UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

April 26, 1983

MEMORANDUM FOR: R. F. Warnick, Director, Special Cases Staff

THRU: Carl J. Paperiello, Chief, Emergency Preparedness and Radiological Safety Branch

FROM: L. R. Greger, Chief, Facilities Radiation Protection Section

SUBJECT: QUALITY PROGRAM AND MANUFACTURING DEFICIENCIES FOR VICTOREEN, INC. RADIATION DETECTION INSTRUMENTATION

References: Memorandum, from W. B. Grant to RIII Files, dated February 28, 1983

Memorandum, from R. J. Cook to Jay Harrison, dated April 8, 1983

Mr. Cook's memorandum, referenced above, takes exception with portions of Mr. Grant's memorandum, referenced above. My appraisal of this situation leads me to believe that there are deficiencies in both Mr. Cook's and Mr. Grant's memoranda. My understanding of the matter follows.

As a result of poor workmanship initially identified with electronic modules manufactured by Victoreen, Inc. and destined for the Midland plant, a more thorough audit of Victoreen's QA program and a larger check of modules were conducted by CPCo and Bechtel personnel. Numerous nonconformances with Victoreen's workmanship standards (Victoreen SOP 500.002), and deficiencies in Victoreen's QA program were identified by the CPCo and Bechtel personnel.

CPCo reported their findings to the NRC pursuant to 10 CFR 50.55e, apparently on the basis of their belief that the nonconformances found in safety related electronic modules could have adversely affected the safety of operations of the Midland nuclear plant.

As a result of the 50.55(e) report by CPCo, the Region IV Vendor Inspection Branch conducted an inspection of Victoreen at Region III's request. The Region IV inspection confirmed the deficiencies found by CPCo and Bechtel personnel in Victoreen's QA program. Two nonconformances with Criterion V of Appendix B to 10 CFR 50 were identified as a result of this matter by Region IV. The Region IV inspection also confirmed some of the nonconformances with Victoreen's workmanship standards found by CPCo and Bechtel personnel in electronic modules. One of fourteen original CPCo modules (12 had previously been shipped to CPCo) was examined. Of the thirteen

nonconforming conditions identified by CPCo/Bechtel, five were observed by Region IV in the one module they inspected. One violation was identified concerning this matter; the violation was for failure to document evaluations of workmanship nonconformances as required by 10 CFR 21.51(b).

Region IV identified one additional violation, failure to assure that procurement documents specified that Part 21 applied, and two additional nonconformances, failure to analyze solder bath quarterly for contamination and failure to use a measuring device to assure that circuit board preheat temperature reaches 170° to 190°.

Victoreen agreed with CPCo to replace all 14 class 1E (safety related) electronic modules with new modules built in accordance with the approved SOP's. Bechtel will perform a 100% inspection of the replacement Class 1E modules; CPCo will perform an overinspection. Victoreen and CPCo also agreed upon necessary changes to the Victoreen QA program; revised Victoreen NQAM and SOP porcedures were submitted to Bechtel for approval. Region IV did not evaluate the QA program changes during this inspection; they state (in inspection report) that they will do so during a future inspection.

Victoreen proposed corrective actions to Region IV for the violations and nonconformances, forwarded by the Region IV inspection report, in a response dated February 11, 1983. The response to the violation for failing to document an evaluation of the nonconformances per 10 CFR 21.51(b) stated that an evaluation was conducted in accordance with the requirements of 10 CFR 21 and that the evaluation, which was enclosed, concluded that the nonconformances from the SOP were not "defects". (See 10 CFR 21.3(d) for definition of defect.) Region IV inspection personnel (Parker) verbally informed Region III (Grant) that he agreed with Victoreen's evaluation that the nonconformances did not constitute a "defect" per Part 21. Mr. Grant wrote his referenced memo to file based on telephone contacts with CPCo, Victoreen, and Region IV, in which he was told essentially the same information as noted above.

Region IV acknowledged Victoreen's 2/11/83 response by letter dated 3/17/83. The Region IV letter requested additional information regarding certain of Victoreen's responses; however, no additional information was requested nor specific comments made concerning the violation for failing to document Victoreen's evaluation of nonconformances. In a telephone conversation, A. Potapovs (RIV) stated that the lack of specific comments in the Region IV acknowledgement letter amounted to tacit acceptance of Victoreen's conclusion that no Part 21 "defect" existed because of the identified nonconformances with the SOP. A memorandum, dated 4/13/83, was sent to Region IV by Region III (Hind to Bangart) requesting written documentation of the Region IV position concerning Victoreen's conclusion. In addition to this lack of a clear Region IV position, a problem appears to exist with the

Victoreen evaluation. That problem is that while CPCo/Bechtel identified seven nonconforming conditions and six other deficiencies, Victoreen appears to have addressed only five of these items in their evaluation to determine if a Part 21 "defect" existed.

Mr. Grant's memorandum was based on verbal information from Victoreen and Region IV personnel. The verbal information should have been treated as preliminary until it was verified in writing. Neither Victoreen's response letter (2/11/83) nor Region IV's acknowledgement letter (3/17/83) specifically stated that the nonconformances would be resolved by revising Victoreen's SOP as stated in Mr. Grant's memorandum. The 4/13/83 memorandum from Hind to Bangart should resolve this matter.

Mr. Cook's memorandum appears to overlook the responsibility of the Region IV Vendor Inspection Branch for judging the acceptability of Victoreen's operations. Further, it does not acknowledge a distinction between "items of noncompliance regarding Part 21 violations" and "defects" as defined in 10 CFR 21.3(d). Clearly a violation of Part 21 can occur without the presence of a "defect".

It is my belief that Region IV should be allowed to resolve this matter, including the need for informing other licensees and the acceptability of changes made in Victoreen's workmanship standards. If we (RIII) disagree with the Region IV resolution of this matter, we should then resolve our disagreement with Region IV and HQ as necessary.

L. R. Greger, Chief
Facilities Radiation Protection Section

cc: W. Grant
R. Cook

~~[illegible]~~
~~[illegible]~~
RFL

Consumers Power Company

James W Cook
Vice President - Projects, Engineering and Construction

General Offices: 1945 West Parnall Road, Jackson, MI 49201 • (517) 788-0453

May 6, 1983

82-09 #4

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: 22183

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
(3) Serial 20726, dated March 9, 1983

The referenced letters were interim 50.55(e) reports concerning quality program and manufacturing deficiencies affecting radiation monitoring equipment being supplied by Victoreen. This letter is our final report on this subject.

The enclosure to this letter provides an analysis of the deficiency and the corrective actions that were taken with regard to this matter.

James W. Cook

WRB/lr

Attachment: Bechtel MCAR-60, Final Report, dated April 22, 1983

CC: Document Control Desk, NRC
Washington, DC

RJCook, NRC Resident Inspector
Midland Nuclear Plant

8305170377

MAY 9 1983

OC0483-0035A-MP01

CC: CBechhoefer, ASLB Panel
FPCowan, ASLB Panel
JHarbour, ASLB Panel
AS&L Appeal Panel
MMCherry, Esq
MSinclair
BStamiris
CRStephens, USNRC
WDPaton, Esq, USNRC
FJKelley, Esq, Attorney General
SHFreeman, Esq, Asst Attorney General
WHMarshall
GJMerritt, Esq, TNK&J
INPO Records Center

Bechtel Associates Professional Corporation

I i 2888 I i 2879

Management Corrective Action Report (MCAR)

SUBJECT: MCAR 60 (issued September 17, 1982)

FINAL REPORT

DATE: April 22, 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 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.

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 and 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/module. 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 preventing the monitor from performing its safety-related function.

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 deficiencies in soldering in the Class 1E modules at the jobsite were not detected before shipment because printed circuit boards are not normally inspected by Bechtel supplier quality 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 this area and because it was determined through previous audits, including the September 23 through 25, 1981 audit, that the vendor appeared to be following its 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.

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 would be replaced with new modules built by Victoreen in accordance with the approved SOPs. This action is scheduled for completion by March 31, 1984.

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. This audit identified nonconformances in three other quality elements that were previously found acceptable.

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. On March 21 through 23, and April 11 through 14, 1983, Bechtel reaudited the eight deficient quality elements. At that time, Victoreen had satisfactorily resolved all but one of the findings. The remaining audit finding is against Quality Element IV, procurement document control. Victoreen failed to ensure that its subsupplier followed its welding procedure. The specific finding was not against the Midland order; however, Victoreen is investigating all of its procurement documents to ensure that none have a similar problem. Victoreen will complete its investigation by April 29, 1983, and Bechtel will perform a reaudit the week of May 1, 1983. The hold-on-shipment restriction will remain in effect until Victoreen satisfactorily resolves the remaining audit finding.

5. One hundred percent inspection of all Class 1E equipment by Bechtel supplier quality, with an overinspection by MPQAD, 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.

Submitted by: G. Singh
Control Systems
Group Supervisor

Approved by: E.M. Hughes
Project Engineer

Concurrence by: E.A. O'Hare
Control Systems
Chief Engineer

Concurrence by: E.H. Smith
Engineering Manager

Concurrence by: for M.A. Dietrich
Project Quality
Assurance Engineer

GS/JDB/mmc(J)

li2888 li2879

SCHEDULE FOR
MCAR 60
CORRECTIVE ACTIONS

Responsible Organization	Task	Scheduled Completion Date
Bechtel engineering	Issue MR 7220-J-244 to include new Class 1E modules.	04/29/83
Bechtel procurement	Issue purchase order for above.	05/06/83
Victoreen	Manufacture Class 1E modules.	01/07/84
Victoreen	Test Class 1E modules.	01/21/84
Victoreen	Replace existing modules with new Class 1E modules (requires Bechtel approval).	02/10/84
Victoreen	Perform calibration.	02/24/84
Victoreen	Perform functional test.	03/02/84
Bechtel engineering	Review and approve test results.	03/23/84
Victoreen	Ship Class 1E monitors	03/31/84