

The Foxboro Company

Foxboro, MA, U.S.A. 02035
Telephone 617-543-8750
Telex 927-602

15 July 1988

US Nuclear Regulatory Commission
Office of Inspection and Enforcement
Washington, DC 20555

Attention: Richard C. Wilson
Vendor Program Branch
Division of Quality Assurance

Dear Mr. Wilson:

Per our telephone conversations, I am enclosing a copy of the letter which was sent as a follow-up to my letter of 24 June 1988. This letter was addressed to the same list of nuclear customers.

In addition, I have enclosed the general letter which was sent to US Nuclear Power Plants for their information.

If you have any further questions, please contact me.

Very truly yours,

THE FOXBORO COMPANY

S. H. Rizvi

S. Hasan Rizvi, D100/N04-2B
Manager, Corporate Quality Assurance

pjb (PW04588)
Enclosures

cc: Nuclear Regulatory Commission, Joseph Petrosino

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FOXBORO

The Foxboro Company

Foxboro, MA, U.S.A. 02035
Telephone 617-543-8750
Telex 927-602

15 July 1988

(Customer Name)

Attention:

Dear :

Reference: Foxboro Sales Order No.

This is a follow-up to our previous letter sent to you dated 24 June 1988:

This letter is to inform you of a problem reported to The Foxboro Company by the Perry Nuclear Power plant of The Cleveland Electric Illuminating Company. This problem is related to SPEC 200, Model 2AC-D+A4 controller card with its associated 2AX+RM, removable manual card. See attached memorandum (Attachment 1) from the Perry Nuclear Power Plant for details.

The 2AC-D+A4+RM (custom) cards returned from Perry Plant were tested in our Quality Assurance Lab and were found to produce a momentary output offset when the 2AX+A4 card was reinserted into the 2AC-D+RM module. This worst case offset was in the order of 0.25 second in total duration, after which the output returns to the original value. We also tested our standard controller card (2AX+A4) and found it exhibited the same offset condition. All controller cards (see Attachment 2) will exhibit this offset condition when used in conjunction with 2AX+RM.

This is the first customer who reported a problem of this nature since the product was introduced in 1972. The offset condition affected Perry Plant's application due to its apparently fast loop response.

We intend to revise our Technical Information (TIs) and Master Instructions (MIs) to alert users to the existence of this offset condition that occurs as stated above (see Attachment 2). You should review the impact of this offset condition on your specific application. No product changes are intended.

In complying with 10 CFR Part 21.21(a)(1)(ii), Foxboro is unable to evaluate the degree of safety hazard that the above described deviation may present to the licensee's plant. Therefore, we are notifying, via this memo, all nuclear plants in order for them to review their applications.

FOXBORO


The Foxboro Company

Foxboro, MA, U.S.A. 02035
Telephone 617-543-8750
Telex 927-602

15 July 1988

(US Nuclear Plants)

Attention:

Dear

Reference: (Nuclear Plants)

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FOXBORO

Nuclear Plant Notification, SPEC 200
15 July 1988
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If you have any questions, please contact either of the following individuals:

Jim Keiper, D859/B52-2K, at (508) 549-6332
Lyn Hewey, D163/N03-1A, at (508) 549-2659
The Foxboro Company
Foxboro, MA 02035

Very truly yours,

THE FOXBORO COMPANY

S. Hasan Rizvi

S. Hasan Rizvi, D100/N04-2B
Manager, Corporate Quality Assurance

pjb (0122d)
Attachment

FOXBORO

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
PERRY NUCLEAR POWER PLANT

M E M O R A N D U M

DATE June 18, 1988

SUBJECT Preliminary Management Report
on Scram 1-88-07

On June 16, 1988 at 1432, during troubleshooting to a recirculation system automatic flux controller circuit card, a spurious spike in recirculation flow demand caused increased core flow resulting in an upscale neutron flux trip and subsequent reactor scram. The plant had been in Operational Condition 1 (Power Operation) at 100% power. Recirculation system flow control valves were approximately 41% open.

As a result of previous anomalies observed in the recirculation system automatic flux controller on June 5, 12, and 13, 1988, it was determined that more information was necessary to formulate a definitive conclusion regarding the cause of these occurrences. Prior to commencement of recirculation system troubleshooting on June 16, the flux controller was verified in manual and the individual loop flow controllers in automatic. Operators and engineers discussed the various recirculation flow control options available including whether or not work on the automatic flow controller card would cause any perturbations to the system while in flux manual control. It was concluded that the individual loop flow controllers would remain in automatic and flux controller in manual. At approximately 1400 the automatic flux control card, 1B33-K632-3, was removed from its cabinet and bench tested. Subsequent testing of the card was satisfactory and at 1432, the card was reinstalled. During the insertion of the card into the cabinet, a noise spike in recirculation flow demand caused a rapid increase in core flow resulting in an increase in neutron flux. Less than one second later, an upscale neutron flux trip on Average Power Range Monitors (APRMs) D, F and G caused a full reactor scram. Recirculation flow control valves completed stroking open to approximately 49%. Reactor pressure vessel water level decreased to Level 3 (+ 177.7 inches above top of active fuel) causing a transfer of reactor recirculation pumps to slow speed. Operators stabilized the plant using appropriate procedures by 1450.

The cause of the event was the reinsertion of the automatic flux control card into the recirculation flow control circuitry. This action induced a noise spike into the control loop circuitry. This spike was sensed by the flux controller abnormal output signal fault detector circuit which caused the flow controllers to shift from loop automatic to loop manual. However, the noise spike also perturbed the manual circuitry resulting in an approximately 10% increase in flow control valve position demand from the initial 41%. Although a technical manual and design drawing review by the engineers did not reveal the potential for this transient, a similar problem has occurred at another plant with a similar design. Additionally, contact with the manufacturer, Foxboro, on June 17 did confirm the possibility that reinsertion of the card may cause improper grounding which could induce a noise spike into the circuitry. Subsequent troubleshooting of the circuit on June 17 confirmed this hypothesis as data showed that flow demand signal spikes of varying magnitude and direction will occur upon insertion of the flux control card back into the loop circuitry.

Subsequent to the event, it was assumed that a problem had also occurred in the Automatic Flow Demand Limiter (AFDL) because of its failure to mitigate the transient (reference Condition Report 88-150). This circuitry is not designed to react rapidly because it is an integral controller and responds with "timed" functions, not instantaneously as does a proportional controller. Consequently, the AFDL had no opportunity to limit the step change in flow demand.

In order to prevent future occurrences of similar events, the following steps are being initiated:

1. Although a review of the overall system response was considered satisfactory, the control circuitry was not tuned to optimum settings for the needs of our plant. Consequently, the recirculation system will not be operated in automatic flux control until such time that we establish optimum operation and control response for our system needs.
2. Until such time that the optimum automatic controller settings are established for Item (1) above, the flux feedback filter setting will be changed to coincide with operation of the recirculation flow control circuit (as established during the startup test program) in the flux manual mode.
3. Prior to subsequent removal and reinstallation of electronic circuit boards in the recirculation flow control system during power operation, the Hydraulic Power Units (HPUs) to the flow control valves will be locked up to prevent unexpected transients to the plant.

LIST OF CONTROLLER CARDS

2AX+A2*
2AX+A3*
2AX+A4*
2AX+A5*
2AX+A7
2AX+A9
2AX+B4**
2AX+B5
2AX+N4
2AX+N5
2AX+T2*
2AX+T3*
2AX+T4**
2AX+T5
2AX+T9

- * Nuclear qualified Class 1E
** Nuclear qualified Class II

NOTE TO BE ADDED TO MI's AND TI's

When reinstalling a controller card into the 2AC-D or other appropriate module, it is possible for a transient to appear at the output (load connection) of the controller and removable manual cards. This transient may have a duration of up to 250 milliseconds, and may be as much as 100% of full scale in magnitude. The user should configure his system so that the occurrence of a transient such as this will not adversely affect the control of his process.

pjb (0122d)

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