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ROTHERT,W.C. Iowa Electric Light & Power Co.
RECIP.NAME RECIPIENT AFFILIATION
MURLEY,T.E. Office of Nuclear Reactor Regulation, Director (Post 870411

SUBJECT: Forwards info re integrated scheduling of plant mod & justification for continued operation w/Loop/LOCA analysis.

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Iowa Electric Light and Power Company
August 31, 1988
NG-88-2996

Dr. Thomas E. Murley
Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Station P1-137
Attention: Document Control Desk
Washington, D.C. 20555

Re: Duane Arnold Energy Center
Docket No. 50-331
Op. License No. DPR-49

Subject: Integrated Plan Schedule B Change: LPCI Swing Bus Design Modification

File: A-278, A-107a, A-225

Reference: (1) Amendment No. 91, "Plan for the Integrated Scheduling of Plant Modifications for the DAEC," D. Eisenhut to L. Liu, May 3, 1983.

Dear Dr. Murley:

As requested by your staff in our conversations on August 25, 1988, this letter transmits our justification for continued operation (JCO) with a loss-of-offsite-power/loss-of-coolant-accident (LOOP/LOCA) analysis which does not consider a loss of 125 VDC power (Attachment 1), and provides the NRC with written notification of an addition to Schedule B of our Integrated Plan (Reference 1). A revised copy of our current Integrated Plan Schedule is attached (Attachment 2).

Section III of the attached JCO states our commitment to complete the design modifications of the Low Pressure Coolant Injection swing bus select logic which are necessary to accommodate the loss of either division of 125 VDC power prior to startup for Cycle 10. Therefore, we are adding a new item, "Modify LPCI Swing Bus Logic," to Schedule B of our Integrated Plan. This item is scheduled to be completed prior to Cycle 10 startup.

Iowa Electric agrees that the existing 125 VDC swing bus arrangement is an undesireable design feature and it will be corrected. However, a question has been raised as to whether or not the existing design meets applicable regulatory requirements. We are reviewing that matter and intend to resolve it in cooperation with the NRC.

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Please contact this office if you require further information about this matter.

Sincerely,

William C. Rothert
Manager, Nuclear Division

WCR/TLF

Attachments: (1) Justification for Continued Operation with a LOOP/LOCA Analysis Which Does Not Consider a Loss of 125 VDC Power.
(2) Integrated Plan Schedule

cc: T. Forker
L. Liu
L. Root
R. McGaughy
J. R. Hall (NRC-NRR)
A. Bert Davis (Region III)
NRC Resident Office

Justification for Continued Operation with a LOOP/LOCA Analysis Which Does Not Consider a Loss of 125 VDC Power

I. Existing Conditions

We have had several recent communications with the NRC regarding the effect of an assumed loss of one division of 125 VDC power on the accident analysis for a Loss-Of-Offsite-Power (LOOP) coincident with a Loss-Of-Coolant-Accident (LOCA). We have determined that our LOOP/LOCA analysis for this event does not accurately account for this failure mode.

The concern stems from the design of the power supplies for the Low Pressure Coolant Injection (LPCI) mode injection valves and Recirculation System isolation valves. These valves are powered from busses 1B34A and 1B44A, which are in turn powered from either 1B34 or 1B44 in a "swing bus" arrangement via breakers 1B3401 or 1B4401 respectively (see Figure 1). Power is normally supplied from bus 1B34 with breaker 1B3401 closed and 1B4401 open. The design of these breakers is such that they are interlocked to prevent both from being closed at the same time. The system is also designed to be "power seeking" so that, in the event that one division of AC power is lost, busses 1B34A and 1B44A will be powered by the remaining division. Breakers 1B3401 and 1B4401 receive control power from their respective divisions of the 125 VDC system and are designed to fail "as-is" upon loss of control power.

Our current LOOP/LOCA analysis is not accurate should the following scenario occur:

The plant is initially in a normal lineup (i.e., breaker 1B3401 is shut and breaker 1B4401 is open) and a LOOP/LOCA occurs, with the pipe break occurring in the "B" Core Spray loop. The worst case single failure would be the instantaneous loss of Division I of 125 VDC Power (i.e., battery failure). In this case, the Division I emergency diesel generator (1G31) would not supply Division I AC power. Breaker 1B3401 would fail in the closed position and the interlock would prevent breaker 1B4401 from closing, even though power is available from Division II AC power. This would leave no low pressure Emergency Core Cooling Systems available to provide water to the core and fuel damage might occur unless the operators intervene. Our current LOOP/LOCA analysis for this scenario assumes that two Residual Heat Removal (RHR) pumps would be available to provide makeup water to the core; but under the above scenario, no RHR pumps would be available.

II. Justification for Operation with Existing Conditions

Our current LOOP/LOCA analysis does not consider the failure of the LPCI swing bus postulated above. This omission is of minimal safety significance for the following reasons:

1. The sequence of events postulated is unique and extremely remote. First, a LOCA must occur; second, a LOOP must occur; and third, the division of 125 VDC (batteries) to which the swing bus is aligned must fail within the first 10 seconds of the LOOP/LOCA. The probability of occurrence of each

of these three events over the life of the plant is low; their simultaneous occurrence is extremely unlikely.

2. The plant battery systems are extremely reliable. The two 125 volt battery subsystems operate ungrounded with battery resistance to ground and battery voltage checked on each shift (i.e., once every 8 hours). Two grounds would be required to defeat the battery system. Thus, grounds of a magnitude which would cause battery degradation are extremely unlikely. The most likely mode of battery degradation is a single cell deterioration which is signaled well in advance by the routine tests which are performed regularly on the battery.

   The 125 VDC batteries at DAEC were replaced in 1987 during the Cycle 8/9 refueling outage. The new lead-calcium batteries were sized by considering the worst case accident load profiles, and using guidance from IEEE 485, the current standard for sizing batteries.

3. Surveillances are performed to detect battery degradation over time. Various battery surveillances are performed on each shift, weekly, quarterly, and once per operating cycle. Total battery voltage and ground checks are performed by each shift. Electrolyte specific gravity, temperature, and cell voltage of the pilot cells are recorded weekly. Electrolyte specific gravity and voltage on all cells are measured on a quarterly basis. Battery Capacity (discharge) testing is performed once per operating cycle.

4. Batteries are monitored continuously. Annunciators in the control room will alarm upon significant changes on the DC power system (e.g., charger breakers, voltage).

In summary, continued operation of the DAEC is justified and the postulated accident scenario is of minimal safety significance due to:

- the extremely unlikely sequence of events which must occur within a very brief period.
- the extremely high reliability of the battery system.
- regular surveillances which would detect even partial battery degradation.
- continuous monitoring of key battery-related parameters via control room alarms.
- interim procedures implemented to mitigate the concern.

III. Planned Action to Correct Existing Conditions

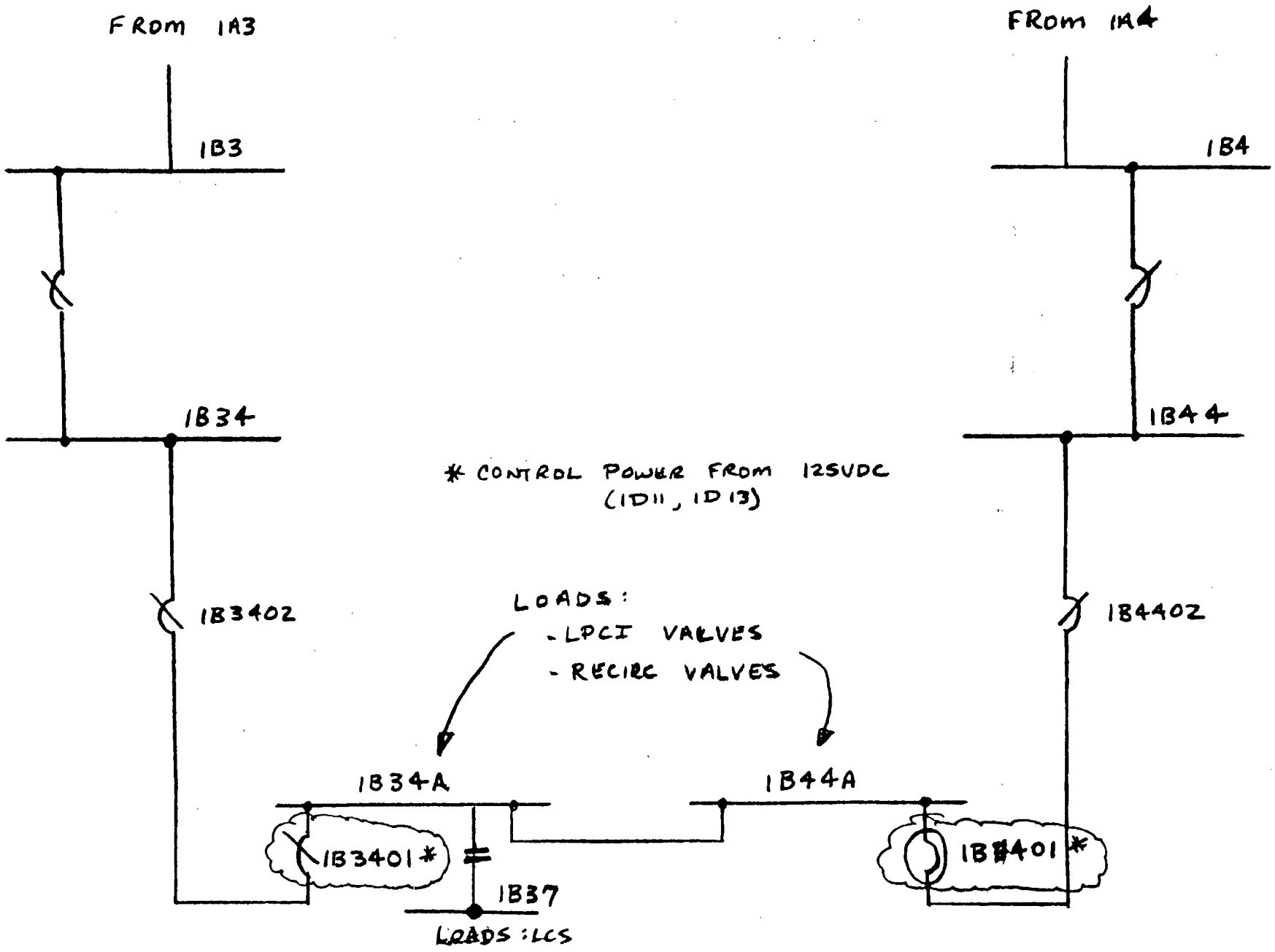
Short-term

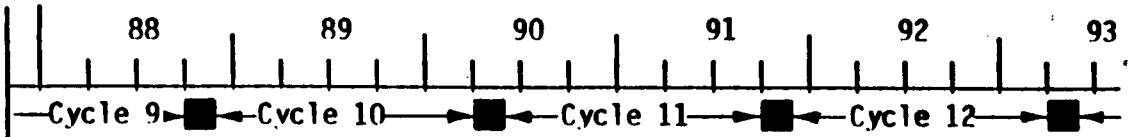
There are procedures in effect which list the symptoms by which operators can recognize the failure of the LPCI inject valve swing bus to transfer when required. Immediate and subsequent operator actions are identified in the procedures.

Long-term

We have initiated an Engineering Work Request to develop a design change in the LPCI swing bus select logic to accommodate the loss of either division of 125 VDC power. This modification will be completed and operable before the start of Cycle 10.

DIAGRAM OF DAEC AC DISTRIBUTION (SIMPLIFIED)
(FIGURE 1)





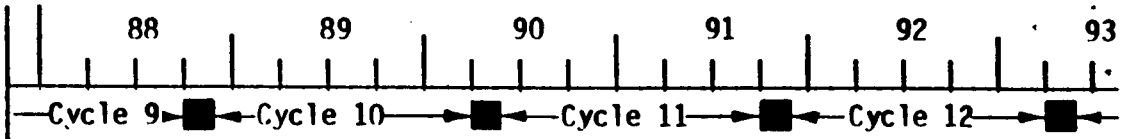
SCHEDULE A

- No Schedule A Items

SCHEDULE B

NRC Items

- Backup Power for TSC — November 1, 1988/NG-87-3142
- Emergency Response Capabilities (Supplement 1 to NUREG-0737)
  - Detailed (Supplement 1) CRDR
    - Phase 2 Long Term Enhancements — Prior to Cycle 10 Startup/NG-86-4251 to NRC
    - Phase 3 Long Term Enhancements — Prior to Cycle 11 Startup/NG-86-4251 to NRC
    - Phase 4 Long Term Enhancements — Prior to Cycle 12 Startup/NG-86-4251 to NRC
  - Regulatory Guide 1.97
    - Upgrade 1E Power Supplies — Prior to Cycle 10 Startup/NG-85-4481 & NG-85-4388 to NRC
    - Reroute Cable for Divisional Separation — Prior to Cycle 10 Startup/NG-85-4481 to NRC
    - Upgrade Instrumentation to Category I — Prior to Cycle 10 Startup/NG-85-4481 to NRC
- Improved Reactor Vessel Water Level Instrumentation — Prior to Cycle 10 Startup/NG-85-4481 to NRC
- Individual Plant Examination — (Note 1)
- Modify LPCI Swing Bus Logic — Prior to Cycle 10 Startup/NG-88-2996
- Station Blackout Rule Compliance — (Note 3)



SCHEDULE B (Continued)

- Surveillance Test Evaluation and Enhancement Program — September 30, 1988/NG-87-3177
- Verification of Seismic Adequacy of Mechanical and Electrical Equipment (USI A-46, GL-87-02) — (Note 1)

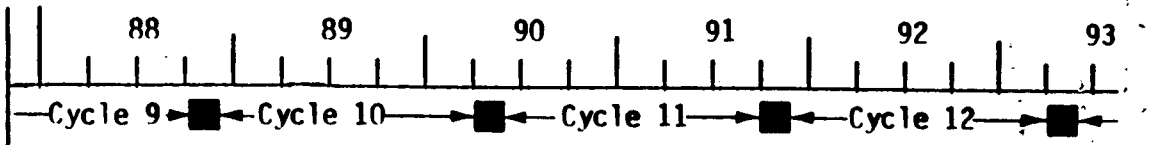
Other Regulatory Agency Items

- Sewage Treatment Plant Modifications — Prior to Cycle 9/10 Refueling Outage/State of Iowa

IELP Initiative Items

- Design Basis Program — (Note 3)
- Drywell-Steam Tunnel HVAC Modifications
  PHASE II - Remaining Insulation — Prior to Cycle 10 Startup/IELP Initiative
- Fire Protection (ANI Annual Projects) — Annual Projects/IELP Initiative
- Generator Retaining Rings and Rewind — Prior to Cycle 10 Startup/IELP Initiative
- Hydrogen Water Chemistry Oxygen/Hydrogen Generator — (Note 2)
- Increased Cooling Tower Capacity — May 1, 1989/IELP Initiative
- MMIS Bill of Materials Program — (Note 3)
- New Facilities Power Distribution Reliability Improvements — December 31, 1990/IELP Initiative
- Plant Initiated Modifications (Annual Projects) — Annual Projects/IELP Initiative

SCHEDULE B (Continued)



- Post Event Reconstruction (GL 83-28, Item 1.2)
  - Upgrade Recorder Power Supplies — Prior to Cycle 10 Startup/IELP Initiative
  - Verify Completion of Safety Injection — Prior to Cycle 10 Startup/IELP Initiative
  - Verify Completion of Containment Isolation — Prior to Cycle 11 Startup/IELP Initiative
- Quality Enhancement Program — September 30, 1988/NG-87-3491
- Relocate PPC VAX Computer — Prior to Cycle 10 Startup/IELP Initiative
- Relocate SPDS Functions on PPC — Prior to Cycle 10 Startup/IELP Initiative
- Safety System Functional Inspection — August 31, 1988
- SPDS Enhancements — During Cycle 10/IELP Initiative
- Training Simulator — June 30, 1990/IELP Initiative
- Turbine Wheel Replacement
  - Replace Low Pressure "A" — Prior to Cycle 10 Startup/IELP Initiative
- Zinc Injection — (Note 2)

Note 1: Schedule not yet certain, awaiting promulgation of NRC requirements.
Note 2: Potential IELP initiative item. Schedule not yet certain.
Note 3: Schedule not yet certain.