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November 17, 1989

Dr. Thomas E. Murley, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Dresden Nuclear Power Station Units 2 and 3
Quad Cities Units 1 and 2
Request for Schedular Relief for DCRDR
Annunciator Modifications
NRC Docket Nos. 50-237, 249, 254 and 265

References (a): NRC Memorandum to D.R. Muller from B.L. Siegel and T.M. Ross dated November 23, 1988, summarizing November 16, 1988 meeting with CECo.

(b): Letter from J.A. Silady to T.E. Murley dated December 20, 1988 requesting Dresden and Quad Cities DCRDR schedule changes per Nov. 16, 1988 meeting.

(c): Conference Call between CECo (J.A. Silady, B. Zank, J. Dierbeck, et al.) and NRC (B. Siegel, R. Eckenrode) on October 26, 1989.

Dr. Murley:

As documented in References (a) and (b), on November 16, 1988 Commonwealth Edison and NRC Staff personnel met to discuss the extension of HED corrective action commitment dates for Dresden and Quad Cities Stations. At that time, CECo presented a concern that Dresden DCRDR Annunciator Modifications M(12)-3-88-22A and B may not be fully completed prior to startup from the Unit 3 refuel outage starting in December, 1989 (i.e, the second DCRDR outage, D3R11). Therefore, a request was made at the meeting to extend the modification completion date to the subsequent refuel outage (D3R12 beginning in March, 1991).

In response, the NRC Staff concluded that the request was too early and best efforts should continue to be made to meet the commitment date; however, if within several months of the committed outage it became clear that certain HED corrective actions require additional time to implement, the staff would consider a schedular relief request.

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Based upon recent status reviews of the subject modifications and interfacing with other DCRDR control room work, CECo has again concluded that the full modification installation cannot be accomplished within the upcoming D3R11 refuel outage as originally scheduled. In addition, recent experience has been obtained on the lead unit for the annunciator modifications, i.e. Quad Cities Unit 1. During finalization of the designs, pre-outage work, and during the current outage's initial installation activities, it has become clear that the total man-hours required for project completion is much larger than previously anticipated.

Much of the outage work, for example, must be performed inside a single panel where the limited physical space allows only a three man crew at any given time. In addition, several panels are available only for short periods of approximately 2 weeks when the equipment affected is out-of-service.

As a result, CECo has concluded that the committed annunciator system upgrades require two refueling outages per unit as well as substantial non-outage efforts. Consequently, an additional operating cycle is also needed for the completion of the Dresden Unit 2 and Quad Cities Unit 2 modifications and at least part of an additional cycle may be needed for Quad Cities Unit 1.

CECo discussed these schedule changes with your staff in the Reference (c) conference call. Enclosure A contains the CECo material utilized during the meeting, including:

a) a timeline chart indicating the requested schedular relief for each of the four Dresden and Quad Cities units;

b) a list of the specific Human Engineering Discrepancies (HEDs) affected, including the Category and Level assigned during the DCRDR;

c) background reference material describing the associated modifications;

d) a workscope summary for Quad Cities which reflects the Unit 1 experience thus far, including projected field labor man-hours for each control room panel;

e) an evaluation of safety significance of the requested schedule extension in view of the Category and Level classifications for the affected HEDs.

Please note that outage dates indicated on the Enclosure A chart are subject to subsequent adjustments by the CECo Overhaul Scheduling Committee which coordinates all nuclear and fossil unit outages.

During the Reference (c) discussions, CECo explained the measures being taken to assure that non-outage work is controlled such that the potential impact on operations is minimized. Controls on outage work were discussed as well. CECo also described how the transition to the modified annunciator system will be managed to avoid the adverse training impacts and different system responses which would be associated with a more "piecemeal" approach. These aspects of the revised schedule are discussed further in Enclosure B.

Finally, Enclosure C provides further discussion to support CECo's conclusion that the revised schedule will not significantly impact the safety of plant operations.

In summary, CECo has continued to aggressively pursue the completion of improvements recommended during the Detailed Control Room Design Reviews. The Dresden and Quad Cities annunciator system upgrades are particularly ambitious, now estimated to involve close to 60,000 man-hours per station and over 800 drawing revisions. The enhanced annunciator system will also have capabilities beyond those committed to in the DCRDR Final Summary Reports and Supplements for the two stations. Despite good faith efforts, however, the committed schedules are no longer feasible to maintain for these modifications and additional relief has therefore become necessary as described in the Enclosures.

Please contact this office should further information be required.

Very truly yours,

J. A. Silady
Nuclear Licensing Administrator

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Enclosures (3)

cc: A.B. Davis - Regional Administrator, Region III
R.M. Lerch - Projects Section Chief, Region III
S.G. DuPont - Senior Resident Inspector, Dresden
B.L. Siegel - Project Manager, NRR
R.L. Higgins - Senior Resident Inspector, Quad Cities
T.M. Ross - Project Manager, NRR

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ENCLOSURE A

10/26/89 CECo-NRC

CONFERENCE CALL ON DRESDEN/QUAD CITIES

DCRDR ANNUNCIATOR MODIFICATION SCHEDULE

INTRO.

A. SCHEDULAR RELIEF REQUEST

- One additional cycle on D2, D3, and QC2
- May need additional cycle on QC1
- Project requires two outages to complete, even with substantial non-outage work.

B. FACTORS IMPACTING SCHEDULE

- Overview of mod. scope
- Experience in finalizing designs
- Experience in implementation on lead unit (Quad Cities Unit 1-current outage)

C. ASSESSMENT OF SAFETY SIGNIFICANCE

- Classification of affected HED_S
  -All level B or C
  -All category 2 except a misclassified Quad Cities HED
- Revised sched. minimizes training and transition impacts

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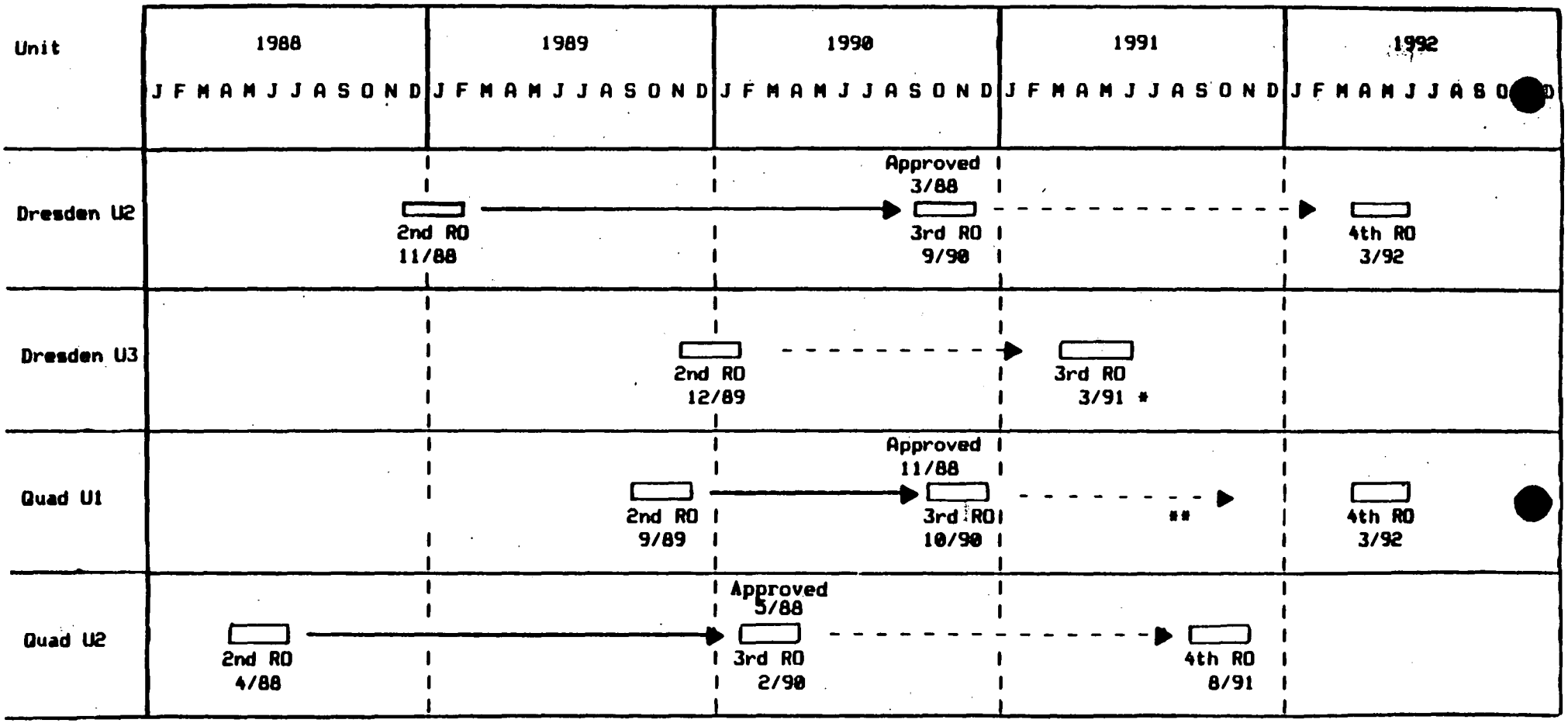
DCRDR ANNUNCIATOR MODS



Legend:

Month/Year	Start of Outage
DCRDR Outage#	Based on FSR definitions
——→	Previously approved scheduled relief (to end of outage)
- - - - →	Proposed schedule change
*	Relief requested at 11/88 meeting but not yet approved
**	Some non-outage work may be needed following restart from 3rd DCRDR Outage

DRESDEN ANNUNCIATOR MODIFICATION HED LIST

Index #	HED #	FSR Pg	Cat/Lvl	Action To Resolve
231	2.2.1.B-1	90	2C	Auditory Coding
232	2.2.1.C.2-3	358	2C	Auditory Coding
107	2.2.1.C.2-4	358	2C	Auditory Coding
233	2.2.2.A-1	92	2C	Auditory Coding
108	2.2.2.A-2	92	2C	Auditory Coding
237	2.2.3.A-1	92	2C	Auditory Coding
191	2.2.3.A-2	92	2C	Auditory Coding
468	2.2.5.A-1	17	2C	Auditory Coding
469	2.2.5.B-3	18	2C	Auditory Coding
470	2.2.6.C-1	93	2C	Auditory Coding
368	3.2.1/OS-2	104	2B	Auditory Coding
472	3.2.1.D-6	20	2C	Auditory Coding
343	3.1.2.C.3-7	100	2B	Multiple-Input Reflash
281	3.1.5.A-1	103	2C	Annunciator Ringback and Flashrate.
354	3.3.2.B-1	107	2C	

QUAD CITIES ANNUNCIATOR MODIFICATION HED LIST

Index #	HED #	FSR Pg	Cat/Lvl	Action To Resolve
109	2.2.1.B-1	54	2B	Auditory Coding
110	2.2.1.C.2-1	54	2B	Auditory Coding
111	2.2.2.A-1	53	2C	Auditory Coding
399	2.2.5.A-1	55	2B	Auditory Coding
398	2.2.5.B-1	56	2B	Auditory Coding
400	2.2.6.A-1	57	2B	Auditory Coding
401	2.2.6.C-1	58	2B	Auditory Coding
404	3.2.1.D-1	69	2B	Auditory Coding
17	3.2.1.F-1	71	2B	Auditory Coding
323	3.2.1.F/OS-2	71	2B	Auditory Coding
74	3.1.2.C.1-1	62	1C	Multiple-Input Reflash
27	3.3.4.C-1	62	1C	Multiple-Input Reflash
27	3.3.4.C-2	62	1C	Multiple-Input Reflash
27	3.3.4.C-3	62	1C	Multiple-Input Reflash
27	3.3.4.C-4	62	1C	Multiple-Input Reflash
12	3.1.2.C.2-1	64	2B	Multiple-Input Reflash
13	3.1.2.C.3-1	65	2B	Multiple-Input Reflash
15	3..34.A-1	68	2C	Multiple-Input Reflash
16	3.1.5.B.1-1-1	68	2C	Annunciator Ringback and Flashrate
15	3.1.5.A-1	68	2C	
20	3.3.2.B-1	74	2C	Annunciator Ringback and Flashrate
67	7.3.2.F.1-1	346	2C	Printing of alarm tile panel and box coordinates on computer alarm messages.
78	7.3.2.F.2-1	346	2C	

NOTE: Reference material only.
R. Koenig will only give a brief overview describing the scope of the modifications.

7.0 MODIFICATION DESCRIPTION

This modification addresses the human engineering deficiencies (HEDs) associated with the plant annunciator system. They were identified during the human factors review at the Quad Cities Station. Commitments were made to the NRC by CECo to resolve the deficiencies and bring them within the guidelines specified in NUREG 0700.

7.1 Existing System Operation:

The existing annunciator system's operation and it's deficiencies are discussed here. The HED numbers and excerpts from the HED findings are given in parenthesis for each deficiency identified.

For a single-input alarm window, that is, an alarm window with only one activating device contact, the following operation sequence occurs:

1. When the activating device contact enters the alarm condition, the alarm window fast flashes and the alarm horn at the associated panel group sounds. For certain alarm inputs, the alarm printer of the plant computer will print out an alarm message. (HED Index No. 0077, "All annunciator alarms are not recorded on the alarm printer of the computer.") | 2

2. Pressing the silence push button at any panel group silences the alarm horn. Pressing the acknowledge push button at the affected panel group causes the alarm window to stop fast flashing and go "solid" (remain continuously on). This will also silence the alarm horn if a silence push button has not already been used to do so. | 2

3. When the activating device contact returns to the normal condition, no audible or visual signal is provided to the Operator to indicate such. (HED Index No. 0016, 0015, "no visual signal which indicates that an alarm has cleared ... no dedicated distinctive audible signal to indicate cleared alarms".) For certain alarm inputs, the alarm printer of the plant computer will print out a reset message. (Again, HED Index No. 0077)

4. Pressing the reset push button at the affected panel group extinguishes the alarm window, but no signal has been given to the Operator to do such.

For a multi-input alarm window, that is, an alarm window that has two or more activating device contacts associated with it, the following operation sequence occurs:

1. When the first activating device contact enters the alarm condition, the alarm window fast flashes and the alarm horn at the associated panel group sounds. Certain multi-input alarms are recorded by the alarm printer of the plant computer. (HED Index Nos. 0077, "All annunciator alarms are not recorded on the alarm printer of the computer."; 0012, "alarm printout capability is not provided for all multi-input annunciators."; 0074, 0027, "several annunciators with inputs from more than one plant parameter... non-specific "trouble" alarms."; 0032, "visual file legends which are ambiguous and non-specific... no other means to investigate the problem further")

2. Pressing the silence push button at any panel group silences the alarm horn. Pressing the acknowledge push button at the affected panel group causes the alarm window to go solid and will silence the alarm horn if the silence push button has not already been used to do so. (2)

3. Subsequent activating device contacts that enter the alarm condition do not cause the alarm window to fast flash again (visual reflash) or the alarm horn to sound (audible reflash). (HED No. 0013, "a reflash capability is not provided which allows subsequent alarms to activate the auditory alert mechanism and reflash the visual tile") Certain multi-input alarms are recorded by the alarm printer of the plant computer. (Again, HED Index Nos. 0077; 0012; 0074, 0027; 0032). No signal, audible or visual, is given to the Operator to instruct him to check the alarm printer for those certain multi-input alarms that it records.

4. When an activating device contact returns to the normal condition, no audible or visual signal is provided to the Operator to indicate such. (HED Index No. 0016, 0015, "no visual signal which indicates that an alarm has cleared ... no dedicated distinctive audible signal to indicate cleared alarms") Certain multi-input alarms are recorded by the alarm printer of the plant computer. (Again, HED Index Nos. 0077; 0012; 0074, 0027; 0032).

5. Pressing the reset push button at the affected panel group extinguishes the alarm window, but no signal has been given to the Operator to do such.

Other annunciator system deficiencies include the following:

1. The fast flash rate of the alarm windows is approximately 2 flashes per second. (HED Index No. 0020, "alarm flash rate does not meet the 3 to 5 flashes per second criterion.")

2. The alarm horns exhibit numerous deficiencies. (HED Index Nos. 0017, 0323, "work stations do not have separate distinct auditory alarms."; 0109, 0110, "Auditory signals do not provide auditory cues ... Several panels will share one alarm... Alarms on Unit 1 are not easily distinguished from alarms on Unit 2 or the common panels... Telephone bells on the center desk and on the SCRE's desk are not easily distinguishable."; 0111, "Telephone signals are not coded for localization ... Annunciator alarms are not coded and one signal alarms for three different panels."; 0398, "bandwidth of the auditory alarm for the annunciator system are greater than 200Hz."; 0399, "frequencies of the auditory signals for the annunciator system are not between 200 and 5000 Hz."; 0400, "sound levels of annunciator signals at workstations

901-55, 902-54, 902-3 and 912-2 do not have signal to noise ratio of at least 10 dB(A)."; 0401, "Some auditory signal intensities exceed the recommended guideline maximum of 90 dB(A)."; 0404, "individual annunciators are not within + or - 2.5 dB of 90.2 dB(A),")

7.2 New System Installation:

This modification will resolve the HEDs for the existing annunciator system by providing auditory coding, audible reflash, audible ringback, visual ringback and adjustable flash rate. This will be accomplished by installing the following equipment:

1. A sequential events recorder (SER) that will provide status messages to the operator for each activating device contact in the annunciator system.

2. Dual electronic horns at the panel groups 901(2)-3 & 4, 901(2)-5, 901(2)-6, 7 & 8 and 912-1 & 5. One horn output will be used as an alarm horn and the other horn output will be used as a ringback horn. (Note: The dual electronic horns have dual inputs, one for the alarm signal and one for the ringback signal. There is only one output. The sounding of the alarm horn (warble sound) takes precedence over the sounding of the ringback horn (tone sound). △2.

   Alarm Horn - This horn will sound when any alarm point in the system enters the alarm condition. This will provide audible reflash for multi-input alarm windows in the annunciator system.

   Ringback Horn - This horn will sound when any alarm point in the system returns to the normal condition. In this way, it will provide audible ringback for the annunciator system

   These electronic horns will have adjustable volume and tone controls to allow each alarm horn and ringback at each panel group to be auditory coded.

3. New logic modules with a ringback sequence at panel 901(2)-34. This will cause the alarm windows to slow flash when their alarm conditions clear, thus providing visual ringback. △2

4. New annunciator flasher cards at Panel 901(2)-34 with adjustable flash rates. This will allow the alarm rate (fast flash) for alarm windows to be adjusted to the required 3 to 5 flashes per second and the reset rate (slow flash) to be adjusted to one-half the alarm rate.

7.3 New System Operation:

The modified annunciator system will operate as discussed here. The HED numbers given in parenthesis identify existing system deficiencies that will be eliminated by the new design.

A single-input alarm window will behave according to the Sequence Table given in Item 2 of the Design Input Requirements (DIR), (See Attachment B).

1. When the activating device contact of a single-input alarm window enters the alarm condition, the alarm window will fast flash, the alarm horn at the associated panel group will sound. For certain alarm inputs, the alarm printer of the plant computer will print out an alarm message. The SER will print out a message specific to the alarm condition. (HED Index No. 0077)

2. Pressing the silence push button at any panel group will silence the alarm horn. Pressing the acknowledge push button at the affected panel group will cause the alarm window to stop fast flashing and go "solid" (remain continuously on). This will also silence the alarm horn if a silence push button has not already been used to do so.

3. When the activating device contact returns to the normal condition, the alarm window will provide visual ringback by slow flashing, the ringback horn at the associated panel group will provide audible ringback by sounding. (HED Index No. 0016, 0015) For certain alarm inputs, the alarm printer of the plant computer will print out a reset message. The SER will print out a message specific to the reset condition. (HED No. 0077)

4. Pressing the silence push button at any panel group will silence the ringback horn. Pressing the reset push button at the affected panel group will extinguish the alarm window and will silence the ringback horn if a silence push button has not already been used to do so.

A multi-input alarm window will behave according to a first in/last out priority with respect to the alarm and ringback modes.

1. The first in portion refers to the fact that only the first activating device contact that enters the alarm condition will cause the alarm window to fast flash. When the fast flash is acknowledged, the alarm window will go "solid". Subsequent activating device contacts that enter the alarm condition will not affect the alarm window. It will remain continuously on.

Although the alarm window will not provide visual reflash for each subsequent alarm condition, the alarm horn at the associated panel group will provide audible reflash by sounding for each alarm condition (HED No. 0013) and the SER will print out a message specific to each alarm condition. (HED Index Nos. 0077; 0012; 0074, 0027; 0032) For certain alarm inputs, the alarm printer of the plant computer will print out an alarm message.

2. Pressing the silence push button at any panel group will silence the alarm horn. Pressing the acknowledge push button at the affected panel group will cause the alarm window to go solid and will silence the alarm horn if a silence push button has not already been used to do so.

3. The last out portion refers to the fact that only the last activating device contact that returns to the normal state will provide visual ringback by causing the alarm window to slow flash. That is, if an activating device contact returns to the normal condition and all other inputs for the alarm window are also in the normal condition, then the alarm window will slow flash.

   Although the alarm window will not slow flash for each activating device that resets, the ringback horn at the associated panel group will provide audible ringback by sounding for each reset condition (HED No. 0016, 0015) and the SER will print out a message specific to each reset condition. (HED Nos. 0077; 0012; 0074, 0027; 0032) For certain alarm inputs, the alarm printer of the plant computer will print out a reset message.

4. Pressing the silence push button at any panel group will silence the ringback horn. Pressing the reset push button at the affected panel group will extinguish the alarm window, if all activating device contacts are in the reset condition, and will silence the ringback horn if a silence push button has not already been used to do so.

Other improvements to the annunciator system will be made as follows:

1. The fast flash rate of the alarm windows will be upgraded to meet the 3 to 5 flashes per second criteria with the slow flash rate set to half the fast flash rate. (HED Item No. 0020) 

2. The alarm horns will be upgraded to include volume and tone controls. This will allow them to be adjusted to resolve the subject deficiencies. (HED Index Nos. 0017, 0323; 0109, 0010; 0111; 0398; 0399; 0400; 0401; 0404. Note: Resolution of the telephone bell deficiencies is not within the scope of this modification.) | 2

In summary, the following features will be added to improve the operation of the annunciator system and resolve the human engineering deficiencies (HEDs) identified by the human factors review of the Control Room.

Auditory Coding - The alarm horns at the panel groups 901(2)-3 & 4, 901(2)-5, 901(2)-6, 7 & 8 and 912-1 & 5 will be adjusted so that the operator can determine which alarm horn is sounding. Likewise, the ringback horns at the panel groups will also be auditory coded. (HED Nos. 0017, 0323; 0109, 0110; 0111; 0398; 0399; 0400; 0401; 0404) | 2

Adjustable Flash Rate - The alarm rate (fast flash) for the alarm windows will be adjusted to 3 to 5 flashes per second and the reset rate (slow flash) will be adjusted to one-half the alarm rate. (HED No. 0020) | 2

Audible Reflash - Multi-input alarm windows will work on a first in priority. The first activating device contact that enters the alarm condition will cause the alarm window to fast flash, the alarm horn at the associated panel group to sound and the SER to print out a message specific to the alarm condition.

Subsequent activating devices contacts for the window that enter into the alarm condition will not provide visual reflash by causing the alarm window to fast flash again. Instead, the alarm horn will provide audible reflash by sounding for each alarm condition and the SER will print out a message specific to each alarm condition. (HED Nos. 0013; 0077; 0012; 0074, 0027; 0032) | 2

Visual and Audible Ringback - When an activating device contact for a single-input alarm window goes from the alarm condition to the normal condition, the alarm window will provide visual ringback by entering the slow flash state, the ringback horn at the associated panel group will provide audible ringback by sounding and the SER will print out a message specific to the normal condition.

Multi-input alarm windows will work on a last out priority for visual ringback. For a multi-input alarm window, the alarm window will provide visual ringback by entering the slow flash state only if an activating device contact clears itself and all the other inputs associated with the alarm window are clear. The ringback horn will provide audible ringback by sounding for all activating device contacts that clear themselves. The SER will print out messages specific to all activating device contacts that clear themselves. (HED Nos. 0016, 0015; 0077; 0012; 0074, 0027; 0032) 2

J. DIERBECK
(Quad Cities Tech. Staff Supervisor)

Annunciator Modification
Quad Cities Station

Total Field Labor Manhours - 28,130 mhrs (est.)
Unit One 12,420 mhrs Unit Two 12,420 mhrs Common 3,290 mhrs

Total Support Manhours - 28,000 mhrs (est.)

About 39% of work is done Non Outage

About 61% of work is done Outage

About 52.5% of the Field Labor Outage work will be done this refuel outage or 4445 mhrs

About 60% of this Field Labor refuel outage work is found in the 901-34 panel or 2650 mhrs

The 901-34 panel has limited physical space and permits only a 3 man crew at any given time.

Installer QC Performs:

Point to Point Wiring Verification
General Construction Attributes Verification
Termination Verification

The 901-3 panel for ECCS systems and the 901-5 panel for RPS/CRD System are worked only during the 3 to 4 week window when the core is unloaded.

Other panels are worked during small 2 week windows when the majority of equipment serviced by the panel is out of service.

After field work is completed on a panel, it takes roughly 12 days to declare the panel annunciator operable.

Activity	Duration
Construction Test	3 days
Installer & Testing Final Work Package Assembly & Review	5 days
CECo QC Package Review	2 days
Mod Test	1 day
Operability Test	1 day
Total	12 days

Annunciator Modification
Field Labor
Man Hours
Quad Cities Station

Panels U-1	Non Outage	1st Refuel	Non Outage	2nd Refuel
901-3		1170		340
901-4		925		280
901-5		----		1950
901-6	2750	----	200	755
901-7		1160		340
901-8		1190		360
901-53			250	
901-54			250	
901-55			250	
901-56			250	
Panels Common				
912-1	750	----	540	
912-2			200	
912-5		----	1400	
912-7			200	
912-8			200	
Panels U-2				
902-3		1170		340
902-4		925		280
902-5	2750	----	200	1950
902-6		----		755
902-7		1160		340
902-8		1190		360
902-53			250	
902-54			250	
902-55			250	
902-56			250	
Subtotal	6250	8890	4940	8050

Total 28,130

C. SAFETY SIGNIFICANCE

J. KRASS (HUMAN FACTORS)

THE HUMAN FACTORS GROUP FEELS THAT THE SAFETY SIGNIFICANCE IS MINIMAL FOR THE FOLLOWING REASONS:

- NO LEVEL A HEDs ASSOCIATED WITH ANNUNCIATOR MODIFICATION.

- ALL HEDs OF CATEGORY 2 CLASSIFICATION, EXCEPT ONE AT QUAD WHICH WAS MISCLASSIFIED AS A CATEGORY 1 HED.

  - Quad Cities original handwritten HED #74 had an extensive Equipment Identification roster associated with it that specifically identified multi-input annunciator tiles in the RHR, HPCI and Core Spray systems as problematic. It is probable that the HEDAT miscued in their assessment on the systems specified on the EID roster in classifying HED 74 as opposed to cueing on the annunciator system as a system per se, which is non safety related according to the FSAR.

  - Other HEDs documenting the same problem at both Dresden and Quad were classified as Category 2.

- ALL HEDs WERE CLASSIFIED AS EITHER LEVEL B OR C.

  - Consequently, at most the HEDs have only a Moderate or Minimal Influence on Plant Performance.

- NEGATIVE TRANSFER OF TRAINING IMPACT MINIMIZED.

  - Delaying energizing SER panel until all points have been terminated and tested will mean operators will not have to deal with "multiple" annunciator systems and different system responses.

- ANNUNCIATOR MODIFICATION IS ADDING SIGNIFICANTLY TO THE ANNUNCIATOR SYSTEM CAPABILITIES ABOVE AND BEYOND IMPROVEMENTS COMMITTED TO THE NRC.

  - This modification will add auditory and visual ringback, different horn tones at different panels, and auditory reflash for multiple-input alarms with a Sequence-Of-Events recorder to printout the input triggering the multiple-input auditory reflash. In addition, the SER is being programmed to handle all annunciator inputs and can be adjusted to virtually eliminate frequently occurring nuisance alarms. Further, it can be expanded to accomodate a CRT display of alarm status.

HED ASSESSMENT CLASSIFICATION
DEFINITIONS OF CATEGORY AND LEVEL

CATEGORY

The Category classification was originally intended to assist the HEDAT in determining A) whether the HED should be corrected or not and, B) the tentative priority for corrections that should be implemented.

Category 1: HEDs Associated with Engineered Safeguard Systems or Engineered Safty Features.

Category 2: HEDs Associated with Plant Systems not Included in Category 1. (i.e. non-Safety Related Systems)

Category 3: HEDs Not Falling in Either Category 1 or Category 2. (i.e. features or components which are neither ESFs / S.R. systems or Non-S.R. systems)

LEVEL

The Level classification was intended to denote the relative safety significance of the HEDs within a given category. It was to be a determining factor in the HEDAT's recommendation to correct a HED.

Level A: HEDs with Documented Errors, Documented Control Based Problems, or in the Judgement of the HEDAT, May have Significant Impact on Plant Safety and/or Productivity.

Level B: HEDs which May have Moderate Influence on Plant Performance (that is, consequences may delay or impact the efficient operation of the plant, but NOT in a significant manner).

Level C: HEDs with a Relatively Minimal Impact on Plant Performance (consequences of human error will not lead to degraded plant safety or operation).

ENCLOSURE B

IMPLEMENTATION OF ANNUNCIATOR UPGRADES

GENERAL APPROACH

This modification will upgrade the existing control room annunciator system and will install a new sequential events recorder (SER) system. Part of the SER system installation will consist of rewiring the annunciator window alarm circuits of the existing annunciator system to provide inputs to the SER system. In effect, this will result in two essentially redundant annunciator systems.

The upgrade to the existing annunciator system involves rewiring of the window alarm circuits. This will be performed in stages over a period of several months, but will not cause significant operational concerns because the effect of the rewiring will be essentially transparent to the operator during this period. That is, the rewired annunciator windows will operate the same as those annunciator windows that have not yet been rewired.

There will come a point in the installation that will cause a change in the behavior of the annunciator system as observed by the operators. That point is the replacement of control cards, a point that CECo proposes to schedule for a second outage of each unit. After this point, all windows that are being rewired under this modification will operate in the same (but new) manner.

Performing the installation as described will complete the modification while preventing any operator confusion which could arise from having two operationally different annunciator characteristics.

PLANNING AND CONTROLS

Each phase of the annunciator modification is being reviewed for the most advantageous time for work and implementation. Consideration will be given to outage and non-outage work, as well as the fuel status during the outages, i.e. loaded, unloaded, or core alterations in progress.

Each annunciator will have to be reviewed on an individual basis and action taken depending on the status and consequence of the equipment involved. Alternatives available include a) temporarily stationing additional operators in the plant to monitor local indication or b) using additional operators in the main control room to specifically monitor plant and equipment paramaters that might be affected during the annunciator outages.

Existing warning systems such as caution cards or out-of-service cards as well as shift turnovers will be used as appropriate to keep the operators apprised of annunciator status.

Finally, the work crew will provide face-to-face briefings with the operators to review the scope of work to be accomplished each shift.

ENCLOSURE C

SAFETY SIGNIFICANCE OF REVISED

SCHEDULE FOR ANNUNCIATOR UPGRADES

Commonwealth Edison Company's Human Factors Group has evaluated the Safety Significance of the HEDs associated with the Dresden and Quad Cities Annunciator Modifications. To extend the completion of the modification by one additional refueling cycle would have minimal safety impact. The evaluation was based on reviews of the original HEDs, the HEDAT Assessment Meeting notes, the Final Summary Reports and Supplements, each respective control room, the annunciator response procedures, and the modification's engineering synopsis.

Significantly, there were no Level "A" HEDs associated with the annunciator modification, only Level "B" or "C". As documented in the CECo DCRDR Program Plan and the Dresden and Quad Cities Final Summary Reports, Level "A" HEDs were those with documented errors, documented control based problems, or in the judgement of the assessment team (HEDAT) may have a significant impact on plant safety and/or productivity. Level "B" HEDs were those with a Moderate effect and Level "C" were those with a Minimal effect. Consequently, at most, the HEDs have only a moderate or minimal impact on plant safety or performance.

In addition, all the HEDs were classified as Category 2 except one HED at Quad Cities which we believe was misclassified as a Category 1 HED. Again, according to the CECo DCRDR Program Plan and the Dresden and Quad Cities Final Summary Report, Category 1 HEDs were those associated with an engineered safeguard system or an engineered safety feature while Category 2 HEDs were those associated with plant systems not included in Category 1. Quad Cities HED Number 74 on FSR page 62 was classified as a 1C. The original handwritten HED Number 74 had an extensive Equipment Identification (EID) roster associated with it that specifically identified multi-input annunciator tiles in the RHR, HPCI and Core Spray systems as problematic. It is likely that the HEDAT miscued in their assessment on the systems specified on the EID roster in classifying HED 74 as opposed to cueing on the annunciator system as a system per se, which is non-safety related according to the FSAR. Further, all other HEDs at both Dresden and Quad Cities that documented the same problem were classified as Category 2. HEDs Number 27, which were grouped in the FSR with HED Number 74 on page 62 were originally classified in the assessment process as Category 2 Level B HEDs. The HEDAT assumed the 1C classification when they were grouped with HED 74 because that HED had a more conservative classification, Category 1 vs. Category 2. Therefore, according to Category and Level classification, the HEDs associated with the annunciator modification are not safety-related and pose only a minimal or moderate impact on plant performance (productivity or efficient operation).

At the conclusion of the outages for which relief has already been granted, some of the alarm inputs will be terminated and ready to be placed in service. So doing, however, would cause those alarm tiles to respond differently than the tiles not yet wired and placed into service in the Sequence of Events Recorder (SER) panel. Consequently, delaying the placement into service of the SER panel until all multiple-input alarm points have been terminated will mean operators will not have to deal with "multiple" annunciator systems and different system responses. We believe the benefit to be gained (from minimizing the negative transfer of training impacts) more than offsets any potential benefit to be gained from activating the system in a piecemeal fashion.

Finally, the system offers the stations the capability to enhance their annunciator systems beyond the original DCRDR commitments to the NRC. For example, our original commitment was to provide a computer listing of safety-related and/or time critical multi-input alarm messages. The system being installed has the capability of being expanded so that all annunciator inputs can be printed. This in turn will make the alarm listing more than a multi-input alarm status device facilitating daily operations and transient analyses. We have an internal commitment to expand the system to its fullest potential as a SER. Further, it will have the capability of being programmed and adjusted to virtually eliminate frequently occurring nuisance alarms. Also, it can be expanded to accommodate a CRT display of alarm status. Although such features will not be fully implemented in conjunction with the FSR committed upgrades, the eventual capabilities of the system should also be considered as supportive of the proposed schedule revision and indicative of CECo's serious intent to enhance the man-machine control room interfaces.

CECo recognizes that delays in implementing DCRDR enhancements are not desirable and should be avoided whenever feasible, even for HEDs not classified as having safety significance. However, for reasons described above, CECo has concluded: a) that the previously committed schedule for annunciator upgrades is no longer feasible to maintain, and b) that the necessary schedule revisions will not significantly impact the safety of plant operations.

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PRIORITY ROUTING

First		Second	
RA		NRC	
DRA		EICSB	
DRP		ESGB	
DRS		HL	
DRSS		OL	
DRMA		OT	
		PAO	

FILE

November 15, 1989

Mr. A. Bert Davis
Regional Administrator
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Dresden Nuclear Power Station Units 2 and 3
Status Report Concerning Improvements to
Isolation Condenser Makeup Systems
NRC Docket Nos. 50-237 and 50-249

References (a): Letter from J.A. Silady to A.B. Davis dated September 18, 1989, transmitting status of CECo review of alternate water sources for the Isolation Condensers at Dresden 2 and 3

(b): Letter from W.D. Shafer to Cordell Reed dated June 16, 1989, transmitting NRC Inspection Report Nos. 50-237/89012 and 50-249/89011.

(c): Letter from J.A. Silady to A.B. Davis dated July 21, 1989 responding to Reference (b) concern on Isolation Condenser Makeup.

Mr. Davis:

This letter provides an update concerning our evaluation of long term improvements to the Dresden Units 2 and 3 Isolation Condenser shell side clean demineralized water supply systems. These improvements, as described in Reference (a), have been divided into three phases which are reviewed below.

REVIEW OF CECo PLANS

The first phase was to implement Isolation Condenser operating procedure revisions to restrict the use of condensate storage water for Isolation Condenser shell side makeup. These revisions, which involve use of service water for Isolation Condenser shell side makeup and/or use of alternate methods for reactor pressure control such as the High Pressure Coolant Injection system and/or the Main Steam Relief Valves, were implemented on May 26, 1989.

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A second phase design improvement involves a power supply modification that is currently under review. This modification proposal involves supplying 480V AC power to the Isolation Condenser shell side motor-operated clean demineralized water fill valves. The tentative schedule for implementing this phase (first quarter 1991) from Reference (a) may change as a result of the evaluation discussed below under "current status".

The third and final phase currently undergoing conceptual design consists of installing two diesel driven pumps for supply of clean demineralized water to the shell side of the Isolation Condensers from the clean demineralized water storage tank. The pumps are intended to be housed in an enclosure attached to the south wall of the Unit 2 Reactor Building. This alternative provides several advantages over the original emergency power makeup source. These include:

1. Elimination of contaminated condensate storage water as a source of Isolation Condenser shell side makeup during loss of off-site power conditions;

2. Increased clean demineralized water makeup flow capacity;

3. Negligible increase on Station emergency electrical power loading; and

4. Use of an existing large volume of clean demineralized water which reduces installation costs.

The tentative installation schedule for this third phase is during the respective unit refueling outages at the end of Cycle 13 in 1992.

CURRENT STATUS

A preliminary review of the existing 10 CFR 50, Appendix R Safe Shutdown Analysis has determined that the Phase 2 design proposal would have an impact on the 10 CFR 50, Appendix R Safe Shutdown Analysis. The major impact of the Phase 2 design proposal is loss of the 2B Condensate Transfer pump as a Safe Shutdown component. The Dresden Station Safe Shutdown Report currently credits the 2B Condensate Transfer pump initial makeup water to the Isolation Condenser shell side. Three options are currently being reviewed to resolve this concern.

Option A is only to credit the redundant 2A Condensate Transfer pump as a Safe Shutdown component. This would result in entry into a seven day Limiting Condition for Operation upon any failure of the 2A Condensate Transfer pump in accordance with the approved Fire Protection Program. Option B is to add the 2/3 B Clean Demineralized Water pump and fill valves as Safe Shutdown components in place of the 2B Condensate Transfer pump. This would require thorough separation requirements and spurious operation analyses. Additionally, both Option A and Option B would require revision of the Safe Shutdown Report and appropriate Safe Shutdown Procedure revisions. Option C is to cancel the Phase 2 design proposal and continue with the implementation of the Phase 3 design proposal. The Safe Shutdown analysis review process has not revealed any concerns regarding the implementation of Phase 3, other than appropriate revisions to the Safe Shutdown Report and Safe Shutdown Procedures.

A final update concerning resolution of the Phase 2 design proposal will be provided within two months.

Please direct any questions you may have regarding this topic to this office.

Very truly yours,

J.A. Silady
Nuclear Licensing Administrator

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cc: B.L. Siegel - Project Manager, NRR
S.G. DuPont - Senior Resident Inspector, Dresden

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