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MIDDLE SOUTH UTILITIES SYSTEM

August 3, 1988

W3P88-1240
A4.05
QA

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Subject: Waterford SES Unit 3
Docket No. 50-382
Detailed Control Room Design Review (DCRDR)
Supplemental Information

References: 1) LP&L Letter W3P86-2557 from K.W. Cook dated 10/14/86

2) LP&L Letter W3P87-1672 from K.W. Cook dated 07/28/87

3) LP&L Letter W3P86-1057 from K.W. Cook dated 03/31/86

Gentlemen:

In a conference call on May 1, 1988, members of LP&L and your staff discussed the additional information that was needed to support final resolution of the DCRDR. Mr. E. Tomlinson of your staff indicated that he was planning a visit to Waterford 3 in early to mid June to perform a final DCRDR review, which would include the resolution of the open items noted in the May conference call. In a subsequent telecon on June 17, 1988, Mr. Tomlinson indicated that a site visit was not possible at the present time. Consequently, in lieu of the visit, LP&L hereby submits the attached information to address each of the four noted open items.

Attachment A contains our responses to the following open items:

1. (a) Additional Needs for Radiation Monitor Instrumentation during a Steam Generator Tube Rupture (SGTR) (HED 182);

   (b) Blowdown Radiation Monitor recording capability for the Steam Generators (HED 239);

2. Clarification of the use of multiple inputs to a single annunciator window for critical plant functions; and

3. Clarification of positive and negative superheated and subcooled values contained on the LCP43 meters (HED 413).

It should be noted that the responses contained in Attachment A are supplemental to those already submitted to you in Reference 1 for Items 1 & 3 and in Reference 2 for Item 2.

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Attachment B provides our response to the remaining open item which involves the status of each of the six engineering evaluations that were addressed in References 2 and 3. Included in Attachment B are the revised HED corrective action pages associated with and categorized by each of the engineering evaluations. Based on the information provided in Attachment B, the following determinations have been made:

1. Completed HEDs

A total of 24 HEDs have been implemented:

HEDs:	138	399	386	127
	139	335	390	255
	140	365	398	277
	141	374	402	302
	283	377	107	227
	284	383	126	228

2. Deferred HEDs

While LP&L has made a concerted effort to resolve the radio frequency problem, an alternate means had to be selected in lieu of the denied requests for a new frequency. Subsequently, HEDs 185 and 281 have been deferred until December, 1989. The pending corrective actions for these HEDs will be tracked until completion by our Commitments Management System.

3. New HEDs

HEDs 450 and 451 have been initiated to implement the proposed corrective actions resulting from the Lighting Analysis and the Noise Reduction Investigation, respectively. Estimated completion of these HEDs is December, 1989. The pending corrective actions for these HEDs will be tracked until completion by our Commitments Management System.

It is our understanding that this response should be sufficient to close out the DCRDR requirements of NUREG-0737 Supplement 1 for Waterford 3. Should you require any subsequent clarification of our responses please contact Tim Gaudet at (504) 595-2835.

Yours very truly,

R.F. Burski

R.F. Burski
Manager
Nuclear Safety & Regulatory Affairs

RFB:TJG:ssf

Attachments

cc: R.D. Martin, J.A. Calvo, D.L. Wigginton, J. Kramer, E. Tomlinson, G. West, NRC Resident Inspectors Office, E.L. Blake, W.M. Stevenson

OPEN ITEM 1(a): ADDITIONAL NEEDS FOR RADIATION MONITOR INSTRUMENTATION DURING A SGTR (HED 182)

LP&L Response: (Reference: LP&L Letter W3P86-2557 dated 10/14/86)

An engineering analysis has been performed to determine radiation instrumentation needs during a SGTR. The Blowdown Radiation Monitor (see HED 260) will provide sufficient sensitivity to determine the location of a tube rupture.

Supplemental Information: (References: OP-902-007, Steam Generator Tube Rupture Recovery Procedure; OP-901-024, Steam Generator Tube Leakage or High Activity Procedure)

In the event of a primary-to-secondary leak or SGTR event, the faulted Steam Generator (S/G) can be determined by one or more of the methods listed in Operating Procedure OP-901-024. One of these methods is to route blowdown samples from only one S/G at a time to radiation monitor PRM-IRE-0100, allowing approximately 10 minutes flush time between readings. Closing only S/G Sampling Isolation Valves SSL 8004A & SSL 8006A will allow S/G #2 blowdown alone to be monitored. Closing only S/G Sampling Isolation Valves SSL 8004B and SSL 8006B will allow monitoring of S/G #1 blowdown alone. The affected S/G will be determined by that which exhibits the highest activity. Other methods of determination are the highest activity indicated on Main Steam Line Monitors PRM-IRE-5500A(B) and the highest activity from radiochemical analysis results. Therefore, the initial response is acceptable and additional needs for radiation monitor instrumentation during a SGTR are not warranted.

OPEN ITEM 1(b): BLOWDOWN RADIATION MONITOR RECORDING CAPABILITY FOR THE SGs (HED 239)

LP&L Response: (Reference: LP&L Letter W3P86-2557 dated 10/14/86)

There is a live radiation reading every 10-15 minutes from a RAD monitor display which will be on CP6. A Blowdown Radiation recorder for the Steam Generator on CP1 will not be added. Trend information is considered not necessary, and very little room is available on CP1 for placement.

Supplemental Information: (References: Operating Procedure OP-901-024, "Steam Generator Tube Leakage or High Activity"; Operating Procedure OP-500-005, "Annunciator Response for Control Room Cabinet E"; Operating Procedure OP-500-010, "Annunciator Response for Control Room Cabinet L"; and Operating Procedure OP-600-012, "Annunciator Response for Secondary Sampling Local Panel."

The following annunciators are available to indicate possible Steam Generator Blowdown radiation:

- BLOWDOWN ACTIVITY HI (CP-1, E0809)
- RAD MONITORING SYS ACTIVITY HI-HI (CP-36, L0109)
- RAD MONITORING SYS ACTIVITY HI (CP-36, L0209)
- RAD MONITORING SYS TROUBLE (CP-36, L0210)
- STM GEN BD No. 1 RADIATION High-High (Recorder Panel, Secondary Sampling Room)

Actuation of any of these annunciators could indicate possible increasing secondary activity. Verification of increase in activity would then be made on CP-6, the Radiation Monitor console. Trending information for the Blowdown Radiation Monitor (PRM-IRE-0100) is available to be displayed by RM-11 on CP-6. The trending could be in the form of a daily reading, an average hourly reading or even a 10 minute trend for up to four hours. Based on the availability of the above data, it is not necessary to add a Blowdown Radiation Recorder on CP-1.

OPEN ITEM 2: CLARIFICATION OF THE USE OF MULTIPLE INPUTS TO A SINGLE ANNUNCIATOR WINDOW FOR CRITICAL PLANT FUNCTIONS

LP&L Response: (Reference: LP&L Letter W3P87-1572 dated 07/28/87)

Two types of multiple input annunciator windows exist in the Waterford 3 control room. In the first type, the multiple inputs all concern the same component (i.e. function). In the second type, the message is more general and the inputs come from different components (i.e. functions). Annunciator windows for critical plant functions have either single inputs, or multiple inputs. If multiple inputs are employed, the windows are the first type described above. In other words, critical plant function annunciator windows do not receive multiple inputs from multiple components/functions.

Supplemental Information:

To support the principle that multiple inputs to an annunciator window concern the same component (function), a review of the engineered safeguards (CP-8) and HVAC (CP-18) control panels was performed. As a result, it was verified that in each case, where multiple inputs from critical plant functions existed, the inputs were sufficiently related to warrant use of one annunciator. In CP-18, for example, there are a total of 90 annunciators, 45 from Cabinet SA and 45 from Cabinet SB. In each cabinet, only 12 of the 45 annunciators have multiple inputs. Table A-1 provides a list of the 12 annunciators from CP-18, Cabinet SA and their associated multiple inputs. As can be seen from this Table, critical plant function annunciator windows do not receive multiple inputs from multiple functions.

As applicable, multiple input annunciators of the same component employ a reflash feature. Because annunciator contacts are normally closed, an initial alarm would cause the associated annunciator contact to open. A subsequent alarm to the already opened contact would cause the momentary reclosure of the contact, thereby allowing the main annunciator to reinitiate the alarm. This feature prevents masking of subsequent alarms for critical plant functions. The exact cause of trouble with a diesel generator, for example, would be pinpointed by the local control panel alarm located near the equipment. In Table A-1, Item 11 (Class 1E Rad Monitoring System Activity HI-HI Annunciator) employs a reflash feature to prevent masking of subsequent alarms.

TABLE A-1

HVAC Control Panel (CP-18, Cabinet SA) Annunciators with Multiple Inputs

Annunciator Window Engraving		Multiple Inputs
1.	EFW FLOW EXTREMELY HI	- EFW FLOW HI TO SG 1 DETECTED BY FLOW SW EFW-IFIS-8330AS
		- EFW FLOW HI TO SG 2 DETECTED BY FLOW SW EFW-IFIS-8331AS
2.	CONTAINMENT VACUUM HI	- CONT/ANNULUS DIFF HI-HI DETECTED BY CVR-IDPIS-5220AS
		- CONT/VACUUM RELIEF VALVE OPEN DETECTED BY 'BC' LIMIT SW
3.	SWGR A AREA TEMP HI	4 THERMOCOUPLES - SVS-ITE-5030A - SVS-ITE-5031A - SVS-ITE-5032A - SVS-ITE-5033A
4.	SWGR B/AB AREA TEMP HI	4 THERMOCOUPLES - SVS-ITE-5018A - SVS-ITE-5019A - SVS-ITE-5020A - SVS-ITE-5021A
5.	RAB HVAC EQUIPMENT ROOM TEMP HI/LO	4 THERMOCOUPLES - HVR-ITE-5100A - HVR-ITE-5101A - HVR-ITE-5102A - HVR-ITE-5103A

TABLE A-1 (Continued)

HVAC Control Panel (CP-18, Cabinet SA) Annunciators with Multiple Inputs

Annunciator Window Engraving		Multiple Inputs
6.	SAFEGUARD PUMPS A AREA TEMP HI	- PAC TEMP SIGNAL T5003A CLR. AH-2 (3A-SA) - PAC TEMP SIGNAL T5003C CLR. AH-2 (3C-SA)
7.	RAB EL-35 AREA FLOODED	- CCW MAKE-UP PUMP AREA FLOODED LWM-ILS-6792A - RAB WEST WING EL (-35) SOUTH AREA FLOODED LWM-ILS-6790A - RAB EAST WING EL (-35) NORTH AREA FLOODED LWM-ILS-6791A
8.	RAB NEGATIVE PRESS LOST	- RAB PIPE CHASE - AMB - RAB PIPE PEN - AMB - RAB SH DN HT EXC RM - AMB - RAB VALVE GALLERY - AMB - SAFEGUARD PUMP RM 'A' - AMB - SAFEGUARD PUMP RM 'B' - AMB - RAB VAULT AREA - AMB
9.	FUEL HANDLING BLDG NEGATIVE PRESS LOST	- FHB/AMBIENT DIFF. PRESS TRANS. HVF.IDPT-5105A - FHB AIRBORNE RADIATION MONITORS (ALLOW ALARMS ONLY DURING HI RADIATION)
10.	FUEL HANDLING BLDG HVAC EQUIPMENT ROOM TEMP HI	2 THERMOCOUPLES - HVF-ITE-5160.1A - HVF-ITE-5160.3A
11.	CLASS 1E RAD MONITORING SYS ACTIVITY HI-HI	- RADIATION MONITOR ARM-IRE-5030 - RADIATION MONITOR ARM-IRE-5031 - RADIATION MONITORS ARM-IRE-5025 & 5026 - RADIATION MONITORS ARM-IRE-0300.2 & 0300.4 - RADIATION MONITORS ARM-IRE-0200.1 & 0200.5

TABLE A-1 (Continued)

HVAC Control Panel (CP-18, Cabinet SA) Annunciators with Multiple Inputs		
Annunciator Window Engraving		Multiple Inputs
	-	RADIATION MONITOR PRM-IRE-0100.1
	-	RADIATION MONITOR PRM-IRE-7050A
	-	RADIATION MONITOR PRM-IRE-5400A
	-	RADIATION MONITOR PRM-IRE-0100Y
12. ANNUNCIATOR SA GROUND DETECTED	-	POSITIVE GROUND
	-	NEGATIVE GROUND

OPEN ITEM 3: CLARIFICATION OF POSITIVE AND NEGATIVE SUPERHEATED AND SUBCOOLED VALUES CONTAINED ON THE LCP43 METERS (HED 413)

LP&L Response: (Reference: LP&L Letter No. 86-2557 dated 10/14/86)

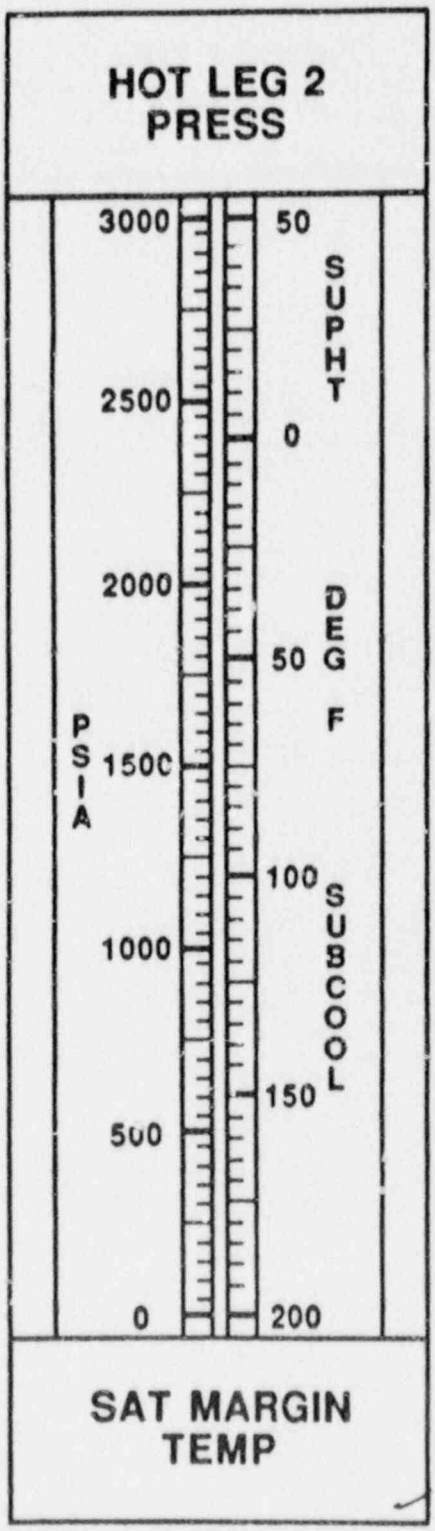
Positive and negative signs will not be added to the meter faces. These are considered by the operators as being unnecessary additions to the control panels. The scales are already labeled with the abbreviations 'SUPHT' and 'SUBCOOL', which is considered sufficient indication.

Supplemental Information: (FSAR Table 7.4-1, "Indicators on Auxiliary Control Panel LCP-43")

LP&L is of the opinion that since Operations personnel are trained to know the difference between subcooled and superheated values (i.e., a reading in the superheat region on a saturation margin monitor would indicate superheated steam and that the core is uncovered), the current labeling convention is sufficient. Plant scales on CP-8 and LCP-43 and indicator ranges given in FSAR Table 7.4-1 (Sheets 2 & 3) provide verification that whenever a range for saturation margin temperature is given, the associated labels for subcooled/ superheat are always present. The enclosed scale provides an example of the current labeling convention used on both CP-8 and LCP-43.

Saturation Margin Temperature Scale

SHUTDOWN COOLING



Results of Engineering Evaluations

1. LIGHTING ANALYSIS (HEDs 138, 139, 140, 141, 283, 284, 399)

General lighting deficiencies were identified by the above listed HEDs. These HEDs involved factors such as shadows on control panels; glare on displays, labels and indicators; variation of light levels on different portions of the control panels; and insufficient illumination levels. In response to these findings, LP&L committed to performing a thorough investigation and providing corrective action recommendations based on the results of the investigation by the second refueling outage. Additionally, LP&L stated that when the investigation was complete, updated copies of the HED corrective action pages would be provided.

Subsequently, Advanced Research Design Corporation (ARD), under contract by LP&L, performed a comparative study to address the identified lighting concerns and explore a number of lighting options. The study involved the construction of a full scale mock up of one section of the control panels. This mock up included edgewise meters mounted at levels similar to the control panels at Waterford 3, a CRT mounted on the vertical section of the panel, and a simulated CRT face on the horizontal section of the panel. Lighting fixtures identical to those found at the plant were installed in correct relationship to the panel section. Systematic measurements were taken with this mock up. A variety of possible lighting solutions were examined: Various louvres (white and black eggcrate, specular parabolic, and aluminum parabolic, all with and without diffuse overlays), different types of fluorescent bulbs, repositioning the luminaires (height and orientation), tilting the meters, and covering the meters with different face plates were among the alternatives attempted. The most promising solutions were then mocked-up in the simulator at Waterford 3 for systematic observations by LP&L and ARD. In addition, lighting distributors and manufacturers were contacted regarding cost, availability, and fire code rating for each possible alternative.

To determine the appropriate course of action, LP&L prepared a position paper on the ARD study. As a result, a design change request (LTN-003) has been initiated to modify the control room lighting. The following modifications are planned for the non-emergency lights both above the control panels and throughout the main operator area of the room: replace the fluorescent bulbs with type SPX35 to improve both color rendition and lumens per watt efficiency; install ½" cell acrylic, silvered, satin finish parabolic louvres to decrease glare; and install high transmission white acrylic diffuser panels above the louvres to further control glare.

Based on the completion of the study (as documented in the February, 1988 ARD Report entitled, "Review of Control Room Lighting Problems and Recommended Solutions for the Waterford 3 Station"), HEDs 138, 139, 140, 141, 283, 284 and 399 are considered closed. The updated corrective action pages for these HEDs are provided in Attachment B-1. In order to appropriately track the corrective actions that have been selected to address the lighting deficiencies, a new HED (No. 450) has been initiated. HED 450 is also included in Attachment B-1.

2. COMPUTER REVIEW (HEDs 335, 365, 374, 377, 383, 386, 390, 398, 402)

Based on a review of the noted problems listed in the above HEDs, which involved inconsistencies in mimic displays regarding location of data groups and the use of labels, symbols, codes, and colors, the Plant Monitoring Computer (PMC) mimic displays on CPU #2 were revised to incorporate these human factors considerations. The reworked mimics were installed on both the on-line and off-line PMC Complexes. The work was performed under Condition Identification Nos. 023442 and 251439. The guidelines used to implement the various computer changes are documented in Manual No. 457002247 (Waterford 3 Plant Monitoring Computer CRT Mimic Generation, Modification, Deletion and Human Factors Guidelines). Controls for these changes are provided in Plant Administrative Procedure NE-7-021, "Plant Monitoring Computer (PMC) CRT Mimic Management".

Implementation of corrective action resulting from an engineering review of the PMC alarms, to speed up and/or prioritize alarms causing PMC printer backlog (HED 335), was completed in August, 1987. The corrective action caused a reduction in the number of points in alarm at 100% power from approximately 150 to approximately 40, many of which are used only for reduced power operation.

The updated HED corrective action pages applicable to the Computer concerns are provided in Attachment B-2.

3. ANNUNCIATOR EVALUATION (HED 107)

In order to improve operating efficiency and reduce personnel errors by providing reliable and precise annunciation of potential problems, an annunciator reduction program was implemented at Waterford 3. The goal of this program is to achieve a "black board" control room. Although achieving this goal is ambitious due to annunciations that are inherent to normal plant operation (i.e., transients), setting such a goal will eliminate erroneous, misleading, or unnecessary annunciations.

An engineer has been assigned the lead responsibility for this program, which, at present, involves the following:

- Coordinating the implementation of work tasks involved in troubleshooting and correcting alarm concerns.
- Providing technical assistance for all annunciator related jobs, tasks, or investigations.
- Monitoring alarms for trends and providing steps needed to implement corrective actions if such are needed.
- Providing status reports on a regular basis.
- Initiating action when a station modification is needed.

- Communicating closely with Operations personnel to uncover annunciator concerns and monitoring their "Annunciator Status Log Book".

Marked improvements have been made since the implementation of this program. The total number of annunciator problems has been reduced from 67 in February 1987 to 48 in June 1988, a 28% reduction. The number of annunciators taken out of service has been decreased from 42 to 22, a 47% reduction.

To ensure that a high level of attention is given to the annunciator situation, a printout that supplies a list and status of annunciators with concerns is generated periodically for plant management's cognizance.

Specifically, with regard to the circuitry and annunciator engraving for the three radiation alarms on CP33 (listed as an original finding of HED 107), windows D7, D8 and G7 were modified under Station Modification No. 960 and CIWA No. 21652 and are no longer lit under normal conditions.

The updated corrective action page for HED 107 is provided in Attachment B-3.

4. NOISE REDUCTION INVESTIGATION (HEDs 126, 127, 255, 277 & 302)

General deficiencies in the auditory alarm system in the control room were identified in the above listed HEDs. These HEDs addressed problems regarding the ability to hear and discriminate annunciator alarms over ambient control room noise. The main source of excessive noise in the control room has been identified as the cooling fans used in the four channels (cabinets) of CP-22. Each channel contains four blowers; each blower is hard wired to the high speed setting providing 550 cfm of air flow at 1350 rpm. CP-22 houses the Core Protection Calculators. Combustion Engineering coordinated the design of these Reliance cabinets and their instrumentation and ensured that the units met safety related, seismic category 1, class 1E criteria. In response to the excessive noise, LP&L committed to performing a systematic evaluation of the sound levels within the control room and providing design alternatives to mitigate the concerns addressed in the above listed HEDs by the completion of the second refueling outage. Additionally, LP&L stated that when the evaluation was complete, updated copies of the HED corrective action pages would be provided.

Subsequently, in an attempt to localize and identify unusually high sources of noise, ARD, under contract by LP&L, conducted an acoustical study examining the background noise throughout the control room. This study provided us with baseline noise readings at various points in the control room, spectral analyses of sound pressure levels at CP-2 and CP-22, and proposals for noise reduction. The report, which

was submitted in February, 1988, confirmed that the source of the noise is CP-22. By reducing the ambient noise caused by the fans in CP-22, annunciator horns and alarms would be more readily distinguished. Therefore, adjustments can be made to the annunciator horns making them conform to NUREG-0700 guidelines.

The CPCs are a fundamental element of the Reactor Protective System at Waterford 3. Although testing of the CPC fans was strongly considered as an option to reduce noise levels, due to the safety importance of the CPCs, their sensitivity under test, and the expense and delay which would be required to replace any instrumentation (which, despite testing temperature limitations, might overheat) it was decided after careful consideration to abort the test plan and pursue other options that would not require interference with the thermal environment of the cabinets while the Core Protection Calculators are operating.

An alternate plan has been developed to seek out quieter fans and redesign both the flow path and fan blower mountings. These corrective actions are to be performed under Station Modification No. 1433.

Based on the completion of the ARD study, as documented in the February, 1988 ARD Report, HEDs 126, 127, 255, 277 and 302 are considered closed. The updated corrective action pages for these HEDs are provided in Attachment B-4. In order to appropriately track the corrective actions that have been selected to address the noise deficiencies, a new HED (No. 451) has been initiated. HED 451 is also included in Attachment B-4.

5. ANALYSIS OF INSTRUMENTATION (HEDs 182, 227, and 228)

Instrumentation analyses for the above listed HEDs, which involved 1) radiation instrumentation needs during a SGTR (HED 182); and 2) setpoint meter modifications on a) the Pressurizer Pressure Controller (227) and b) the Steam Bypass Master Controller (228), have been completed and the results are as follows. Since the response provided in October, 1986 for HED 182 is acceptable and no subsequent changes to the corrective action page have been made, a copy of the HED 182 corrective action page has not been included. (See Open Item 1(a) of Attachment A for the supplemental response to HED 182.) In January, 1987 the setpoint meters addressed in HEDs 227 and 228 were modified under SM 1469 such that the setpoint meters are now identical to the process meters on the same controller.

Updated copies of HEDs 227 and 228 corrective action pages are provided in Attachment B-5.

6. REVIEW OF RADIO COMMUNICATIONS (HEDs 185 & 281)

HEDs 185 and 281 identified communication deficiencies with the Waterford 3 radio system. The signals from the maintenance and security radios bleed into the operations radio. Based on the interference problem, LP&L committed to review the radio system, made recommendations to eliminate the interference problem and implement a solution.

Subsequently, in January 1985, representatives from Motorola Communication & Electronics, Inc. and Waterford 3 Plant Staff performed a detailed examination of the Waterford 3 radio communications system. It was determined that the interference was caused by a frequency mix that occurs when the operating frequencies are exactly 50 KHz apart, as is the case. To eliminate the source of the interference, a change in the frequency of the maintenance repeater was recommended.

Two separate requests for a new frequency for Waterford 3 have been submitted to the Utilities Telecommunications Council (UTC). The Federal Communications Commission (FCC) requires a UTC recommendation before taking affirmative action on licensing requests for such changes. Both requests were denied by the UTC due to severe congestion within the requested frequency spectrum in the effective range of the Waterford 3 radios. As of this date, the UTC still cannot recommend a frequency change for the Waterford 3 system.

In light of the above, alternate means for correcting the interference problem without a frequency change were sought. Motorola Corporation was contacted again to discuss the current equipment configuration of the two 2-port combiners each of which feeds a hybrid to provide interference free access of the Maintenance, Operations and Security radio repeaters to the antenna system. Motorola explained that the second combiner and hybrid were added after the original two frequency repeater system was installed in order to permit the addition of the third repeater frequency. It appears as though this type of arrangement may be the major cause of the interference problem. Subsequently, LP&L has initiated Design Change No. DC 3046 to replace the current configuration with a single 4-ported combiner without the external hybrid device, which is the most efficient equipment design for this type of configuration.

The updated HED corrective action pages applicable to the radio communication concern are provided in Attachment B-6.

ATTACHMENT B-1

LIGHTING ANALYSIS HEDs

CORRECTIVE ACTIONS

HED NO.: 0138

GUIDE NO.: 1.5.3.E.2

CATEGORY: X

FINDING:

Labels, instructions, and other written information are shadowed.

RESPONSE:

Lighting experts will further review the lighting situation. A thorough investigation and implementation of recommendations will be complete by the second refueling outage.

IMPLEMENTATION:

Advanced Research Design Corporation (ARD) performed a comparative study to address the identified lighting concerns. The results of this study are documented in the February, 1988 ARD Report entitled, "Review of Control Room Lighting Problems and Recommended Solutions for the Waterford 3 Station". LP&L has prepared a position paper on the study to determine the appropriate course of action. See HED 450 for corrective actions to be implemented.

CORRECTIVE ACTIONS

HED NO.: 0139

GUIDE NO.: 1.5.3.D, F, G, 1.5.7.A.2

CATEGORY: X

FINDING:

There is excessive glare in the control room which interferes with the readability of displays, labels, and indicators.

RESPONSE:

Lighting experts will further review the lighting situation. A thorough investigation and implementation of recommendations will be complete by the second refueling outage.

IMPLEMENTATION:

Advanced Research Design Corporation (ARD) performed a comparative study to address the identified lighting concerns. The results of this study are documented in the February, 1988 ARD Report entitled, "Review of Control Room Lighting Problems and Recommended Solutions for the Waterford 3 Station". LP&L has prepared a position paper on the study to determine the appropriate course of action. See HED 450 for corrective actions to be implemented.

CORRECTIVE ACTIONS

HED NO.: 0140

GUIDE NO.: 1.5.3.B

CATEGORY: X

FINDING:

The lighting levels at given work stations vary greatly between the vertical and horizontal slants of the benchboards.

RESPONSE:

Lighting experts will further review the lighting situation. A thorough investigation and implementation of recommendations will be complete by the second refueling outage.

IMPLEMENTATION:

Advanced Research Design Corporation (ARD) performed a comparative study to address the identified lighting concerns. The results of this study are documented in the February, 1988 ARD Report entitled, "Review of Control Room Lighting Problems and Recommended Solutions for the Waterford 3 Station". LP&L has prepared a position paper on the study to determine the appropriate course of action. See HED 450 for corrective actions to be implemented.

CORRECTIVE ACTIONS

HED NO.: 0141

GUIDE NO.: 1.5.3.A

CATEGORY: X

FINDING:

The illumination levels in the control room do not meet the recommended values of NUREG-0700. At the panels, the lighting levels range from 5-27 footcandles. NUREG-0700 recommends levels between 20-50 footcandles. This lighting level, in conjunction with glare, causes shadowing and operator difficulties in reading meters.

RESPONSE:

Lighting experts will further review the lighting situation. A thorough investigation and implementation of recommendations will be complete by the second refueling outage.

IMPLEMENTATION:

Advanced Research Design Corporation (ARD) performed a comparative study to address the identified lighting concerns. The results of this study are documented in the February, 1988 ARD Report entitled, "Review of Control Room Lighting Problems and Recommended Solutions for the Waterford 3 Station". LP&L has prepared a position paper on the study to determine the appropriate course of action. See HED 450 for corrective actions to be implemented.

CORRECTIVE ACTIONS

HED NO.: 0283

GUIDE NO.: Op Survey A7.01

CATEGORY: X

FINDING:

In areas of the panel with bright overhead lighting the glare on meters and CRTs is extreme, especially on the top veritical sections. Glare is intense unless you are standing directly in front of the indication. Computer CRTs are prone to glare.

RESPONSE:

Lighting experts will further review the lighting situation. A thorough investigation/recommendations will be complete b[illegible] second refueling outage.

IMPLEMENTATION:

Advanced Research Design Corporation (ARD) performed a comparative study to address the identified lighting concerns. The results of this study are documented in the February, 1988 ARD Report entitled, "Review of Control Room Lighting Problems and Recommended Solutions for the Waterford 3 Station". LP&L has prepared a position paper on the study to determine to appropriate course of action. See HED 450 for corrective actions to be implemented.

CORRECTIVE ACTIONS

HED NO.: 0284

GUIDE NO.: Op Survey A7.02

CATEGORY: X

FINDING:

Lighting over the panels needs to be more diffused and maintained at a low level. Some glare on main control panel indicators during normal and emergency lighting is caused by the refusal to use soft flourescent lights. Lighting is adequate to see all boards and indicators, but the light is not diffused or soft enough to prevent glare on computer CRTs and board indicators.

RESPONSE:

Lighting experts will further review the lighting situation. A thorough investigation/recommendations will be complete by the second refueling outage.

IMPLEMENTATION:

Advanced Research Design Corporation (ARD) performed a comparative study to address the identified lighting concerns. The results of this study are documented in the February, 1988 ARD Report entitled, "Review of Control Room Lighting Problems and Recommended Solutions for the Waterford 3 Station". LP&L has prepared a position paper on the study to determine the appropriate course of action. See HED 450 for corrective actions to be implemented.

CORRECTIVE ACTIONS

HED NO.: 0399

GUIDE NO.: 7.2.1.B

CATEGORY: X

FINDING:

The HERCO displays are situated at such an angle that they reflect light from the overhead lamps causing glare, and making them difficult to read.

RESPONSE:

Lighting experts will further review the lighting situation. A thorough investigation/recommendations will be complete by the second refueling outage.

IMPLEMENTATION:

Advanced Research Design Corporation (ARD) performed a comparative study to address the identified lighting concerns. The results of this study are documented in the February, 1988 ARD Report entitled, "Review of Control Room Lighting Problems and Recommended Solutions for the Waterford 3 Station". LP&L has prepared a position paper on the study to determine the appropriate course of action. See HED 450 for corrective actions to be implemented.

CORRECTIVE ACTIONS

HED NO.: 0450

GUIDE NO.: 1.5.3.A, B, D, E.2, F & G; 1.5.7.A.2
7.2.1.E; Op Surveys A7.01 & .02

CATEGORY: X

FINDING:

General lighting deficiencies were identified by HEDs 138, 139, 140, 141, 283, 284 and 399. To examine the deficiencies and explore a number of lighting options, ARD Corporation conducted a comparative study. Based on the results of the study, it was determined that modifications need to be implemented to raise the illumination level, reduce shadows and reduce glare.

RESPONSE:

As a result of a position paper that was prepared on the ARD study, a design change request (LTN-003) has been initiated to modify the control room lighting. The following modifications are proposed for the non-emergency lights both above the control panels and throughout the main operator area of the room: 1) replace the fluorescent bulbs with type SPX35 bulbs to improve both color rendition and lumens per watt efficiency; 2) install ½" cell acrylic, silvered, satin finish parabolic louvres to decrease glare; and 3) install high transmission white acrylic diffuser panels above the louvres to further control glare.

IMPLEMENTATION:

Estimated date of completion is December, 1989.

ATTACHMENT B-2

COMPUTER REVIEW HEDs

CORRECTIVE ACTIONS

HED NO.: 0335

GUIDE NO.: Oper. Survey E5.03

CATEGORY: X

FINDING:

There are numerous computer alarms not critical to operations (doors, etc.). In many cases, these alarms will backlog the printer.

RESPONSE:

An engineering study will be performed to evaluate the optimum method to speed up and/or prioritize the alarms to eliminate the backlog.

IMPLEMENTATION:

A study of the PMC alarms was performed by the Operations Department. As a result of the study, it was determined that various alarms were not necessary and required deletion while others required setpoint changes. Subsequently, approximately 150 alarms were either eliminated, changed or better coordinated. Implementation is documented under CIWA 023442 on August 24, 1987.

CORRECTIVE ACTIONS

HED NO.: 0365

GUIDE NO.: 7.2.4.G.1

CATEGORY: X

FINDING:

Some lists are not vertically aligned and left justified.

RESPONSE:

The finding is valid. Due to the complexity of the PMC and the need to integrate various computer changes, a review will be conducted to identify and implement the means of correction.

IMPLEMENTATION:

Based on a review of this and associated computer inconsistencies by LP&L personnel, the PMC mimic displays on CPU #2 have been revised to incorporate human factors considerations. Implementation of the reworked displays is documented under CIWA 251439 which was completed on April 6, 1988. In the course of the corrective action, LP&L developed a set of human factors guidelines in order to avoid similar problems in the future. This document was reviewed by ARD Corporation and is now a controlled document, #457002247, entitled, "Plant Monitoring Computer CRT Mimic Generation, Modification, Deletion and Human Factors Guidelines".

CORRECTIVE ACTIONS

HED NO.: 0374

GUIDE NO.: 7.2.4.A.1, 7.2.4.E.2, 7.2.7.G

CATEGORY: X

FINDING:

There are a number of inconsistencies among the PMC displays. Colors represent different meanings on different mimics, legends describing the use of color on a given mimic are used rarely, and symbols are likewise used inconsistently (e.g., pumps are represented differently on different mimics).

RESPONSE:

All PMC displays will be reviewed, with color coding and symbols standardized.

IMPLEMENTATION:

Based on a review of this and associated computer inconsistencies by LP&L personnel, the PMC mimic displays on CPU #2 have been revised to incorporate human factors considerations. Implementation of the reworked displays is documented under CIWA 251439 which was completed on April 6, 1988. In the course of the corrective action, LP&L developed a set of human factors guidelines in order to avoid similar problems in the future. This document was reviewed by ARD Corporation and is now a controlled document, #457002247, entitled, "Plant Monitoring Computer CRT Mimic Generation, Modification, Deletion and Human Factors Guidelines".

CORRECTIVE ACTIONS

HED NO.: 0377

GUIDE NO.: 7.2.4.A.1

CATEGORY: X

FINDING:

Data are not presented in a readily usable format on the PMC. Mimic designations are inconsistent and unrecognizable. Mimic names are used, which are not descriptive of the mimics. Number codes are also used which are not descriptive of the mimics.

RESPONSE:

The finding is valid. Due to the complexity of the PMC and the need to integrate various computer changes, a review will be conducted to identify and implement the means of correction.

IMPLEMENTATION:

Based on a review of this and associated computer inconsistencies by LP&L personnel, the PMC mimic displays on CPU #2 have been revised to incorporate human factors considerations. Implementation of the reworked displays is documented under CIWA 251439 which was completed on April 6, 1988. In the course of the corrective action, LP&L developed a set of human factors guidelines in order to avoid similar problems in the future. This document was reviewed by ARD Corporation and is now a controlled document, #457002247, entitled, "Plant Monitoring Computer CRT Mimic Generation, Modification, Deletion and Human Factors Guidelines".

CORRECTIVE ACTIONS

HED NO.: 0383

GUIDE NO.: 7.2.5.B

CATEGORY: X

FINDING:

There is an inconsistency of location for physical data groups on the PMC. Legends to explain the symbols used for components on mimics are rarely used. When they are used, they are placed haphazardly wherever spaces is available.

RESPONSE:

The finding is valid. Due to the complexity of the PMC and the need to integrate various computer changes, a review will be conducted to identify and implement the means of correction.

IMPLEMENTATION:

Based on a review of this and associated computer inconsistencies by LP&L personnel, the PMC mimic displays on CPU #2 have been revised to incorporate human factors considerations. Implementation of the reworked displays is documented under CIWA 251439 which was completed on April 6, 1988. In the course of the corrective action, LP&L developed a set of human factors guidelines in order to avoid similar problems in the future. This document was reviewed by ARD Corporation and is now a controlled document, #457002247, entitled, "Plant Monitoring Computer CRT Mimic Generation, Modification, Deletion and Human Factors Guidelines".

CORRECTIVE ACTIONS

HED NO.: 0386

GUIDE NO.: 7.2.4.D

CATEGORY: X

FINDING:

Some labels on mimics for the PMC are vertically oriented making them difficult to read. Mimic CCW01.4 illustrates this problem.

RESPONSE:

The finding is valid. Due to the complexity of the PMC and the need to integrate various computer changes, a review will be conducted to identify and implement the means of correction.

IMPLEMENTATION:

Based on a review of this and associated computer inconsistencies by LP&L personnel, the PMC mimic displays on CPU #2 have been revised to incorporate human factors considerations. Implementation of the reworked displays is documented under CIWA 251439 which was completed on April 6, 1988. In the course of the corrective action, LP&L developed a set of human factors guidelines in order to avoid similar problems in the future. This document was reviewed by ARD Corporation and is now a controlled document, #457002247, entitled, "Plant Monitoring Computer CRT Mimic Generation, Modification, Deletion and Human Factors Guidelines".

CORRECTIVE ACTIONS

HED NO.: 0390

GUIDE NO.: 7.2.7.H

CATEGORY: X

FINDING:

Graphic codes on the PMC do not have the same meaning in all applications. There is inconsistency in the use of symbols (e.g., different valve symbols which have the same meaning).

RESPONSE:

The finding is valid. Due to the complexity of the PMC and the need to integrate various computer changes, a review will be conducted to identify and implement the means of correction.

IMPLEMENTATION:

Based on a review of this and associated computer inconsistencies by LP&L personnel, the PMC mimic displays on CPU #2 have been revised to incorporate human factors considerations. Implementation of the reworked displays is documented under CIWA 251439 which was completed on April 6, 1988. In the course of the corrective action, LP&L developed a set of human factors guidelines in order to avoid similar problems in the future. This document was reviewed by ARD Corporation and is now a controlled document, #457002247, entitled, "Plant Monitoring Computer CRT Mimic Generation, Modification, Deletion and Human Factors Guidelines".

CORRECTIVE ACTIONS

HED NO.: 0398

GUIDE NO.: 7.2.7.M.1

CATEGORY: X

FINDING:

Red and green colors are sometimes used on CRT displays as background colors or to represent unchanging information. This diminishes the attention getting value of these colors when they are used to code important values.

RESPONSE:

The finding is valid. Due to the complexity of the PMC and the need to integrate various computer changes, a review will be conducted to identify and implement the means of correction.

IMPLEMENTATION:

Based on a review of this and associated computer inconsistencies by LP&L personnel, the PMC mimic displays on CPU #2 have been revised to incorporate human factors considerations. Implementation of the reworked displays is documented under CIWA 251439 which was completed on April 6, 1988. In the course of the corrective action, LP&L developed a set of human factors guidelines in order to avoid similar problems in the future. This document was reviewed by ARD Corporation and is now a controlled document, #457002247, entitled, "Plant Monitoring Computer CRT Mimic Generation, Modification, Deletion and Human Factors Guidelines".

CORRECTIVE ACTIONS

HED NO.: C402

GUIDE NO.: 7.2.7.K.1, 7.2.7.K.2

CATEGORY: X

FINDING:

Colors used on PMC displays are not always consistent with the use of color elsewhere in the control room. For example, red, green, amber are used to code status of a component, but do not always convey the same meaning with regard to that component (e.g., breaker closed or open). On many mimic displays, pumps, breakers, and dampers are represented in an unchanging color, regardless of their status.

RESPONSE:

The finding is valid. Due to the complexity of the PMC and the need to integrate various computer changes, a review will be conducted to identify and implement the means of correction.

IMPLEMENTATION:

Based on a review of this and associated computer inconsistencies by LP&L personnel, the PMC mimic displays on CPU #2 have been revised to incorporate human factors considerations. Implementation of the reworked displays is documented under CIWA 251439 which was completed on April 6, 1988. In the course of the corrective action, LP&L developed a set of human factors guidelines in order to avoid similar problems in the future. This document was reviewed by ARD Corporation and is now a controlled document, #457002247, entitled, "Plant Monitoring Computer CRT Mimic Generation, Modification, Deletion and Human Factors Guidelines".

ATTACHMMENT B-3

ANNUNCIATOR EVALUATION

HED 107

CORRECTIVE ACTIONS

FED NO.: 0107

GUIDE NO.: 3.3.2.C

CATEGORY: X

FINDING:

Under normal operating conditions, no annunciators should be illuminated. A "dark" panel concept is not used in the Waterford-3 control room. Specifically, three high-radiation alarms (CP33) are lit due to the lack of flow to the monitor (as opposed to actual high activity).

RESPONSE:

After operational experience has been obtained, an evaluation of all annunciators to conform to dark board concept will be performed. The circuitry and annunciator engraving for the rad monitoring on CP33 will be investigated for the most appropriate modification.

IMPLEMENTATION:

Annunciator windows D7, D8 and G7 on CP33 were modified by Station Modification #960, CIWA 21652 (work completion notice was filed November 4, 1985). These windows are no longer lit under normal conditions. In order to improve operating efficiency and reduce personnel error by providing reliable and precise annunciation of potential problems, an annunciator reduction program was implemented at Waterford 3. Since its implementation, the overall annunciator reduction program has been successful in significantly reducing the number of erroneous, misleading or unnecessary illuminated annunciators.

ATTACHMENT B-4

NOISE REDUCTION HEDs

CORRECTIVE ACTIONS

HED NO.: 0126

GUIDE NO.: 2.1.6.E.1, 2.2.6, 3.2.1.A

CATEGORY: X

FINDING:

The auditory signals (annunciator horns) do not provide a value of at least 10dB(A) above average ambient noise. In fact the speaker volume exceeds these annunciators.

RESPONSE:

The systematic evaluation of the sound levels within the control room will determine the interactive effects of the ambient noise levels and the auditory signals of the annunciators and emergency alarms. The high background noise in the control room, its volume, amplitude, and frequencies significantly affect the signal-to-noise ratios of the auditory signals and thereby reduce their effectiveness. A thorough review of the dynamics associated with these problems will diagnose the root causes and provide for design alternatives to mitigate these problems. Recommendations will include considerations for ensuring sufficient volume levels and volume level deviations for the annunciators as well as providing for the reduction of ambient noise levels.

IMPLEMENTATION:

An acoustical study was performed by ARD Corporation to examine the background noise throughout the control room. A report documenting the results of the study, to include a confirmation that the main source of the noise is CP-22 and provide proposals for noise reduction, was submitted by ARD in February, 1988. The resulting corrective actions will be implemented under HED 451.

CORRECTIVE ACTIONS

HED NO.: 0127

GUIDE NO.: 3.2.1.D

CATEGORY: X

FINDING:

The average volume of annunciator horns is 71dB. All individual horns deviate from the average more than the +/-2.5dB recommended by NUREG-0700.

RESPONSE:

The systematic evaluation of the sound levels within the control room will determine the interactive effects of the ambient noise levels and the auditory signals of the annunciators and emergency alarms. The high background noise in the control room, its volume, amplitude, and frequencies significantly affect the signal-to-noise ratios of the auditory signals and thereby reduce their effectiveness. A thorough review of the dynamics associated with those problems will diagnose the root causes and provide for design alternatives to mitigate these problems. Recommendations will include considerations for ensuring sufficient volume levels and volume level deviations for the annunciators as well as providing for the reduction of ambient noise levels.

IMPLEMENTATION:

An acoustical study was performed by ARD Corporation to examine the background noise throughout the control room. A report documenting the results of the study, to include a confirmation that the main source of the noise is CP-22 and provide proposals for noise reduction, was submitted by ARD in February, 1988. The resulting corrective actions will be implemented under HED 451.

CORRECTIVE ACTIONS

HED NO.: 0255

GUIDE NO.: T.A. SI6, C2.2

CATEGORY: X

FINDING:

There should be more discrimination in alarm sounds between panels.

RESPONSE:

A thorough review of the annunciator tones will be conducted to see if this is possible with installed equipment.

IMPLEMENTATION:

An acoustical study was performed by ARD Corporation to examine the background noise throughout the control room. A report documenting the results of the study, to include a confirmation that the main source of the noise is CP-22 and provide proposals for noise reduction, was submitted by ARD in February, 1988. The resulting corrective actions will be implemented under HED 451.

CORRECTIVE ACTIONS

HED NO.: 0277

GUIDE NO.: Op Survey A5.01, C1.01

CATEGORY: X

FINDING:

Communication between the control desk and the protection panel area in the back is impossible due to unnecessarily high background noise levels from CPC ventilation fans on CP21 and CP22. This fan noise bleeds over into front panel area and creates background noise. The RPS noise is a consistent high problem concerning normal verbal control room communication.

RESPONSE:

The systematic evaluation of the sound levels within the control room will determine the interactive effects of the ambient noise levels and the auditory signals of the annunciators and emergency alarms. The high background noise in the control room, its volume, amplitude, and frequencies significantly affect the signal-to-noise ratios of the auditory signals and thereby reduce their effectiveness. A thorough review of the dynamics associated with these problems will diagnose the root causes and provide for design alternatives to mitigate these problems. Recommendations will include considerations for ensuring sufficient volume levels and volume level deviations for the annunciators as well as providing for the reduction of ambient noise levels.

IMPLEMENTATION:

An acoustical study was performed by ARD Corporation to examine the background noise throughout the control room. A report documenting the results of the study, to include a confirmation that the main source of the noise is CP-22 and provide proposals for noise reduction, was submitted by ARD in February, 1988. The resulting corrective actions will be implemented under HED 451.

CORRECTIVE ACTIONS

HED NO.: 0302

GUIDE NO.: B6.02, C1.02

CATEGORY: X

FINDING:

Emergency alarms, i.e., plant fire, plant emergency alarm, controls should be near plant operator console. The low volume of the fire alarms makes them difficult to hear at a distance.

RESPONSE:

The systematic evaluation of the sound levels within the control room will determine the interactive effects of the ambient noise levels and the auditory signals of the annunciators and emergency alarms. The high background noise in the control room, its volume, amplitude, and frequencies significantly affect the signal-to-noise ratios of the auditory signals and thereby reduce their effectiveness. A thorough review of the dynamics associated with these problems will diagnose the root causes and provide for design alternatives to mitigate these problems. Recommendations will include considerations for ensuring sufficient volume levels and volume level deviations for the annunciators as well as providing for the reduction of ambient noise levels.

IMPLEMENTATION:

An acoustical study was performed by ARD Corporation to examine the background noise throughout the control room. A report documenting the results of the study, to include a confirmation that the main source of the noise is CP-22 and provide proposals for noise reduction, was submitted by ARD in February, 1988. The resulting corrective actions will be implemented under HED 451.

CORRECTIVE ACTIONS

HED NO.: 0451

GUIDE NO.: 2.1.6.E.1; 2.2.6; 3.2.1.A&D; T.A. SI6;
Op Survey A5.01, B6.02, C1.01, C1.02, C2.2

CATEGORY: X

FINDING:

General deficiencies in the auditory alarm system in the control room were identified by HEDs 126, 127, 255, 277 and 302. In an attempt to localize and identify unusually high sources of noise, examine background noise, and provide proposals for noise reduction, ARD Corporation conducted an acoustical study. Based on the results of the study and further investigation, it was determined that modifications need to be implemented to address the problems regarding the ability to hear and discriminate annunciator alarms over ambient control room noise.

RESPONSE:

Station Modification (SM) No. 1433 has been initiated to reduce the noise level in the control room. The source of the noise is twofold. The noise results from both the sixteen Mclean blower fans (there are four in each of four CPC cabinets, know collectively as CP-22) and from the low frequency resonance of the cabinets themselves which is induced by blower/cabinet interaction. The corrective actions to be performed under SM 1433 may include the following: 1) replace the blowers with fewer, low noise-designed blowers; 2) redesign the blower mountings; and 3) redesign the air passages into and out of the cabinets. After the implementation of SM 1433, the sound pressure levels of the annunciator horns will be measured to determine if the problem of insufficient gain over ambient noise still exists. If it does, the signal levels will be adjusted.

IMPLEMENTATION:

Estimated date of completion is December, 1989.

ATTACHMENT B-5

ANALYSIS OF INSTRUMENTATION HEDs

CORRECTIVE ACTIONS

HED NO.: 0227

GUIDE NO.: T.A. HT5

CATEGORY: X

FINDING:

The setpoint meter on the pressurizer pressure controller should be modified so that it is identical to the process meter on the same controller.

RESPONSE:

This will be investigated and modified if product availability allows. If no other meter scale can be added it will be reevaluated.

IMPLEMENTATION:

The setpoint meter was modified under Station Modification #1469 such that it is now identical to the process meter on the same controller. The work completion notice for this modification was issued on January 30, 1987 and the document update record was issued April 25, 1988.

CORRECTIVE ACTIONS

HED NO.: 0228

GUIDE NO.: T.A. DI7

CATEGORY: X

FINDING:

The setpoint meter on the steam bypass master controller (CP1) should be identical to the process meter on the same controller.

RESPONSE:

This will be investigated and modified if product availability allows. If no other meter scale can be added it will be reevaluated.

IMPLEMENTATION:

The setpoint meter was modified under Station Modification #1469 such that it is now identical to the process meter on the same controller. The work completion notice for this modification was issued on January 30, 1987 and the document update record was issued April 25, 1988.

ATTACHMENT B-6

RADIO COMMUNICATIONS HEDs

CORRECTIVE ACTIONS

HED NO.: 0185

GUIDE NO.: Oper. Survey A5.3, D3.1, 2.1.4.B.1, T.A. SI.2

CATEGORY: X

FINDING:

The radio system does not provide adequate communication for the control room operators. The signals from maintenance and security radios bleed into the operations radio.

RESPONSE:

The radio system will be thoroughly reviewed and a recommendation will be available.

IMPLEMENTATION:

Representatives from Waterford 3 Plant Staff and Motorola Communications and Electronics, Inc. performed a detailed examination of the Waterford 3 radio communication system on January 22, 1986. To eliminate the source of the interference, a change in the frequency of the maintenance repeater was recommended.

In light of the fact that two separate requests for a new frequency for Waterford 3 have been denied due to severe congestion within the requested frequency spectrum in the effective range of the Waterford 3 radios, an alternate means for correcting the interference problem has been selected. Design change (DC) #3046 has been initiated to replace the two existing 2-port combiners with a single 4-port combiner. By installing this equipment, which is the most efficient design for this type of arrangement, the interference problem should be resolved. Estimated completion date is December, 1989.

CORRECTIVE ACTIONS

HED NO.: 0281

GUIDE NO.: Op Survey A5.06

CATEGORY: X

FINDING:

There is need for a better communication system, such as sound powered phones or another phone system with plug-ins, at all major components and throughout the plant. There is also incompatability between three wire female sockets and two wire male plugs which result in unreliable connections in remote locations.

RESPONSE:

A solution for Radio System problems will be implemented to provide adequate communications. Much of this hinges on FCC approval of a new radio frequency.

IMPLEMENTATION:

Representatives from Waterford 3 Plant Staff and Motorola Communications and Electronics, Inc. performed a detailed examination of the Waterford 3 radio communication system on January 22, 1986. To eliminate the source of the interference, a change in the frequency of the maintenance repeater was recommended.

In light of the fact that two separate requests for a new frequency for Waterford 3 have been denied due to severe congestion within the requested frequency spectrum in the effective range of the Waterford 3 radios, an alternate means for correcting the interference problem has been selected. Design change (DC) #3046 has been initiated to replace the two existing 2-port combiners with a single 4-port combiner. By installing this equipment, which is the most efficient design for this type of arrangement, the interference problem should be resolved. Estimated completion date is December, 1989.