

DUKE POWER COMPANY

STEAM PRODUCTION DEPT.

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August 3, 1982

Mr. James P. O'Reilly, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

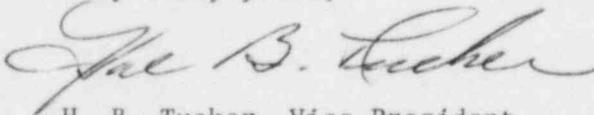
Re: McGuire Nuclear Station Unit 1
Docket No. 50-369

Dear Mr. O'Reilly:

Please find attached Revision 1 to Reportable Occurrence Report RO-369/81-181. The report has been revised in its entirety. The original report was submitted by Mr. W. O. Parker, Jr.'s letter of January 19, 1982. This report concerns T.S.3.8.2.3, "The following D.C. channels shall be operable and energized:... b. Channel 2 consisting of 125 volt DC Bus No. EVDB, 125 volt DC Battery Bank No. EVCB and a full capacity charger...". This incident was considered to be of no significance with respect to the health and safety of the public.

Submittal of this Revision also fulfills commitments made in Duke Power Company's response to the violation identified in IE Inspection Report 50-369/82-08 (ref. Mr. W. O. Parker, Jr.'s letter of May 28, 1982).

Very truly yours,



H. B. Tucker, Vice President
Nuclear Production

PBN/jfw
Attachment

cc: Director
Office of Management and Program Analysis
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Records Center
Institute of Nuclear Power Operations
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Atlanta, Georgia 30339

Mr. P. R. Bemis
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DUKE POWER COMPANY
McGUIRE NUCLEAR STATION
REPORTABLE OCCURRENCE REPORT NO. 81-181 (REVISION)

REPORT DATE: August 3, 1982

FACILITY: McGuire Unit 1, Cornelius, NC

IDENTIFICATION: 125V Battery EVCB Was Left Connected to Vital I&C Bus EVCB
After the Specific Gravity (S/G) Was Found to be Lower Than
Technical Specification Limits

DISCUSSION: On November 12, 1981, cell #31 of 125VDC Vital Instrumentation and Control Power Battery EVCA was found to have a specific gravity (S/G) reading lower than the other cells. Although the specific gravity was above the minimum Technical Specification value, it was more than 0.020 below the average of all the battery's cells. At 1735, EVCA was isolated from its normal distribution center, EVDA, and placed on equalizer (high voltage) charge. During the battery charge, distribution center EVDA was energized by connecting it, via tie circuit breakers, to EVDC.

The morning of November 13, while EVCA was out of service, instrumentation and electrical (IAE) technician A measured the specific gravity of cells in Vital Battery EVCB and found cell #16 below Technical Specifications limits (1.194 versus required 1.195). He also determined by calculation that cell #16 was more than 0.020 below the average S/G of the battery. He documented the readings per procedure "125 Volt Vital Batteries Weekly/Monthly Inspection and Preventative Maintenance", and on the work request. Since his normal supervisor was off duty, he reported his findings to IAE Supervisor A. Supervisor A took the data to his supervisor, IAE Unit Coordinator A, and discussed the findings and the accuracy of the measurement methods. The unit coordinator requested the assistance of IAE Supervisor B, who has had experience with battery systems, and together they remeasured the S/G of the electrolyte in cell #16 of EVCB. First, they measured the fluid in the sample tube as the technicians had done, with the same results. They then mixed the fluid in the battery by taking electrolyte from the sample tube and releasing it in the center of the cell. Subsequent measurement of the fluid in the center of the cell gave readings that met the Technical Specification limits. Based on the later measurements, the Unit Coordinator and Supervisor B determined that the cell and battery were operable although the cell was lower than other cells in the battery. They did not notify the Shift Supervisor or document these measurements.

IAE Technician A remeasured the S/G of EVCB cell #16 on November 14, using the same method he had used previously. The reading was below Technical Specification limits and he reported this finding to his normal IAE supervisor who had returned to duty. This supervisor, C, notified the Shift Supervisor that EVCB was inoperable. Operations returned battery EVCA to service at 0805 and removed EVCB from service at 0821. EVCB was placed on an equalizer charge.

Battery EVCB was returned to service at 0924 on November 15, although specific gravity readings documented on the work request indicated that cell #16 was still below Technical Specification limits. No reason could be found for this action in documentation or in the memory of the control room senior reactor operator (SRO) involved, and the date was incorrectly logged as November 14. At 1710 an inadvertent reactor trip occurred during preparations for the Dropped Rod Test. The reactor was restarted and tripped again at 2306 in conjunction with the test. Shortly before the

second trip, IAE informed Operations that battery EVCB was not in compliance with Technical Specifications, and it was declared inoperable (at 2223). As soon as the operators had stabilized the plant following the Dropped Rod Test, EVCB was removed from service (0010 on November 16). The plant was cooled down to Mode 5 (Cold Shutdown) by 0800 on November 16. Battery EVCB remained out of service until cell #16 was jumpered out on November 20. The battery was then returned to service with 58 connected cells (normally 59 connected cells).

During the incident the unit operated at 48% power.

Technical Specification 3.8.2.3 requires that all four 125 VDC Vital Instrument and Control Power channels be energized and operable for operation in Modes 1-4. The specification also includes action statements and surveillance requirements that define cell and battery operability. This incident involves the failure to meet these requirements.

Causes of the incident include: Component Malfunction/Failure-defective battery cell; Administrative/Procedural Deficiency-the battery inspection and preventative maintenance procedure did not define the S/G measurement method and Operations' documentation methods were not adequate; and Personnel Error-inadequate or erroneous documentation of events by IAE and Operation personnel.

EVALUATION: The battery cells are about 20" high and are equipped with a sample tube which extends down into the cell about 7". Electrolyte level ranges from 18.25-19". With the cell full of fluid, the 3" hydrometer tube could only extend about 1.25 inches below the surface to draw a sample. Since some stratification could be expected in the electrolyte, a sample drawn in this fashion is very conservative. Supervisor B obtained a more representative sample of electrolyte, on the 13th, by removing it through the sample tube and depositing it in the top center of the battery cell. He then sampled the top center of the cell and found the S/G to be above 1.200. The inspection procedure did not define the method to be used in sampling batteries and the technicians had adopted the process of drawing a sample from the sample tube without any preliminary mixing.

Even though the S/G of cell #16 was low, it is felt that cell reversal was not a danger during the incident. Voltage of cell #16 was measured at 2.18 volts on November 13, meaning that the cell was still strong (average cell voltage was 2.25 on the battery) even though the S/G was low. It is possible that the low S/G was caused by a loss of part of the acid in the electrolyte during the life of the cell. This could have happened by spillage or overfilling the cell. If this were the case, the cell might have had more capacity than was indicated by the S/G reading.

A service discharge test was conducted on battery EVCB on February 23, 1982 with 58 connected cells (cell #16 was still jumpered out). The test was conducted by discharging the battery at 1217 amps. for one minute and then 370 amps. for an additional 59 minutes. At the end of the first minute the battery voltage was measured at 105 volts, and after the discharge was completed, battery voltage was 112 volts. These values were well above the acceptance criteria of 103 volts. Even if cell 16 had reversed, the battery was capable of fulfilling its design function.

The failure of IAE Supervisor B and the Unit Coordinator to resolve the discrepancy between their S/G readings and the readings taken by the technician, and to document the resolution, caused confusion and raised doubts about the actions taken on November 13, 1981. The Technical Specification limit on operation with an inoperable battery (72 hours) had no effect on IAE Supervisor B and the Unit Coordinator's decision to keep battery EVCB in service. Battery EVCA was able to meet the Technical Specification requirements and was placed on equalizing charge only as a preventative measure. It could have been returned to service at any time. The Dropped Rod Test had been scheduled for November 15, so battery EVCB could have been removed from service on November 13, and remained out of service until the reactor trip and cooldown without exceeding the 72 hours.

When EVCB was returned to service on November 15, no reason was listed in the Technical Specification Action Item Log. The date was incorrectly listed as November 14, 1981. No reason has been found for returning EVCB to service at this time. The operators expected to trip unit 1 reactor within 12 hours and proceed to Mode 5, therefore, no Technical Specification time limit was involved in the decision.

Many of the problems and much of the confusion concerning this incident were caused by inadequate documentation of the actions taken. Although the battery testing performed by the IAE technician on the morning of November 13, was well documented on the procedure and work request, subsequent testing by the IAE supervisor was not documented. This failure implied, to a reviewer, that no action was taken after cell #16 of EVCB was found out of specification. In the second instance, returning EVCB to service on November 15, the personnel involved cannot remember why that action was taken.

Some confusion was caused by Control Room logbook entries concerning the I&C batteries. The operators would initiate a Technical Specification Action Item, clear the item 15 or 20 minutes later and immediately initiate a second item on the same battery. The purpose of this double entry system was to indicate that the defective battery had been removed from its associated bus within the two hour time limit. The Technical Specification Action Item Logbook has been expanded to allow operators to enter appropriate comments. This should help alleviate some of the confusion which led to this incident.

Vital batteries at McGuire are oversized and can be safely operated with fewer than the normal 59 cells connected. Documentation to support such battery operation was provided on November 20, 1981 when the appropriate one line diagram drawing was reissued with a note added. This note states "Battery sizing is such that one cell may be jumpered out without adversely affecting designed capacity. The jumpering of one cell is not considered a modification to a battery bank".

SAFETY ANALYSIS: An analysis of battery loading calculations by Duke Power Company has determined that one cell may be jumpered without adversely affecting the design capacity of the battery. The service discharge test of February 23, 1982 proved that EVCB could have performed as designed with, or without, cell #16. Additionally, the 125 volt DC vital instrumentation and control power batteries are sized to support the emergency requirements of both unit 1 and unit 2. Only unit 1 is in operation and the capability of the reduced capacity battery was more than

sufficient to meet all design safety functions. Therefore, the health and safety of the public were not affected by this incident.

CORRECTIVE ACTION: IAE procedure "125 Volt Vital Batteries Weekly/Monthly Inspection and Preventative Maintenance" has been changed to include specific instructions to be followed if S/G readings on a battery fall below the Technical Specification limits. An enclosure was also added to describe, in detail, how S/G readings should be taken. The specified method should standardize S/G measurements and result in more representative samples. Since the procedure changes were completed, no problems have occurred with IAE personnel determining a battery's operable status.

The service discharge test completed on February 23, 1982 verified that battery EVCB could function successfully with 58 connected cells.

Authorization has been obtained, through the drawing change mentioned in the evaluation, to jumper out one cell of the 59 cell vital batteries if trouble is experienced. If more than one cell is involved, the previous service discharge test would be reviewed to determine if more than one cell could be removed.

On November 20, cell 16 of the battery was disconnected making EVCB a 58 cell battery. The cell will be replaced with a new cell. Cell 31 of EVCA was replaced with a new cell on June 4, 1981.

This incident has been covered with all station employees through crew meetings. The necessity of complete and accurate documentation of station activities was stressed. Operators are now required to log the exact reason a system (or piece of equipment) required by Technical Specifications is removed from or returned to service. This should eliminate any confusion among the operators as to the exact status of Technical Specification related equipment.