

ILLINOIS POWER COMPANY



CLINTON POWER STATION, P.O. BOX 678, CLINTON, ILLINOIS 61727

December 21, 1984

Docket No. 50-461

Director of Nuclear Reactor Regulation  
Attention: Mr. A. Schwencer, Chief  
Licensing Branch No.2  
Division of Licensing  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

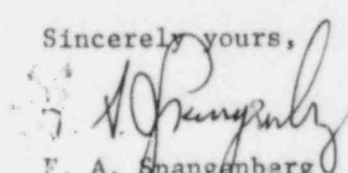
Subject: Clinton Power Station Unit 1  
Safety Parameter Display System  
Response to NRC Pre-Implementation  
Audit Findings

Dear Mr. Schwencer:

This letter is in response to the NRC Pre-Implementation Audit of the Clinton Power Station Safety Parameter Display System (SPDS) December 12-13, 1984. Illinois Power has developed the attached SPDS Action Plan to resolve the NRC Staff audit findings. Upon completion, the results of this action plan will be provided promptly to the NRC Staff for review.

Should the NRC Staff have any comments regarding this SPDS Action Plan, please contact me at (217) 935-8351, extension 324.

Sincerely yours,

  
F. A. Spangenberg  
Director - Nuclear Licensing  
and Configuration  
Nuclear Station Engineering

Attachment

JLP/em

cc: B. L. Siegel, NRC Clinton Licensing Project Manager  
NRC Resident Office  
Regional Administrator, Region II, USNRC  
Illinois Department of Nuclear Safety

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CLINTON POWER STATION - SAFETY PARAMETER DISPLAY SYSTEM  
NRC PRE-IMPLEMENTATION AUDIT FINDINGS  
ACTION PLAN (AP)

Following the NRC Staff Pre-Implementation Audit December 13, 1984 Exit Meeting, a detailed Action Plan (AP) was developed for resolving the NRC concerns. The SPDS AP consists of two (2) major elements. The first element of the AP addresses the NRC Staff's general concerns regarding their "low confidence" in the SPDS Design development process and the Verification and Validation (V&V) program performance results. The second element of the AP addresses the NRC Staff's specific concerns regarding the SPDS Parameter Set, the data validation schemes used, the SPDS Display format chosen, and pertinent Human Factors aspects of the SPDS. This second element of the SPDS AP also ensures that future NRC general concerns regarding confidence in the overall SPDS developmental process do not arise. The following discussions are therefore divided into the separate elements of the SPDS AP.

SPDS Action Plan (AP)

Two major elements comprise the SPDS AP, as follows:

Element I: NRC Confidence in the Overall SPDS Developmental Process

This AP element includes resolution of NRC general concerns regarding the following:

- A. SPDS Design Development Process
- B. SPDS V&V Program Performance Results

Element I AP:

The NRC Staff's "low confidence in the overall SPDS developmental process" resulted from two general weaknesses:

1. The IP presentations did not stress the details of the actual design developmental process; and
2. The operator interviews and surveys to ensure SDPS useability were not performed and documented in the formal manner expected by the Staff.

The development of the current "SPDS Requirements Document" and the "SPDS and Supporting Displays Design Document" was through an extensive interaction and review process involving various IP personnel from the Computer Engineering Group, Control and Instrumentation Group, Technical Assessment (SPDS V&V), CYGNA Energy Services (SPDS V&V), Plant Technical Staff, Plant Operations, and the SPDS Human Factors Review Team (with assistance from Dr. Charlie Hopkins, Human Factors Expert from the University of Illinois). The original SPDS display format was developed by Plant Operations (lead responsibility through Mr. Gerry Thompson). The Plant Operations group reviewed this format (that review was not formally documented) and presented it to engineering for implementation. The early involvement of the Plant Operations personnel coupled with the July 1981 NUCLENET Owner's Group presentations to the NRC Staff regarding the implementation of the SPDS via the NUCLENET Control Room concept, resulted in IP's consideration that the SPDS display format was acceptable to the NRC Staff. It should be noted that, although several SPDS display parameters have been modified since the original development, the current SPDS display retains the original basic format (i.e. the information display techniques are basically the same as originally conceived).

For the reasons discussed above, the Human Factors review team did not perform the following as part of their reviews of the SPDS:

1. Documented analysis to determine the operator response(s) to the chosen display; and
2. Documented reactor operator surveys used to verify the useability of the chosen display format.

These elements of the review are added to the re-evaluations proposed in the discussion of SPDS AP Element II below.

The AP Element I therefore involves performance of the following:

1. IP review of the current SPDS development process;
2. Documentation of the logic and justification for the approach(es) previously/currently in use that arrived at the current design; and
3. Detailed discussions with the NRC Staff regarding the design development approach(es) used by IP in arriving at the current SPDS configuration.

The SPDS developmental review/documentation process should include identification of the actions taken by Plant Operations staff during the original design formulation, the various reviews (design, V&V Human Factors, etc.) processes that occurred, the relationship to the work performed by the NUCLENET Owner's Group, and the history of interaction with the NRC Staff on the CPS SPDS Display design.

The intent of this element of the SPDS AP is to ensure that future SPDS design development, V&V program performance, and subsequent NRC Staff audits avoid these problems and result in establishing the necessary NRC Staff confidence required to resolve the SPDS issues at CPS.

#### Element II: Resolution of NRC Technical Concerns on SPDS

This AP element includes resolution of general and specific NRC concerns associated with the following:

- A. The criteria used for establishing the SPDS Parameter Set and the associated setpoints;
- B. The prioritization of the various SPDS Parameters for establishing the following:
  - \* the Data Validation Schemes used; and
  - \* the inputs to the various Critical Safety Function Alarm Boxes used on the SPDS Display.
- C. The criteria used to establish the appropriate SPDS Display Format (i.e. how the SPDS Parameter Set can be most functionally presented); and
- D. The various Human Factors considerations that define the final SPDS Display. This includes:
  - \* Color Code scheme(s) used;
  - \* Abbreviations used on SPDS;
  - \* Color discrimination and contrast; and
  - \* Operator task analyses, interviews, & questionnaires used to review the CPS SPDS.

#### AP Element II :

This SPDS AP element addresses the broader issue of NRC concerns regarding the developmental criteria used for the SPDS Display format and the corresponding SPDS Parameter Set used as well as the individual technical concerns identified from the review of the current "SPDS and Supporting Displays Design Document". The program proposed will be performed within the constraints of the existing Plant Process Computer design.

The following program will address each of the major parts identified above in an integrated plan:

1. SPDS Parameter Selection

This involves performing the following reviews/evaluations:

- (a) Review the CPS Emergency Operating Procedures (EOPs), Emergency Procedure Guidelines (EPGs), Emergency Plan, (E-Plan), the CPS Technical Specifications, and the EPG/EOP Calculations - this review will consider all operator entry conditions and appropriate action levels to identify the required SPDS Parameter Set.
- (b) Selection of the requirements for the SPDS Data Set - each SPDS Parameter will be reviewed for signal input redundancy requirements, and signal pedigree (i.e. Class 1E, etc.).
- (c) Selection of SPDS Data Set -
  - \* Choose SPDS Parameter Set: EOP/EPG/E-Plan entry conditions should be equated to a primary SPDS parameter.
  - \* Identify required setpoint(s) for each SPDS parameter (source documents include the CPS Technical Specifications and the EPG/EOP Calculations)
  - \* Identify any required deviations from EPGs/EOPs/E-Plan and justify.
- (d) Establish Data Validation Schemes -
  - \* Prioritize the importance of each SPDS parameter
  - \* Establish Validation Methods:
    - Averaging Algorithm
    - Group Point Failure Checks
    - Redundancy Checks
    - Reasonableness Checks
    - Analytical Redundancy
    - "Rate of Change" Algorithms
  - \* Assign Validation Methods to each SPDS parameter based on prioritization scheme(s).

(e) Human Factors Evaluations -

Operator Survey Questionnaires will be developed. These questionnaires will be given to various IP Operations, Plant Technical Staff, and other IP personnel involved in the EPG/EOP and/or CPS Emergency Plan development to identify what SPDS is supposed to accomplish, which parameters could best perform this function, and how this information should be displayed.

The results of these surveys will be considered in selecting the task force regarding the appropriate parameter set for SPDS.

The specific concerns identified by the NRC Staff during the SPDS Pre-Implementation Audit will be reviewed as part of this effort.

2. SPDS Display Design Format

This involves considering various means of presenting the SPDS parameter set information to the operator. Consideration will be given to retaining as much of the existing display format as is justifiable while evaluating various alternative display formats (including second page SPDS information [e.g. AIDS], automatic paging to the corresponding supporting EOP display format, alternatives to color coding techniques for alerting the operator to changing conditions, and other format changes).

This review will be performed within the constraints of the existing Plant Process Computer hardware/software design configuration.

This review will also include a Human Factors evaluation of the existing color codes used to establish the optimum color scheme required to resolve the NRC Staff concerns. These reviews will encompass the broad color problems related to all of the displays in the NUCLENET design.

The results of the personnel surveys performed as part of the SPDS Parameter Set Selection discussed above will be factored into the final SPDS Display format selection process.

This effort will include a review of the CRT hardware (CONRAC) in the Main Control Room to resolve NRC - identified resolution problems.

The specific NRC Staff concerns identified from the SPDS Pre-Implementation Audit will be reviewed as part of this effort.

3. Develop Preliminary SPDS Display Design

Following completion of the two efforts identified above, preparation of a preliminary SPDS Display Design will be completed.



4. SPDS Verification & Validation Reviews

Following completion of the Preliminary SPDS Display Design, the IP V&V Team will review the following:

- (a) Parameter Set selection criteria used and the associated setpoints established;
- (b) Data Validation Schemes established and their assignment to the SPDS parameters by prioritization;
- (c) The final display format chosen (specifically evaluating the means of information display and its usefulness to the operators in terms of EPG/EOP/E-Plan requirements);
- (d) The acceptability of the color schemes used in meeting SPDS functional requirements (e.g. NUREG-0835 compliance); and
- (e) The IP V&V Team will witness the static EOP walkthroughs of the SPDS discussed in item #5 below.

5. Static EOP Walkthroughs of the Preliminary SPDS Design

This task will involve the following efforts:

- (a) Develop Operator Review Questionnaires that will be used to evaluate the exercise results of the SPDS;
- (b) The Static SPDS Display format will be input onto the CPS Simulator. EOP scenarios will be walked through, using a trained operator(s) to statically test the useability of the chosen SPDS Display format and Parameter Set. The supporting ARM/PRM "Status Grid" and supplementary displays as well as the supporting EOP Displays will also be included in these exercises.
- (c) The results of these static EOP walkthroughs will be used to establish a Final SPDS Display Design Format.

The specific NRC concerns identified from the SPDS Pre-Implementation Audit will be reviewed as part of this effort.

6. Final SPDS Design Display Format

Following completion of the above tasks, Final SPDS Display Design Format will be implemented.

Actual final implementation will include as part of the Detailed Control Room Design Review (DCRDR) review process a dynamic simulation of the SPDS, ARM/PRM, EOPs, and the Main Control Room design on the CPS Simulator.

The tasks identified above for the proposed SPDS AP may require revisions to the following SPDS related documents (this list is not necessarily all inclusive):

1. V&V SPDS Requirements Review Report;
2. V&V SPDS Design Review Report;
3. V&V SPDS Parameter Set Validation Report;
4. SPDS Requirements Document (design); and
5. SPDS and Supporting Displays Design Document (design).