



Consumers  
Power  
Company

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March 9, 1983

82-09 #3

Mr J G Keppler, Regional Administrator  
US Nuclear Regulatory Commission  
Region III  
799 Roosevelt Road  
Glen Ellyn, IL 60137

MIDLAND NUCLEAR COGENERATION PLANT -  
DOCKET NOS 50-329 AND 50-330  
QUALITY PROGRAM AND MANUFACTURING DEFICIENCIES  
AT VICTOREEN, INC.  
FILE: 0.4.9.65 SERIAL: 20726

Reference: J W Cook letters to J G Keppler, Same Subject:

- (1) Serial 19074, dated October 15, 1982
- (2) Serial 20651, dated December 30, 1982

This letter, as was the referenced letter, is an interim 50.55(e) report concerning quality program and manufacturing deficiencies affecting radiation monitoring equipment being supplied by Victoreen. The attachment to this letter provides a status of the actions in progress to correct these deficiencies.

Another report, either interim or final, will be sent on or before May 6, 1983.

*James W. Cook*

WRB/lr

Attachment: Bechtel MCAR-60, Interim Report 3, dated February 16, 1983

CC: Document Control Desk, NRC  
Washington, DC

RJCook, NRC Resident Inspector  
Midland Nuclear Plant

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CC: CBechhoefer, ASLB Panel  
FPCowan, ASLB Panel  
JHarbour, ASLB Panel  
AS&L Appeal Panel  
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# Bechtel Associates Professional Corporation

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## Management Corrective Action Report (MCAR)

SUBJECT: MCAR 60 (issued September 17, 1982)

INTERIM REPORT 3

DATE: February 16, 1983

PROJECT: Consumers Power Company  
Midland Plant Units 1 and 2  
Bechtel Job 7220

### Description of Deficiency

Approximately 80% of the Midland radiation monitoring system electronic modules (Class 1E and non-Class 1E) manufactured by Victoreen, Inc. of Cleveland, Ohio, and reviewed by project personnel were found to be nonconforming due to workmanship problems because they did not meet the approved Victoreen's Standard Operating Procedure (SOP) 500.002.

Four of the 12 Class 1E radiation monitors were reviewed at the Midland jobsite and were found to have similar nonconforming conditions.

The majority of nonconforming conditions are in the area of soldered connections. The soldered connections were found to have the following deficiencies:

- a. Insufficient soldering
- b. Excessive soldering
- c. Cold solder joints
- d. Excessive heat
- e. Capacitor body enamel protruding into the plated-through holes
- f. Diode bodies partially embedded in solder
- g. Flux not cleaned from boards

Other deficiencies observed were occurrences of circuit board delamination (measling), contamination on wire wrap connectors, duplicate serial numbers on like modules, lifted circuit foil, excessive insulation removal from jumper wires, and components not properly attached mechanically.

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Historical Background and Summary of Investigation

During the second week of August 1982, eight of the electronic modules were inspected at the vendor's shop by project supplier quality personnel. Numerous occurrences of poor workmanship (rejectable in accordance with Victoreen SOP 500.002) were encountered and all electronic modules in the Victoreen plant were rejected for use in the Midland plant.

Between September 1 through 13, 1982, MPQAD and Bechtel supplier quality assembled a team of experienced individuals who went to Victoreen to quantify the workmanship problems. The team reviewed 877 modules, of which 730 were found to be nonconforming.

A full-scope audit of the supplier's quality assurance (QA) program performed on September 8 through 10, 1982, at Victoreen's facility revealed that there are deficiencies in the execution of its QA program (12 of the 19 audit elements were identified as deficient). On September 23, 1982, a sample inspection of workmanship on 4 of the 12 Class 1E radiation monitors shipped to the Midland jobsite was conducted. Nonconforming workmanship was found in all four monitors.

Analysis of Safety Implication

There were approximately 1,500 nonconforming conditions found in the four Class 1E monitors inspected at the jobsite. This represents approximately 35 deficiencies/modules. The Class 1E monitors had been conditionally shipped to the jobsite because their qualification was not complete. It is probable that during qualification testing, one or more of the deficiencies would have been uncovered. However, had the deficiencies not been discovered and corrected, it is possible that the nonconforming workmanship could have resulted in a reduction of the predicted reliable life expectancy of the equipment, resulting in a loss of operability.

The Class 1E monitors are designed in a manner such that loss of power or failure of certain components will result in an alarm condition. However, due to the large number of nonconformances, the types of failures and results thereof cannot be analyzed. It is considered probable that one or more of the nonconforming conditions could have adversely affected one or more of the Class 1E radiation monitors, thereby affecting the safe operation of the plant.

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## Probable Cause

The cause of the poor workmanship appears to be a breakdown of the supplier's QA program, which resulted from an apparent deemphasis of the quality program following a shift in senior management and frequent changes in QA personnel. The following significant deficiencies in the supplier's QA program were noted:

- a. Victoreen rewrote and implemented a new QA manual without prior approval from Bechtel.
- b. Victoreen conducted inadequate in-process inspection.
- c. Victoreen's QA department failed to review test and inspection documents as required by its SOPs.
- d. Victoreen's QA department failed to review its formal purchase orders and also were delinquent in performing required evaluation of its suppliers.
- e. Some of Victoreen's SOPs did not have the required formal sign-off by its engineering, manufacturing, and QA organizations.
- f. Victoreen had used several tools/instruments which were not currently recorded in its calibration systems.
- g. Victoreen conducted inadequate employee training.

The reason that deficiencies in soldering in the Class 1E modules at the jobsite were not detected before shipment appears to be that printed circuit boards are not normally inspected for soldering workmanship. The procedures submitted by the vendor for soldering were considered satisfactory and were similar to standard industry practices. Because we have not had a history of deficiencies in the area and because it was determined through previous audits, including the September 23 through 25, 1981 audit, that the vendor appeared to be utilizing his procedures, extraordinary inspection efforts in this area were not deemed necessary.

## Corrective Action

The actions noted below have been or are being taken to correct the deficiencies in the Class 1E monitors and completely resolve any safety concerns addressed in this report.

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1. Failure by Victoreen to submit its revised QA program (Revision 7, QA manual and SOPs) to Bechtel for review and approval resulted in Bechtel issuing a stop-work order on June 8, 1982. Subsequently, the QA program was submitted by Victoreen, was reviewed and commented on by Bechtel, and ultimately received Bechtel approval. Following the approval, Bechtel lifted the stop-work order on June 18, 1982. No Class 1E equipment was shipped during this period.
2. A stop-further process for inspection and testing activities and a restriction on shipment was placed on all Class 1E equipment on September 10, 1982, as a result of the September 8 through 10, 1982, audit.
3. On September 23, 1982, MPQAD overinspected a sample of 4 of 12 Class 1E monitors that had been shipped to the jobsite during August 1982. In the four monitors overinspected, approximately 1,500 nonconforming conditions were identified as described in the Analysis of Safety Implication section. These nonconforming conditions are also identified on Consumers Power Company Nonconformance Report M-01-9-2-129. Hold tags were applied to all 12 Class 1E monitors.

On September 30, 1982, Bechtel project personnel and Victoreen personnel again went to Midland to further investigate the deficiencies. Victoreen concurred with the nonconformances.

Bechtel met with Victoreen on October 27 and December 2 and 8, 1982, to discuss corrective actions required for the monitors. On January 6, 1983, a meeting was held between Victoreen, Consumers Power Company, and Bechtel. During this meeting, it was decided that all of the electronics modules for the Class 1E monitors at the jobsite and at Victoreen's facility should be replaced with new modules built by Victoreen in accordance with the approved SOPs.

4. Bechtel supplier quality met with Victoreen on September 24, 1982, to establish corrective action and completion dates to resolve Victoreen QA program deficiencies. Subsequent meetings were held on October 4, 5, and 28, and November 18, 1982, to monitor the status of the corrective actions.

At Victoreen's request, Bechtel performed a full-scope audit January 19 through 20, 1983, to determine if Victoreen had satisfactorily resolved the deficiencies identified in the September 8 through 10, 1982, audit. The January 19 through 20, 1983, audit revealed that Victoreen corrected 7 of the 12 deficient quality elements identified in the September audit.

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Additionally, the latest audit identified nonconformances in three other quality elements. Therefore, Victoreen's current corrective action involves eight quality elements. The new QA manager had drafted several revised QA-related procedures that should correct the problem areas.

Based on improvements in Victoreen's quality program and verbal commitments from Victoreen's new president and QA manager, the stop-further-process restriction for inspection and testing activities was lifted. The hold-shipment restriction will remain in effect until Victoreen corrects all remaining audit findings. Victoreen has placed a hold on manufacturing of all Class-1E equipment pending Bechtel approval of the revised QA manual and related procedures. Another full-scope audit at Victoreen will be performed before shipment to the jobsite.

5. One hundred percent inspection of all Class 1E equipment by supplier quality, with an overinspection by Consumers Power Company, will be performed. Additional supplier quality personnel have been assigned to this order and all supplier quality personnel inspecting this equipment have or will receive prior additional training in inspection of printed circuit boards.

## Reportability

Based on the safety implication analysis of this report, the described deficiency is considered reportable in accordance with the Code of Federal Regulations, 10 CFR 50.55(e). Consumers Power Company reported the deficiency to the NRC on September 17, 1982.

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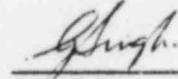
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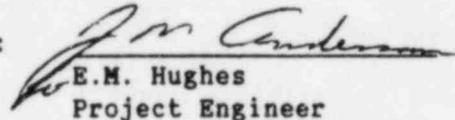
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Submitted by:



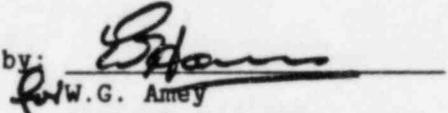
G. Singh  
Control Systems  
Group Supervisor

Approved by:



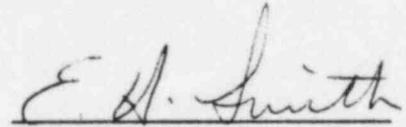
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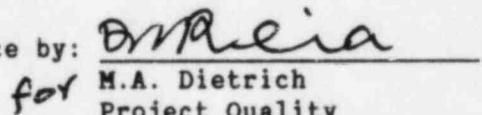
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