ENCLOSURE 2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SECOND SUPPLEMENTAL SAFETY EVALUATION

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO SAFETY PARAMETER DISPLAY SYSTEM

OMAHA PUBLIC POWER DISTRICT

FORT CALHOUN STATION, UNIT NO. 1

DOCKET NO. 50-285

BACKGROUND

All holders of operating licenses and applicants for an operating license issued by the Nuclear Regulatory Commission (NRC) must provide a Safety Parameter Display System (SPDS) in the control room of their plant. The Commission-approved requirements for the SPDS are defined in Supplement 1 to NUREG-0737 (Reference 1).

The purpose of the SPDS is to provide a concise display of critical plant variables to control room operators to aid them in rapidly and reliably determining the safety status of the plant. Supplement 1 to NUREG-0737 requires licensees and applicants to prepare a written safety analysis describing the basis on which the selected parameters are sufficient to assess the safety status of each identified function for a wide range of events, which include symptoms of severe accidents. Licensees and applicants shall also prepare an Implementation Plan for the SPDS which contains schedules for design, development, installation, and full operation of the SPDS as well as a design Verification and Validation (V&V) Plan. The Safety Analysis and the Implementation Plan are to be submitted to the NRC for staff review. The results from the staff's review are to be published in a Safety Evaluation Report (SER).

There are a number of requirements which the SPDS should satisfy. They are, with Supplement 1 to NUREG-0737 references in parentheses, as follows:

1. Concise display of critical plant variables to control room operators (4.1a)

2. Location convenient to control room operators (4.1b)

3. Continuous display of plant safety status information (4.1b)

4. High degree of reliability (4.1b)

5. Suitable isolation from electrical or electronic interference with safety systems (4.1c)

6. Designed incorporating accepted Human Factors Engineering principles (4.1e)

7. Minimum information displayed shall be sufficient to determine plant safety status with respect to five safety functions (4.1f)

   i. Reactivity control
   ii. Reactor core cooling and heat removal from the primary system
   iii. Reactor coolant system integrity
   iv. Radioactivity control
   v. Containment conditions

8. Procedures and operator training addressing actions with and without the SPDS should be implemented (4.1c).

The NRC staff review will be directed at: (a) confirming the adequacy of the parameters selected to provide information about critical safety functions, (b) confirming that means are provided to assure that the data displayed are valid, and (c) confirming that the licensee has committed to a human factors program to ensure that the displayed information can be readily perceived and comprehended so as not to mislead the operator. If based on this review, the staff identifies a serious safety question or seriously inadequate analysis, the Director of the Office of Enforcement or the Director of the Office of Nuclear Reactor Regulation may request or direct the licensee to cease implementation.

On June 7, 1985, the SER (Reference 2) on the Fort Calhoun Station (Fort Calhoun) SPDS was transmitted to Omaha Public Power District (OPPD). The SER was based on: (1) the licensee's letter of April 15, 1983 (Reference 3) that responded to Generic Letter 82-33 concerning emergency response capabilities; (2) the licensee's Safety Analysis Report submitted by letter dated October 28, 1983 (Reference 4); and (3) the licensee's letter of December 7, 1984 (Reference 5) providing a list of SPDS process variables that were selected based on Combustion Engineering Emergency Procedure Guidelines.

On November 28, 1986, the first Supplemental Safety Evaluation Report (SSER1) was conveyed to the licensee. SSER1 reviewed the licensee's submittal of September 29, 1986 (Reference 6) that requested changes to the approved SPDS variable list.

This second Supplemental Safety Evaluation Report (SSER2) is based on the following:

1. The licensee's report dated August 15, 1985 (Reference 7), providing the results of a human factors review of the SPDS.

2. The licensee's letter dated August 27, 1987 (Reference 8), responding to the NRC's request for information on the SPDS.

3. The results of the postimplementation audit (September 16 and 17, 1987) of the licensee's SPDS at Fort Calhoun conducted by the staff and its consultants from Science Application International Corporation (SAIC).

4. The licensee's letters dated July 6, 1988, December 21, 1988, June 19, 1989, and June 22, 1989, (References 9, 10, 11 and 12, respectively), responding to the conclusions contained in SAIC's Technical Evaluation Report (TER).

SAIC's SPDS TER is attached to this SSER2. The NRC agrees with the technical positions and conclusions contained in the TER.

EVALUATION

The staff evaluation of the Fort Calhoun SPDS is provided below. The evaluation is consistent with Section 18.2, "Safety Parameter Display System," Revision 0 of NUREG-0800, "Standard Review Plan," (Reference 13). This evaluation is based on all information available to date.

1. Concise display of critical plant variables to aid control room operators in determining the safety status of the plant

Based on observations during the postimplementation audit, the staff finds that the licensee's SPDS provides a concise display. The staff, therefore, concludes that the licensee has satisfied this requirement of Supplement 1 to NUREG-0737.

2. Location convenient to control room operators

Observations during the postimplementation audit, revealed that the licensee's SPDS is located convenient to control room operators. The staff concludes, therefore, that the licensee has satisfied this requirement of Supplement 1 to NUREG-0737.

3. Continuous display of information from which plant safety status can be assessed

Based on discussions and observations during the postimplementation audit, the staff found that (1) some SPDS displays do not have critical safety function boxes and (2) the audible alarm for the SPDS can be disabled. By letter dated December 21, 1988, the licensee committed to correct these two discrepancies during the 1990 refueling outage.

The staff finds this commitment satisfactory and concludes that the completed actions by the licensee will satisfy this requirement of Supplement 1 to NUREG-0737.

4. Aid operators in rapid, reliable determination of plant safety status

In Section 3.4 of the enclosed TER, Requirement 4 is discussed in detail. The staff agrees with the findings as presented in the TER including the recommendations provided.

The staff concludes that the licensee has implemented an SPDS that is rapid and reliable and has, therefore, satisfied this requirement of Supplement 1 to NUREG-0737.

5. Suitable isolation from electrical or electronic interference with equipment and sensors that are in use for safety systems

Based on review of the licensee's submittals on its isolation devices, the staff finds that (1) the 16 General Atomic Model BA-1A buffer amplifiers that provide input to the SPDS meet the maximum credible fault criteria, (2) the coil to contact isolation of General Electric HFA and HEA relays is acceptable, and (3) the other devices (TEC-156, Foxboro 2AO-VAI) and configurations (double-fused power supplies) are acceptable. The staff concludes that the licensee's isolation devices used at Fort Calhoun qualify as isolators and are acceptable for interfacing the SPDS with Class 1E safety systems. The staff also concludes that the licensee has satisfied this requirement of Supplement 1 to NUREG-0737.

6. Incorporation of accepted human factors principles

Review of the SPDS displays during the postimplementation audit revealed one instance where the display content was incomplete and the displayed information for four displays could not be readily perceived and comprehended by the Shift Technical Advisor (STA). Section 3.6 of the SPDS TER (Attachment 1) discusses the details of these two findings. By letter dated June 22, 1989, the licensee stated that during the Fall 1988 refueling outage, the findings were corrected.

The staff concludes that the completed actions by the licensee satisfies this requirement of Supplement 1 to NUREG-0737.

7. Parameters selected to provide, as a minimum, information about reactivity control, reactor core cooling and heat removal from the primary system, reactor coolant system integrity, radioactivity control, and containment conditions

During the September 16 and 17, 1987 postimplementation audit, it was found that the licensee's SPDS did not include main steam line radiation which is considered to be essential for monitoring radioactivity control. Section 3.7 of the attached SPDS TER provides a detailed discussion of this finding. By letter dated June 19, 1989, the licensee has stated to have provided indication of main steam line radiation as part of its SPDS.

The staff concludes that the completed action by the licensee satisfies this requirement of Supplement 1 to NUREG-0737.

8. Implementation of procedures and operator training leading to timely and correct safety status assessment both with and without the SPDS

Interviews with control room operators and STAs during the postimplementation audit, identified a need for additional training regarding what computer points drive the information blocks and status bars, and what information blocks and status bars drive critical safety function boxes. The licensee's letter of June 19, 1989 stated that the subject training has been completed.

Based on this information, the staff finds the licensee has satisfied this requirement of Supplement 1 to NUREG-0737.

CONCLUSION

In summary, the staff concludes that Omaha Public Power District has satisfied or will satisfy all of the eight SPDS requirements of Supplement 1 to NUREG-0737 when the committed items are completed.

SPDS REFERENCES

1. NUREG-0737, Supplement 1, "Clarification of TMI Action Plan Requirements - Requirements for Emergency Response Capability (Generic Letter No. 82-33)," December 17, 1982.

2. Letter from E. J. Butcher (NRC) to R. L. Andrews (OPPD), "Safety Parameter Display System," June 7, 1985.

3. Letter from W. C. Jones (OPPD) to R. A. Clark (NRC), "Generic Letter 82-33, Supplement 1 to NUREG-0737, Emergency Response Capabilities," April 15, 1983.

4. Letter from W. C. Jones (OPPD) to J. R. Miller (NRC), "Safety Parameter Display System," with Attachment, "SPDS Parameter Selection, Safety Analysis," October 28, 1983.

5. Letter from R. L. Andrews (OPPD) to J. R. Miller (NRC), "Safety Parameter Display System (SPDS)," December 7, 1984.

6. Letter from R. L. Andrews (OPPD) to A. C. Thadani (NRC), "Request for Change of Safety Parameter Display System Variable List," September 29, 1986.

7. Letter from R. L. Andrews (OPPD) to E. J. Butcher (NRC), "Control Room Design Review (CRDR) Report Supplement on Safety Parameter Display System (SPDS)," August 15, 1985.

8. Letter from R. L. Andrews (OPPD) to A. Bournia (NRC), "SPDS Information," August 27, 1987.

9. Letter from K. J. Morris (OPPD) to P.D. Milano (NRC), "Status of the Detailed Control Room Design Review and Safety Parameter Display System Audit Findings," July 6, 1988.

10. Letter from K. J. Morris (OPPD) to P. D. Milano (NRC), "Revised Schedule for Resolution of the Detailed Control Room Design Review Audit Findings," Attachment 2, "SPDS Audit Findings," December 21, 1988.

11. Letter from K. J. Morris (OPPD) to NRC, "Questions on Completion Status of Certain SPDS Items," June 19, 1989.

12. Letter from K. J. Morris (OPPD) to NRC, "Requested Safety Parameter Display System (SPDS) and Plant Modification Status," June 22, 1989.

13. NUREG-0800, "Standard Review Plan," Section 18.2, "Safety Parameter Display System," Revision 0, September 1984.

Dated: June 29, 1989

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ATTACHMENT 1

SPDS TER