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October 14, 1983

82-01 #7

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MIDLAND ENERGY CENTER PROJECT  
DOCKET NOS 50-329 AND 50-330  
DEFICIENCIES IN ELECTRICAL ACCESSORIES ASSOCIATED  
WITH SAFETY-RELATED MATERIAL REQUISITIONS  
FILE: 0.4.9.57 SERIAL: 23817

- References: 1) J W Cook letter to J G Keppler, Main Steam Isolation Valves,  
Final Report, Serial 17558, Dated July 30, 1982
- 2) Serial 22171, dated April 12, 1983
- 3) Serial 22255, dated July 15, 1983

This letter is a final 10CFR50.55(e) report concerning deficiencies in  
electrical components in that non-Class 1E devices were wired into  
Class 1E circuits.

Attachment 1 describes action now being taken to complete resolution of  
this problem. All engineering investigation needed to identify procurement  
document discrepancies has been completed.

*JAMooney for JWCook*

JWC/WRB/cd

Attachments: (1) MCAR-55, Revision 1, Final Report, dated September 26, 1983

CC: Document Control Desk, USNRC, Washington, DC  
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OC1083-0004A-MP01

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## Management Corrective Action Report (MCAR)

Subject: MCAR 55, Revision 1

Deficiencies in Electrical Accessories Associated With  
Safety-Related Material Requisitions

## Final Report

Date: September 26, 1983

Project: Consumers Power Company  
Midland Plant Units 1 and 2  
Bechtel Job 7220Description of Deficiency

The initial scope of the MCAR 55 included main steam isolation valves (MSIVs) and actuators supplied by Energy Products Group (EPG), a division of Gulf and Western Manufacturing Company under Purchase Order 7220-M-118A(Q). Major safety-related electrical components of the MSIV system (the actuators, logic cabinets, and the control panel inserts) were found to be nonconforming to the separation criteria of Regulatory Guide 1.75, Quality Assurance Program, as required by 10 CFR 50 Appendix B, or ANSI 45.2 and the project seismic requirements.

The scope of MCAR 55 was expanded as a result of project's commitment to review safety-related material requisitions for similar nonconformances. A review of four additional equipment packages [M-125C(Q) nuclear stainless steel valves 150 through 400 pound ratings 2-1/2-inch and larger, M-149(Q) air handling units, M-150(Q) air filtering units, and M-154(Q) HVAC isolation valves] that include electrical accessories has revealed that some non-Class 1E devices have been wired into Class 1E circuits.

Summary of Investigation and Historical Background

Investigation and historical background of MSIV deficiencies were summarized in the final report on original MCAR 55, issued July 28, 1982 (see Attachment 1). As a result of MCAR 55, further review was conducted for selected safety-related material requisitions. Contacts with four equipment package vendors and review of available documentation confirmed that some non-Class 1E devices have been wired into Class 1E circuits.

Analysis of Safety Implication

A detailed analysis of safety implication was performed for the MSIVs in the final report on original MCAR 55 (see Attachment 1). Detailed analysis for each purchased item of the four additional equipment packages has been included in MCAR 55, Rev 1, review. Potential safety concerns exist for some of these systems to perform their safety

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function as described in applicable FSAR sections because the integrity of the Class 1E power and control circuits may be degraded by the inclusion of non-Class 1E devices if not properly isolated.

Probable Cause

The cause of MSIV deficiencies was described in the final report on original MCAR 55 (see Attachment 1). Investigation of why some non-Class 1E devices have been wired into Class 1E circuits indicated the following:

- a. Some material requisitions for safety-related equipment did not directly reference the requirements of Regulatory Guide 1.75 and IEEE-384 regarding identification and separation of the Class 1E and non-Class 1E functions and devices.
- b. Some vendors provided non-Class 1E devices for functions which they understood to be nonsafety-related.
- c. Vendor documents frequently did not distinguish between Class 1E and non-Class 1E functions and devices.
- d. Electrical schemes and control logics for this equipment were usually developed on the assumption that the electrical accessories provided as part of safety-related material are Class 1E.

Corrective Action

Recommended Corrective Actions 1 through 6 associated with the original issue of MCAR 55 related to the MSIVs were completed (see Attachment 1).

The following actions resolve the expanded scope of MCAR 55, (Actions 7 through 10).

1. Actions 7 and 8:

1.1 Guidelines and a checklist have been developed for review of safety-related material requisition requirements and vendor design adequacy. All safety-related material requisitions that include procurement of electrical components and accessories (see Attachment 2) have been reviewed in accordance with the guidelines and checklist. The review included the following:

- a. Review of safety-related material requisitions and specifications to ensure that equipment and accessories are properly specified to meet the project commitment of Regulatory Guides 1.89 (IEEE Standard 323), 1.100 (IEEE Standard 344), and 1.75 (IEEE Standard 384), as applicable.

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- b. Based on the results of the review of Item a, a review of vendor electrical design (those designs where both Class 1E and non-Class 1E components may be present) for adequacy and clarity based on system functional requirements was conducted.
- c. Bechtel electrical design (those designs where both Class 1E and non-Class 1E components are used in vendor design) interface with vendor electrical design.
- d. Identified inconsistencies.

1.2 A list identifying all safety-related equipment/instruments is being developed as project Drawing 7220-L-100(Q), and will be issued Rev. 0 in accordance with engineering production schedule EPS-5010.

2. Action 9:

Based on the results of the review of Item 1 above, a corrective action plan has been developed (see Attachment 3) to ensure that safety-related design uses only Class 1E devices/equipment or provides equipment isolation as required. Attachment 3 identifies purchase orders having inconsistencies and requiring corrective actions. The following deficiencies are not included in Attachment 3 for the reason stated.

- a. Deficiencies identified on Quality Action Request (QAR) M-74 for Purchase Orders M-125C, M-149, M-150, and M-154 have been corrected except for M-150.
- b. Limit torque actuators provided on safety-related valve orders identified on MCAR 46 as having qualification and documentation problems are being resolved on MCAR 46.
- c. Qualification related deficiencies are being investigated for adequate qualification and documentation as a part of the current seismic and environmental qualification effort for all safety-related equipment.

Engineering production schedule (EPS-1017) for MCAR 55, Revision 1 activities will be revised by October 21, 1983 to include corrective action plan identified in Attachment 3.

3. Action 10:

The review discussed above is documented and is auditable.



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As a result of MCAR 55 and to preclude non-Class 1E components wired into Class 1E circuits all disciplines have been made aware of the probable causes of MCAR 55 problems and have been advised to consider them when preparing safety-related material requisitions that include procurement of electrical components and accessories, reviewing vendor prints, and performing Bechtel electrical interface design.

Reportability

The final report on MCAR 55, issued July 28, 1982, committed to the further reviews of equipment not covered in either MCAR 55 or MCAR 46. On March 11, 1983, Mr. W.R. Bird of Consumers Power Company notified Mr. R. Gardner of the NRC that deficiencies in electrical accessories/devices associated with other equipment had been identified.

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Electrical Group Supervisor

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- Attachments:
1. Original MCAR 55 Final Report Issued July 28, 1982
  2. Material Requisitions Reviewed for MCAR 55, Revision 1  
Concerns
  3. MCAR 55, Revision 1 Corrective Action Plan

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Management Corrective Action Report (MCAR)

SUBJECT: MCAR 55 (Issued 1/15/82)

Deficiencies in Electrical Components Associated with  
MSIV Actuators, Logic Cabinets, and Control Panel Inserts

FINAL REPORT

DATE: July 28, 1982

PROJECT: Consumers Power Company  
Midland Plant Units 1 and 2

Bechtel Job 7220

Description of Deficiency

Main steam isolation valves (MSIVs) and actuators were supplied by Energy Products Group (EPG), a division of Gulf and Western Manufacturing Company, under Purchase Order 7220-M-118A(Q). The logic cabinets and control panel inserts were vendor supplied units not covered in detail by the valve specification, and were provided with off-the-shelf commercial grade items without seismic qualification. Recent review of the MSIV actuator design and accessories also revealed that certain components of the hydraulic actuator, that must operate in order for the MSIV to perform its safety function, are not in accordance with the applicable IEEE standards and Regulatory Guide 1.75 requirements.

The major safety-related electrical components of the MSIV system are the actuators, the logic cabinets, and the control panel inserts. Details of the nonconformances and deficiencies identified are as follows:

A. Actuator

1. The separation criteria of Regulatory Guide 1.75 were not met.
2. The electrical components listed below were not procured by EPG as Class 1E nor in accordance with a quality assurance program meeting the requirements of 10 CFR 50, Appendix B or ANSI N45.2.
  - a. Wiring
  - b. Trip solenoids
  - c. Solenoid valves
  - d. Limit switches



B. Logic Cabinets

1. The cabinets and their components are not seismically qualified.
2. The separation criteria of Regulatory Guide 1.75 were not met.
3. The electrical components were not procured by EPG as Class 1E nor in accordance with a quality assurance program meeting the requirements of 10 CFR 50, Appendix B, or ANSI N45.2.

C. Control Panel Inserts

1. The control panel inserts and their components are not seismically qualified.
2. The separation criteria of Regulatory Guide 1.75 were not met.
3. The electrical components were not procured by EPG as Class 1E nor in accordance with a quality assurance program meeting the requirements of 10 CFR 50, Appendix B or ANSI N45.2.

Summary of Investigation and Historical Background

Bechtel became aware of possible inadequacies in the MSIVs by Consumers Power Company Nonconformance Report M-01-9-0-064, an unsolicited proposal for modification from EPG dated April 1, 1980, and a review of environmental qualification data.

Contacts with the vendor, review of available documentation, and inspection of the installed hardware at the jobsite confirmed the deficiencies described above.

Analysis of Safety Implication

The safety function of the actuator and associated electrical components is to provide emergency closure of the MSIV upon receipt of either a Channel A or Channel B main steam line isolation signal (MSLIS). All electrical components that are required for transmission of the MSIVS, tripping the latch mechanism, closing the valve, and maintaining a tight shut-off, must be capable of performing the safety function during or after a seismic event. A potential safety problem exists if failure of any of the components results in failure of the MSIV to perform its safety function as described in the FSA.

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#### Probable Cause

The original MSIV design specification was prepared with the intention of purchasing only valves and power operators. Logic cabinets and control panel inserts were not contemplated when the original specifications were prepared and issued for bid; and therefore, design requirements and criteria for such items were not included in the technical specification. However, EPG offered the panel inserts and logic cabinets in their proposal as additional items as an incentive to market their unique and innovative ball valve design for MSIV service. During the course of procurement, a failure to address the full safety-related requirements of the design resulted in the described condition.

This closes Action Item 6 of MCAR 55.

#### Corrective Action

1. Purchase Order 7220-M-238(Q), Main Steam Isolation Valve Electrical Modifications, has been issued to procure materials that would correct the deficiencies and nonconformances that were identified in the existing electrical equipment. This purchase order has been placed with EPG. The scope of work to be covered is summarized below. The corrective actions satisfy the requirements of Items 1 and 2 of MCAR 55.

##### A. Actuator

1. Seismically and environmentally qualified EA-180 NAMCO limit switches, essential mounting brackets, wiring, and flexible conduit will replace existing components. Modification of the actuator will bring it into compliance with the seismic requirements of 7220-M-238(Q) and the separation criteria of Regulatory Guide 1.75.
2. Seismic qualification of the actuator trip solenoids and solenoid valves will be obtained.

##### B. Logic Cabinets

1. Provide four (4) new logic cabinets to meet the seismic and environmental qualification requirements and separation criteria as defined in Specification 7220-M-238(Q). Only one Class 1E channel will be contained in each cabinet.

##### C. Control Panel Inserts

1. Modify or replace four (4) control panel inserts to meet the seismic and environmental qualification requirements and criteria as defined in 7220-M-238(Q).

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2. All MSIV Class 1E electrical component deficiencies have been added to the Qualification Open Action Summary dated March 11, 1982. This action satisfies Corrective Action 3 of MCAR 55.
3. The main steam isolation valve specification, 7220-M-118A, identified the qualification requirements for the valve and actuator. However, the vendor supplied logic cabinets and control panel inserts were not supplied in accordance with a recognized qualification program; a fact which was not detected by the MCAR 25 rereview. Specification 7220-M-238(Q) was prepared to correct the deficiencies and nonconformances that exist in the MSIV electrical equipment.

The scope of MCAR 25 did not require review of the specification to determine adequacy of imposed qualification requirements. It reviewed the specification requirements against the FSAR (e.g. safety, Seismic Category I, adequacy of qualification reports to specification requirements).

Review of Q-listed equipment specifications in preparation for NRC audits of seismic and environmental qualifications will ensure that unresolved problems are identified. This process coupled with tracking of all NCRs in accordance with EDP 4.61 provides assurance that acceptable qualifications will be provided. The above closes the recommended Action Item 4 of MCAR 55.

4. Investigation of all Q-listed valve orders on the Midland project revealed that electrical components associated with logic cabinets and control panel inserts that were specified with inadequate qualification requirements were unique to Purchase Order 7220-M-118A(Q) only.

Limiterque actuators provided on Q-listed valve orders identified on MCAR 46 as having qualification and documentation problems are being resolved on MCAR 46 to satisfy FSAR commitments. Actuators and electrical components on orders not identified on MCAR 46 are being identified and investigated for adequate qualifications and documentation as a part of the current seismic and environmental qualification effort for all safety-related equipment. Each of these efforts will result in reports which will be incorporated in or referenced in the FSAR. This closes Action Item 5 of MCAR 55.

All necessary corrective actions related to this MCAR have now been established, and have either been completed or entered into the normal engineering release tracking system.

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Reportability

Based on the deficiencies that exist in the equipment and the magnitude of the effort required to make the necessary repairs, we determined that the subject of this MCAR is reportable within the requirements of 10 CFR 50.55(e). The NRC has been duly notified.

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Attachment 2 to  
 MCAR 55, Revision 1  
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Material Requisitions Reviewed for MCAR 55, Revision 1 Concerns

<u>Architectural</u>	<u>Civil</u>	<u>Control Systems</u>	<u>Electrical</u>	<u>Mechanical</u>	<u>Nuclear</u>
None	C-24	J-201	E-6	M-14	M-54
	C-50B	J-202	E-7	M-18	M-56
		J-204	E-11	M-19	M-93
		J-205	E-13	M-20	M-374
		J-207	E-19	M-52	
		J-229	E-20	M-53	
		J-233	E-34	M-75	
		J-244	E-45	M-92	
		J-245	E-49	M-117	
		J-249	E-51B	M-118B	
		J-255A	E-205	M-120	
		J-255E		M-123A	
		J-256		M-123B	
		J-258		M-123C	
		J-275A		M-125A	
		J-275B		M-125B	
		J-278		M-125C	
		J-281		M-127B	
		J-284		M-129A	
		J-297		M-129B	
				M-131	
				M-132	
				M-134	
				M-146	
				M-149	
				M-150	
				M-151	
				M-154	
				M-157	
				M-163	
				M-168	
				M-169	
				M-180	
				M-224	
				M-347	
				M-349	
				M-398	

MCAR 55, Revision 1 Corrective Action Plan

P.O.	Equipment Description	Description of Deficiencies	Quantity	Corrective Action	Remarks
M-19	Emergency Diesel Generator Fuel Oil Transfer Pumps (1P-78A, B and 2P-78A, B)	Unqualified thermostat (motor thermal cut-out) wired Class 1E	4	Provide ESFAS D-G start signal to override ther- mal cut-out [CPCo Letter 9/30/80 (Com 12942)], or modify circuits.	129622
M-75	Service Water Pumps (OP-75A, B, C, D, E)	Unqualified motor space heaters wired Class 1E	5	Provide isolator or disconnect space heater wiring.	
M-180	Service Water Self- Cleaning Strainers (OF-75A, B, C, D, E)	Unqualified motor space heaters wired Class 1E	5	Provide isolator or disconnect space heater wiring.	
M-123C	Nuclear Stainless Steel Valves 600-Pound Rating and Higher, 2-1/2-Inch and Larger (1MO-1058, 1059, and 2MO-1158, 1159)	Unqualified motor (Rotork) space heaters wired Class 1E	4	Provide isolator or disconnect space heater wiring.	129646
M-169	Hydrogen Recombiners (1VE-54A, B and 2VE-54A, B)	Unqualified thermocouples Wired Class 1E	12	Qualify thermocouples to Class 1E, or modify circuits.	
M-150	Air Filtering Units (OVM-78A, B; OVM-79A, B; OVM-94A, B)	1. Two non-Class 1E instru- ment systems sharing the same power supply with two Class 1E instrument systems. 2. No separation provided for non-Class 1E instrument systems.	6	There are three options: 1. Rearrange Class 1E and non-Class 1E devices within the same panel with proper separation and modify wiring. 2. Separate Class 1E and non-Class 1E devices into two panels and modify wiring. 3. Qualify non-Class 1E devices to Class 1E.	Only two non- Class 1E and one Class 1E instrument systems involved for OVM-79A, B.