transmitters which are installed in different instrument channels monitor main steam line (MSL) flow to initiate isolation of the main steam lines when high steam flow is detected. These transmitters are safety-related and are utilized in an engineered safety feature actuation system.

The MSL flow transmitters are used to provide an input signal corresponding to MSL flow to the Primary Containment Isolation System (PCIS). The PCIS automatically initiates closure of the MSIVs when high main steam line flow is detected. A total of sixteen (16) transmitters monitor MSL flow. The transmitters are divided among four instrument channels A, B, C, and D (i.e., four transmitters per channel). The instrument channels are arranged as two isolation logics (isolation logic A1/A2 and isolation logic B1/B2) so that a one-out-of-two taken twice actuation logic (isolation logic A1 or A2 and isolation logic B1 or B2) will automatically initiate closure of the MSIVs. High MSL flow sensed by any one of the four transmitters in the instrument channel will cause a trip of the respective instrument channel. The PCIS is an engineered safety feature; hence, the MSL flow transmitters are used to actuate an engineered safety feature system. The MSL flow transmitters are normally pressurized to a nominal 1000 psig.

The historical data for the two (2) MSL flow transmitters has been reviewed and the transmitters have not exhibited symptoms indicative of loss of fill-oil. Accordingly, the transmitters are considered operable. These transmitters are included in the enhanced monitoring program developed in response to NRC Bulletin No. 90-01 to readily identify transmitters exhibiting symptoms indicative of loss of fill-oil. If in the future, any of these transmitters are identified by the enhanced monitoring program as exhibiting symptoms indicative of loss of fill-oil, the appropriate operability acceptance criteria will be applied to confirm transmitter operability or appropriate corrective action will be taken in accordance with the monitoring program.

RESPONSE TO REPORTING REQUIREMENT 1.c

The historical data for the 12 MSL flow transmitters, at LGS Unit 2 and PBAPS Unit 3, have been reviewed for symptoms indicative of a loss of fill-oil using the same methods established for the enhanced monitoring program described in our letter dated July 13, 1990. None of the 12 transmitters have exhibited symptoms indicative of a loss of fill-oil. Based on our review of the historical data and our favorable operating experience with these transmitters, these transmitters are considered operable.

In addition, these transmitters are being monitored in accordance with the enhanced monitoring program that we have developed in response to NRC Bulletin No. 90-01 to readily identify transmitters exhibiting symptoms indicative of a loss of fill-oil. These transmitters are monitored in the program by trending zero drift of the transmitter's calibration data, by comparison trending of transmitter's operating data during routine plant operations from redundant instrument channels, and extended span check during calibration testing. These methods of monitoring are briefly described below. A more detailed description of the enhanced monitoring program is contained in Exhibit 1 of our July 13, 1990 submittal.

Zero Drift Trending of Calibration Data

In this method of monitoring, transmitter calibration data is analyzed and the cumulative drift from zero is trended. If the accumulated zero drift of a transmitter exceeds a pre-determined drift limit, the data and trend are reviewed to confirm the reasonableness of the information. Upon confirmation, the transmitter is identified as exhibiting symptoms indicative of loss of fill-oil and the appropriate operability acceptance criteria will be applied in accordance with the enhanced monitoring program. The drift limits used in the enhanced monitoring program are based on Rosemount's drift limits published in Rosemount Technical Bulletin No. 4.

Drift Trending of Process Operating Data For
Three or More Redundant Instrument Channels

In this method of monitoring, transmitter operating data is collected between calibration intervals. For the MSL flow transmitters, data is collected bi-weekly. Redundant instrument channels are grouped together. A moving weighted average of the deviation of each individual transmitter's operating data from the process average of all the redundant transmitters in the group is evaluated. If the average deviation of a transmitter exceeds a pre-determined drift limit, the data and trend are reviewed to confirm the reasonableness of the information. Upon confirmation, the transmitter is identified as exhibiting symptoms indicative of loss of fill-oil and the appropriate operability acceptance criteria will be applied in accordance with the enhanced monitoring program. The drift limits used in

the enhanced monitoring program are based on Rosemount's drift limits published in Rosemount Technical Bulletin No. 4.

In addition to the two methods of monitoring discussed above, an extended span response check as described in Exhibit 1 of our July 13, 1990 letter, is performed on each of the MSL flow transmitters as part of the scheduled surveillance check for these transmitters. Transmitters which respond sluggishly during the extended span check or fail to reach the expected output will be identified as having symptoms indicative of loss of fill-oil and the appropriate operability acceptance criteria will be applied in accordance with the enhanced monitoring program.

REQUESTED ACTION ITEM 5

Document and maintain in accordance with existing plant procedures a basis for continued plant operation covering the time period from the present until such time that the Model 1153 Series B, 1153 Series D, and Model 1154 transmitters from the manufacturing lots that have been identified by Rosemount as having a high failure fraction due to loss of fill-oil in use in the reactor protection or engineered safety features actuation systems can be replaced. In addition, while performing the actions requested above, addressees may identify transmitters exhibiting symptoms indicative of loss of fill-oil that do not conform to the established operability acceptance criteria and are not addressed in the technical specifications. As these transmitters are identified this basis for continued plant operation should be updated to address these transmitters covering the time period from the time these transmitters are identified until such time that these transmitters can be replaced. When developing and updating this basis for continued plant operation, addressees may wish to consider transmitter diversity and redundancy, diverse trip functions (a separate trip function that may also provide a corresponding trip signal), special system and/or component tests, or (if necessary) immediate replacement of certain suspect transmitters.

SUPPLEMENTAL RESPONSE TO REQUESTED ACTION ITEM 5

The twelve MSL flow transmitters installed in LGS Unit 2 and PBAPS Unit 3 are 1) operable and we have had favorable operating experience with them, 2) not exhibiting symptoms indicative of a loss of fill-oil, and 3) being monitored in accordance with the enhanced monitoring program designed to readily detect symptoms indicative of a loss of fill-oil.

Therefore, we do not plan to replace any of these transmitters at this time. If any of these transmitters are identified and confirmed by the enhanced monitoring program as exhibiting symptoms indicative of a loss of fill oil, they will be declared inoperable and appropriate action taken in accordance with the applicable Technical Specifications; or if not addressed by the Technical Specifications they will be replaced at the earliest possible opportunity and if necessary, justification for continued operation prepared and maintained.

If you have any questions, or require additional information, please do not hesitate to contact us.

Very truly yours,

RM Kacich for

G. J. Beck,
Manager
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cc: T. T. Martin, Administrator, Region I, USNRC
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