

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555

February 24, 1995

NRC INFORMATION NOTICE 95-13: POTENTIAL FOR DATA COLLECTION EQUIPMENT TO AFFECT PROTECTION SYSTEM PERFORMANCE

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to a potential single or common mode failure when using devices to collect data on protection system performance. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

During testing of the main turbine at Fermi 2 after extensive maintenance, the licensee received spurious high reactor water level alarms on the sequence-of-events recorder for the reactor core isolation cooling (RCIC) system. On February 10, 1995, a portable computerized data acquisition system (DAS) was connected to four level instruments and one pressure instrument in each of two divisional testability cabinets. The DAS consisted of two separate computer units, with one unit being connected to each testability cabinet so that both divisions could be monitored simultaneously.

It was assumed that the DAS units were nonintrusive, and no evaluation was performed in accordance with Section 50.59, "Changes, Tests, and Experiments", of Title 10 of the *Code of Federal Regulations* (10 CFR). No detailed testing of the DAS units was performed to determine potential failure modes or effects on the instruments to which they were connected. No guidance was given to the technicians on whether or not to leave the devices connected when they were deenergized.

Operators in the control room noted that when the DAS units were turned off on February 11, 1995, the wide range level indication decreased by 25 cm [10 inches]. Investigation by the licensee showed that when the DAS input multiplexer was energized, the input impedance was in excess of 100K ohm, but when it was deenergized, the impedance dropped to approximately 4K ohm. This phenomenon appears to be an inherent characteristic of the DAS overvoltage protection circuit, rather than any internal component failure. The vendor

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manual does not contain a caution about leaving the inputs connected when the unit is deenergized.

The drop in impedance allowed more current to be drawn from the wide range level indication circuitry and resulted in the decreased level indication. Since both units were turned off at the same time, both divisions were affected.

### Discussion

The DAS units used at Fermi 2 are manufactured by Intelligent Instrumentation and utilize a Model No. PCI-20098C multifunction carrier board. The overvoltage protection circuit is a common design used in solid state multiplexers sold by various manufacturers of data acquisition equipment. This equipment may be widely used in the nuclear power industry to collect special plant data for analysis of various input parameters.

Although detailed testing of the DAS units was not performed before their use, a routine preconnection test was performed. A digital voltmeter was used to test the units in both the energized position and the deenergized position, but the voltmeter did not detect the change in input impedance.

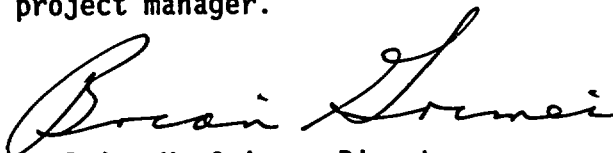
At Fermi 2, the DAS units were plugged into test jacks in the testability cabinets normally used for surveillance testing. This practice is common in the industry. The bias inserted by the devices when deenergized affected the autostart and high level trip signals for RCIC and high pressure coolant injection (HPCI). Additional testing indicated that RCIC and HPCI would initiate at a level approximately 13 cm [5 inches] higher than expected on low reactor level and would trip about 43 cm [17 inches] above the expected high level trip setpoint.

The DAS units were powered by a nonsafety-related source. Although the technicians turned the units off, the same effect would have been achieved if the unit suffered a loss of station or offsite power during testing. In either case, the possibility existed for a common mode error in the low level initiation and high level trip setpoints for HPCI and RCIC.

Separation of redundant channels of protection systems during testing is addressed in Regulatory Guide 1.118, "Periodic Testing of Electric Power and Protection Systems." It states that a temporary test setup shall be considered a part of the safety system. In addition, the Institute of Electrical and Electronics Engineers (IEEE) Standard 279-1977, "Criteria for Protection Systems for Nuclear Power Generating Stations," specifies that a single failure in the protection system not cause a loss of function, and redundant channels be independent and physically separated. IEEE Standard 338-1975, "Criteria for the Periodic Testing of Nuclear Power Generating Station Safety Systems," specifies that test equipment not cause loss of independence between redundant channels. The licensing basis of each plant contains the specific applicable commitments for channel independence.

Section 50.59 of 10 CFR requires licensees to provide a basis for the determination that a test or experiment not described in the safety analysis report does not involve an unreviewed safety question.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.



Brian K. Grimes, Director  
Division of Project Support  
Office of Nuclear Reactor Regulation

Technical contacts: Monte Phillips, RIII  
(708) 829-9637

David Skeen, NRR  
(301) 415-1174

Attachment: List of Recently Issued NRC Information Notices

*Attachment filed in Jacket*

LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
95-12	Potentially Nonconforming Fasteners Supplied by A&G Engineering II, Inc.	02/21/95	All holders of OLs or CPs for nuclear power reactors.
95-11	Failure of Condensate Piping Because of Erosion/Corrosion at a Flow-Straightening Device	02/24/95	All holders of OLs or CPs for nuclear power reactors.
95-10 Supp. 1	Potential for Loss of Automatic Engineered Safety Features Actuation	02/10/95	All holders of OLs or CPs for nuclear power reactors.
95-10	Potential for Loss of Automatic Engineered Safety Features Actuation	02/03/95	All holders of OLs or CPs for nuclear power reactors.
95-09	Use of Inappropriate Guidelines and Criteria for Nuclear Piping and Pipe Support Evaluation and Design	01/31/95	All holders of OLs or CPs for nuclear power reactors.
95-08	Inaccurate Data Obtained with Clamp-On Ultrasonic Flow Measurement Instruments	01/30/95	All holders of OLs or CPs for nuclear power reactors.
95-07	Radiopharmaceutical Vial Breakage during Preparation	01/27/95	All USNRC medical licenses authorized to use byproduct material for diagnostic procedures.
95-06	Potential Blockage of Safety-Related Strainers by Material Brought Inside Containment	01/25/95	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License  
 CP = Construction Permit

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Attachment: List of Recently Issued NRC Information Notices

DOCUMENT NAME: 95-13.IN  
\* See previous concurrence

OFC	OECB:DOPS	SC/OECB:DOPS	PUB:ADM	RIII
NAME	DSkeen*	RDennig*	MMejac*	MPhillips*
DATE	02/22/95	02/23/95	02/22/95	02/22/95
OFC	SC/HICB	OECB:DOPS	C/OECB:DOPS	D/DOPS
NAME	JMauck*	RKiesel*	ACHaffee*	BGrimes
DATE	02/23/95	02/23/95	02/23/95	02/23/95

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The drop in impedance allowed more current to be drawn from the wide range level indication circuitry and resulted in the decreased level indication. Since both units were turned off at the same time, both divisions were affected.

Discussion

The DAS units used at Fermi 2 are manufactured by Intelligent Instrumentation, and utilize a Model No. PCI-20098C multifunction carrier board. The overvoltage protection circuit is a common design used in solid state multiplexers sold by various manufacturers of data acquisition equipment. This equipment may be widely used in the nuclear power industry to collect special plant data for analysis of various input parameters.

Although detailed testing of the DAS units was not performed before their use, a routine preconnection test was performed. A digital voltmeter (DVM) was used to test the units in both the energized position and the deenergized position, but the DVM did not detect the change in input impedance.

At Fermi 2, the DAS units were plugged into test jacks in the testability cabinets normally used for surveillance testing. This practice is common in the industry. The bias inserted by the devices when deenergized affected the autostart and high level trip signals for RCIC and high pressure coolant injection (HPCI). Additional testing indicated that RCIC and HPCI would initiate at a level approximately 12 cm [5 inches] higher than expected on low reactor level and would trip about 43 cm [17 inches] above the expected high level trip setpoint.

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Office of Nuclear Reactor Regulation

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Attachment: List of Recently Issued NRC Information Notices

DOCUMENT NAME: G:\DLS\IN95-XX.DAS

\* See previous concurrence

OFC	OECB:DOPS	SC/OECB:DOPS	PUB:ADM	RIII
NAME	DSkeen*	RDennig*	MMejac*	MPhillips*
DATE	02/22/95	02/23/95	02/22/95	02/22/95
OFC	SC/HICB	OECB:DOPS	C/OECB:DOPS	D/DOPS
NAME	JMauck*	RKiessel*	ACHaffee*	BGrimes
DATE	02/23/95	02/23/95	02/23/95	02/ /95

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NAME	DSkeen*	RDennig	MMejac*	MPhillips <i>DAL</i>
DATE	02/22/95	02/23/95	02/22/95	02/22/95
OFC	<i>SCYH/CR</i>	OECB:DOPS	C/OECB/DOPS	D/DOPS
NAME	JMauck	RKiesel <i>OK</i>	AChaffee <i>OK</i>	BGrimes
DATE	02/23/95	02/23/95	02/22/95	02/ /95

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OFC	OECEB:DOPS	SC/OECEB:DOPS	PUB:ADM	R-III
NAME	DSkeen <i>DS</i>	RDennig	Tech Ed <i>M. Phillips</i>	MPhillips
DATE	2/22/95	/ /95	2/22/95	/ /95

OFC	SC/HICB	DOPS	C/OECEB:DOPS	D/DORS
NAME	JMauck	RKiesel	AChaffee	BGrimes
DATE	/ /95	/ /95	/ /95	/ /95

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 DOCUMENT NAME: G:\DLS\IN95-XX.DAS