Consumers Power Company

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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
Q-RELATED EQUIPMENT COOLED BY NON-Q HVAC SYSTEM
FILE: 0.4.9.63 SERIAL: 20696

References: J W Cook letters to J G Keppler, same subject:

(1) Serial 17529, dated June 25, 1982
(2) Serial 17578, dated August 17, 1982
(3) Serial 19096, dated November 22, 1982

This letter, as was the referenced letter, is an interim 50.55(e) report on Q-related equipment cooled by non-Q HVAC systems.

Another report, either interim or final, will be sent on or before May 17, 1983.

James W. Cook

WRB/ljr

Attachment: MCAR-59, Interim Report 4, dated January 24, 1983

CC: Document Control Desk, NRC
Washington, DC

RJCook, NRC Resident Inspector
Midland Nuclear Plant

FEB 16 1983

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CC: CBechhoefer, ASLB Panel
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Bechtel Associates Professional Corporation

SUBJECT: MCAR 59 (issued May 28, 1982)

INTERIM REPORT 4

DATE: January 24, 1983

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

Description of Deficiency

Safety-related devices are located in portions of the auxiliary building and are cooled by non-Q heating, ventilating, and air-conditioning (HVAC) systems. Loss of these non-Q HVAC systems following various design basis accidents (DBAs) could result in room environmental temperatures that could exceed the specified design temperature of 104F because the rooms are serviced by non-Q HVAC systems. Under these conditions, the safety-related equipment in these rooms may not operate reliably, and both trains of redundant Q-listed equipment are affected by loss of the non-Q HVAC system in many instances.

Summary of Investigation and Historical Background

The results of the review of the project design drawings to date have identified 101 areas containing approximately 2,000 items of Class 1E electrical equipment, devices, and instruments in the auxiliary building that are cooled by non-Q HVAC systems.

Analysis of Safety Implication

The predicted steady-state maximum environmental room temperatures in the existing non-Q-cooled portions of the auxiliary building, assuming a DBA simultaneous with an extended loss of the non-Q HVAC systems, has been determined. The resulting temperatures are based on two accident conditions as follows:

Case 1 - A loss-of-coolant accident (LOCA) in both reactor units concurrent with a loss of offsite power - All safety-related equipment has been assumed to be operating and generating heat as well as any dc or diesel-backed ac nonsafety-related equipment. The auxiliary building non-Q HVAC system, as well as non-Q heat sources (except as noted above), are assumed to be inoperative, whereas four trains of the safeguards HVAC system are assumed to be available. (See Note, Page 2.)

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Case 2 - A LOCA in both reactor units with offsite power available - A total loss of non-Q HVAC systems is assumed, whereas four trains of the safeguards HVAC system are assumed to be available. Because offsite power is available, nonessential equipment could be available and generating heat as well as any dc or diesel-backed ac equipment. (see Note.) | 4

The following is a summary of the results of the peak temperature calculations for the two cases considered: | 4

	Case 1	Case 2
Total number of non-Q-cooled areas analyzed	167	167
Total number of the 167 non-Q-cooled areas containing Class 1E devices	101	101
Total number of the 101 non-Q-cooled areas containing Class 1E devices with peak temperature ≥104F	74	86
Total number of the above non-Q-cooled areas containing Class 1E devices with peak temperature of ≥104F and to which Q cooling will be added (tentative).	20	20
Remainder of non-Q-cooled areas containing Class 1E devices with peak temperature of ≥104F and not presently planned to be Q cooled.	54(1)	66(2)

Note: Both units were assumed to be affected by a LOCA to simplify the analysis. This assumption is conservative. Assuming one unit in LOCA and one unit in hot shutdown, the major difference would be the pipeways, where heat loads would be lower during hot shutdown because fewer engineered safety features (ESF) piping systems would be operating.

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(1) Of these 54 areas, the peak temperatures are broken down as follows:

a) 104F < 11 areas ≤ 110F

b) 110F < 23 areas ≤ 120F

c) 120F < 20 areas ≤ 130.2F

(2) Of these 66 areas, the peak temperatures are broken down as follows:

a) 104F < 6 areas ≤ 110F

b) 110F < 12 areas ≤ 120F

c) 120F < 20 areas ≤ 130F

d) 130F < 14 areas ≤ 140F

e) 140F < 5 areas ≤ 150F

f) 150F < 2 areas ≤ 160F

g) 160F < 3 areas ≤ 170F

h) 170F < 1 area ≤ 180F

i) 180F < 1 area ≤ 190F

j) 200F < 2 areas ≤ 210F

The peak temperature calculations are being revised as a result of a change in the maximum post-DBA temperature of the spent fuel pool. The maximum post-DBA temperature has increased from 142 to 157F, and will consequently affect the peak temperature of rooms adjacent to the spent fuel pool and the fuel pool pump and heat exchanger rooms but are considered to have minimal impact on device evaluations. 4

Probable Cause

The root cause of the discrepancies is as follows. Although documentation existed on project identifying areas served by the safety-grade ventilation system, the required interdiscipline coordination was not effective because the limiting conditions defining the maximum temperature that would be experienced by safety-related devices located in areas served by non-Q HVAC systems had not been established. 4

Therefore, design decisions as to suitable locations for intended service were made without adequate consideration of the impact of a loss of offsite power or post-DBA conditions. This resulted in a lack of consistency in:

1. Locating safety-grade equipment in an area served by a nonsafety-grade ventilation system

2. Specifying and ascertaining that adequate environmental qualification service conditions exist for the safety-grade equipment when located in an area served by nonsafety-grade ventilation systems

Corrective Action

1. Project engineering is still reviewing the safety function of the Q devices in the areas already identified to evaluate the safety-related implications of the equipment failure following the DBAs. Should the evaluation indicate that failure of the equipment could adversely affect the capability of the plant systems to mitigate the consequences of the accident or to achieve and maintain a safe shutdown, corrective action would be implemented on a case-by-case basis. These actions could include the following:

   a) Upgrade selected auxiliary building HVAC systems to Q status to limit the effect of the peak room temperature within the current environmental qualification envelope of the equipment.

   b) Relocate the Class 1E device to another area where the predicted peak environmental temperature is within the environmental qualification envelope of the equipment.

   c) Replace the Class 1E device, which does not qualify for the predicted peak room temperature, with one that qualifies.

   d) Qualify the existing Class 1E device for temperatures greater than or equal to the calculated peak room environmental temperature.

   Specific area-by-area resolutions will be addressed in future interim reports. Case 1 results will be used as the basis for

determining the need for corrective action. Bechtel will develop information for Consumers Power Company's use in development of emergency operating guidance to ensure that nonessential heat-producing equipment will be deenergized as needed after a DBA to preclude the possibility of Case 2 occurring and to limit the peak temperatures to acceptable levels.

A computer list of the affected safety-related devices in the auxiliary building, derived from the licensing equipment qualification data base, has been developed. The list is categorized by room number and contains information on the required operability period of the safety-related device, its functional status before and after the accident, its failure mode, power consumption, qualification test data, predicted peak temperature for Cases 1 and 2, the estimated peak temperature to which the device can be qualified based on Arrhenius techniques or reanalysis by the equipment manufacturer, and the proposed resolution for corrective action, if any. After accounting for 1) the 20 areas in which Q cooling will be tentatively added, and 2) devices which are located in non-Q-cooled areas but have been determined to be potentially qualified for the environment in which they are located, approximately 300 devices remain to be evaluated for their non-Q-cooled environment. The criteria for evaluating the acceptability of a safety-related devices' location with respect to its environmental qualification are being developed. The issues of harsh versus mild environment, operability period, failure mode, and active versus passive function are being evaluated and considered in development of the criteria. 4

2. Project Drawings 7220-M-560(Q), Sheets 1 through 9, Rev 0, were issued on July 26, 1982, to clarify the areas of the auxiliary building that are cooled by Q HVAC systems. The use of these drawings should result in locating Q devices only in areas where a suitable environment exists. 4

3. An assessment has been made of the 101 affected areas. Engineering and procurement activities are presently under way to add safety-grade HVAC to 20 areas of the auxiliary building that have, in general, the highest predicted peak temperatures of all affected areas, the greatest concentration of safety-related devices, and areas containing safety-related devices with post-accident operability period requirements of 30 days or more.

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4. The manufacturer of the safeguards water chillers, Carrier Corporation, has evaluated the feasibility of increasing the capacity of the existing safeguards water chillers to serve the addition of Q cooling in certain areas of the auxiliary building as required. Carrier Corporation has concluded that the capacity of the four chillers can be increased from 180 to 200 tons by replacing the centrifugal compressors' impeller and the low-side float valve in the economizer section.

Reportability

This deficiency was reported to the NRC on May 26, 1982, as potentially reportable under 10 CFR 50.55(e) by Consumers Power Company.

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NOTE: △Denotes information that has been revised or that is new since the last interim report.