



Boston Edison

Pilgrim Nuclear Power Station
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Senior Vice President -- Nuclear

June 20, 1997

BECO Ltr. 2.97.065

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

License DPR-35
Docket 50-293

SUBJECT: REPLY TO NOTICE OF VIOLATION (REFERENCE NRC INSPECTION REPORT
NO. 50-293/97-02)

Enclosed is Boston Edison Company's reply to the Notice of Violation contained in the subject inspection report.

The following commitments are made in this letter:

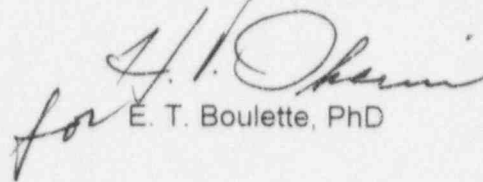
- Specification E-15A and regulating transformers documentation (vendor manual V-1184) will be revised to reflect PDC 97-11 as part of the routine modification close-out process by August 31, 1997.
 - The electrical engineering department will update the design guide to enhance the Equipment Codes and Standards section by June 30, 1997.
 - The specification procedure will be revised to require identification of all new component automatic functions by July 31, 1997.
 - The human performance aspects of the cause of the deficiency in specification E15A which were addressed via the corrective action process (PR 97.9245) will be discussed in the electrical engineering department training by August 31, 1997.
 - The vendor interface issues associated with this violation will be addressed in our supplemental response due by July 11, 1997.
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The NRC requested inspection report (IR 97-02) that Boston Edison staff specifically address actions planned to strengthen the oversight and interface of vendor activities. This response will be included in a supplement to this violation response by July 11, 1997.

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Please do not hesitate to contact me if there are any questions regarding the enclosed reply.


for E. T. Boulette, PhD

KRD/dmc/vio97-02

Enclosure 1: Reply to Notice of Violation

cc: Mr. Alan Wang, Project Manager
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Enclosure 1

Reply to Notice of Violation

"As a result of an inspection conducted from March 3 to April 28, 1997, the following violation of NRC requirements was identified (VIO 50-293/97-02-01). In accordance with the NRC Enforcement Policy (60 FR 34381; June 30, 1995), the violation is described below:

Violation:

10CFR Part 50, Appendix B, Criterion III, Design Control, requires that applicable regulatory requirements and design basis for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions.

1. Contrary to the above, the function of the 480/120 voltage regulating transformers was not correctly translated into specifications which became evident during a significant storm on April 1, 1997, when the running SSW and RBCCW pumps tripped and isolations of the RWCU system and RBIS occurred with the resultant start of the SBT system. The transformers were procured and installed by engineering specification E-51A and PDC 91-51A and automatically turned off due to an unknown vendor installed undervoltage design feature.
2. Contrary to the above, the function of MO-1301-53 (RCIC system full flow test valve) was not correctly translated into drawings when the valve functioned in the seal-in close mode on April 17, 1997, causing an inadvertent overspeed/trip and increased unavailability time of the RCIC system turbine. Electrical design drawing M1G27 did not reflect an earlier modification made at an indeterminate date which converted MO-1301-53 to jog open/jog close.

The above failures adversely affected the performance of safety related equipment and unnecessarily challenged the operators.

This is a Severity Level IV violation (Supplement IV)."

REASON FOR THE VIOLATION

Example No. 1 - 480/120 Voltage Regulating Transformers

The reason for the violation cited as example No. 1 was that purchase specification (E15A) did not specify operation during voltage transients. A contributing cause was a vendor-installed undervoltage trip which came with the delivered transformers without the knowledge of Boston Edison. This feature in the delivered product was not captured in the equipment documentation.

Discussion

The regulating transformers were installed in 1992 via design modifications per PDC 91-59A and PDC 91-59B and associated safety evaluation nos. 2664, 2685, and 2706. Transformers X55, X56, X57, and X58 were designed to regulate input voltages of 480 volts \pm 20% (i.e., 576-384 volts) and provide regulated output voltages of 120VAC \pm 4%. Each regulating transformer contains a programmable microprocessor control unit (MCU) that senses input voltage and selects the proper voltage tap to provide the regulated 120 volt output voltage. The MCUs were programmed by the manufacturer to shut down the regulating transformer if input voltage was outside the transformer's input voltage range of 576 - 384 volts. The input voltage range of \pm 20% was based on the worst case voltage dips that would be seen during design basis accidents concurrent with a loss of offsite power. Transient voltages below 384VAC due to 345KV grid disturbances were not considered.

During a severe storm on April 1, 1997, safeguard panels Y3 and Y4 lost power due to the automatic shut down of voltage regulating transformers X55 and X56. After each shut down, the operators took manual action to open and reclose the input breakers to the transformers that reset the transformers and restored power to Y3 and Y4. At the same time, regulating transformer X58, which powers the "B" train of the post accident sampling system (PASS), shut down and was reset in the same fashion. Transformer X57 was tagged out of service for maintenance during the storm.

The transformers shut down due to a transient undervoltage condition. This condition was identified when a review of the 480VAC voltage level showed a voltage drop to approximately 350VAC during the storm.

The design documentation (vendor manual, etc.) provided by the manufacturer and supplier of the transformers did not identify an automatic shut down feature if input voltage was less than 380 volts. The lack of the identification of the feature is significant because an automatic shut down due to input voltages from zero volts to 384 volts would require a manual reset of the transformer versus a designed automatic reset if input voltage was zero volts. Specification E15A did not request that the transformers continue operation or prohibit shutdown during voltages outside the design regulation range.

The cause for the automatic shut downs of the regulating transformers was a deficiency in specification E15A which did not address the effects of 480 volt transients of less than 384 volts. The apparent cause of the deficiency was an unintentional cognitive error made by the utility electrical engineer who prepared the specification. Nuclear engineering procedure 3.08, "Specifications and Reports", governs the preparation and issuance of specifications. There were no unusual electrical engineering work location characteristics that contributed to the error. The

human performance aspects of the cause of the deficiency in specification E15A was addressed via the corrective action process (PR 97.9245) which concluded that the problem report would be discussed in the electrical engineering department training.

Example No.2 - MO-1301-53 wiring discrepancy

The reason for the violation cited as example No. 2 was lack of design control at a previous time in plant operation due to elementary and connection drawings not reflecting a change that made MO-1301-53 a jog close valve.

Discussion:

During RCIC testing on April 17, 1997, MO-1301-53 operated as a seal-in close valve instead of operating as a jog valve in both open/close directions. A new bucket for MO-1301-53 was installed under PDC 93-38 during RFO #11. The new bucket was wired in accordance with the existing connection and elementary drawings per the design basis. These documents referenced MO-1301-53 as a jog open/seal-in close valve. The wiring in the old bucket was then investigated. It was found that a wiring change made to an auxiliary relay in the bucket changed the function from a seal-in close valve to a jog close valve. This change was not captured in previous drawing revisions. A search of the maintenance request (MR) database also revealed this change was not captured on a MR. It is, therefore, concluded that the change was made at an indeterminate date possibly dating back to pre-1972 startup testing.

The undocumented wiring change did not result in a failure of valve MO-1301-53.

CORRECTIVE STEPS TAKEN AND RESULTS ACHIEVED

Example No.1

The microprocessor control units (MCUs) for the four regulating transformers were modified via a design change (PDC 97-11) on April 12, 1997. The modification disabled the undervoltage and overvoltage shut down functions. This allows the transformers to operate in the unregulated mode when the input voltage is outside the design range. Post work tests were performed to ensure the regulating transformers would continue to operate during simulated undervoltage and overvoltage conditions. During the tests, the highest and lowest transformer taps were selected without a shut down of the respective regulating transformer. Based on the satisfactory results of this testing, the regulating transformers were declared operable.

Problem report, PR 97.1658, was written to document that the safety evaluation 2664 performed to allow the installation of the regulating transformers did not evaluate the consequences of an undervoltage transient shut down. The problem report evaluation concluded that the undervoltage shutdown was not considered because the vendor had not notified Boston Edison about the transformer's undervoltage trip, and specification E15A did not ensure continued operation of the transformers during voltage transients. The evaluation also concluded that the procedures to write specifications and safety evaluations are adequate; however, the specification procedure will be enhanced to require identification of all new component automatic functions. The electrical engineering department design guide will be also be updated to enhance the Equipment Codes and Standards section.

Example No. 2

An engineering design change (FRN 93-38-21) was issued on April 18, 1997, to change valve MO-1301-53 to a jog open/close valve. The valve was then stroked (jogged in the open and close directions) with satisfactory results. The document changed the closing circuit from a seal-in type circuit to a jog type circuit. The affected drawings will be revised as part of the routine modification close-out process. With this change, the control circuitry for MO-1301-53 functions as a jog circuit in the open and close directions. The change did not affect the automatic closing function of valve MO-1301-53.

A review was conducted of the other breakers replaced under PDC 93-38 focusing on those that power motor-operated valves that contain a jog control switch circuit. The review concluded the buckets were wired in accordance with design, and the undocumented wiring change was an isolated instance that could date back to initial start-up testing (circa 1972). Current procedures and work practices require approved design changes for wiring changes and documenting wiring discrepancies in accordance with the problem report process.

CORRECTIVE STEPS THAT WILL BE TAKEN TO AVOID FURTHER VIOLATIONS

Example No. 1

Specification E-15A and regulating transformers documentation (vendor manual V-1184) will be revised to reflect PDC 97-11 as part of the routine modification close-out process by August 31, 1997.

The specification procedure will be enhanced to require identification of all new component automatic functions by July 31, 1997.

The electrical engineering department will update the design guide to enhance the Electrical Codes and Standards and section by June 30, 1997.

The human performance aspects of the cause of the deficiency in specification E15A, which were addressed via the corrective action process (PR 97.9245), will be discussed in the electrical engineering department training by August 31, 1997.

The vendor interface issues associated with this violation will be addressed in our supplemental response due by July 11, 1997.

Example No. 2

Our current procedures and work practices require approved design changes for wiring changes and documenting wiring discrepancies in accordance with the problem report process. No further changes are required to prevent recurrence.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

Example No. 1

Full compliance will be achieved by August 31, 1997, following implementation of the last open corrective action. These commitments are being tracked under RC 97.0023.

Example No. 2

Full compliance was achieved when MO-1301-53 was rewired and tested on April 18, 1997.

REFERENCES

- 1) LER 97-007 "Safeguards Buses De-energized and Losses of Off-site Power during Severe Storm while Shut Down", Boston Edison Letter #2.97.050 dated May 1, 1997.
- 2) LER 97-009 "RCIC System Inoperable due to Turbine Overspeed Trip during Surveillance", Boston Edison Letter #2.97.056 dated May 19, 1997.