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May 27, 1988

Mr. Edward C. Wenzinger, Chief
Projects Branch No. 2
Division of Reactor Projects
USNRC Region I
ATTN: Document Control Desk
Washington, DC 20555

Docket: 50-352

Subject: I.E. Bulletin 85-03 "Motor-Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings"
Response to Request for Additional Information and Supplement 1
Limerick Generating Station Unit 1

References:
(1) S. J. Kowalski (PECo) letter to E. C. Wenzinger (NRC), dated April 29, 1988
(2) E. C. Wenzinger (NRC) letter to J. S. Kemper (PECo), dated March 29, 1988
(3) J. S. Kemper (PECo) letter to W. T. Russell (NRC), dated November 17, 1987
(4) J. S. Kemper (PECo) letter to T. E. Murley (NRC), dated October 2, 1986
(5) I.E. Bulletin 85-03 Supplement 1, dated April 27, 1988

Dear Mr. Wenzinger:

The purpose of this letter is twofold. First, it responds to your request for additional information (RAI) to facilitate your review of our Limerick I.E. Bulletin 85-03 response. Second, it provides our response to I.E. Bulletin 85-03 Supplement 1.

In accordance with the commitment made in our Reference (1) letter, the attached document provides a complete response to each RAI item in your Reference (2) letter. This document supplements those previously submitted by References (3) and (4).

Supplement 1 of I.E. Bulletin 85-03 was issued to clarify the NRC position on valve mispositioning. The motor operated valve program established for Limerick Unit 1 includes consideration of mispositioning of valves prior to performing their intended safety function. This was accomplished by evaluating each valve starting in both the open and closed positions prior to moving to its required safety position. The most conservative set of conditions was then selected as the basis for setting and maintaining switches to assure valve operability. Therefore, our responses to the RAI items on inadvertent operation and our previous submittals satisfactorily demonstrate compliance with the requirements of IEB 85-03 Supplement 1.

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If you have any questions or require any additional information regarding our I.E. Bulletin 85-03 program, please do not hesitate to contact us.

Sincerely,

J W Gallagher
for
S J Kowalski

TSN/pd05188805

Enclosure Report

Copy to: Addressee
LGS Resident Site Inspector
NRC Division of Operational Events Assessment
NRC, Document Control Desk
Washington, DC 20555

RESPONSE TO USNRC REQUEST FOR ADDITIONAL INFORMATION

I.E. BULLETIN 85-03 RESPONSE FOR LIMERICK 1, 2

The following provides PECo's response to the USNRC request for additional information dated March 29, 1988. Each specific requested item is restated followed by the PECo response.

1. NRC Request

If MOVATS is planned for application to some MOVs which are not included in its data base, commit to and describe an alternate method for determining the extra thrust necessary to overcome pressure differentials for these valves.

PECo Response

PECo is not using the MOVATS data base in establishing the MOV thrust requirements for a given differential pressure. However, we are making use of MOVATS equipment to determine stem thrust and set torque switches based on minimum required thrust values determined by the valve vendors. We consider that the valve vendors have an experience base much larger than that of MOVATS. This experience base includes the use of motor-operated valves in diverse industries such as petrochemical refineries and fossil power stations.

The Limerick Unit 1 MOVATS test program was completed prior to the issuance of I.E. Bulletin 85-03. In lieu of re-MOVATS testing all subject valves under differential pressure conditions, we justified our selected thrusts and resulting torque switch settings by a combination of the following:

(a) For most valves, margin exists in the original design differential pressure (D-P) with respect to the D-P corresponding to the maximum design basis.

(b) For all valves, margin exists in the actual stem thrust with respect to the minimum required for maximum D-P conditions.

(c) Actual pre-operational or routine surveillance testing.

(d) Supplemental D-P testing of selected MOVs.

Our response of 11/17/87 provided pertinent information on each of these items. The data collected for this effort confirms the adequacy of the torque switch setting techniques and, to the extent practical, the vendor's methodology to predict the necessary stem force for a given differential pressure.

2. NRC Request

Revise the table of the response dated 10/2/86 to include values of differential pressure for opening the following MOVs, or justify exclusion of these pressures. As required by Action Item (a) of the bulletin, assume inadvertent equipment operations.

(a) HPCI MOV HV-1F004 is shown normally open in Zone F-3 of Drawing M-55 Sheet 1 Revision 32, and as MOV 3 on Page 68 of BWROG Report NEDC-31322 dated September 1986. How would suction from the CST be ensured if this MOV were to be (a) actuated inadvertently to the closed position upon intended initiation of the system or (b) left closed inadvertently?

(b) RCIC MOV HV-1F010 is shown normally open in Zone E-2 of Drawing M-49 Sheet 1 Revision 28, and as MOV 3 on Page 72 of the BWROG Report. The question in Item 2(a) above applies here also.

(c) HPCI MOV HV-1F072 is shown normally open in Zone C-6 of Drawing M-55 Sheet 1 Revision 32, and as MOV VI on Page 71 of the BWROG Report. How would exhaust from the turbine to the suppression pool be ensured if this MOV were to be (a) actuated inadvertently to the closed position upon intended initiation of the system or (b) left closed inadvertently?

(d) RCIC MOV HV-1F060 is shown normally open in Zone B-5 of Drawing M-49 Sheet 1 Revision 28, and as MOV VI on Page 74 of the BWROG Report. The question in Item 2(c) above applies here also.

PECo Response

Inadvertent valve positioning, particularly those performed during and directly counter to safety system operation are extremely unlikely given the extensive training that control room operators and supervision receive. Postulated actions which are directly counter to proper safety system function are considered beyond design basis.

A positive feature of the Limerick program with respect to inadvertent operation is that the OPEN and CLOSE torque switch settings are identical. Therefore, an operator output force at least equal to that required to fully close the valve against maximum pressure is available to fully open the valve when actuated. This program conservatism helps to assure recovery from inadvertent valve operation.

(a) The HPCI condensate storage tank (CST) suction valve HV-55-1F004 is normally open to lineup the CST to the HPCI pump suction. However, the CST is a non-safety related non-seismic Category II structure. On loss of the CST, pump suction automatically transfers to the Suppression Pool which serves as the HPCI system safety-related water supply. Therefore, pump suction from the CST does not have to be ensured since during a design basis accident (DBA) the CST is not assumed to be available.

The resulting differential pressure across the valve, if it were inadvertently out of position and called upon to open, would correspond to that generated by the CST static head. This differential pressure is less than the 23 psid computed for the closing direction and well within the capability of the motor-operated valve assembly.

If the valve were inadvertently closed while the system is aligned with the CST, the HPCI pump suction pressure instrumentation would initiate a trip of the HPCI turbine so as not to damage the turbine driven pump. Once the cause of the trip was recognized (e.g. via control room position indication), pump suction would be realigned and the HPCI turbine restarted.

(b) Our response to your request regarding the RCIC condensate storage tank (CST) suction valve HV-49-1F010 follows the same logic as that provided for the HPCI CST suction valve.

(c) The HPCI turbine exhaust isolation valve HV-55-1F072 is normally open to provide a flowpath for turbine steam exhaust to the suppression pool. If this valve were inadvertently closed, a VALVE NOT FULL OPEN ALARM and HPCI OUT OF SERVICE ALARM would actuate in the control room. Therefore, the mispositioning of this valve will be immediately recognized and responded to by control room personnel. Inadvertent operation of this valve is considered extremely remote since the control room handswitch has a keylock permissive (shift supervision controls access to this key).

If the valve were inadvertently closed while the system is in operation, the HPCI turbine exhaust pressure instrumentation would initiate a trip of the HPCI turbine so as not to overpressurize the low pressure piping. Once the cause of the trip was recognized, turbine exhaust would be realigned and the HPCI turbine restarted. As stated earlier, several alarms would be received before the valves were completely shut which would immediately alert the control room operators to the problem.

(d) Our response to your request regarding the RCIC turbine exhaust isolation valve HV-49-1F060 follows the same logic as that provided for the HPCI turbine exhaust isolation valve.

3. NRC Request

Revise the table of the response dated 10/2/86 to include MOVs HV-124 and HV-125, or justify their exclusion. These valves are shown normally open in series in Zone H-6 of Drawing M-55 Sheet 1 Revisic 32. Similar valves are not identified in the BWROG Report. How would suction to the HPCI and RCIC systems be ensured if one of these valves were to be (a) actuated inadvertently to the closed positic upon intended initiation of the system or (b) left closed inadvertently?

PECo Response

HV-124 and HV-125 have not been addressed by PECo's Limerick I.E. Bulletin 85-03 response based on the following considerations:

(a) HV-124 and HV-125 are infrequently operated maintenance valves that permit work on piping downstream of the CST. While the HV-124 and HV-125 motor operators are powered from an emergency motor control center (MCC), the valves and the piping they are installed in are non-safety related. The CST is a non-safety related water supply. Therefore, ECCS pump suction from the CSi need not be assured during a DBA.

(b) Several checks are performed to assure these valves are properly positioned. First, these valves are included in a monthly ECCS lineup verification check. Secondly, the routine HPCI and RCIC system surveillance testing required by our Technical Specifications verify the proper valve position by demonstrating rated flow from the CST. We believe that these checks and the administrative controls in place provide adequate assurance against inadvertent positioning.

(c) If either of these valves were mispositioned closed, the HPCI and RCIC turbines would trip on low pump suction pressure. Pump suction would be immediately diverted by control room operators to the safety related suppression pool.

4. NRC Request

Resolve a discrepancy in the table of the response dated 10/2/86, for the following two MOVs with similar functions. Also consider the effect of Note (o) on Page 66 of the BWROG Report about providing differential pressures for test valves.

(a) HPCI MOV HV-1F007 is shown normally open in Zone D-4 of Drawing M-55 Sheet 1 Revision 32, and as MOV 8 on Page 68 of the BWROG Report. Differential pressure is given for opening only.

(b) RCIC MOV HV-1F012 is shown normally open in Zone D-4 of Drawing M-49 Sheet 1 Revision 28, and as MOV 8 on Page 72 of the BWROG Report. Differential pressure is given for closing only. How would injection to the reactor vessel be ensured if this valve were to be (a) actuated inadvertently to the closed position upon intended initiation of the system or (b) left closed inadvertently?

PECo Response

The noted discrepancy regarding the design basis safety function of the injection valve test valves in the HPCI and RCIC systems was due to an oversight in our response dated 10/2/86 which we have subsequently corrected in our response dated 11/17/87. The stated differential pressures should apply in both cases to valve opening rather than closing. We included these and several other valves in our Limerick I.E. Bulletin 85-03 program specifically to address inadvertent valve operation beyond the original scope recommended by the BWROG. In this regard, we have already addressed Supplement 1 of I.E. Bulletin 85-03, dated 4/27/88.

5. NRC Request

Revise the table of the response dated 10/2/86 to include RCIC Trip and Throttle Valve HV-112, or justify its exclusion. This valve is shown as a MOV on FSAR Figure 5.4-9 Revision 43, 5/85, and as MOV X on Page 74 of the BWROG Report.

PECo Response

The RCIC Turbine Trip and Throttle Valve, HV-50-112, does not have a safety function affecting the valve motor-operator. The motor-operator is used to only open the valve (reset function) under negligible differential pressure due to equalizing orifices across the valve. The valve's safety function to close is accomplished by a separate spring mechanism. Section 3.3.4.15 of BWROG Report NEDC 31322 further delineates the technical justification for exclusion of this valve.

The RCIC Trip and Throttle valve is operated during Technical Specification system surveillance testing. This testing provides assurance that the RCIC Trip and Throttle Valve operates properly including recovery from an inadvertent trip. Recovery procedures for an inadvertent trip call for the upstream steam admission valve HV-49-1F045 to be closed prior to resetting the Trip and Throttle Valve.

6. NRC Request

The proposed program for action items b, c, and d of the bulletin is incomplete. Provide the following details as a minimum:

(a) commitment to justify continued operation of a valve determined to be inoperable (assumed typo),

(b) description of method possibly needed to extrapolate valve stem thrust determined by testing at less than maximum differential pressure,

(c) consideration of pipe break conditions as required by the bulletin, and

(d) stroke testing when necessary to meet bulletin requirements.

PECo Response

(a) In our response dated 11/17/87 to bulletin item (b), we demonstrated that the subject motor-operated valves had the design capabilities to function as required under design basis conditions. Because these valves met their operability requirements, there is no need to justify continued operation of a valve determined to be inoperable.

(b) As we described in our response to RAI item 1), PECo justified the adequacy of the subject valve torque switch settings via an engineering review of design margins and actual differential pressure testing on selected MOVs.

(c) Pipe break conditions were considered in the development of the differential pressures and the resultant thrust requirements.

As described in our response dated 11/17/87, PECo has performed supplemental testing which closed the HPCI/RCIC steam line isolation valves with their respective turbine running and acting as a sink for the downstream pressure. This is the closest simulation of actual pipe break conditions that we can safely duplicate and justify.

In addition, we are following and providing input to the Idaho National Engineering Laboratory (INEL) program to address this concern as USNRC Generic Issue 87. Upon completion of this program, we will consider recommendations to improve valve reliability.

(d) The valves were stroke tested as a matter of course during the initial limit switch and torque switch setting process. Additional stroke testing is performed as part of the ISI program, surveillance testing and required post-maintenance checkout process. The above actions provide the necessary stroke testing to meet bulletin requirements.