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 AUTH.NAME                      AUTHOR AFFILIATION  
 FITZPATRICK, E.                Indiana Michigan Power Co. (formerly Indiana & Michigan Ele  
 RECIP.NAME                      RECIPIENT AFFILIATION  
 MURLEY, T.E.                    Document Control Branch (Document Control Desk)

SUBJECT: Forwards response to Generic Ltr 91-06. "Resolution of Generic Issue A-30, 'Adequacy of Safety-Related DC Power Supplies.'"

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AEP:NRC:1152

Donald C. Cook Nuclear Plant Units 1 and 2  
Docket Nos. DPR-58 and DPR-74  
License Nos. 50-315 and 5-316  
RESPONSE TO NRC GENERIC LETTER 91-06;  
RESOLUTION OF GENERIC ISSUE A-30

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

Attn: T. E. Murley

October 28, 1991

Dear Dr. Murley:

This letter provides our response to NRC Generic Letter (GL) 91-06, Resolution of Generic Issue A-30, "Adequacy of Safety-Related DC Power Supplies." The GL requests information regarding the plant-specific maintenance, surveillance, and monitoring provisions for the DC power system. This information is provided in the attachment to this letter.

As requested in the GL, our response is being submitted under oath according to the provisions of Section 182a of the Atomic Energy Act 1954, as amended, and 10 CFR 50.54(f).

Sincerely,

E. E. Fitzpatrick  
Vice President

ldp

Attachment

9111040187 911028  
PDR ADOCK 05000315  
P PDR

ADD 1

Dr. T. E. Murley

-2-

AEP:NRC:1152

cc: D. H. Williams, Jr.  
A. A. Blind  
J. R. Padgett  
G. Charnoff  
A. B. Davis - Region III  
NRC Resident Inspector - Bridgman  
NFEM Section Chief

STATE OF OHIO)  
COUNTY OF FRANKLIN)

Eugene E. Fitzpatrick, being duly sworn, deposes and says that he is the Vice President of licensee Indiana Michigan Power Company, that he has read the foregoing Response to NRC Generic Letter 91-06; Resolution of Generic Issue A-30, "Adequacy of Safety-Related DC Power Supplies" and knows the contents thereof; and that said contents are true to the best of his knowledge and belief.

E. E. Fitzpatrick

Subscribed and sworn to before me this 28<sup>th</sup>  
day of October, 1991.

Rita D. Hill  
NOTARY PUBLIC

RITA D. HILL  
NOTARY PUBLIC, STATE OF OHIO  
MY COMMISSION EXPIRES 6-28-94



Attachment to AEP:NRC:1152



10 CFR 50.54(f) REQUEST - GENERIC ISSUE (GI) A-30 "ADEQUACY OF  
SAFETY-RELATED DC POWER SUPPLIES"

Background

The specific area of concern of GI A-30 "Adequacy of Safety-Related DC Power Supplies" is the adequacy of the safety-related dc power in operating nuclear power plants, particularly with regard to multiple and common cause failures. Risk analysis and past plant experience support conclusions that failure of the dc power supplies could represent a significant contribution to the unreliability of shutdown cooling. Analysis indicates that inadequate maintenance and surveillance and failure to detect battery unavailability are the prime contributors to failure of the dc power systems.

During the development of plans to resolve GI A-30, it was observed that several previously issued regulatory notices (IENs), bulletins (IEBs) and letters (GLs) submitted to licensees include recommendations similar to those that have been identified to resolve GI A-30. More specifically, it has been determined that recommendations contained in notifications IEN 85-74, "Station Battery Problems", IEB 79-27, "Loss of Non-Class 1E Instrumentation and Control Power System Bus during Operation," and separate actions being taken to resolve GI 49, "Interlocks and LCOs for Class 1E Tie Breakers" include the elements necessary to resolve GI A-30. It is therefore concluded that licensees that have implemented these recommendations and actions will have resolved GI A-30. The response to the questions that follow is necessary to provide the staff with information to determine whether any further action is required for your facility.

Questions

The following information is to be provided for each unit at each site:

1. Unit ONE
2. a. The number of independent redundant divisions of Class 1E or safety-related dc power for this plant is TWO per UNIT. (Include any separate Class 1E or safety-related dc, such as any dc dedicated to the diesel generators.)  
b. The number of functional safety-related divisions of dc power necessary to attain safe shutdown for this unit is ONE.
3. Does the control room at this unit have the following separate, independently annunciated alarms and indications for each division of dc power?
  - a. alarms
    1. Battery disconnect or circuit breaker open? YES
    2. Battery charger disconnect or circuit breaker open (both input ac and output dc)? YES



3. dc system ground? YES
4. dc bus undervoltage? YES
5. dc bus overvoltage? YES
6. Battery charger failure? YES
7. Battery discharge? See Note 1, page 9 of 9

b. Indications

1. Battery float charge current? See Note 1, page 9 of 9
2. Battery circuit output current? See Note 1, page 9 of 9
3. Battery discharge? See Note 1, page 9 of 9
4. Bus voltage? YES

- c. Does the unit have written procedures for response to the above alarms and indications? YES
4. Does this unit have indication of bypassed and inoperable status of circuit breakers or other devices that can be used to disconnect the battery and battery charger from its dc bus and the battery charger from its ac power source during maintenance or testing? See Note 2, page 9 of 9
5. If the answer to any part of question 3 or 4 is no, then provide information justifying the existing design features of the facility's safety-related dc systems. \*See note below. See Note 3, page 9 of 9.
6. (1) Have you conducted a review of maintenance and testing activities to minimize the potential for human error causing more than one dc division to be unavailable? YES and (2) do plant procedures prohibit maintenance or testing on recundant dc divisions at the same time?  
YES

If the facility Technical Specifications have provisions equivalent to those found in the Westinghouse and Combustion Engineering Standard Technical Specificati for maintenance and surveillane, then question 7 may be skipped and a statement to that effect may be inserted here. n/a

7. Are maintenance, surveillance and test procedures regarding station batteries conducted routinely at this plant? Specifically:
  - a. At least once per 7 days are the following verified to be within acceptable limits:
    1. Pilot cell electrolyte level? YES

2. Specific gravity or charging current? YES
  3. Float voltage? YES
  4. Total bus voltage on float charge? YES
  5. Physical condition of all cells? YES
- b. At least once per 92 days, or within 7 days after a battery discharge, overcharge, or if the pilot cell readings are outside the 7-day surveillance requirements are the following verified to be within acceptable limits:
1. Electrolyte level of each cell? YES
  2. The average specific gravity of all cells? YES
  3. The specific gravity of each cell? YES
  4. The average electrolyte temperature of a representative number of cells? YES
  5. The float voltage of each cell? YES
  6. Visually inspect or measure resistance of terminals and connectors (including the connectors at the dc bus)?  
YES
- c. At least every 18 months are the following verified:
1. Low resistance of each connection (by test)? YES
  2. Physical condition of the battery? YES
  3. Battery charger capability to deliver rated ampere output to the dc bus? YES
  4. The capability of the battery to deliver its design duty cycle to the dc bus? YES
  5. Each individual cell voltage is within acceptable limits during the service test? YES
- d. At least every 60 months, is capacity of each battery verified by performance of a discharge test? YES
- e. At least annually, is the battery capacity verified by performance discharge test, if the battery shows signs of degradation or has reached 85% of the expected service life? See Note 4, page 9 of 9

8. Does this plant have operational features such that following loss of one safety-related dc power supply or bus:
- a. Capability is maintained for ensuring continued and adequate reactor cooling? YES
  - b. Reactor coolant system integrity and isolation capability are maintained? YES
  - c. Operating procedures, instrumentation (including indicators and annunciators), and control functions are adequate to initiate systems as required to maintain adequate core cooling? YES
9. If the answer to any part of question 6, 7 or 8 is no, then provide your basis for not performing the maintenance, surveillance and test procedures described and/or the bases for not including the operational features cited. \*See note below. See Note 5, page 9 of 9

\*Note: For questions involving supporting type information (question numbers 5 and 9) instead of developing and supplying the information in response to this letter, you may commit to further evaluate the need for such provisions during the performance of your individual plant examination for severe accident vulnerabilities (IPE). If you select this option, you are required to:

- (1) So state in response to these questions, and
- (2) Commit to explicitly address questions 5 and 9 in your IPE submittal per the guidelines outlined in NUREG-1335 (Section 2.1.6, Subitem 7), "Individual Plant Examination: Submittal Guidance."



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10 CFR 50.54(f) REQUEST - GENERIC ISSUE (GI) A-30 "ADEQUACY OF  
SAFETY-RELATED DC POWER SUPPLIES"

Background

The specific area of concern of GI A-30 "Adequacy of Safety-Related DC Power Supplies" is the adequacy of the safety-related dc power in operating nuclear power plants, particularly with regard to multiple and common cause failures. Risk analysis and past plant experience support conclusions that failure of the dc power supplies could represent a significant contribution to the unreliability of shutdown cooling. Analysis indicates that inadequate maintenance and surveillance and failure to detect battery unavailability are the prime contributors to failure of the dc power systems.

During the development of plans to resolve GI A-30, it was observed that several previously issued regulatory notices (IENs), bulletins (IEBs) and letters (GLs) submitted to licensees include recommendations similar to those that have been identified to resolve GI A-30. More specifically, it has been determined that recommendations contained in notifications IEN 85-74, "Station Battery Problems", IEB 79-27, "Loss of Non-Class 1E Instrumentation and Control Power System Bus during Operation," and separate actions being taken to resolve GI 49, "Interlocks and LCOs for Class 1E Tie Breakers" include the elements necessary to resolve GI A-30. It is therefore concluded that licensees that have implemented these recommendations and actions will have resolved GI A-30. The response to the questions that follow is necessary to provide the staff with information to determine whether any further action is required for your facility.

Questions

The following information is to be provided for each unit at each site:

1. Unit TWO
2. a. The number of independent redundant divisions of Class 1E or safety-related dc power for this plant is TWO per UNIT. (Include any separate Class 1E or safety-related dc, such as any dc dedicated to the diesel generators.)  
b. The number of functional safety-related divisions of dc power necessary to attain safe shutdown for this unit is ONE.
3. Does the control room at this unit have the following separate, independently annunciated alarms and indications for each division of dc power?
  - a. alarms
    1. Battery disconnect or circuit breaker open? YES
    2. Battery charger disconnect or circuit breaker open (both input ac and output dc)? YES



- 3. dc system ground? YES
- 4. dc bus undervoltage? YES
- 5. dc bus overvoltage? YES
- 6. Battery charger failure? YES
- 7. Battery discharge? See Note 1, page 9 of 9

b. Indications

- 1. Battery float charge current? See Note 1, page 9 of 9
- 2. Battery circuit output current? See Note 1, page 9 of 9
- 3. Battery discharge? See Note 1, page 9 of 9
- 4. Bus voltage? YES

c. Does the unit have written procedures for response to the above alarms and indications? YES

- 4. Does this unit have indication of bypassed and inoperable status of circuit breakers or other devices that can be used to disconnect the battery and battery charger from its dc bus and the battery charger from its ac power source during maintenance or testing? See Note 2, page 9 of 9
- 5. If the answer to any part of question 3 or 4 is no, then provide information justifying the existing design features of the facility's safety-related dc systems. \*See note below. See Note 3, page 9 of 9
- 6. (1) Have you conducted a review of maintenance and testing activities to minimize the potential for human error causing more than one dc division to be unavailable? YES and (2) do plant procedures prohibit maintenance or testing on redundant dc divisions at the same time?  
YES

If the facility Technical Specifications have provisions equivalent to those found in the Westinghouse and Combustion Engineering Standard Technical Specifications for maintenance and surveillance, then question 7 may be skipped and a statement to that effect may be inserted here. n/a

- 7. Are maintenance, surveillance and test procedures regarding station batteries conducted routinely at this plant? Specifically:
  - a. At least once per 7 days are the following verified to be within acceptable limits:
    - 1. Pilot cell electrolyte level? YES

2. Specific gravity or charging current? YES
  3. Float voltage? YES
  4. Total bus voltage on float charge? YES
  5. Physical condition of all cells? YES
- b.. At least once per 92 days, or within 7 days after a battery discharge, overcharge, or if the pilot cell readings are outside the 7-day surveillance requirements are the following verified to be within acceptable limits:
1. Electrolyte level of each cell? YES
  2. The average specific gravity of all cells? YES
  3. The specific gravity of each cell? YES
  4. The average electrolyte temperature of a representative number of cells? YES
  5. The float voltage of each cell? YES
  6. Visually inspect or measure resistance of terminals and connectors (including the connectors at the dc bus)?  
YES
- c. At least every 18 months are the following verified:
1. Low resistance of each connection (by test)? YES
  2. Physical condition of the battery? YES
  3. Battery charger capability to deliver rated ampere output to the dc bus? YES
  4. The capability of the battery to deliver its design duty cycle to the dc bus? YES
  5. Each individual cell voltage is within acceptable limits during the service test? YES
- d. At least every 60 months, is capacity of each battery verified by performance of a discharge test? YES
- e. At least annually, is the battery capacity verified by performance discharge test, if the battery shows signs of degradation or has reached 85% of the expected service life? See Note 4, page 9 of 9



8. Does this plant have operational features such that following loss of one safety-related dc power supply or bus:
- a. Capability is maintained for ensuring continued and adequate reactor cooling? YES
  - b. Reactor coolant system integrity and isolation capability are maintained? YES
  - c. Operating procedures, instrumentation (including indicators and annunciators), and control functions are adequate to initiate systems as required to maintain adequate core cooling? YES
9. If the answer to any part of question 6, 7 or 8 is no, then provide your basis for not performing the maintenance, surveillance and test procedures described and/or the bases for not including the operational features cited. \*See note below. See Note 5, page 9 of 9

\*Note: For questions involving supporting type information (question numbers 5 and 9) instead of developing and supplying the information in response to this letter, you may commit to further evaluate the need for such provisions during the performance of your individual plant examination for severe accident vulnerabilities (IPE). If you select this option, you are required to:

- (1) So state in response to these questions, and
- (2) Commit to explicitly address questions 5 and 9 in your IPE submittal per the guidelines outlined in NUREG-1335 (Section 2.1.6, Subitem 7), "Individual Plant Examination: Submittal Guidance."

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Note 1: Monitored locally at the Battery Control Panel.

Note 2: There are no bypass features for the battery isolation fuses or the battery charger AC and DC circuit breakers. As stated in Question #3, alarms exist in the control room that would indicate if the battery isolation fuses were pulled or if the battery charger AC or DC circuit breakers were open.

All inoperable DC related equipment (circuit breakers, fuses, etc) is logged in the "Open Items Log" maintained in the Control Room.

Note 3: There is no indication or alarm for battery input/output current or battery discharge in the Control Room. The status/condition of the battery is monitored utilizing the following:

- a. Battery disconnect or circuit breaker open alarm.
- b. DC system ground alarm.
- c. DC bus undervoltage alarm.
- d. DC bus overvoltage alarm.
- e. Routine tours and monitoring of the batteries, the battery control panels (which have indication of battery float charge current, battery circuit output current and battery discharge) and the battery charger control panels.

Note 4: A battery service test is performed at least once per 18 months, coincidental with the plant's planned outages. Our engineering practice mandates battery replacement approximately every 10 years. In addition, D. C. Cook Nuclear Plant Technical Specifications include Limiting Conditions of Operation which require immediate corrective action if the battery shows signs of degradation.

Note 5: See Question #7.e. and Note 4. The 18 month service test, along with the regular maintenance the batteries receive, and the Technical Specification requirements for operation, satisfies and exceeds the intent of Question #7.e. (i.e., the battery is not permitted to reach a degraded state or 85% of it's expected service life).



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