



# Pennsylvania Power & Light Company

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NOV 27 1985

Director of Nuclear Reactor Regulation  
Attention: Ms. E. Adensam, Director  
BWR Project Directorate #3  
Division of Boiling Water Reactor Licensing  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

SUSQUEHANNA STEAM ELECTRIC STATION  
DETAILED CONTROL ROOM DESIGN REVIEW  
ER 100450 FILE 841-2  
PLA-2558

Docket Nos. 50-387  
50-388

Dear Ms. Adensam:

This letter is provided in response to the remaining open issues regarding the Detailed Control Room Design Review. These issues are:

1. Performance of a Task Analysis to Revision 3 to the Emergency Procedures Guidelines.
2. Color convention in the Susquehanna SES control room.
3. Lack of bulb test capability for single indicator lights.
4. Fire Panel (650) Access.
5. Scheduling for the resolution/completion of open human engineering discrepancies.

## Task Analysis

PP&L has reevaluated the commitment to complete an upgraded Task Analysis as stated in our DCRDR Supplemental Summary Report (PLA-2423). We propose deletion of the commitment and any requirement for its completion. There are two reasons for this request. First, all of the Emergency Response Capability efforts related to such an analysis have been completed. Second, and more important, based on the results of our comprehensive validation efforts, we are now convinced that the methodology we used to develop our Emergency Response Capability, is an acceptable alternative to the use of Task Analysis as described in Supplement 1 to NUREG 0737.

There has been some confusion in the industry about what the NRC expects from the task analysis process. PP&L has focused attention on evaluating benefits of the process. Consequently, we believe we understand what task analysis is and what it can be used for. As stated in NUREG 0899, "Analysis of tasks

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provides the basis for defining the information needs of the operators. Tasks, like functions, may be analyzed at different levels, depending upon the intended application of the analysis.... The specific depth with which task analytic data needs to be collected will depend upon its intended application. Thus, in some form, task analysis can be used to support:

- o Development of procedures,
- o Evaluation of existing man/machine systems,
- o Specification of design requirements for man/machine systems,
- o Evaluation of existing training programs,
- o Specification of training needs,
- o Evaluation of existing personnel qualification criteria,
- o Specification of personnel qualification criteria
- o Evaluation of existing staffing requirements,
- o Specification of staffing needs."

Because of our unique situation of licensing units in parallel with evolution of the NUREG 0737 requirements, PP&L chose to limit the application of our Task Analysis to evaluation of information and control requirements in the Susquehanna Control Rooms.

In response to time and regulatory constraints of the licensing process, PP&L developed a plan to address all the guidance of NUREG 0737 as quickly as possible. This plan, submitted to the NRC on April 15, 1983, described distinct parallel efforts on SPDS, DCRDR, Reg. Guide 1.97, upgraded EOPs and ERFs, and was designed to accomplish each effort expeditiously. The plan was also clear regarding use of the validation program as the primary tool for ensuring all these efforts were integrated to provide the desired improvements in Emergency Response Capability. It was also clear in all of PP&L's submittals to NRC, including the DCRDR Summary Report (Submitted November 11, 1983), SPDS Safety Analysis Report (Submitted September 30, 1983), SSES Conformance to RG 1.97, Rev. 2 (Submitted May 31, 1984), and the Procedure Generation Package (Submitted May 1985), that Task Analysis was being used exclusively in the DCRDR and not as a prerequisite to any other ERC efforts. In fact, the guidance that Task Analysis should be based on Rev. 3 EPGs was not clearly established until May 14, 1984 in a memorandum describing the results of a May 4 meeting with BWR Owners' Group representatives. By this time all of PP&L's ERC efforts were either complete or well underway.

PP&L saw no way we could change our plans and somehow backfit an upgraded task analysis into our ERC integration efforts. However, we were advised by the NRC at that time that the way to achieve an acceptable DCRDR was to upgrade

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our existing task analysis basing it on Rev. 3 EPGs. For this reason, we committed to such an effort in our DCRDR Supplemental Summary Report, submitted to the NRC March 1, 1985. However, having completed the EOP validation, we now believe that such an effort is unlikely to provide any useful input to the DCRDR and are convinced it would provide no useful input to the other already completed ERC efforts.

In addition to our reservations about the usefulness of performing an upgraded task analysis, PP&L believes an acceptable alternative to the guidance provided by the NRC exists.

PP&L is convinced that the comprehensive validation methodology used for Susquehanna provides assurance that the methodology utilized to improve our Emergency Response Capability, including generation of symptom based EOPs, produces the same results expected of the methodology proposed in NUREG 0737 Supplement 1. It is our opinion that task analysis is only one of several methods possible to achieve acceptable systems and procedures. The real test that the systems and procedures resulting from any of these methods, including task analysis, meet human factor criteria should be based on performance criteria like those demonstrated by validation. We are not alone in this position. Edger Shiver, et al, stated in "Task Analysis as a Technique to Ensure Safe Job Performance"; "...human factors criteria are first of all performance criteria, that is, if correct performance is obtained, the process used to obtain it is assumed to be correct. For example, if the procedures work, it is safe to assume that a valid process was used to develop them. However, there is no way to ensure that performance criteria are met simply by applying the right process. It is not possible to say that because task analytic techniques have been used to prepare procedures or training that that ensures performance criteria will be met. The validation of products prepared by task analytic processes must be accomplished to satisfy performance criteria."

PP&L is confident that our validation process has rigorously proven that both SPDS and the symptom based Emergency Operating Procedures work and that they are well integrated with other Emergency Response Capabilities. We welcome NRC review of the results of the validation completed to date. PP&L has planned one final round of validation that will occur after all NUREG 0737 capabilities are fully implemented. We anticipate that this System Validation will be a final proof test that our methodology has provided the results sought by NUREG 0737, Supplement 1; that is: proper development of each of the improvements in emergency response capability and assurance of integration between improvements and the existing capabilities. Based on the results from the SPDS and EOP Validation and our expectations of similar results from the System Validation, we can see no useful purpose in performing an upgraded task analysis, and performance of an upgraded Task Analysis would be a waste of both PP&L and NRC resources. We request your timely concurrence with this position.

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### Color Convention

In our meeting with the staff on August 28, 1985, the staff reviewer, Mr. R. Eckenrode, expressed his belief that color is overused as a code in the Susquehanna control room and that the convention used contradicts accepted population stereotypes. He also contended that under stressful conditions operators could make mistakes as a result of reverting to some previously learned color code. Mr. Eckenrode stated, however, he was not seeking wholesale changes in the color convention but rather only certain specific "minor" changes to improve the convention. Even though PP&L strongly disagreed with the staff's conclusions, we took the action to evaluate the impact of the "minor" changes suggested by the staff. The results of our evaluation are as follows:

- (1) The costs associated with the suggested changes are approximately four million dollars in 1985 dollars and the time frame necessary to accomplish the changes is as long as four years.
- (2) The suggested color magenta is not available in standard lens colors for our lamps and would have to be developed as a specialty item with a lamp supplier.
- (3) Without evaluation and testing, it is not clear that effective color differentiation by operators will be possible between magenta and red lamps on the boards. Presently, green stands out markedly from other lamps on the boards.
- (4) The magenta color is not supported by current LED technology and would thus impair our effort to develop long-life indicator lamps for the panels to resolve the lamp testing issue (discussed below).
- (5) Implementation of the suggested changes would result in a sizeable negative transfer impact on operator performance that would initially increase the expected human error rate for current operators.

In summary, our evaluation clearly indicates the color convention changes suggested by the NRC are not "minor" as characterized by the staff. Additionally, the suggested changes are not cost beneficial and will not result in any substantial increase in protection of the health and safety of the public and in fact appear to be detrimental and difficult to implement. Consequently, PP&L's position that no color convention change is necessary remains the same as that expressed during the August 28, 1985 meeting.

### Lack of Bulb Test Capability

Guidance in NUREG 0700 states that either dual bulbs or lamp test capability should be present on control room panels. It is not feasible to accommodate either of these options in the Susquehanna SES control room.

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We have investigated development and use of a hand-held test device and have determined this alternative to be unsatisfactory.

In general, study of this issue has determined that present operating policy, operating experience to date, and continued management attention minimizes any effect of burned out indicating lamps on plant operation. Specifically, a review of the incident reporting history and fifty scram/transient reports did not disclose any instance where a burned-out lamp contributed to the cause of the event. Additionally, duty management walkdowns of the plant routinely include checks of plant status from the control room. During these checks the Operator is quizzed on system status. The control room operator has always known the plant status including lit and unlit indicating lamps.

Control room operators are trained to operate or test systems based on comparison of system parameters such as flow, pressure, current, voltage and component status. They are trained to remain cognizant of system status and to confirm indication prior to taking action. Consequently any single burned-out indicating lamp would not be detrimental to plant operation. Any burned-out lamps are promptly replaced as they are discovered.

Testable indicating lamps are tested once per shift. All other normally lit lamps are observed by the operator during shiftly panel walkdown and periodically during the shift while operating the plant. Normally unlit lamps are observed by the operator during equipment operation when the lamps are lit.

PP&L is continuing to pursue the development of a qualified long-lived bulb which satisfies all engineering and HFE design criteria without imposing unnecessary major redesign and rework of existing Susquehanna SES design features. Engineering studies have identified replacement bulbs and cartridges for currently used lamp sockets in AC applications that will perform this function. Two prototype lamps are presently installed in non-safety indicating circuits in Unit 1 to demonstrate operator acceptance and circuit compatibility. DC lamps require a specific polarity which is not controlled in SSES design; however, work is underway to develop a non-polarized DC version of cartridge lamps. Should this effort fail, the alternative would be to correct polarity on DC sockets on the panels (rewiring). This alternative would require extension of the anticipated completion date into 1987.

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It is our plan to relamp on a one time basis. We do not perceive a need for periodic relamping as burned-out indicating lamps have never been a problem at Susquehanna SES due to plant operating policy, operator training and system knowledge, and management attention to plant operation. We believe the addition of long-life indicating bulbs is a positive, cost effective enhancement. We are anticipating completion of the bulb qualification effort and issuance of a purchase specification in 1986. Installation would be performed as soon as bulbs are available.

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Fire Panel Access (HED #295)

During the NRC DCRDR audit, a potential deficiency was noted for the 650 panel. The location of Panel Box 2021 impeded access to controls on the 650 panel and cast shadows on labeling rendering the label difficult to read. A review of the panel arrangement disclosed that there are no operational requirements for the use of the switches in question by the control room operators during normal or emergency operations. Therefore, the existing configuration and lighting is satisfactory for all possible actions associated with these switches. Consequently, there will be no further action required on this HED.

Schedule

PP&L has reviewed the implementation schedules for open HEDs including those identified during the NRC audit. We have concluded that in order to avoid operational problems associated with implementation of changes on a unit basis, we will approach scheduling on a system basis with both units modified at the same time. These modifications will include updating of associated procedures. We believe this approach will cause less operator confusion and is in the best interest of safety. Utilizing this approach, all outstanding HED's will be completed by the end of the Unit 2 first refueling outage currently scheduled for December, 1986.

This satisfies our audit response commitment to respond with a schedule by January 31, 1986 for those post-audit HED.

Based on the information provided in this letter all HEDs either have committed implementation dates or require no further action. Should you have any questions, please contact us.

Very truly yours,



H. W. Keiser  
Vice President-Nuclear Operations

cc: M. J. Campagnone - USNRC  
R. H. Jacobs - USNRC



## Pennsylvania Power &amp; Light Company

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December 31, 1985

U.S. Nuclear Regulatory Commission  
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SUSQUEHANNA STEAM ELECTRIC STATION  
LICENSEE EVENT REPORT 85-034-00  
ER 100450 FILE 841-23  
PLAS-137

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Docket No. 50-387  
License No. NPF-14

Attached is Licensee Event Report 85-034-00. This report was determined reportable per 10CFR50.73(a)(2)(iv), in that the loss of an Emergency Safeguards System transformer resulted in a Unit 1 and Unit 2 scram.

T.M. Crimmins, Jr.  
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TNC/pjg

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