UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
WASHINGTON, D.C. 20555

March 22, 2011

NRC INFORMATION NOTICE 2011-06: ERRONEOUS CRITICALITY ALARM MONITORING SIGNAL CAUSED BY INCORRECT DATA ACQUISITION MODULE CONFIGURATION

ADDRESSEES

All licensees required to maintain criticality alarm systems to monitor critical mass of special nuclear material.

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to alert addressees to a concern arising from an incorrectly configured data acquisition module in a criticality accident alarm system at a fuel fabrication facility. NRC expects that recipients will review the information for applicability to their facilities and consider actions to avoid similar problems. Suggestions contained in this IN are not new NRC requirements; therefore, no specific action or written response is needed.

DESCRIPTION OF CIRCUMSTANCES

A U.S. facility manufactures light water reactor fuel under an NRC license and is required by 10 CFR Part 70.24 to install and maintain a criticality accident alarm system at its plant. The licensee had installed a system consisting of detectors, signal processing equipment and electric horns. The licensee system processed signals on two circuits, one for inside detectors and one for outside detectors. Both circuits were arranged as shown in **Figure 1** with a National Instruments SCXI-2000 data acquisition module installed in each (multiplexers were used as needed such as the arrangement shown for stations #14 and #17). When activated, the licensee system was designed to send an alarm signal directly to the alarm horns and also send a monitoring signal to the main guard station through a separate line in the same transmission cable. The monitoring signal was processed through the data acquisition module which scanned the detector channels and sent a signal to a monitoring console in the main guard station.

During a routine maintenance operation on one of the circuits, the licensee upgraded the software for both data acquisition modules. Following completion of the maintenance operation, the licensee successfully tested the circuit on which the maintenance had been performed. Several months later, the licensee performed routine scheduled calibration on the other circuit and determined that the monitoring signal was incorrect. The calibration was performed several times with a 50 mRem source and the monitoring console readouts were as low as 15 mRem.

ML110340026

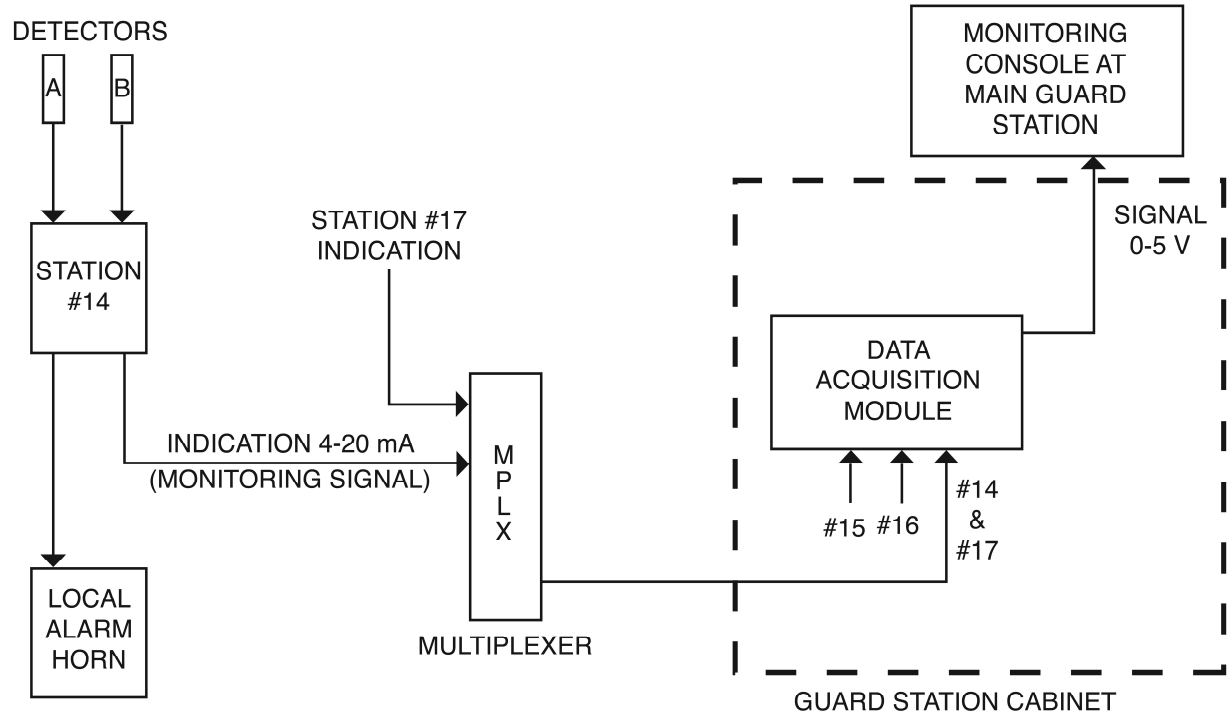

Figure 1
Criticality Alarm Circuit

The licensee determined that the reason for the incorrect signal readout was that the data acquisition module for that circuit had originally been configured with a jumper that incorporated a 10 kHz filter. The previous software controlling the data acquisition module had instructions to slow the channel scan to allow an interchannel delay which allowed the signals time to settle so that correct readouts were received at the monitoring console. The upgraded software eliminated the interchannel delay and the resulting signal was unstable with the readout significantly less than the actual source. The other circuit was unaffected because the filtering had never been enabled.

NRC is concerned about the resulting event because the licensee criticality alarm maintenance procedure allows the criticality horns to be silenced during maintenance in which case the licensee relies on physical observation of the monitoring signal at the alarm console in the guard station. When the alarm maintenance procedure is in effect, a signal for a criticality alarm could be manually broadcast on the licensee public address system based on the observer's conclusion about the panel indication. An incorrect monitoring signal would be a problem if an actual criticality event occurred with the horns silenced since it could be misinterpreted as not meeting the threshold to manually announce the alarm.

DISCUSSION

The monitoring signal in the licensee criticality accident alarm system was important to safety because, during maintenance operations capable of causing a false criticality alarm, the affected horns were silenced and an operator was assigned to observe the main guard station panel. Reliance on visual indications for criticality alarm monitoring during maintenance operations with the horns silenced is a common procedure at NRC-licensed fuel cycle facilities.

NRC is concerned about adequate configuration of electronic components during initial installation in safety system or safety-related applications. In some cases, as shown in the above situation, the configuration problem may not be detected for years due to a subsequent change or other circumstance. NRC expects that licensee management measures will assure proper initial configuration of electronic components.

NRC requires management measures at fuel cycle licensees to maintain consistency between design requirements, the physical configuration, and the facility documentation. Failure to adequately configure electronic components prior to operation of a safety system or equipment can result in failure to establish necessary controls or compromise of established controls. NRC safety inspections routinely review licensee management measures to determine how well they ensure the availability and reliability of IROFS. These inspections include review of licensee change management procedures to ensure that analytical assumptions are not compromised during or after implementation. Vender specifications for electronic component configuration might be inspected during an operational readiness review.

CONTACT

This information notice requires no specific action, nor written response. If you have any questions about the information in this notice, please contact the technical contact listed below.

/RA/

John D. Kinneman, Director
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Technical Contact: Dennis Morey, NMSS
301-492-3112
E-mail: dennis.morey@nrc.gov

DISCUSSION

The monitoring signal in the licensee criticality accident alarm system was important to safety because, during maintenance operations capable of causing a false criticality alarm, the affected horns were silenced and an operator was assigned to observe the main guard station panel. Reliance on visual indications for criticality alarm monitoring during maintenance operations with the horns silenced is a common procedure at NRC-licensed fuel cycle facilities.

NRC is concerned about adequate configuration of electronic components during initial installation in safety system or safety-related applications. In some cases, as shown in the above situation, the configuration problem may not be detected for years due to a subsequent change or other circumstance. NRC expects that licensee management measures will assure proper initial configuration of electronic components.

NRC requires management measures at fuel cycle licensees to maintain consistency between design requirements, the physical configuration, and the facility documentation. Failure to adequately configure electronic components prior to operation of a safety system or equipment can result in failure to establish necessary controls or compromise of established controls. NRC safety inspections routinely review licensee management measures to determine how well they ensure the availability and reliability of IROFS. These inspections include review of licensee change management procedures to ensure that analytical assumptions are not compromised during or after implementation. Vender specifications for electronic component configuration might be inspected during an operational readiness review.

CONTACT

This information notice requires no specific action, nor written response. If you have any questions about the information in this notice, please contact the technical contact listed below.

/RA/
John D. Kinneman, Director
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Technical Contact: Dennis Morey, NMSS
301-492-3112
E-mail: dennis.morey@nrc.gov

ML110340026

OFC	FCSS/TSB	Tech ED	FCSS/TSB	FCSS/SPTSD	FCSS
NAME	DMorey	xxx: via fax	PSilva	MBailey	JKinneman
DATE	2/3/11	2/3/11	2/28/11	3/7/11	3/22/11

OFFICIAL RECORD COPY