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June 4, 1981
EF2-53,112

Mr. L. L. Kintner
Division of Project Management
Office of Nuclear Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: NRC Human Factors Engineering Control Room
Design Review Audit Report of Enrico Fermi 2

Dear Mr. Kintner:

During the meeting between NRC HFEB Branch members and Detroit Edison Company on 6-3-81, you requested that we send the comments on the subject report by the end of this week. We are enclosing our comments as an attachment to this report. (See Attachment A).

Your report assigns priority rating of 1,2 and 3, to various items with the stipulation that category 1 and 2 items be corrected prior to loading fuel and prior to achieving sensible heat respectively. Priority rating 3 discrepancies should be evaluated and proposed actions reported as part of the long term design review (due one year from the issue date of NUREG-0700).

Our comments for these category 1, 2 and 3 items were discussed extensively with your HFEB members (R. J. Schemel - Team Leader) on 6-3-81 and are based on the conclusions reached in that meeting.

If you have any questions on our response, please direct the same to Gopal K. Sharma, Control Center Engineer, EF2 at (313) 649-7194.

Yours truly,

W. F. Colbert
Technical Director
Enrico Fermi Unit 2

CC: B. Little

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DETROIT EDISON RESPONSE
TO
NRC HUMAN FACTORS ENGINEERING
CONTROL ROOM DESIGN REVIEW AUDIT REPORT
ENRICO FERMI 2 NUCLEAR POWER STATION

In response to your report, we are listing your findings and giving our response on a one to one basis.

1. CONTROL ROOM WORKSPACE

<u>Finding</u>	<u>Detroit Edison Response</u>
1.	Indicator and control surveillance is not performed from this position. The annunciators can be observed from this position. The manning of the control room is such that this is not a concern. This item should therefore be deleted.
2.	The controls in question are not safety related. Further they are rarely used. The priority rating on these should be changed to 3 (long term review).
3.	Long term review.
4.	Long term review.
5.	A full set of procedures will be available before fuel load.
6.	Long term review.
7.	The headsets provided will be adjustable for use by individual operators. (before fuel load)
8.	The control room procedure binders will have an index in front of each volume and index tab separators will be provided for individual procedures before fuel load.
9.	Each system operating procedure requiring the use of M/A Sta will have the procedure for manual/automatic controllers included as a part of the procedure. (before fuel load)
10.	Written procedures will be stored at Remote Shutdown Panel before fuel load.

2. WORKPLACE ENVIRONMENT

<u>Finding</u>	<u>Detroit Edison Response</u>
1.	The back-ground noise levels, alarm levels above background noise, temperature and humidity will be evaluated after the HVAC installation and before fuel load.

2. WORKPLACE ENVIRONMENT (continued)

<u>Finding</u>	<u>Detroit Edison Response</u>
2.	Long term review.
3.	Long term review.
4.	We will verify that the lighting systems are installed as designed and verify readings. (before fuel load)
5.	Emergency light (8 hr.) will be provided at Remote Shutdown Panel. (before fuel load)
6.	Long term review.
7.	Long term review.
8.	The communication requirements will be evaluated and a proposed solution reported. (before fuel load)
9.	The location of the paging system will be changed and volume adjustment provided. (before fuel load)
10.	The Suppression Chamber bulk water temp recorder will be relocated. (before fuel load)
11.	Inadvertent operation cannot happen because of direct indication from plant component. This item should therefore be deleted.
12.	Administrative Procedures for making permanent modifications to the control boards will be provided before fuel load.

3. ANNUNCIATORS AND AUDITORY SIGNALS

<u>Finding</u>	<u>Detroit Edison Response</u>
1.	Long term review.
2.	We will fix this.
3. & 15.	The Alpha-Numeric System shall be changed with a new system. The Alarm Response Procedure number will correspond to the number on the annunciator window. This will be accomplished before fuel load.
4.	During the mockup of control panels for Fermi 2 we considered the number of different tones that will be adequate for Fermi 2 control room. Our conclusion was three, one for each of the three different sections of panel groups in the control room.

3. ANNUNCIATORS AND AUDITORY SIGNALS (continued)

<u>Finding</u>	<u>Detroit Edison Response</u>
4. (contd)	One of these section consists of Panels 601, 602, 603, 804 and 805. Our philosophy is that if an operator is attending a problem as an example say on Panel 601 and the alarm auditory comes say on Panel 805 - he should be able to judge the gravity of the situation from where he is in this instance on 601 (the annunciator engraving is large enough to be seen from anywhere in the control room). If the problem on Panel 601 is of a more grave nature, he should be able to stop the auditory <u>distraction</u> by pressing the acknowledge button on 601. However, the annunciator window on 805 will still keep on blinking - a reminder that the problem is left unattended. We feel that this ability to silence the Auditory from anywhere in the control room will avoid operator distraction and be a valuable operator tool in stressful emergency conditions. This supplemented with a blinking lite for unattended but acknowledged problems will go a long way to help the operators. In the above example after attending to the problem on Panel 601 the operator can go press the acknowledge button on Panel 805. The blinking light will go solid - till the cause of the problem is removed. We feel that the intent of guidelines is met and therefore this finding be deleted. This example was given to illustrate the strengths of our annunciator philosophy.
5.	Long term review.
6.	Long term review.
7.	Long term review.
8.	Shall be changed before fuel load.
8a.	Shall be removed before fuel load.
9.	Shall be changed before fuel load.
10.	Long term review.
11.	Shall be made consistent.
12.	We will modify the blue tiles to avoid glare and remove any readability problems.
13.	Long term review.
14.	Long term review.
15.	See response to Finding 3.

3. ANNUNCIATORS AND AUDITORY SIGNALS (continued)

<u>Finding</u>	<u>Detroit Edison Response</u>
16.	Long term review.
17.	Long term review.
18.	The evacuation signal will be installed before fuel load.
19.	See response to Finding 1, under workplace environment.

CONTROLS

<u>Finding</u>	<u>Detroit Edison Response</u>
1.	The alarm acknowledge buttons will be provided with mushroom heads before fuel load.
2.	Long term review.
3.	We will fix the switches on panels 804, 808, 809, 810 and 817. However the IRM range switches on Panel 603 are Detroit Edison special. These switches were "custom built" after a lot of experimentation by a number of personnel (technical and Human Factor specialist). These switches are used by the operator to change the range on the IRM recorders. At the moment he/she is doing it - the eyes are fixed on the Recorder Scale and the hand follows the movement to reduce the scale values i.e. counterclockwise movement. However, in this process he increases the range of the instrument and that is the reason why the range numbers increase in the counter-clockwise direction. We therefore suggest that this finding be removed for these switches.
4.	The labels will be relocated before fuel load.
5.	Positive indication will be provided for safety relief valve position indication before fuel load.
6.	These switches on Panel 808 shall be modified so that the arrows point in correct direction (before fuel load).
7.	Black side borders will be provided for these pushbutton switches on Panels 805 and 806 (before fuel load).
8.	Black side borders for pushbutton switches and white side borders for indicators will be provided on Remote Shutdown Panel (before fuel load).
9.	The label will be provided on Panel 804 - before fuel load.

CONTROLS (continued)

<u>Finding</u>	<u>Detroit Edison Response</u>
10.	The position indicator line will be extended (to be readable) on the particular switch on Panel 805 before fuel load.
11.	The four black reset buttons on Panel 601 will be modified before fuel load.
12.	There are four IRM recorders. These are dual scale recorders. There are eight IRM range switches. The dual scale recorders have two pens one orange and the other blue. 4 IRM range switches have orange handles and the remaining 4 have blue handles. The range switches with orange handle manipulate the orange pen on the recorders and the range switches with blue handle manipulate the blue pen on the recorders. Each scale is a dual range - one range being red - 0 to 40 and the other range is black - 0 to 125. Individual range selector switches have red and black markings on scale. Red marking corresponds to red range and black marking corresponds to black range. Therefore there is no confusion and this item should be deleted.
13.	Long term review.

VISUAL DISPLAYS

<u>Finding</u>	<u>Detroit Edison Response</u>
1.	We will change the shade of blue before fuel load.
2.	Long term review.
3.	Will fix before fuel load.
4.	Manual/Auto stations are industry standard. We suggest this be considered a part of long term review.
5.	Long term review.
6.	We will fix these before fuel load.
7.	Long term review.
8.	We will fix this before fuel load.
9.	The unit markings will be provided before fuel load.
10.	Operating limits will be provided prior to achieving sensible heat.
11.	Long term review.

VISUAL DISPLAYS (continued)

<u>Finding</u>	<u>Detroit Edison Response</u>
12.	The color coding of indicator lights for EDG 11, 12, 13 and 14 will be made consistent before fuel load.
13.	The inconsistencies will be corrected before fuel load.
14.	Long term review.

PANEL LAYOUT

<u>Finding</u>	<u>Detroit Edison Response</u>
1.	Long term review.
2.	Long term review.
3.	Demarcation will be provided before fuel load.
4.	Demarcation lines will be added before fuel load.
5.	Long term review.
6.	Long term review.
7.	Long term review.

CONTROL/DISPLAY INTEGRATION

<u>Finding</u>	<u>Detroit Edison Response</u>
1.	The fire zone information will be provided on a clipboard located on panel apron before fuel load.
2.	Long term review.
3.	Long term review.
4.	Long term review.
5.	A label will be added before fuel load.
6 thru 11	Long term review.
12.	Please delete as item covered under Finding 3 of the controls section.
13.	Long term review.

CONTROL/DISPLAY INTEGRATION (continued)

<u>Finding</u>	<u>Detroit Edison Response</u>
14.	The two different indications are redundant indications, not different indications. This item should therefore be deleted.

LABELS

<u>Finding</u>	<u>Detroit Edison Response</u>
1 thru 5	These items will be fixed prior to fuel load.
6.	As hierarchial labelling is preferred this item should be deleted.
7.	The labels will be fixed to agree with the standards before fuel load.
8.	This item is not correct and should therefore be deleted.
9.	We will relocate the labels before fuel load.
10.	The label will be provided before fuel load.
11.	Group label will be provided before fuel load.
12.	We either use full words or standard abbreviations. Therefore please delete this item.
13.	We will add the label before fuel load.
14.	The labels will be moved below and position indication provided before fuel load.
15.	Will relocate before fuel load.
16.	The label location does not violate plant convention therefore this item should be deleted.
17.	Long term review.
18 and 19.	Will fix before fuel load.
20 and 21.	Long term review.
22 thru 24	Will fix before fuel load.
25.	Long term review.
26 thru 35	Will fix before fuel load.
36 thru 39	Long term review.

LABELS (continued)

<u>Finding</u>	<u>Detroit Edison Response</u>
40.	Will fix before fuel load.
41.	Long term review.
42 and 43.	Will fix before fuel load.
44 thru 47	Long term review.
48.	This needs long term evaluation. Please remove the superscript
49.	Long term review.
50.	Due to the configuration a functional (rather than mimic) layout is used. There is no safety function involved which may cause operator confusion in a rush situation. We therefore recommend that the category on this be changed to long term review.
51.	Long term review.
52.	Will fix before fuel load.
53.	Long term review.
54.	Will fix before fuel load.

PROCESS COMPUTER

<u>Finding</u>	<u>Detroit Edison Response</u>
1.	We are using GE package for NSSS software. Most of the software was available for review. Also cross indexing is provided and is available for review. The remaining software will be delivered prior to fuel load.
2.	The non-function keys will either be raised or locked to provide a cue to the operator that he/she is on the proper or improper key. Alphabetical keys will be recapped so only letters will be shown. Other function keys will be capped. (before fuel load)
3.	The computer keyboard is similar to calculator keyboard. The operators are familiar with calculator keyboard. We recommend that this item be deleted.
4.	CRT display items by log numbers is a very flexible approach provided for operator use. Certain logs will be fixed (administratively controlled) and the others will be available for operators to control i.e. the operators can control the information input to these. Shift change over administrative procedures will be developed prior to plant achieving sensible heat so that incoming shifts will know what the log number is referencing and what log numbers are available.

PROCESS COMPUTER (continued)

<u>Finding</u>	<u>Detroit Edison Response</u>
5.	We will replace the temporary labels before fuel load.
6.	We use GE standard color scheme. This should be a part of the long term review.
7.	Long term review.
8.	We will adjust this prior to sensible heat so only significant figures consistent with instrument accuracy will be displayed. The available field width is not adequate to allow decimal point line up. This will compromise the display description. We suggest that this item either be deleted or considered a part of long term review.
10.	The line printer is not an operation tool but a historical evaluation tool. Demand Printer is available in the control room for use by the operator. The questions of storage of data, use of computer and what it does, the use of Sequence of Event recording system, etc. should be integrated with NUREG 0696 and the capability of the entire system - not just the speed of one printer - should be evaluated. This total evaluation should be a part of long term review.

DATA RECORDING

<u>Finding</u>	<u>Detroit Edison Response</u>
1.	These points will be identified for 1, 2 and 3 pen recorders before fuel load.
2.	Recorders with 1, 2 and 3 pens will have these ranges marked before fuel load.
3.	We will fix this prior to plant achieving sensible heat.
4.	Long term review.
5.	The scale will be modified prior to fuel load.
6.	Long term review.
7 thru 9.	This will be fixed before fuel load.
10.	Long term review.
11.	The recorders in question are Post Accident recorders. For immediate actual reading the operator can check the needle location, for long term or historical evaluation a multiplier is used to calculate values. This item should therefore either be deleted or the priority changed to long term review.