



MISSISSIPPI POWER & LIGHT COMPANY

Helping Build Mississippi

P. O. BOX 1640, JACKSON, MISSISSIPPI 39205

April 7, 1982

NUCLEAR PRODUCTION DEPARTMENT

U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D. C. 20555

Attention: Mr. Harold R. Denton, Director

Dear Mr. Denton:

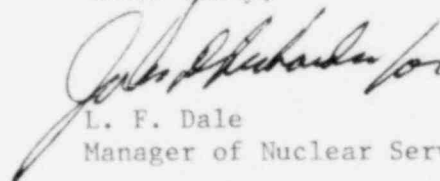


SUBJECT: Grand Gulf Nuclear Station
Units 1 and 2
Docket Nos. 50-416 and 50-417
File: 0260/0272/L-344.0
Ref: AECM-81/291, AECM-81/459
Final Resolution of Human Factors
Engineering Review Deficiencies
AECM-82/130

Please find attached the final resolution of all the control room human factors engineering review deficiencies identified by the referenced correspondence. As requested by your Mr. Dick Eckenrode (HFEB), the attached descriptions identify those final HFE resolutions that may have either (1) deviated from the original resolution as discussed in the responses to each HFE findings, (2) required clarification to the original HFE finding responses which provided alternate or multiple solutions, or (3) required clarification to make previous HFE finding responses more specific than that indicated in the original submittal. Attachments 1 and 2 readdress those HFE findings identified in AECM-81/291 and AECM-81/459 respectively.

The human factors engineering items (findings) marked with an asterisk in Attachments 1 and 2 indicate that these responses, which are to be resolved by fuel load, have not been implemented completely at this time. Most of these remaining items will be closed out prior to Mr. Eckenrode's site visit on April 14, 1982 and any remaining items will be closed out prior to fuel load.

Yours truly,


L. F. Dale
Manager of Nuclear Services

SAB/SHH/JDR:rg

Attachments

cc: See next page

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MISSISSIPPI POWER & LIGHT COMPANY

AECM-82/130

Page 2

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Final Resolution of the
Human Factors Engineering Review
Deficiencies

(Itemized from AECM-81/291)

ITEM	FINDING	FINAL RESOLUTION
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CONTROL ROOM WORKSPACE

1	1.1	Priority 3
2	1.2	Priority 3
3	1.3	Priority 3
4	1.4	Performed as indicated per AECM-81/291 by painting spare meter faces with grey paint to avoid misinterpretation.
5	1.5	No action required
6	1.6	Changed to Priority 3 per AECM-81/291.
7	1.7	Priority 3
*8	1.8	Performed as indicated per AECM-81/291 by placing telephone system on the Shift Supervisor's desk.
9	1.9	Performed as indicated per AECM-81/291 by placing plastic inserts in open holes in the benchboards.
10	1.10	Priority 3
*11	1.11	Performed as indicated per AECM-81/291. Plant procedure 01-S-06-4 was revised to preclude using recessed area of Panel P680 as storage for superfluous items.
*12	1.12	Performed as indicated per AECM-81/291 by providing carts (on casters) for procedure placement at the control room panels.
*13	1.13	Changed to priority 3 per AECM-81/291. Administrative restrictions for placing procedures etc. on controls is provided by Plant Procedure 01-S-06-4.
*14	1.14	Changed to priority 3 per AECM-81/291. Stools were provided for operator use as an interim step.
15	1.15	Priority 3
16	1.16	Priority 3
17	1.17	Priority 3

*Indicates some level of incompleteness necessary to close out item as required prior to fuel load.

<u>ITEM</u>	<u>FINDING</u>	<u>FINAL RESOLUTION</u>
*18	1.18	Performed as indicated per AECM-81/291. A cabinet has been provided to store head set at each remote shutdown panel.
19	1.19	Performed as indicated per AECM-81/291.
20	1.20	Performed as indicated per AECM-81/291.
*21	1.21	Performed as indicated per AECM-81/291. A cabinet at each R.S.P. has been provided to store necessary procedures.
22	1.22	Priority 3
23	1.23	Performed as indicated per AECM-81/291. The phone color coding scheme is as follows: NRC Hotline - Red H.P. Hotline - White Operational Hotline - Black (Offsite Agencies) Normal Communications Line - Beige Load Control Center Dispatcher - Black (no dial)

WORKSPACE ENVIRONMENT

24	2.1	No action required. Environmental survey will be performed and submitted to NRC 60 days prior to 5% power.
25	2.2	Performed as indicated per AECM-81/291 by coating meter faces with clear lacquer to reduce glare. Performed prior to fuel load.
26	2.3	Performed as indicated by AECM-81/291 by coating "SSW Sys B Flow" meter with lacquer to reduce glare. Replacement of GE 180 meters are being conducted in accordance with NUREG-0588 resolution.
27	2.4	Performed as indicated per AECM-81/291 by placing a shaded polarizing screen over the CRT to reduce glare. Performed prior to fuel load.
28	2.5	Priority 3
29	2.6	Priority 3
30	2.7	Priority 3
31	2.8	No action required
32	2.9	Performed as indicated per AECM-81/291
*33	2.10	Performed as indicated per AECM-81/291 by providing a cabinet at each R.S.P. which contain spare bulbs

<u>ITEM</u>	<u>FINDING</u>	<u>FINAL RESOLUTION</u>
<u>ANNUNCIATORS</u>		
34	3.1	Performed as indicated per AECM-81/291.
35	3.2	Performed as indicated per AECM-81/291.
36	3.3	Performed as indicated per AECM-81/291.
37	3.4	The resolution to this item will be implemented as revised per AECM-81/459 prior to 5% power.
38	3.5	No action required
39	3.6	Performed as indicated per AECM-81/291.
40	3.7	Priority 3
41	3.8	Performed as indicated per AECM-81/291.
42	3.9	Performed as indicated per AECM-81/291.
43	3.10	Performed as indicated per AECM-81/291.
44	3.11	Priority 3
45	3.12	Performed as indicated per AECM-81/291.
*46	3.13	Performed as indicated per AECM-81/291, however the audible ringback instead of being a bell has been replaced with a chime to be incorporated on each panel. The auditory intensity of the previously proposed bells was too high even when adjusted down to its lower limits. The new chimes will clear in app. 30 seconds and their tone will be the same for each panel. (The ring back frequency and location shown in Table 2 and 3 of the AECM-81/291 response is no longer applicable.)
47	3.14	Priority 3
<u>CONTROLS</u>		
*48	4.1	Performed as indicated per AECM-81/291.
49	4.2	Performed as indicated per AECM-81/291.
50	4.3	Priority 3
51	4.4	Changed to Priority 3 per AECM-81/291.
*52	4.5	Performed as indicated per AECM-81/291.

<u>ITEM</u>	<u>FINDING</u>	<u>FINAL RESOLUTION</u>
53	4.6	Priority 3
*54	4.7	Performed as indicated per AECM-81/291.
55	4.8	Deleted
56	4.9	No action required
57	4.10	Performed as indicated per AECM-81/291.
58	4.11	Performed as indicated per AECM-81/291.
59	4.12	Changed to priority 3 per AECM-81/291.
60	4.13	Performed as indicated per AECM-81/291.
61	4.14	Priority 3
62	4.15	Performed as indicated by AECM-81/291 by providing demarcation lines along with black control knob outer rings for the generator controls.
63	4.16	Priority 3
64	4.17	Priority 3
65	4.18	Performed as indicated per revised response in AECM-81/459.
66	4.19	Changed to priority 3 per AECM-81/291.
*67	4.20	Performed as indicated per AECM-81/291 by a preoperational and subsequent semi-annual cleaning of the P680 panel pushbuttons via an operations standing order. An in-plant task card will be issued later.
68	4.21	Performed as indicated per AECM-81/291.
69	4.22	Performed as indicated per AECM-81/291 by raising the label engraving for better visibility.
70	4.23	Priority 3
71	4.24	Performed as indicated per AECM-81/291.
72	4.25	Performed as indicated per AECM-81/291.
73	4.26	Performed as indicated per AECM-81/291.
*74	4.27	Performed as indicated per revised response in AECM-81/503.
75	4.28	Deleted
76	4.29	Priority 3

<u>ITEM</u>	<u>FINDING</u>	<u>FINAL RESOLUTION</u>
<u>DISPLAYS</u>		
77	5.1	Performed as indicated per AECM-81/291 by providing "Aux Boiler Pump Standby" and "Aux Boiler Heater Standby" labels.
78	5.2	No further action required.
79	5.3	Priority 3
80	5.4	No further action required.
81	5.5	Performed as indicated per AECM-81/291.
82	5.6	Performed as indicated per AECM-81/291.
83	5.7	Performed as indicated per AECM-81/291.
84	5.8	Performed as indicated per AECM-81/291.
85	5.9	Performed as indicated per AECM-81/291 by changing the scale to read level in feet.
*86	5.10	Performed as indicated per AECM-81/291.
87	5.11	Performed as indicated per AECM-81/291.
88	5.12	No action required.
*89	5.13	Performed as indicated per AECM-81/291.
90	5.14	Performed as indicated per AECM-81/291.
91	5.15	Performed as indicated per AECM-81/291. Modifications on the Foxboro controller will be implemented in accordance with resolution of NUREG-0588 requirements.
*92	5.16	Performed as indicated per AECM-81/291.
93	5.17	Performed as indicated per AECM-81/291.
94	5.18	Priority 3
95	5.19	Priority 3
*96	5.20	Performed as indicated per AECM-81/291 by providing yellow out-of-tolerance ranges on most of the main control room panel scales. The back panels and some main control room panels were provided with the yellow (out-of-tolerance) labels on the face bezels. Indication of operating zones were not used.
*97	5.21	Performed as indicated by AECM-81/291, by providing lamps with a higher starting voltage to eliminate induced voltage.

<u>ITEM</u>	<u>FINDING</u>	<u>FINAL RESOLUTION</u>
*98	5.22	Performed as indicated per the revised response provided in AECM-82/86. A daily survey of the panel areas is being provided in the Plant Procedure 02-S-01-5.
*99	5.23	Performed as indicated per the revised response provided in AECM-82/86.
100	5.24	Performed as indicated by AECM-81/291.
*101	5.25	Performed as indicated by AECM-81/291.

AUDITORY SIGNAL SYSTEMS

*102 6.1 Performed in accordance with the following revision to AECM-81/291. The audible alarm horns have been modified with warblers to provide a wavering response to reduce sound harshness. The alarm frequencies have been set as follows:

<u>Panel</u>	<u>Frequency</u>
P845	275 Hz
P842	1400 Hz
P862	750 Hz
P680	500 Hz
P870	1800 Hz
P601	1000 Hz
P807	2225 Hz
P808	250 Hz
P811	400 Hz

*103 6.2 Performed as indicated per AECM-81/291 except that a ringback chime has been provided at each panel in conjunction with the audible alarm.

LABELS AND LOCATIONAL AIDS

104	7.1	Performed as indicated by AECM-81/291.
105	7.2	Performed as indicated by AECM-81/291.
106	7.3	Performed as indicated by AECM-81/291.
107	7.4	Performed as indicated by AECM-81/291.
108	7.5	Performed as indicated by AECM-81/291.
109	7.6	Performed as indicated by AECM-81/291.
110	7.7	Performed as indicated by AECM-81/291.
*111	7.8	Performed as indicated by AECM-81/291.

<u>ITEM</u>	<u>FINDING</u>	<u>FINAL RESOLUTION</u>
112	7.9	Priority 3
*113	7.10	Performed as indicated by AECM-81/291.
114	7.11	Performed as indicated by AECM-81/291.
115	7.12	Changed to priority 3 per AECM-81/291.
116	7.13	Priority 3
117	7.14	Priority 3
118	7.15	Priority 3
119	7.16	Performed as indicated by AECM-81/291.
120	7.17	Changed to priority 3 per AECM-81/291.
121	7.18	Performed as indicated by AECM-81/291.
122	7.19	Performed as indicated by AECM-81/291.
123	7.20	Performed as indicated by AECM-81/291.
124	7.21	No further action planned.
125	7.22	No further action planned.
126	7.23	Performed as indicated by AECM-81/291.
127	7.24	Performed as indicated by AECM-81/291.
128	7.25	Performed as indicated by AECM-81/291.
*129	7.26	Performed as indicated by AECM-81/291.
130	7.27	Changed to priority 3 per AECM-81/291.
131	7.28	Performed as indicated per AECM-81/291.
132	7.29	Performed as indicated per AECM-81/291.
133	7.30	Changed to priority 3 per AECM-81/291.
134	7.31	Changed to priority 3 per AECM-81/291.
135	7.32	Performed as indicated per AECM-81/291.
136	7.33	Performed as indicated per AECM-81/291.
137	7.34	Performed as indicated per AECM-81/291.
*138	7.35	Performed as indicated per AECM-81/291.

<u>ITPM</u>	<u>FINDING</u>	<u>FINAL RESOLUTION</u>
*139	7.36	Performed as indicated per AECM-81/291 by changing tagging procedure (Procedure no. 01-S-06-1) to assure proper tagging on control panels.
140	7.37	Performed as indicated per AECM-81/291.
*141	7.38	Performed as indicated per AECM-81/291.
142	7.39	Performed as indicated per AECM-81/291.
143	7.40	Performed as indicated per AECM-81/291.
144	7.41	Performed as indicated per AECM-81/291. The mimic color coding scheme is as follows: Dark blue - Water (Process, etc.) Light blue - Water (Service, drains, etc.) White - Air/vents Red - Steam Dark green - 500 K.V. power Light green - 115 K.V. Dark brown - 34.5 K.V. power Orange - 13.8 K.V. power Gold - 4.16 K.V. power Light brown - 6.9 K.V. power Yellow - 480 V power Gray - Demarcation lines
145	7.42	Performed as indicated per AECM-81/291.
146	7.43	Performed as indicated per AECM-81/291.
147	7.44	Performed as indicated per AECM-81/291.
148	7.45	Performed as indicated per AECM-81/291.
149	7.46	Performed as indicated per AECM-81/291.

PROCESS COMPUTER

150	8.1	Priority 3
151	8.2	Priority 3
152	8.3	Priority 3
153	8.4	Priority 3
154	8.5	Changed to priority 3 per AECM-81/291.
155	8.6	Priority 3
156	8.7	Priority 3

<u>ITEM</u>	<u>FINDING</u>	<u>FINAL RESOLUTION</u>
157	8.8	Priority 3
158	8.9	Changed to priority 3 per AECM-81/291.
159	8.10	Priority 3
160	8.11	Performed as indicated per AECM-81/291 by both sliding the CRTs forward and shaving the screen bezel.
161	8.12	No action required.
162	8.13	Priority 3
163	8.14	Deleted
164	8.15	No color-coding inconsistencies have been identified.
165	8.16	Performed as indicated per AECM-81/291.

PANEL LAYOUT

166	9.1	Changed to priority 3 per AECM-81/291.
167	9.2	Priority 3
168	9.3	This response will be implemented per revised response on AECM-81/459 prior to October 1982.
169	9.4	No action required.
170	9.5	Performed as indicated per AECM-81/291.
171	9.6	Priority 3
172	9.7	Priority 3
173	9.8	Deleted
174	9.9	Changed to priority 3 per AECM-81/291.
175	9.10	Deleted
176	9.11	Priority 3
177	9.12	Priority 3
178	9.13	Priority 3
179	9.14	Priority 3
180	9.15	Priority 3
181	9.16	Priority 3

<u>ITEM</u>	<u>FINDING</u>	<u>FINAL RESOLUTION</u>
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CONTROL-DISPLAY INTEGRATION

182	10.1	Priority 3
183	10.2	Priority 3
184	10.3	Performed as indicated per AECM-81/291.
*185	10.4	Performed as indicated per AECM-81/291. A total of nine Bailey controllers were determined to have reversed control action. Of these, two were "unitized" controllers and were labeled showing reverse action. The seven "split" controllers were reversed to show opening action in the right hand direction.
186	10.5	Priority 3
187	10.6	No action required.

Final Resolution of the
Human Factors Engineering Review
Deficiencies

(Itemized from AECM-81/459)

<u>ITEM</u>	<u>FINDING</u>	<u>FINAL RESOLUTION</u>
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CONTROL ROOM EMERGENCY EQUIP.

*1	1.1	Performed as indicated per AECM-81/459 by providing a new procedure (H.P. procedure no. 10-S-01-24) to perform periodic checks of emergency equipment.
2	1.2	Performed as indicated per AECM-81/459 including 2 additional 30-60 minute air packs and 24 emergency evacuation air supplies (3 minutes) in the TSC.
3	1.3	Performed as indicated per AECM-81/459.
4	1.4	Performed as indicated per AECM-81/459.
5	1.5	Performed as indicated per AECM-81/459. (Operational personnel training is a continuous ongoing action.)
6	1.6	Performed as indicated per AECM-81/459.
7	1.7	Performed as indicated per AECM-81/459.
8	1.8	Performed as indicated per AECM-81/459.
9	1.9	Performed as indicated per AECM-81/459.
10	1.10	Performed as indicated per AECM-81/459.

CONTROL ROOM PROCEDURES

*11	2.1	Performed as indicated per AECM-81/459.
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CONTROL ROOM COMMUNICATION

*12	3.1	Performed as indicated per AECM-81/459. Primary communications instructions are provided in Procedure 04-S-01-R61-1 and alternate instructions are provided in Procedure 01-S-06-14.
13	3.2	No specific action required.
14	3.3	Performed as indicated per AECM-81/459 by various Emergency Plan Procedures.
*15	3.4	Performed as indicated per AECM-81/459.
16	3.5	No action required.
17	3.6	Changed to priority 3 per AECM-81/503.

18 3.7 Performed as indicated per AECM-81/459.

NSSS COMPUTER SYSTEM

The NSSS Computer System human factors engineering deficiencies will be considered under the long term control room review (Priority 3), as discussed in AECM-81/503 due to the temporary nature of the existing NSSS computer. This includes HFE items 19 through 41 (Findings 4.1 through 4.23).

CONTROL ROOM ENVIRONMENT

*42 5.1 The remaining control room, back panel, and remote shutdown panel environmental surveys will be conducted and submitted to the NRC 60 days prior to a full power operating licensing issuance (5% power).