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October 28, 1991

Re: Indian Point Unit No. 2
Docket No. 50-247

Document Control Desk
US Nuclear Regulatory Commission
Mail Station P1-137
Washington, DC 20555

SUBJECT: Response to Generic Letter 91-06; Resolution of Generic Issue A-30: "Adequacy of Safety Related DC Supplies"

Attachment 1 of this letter provides the written response to the questions in Enclosure 1 of Generic Letter 91-06.

Should you have any questions regarding this matter, please contact Mr. Charles W. Jackson, Manager, Nuclear Safety and Licensing.

Very truly yours,

Subscribed and sworn to
before me this 28th day
of October, 1991.

Karen L. Lancaster
Notary Public

KAREN L. LANCASTER
Notary Public, State of New York
No. 60-4643659
Qualified in Westchester County
Term Expires 9/30/93

Attachment

cc: Mr. Thomas T. Martin
Regional Administrator - Region I
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Mr. Francis J. Williams, Jr., Project Manager
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A001

ATTACHMENT 1

The following information is provided in response to the questions listed in Generic Letter 91-06:

1. Unit: Indian Point Unit No. 2.

2. a. The number of independent redundant divisions of Class 1E or safety-related DC power for this plant is four.

   125V DC Buses 21, 22, 23 and 24 are the safety-related DC power sources at IP2. These buses provide independent sources of 125V DC power for the two redundant logic trains for the Engineered Safeguard Features (ESF) and the four 118V AC instrument buses through static inverters. The original plant design consisted of 125V DC Buses 21 and 22 which are the independent sources of power for the ESF and Instrument Buses 21 and 22. 125V DC Buses 23 and 24 were added to provided additional independent sources of power for Instrument Buses 23 and 24.

   b. The number of functional safety-related divisions of DC power necessary to attain safe shutdown for this unit is one.

   IP2 can be brought to safe shutdown with any one of the four safety-related DC power sources.

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? No.

      2. Battery charger disconnect or circuit breaker open (both input AC and output DC)? AC-yes; DC-no. Charger AC input failure is part of "Battery Charger Trouble" category alarm.

      3. DC system ground? No. Battery charger ground is part of "Battery Charger Ground" category alarm.

      4. DC bus undervoltage? No. Battery charger low DC volts is part of "Battery Charger Trouble" category alarm.

      5. DC bus overvoltage? No. Battery charger high DC volts is part of "Battery Charger Trouble" category alarm for Battery Chargers 22, 23, and 24.

      6. Battery charger failure? Yes.

      7. Battery discharge? No.

b. Indications

1. Battery float charge current? No.

2. Battery circuit output current? No.

3. Battery discharge? No.

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?

Battery charger input failure which is indicative of the AC power source to the charger being disconnected is part of the "Battery Charger Trouble" category alarm. There is no indication of bypassed and inoperable status of the battery charger DC output breakers, the fuses on Batteries 21 and 22 and the breakers on Batteries 23 and 24. The plant relies upon administrative control to assure that fuses and breakers are returned to their correct positions following maintenance or testing. In addition, battery charger DC output current and voltage as well as inverter DC input current and voltage and DC bus voltage is monitored twice per shift during the Nuclear Plant Operator (NPO) tour.

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.

The following information justifies the existing plant design features. Subparagraph references correspond to the question number:

A category alarm "Battery Charger Trouble" for each battery charger and also a separate alarm, "Battery Charger Ground" for each battery charger is provided in the control room. In addition to above the cause of battery charger trouble and positive or negative ground are indicated on each of the local battery charger panels in the form of indicating lights. Continued use of the single category alarm with indication of the cause of alarm on the local panel and a separate ground alarm with indication of positive or negative ground on the local panel is considered to provide reasonable assurance of DC system availability when complemented by station operating procedures and surveillance test requirements.

3.a.1 Batteries 21 and 22 are connected to 125 VDC power panels 21 via 1200A fuse and 22 via 1600A fuse respectively and batteries 23 and 24 are connected to 125VDC power panels 23 and 24 respectively via 800A circuit breakers. Battery fuse or circuit breaker open positions are not provided as inputs to the IP2 annunciation system. Presently, administrative controls identify and assure that, if opened, the fuse/breaker is reclosed. For all batteries the monthly periodic test (PT) measures float voltage directly at the battery terminals. If the battery was disconnected from the bus, the measured voltage would be below the test required values. Based on the administrative controls and the surveillance tests, a battery disconnect or circuit breaker open alarm is not considered necessary. As a result of an independent review of the IP2 DC monitoring system in January, 1990, we have under consideration an enhancement of the battery voltage monitoring system during the 1993 outage to monitor the battery terminal voltage so that we will have an annunciation in the control room as an input to the battery charger trouble alarm whenever the battery terminal voltage falls below a predetermined value. This will enhance the existing monitoring system of battery fuse/breaker open position.

3.a.2 All four battery chargers have AC disconnect or circuit breaker open as an input to the battery charger trouble alarm. However, no such alarm exists for DC disconnect or circuit breaker open. As indicated in subparagraph 3.a.1, existing administrative controls and the surveillance test provides sufficient monitoring of the battery charger DC output breakers. In addition, the proposed monitoring of the DC battery terminal voltage as outlined in subparagraph 3.a.1 will enhance the monitoring of the battery charger DC breaker open position, since as soon as the battery charger DC output breaker is open, DC battery terminal voltage will fall below the predetermined value and will initiate a battery trouble alarm in the control room.

3.a.3 Instead of DC system ground, IP2 has individual alarms for each battery charger ground. The battery charger is almost always connected to the DC bus (the plant would fall into a limited Condition of Operation (LCO) otherwise). For all practical purposes, battery charger ground will monitor DC bus ground since a bus ground will initiate a battery charger ground when the charger is connected to the bus.

3.a.4 Instead of DC bus undervoltage, IP2 has the battery charger DC undervoltage condition as an input to the battery charger trouble alarm. Again, since the battery charger is almost always connected to the DC bus, a DC bus undervoltage condition will initiate a battery charger trouble alarm due to the corresponding undervoltage condition that will occur on the battery charger. In addition, our proposed enhancement of monitoring the battery terminal voltage as indicated in subparagraph 3.a.1, will also serve the purpose of DC bus undervoltage alarm.

3.a.5 Instead of DC bus overvoltage, IP2 has battery charger overvoltage as an input to the category alarm for battery chargers 22, 23 and 24 (battery charger 21 does not have the overvoltage alarm input, but it has a DC output voltmeter which is monitored on the NPO Tour). The present NPO tour includes monitoring/evaluating/logging of all bus voltages. Any reading out of specification, either high or low, is identified for appropriate corrective action. This inspection together with the reliable experience demonstrated by the charger provides adequate monitoring of the DC bus voltage condition.

3.a.7 Battery discharge alarm is not provided in the IP2 annunciation system design. However, the most likely cause of battery discharge would be a DC system ground which is an alarm condition as indicated in item 3.a.3 or a DC system fault which in turn will cause undervoltage and will provide input to the category alarm. In addition, our enhancement of monitoring the battery terminal voltage will also serve the purpose of identifying a potential discharge condition on the batteries.

3.b.1, 2, 3 The proposed monitoring of the battery terminal voltage will initiate the category alarm when the voltage drops below a predetermined value. This will be used in lieu of battery float charge current, output current and discharge indication.

4. Refer to justification of 3.a.1

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? and (2) do plant procedures prohibit maintenance or testing on redundant DC division at the same time?

All maintenance and testing activities require permission from the Senior Watch Supervisor (SWS) to commence, and the Senior Reactor Operator (SRO) must be informed prior to commencement. The SWS is responsible for verifying that redundant equipment is available prior to the removal of any safety-related equipment from service and that plant Technical Specifications are followed.

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.

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:

There is no routine maintenance, surveillance (other than NPO tour) or testing that is done at least once per 7 days. The 5 items in this section are covered under the monthly test:

1. Pilot cell electrolyte level? Yes. This is done for all cells.

2. Specific gravity or charging current? Yes. Specific gravity of pilot cells is recorded.

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, but not DC bus connectors.

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 its design duty cycle to the DC bus? No.

4. The capability of the battery to deliver its design duty cycle to the DC bus? No, this is done every other refueling outage.

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, this is done alternating with item 7.c.4 above.

e. At least annually, is the battery capacity verified by performance discharge test, if the battery show signs of degradation or has reached 85% of the expected service life? Performance discharge tests are normally done at every other refueling outage as described in 7.d above. However, if degradation is found more frequent surveillance and maintenance and/or repair is done if deemed necessary.

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. Loss of one safety-related DC power supply or bus is a single failure for which the plant is designed to meet.

c. Operating procedures, instrumentation (including indicator and annunciators), and control functions are adequate to initiate systems as required to maintain adequate core cooling? Yes. Plant operating procedures address the loss of a safety-related DC power supply or bus. These procedures alert the operators of equipment lost and automatic actuations resulting from the loss of DC.

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.

7. Maintenance, surveillance and test procedures at Indian Point No. 2 are done in accordance with plant Technical Specifications and follow the recommendations of IEEE 450-1987. The monthly test stated in item 7.a is acceptable according to IEEE 450-1987. Battery charger capability is not normally tested. The battery charger almost always supplies the DC bus (the plant falls into a LCO otherwise), and its output parameters are monitored on the NPO tour. Any charger malfunction will be annunciated.