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TITLE: Action Plan Report for NI-1 Source Range Channel

REPORT BY: M. L. Borysiak

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PLAN NO.: 15A-1  
15A-2

DATE PREPARED: June 17, 1985

### INTRODUCTION

The impact of NI-1 being declared inoperable prior to and during the transient and the subsequent problem of NI-2 failing to respond when the high voltage was turned on to the detector was to enter the action statement of Technical Specification (T.S.) 3.3.1.1 after the reactor tripped. Action Statement 6 of T.S. 3.3.1.1 simply stated is, if both source range channels are inoperable, verify compliance with the Shutdown Margin requirements of T.S. 3.1.1.1 within one hour and at least once per 12 hours thereafter. The Shutdown Margin requirements were verified and documented in the Reactor Operator's log. Thus, there was no significant impact during or following the transient due to the NI-1 being declared inoperable other than creating an undesirable added distraction to the operators in having to verify the Shutdown Margin requirements. NI-1 was subsequently declared operable at approximately 0400-0500 on June 9, 1985, upon the successful completion of ST 5091.01, Source Range Functional Test.

The problems with NI-1, as specified in the "Summary of Data" section of this report have existed since prior to initial start-up. Past efforts to eliminate these problems have succeeded in reducing these problems, but not the total elimination thereof. The problems with NI-1 appear to be an annoyance and distraction to plant operations rather than a significant impact on plant operations.

Even though there appears to be no significant impact on plant operations, it is still highly desirable to correct these problems.

### SUMMARY OF DATA

1. Collect and analyze known information/operational data for conditions prior to, during, and after the transient.

Past history and documentation with respect to the NI-1 problem has been obtained from Information & Records Management System, Davis-Besse Maintenance Management System and the M-535 specification file. Due to this review and from discussions with L. C. Stalter, K. A. Yarger, T. R. Isley, and J. M. DeSando and from personal involvement since 1978, these problems have existed since prior to the initial start-up. The operational data for conditions prior to, during and after the transient are as follows. On June 4, 1985, NI-1 was declared inoperable due to it reading  $\approx 1.5$  decades above NI-2 with the High Voltage Cut Off (HVCO) in effect. NI-1 was inoperable during the trip. At approximately 0400-0500 on June 9, 1985, ST 5091.01 was completed and the NI declared operable.

There are two, what would appear to be, mutually exclusive problems associated with the NI-1 Source Range Nuclear Instrumentation channel. The first problem deals with the intermittent erroneous count rate indication when both the HVCO is in effect and when it is not. The second deals with an intermittent spiking problem which occurs when the HVCO is in effect and when it is not.

2. Review maintenance and test history.

A review of the maintenance history indicates that five work orders have been written since January of this year on the problems of spiking and erroneous counts. No significant results were obtained in determining the root cause of either problem. The required surveillance test, tests the equipment within the RPS cabinets. Historically, these tests have not shown any problems.

CHANGE ANALYSIS

Since 1977, the boron trifluoride detectors, pre-amp and cable in Containment have been replaced, along with modules in the RPS and a reworking of the grounds on the pre-amp and Count Rate Amplifier Module (CRAM) connections with no positive effect on the total elimination of the spiking problem nor the erroneous/elevated count rate.

HYPOTHESES

- I. Possible intermittent problem within the CRAM causing erroneous counts.
- II. Erroneous counts being induced from outside the RPS cabinet, i.e., in cable from penetration to CRAM.
- III. Intermittent spiking problem induced from other equipment/cables in proximity to the manufacturer's supplied non-shielded cable.
- IV. Intermittent spiking problem caused from ground loops between systems.
- V. Signal cable length for NI-1 is such that the length is terminated in a  $\frac{1}{4}$ ,  $\frac{1}{2}$ , or full wave length to be susceptible to a low frequency of 45-60 Hz., i.e., the cables resonant frequency.

NOTE: Past efforts to identify the root cause suggest that the planned actions may not be totally successful in identifying the root causes. If these problems cannot be eliminated, the only alternative would be to use the future Source Range indications that will be installed as part of the new Neutron Flux Monitoring Systems as per Regulatory Guide 1.97. This particular Facility Change Request (FCR 84-116) has been budgeted and is presently in the detailed design stage.

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## ACTION PLAN

FD-0408

TITLE

NI-1 Source Range Nuclear Instrumentation Channel

SPECIFIC OBJECTIVE

Rev. 0

PLANT NUMBER

15A-1

DATE PREPARED

6/18/85

PAGE

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PREPARED BY

M. L. Borysiak

Plan for testing hypotheses for the intermittent elevated count rate. (Hypotheses I, II &amp; V)

STEP NUMBER	ACTION STEPS	PRIME RESPONSIBILITY	ASSIGNED TO	START DATE	TARGET DATE	DATE COMPLETED
	"All steps of this Action Plan are to be performed in accordance with the latest revision of "Guidelines to Follow When Troubleshooting or Performing Investigative Actions into the Root Causes Surrounding the June 9, 1985 Reactor Trip".					
	These Action Plan steps may be performed in any order.					
1.	Determine/further isolate the problem.					
	A. Take readings on the Count Rate Amplifier Module (CRAM) test jacks J3, J4 and J5 on both NI-1 and NI-2 with and without the High Voltage (HV) on, when unit is shutdown (Mode 5).	M. Borysiak	T. Isley J. DeSando			
	B. Repeat step A only with HV off when unit is at power (Mode 1)	M. Borysiak	T. Isley J. DeSando			
	C. When elevated count rate appears, repeat step A or B.	M. Borysiak	T. Isley J. DeSando			
	D. Evaluate results obtained and determine/plan next step in identifying root cause.	M. Borysiak	M. Borysiak T. Isley J. DeSando Babcock &			

WILLCOX

## ID: A408

TABLE 1.

PLATE NUMBER  
15A-1

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PREPARED BY  
M. L. Borysiak

Plan for testing hypotheses for the intermittent elevated count rate. (Hypotheses I, II & V)

STEP NUMBER	ACTION STEPS	PRIME RESPONSIBILITY	ASSIGNED TO	START DATE	TARGET DATE	DATE COMPLETED
2.	Cable Check.					
	A. Using a calibrated Time Domain Reflectometer, accurately measure the signal cable length of NI-1 and NI-2 (NI-2 for reference). Also check signal lead, outer shield and inner shield for anomalies.	M. Borysiak	T. Isley J. De Sando			
	B. Calculate resonant frequency of cable	M. Borysiak	T. Isley J. DeSando			
	C. Walkdown conduit/cable looking for possible sources that may induce noise in close proximity to the conduit/cable. (Specifically 60 HZ, AC equipment).	M. Borysiak	T. Isley J. DeSando			

## ACTION PLAN

ID 8408

TITLE

NI-1 Source Range Nuclear Instrumentation Channel

Rev. 0

PLAN NUMBER

15A-2

PAGE

1 of 2

DATE PREPARED

6/18/85

PREPARED BY

M. L. Borysiak

## SPECIFIC OBJECTIVE

Plan for testing hypotheses for the intermittent spiking problem. (Hypotheses III &amp; IV)

STEP NUMBER	ACTION STEPS	PRIME RESPONSIBILITY	ASSIGNED TO	START DATE	TARGET DATE	DATE COMPLETED
	<p>"All steps of this Action Plan are to be performed in accordance with the latest revision of "Guidelines to Follow when Troubleshooting or Performing Investigative Actions into the Root Causes Surrounding the June 9, 1985 Reactor Trip".</p> <p>These Action Plan steps may be performed in any order.</p>					
1.	Have operators monitor and log any spiking problems observed.	M. Borysiak	T. Isley			
2.	From drawings, verify shielded versus non-shielded manufacturer supplied cable from equipment in Control Room to Reactor Protection System (RPS).	M. Borysiak	M. Borysiak			6/13/85
3.	List of equipment in Control Room connected to RPS cabinet via manufacturer supplied cable and the routing of that cable (conduits/cable trays/wireways).	M. Borysiak	T. Isley J. DeSando			
A.	From the above routings, determine what other cables also	M. Borysiak	T. Isley			

## ACTION PLAN

FD-503 (2-7-79)

TITLE

NI-1 Source Range Nuclear Instrumentation Channel

SPECIFIC OBJECTIVE

Rev. 0

PLAN NUMBER

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DATE PREPARED

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PREPARED BY

M. Borysiak

Plan for testing hypotheses for the intermittent spiking problem. (Hypotheses III and IV)

STEP NUMBER	ACTION STEPS	PRIME RESPONSIBILITY	ASSIGNED TO	START DATE	TARGET DATE	DATE COMPLETED
	run in that routing.		J. DeSando			
4.	List of cables exiting RPS cabinet, destination and routing.	M. Borysiak	T. Isley J. DeSando			
	A. From the above routings, determine what other cables also run in that routing.	M. Borysiak	T. Isley J. DeSando			
5.	Analyze the information obtained in steps 1 through 4, correlate with past spiking problems and develop further tests.	M. Borysiak	T. Isley J. DeSando			