SSINS No.: 6835
IN 86-10

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

February 13, 1986

IE INFORMATION NOTICE NO. 86-10: SAFETY PARAMETER DISPLAY SYSTEM MALFUNCTIONS

Addressees:

All nuclear power reactor facilities holding an operating license (OL) or a construction permit (CP).

Purpose:

This notice is to inform recipients of the results of a recent survey done to determine the status and quality of safety parameter display systems (SPDS) at operating reactors. It is expected that recipients will review this information for applicability to their facilities and consider actions, if appropriate, to preclude a similar problem from occurring at their facilities. However, suggestions contained in this notice do not constitute NRC requirements; therefore, no specific action or written response is required.

The information herein is being provided as an early notification of a significant matter that is still under review by the NRC staff. The NRC is continuing to obtain and evaluate pertinent information. If NRC evaluation so indicates, further licensee actions may be requested.

Background:

Prompt implementation of the SPDS in operating reactors is a design goal of prime importance. The NRC staff does not review operating reactor SPDS designs for compliance with the requirements of Supplement 1 of NUREG-0737 prior to implementation unless a pre-implementation review has been specifically requested by the licensee. The licensee's Safety Analysis and SPDS Implementation Plan are reviewed by the NRC staff only to determine if a serious safety question is posed or if the analysis is seriously inadequate.

If no serious safety question is identified and the licensee's analysis is reasonably adequate, the staff directs the licensee to continue implementation. Final acceptability of the licensee's SPDS is conditional to a satisfactory post-implementation audit.

To determine the appropriate level of technical effort needed for post-implementation audits, the staff decided in mid-1985 to survey a sample of six operating plants to determine the state of SPDS implementation and to ascertain the scope and depth of review necessary for post-implementation audits.

The sample selected for the survey was chosen to represent the major reactor and SPDS types. Five of the six plants in the sample had been issued Commission orders or license conditions that stipulated the SPDS was to be operational. At the time of the survey all five of these plants had declared their SPDSs operational in accordance with their orders or license conditions. At two of these five plants the SPDS was, in fact, not operational.

Discussion:

The survey included onsite evaluations of licensee documentation and hardware, as well as interviews with operations personnel. Detailed survey findings are presented in Attachment 1. The major deficiencies identified from the survey results include:

- Lack of SPDS availability because of gross system malfunctions,
- Display of unreliable or invalid data and alarms,
- Poor acceptance of SPDS by operators because of reliability problems,
- Failure of management to integrate SPDS into the operational environment,
- Changes and interruption of SPDS display from outside the control room,
- Inadequate documentation of SPDS and failure to control system testing and modifications, and
- Slow SPDS response to some operator commands.

Problems similar to those described above also have been identified by the staff during the evaluation of the emergency data acquisition systems as a part of the Emergency Response Facility appraisals. These appraisals have been conducted at six different plant sites.

The following reference materials provide information on the individual guidance and requirements for SPDS and emergency data acquisition systems:

NUREG-0737, Supplement 1, January 1983.
NUREG-0800, Chapter 18.2, November 1984.
NUREG-0696, February 1981.

No specific action or written response is required by this information notice. If you have questions about this matter, please contact the Regional Administrator of the appropriate NRC regional office or this office.

Edward L. Jordan, Director
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

Technical Contacts: Roger Woodruff, IE
(301) 492-7205
George Lapinsky, NRR
(301) 492-8166

Attachments:
1. Survey Results
2. List of Recently Issued IE Information Notices

SURVEY RESULTS

1. Reliability/Availability

Three of the six plants were identified as having serious problems regarding SPDS availability. Some systems were found to be unavailable because of gross system malfunctions. Others were providing invalid and unreliable data and were considered to be nonfunctional because operators, justifiably, avoid using them. Because no records or logs of SPDS performance are currently kept at these plants, the extent of the problem could only be judged by the verbal descriptions of the users and technical staff; e.g., "The system has never run for twenty-four hours straight without a failure."

Supplement 1 to NUREG-0737 calls for the SPDS to "continuously display information from which the plant safety status can be readily and reliably assessed. . ." Plants that have declared the SPDS to be operational are expected to have reliable displays portraying accurate values on a continuous basis. This was not the case at half of the plants in the sample.

2. Potentially Misleading Information

At half of the plants, the staff identified invalid data and alarms that could mislead users. This problem is most critical at those plants that use the SPDS as a part of the emergency data acquisition system to provide information to the technical support center (TSC) and emergency operations facility (EOF). In most cases these erroneous indications were caused by not maintaining SPDS software to reflect the most current state of the plant; e.g., new alarm setpoints were not entered into SPDS software, and SPDS compensation and calibration were not routinely checked and corrected. In one case, the major problem was that the system was simply not complete--revision and debugging of the software was ongoing, while the SPDS was purportedly operational in the control room, the TSC, and the EOF. Normally any instrument that is not functional is appropriately tagged-out and repaired, but this was not done in this case. In addition, using the control room as a test-bed for SPDS creates the potential for misleading operators and of destroying operator confidence in the SPDS.

3. Poor Operator Acceptance

Because of the problems stated above--unreliable, inaccurate, and invalid data--some operations personnel stated that they did not trust the SPDS and would not use it under any circumstances. This problem appeared to be further exacerbated at those plants where the operators were not actively involved in SPDS design decisions.

4. Management Support

At two plants the staff observed a lack of management support for the SPDS concept. At one plant this lack of support was evidenced by a

disinterested attitude toward an obviously useless system. There was no delegation of responsibility to put somebody in the lead to correct the system and make it a useable tool for control room operators. At a second plant several high-ranking managers voiced their opinion that the SPDS was only an aid and that its use was entirely optional regardless of plant mode or condition. As a result, the SPDS was not well integrated into the operational environment of the control room at this plant. In fact, the operations personnel interviewed at this plant did not know who, if anyone, was assigned to monitor plant status using this SPDS.

5. Miscellaneous Findings

Display Security - At one plant where the SPDS had been operable for 2 years, control room SPDS displays were routinely being changed and interrupted from outside the control room. This was being done without the knowledge or consent of the control room crew and without "tagging out" the SPDS for maintenance.

System Documentation and Maintenance - Five of the six plants had one or more of the following problems: incomplete or missing elements in the system documentation, especially those that would be needed to correctly maintain SPDS functions as originally designed; inadequate testing, often without defined acceptance criteria; lack of software change review process and appropriate reviewers; no plans for retesting after software changes; and inability to produce current documentation for the existing system.

Response - At one plant the response of the SPDS to operator commands varied from 3 seconds to several minutes depending on the type of command and the number of other active terminals. The staff has observed that response times of over 10 seconds are generally perceived by users as a system or communication failure. Therefore, such long response times may cause frustration and keying errors as the user tries to "correct" the situation.

Critical Safety Functions - At one plant the SPDS did not provide sufficient information to monitor the radioactivity control safety function (remote area radiation monitors).

Training - At three plants operators felt that their training regarding the use of SPDS was inadequate.

Integration Into Emergency Operations - At three plants the role of the SPDS during emergency operations was undefined and no primary user could be identified.

Attachment 2
IN 86-10
February 13, 1986

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
86-09	Failure Of Check And Stop Check Valves Subjected To Low Flow Conditions	2/3/86	All power reactor facilities holding an OL or CP
86-08	Licensee Event Report (LER) Format Modification	2/3/86	All power reactor facilities holding an OL or CP
86-07	Lack Of Detailed Instruction And Inadequate Observance Of Precautions During Maintenance And Testing Of Diesel Generator Woodward Governors	2/3/86	All power reactor facilities holding an OL or CP
86-06	Failure Of Lifting Rig Attachment While Lifting The Upper Guide Structure At St. Lucie Unit 1	2/3/86	All power reactor facilities holding an OL or CP
86-05	Main Steam Safety Valve Test Failures And Ring Setting Adjustments	1/31/86	All PWR facilities holding an OL or CP
86-04	Transient Due To Loss Of Power To Integrated Control System At A Pressurized Water Reactor Designed By Babcock & Wilcox	1/31/86	All power reactor facilities holding an OL or CP
86-03	Potential Deficiencies In Environmental Qualification Of Limitorque Motor Valve Operator Wiring	1/14/86	All power reactor facilities holding an OL or CP
86-02	Failure Of Valve Operator Motor During Environmental Qualification Testing	1/6/86	All power reactor facilities holding an OL or CP
86-01	Failure Of Main Feedwater Check Valve Causes Loss Of Feedwater System Integrity And Water-Hammer Damage	1/6/86	All power reactor facilities holding an OL or CP

OL = Operating License
CP = Construction Permit

NUS CORPORATION

INTERNAL CORRESPONDENCE

TO: LIS Technical Staff

DATE: March 5, 1986
CD-LIS-86-258

FROM: D. N. Perkey

COPIES:

SUBJECT: IE Notice 86-10 Safety Parameter Display System Malfunctions

The following is a list of the six plants that are referred to in IE Notice 86-10; contacts for each of the plants are also noted.

A copy of this memo will be filed with the notice for future reference.

o Hatch 1/2	Paul Springer	404/526-7010
o Rancho Seco	Jerry Williams Dallas Scott	209/333-2935/4986 209/333-2935/4958
o St. Lucie 1/2	Lamar McLaughlin	305/~~466-1100~~ 465-3556/3574
o Susquehanna 1/2	Bill Williams	215/770-7856
o Trojan	Mark Peery	503/226-8105
o Waterford 3	Tim Gaudet	504/595-2838

DNP/mc