

NRC REVIEW OF CALLAWAY PLANT AUXILIARY SHUTDOWN PANEL  
HUMAN ENGINEERING DISCREPANCIES REPORTED BY SNUPPS  
IN THE DCRDR SUMMARY REPORT

Background

In accordance with Supplement 1 to NUREG-0737 the Standard Nuclear Unit Power Plant System (SNUPPS) staff conducted a Detailed Control Room Design Review (DCRDR) of the Callaway Plant for Union Electric Company. As part of this effort the Auxiliary Shutdown Panel (ASP) was reviewed and the human engineering discrepancies (HED) were reported in the DCRDR Summary Report (Reference 1). The staff reviewed the Summary Report and conducted an on-site audit on February 28 and 29, 1984.

Discussion

Several of the HEDs identified during the licensee review of the ASP are interrelated and require integrated resolutions. These HEDs are summarized below:

1. The separation for operator movement between the ASP and the opposing wall is 40 inches (minimum recommended is 50 inches).
2. The security door box (TV1431) mounted on the wall opposing Panel B reduces the clearance for operator movement to 30 inches in front of the panel.

3. Some controls for emergency operation are located outside the recommended height range of 34 to 53 inches above the floor. Controls on the ASP are located up to 64 inches above the floor.
4. Some displays are located above the recommended height for normal (41 to 70 inches above the floor) and frequent or precise reading (50 to 65 inches above the floor). All displays on the ASP are located between 65 and 80 inches above the floor.

During the on-site audit, February 28 and 29, 1984, the staff reviewed these HEDs and resolutions proposed by the licensee. The staff agreed with the HEDs but did not agree with some of the resolutions.

Although the 40-inch separation between the panel and opposing wall is well below the recommended 50-inch minimum, the staff does not expect the licensee to move either the installed panels or the concrete fire wall and considers the reduced working space (40 inches) to be acceptable. The door box which was mounted on the wall was moved to another location but two sections of door box conduit (3" - 4" OD) running from the ceiling to the floor about one foot from the wall was not removed. These present a hinderance and a hazard to the operator during emergency operations at Panel B. By letter dated March 21, 1984, (Reference 2) the licensee committed to remove the door box conduit prior to fuel load. By letter dated May 15, 1984, (Reference 3) the licensee rescinded this commitment with no justification.

At the time of the licensee's review and the staff's on-site audit the fire door, separating the panels for the two trains of the ASP instrumentation, was not installed. Subsequent information (Reference 2) indicates that the door will open into the Panel B area from a hinge point approximately 12 inches out from the wall opposing the panel. The combination of open fire door and two sections of conduit results in an operating area in front of the ASP well below the recommended minimum.

Although some controls are located higher than the recommended height for emergency operations, they are within the reach capability of the 5th percentile female operator. The staff considers this to be acceptable, though less than desirable.

The top row of displays which include steam generator level and reactor coolant systems temperature and pressure are approximately 15 inches above the recommended height for precise or frequent reading and approximately 10 inches above the recommended height for normal reading. This is considered by the staff to be the most serious problem of the ASP. It is further aggravated by the confined operating area since the natural tendency for a person having difficulty reading a high display is to step back to improve the line of sight angle to the display. Since the opposing wall is much closer than the recommended minimum, it is not possible to step back more than a few inches. The result is that the top row of meters are subject to reading errors both from inadequate direct visual access and from parallax.

During the staff's on-site audit exit briefing, a resolution, agreeable to the staff and not requiring major structural changes, was discussed with the licensee. This resolution involved the design and installation of a removable platform approximately eight inches high in front of the two panels. This platform would improve visual access to the top row of meters and improve physical access to the controls discussed in the earlier HED. This resolution has been accepted for implementation by Kansas Gas and Electric Company at the SNUPPS designed Wolf Creek Generating Station. The licensee committed (Reference 2) to determine an agreeable (with the NRC) permanent resolution prior to exceeding 5% power operation. In the interim, a temporary step would be made available within the ASP room.

It is the staff's position that taking no corrective action as indicated in the letter of Reference 3 has not been satisfactorily justified and is not, "an agreeable permanent resolution." Furthermore, the staff considers a temporary moveable step stool to be potentially hazardous during emergency operations and not acceptable as a permanent solution.

#### Conclusion

The staff's position on the licensee's proposal to make no corrections to these ASP HED's reported in the DCRDR Summary Report is as follows:

- (a) The conduit presents a nominal hinderance, hazard, and nuisance to emergency operation of the ASP, however, it need not be removed prior

to loading fuel. The conduit should be considered for removal if further permanent modifications are to be made in the ASP area.

- (b) The top row of meters on the ASP are approximately ten inches above the maximum recommended height and are prone to reading errors by shorter operators, especially under the stress of emergency operations. Not taking corrective action in this instance is not, "an agreeable permanent resolution," as committed to by the applicant in the reference letter.
- (c) A temporary moveable step stool may be hazardous during emergency operations and is not acceptable as a permanent solution to (b).

Reference 3 indicates that numerous design modifications have been made to the ASP from other NRC requirements that have impacted human factors aspects. It is the staff's position that human factors review should be conducted for all proposed design modifications affecting the man/machine interface. As committed to by the applicant in Reference 2, and as stated in the HFEB input to Supplement No. 3 of the SER, we require the applicant to propose an acceptable permanent resolution and implementation schedule for the discrepancies described herein.

References

1. Letter to H. Denton from N. Petrick, SNUPPS, SLNRC 84-0019, February 2, 1984, DCRDR Summary Report for SNUPPS.
2. Letter to H. Denton from N. Petrick, SNUPPS, SLNRC 84-0048, March 21, 1984, NRC Audit of SNUPPS Control Room Design Reviews, Week of February 27, 1984.
3. Letter to H. Denton from D. Schnell, Union Electric Company, ULNRC-822, May 15, 1984, Control Room Design Review.