Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

December 14, 1990

DCD/DCB (RIDS)

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

Subject: Quad Cities Station Investigation of the Cracked 250V Battery Cell
NRC Docket Nos. 50-254 and 50-265

Reference: Letter from E. Greenman to Cordell Reed dated October 31, 1990.

Dear Mr. Davis:

The reference letter informed Commonwealth Edison of an allegation received by the Region III Office of Nuclear Regulatory Commission concerning Quad Cities investigation of the cracked 250V battery cell (NRC allegation RIII-90-A-0002). The letter requested that Commonwealth Edison review the adequacy of the initial investigation and address a lack of cooperation on the part of employees. The requested review was performed and the results of that review are contained in the Attachment.

An extension to the due date for this response was requested and granted by W. Shafer of your office.

Please address any questions concerning this matter to this office.

Very truly yours,

T. J. Kovach
Nuclear Licensing Manager

Attachment

RR:TK:lmw
ZNLD653

cc: H. Miller (RIII)
W. Shafer (RIII)
NRC Resident Inspector - Quad Cities

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RESULTS OF INVESTIGATION

NRC ALLEGATION RIII-90-0A-002

I. INTRODUCTION

In response to NRC Allegation RIII-90-0A-002, Commonwealth Edison (CECo) conducted an independent review of Quad Cities Station's investigation of the cracked Unit 1 250V DC battery cell which was identified on November 1, 1989. The review was conducted by the Nuclear Quality Programs Superintendent from Braidwood Station and a Nuclear Quality Programs Inspector from Braidwood Station. The goal of the review was to assess the adequacy of the Station's initial investigation, determine whether there was the lack of cooperation on the part of employees during the initial investigation and to formulate appropriate corrective actions.

II. SCOPE OF INVESTIGATION

The allegation investigation was conducted by reviewing the original investigation packages (which include the documentation from the investigations conducted by the Quad Cities' Regulatory Assurance Group and the Technical Staff in November, 1989) and the documentation package associated with the subsequent investigation (which was conducted by the Regulatory Assurance Group in July, 1990). In addition, in-depth interviews were conducted with the following individuals:

1. Four CECo electricians and the foreman who were involved in the incident
2. CECo Engineering & Construction Engineer who directs the contract personnel
3. CECo Engineering & Construction Field Engineer who directed the Contractor crew involved with the event.
4. CECo Operations Foreman
5. CECo Regulatory Assurance Supervisor

6. CECo Regulatory Assurance personnel who conducted the July, 1990 investigation

7. CECo Master Electrician at the time of the incident (now Assistant Supt. of Maintenance)

8. CECo Quality First Administrators

9. CECo Technical Superintendent

10. Station Manager

11. Station Technical Staff Supervisor

The individuals who conducted the original investigations were not available to be interviewed. The individuals have previously resigned from the Company. Also, the contractors involved with the investigation could not be interviewed because they are no longer on-site. As a result, the allegation investigators interviewed the Quality First Organization. The Quality First Organization performs debriefs with all exiting employees to determine if they have any safety concerns. The Quality First Group stated that there were no reported concerns regarding the investigation or the cracked battery cell event.

In addition, the supervisors of those who performed the initial investigation were interviewed and no information developed to suggest personnel were not cooperating in the investigation.

III. BACKGROUND

On November, 1, 1989 contractor personnel noticed that there was a liquid substance on the floor of the Unit 1 battery room. The Station's Technical Staff was notified. Cell #69 of the Unit 1 250V DC batteries was found leaking. Initially, the incident was classified as a Potentially Significant Event (PSE) by the "acting" Regulatory Assurance Supervisor due to the potential involvement of contractors and, as a result, heightened regulatory attention. During the course of the initial investigation, which was conducted by the Regulatory Assurance Department, it was determined that the event did not meet the significance threshold for a Potentially Significant Event. The incident was reclassified as a Deviation Report (DVR). The completion of the investigation was assigned to the Technical Staff. The final results of the investigation were documented on DVR 04-01-89-099.

The apparent cause of the event, which is contained in DVR 04-01-89-099 is as follows;

> "A joint investigation performed by the station's Technical Staff Engineering Department and the Regulatory Assurance Department have narrowed the cause to two theories.
>
> Contractor personnel had been working in the room for some time installing a new battery and rack. In the course of the new battery installation, the contractors also mounted an overhead trolley that may have fallen onto the battery. Interviews with the contractor personnel indicate that they did not drop any items on the battery but that they heard the station's electricians drop something heavy

between the batteries while installing an overhead lifting rig that connects to the trolley that was previously installed by the contractors. The electricians were interviewed and contend that the lifting rig was never above the battery and that nothing fell while they were working. Either group could have caused the incident although both groups adamantly deny it. Whichever group caused the incident, the root cause is attributed to management deficiency. At no time when installing this equipment on the beam should it have been over the battery. The contractors' work package did not contain precautions or cautions that warned them about not performing this work over the battery. The station electricians did not have any written guidance for hanging the lift on the beam."

IV. RESULTS OF THE INVESTIGATION

A. Adequacy of the Station's Investigation

The allegation investigation team determined that the initial investigations, which were conducted by the Regulatory Assurance Department and the Technical Staff, were not sufficiently thorough, the conclusions reached were based on several unproven assumptions, did not properly take into account all the available information and did not adequately address the root cause.

The initial Regulatory Assurance investigation assumed that the batteries were most probably damaged by someone who dropped an overhead trolley or an overhead lifter on the batteries (at the time contractor employees heard a noise in the area where station electricians were working). The facts supporting this conclusion were not delineated in the DVR. Through the review of documentation, it was identified that this assumption was based on finding an indentation on the top of an adjacent battery with some flecks of orange paint on the battery. The original investigation also indicated that there were two shades of orange paint and white paint on the batteries.

The Battery Room overhead trolley is red and the overhead trolley beam is orange. The blue electric lift mechanism, which was installed by the Station electricians, has an attached orange hook. While the overhead trolley and the lift mechanism have sufficient mass to cause the damage, the orange hook (by itself) does not have sufficient mass. Photographs, which were taken during the original investigation, showed that the overhead trolley had an indentation with some chipped paint. Since the trolleys are stored in 55 gallon drums, the allegation investigation concluded that the slight damage to the trolley could have happened at any time previous to the event. It was also concluded that the orange paint on the batteries may have originated from the orange painted beam due to the movement of the trolley along the beam.

The text of the DVR and the contractor interview notes were found to be inconsistent. The DVR states that the contractors heard the Station electricians drop something heavy between the batteries. The original interview documentation states that the contractors heard a loud noise. It appears that the investigator assumed that something was dropped. During the interviews associated with the allegation investigation, the Station electricians stated that the operation of the electric lift results in a loud noise. Thus, the contractors could have heard a loud noise, the Station electricians may not have dropped anything and the battery could have been damaged for some indefinite period prior to this.

During the original investigation, a Station electrician stated that he saw water on the floor on October 30, but did not report it because he assumed that it may have been water which was used to core drill in concrete by the contractors. Also, a contractor stated that the water had been on the floor from "day one" (three to four weeks earlier). This information was not taken into consideration during the initial investigation nor was it included in the DVR.

In addition, the DVR describes the leakage rate of the battery crack as "one pinhead drop per minute"; however, the investigation did not calculate how long it would take to develop the puddle on the floor. The July, 1990 Regulatory Assurance investigation determined that it would take approximately 20-25 days to accumulate the approximately 1/2 gallon puddle that was discovered.

The DVR states that the contractor work package did not contain precautions or cautions that warned about performing work over a battery. This statement was unsubstantiated. The allegation investigation concluded that adequate information was provided to the contractors in the work package. The DVR also states that written guidance was not provided for hanging the lift on the overhead beam. While no written guidance was available, the allegation investigators believe that it is unlikely that an electrician would install any heavy item over energized 250 VDC batteries, both from a safety as well as an ease of installation standpoint.

B. Cooperation of Individuals Involved

Interviews, which were performed by the allegation investigators, revealed that neither the Station electricians involved, their foreman nor the Master Electrician were formally interviewed by the initial Regulatory Assurance or the Technical Staff investigators. Two Station electricians recall being asked by the Regulatory Assurance investigator if they cracked the battery. The Stations electricians stated that they did not damage the battery. One Station electrician stated that the response from the Regulatory Assurance investigator was "Well, somebody did and somebody is lying". The other Station electricians do not remember being interviewed by the initial Regulatory Assurance investigator.

The Master Electrician recalls that he was approached by the initial Regulatory Assurance investigator with a list of questions. The Regulatory Assurance investigator indicated that the Station electricians involved would be interviewed in accordance with those questions. The Master Electrician did not know if the investigator did implement the planned interviews. The Master Electrician requested that the Electrical Foreman, who was involved in the incident, document the crew's activities (which is a common practice at the Station for investigations). The Foreman completed the write-up, solicited the signatures of the Station electricians and provided the information to the Regulatory Assurance investigator.

The allegation states that "the EM's eventually refused to cooperate with the investigation, and they drafted and signed a letter stating that, among other things, they would not cooperate with the investigator". The only letter, which could be found, was the description of the electricians' activities in the room. The letter does not reflect the alleger's statement that the Station electricians would not cooperate. The Station electricians stated that they signed the document because they felt that they were being accused of damaging the battery.

During the interviews, which were conducted as part of this investigation, the Station electricians, including the foreman, were cooperative and stated that they had no reason not to cooperate with either this or the Station's earlier investigations. There was a consensus that, if they had damaged the battery, it would have been reported to the foreman. The Station electricians felt that Station management would have considered the incident to be more significant if they had damaged the battery and not reported the damage (rather than reporting the damage).

The initial investigation documentation package included a detailed report of the contractor interviews but did not contain any Electrical Maintenance Department interviews or any indication that the Station electricians were uncooperative.

C. Other Issues

Communications between the Regulatory Assurance and Technical Staff investigators appears to have been inadequate. The Regulatory Assurance and Technical Staff investigators may have had different perspectives of what was required for their evaluations; therefore, some pertinent information may have been lost in the transfer from a PSE to a DVR. The allegation investigation concluded that the Technical Staff DVR information was most likely derived from the draft PSE report and not from an independent investigation.

The assignment of the initial Regulatory Assurance individual to investigate the incident appears to be inappropriate, in that the individual had recently transferred from the Electrical Maintenance Department (due to personal problems) to Regulatory Assurance. Assignment of this individual to investigate the Electrical Maintenance Department raises a question as to the objectivity of the investigator. The initial assignment was made by the "acting" Regulatory Assurance Supervisor. When the Supervisor returned to work, the investigation was already in progress. The Regulatory Assurance Supervisor stated that he would not have assigned this individual to this investigation due to his previous work assignment in the Electrical Maintenance Department.

V. CONCLUSION

1. The initial investigations were poorly performed and did not identify the root cause.

   - The draft PSE investigation report, which was conducted by Regulatory Assurance, is based on several unproven assumptions.

   - The DVR investigation conducted by the Technical Staff appears to be based solely on the Regulatory Assurance investigation.

   - Neither investigation considered all available information or determined the root cause.

   - The assignment of the Regulatory Assurance investigator to investigate the department from which he was recently transferred (due to personal problems) appears to be inappropriate.

2. There is no evidence that personnel did not cooperate with the investigation.

   - The original investigation file contains good documentation on contractor interviews but contains no reference of any Electrical Maintenance personnel interviews or indication of a lack of cooperation.

   - Based on the documentation review and personnel interviews, there was no evidence that the Electrical Maintenance personnel were uncooperative or evasive during the initial or subsequent investigations.

- The letter drafted and signed by the electricians does not support the allegation.

- No evidence of poor cooperation by contractors was noted in the initial or subsequent evaluations conducted by the Station.

VI. CORRECTIVE ACTIONS

1. Initially, it should be noted that since the earlier Station Investigation, Quad Cities Station has developed new procedures on Deviation Reports. QCAP 1780-3 "Deviation Report/Licensee Event Report/Deviation Investigation Report" requires that personnel perform investigation per QCAP 1780-11 "Root Cause Investigation Procedure". QCAP 1780-11 provides guidelines for conducting investigations. This formal guidance was not previously provided and should enhance the quality of investigations. QCAP 1780-3 and QCAP 1780-11 were approved on 7-9-90 and 8-1-90, respectively. Also, a procedure (QCAP 1780-10 "Root Cause Investigation Program") describes the overall program. This procedure was approved on 8-1-90. The procedure elements which address the concerns, which were identified through this review, are as follows:

   a. The purpose of Procedure QCAP 1780-10 "Root Cause Investigation Program" is to (1) provide guidance for consistent implementation of the Root Cause Investigation Program and (2) ensure fair and efficient investigations are conducted. These goals are achieved by:

      1. Providing a consistent scaling mechanism for event evaluation across departments.

2. Assigning appropriate Quad Cities resources for the Root Cause Investigations, based on risk to the corporation.

3. Providing a common approach and language to determinations.

4. Providing for thoroughness and efficiency scaled to the level of occurrence.

5. Ensuring that root causes and factors contributing to the severity of an event are identified for correction, recognizing that events are rarely, if ever caused by just one factor.

6. Lowering the threshold of occurrences necessitating root cause investigation.

7. Ensuring appropriate corrective actions are specified, implemented to prevent recurrence of the undesired event, and to address conditions which made the event worse.

b. Procedure QCAP-1780-11 "Root Cause Investigation Procedure" requires that a list of facts be developed by the investigator. Also, a sequence of events must be generated to describe how the event occurred.

c. Procedure QCAP-1780-11 requires that all conclusions have sufficient factual support to enable the reviewer to understand how each conclusion was reached.

d. The procedure defines the training requirement which are required for personnel performing investigations.

e. Procedure QCAP 1780-3 provides specific guidance on the review process. The review guidance includes:

- Text reads well and provides sufficient detail such that event can be understood.
- Information presented is accurate
- No unanswered questions exist
- Conclusions reached are consistent with information presented.

2. An additional review criteria will be added to QCAP 1780-3. The additional criteria will require that the report is objective and does not reflect any personal biases. This revision will be completed by February 15, 1991.

3. In light of this allegation, personnel performing investigations will be counseled on their responsibility to report to management any barriers (e.g., uncooperativeness) to completing a thorough investigation. This will be completed by January 15, 1991.