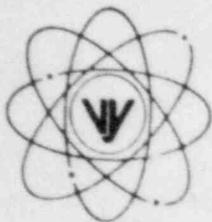


VERMONT YANKEE NUCLEAR POWER CORPORATION



RD 5, Box 169, Ferry Road, Brattleboro, VT 05301

FVY 86-30

REPLY TO:
ENGINEERING OFFICE
1671 WORCESTER ROAD
FRAMINGHAM, MASSACHUSETTS 01701
TELEPHONE 617-872-8100

March 31, 1986

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Office of Nuclear Reactor Regulation
Mr. Daniel R. Muller, Director
BWR Project Directorate #2
Division of BWR Licensing

References: a) License No. DPR-28 (Docket No. 50-271)
b) Letter, VYNPC to USNRC, FVY 85-61, dated 7/1/85
c) Letter, VYNPC to USNRC, FVY 85-87, dated 9/16/85

Dear Sir:

Subject: Vermont Yankee Detailed Control Room
Design Review Summary Report (DCRDR)

By letter dated July 1, 1985 [Reference b)], Vermont Yankee Nuclear Power Corporation submitted a Detailed Control Room Design Summary Report for the Vermont Yankee Nuclear Power Plant providing a status of all identified Human Engineering Discrepancies (HED's) along with a proposed schedule for implementation of HED resolutions. Several study areas of the DCRDR submittal were further discussed with your staff during a telecon on October 10, 1985. This letter provides, as Attachment 1, a final disposition of the previously unresolved study areas, HED's 0201, 05E2, 0600, 0700, 0903, and 1000, as well as an updated list of planned modifications and a schedule for their implementation.

The six study items for which a complete description is included are summarized below:

HED 0201 Specify how the final AOG panel will differ from the guidelines. Are important features consistent?

There are no safety significant findings which will not be fixed.

HED 05E2 Address instrument failure mode.

There are no instruments for which failure mode is not obvious.

HED 0600 Complete engineering study for the annunciators.

This study has been completed. Specific changes to be made are described in the attachment and include HED's 0601, 0602, and 0603.

8604070183 860331
PDR ADOCK 05000271
P PDR

A003
1/1

VERMONT YANKEE NUCLEAR POWER CORPORATION

U.S. Nuclear Regulatory Commission
March 31, 1986
Page 2

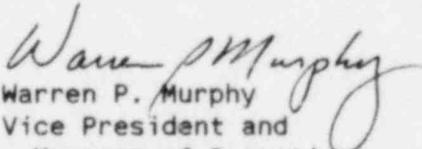
- HED 0700 Provide a copy of the revised DP 0162 procedure.
A draft copy of the planned revision is attached.
- HED 0903 Provide specific corrective actions.
This item addresses noise levels in the control room. See attached evaluation.
- HED 1000 Provide lesson plans and specific training materials.
This item addresses interchange of indicating light lenses. Controls will be implemented by means of an administrative procedure (AP 0157). A draft copy is attached. This procedure will be included in the annual Requalification Training Program for operators, as appropriate.

It is our intention to complete these modifications during the next two successive outages; however, this revised schedule assumes no unforeseen difficulties in the design, procurement and installation efforts associated with each of the respective modifications. We will provide advanced written notification of items, if any, that are later determined to require extension beyond the 1988 outage. Further, we are willing to meet with your staff to discuss the scope and schedule of the Vermont Yankee Detailed Control Room Design Review Program.

We trust that this information is acceptable; however, should you have any questions or require additional information concerning this subject, please contact us.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION


Warren P. Murphy
Vice President and
Manager of Operations

/dm

LIST OF ATTACHMENTS

- | | |
|--------------|---|
| Attachment 1 | Previously Unresolved Study Areas and Revised Implementation Schedule |
| Attachment 2 | DCRDR Label Standard |
| Attachment 3 | Draft Alarm Response Page |
| Attachment 4 | Draft Procedure DP 0162, Control of Operator Aids and Temporary Labels |
| Attachment 5 | Control Room Noise Levels |
| Attachment 6 | Draft Procedure, AP 0157, Identification and Control of Indicating Lights |

ATTACHMENT 1

HED 0201 - AOG PANEL FINDINGS

This HED concerns problems associated with the AOG Control Panel, CRP 9-50. Each of the findings was reviewed in detail and possible fixes were evaluated. The two findings considered most significant by the DCRDR were the location of the controls versus the associated feedback indication, and the existing radiation monitors and H₂ monitors located below the anthropometric limits.

The control switches for AOG valves are located to the right and left of the main mimic, thus the valve indication is not directly correlated with the control switch. The operation of this system is, however, almost always automatic. Thus the valve position is not dependent on control switch position. Since the valves will open or close depending on which mode of operation is selected, the manual control switches are provided only for the rare occurrence of manual operation of the system and for initial system alignment. Relocation of these control switches within the mimic would create additional confusion due to the large density of indications presently located on the panel.

The radiation monitors and H₂ monitors are located below the recommended height; however, recorders display the same information and are located higher on this same panel. Also, annunciation of these parameters is provided. Therefore, there is no reason to relocate these meters.

Many of the remaining findings had to do with the unfamiliarity most operators feel regarding this system. The operator's understanding of this system will be greatly enhanced with the current VY specific simulator. Use of this simulator will allow the operators to become familiar with a panel that is rarely used except for startup of the system.

There were four (4) findings which suggest that the AOG panel should be relocated to the primary operating area. This finding is unrealistic and will not be further addressed.

The AOG panel is acceptable for the type of operation required. No action will be taken to relocate controls and indications. The labeling on this panel was closely evaluated and will be upgraded such that the association of controls and feedback will be readily obtainable. Such measures as coding, hierarchical labeling, and demarcation will be implemented to assist the operator in his understanding and ease of operation of the system. In addition, the mimic will be completely replaced and all non-essential mimic lines will be deleted. The location of all instrumentation within the mimic will be denoted by nameplates matching the color of the main indicator nameplate. All control switches will have a description added to aid in correlating the control switch with the appropriate indication within the mimic.

HED 05E2 - INSTRUMENT FAILURE MODE

There are no related findings associated with this item. A document search was conducted to determine how this item was included in this HED, and the item was found to address the alternate shutdown panel indicators. Since this panel is not normally energized, it appeared that there was no way to tell if the meters were operable from observation. However, once the panel is energized, there is no difficulty determining instrument failure mode. The operators' familiarity with this panel will be greatly enhanced with the current VY-specific simulator since the Alternate Shutdown Panel is included in the scope of simulation. No further action will be taken.

HED 0600 - ANNUNCIATOR STUDY

An engineering study of all control room annunciators has been completed using the criteria of NUREG 0700. A summary of related findings and changes to be made are described under HED's 0600, 0601, 0602 and 0603. Findings and changes related specifically to HED 0600 include the following:

1. No consistent use of acronyms/abbreviations.

All labels have been reviewed and will be replaced. An Acronym/Abbreviation Standard has been developed, and included as Attachment 2.

2. High use of common alarms/no reflash for 2nd alarm input.

A complete evaluation of each annunciator window was conducted to determine the need to separate alarms. There are no current alarms which need to be split nor any which require reflash capability.

3. No first out feature provided.

A first out feature is currently installed at Vermont Yankee for all automatic scram signals. When the first signal is received, it flashes in a distinct pattern - three fast pulses, pause, three fast pulses, pause, etc. The second alarm received flashes at the normal fast steady rate. When the acknowledge button is hit, the first alarm flashes at a slow steady rate while all successive alarms come in solid. The alarm that is still flashing is the first scram signal that was received. Once the reset button is depressed, all alarm windows come in solid (reference FASR Section 7.2.3.5)

4. Letter size not controlled.

A lettering standard has been developed and included as Attachment 2.

5. No segregation/prioritizing of alarms.

All annunciator windows will be rearranged and replaced to ensure consistency in meaning, abbreviations and acronyms. Alarms will be segregated by system and prioritized from top to bottom. The rearrangement and relettering will be done simultaneously.

6. Setpoint information not provided.

This item was considered in the annunciator label standard and a determination made that alarm setpoints will not be included on the annunciator windows. The basis for this is the fact that there would be less confusion between the Administrative and the Technical Specification setpoint values, the actual setpoint tolerances applied when setting the alarms and with setpoint changes that typically occur throughout the life of the plant. Setpoint information is more properly included in the Alarm Response Sheets and these will be much easier to use with the new tabbing arrangement described in HED 0603.

HED 0601 - ANNUNCIATOR CONTROLS

A. Separate silence control not provided.

A silence control is an extra control that allows operators to turn the audible signal off while leaving the visual signals/flashing lights on. During multiple alarm events, the audible signal may be on almost continuously because of successively occurring and clearing alarms. A silence control could be implemented in two ways: 1) a global silence switch which would disconnect the horn(s) for all incoming and clearing alarms or 2) a separate silence pushbutton that would clear the horn each time an alarm is received - but subsequent alarms would reactivate the horn.

For the first case (global silence), if the silence control were used, each alarm would continue to flash. Subsequent alarms coming in would not be noticed since they would be just one more alarm in an existing field of flashing lights. The only way the operator could distinguish subsequent alarms in a multiple alarm event would be to use the Acknowledge pushbutton which would silence the alarms as well as create a solid light whereby subsequent alarms could be readily distinguished. Additionally, if the Silence and Acknowledge were used, newly occurring alarms would remain unnoticed since there would be no horn to alert the operator.

The second case (individual alarm silence) also has major shortcomings. Consider again the case of multiple alarm events. Even with a silence control, the horn would be on almost continuously due to subsequent alarms and clearing alarms. The operator is still faced with the horn as well as an ever-growing field of flashing lights which he has no hope of assimilating unless he uses the Acknowledge Control. Further, the Annunciator System at Vermont Yankee does not have the capability of installing this feature, thus it would require a complete replacement of the system in order to install this feature.

Based on the above, no silence control will be installed.

B. The annunciator response controls cover too large an area.

The existing Annunciator System is currently split into two response zones, one for NSSS and one for BOP. A detailed review of possible locations and acceptable zones was completed and the following changes will be made:

1. The annunciator response controls will be split into four zones: One for CRP 9-8; one for CRP 9-7 and 9-6; one for CRP 9-5 and 9-4; and one for CRP 9-3. This arrangement will ensure that an operator will be able to read an annunciator window while acknowledging the alarm.
2. The annunciator controls will be arranged in a standard configuration at each response location so that the operator can identify each control pushbutton by its relative position on the panel.
3. Controls will be located at the same relative position on each panel such that the operator can quickly locate these controls and not have to reach across the panels in order to use the controls.

The combination of changes described above will ensure the best possible combination of operator convenience and adequate assurance that all alarms will be properly acknowledged.

HED 0602 - ADDITIONAL ANNUNCIATORS

This HED suggests several annunciators which were considered for addition to the existing annunciator system. Each finding was evaluated and the results are as follows:

1. Provide annunciation of feedwater pump trip on high water level.

This alarm point has already been installed at Vermont Yankee.

2. Provide annunciation of feedwater pump auto start.

This alarm would be redundant to the feedwater pump trip alarm added previously. The only time a feedwater pump can auto start is if its control switch is in AUTO and a running pump trips. Therefore, the addition of the feedwater pump trip alarm makes this alarm unnecessary. No change will be made.

3. Provide annunciation of steam flow/feed flow mismatch.

The level control system at Vermont Yankee utilizes feed and steam flow as inputs. If there were a mismatch in these inputs, it would be readily seen as a level perturbation and most likely result in a high or low level alarm. Additionally, a feed flow/steam flow mismatch annunciator would be a nuisance alarm during startup or shutdown. Steam and feed flow signals are being moved to the same recorder (HED 0200) thus any mismatch will be obvious. No further change will be made.

4. Provide annunciation of HPCI Hi Drywell Pressure initiation blocked.

A normally lit white indicating light will be added directly above the reset-pushbutton. This light will remain lit as long as the LO-LO level and Hi drywell pressure initiation signals are clear. If an initiation signal is received, the light will go out and remain out until the signal is cleared by depressing the pushbutton.

5. Provide annunciation of HPCI/RCIC initiation signal/auto start.

HPCI initiates on LO-LO level or Hi drywell pressure. RCIC initiates on LO-LO level. Both of these conditions are indicated and alarmed in the control room. If either of these signals is received, there are many automatic actions that occur. Adding an additional alarm for HPCI/RCIC auto start would not enhance the operator's ability to determine the status of these systems due to the large number of incoming and clearing alarms. The white light being installed for HPCI Hi drywell pressure initiation blocked (HED 0602) will provide indication of HPCI/RCIC auto start since, if the initiating condition occurs, the light will go out. No further change will be made.

HED 0603 - ALARM RESPONSE PROCEDURE

The Alarm Response Sheets will be reformatted and tabbed. This new arrangement consists of relabeling each annunciator in the Control Room such that an alarm window will be referred to by control room panel and this window number. The existing convention of each annunciator being labeled separately will be discontinued. For example, currently an alarm is identified as CRP 9-3 Annunciator A-2 Window 3-D. The new system will be CRP 9-3 Window 3-H. Separate tabs will be provided for each control panel with subtabs for each column. Further, only one window will appear on a single page in the Alarm Response procedure. The response time with this revised system will be greatly improved. Attachment 3 provides an example of the new Alarm Response Sheet.

HED 0700 - CONTROL OF OPERATOR AIDS AND TEMPORARY LABELS

A draft copy of the revised procedure, DP 0162, Control of Operator Aids and Temporary Labels, has been included as Attachment 4.

HED 0903 - CONTROL ROOM NOISE LEVELS

The description of this HED included in the summary report appears to be in error. It states that the noise level in the Control Room in the area of the back panels is 85 DB due to the 60 cycle hum from the relays. The noise survey was repeated during the week of January 14, 1985, and the following data was obtained:

<u>Location</u>	<u>DBA</u>
1	51
2	51
3	53
4	53
5	53
6	57
7	55
8	53
9	56
10	60
11	63

(Continued)	<u>Location</u>	<u>DBA</u>
	12	62
	13	68
	14	61
	15	60
	16	59
	17	60
	18	64

Noise levels were measured with a Bruel and Kjaer Precision Integrating Sound Level Meter, Model 2218, at eighteen (18) different locations in the Control Room (see Attachment 5 for locations). The data indicates that at all but one location the noise level was below the recommended 65 DB maximum.

The noise levels in the main operating area of the Control Room are within the guidelines of NUREG 0700. The actual noise level at the location of the relay panels (noise source) is 68 DBA, only 3 DB above the maximum recommended by 0700. Installation of carpet in the Control Room and replacement of ceiling tiles (HED 1409) will further reduce sound levels. No other corrective action is considered necessary for this item.

IDENTIFICATION OF INOPERATIVE INSTRUMENTATION
HED 1000 - AND CONTROL OF INDICATING LIGHTS

Identification of inoperative instrumentation and control of indicating lights will be implemented by means of administrative procedure AP 0157, a draft copy of which has been included as Attachment 6.

HED IMPLEMENTATION SCHEDULE

ATTACHMENT 1

Page 7

THE FOLLOWING ARE PLANNED FOR IMPLEMENTATION DURING THE 1987 OUTAGE

DESCRIPTION	HED
RELOCATE CONDENSER VACUUM ISOLATION SWITCHES ON CRP 9-15, 9-17	0101
REVISE KEYLOCK SWITCH DIRECTIONS (6 TOTAL)	05E0
REWIRE CWB PUMP BYPASS GATES AND COND FLOOD VALVE SWITCHES	05C0
REMOVE HEAD SPRAY VALVE CONTROL SWITCHES, CONTROLLER, AND MIMIC	0601
REARRANGE COMPONENTS ON CRP 9-2	0200
RELOCATE HOGGER CONTROL SWITCH TO CRP 9-2	1406
RELOCATE 516 VLV RESETS, OG RECORDER SLEECTOR, FCV-35 INDICATORS	1406
ELIMINATE FCV-11 INDICATORS	1406
REARRANGE SJAЕ SWITCHES	1406
REVISE AP 0157, DP 0162	0700/1000
REVISE ALARM LIGHTS ON CRP 9-10 RAD MONITORS	0200
REVISE INDICATORS ON CRP 9-23	0200
RELOCATE 345KV DIGITAL VOLTMETER FROM 9-8 TO 9-7	0200
REARRANGE ROSEMOUNTS AND RECORDER INPUTS ON CRP 9-5	0200
RELOCATE/SPLIT ANNUNCIATOR CONTROLS INTO 4 ZONES	0601
RELOCATE VITAL AC TRANSFER SWITCH FROM 9-5 TO 9-8	0203
FIX EPR/MPR FINDINGS	1402
ADD SCRAM LIGHTS TO CRP 9-5	1405
ADD DIESEL GENERATOR VAR METERS ON CRP 9-8	1405
ADD INDICATION OF HPCI INITIATION BLOCKED	0602
ADD MTS-2 TRIP INDICATION TO CRP 9-7	05B0
SEAL ALL OPENINGS IN CONTROL PANELS	1403
RELABEL SWITCH ESCUTCHEON PLATES	05D0
REPAINT CONTROL PANELS	N/A
ADD LINES OF DEMARCATION/HIERARCHICAL LABELS	0208
REPLACE ALL MIMICS	0300
REPLACE ALL NAMEPLATES	0400
PAINT/REPLACE CONTROL SWITCHES FOR COLOR STANDARD	0300

THE FOLLOWING ARE PLANNED FOR IMPLEMENTATION DURING THE 1988 OUTAGE

FLIP HPCI/RCIC RPM METERS	05E3
SCALE CHANGE ON COOLIDGE LINE VOLTAGE	0200
REPAINT INDICATOR SCALES (ADD UNITS, CHANGE DIVISIONS, ETC.)	05E1/05E2
ADD ZONE CODING TO INDICATOR SCALES	05D0
REWIRE ANNUNCIATOR SYSTEM (SEGREGATE, PRIORITIZE)	0600
REQUIRES TWO NEW PANALARMS	
ELIMINATE UNNECESSARY ALARMS	0602
ADD ANNUNCIATION OF RX/CTMT RAD MONITOR FLOW/FILTER FAULT	05B0
REPLACE ANNUNCIATOR WINDOWS	0600
REVISE ALARM RESPONSE SHEETS	0603
REPLACE TURBINE ACCELERATION METER	0200
FIX LIGHTING/HVAC REPLACE CONTROL ROOM CEILING	0800/0901/0902/0904/1409