

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555-0001

April 11, 1996

NRC INFORMATION NOTICE 96-22: IMPROPER EQUIPMENT SETTINGS DUE TO THE USE OF
NONTEMPERATURE-COMPENSATED TEST EQUIPMENT

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 the potential for improper calibration and setting of safety-related equipment setpoints as a result of using nontemperature-compensated measuring and test equipment. 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

On October 5, 1995, the licensee for the Farley Nuclear Plant determined that nontemperature-compensated pressure gauges of various ranges and by different manufacturers were in use at the plant. An investigation revealed that these gauges had been used for testing and calibration of safety-related equipment without correcting the readings for temperature effects. Nontemperature-compensated gauges were used in testing and/or calibration of reactor trip system transmitters, engineered safety features actuation system transmitters, main steam safety valve lift settings, and pressure instruments used for calorimetric calculations.

The licensee conducted an evaluation of the use of nontemperature-compensated pressure gauges in these applications. After accounting for the additional uncertainties associated with the gauges, the current safety analysis and technical specification limits and nominal trip setpoints remained acceptable; however, the calculated setpoint margins were reduced.

On February 10, 1995, during a refueling outage at the Surry Power Station, Unit 2, the as-found calibration test data for the three safety-related pressurizer pressure transmitters were not within the allowable tolerance. A root cause evaluation team determined that the error in the allowable tolerance was caused, in part, by using a nontemperature-compensated pressure gauge to calibrate each of the three transmitters after installation.

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The transmitters provide pressurizer pressure input to the reactor trip system and the engineered safety features actuation system. An assessment of the safety implications of these errors determined that Unit 2 had exceeded Technical specification values and, therefore, margin was reduced. However, operation remained within design basis and safety analysis limits.

Discussion


At both the Farley and Surry plants, the licensees used measuring and test equipment in environments in which corrections for temperature should have been made to ensure the accuracy of setpoints of safety-related equipment. Specifically, at the Surry plant, the catalog of the pressure test gauge vendor (HEISE) specifies that the nontemperature-compensated test gauge was accurate to specified values at a reference calibration temperature of 73 degrees F. For a 3000-psig range HEISE gauge, environmental temperature variances can cause up to a 3 psig error for each 5 degrees F change from the reference temperature.

To maintain the accuracy of measuring and test equipment used in calibrating safety-related devices, all factors, including the environmental temperature at which the safety-related equipment will operate, are normally identified in plant calibration procedures. Also, there are several nuclear industry references that provide guidance on proper methods of addressing environmental effects on measuring and test equipment stored and used at nuclear plants.

The Institute of Electrical and Electronic Engineers Standard 498-1975, "IEEE Standard Supplementary Requirements for the Calibration and Control of Measuring and Test Equipment Used in the Construction and Maintenance of Nuclear Power Generating Stations," specifically addresses temperature compensation of measuring and test equipment. Section 3.2 of this document titled "Environmental Controls" states, in part, that "measuring and test equipment and reference standards shall be transported, stored and calibrated in environments which will not adversely affect their accuracy. Environmental factors which shall be considered include, but shall not be limited to: temperature, [and] humidity.....When inaccuracy of measuring and test equipment or reference standards, because of environmental effects, cannot be avoided, compensating corrections shall be determined and applied."

The Instrument Society of America's "Setpoints for Nuclear Safety Related Instrumentation Used in Nuclear Power Plants," ISA-S67.04 (1982), has been endorsed by the NRC in Regulatory Guide 1.105, "Instrument Setpoints for Safety-Related Systems." Section 7.3 of the standard states that "A system shall be established to ensure the accuracy and adequacy of the test equipment used to verify setpoints and tolerances of safety-related instrumentation." Test equipment accuracy directly affects setpoint calculations. Among the factors which affect the accuracy of measuring and test equipment is the temperature at which a calibration is actually performed.

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


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LIST OF RECENTLY ISSUED
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Information Notice No.	Subject	Date of Issuance	Issued to
96-21	Safety Concerns Related to the Design of the Door Interlock Circuit on Nucletron High-Dose Rate and Pulsed Dose Rate Remote Afterloading Brachytherapy Devices	04/10/96	All U.S. NRC Medical to the Licensees authorized to use brachytherapy sources in high- and pulsed-dose-rate remote afterloaders
96-20	Demonstration of Associated Equipment Compliance with 10 CFR 34.20	04/04/96	All industrial radiography licensees and radiography equipment manufacturers
96-19	Failure of Tone Alert Radios to Activate When Receiving a Shortened Activation Signal	04/02/96	All holders of OLs or CPs for nuclear power reactors
96-18	Compliance with 10 CFR Part 20 for Airborne Thorium	03/25/96	All material licensees authorized to possess and use thorium in unsealed form
95-03 Supp. 1	Loss of Reactor Coolant Inventory and Potential Loss of Emergency Mitigation Functions While in a Shutdown Condition	03/25/96	All holders of OLs or CPs for PWR power plants
96-17	Reactor Operation Inconsistent with the Updated Final Safety Analysis Report	03/18/96	All holders of OLs or CPs for nuclear power reactors
96-16	BWR Operation with Indicated Flow Less Than Natural Circulation	03/14/96	All holders of OLs or CPs for boiling-water reactors
96-15	Unexpected Plant Performance During Performance of New Surveillance Tests	03/08/96	All holders of OLs or CPs for nuclear power reactors

OL = Operating License
 CP = Construction Permit

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original signed by

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Tech Editor has reviewed and concurred as of 01/30/96.

*SEE PREVIOUS CONCURRENCES

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