FEB 13 1985

Docket Nos.: STN 50-454
and STN 50-455

Mr. Dennis L. Farrar
Director of Licensing
Commonwealth Edison Company
P. O. Box 767
Chicago, Illinois 60690

Dear Mr. Farrar:

Subject: Staff Audit of Byron 1 and 2 Safety Parameter Display System

Enclosed is an audit plan for the Byron 1 and 2 Safety Parameter Display System (SPDS). The audit plan defines topics which we desire to evaluate, along with the data, information, documentation and personnel that will be needed to support the audit. Upon completion of the audit, we plan to write a Safety Evaluation Report on the SPDS.

We propose to conduct the audit from April 23 to April 25, 1985. If you cannot support the audit during these dates. or any clarification is needed, call the Byron Project Manager, L. Olshan, at (301) 492-7070.

Sincerely,

/s/

B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing

Enclosure:
As stated

cc: See next page

CONCURRENCES:

DL:LB#1	DL:LB#1
LOlshan:es	BJYoungblood
2/12/85	2/13/85

DIST:
Docket File
NRC PDR
PRC System
NSIC
Local PDR
LB#1 Rdg
MRushbrook
LOlshan
ACRS (16)
EJordan
RHeischman
~~ACRS (16)~~
Beltracchi

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

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Sincerely,

Paul W O'Connor
for BJY
B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing

Enclosure:
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ENCLOSURE

AUDIT PLAN

FOR THE

BYRON 1 AND 2

SAFETY PARAMETER DISPLAY SYSTEM

Background

All holders of operating licenses issued by the Nuclear Regulatory Commission (licensees) and applicants for an operating license (OL) 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.

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. NUREG-0737, Supplement 1, 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 plan. The safety analysis and the implementation plan are to be submitted to the NRC for staff review. The results of the staff's review are to be published in a Safety Evaluation Report (SER).

Commonwealth Edison Company submitted a safety analysis (Ref. 1) for the Byron Units 1 and 2 SPDS. The staff reviewed the safety analysis and concluded that insufficient information was provided to complete our evaluation. Reference 2, a request for additional information was forwarded to the Commonwealth Edison Company. To facilitate the completion of the review, the staff will audit the Byron Units 1 and 2 SPDS.

Audit Schedule

The staff proposes this be scheduled for April 23-25, 1985. We anticipate that the audit will require two full days (April 23-24) of effort. We plan an exit briefing for the morning of April 25, 1985.

NRC Audit Team

The NRC Audit Team will consist of representatives from the Human Factors Engineering Branch, Procedures and Systems Review Branch, and from the Instrumentation and Control Systems Branch. In addition, the staff will be assisted in the audit by Science Applications International Corporation (SAIC).

Audit Tasks

The audit consists of four sets of tasks that are defined as:

I. General Issues
II. Human Factors Engineering Audit
III. Procedures and Systems Review Audit
IV. Instrumentation and Control System Audit

Details on each of these sets of tasks are provided next.

Review Basis: NUREG-0737, Supplement 1, "Clarification of TMI Action Plan, Requirements for Emergency Response Capability."

I. General Issues

	Topics	Audit Needs:	Estimated Time (Hours)
1.	An entry briefing by the NRC audit team to discuss schedule and audit plan.	A conference room or equivalent to hold briefing	0.25
2.	Staff caucus to discuss results of audit.	A conference room or equivalent.	2
3.	An exit briefing by the NRC audit team to report on the findings of the audit.	A conference room or equivalent to hold briefing.	0.5
4.	Commonwealth Edison is to define the scope of the SPDS within the computer system in which it is implemented and in terms of the SPDS as stated in NUREG-0737, Supplement 1.	Have available all elements of the design as it currently exists consisting of hardware, software and display formats.	0.5
5.	Staff audit of the Design Verification and Validation Program used in the development of the SPDS.	Have available the Design Verification and Validation Program. Also, on a part-time basis, have available a qualified person capable of answering staff questions on the program.	1.5

Topics	Audit Needs:	Estimated Time (Hours)
II. Human Factors Engineering Audit		
1. Staff audit of the System Specifications and standards used in the design, such as human factors engineering standards.	System Specifications, generic application data and standards used in the design. Also, on a part-time basis, have available personnel capable of answering questions on the specifications and standards. The licensee should also be prepared to discuss details of the Human Factors Program used in the design along with data validation techniques and the means used to inform the operator of invalid data.	2
2. Staff audit of the validation of the display formats utilizing man-in-the-loop tests of a prototype display, if applicable.	The validation program and the results from the program. Also have available personnel capable of answering staff questions on the validation program and the results from the program.	2
3. Staff audit of the software specifications for incorporation of human factors requirements.	The generic software requirements, the generic spec., and human factors standards used in the design. Also have available personnel capable of answering questions on these documents.	1.5
4. Staff audit of the design, code, test software and data base instructions (if applicable).	Design documentation, listing of code, and description of data base. Also have available personnel capable of answering questions on these documents.	1.5
5. Staff audit of integration tests and test results for displays and scenarios, applicable.	Documents and test plans for integration tests along with test results. Also have available personnel to answer questions on these documents.	2

	Topics	Audit Needs:	Estimated Time (Hours)
6.	Staff audit of selected display formats for conformance to human engineering standards and guidelines. Evaluate if display flicker exists; also determine adequacy of time lag for display of data.	Selected display formats on prototype display system, if available. As a minimum, a hard copy, in color, of selected display formats will suffice.	2.5
7.	Staff audit of display devices, display controls, and keyboards, etc. for conformance to human engineering standards and guidelines.	Have available display devices, display controls and keyboards, etc. Also have available personnel to answer staff questions on these devices.	2
8.	Staff audit of design validation test methods, and test plans.	Documents on test methods and test plans, if available. If documents are not available, provide a discussion on validation testing.	1
III.	Procedures and Systems Review Audit		
1.	Staff audit of displayed information on the critical safety functions, including radioactivity control as defined by NUREG-0737, Supplement 1. The use of data from source range monitors and from containment radiation monitors will also be audited in terms of the critical safety functions.	A demonstration or discussion of how the SPDS meets the requirements of NUREG-0737, Supplement 1 should be provided.	2

	Topics	Audit Needs:	Estimated Time (Hours)
2.	Staff audit of provisions for expansion to accommodate future revisions to the Emergency Procedure Guidelines.	Have available memory storage specifications for the software, data bases, and data along with hardware computer memory sizes.	1
IV.	Instrumentation and Control Systems Audit		
1.	Audit and evaluate the program plan of the reliability assessment and/or testing of the SPDS hardware. Review the rationale for the selection of hardware components.	Have available the reliability program, test results (if any) and the basis on the selection of hardware.	2
2.	Audit the accuracy requirements of instrumentation used for the selected parameters.	Have available the design requirements for the instrumentation.	1
3.	Audit the Computer Operating System A. Operating software that software other than application software (to control disk, to control tape, to control multiplexer). B. System architecture and the fault tolerance of the architecture. C. Storage capacity and expandability of system. D. CPU efficiency, information rates.	Have available whatever information is necessary to support this effort.	2

Topics	Audit Needs:	Estimated Hours (Hours
E. Initial and periodic testing.		
F. Software security (From system crashes, system overloads, conflicting tasks on systems employing general purpose, multi-task computers).		
4. Audit of qualification of isolation devices.	Have available the design criteria and the qualification test results which respond to the defined data needs.	4
A. Audit each type of device used to accomplish electrical isolation, describe the specific testing performed to demonstrate that the device is acceptable for its application(s). This description should include elementary diagrams when necessary to indicate the test configuration and how the maximum credible faults were applied to the devices.		
B. Audit data to verify that the maximum credible faults applied during the test were the maximum voltage/ current to which the device could be exposed, and audit how the maximum voltage/ current was determined.		

Topics	Audit Needs:	Estimated Time (Hours)
C. Audit data to verify that the maximum credible fault was applied to the output of the device in the transverse mode (between signal and return) and other faults were considered (i.e., open and short circuits).		
D. Audit the pass/fail acceptance criteria for each type of device.		
E. Audit the measures taken to protect the safety systems from electrical interference (i.e., Electrostatic Couplings, EMI, Common Mode and Crosstalk) that may be generated by the SPDS. Also, the licensee should provide a commitment that the isolation devices comply with the environmental qualifications (10 CFR 50.49) and with the seismic qualifications which were the basis for plant licensing.		

REFERENCES

1. Letter from E. Swartz, Commonwealth Edison Company, to H. R. Denton, NRC, subject: "Byron Station Units 1 and 2 SPDS Safety Analysis," dated December 29, 1983.

2. Letter from B. J. Youngblood, NRC, to D. L. Farrar, Commonwealth Edison Company, subject: "Request for Additional Information - Byron/Braidwood SPDS," dated November 9, 1984.