



September 30, 1986  
IPN-86-48

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Senior Vice President  
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U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Attention: Mr. Steven A. Varga, Director  
PWR Project Directorate No. 3  
Division of PWR Licensing-A

Subject: Indian Point 3 Nuclear Power Plant  
Docket No. 50-286  
Detailed Control Room Design Review

References: 1) Letter from J. C. Brons to S. A. Varga, dated  
October 31, 1985, (IPN-85-59), entitled:  
"Detailed Control Room Design Review Summary  
Report."

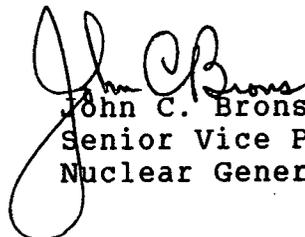
Dear Sir:

Attachment 1 to this letter provides the results of the engineering studies of those Human Engineering Deficiencies (HEDs) identified in Reference 1 as requiring further evaluation. A schedule for the resulting modifications is also provided in Attachment 1.

As a result of the engineering evaluations of the modifications committed to in Reference 1, the resolution of a number of HEDs have been revised. Attachment 2 to this letter provides the revised HED resolutions and the associated rationale for each resolution.

Should you or your Staff have any questions regarding this matter, please contact Mr. P. Kokolakis of my staff.

Very truly yours,

  
John C. Brons  
Senior Vice President  
Nuclear Generation

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cc: Resident Inspector's Office  
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Attachment 1 to IPN-86-48  
Engineering Study Results

New York Power Authority  
Indian Point 3 Nuclear Power Plant  
Docket No. 50-286

COMMUNICATIONS STUDY

HED 68 There is inadequate coverage by the announcing system throughout the plant due to several dead spots and loud ambient plant noise.

RESOLUTION - A test tone could be heard at most locations even with a number of the speakers inoperable. The repair or replacement of inoperable speakers/handsets will be added to the ongoing maintenance program. With all components operating properly and the volume controls on all amplifiers adjusted to produce a sound level from the speakers suitable for the local ambient noise conditions, the result will be a system which will provide intelligible plant-wide communications.

HED 69 Loudspeakers are not provided in control room areas where operator might be such as kitchen, restroom, locker room and back panel areas A, B, C and D.

RESOLUTION - Further investigation of this HED revealed that loudspeakers are not necessary in these areas since an operator is required to be in the operating area of the control room at all times.

HED 70 Loudspeakers audio gain controls are not limited to preclude reducing volume below an audible level.

RESOLUTION - The volume controls on the control room area speaker amplifiers are located in the control room. The control room operators would not lower the paging system volume below audible levels. As such, no action is necessary.

HED 71 Control room inputs to the plant announcing system do not have priority over any plant input. The control room input is not capable of interrupting an announcement in progress.

RESOLUTION - Announcements on the plant paging system are usually very short in duration, approximately 10-15 seconds. As such, the maximum possible delay in a control room announcement would be on the order of 15 seconds. This length of delay would not pose an operational concern. As such, no action is necessary.

HED 449 The page party system needs to be upgraded. It doesn't work in many locations and more phones are needed in various locations.

RESOLUTION - See Resolution to HED 68. The number of phones was deemed adequate.

HED 517 There is no way to contact NPO from control room during a loss of all AC Power. No power to communications equipment and can't use walkie talkie in control room.

RESOLUTION - The telephone system will be supplied from an uninterruptible power supply. In addition, a communications base station is also available in the control room.

SCHEDULE - Modification will be implemented by the completion of the Cycle 5/6 Refueling Outage.

## CONTROL ROOM LIGHTING STUDY

HED 90 The illumination levels at the supervisory and flight control panels exceed the maximum recommended levels.

RESOLUTION - As a result of this HED, the Authority conducted a subsequent illumination study in the control room. The illumination levels measured on the supervisory panels varied from 16 FC on panel SOF to 30 FC on panel SFF, with the average being 24.3 FC. The levels measured on the vertical sections of the flight panels were 20 FC on panel FDF and 24 FC on panels FAF, FBF and FCF. The levels measured on the inclined console surfaces were 44 FC on FAF, 48 FC on FBF and 50 FC on FCF. Contrary to the original findings of HED No. 90, these levels are not excessive but are, with the exception of the 16 FC on panel SOF, within the acceptable range 20 - 50 FC. In an attempt to determine the reason for this disparity, a second set of illuminance measurements was made on the vertical panel surfaces with the light sensitive cell of the meter held in a horizontal position. These readings varied from 42 FC on panel SOF to 85 FC on panels SGF and SFF, with the average being approximately 60 FC. From these findings, it was concluded that the measurements upon which HED 90 was based were taken with the light sensitive cell in the horizontal position which is an incorrect position and that the actual illumination levels on the panels are in fact acceptable. As part of the Maintenance Program, any burned out fluorescent tubes in the supervisory panel supplementary lighting fixture will be replaced in order to maintain the illuminance on panel SOF above 20 foot candles.

HED 95 Reflectance of instruments and displays on the control panels is below the minimum preferred range.

RESOLUTION - While most of the reflectances for the instruments and displays that were measured during the DCRDR survey were below the preferred range of 80-100%, this does not appear to be a real problem from a visual standpoint. Except for those subject to glare, the instruments and displays were easily read. Those instruments subject to glare are addressed in HEDs 96 & 413.

HED 96 Various instruments and displays on the control  
& 413 panels are subject to excessive glare.

RESOLUTION -

The Authority has evaluated the use of non-glare type meter faces and has decided not to implement these type meter faces in the control room. The non-glare type meter face is not transparent but rather it is translucent. Meter readability with these type meter faces is limited to a narrow range of incident viewing angles. Furthermore, the non-glare type meter faces are subject to a certain level of glare. As the existing meters are readable with the existing levels of glare, the non-glare type meter faces will not substantially improve meter readability. Hence, no action is planned.

HED 97 Color and lighting are not used in the control room to create a cheerful atmosphere.

RESOLUTION -

The control room walls were recently painted and a new carpet was recently installed; thereby improving the aesthetics of the control room. The present light green color of the control panels is one which has been found to be restful to the eyes when long observation periods are involved and, as such, is a good choice of color for the panels. As such, no action is planned.

HED 127 Light intensity of some indicator lights is not at least 10% greater than the surrounding panel surface.

RESOLUTION -

The operator has no problem distinguishing which indicator lights have been illuminated. As such, no action is planned.

Alarms in the Control Room

HED 386 Too many different systems on one panel.

405 & 441 Alarms which were added as part of modifications are on panels not associated with that alarm.

The placement of individual annunciators do not follow a logical pattern.

RESOLUTION - During the initial design of the control panels, the annunciators were functionally grouped. Numerous subsequent control room modifications required the addition of a large number of annunciators. Due to available annunciator window constraints, the original functional grouping of annunciators could not be followed for all of the additional annunciators. A number of the critical annunciators will be relocated.

SCHEDULE - This modification will be completed by the completion of the Cycle 6/7 Refueling Outage.

## Correlation Between Control Switches and Reset Buttons

HED 202 Phase A isolation switches and resets are separated from others on SNF panel and not identified.

HED 232 Reset push buttons not ordered (i.e., layout of resets not the same as the valve controls).

RESOLUTION - No modifications to the switches and resets are planned since the frequency of operation is low and there is no need to operate the switches and resets quickly. However, a color code will be implemented to more readily identify the isolation switch with their corresponding reset push button.

SCHEDULE - Color code to be implemented by the completion of the Cycle 5/6 refueling outage.

Miscellaneous Studies

HED 213 When a light bulb goes out, the failure is not apparent to the operator. These light indicators have no lamp test capability.

RESOLUTION - No action planned. These indicators are not normally illuminated. A common alarm is provided on control board to alert the operator to a concern which is indicated individually by the subject light indicators. The operator will then look to see what indicator is illuminated for specifics. If no indicator is lit, the operator is informed of a bulb failure.

HED 423 Valves 820 A&B component cooling water (CCW)  
& 424 discharge from the RHR HX's should be monitored in the fashion of 638 & 640 with controls on RHR section of supervisory panel.

Manual CCW HX outlet valves require containment entry and radiation exposure.

RESOLUTION - These two items were identified during the operating personnel interview. These items do not involve a deficiency from the human factors criteria provided by NUREG-0700. These items of concern are related to valve accessibility and does not involve a human factors concern.

HED 432 Controls for RCV-014 and 018 should be located in control room so NPO cannot inadvertently operate without control room permission.

RESOLUTION - RCV-014 & 018 control Waste Disposal, RCV-014-Gas control through stack, RCV-018 Liquid control through discharge canal. Presently, controls are located on waste disposal panel in PAB. A permissive will be introduced in the RCV-014 & RCV-018 circuitry such that before the valves can be operated the control room operator must provide the permissive signal switch.

SCHEDULE - Modification will be completed by the completion of the Cycle 6/7 Refueling Outage.

HED 451 Contacting the NPO during power outage is extremely difficult because the power supply for page system is not redundant.

RESOLUTION - See HED 517 of the Communications Study.

HED 454 "Two is True" valve lights-bulbs can't be tested without removing each cube.

RESOLUTION - Modification to provide push to test function on the "two is true" will be implemented.

SCHEDULE - Modification will be completed by the completion of the Cycle 6/7 refueling outage.

HED 471 All 480 volt pump indicator lights are an indication of breaker position not pump status. So unless there is a flow, amp, or discharge press meter to go along with each pump, there is no direct indication that the pump is operating.

RESOLUTION - All 480V motors have direct indication except containment spray. Modification will be implemented to provide direct indication for containment spray pumps.

SCHEDULE - Modification will be completed during the Cycle 6/7 refueling outage.

HED 475 The steam generator wide range level recorders are cold calibrated recorders. They are temperature sensitive. Readout must be corrected if  $< 100$  degree .

RESOLUTION - A temperature compensation curve is provided in the graph book. Additional intermediate data points will be provided.

SCHEDULE - Resolution will be completed by the completion of the Cycle 5/6 Refueling Outage.

HED 502 Boric acid transfer pump speed does not have any other indication of flow on emergency boration. Pump run only shows slow-fast but this is taken off switch and not at the motor windings.

RESOLUTION - Modification will be implemented to provide flow indication on control board.

SCHEDULE - Modification will be implemented by the completion of the Cycle 6/7 refueling outage.

HED 516 A direct indication of pressurizer spray valve status is not provided as required by procedure.

RESOLUTION - A modification will be implemented to provide direct indication of pressurizer spray valve position.

SCHEDULE - Modification will be implemented by the completion of the Cycle 6/7 Refueling Outage.

HED 407 No thermostatic control of heating/cooling or  
& 444 ventilation.

Air conditioning compressor trips often in summer.

RESOLUTION - The Authority is planning to upgrade the control room HVAC system by the completion of the Cycle 6/7 refueling outage. The above HEDs should be resolved as part of this effort.

HED 422 Boiler Feedwater Pump (BFP) speed control only works in manual and is very touchy and unprecidatable.

RESOLUTION - This concern is included in the study of total BFP system. Since this involves a major study and modification, a detailed schedule could not be established at this time.

HED 365 Normal containment pressure is too low to be read.  
&373 These are accident meters. Need narrow range meter from 2 inches vacuum to 2 PSI.

Containment pressure during normal operations cannot be read with precision or accurately by the operator due to its scale range.

RESOLUTION - No action required. Containment narrow range pressure can be read from Foxboro cabinet B9 in the control room.

HED 420 SG level chart recorders wear out frequently (especially #34).

RESOLUTION - Steam generator recorders have been replaced.

HED 459 The operators feel that during startup and emergency the RO Rover is needed in CCR but that would leave NPO's undermanned.

RESOLUTION -

This HED was identified during the Operating Personnel Interview. At the time of the survey the position of RO Rover was just being initiated. The RO Rover is available to conduct valve line-up checks, take routine tours, investigate problem areas, and provide assistance during emergencies. The RO Rover has the responsibility of reporting to the control room to assist the SRO and Ro when directed so by the Shift Supervisor or SRO. The Authority feels that it is within the purview of the Shift Supervisor or the SRO to balance the need for RO Rover assistance in the control room versus the need for RO Rover assistance to the NPOs in the plant. Furthermore, the current staff of NPOs is more than adequate. In addition to the two NPOs with watch duties, an additional NPO is available in both the water factory and the condensate polisher facility. They may be removed from their normal duties to support any plant requirement.

HED 72 Several auditory signals were not 10 dB(A) above average ambient noise. Only (3) three were those being: R1 Radiation Alarm, first out alarm, and fire alarm. Those below the 10 DB(A) guideline were: telephone, fire alarm, low O2, printer alarm, high flux counter, containment evacuation, and annunciator alarm.

RESOLUTION

Telephones will be replaced. The computer printer has been replaced. No action is planned on any of the auditory signals due to the small size of our control room, different locations of signals and the different types of signals i.e. bells, horns, siren, etc. which enable the operators to hear and distinguish the aforementioned signals over the ambient noise.

Attachment 2 to IPN-86-48  
Changes in HED Status

New York Power Authority  
Indian Point 3 Nuclear Power Plant  
Docket No. 50-286

HED 411 Occasional high pitched noise from county hotline is distracting.

PREVIOUS ACTION Install a volume switch on county hotline.

NEW RECOMMENDATION No action. There is a volume control on the county hotline. A subsequent evaluation indicates there is no high pitched noise from the county hotline.

HED 108 The eight Foxboro auxiliary feedwater flow regulator potentiometers turn counter-clockwise to cause an increase in parameter.

PREVIOUS ACTION Provide valve controls that cause an increase in parameter with clockwise motion.

NEW RESOLUTION A reassessment of this HED indicates that the parameter of concern is the systematic response, i.e. flow. A clockwise turn decreases the output of the controller which leads to an increase in flow. Hence, the controls does in fact cause an increase in the parameter that being flow with a clockwise motion.

HED 427    AFW Reg valve controller indicates % shut instead of % open. This is also opposite of main feedwater reg. valve controls.

PREVIOUS ACTION    Same as that for HED 108

NEW RESOLUTION    No action required. The percentage indicates output of the controller not valve position. Meters directly above the controllers provide an indication of flow.

HEDs 214    Chart recorder range was 0 to 120 and was  
218, 220    changed using pencil, paper and pen 0 to 60.

The ink clogs the pen frequently, the pen skips and the ink smudges.

Plots all the same color - purple. Colors should permit channel identification from line color.

PREVIOUS ACTION    Replace recorders during the Cycle 5/6 Refueling Outage.

NEW RESOLUTION    At the time the previous action was committed to, it was thought that the recorder replacement would involve a simple replacement in kind. However, upon completion of preliminary engineering, it was determined that the recorder powers 12 transmitters. As this type of recorder is now obsolete, the 12 transmitters must also be replaced and an additional power supply is needed to drive the transmitters. The original commitment date of the Cycle 5/6 Refueling Outage must be revised to the Cycle 6/7 Refueling Outage due to increased scope of work.

HEDs 116, The auxiliary feedwater flow meters do not need a 474 & 514 logarithmic scale for a range of 0 to 400 GPM.

These meters are not sensitive enough at low end (25 GPM) to accomplish task

Instrumentation does not give accurate indication of AFW flow at  $\leq$  100 GPM.

**PREVIOUS ACTION** Provide square root extracted signal and a linear meter.

**NEW RESOLUTION** These HEDs are a result of an EOP requirement to verify auxiliary feedwater flow of 25 gpm. However, this 25 gpm is an arbitrary value assumed to assure adequate flow to the steam generator. A value of 100 gpm can be used in lieu of the 25 gpm. The EOPs have been revised to verify an auxiliary feedwater flow of 100 gpm. This revision to the EOPs obviates these HEDs.