Consumers Power Company

Docket 50-255

SEISMIC STRUCTURAL - INTEGRITY EVALUATION OF SELECTED ELECTRICAL EQUIPMENT AT PALISADES NUCLEAR POWER PLANT

DECEMBER 1982

15 Pages

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URS/JAB 8249

SEISMIC STRUCTURAL-INTEGRITY EVALUATION OF SELECTED ELECTRICAL EQUIPMENT AT PALISADES NUCLEAR POWER PLANT

Revision 1

This report shall be considered to be preliminary pending completion of URS/Blume quality assurance reviews.

Prepared for

Consumers Power Company
Jackson, Michigan

December 1982

Prepared by

URS/John A. Blume & Associates, Engineers
130 Sylvan Street
Danvers, Massachusetts 01923

FORM 4.1-1

URS/BLUME DOCUMENT APPROVAL SHEET

DOCUMENT TITLE: Seismic Structural Integrity Evaluation of Selected Electrical Equipment at Palisades Nuclear Power Plant

DOCUMENT TYPE: Criteria ☐ Interface ☐ Report ☒ Specification ☐ Other ☐

PROJECT NAME: Palisades Electrical Equipment

JOB NO.: 8249

CLIENT: Consumers Power Company

This document has been prepared in accordance with the URS/Blume Quality Assurance Manual and Project requirements.

Initial issue (Rev. 0)

Prepared by: _____ Date: 12/17/82

Reviewed by: _____ Date: 12/17/82

Approved by: _____ Date: 12/17/82

REVISION RECORD:

Revision No.	Prepared By/Date	Reviewed By/Date	Approved By/ Date	Description of Revision
1	12/22/82	12/22/82	12/22/82	Editorial corrections

CONTENTS

FIGURES

URS/Blume

1. INTRODUCTION

At the request of Consumers Power Company, URS/John A. Blume & Associates, Engineers (URS/Blume), performed an evaluation of selected electrical equipment at the Palisades Nuclear Power Plant near South Haven, Michigan, for structural integrity under seismic loads. The evaluation was conducted as part of the Systematic Evaluation Program of the U.S. Nuclear Regulatory Commission (NRC).

Background

In an earlier study,[1] URS/Blume investigated the seismic anchorage of safety-related electrical-equipment cabinets at the Palisades plant. Items that were found to require additional seismic restraints were modified in the latter part of 1981 during a refueling outage.

A complete structural-integrity evaluation requires that the adequacy of the load path extending from electrical devices within equipment cabinets to the anchorage of the unit also be assessed. In such an evaluation, three segments of the load path are of particular concern: the anchorage of electrical devices, the walls and panels of the cabinet, and the region in which support for the cabinet is provided. The weakest segment of the load path is generally the cabinet-support region. Therefore, as part of the anchorage study, two-point supports were designed for electrical equipment cabinets wherever possible.

The two-point method of support supplies lateral bracing from the top of the unit to adjacent concrete walls, in addition to anchorage at the base of the unit by means of anchor bolts. In comparison with base-only support, this method results in higher natural frequencies, lower seismic accelerations and structural stresses, and a reduction in anchorage requirements for the electrical devices within the cabinets.

Further Evaluation

During the phase of work recently completed, a generic review of the cabinet anchorage of safety-related motor control centers (MCC), switchgears,

and control panels was conducted. Low-voltage and medium-voltage switchgears and all MCCs except for MCC 1 and MCC 2 were provided with two-point support, which would result in low seismic forces on the cabinet supports. MCC 1 and MCC 2 are located in the auxiliary building at elevation 610 ft, where seismic motion is expected to be stronger than at most other locations of safety-related electrical equipment at the Palisades plant. The control room is an exception. MCC 1 and MCC 2 were therefore evaluated for seismic structural integrity on the basis of worst-case sampling. Evaluation of control panels was not a part of the work reported here; it will be carried out in a separate study.

Evaluation of electrical-device anchorages was performed on a generic basis and is applicable to all safety-related equipment cabinets at the Palisades plant.

Report Organization

Section 2 of this report describes the methods and criteria used to evaluate the anchorage of electrical devices at the Palisades plant and presents the results of the evaluation. In Section 3, a detailed description of MCC 1 and MCC 2 is given. Evaluation of these MCCs was the primary focus of effort in this structural-integrity assessment. A description of the methods and criteria that were used and the results of the investigation are also presented in Section 3. Section 4 summarizes the work done in this phase of the study and is followed by a list of the references cited in the report.

2. ANCHORAGE OF ELECTRICAL DEVICES

Methods and Criteria

At the outset of the investigation, a generic study of the types of anchorage used for electrical devices within the equipment cabinets at the Palisades plant was performed. To assess the adequacy of the anchorage, the design-basis earthquake (DBE) loadings, as defined by the floor-response spectra for the containment building[2] and for the auxiliary building,[3] were used. The curves for 5% damping presented in those analyses were chosen for this study.

For analysis of electrical-device anchorage, the equivalent-static-load method was selected. For analysis of horizontal loading, the highest horizontal-response spectrum peak encountered at locations of safety-related electrical equipment in the plant was used. That value was increased to provide a conservative estimate of the worst response to be expected at the midpoint of a simply supported rectangular plate in the vertical plane, located at the top of an unbraced electrical equipment cabinet. Because electrical equipment cabinets are generally rigid (i.e., have a fundamental frequency higher than 33 Hz) in the vertical direction, the zero-period acceleration (ZPA) value of the DBE spectrum was used for analysis of vertical loading.

The computed horizontal-acceleration value used for evaluation of device anchorage was S_h = 21.8g. The vertical-acceleration value was S_v = 0.20g; this value was added to the dead load of the electrical device.

A list of electrical devices, with the manufacturer's name and model number and details of anchorage, had been compiled during a URS/Blume field survey. The actual weights of the devices had been determined from manufacturers' catalogues or had been conservatively estimated. The weights for the MCC 1 and MCC 2 devices ranged from 1-1/2 lb for an overload heater coil to 24 lb for a starter. The anchorage patterns varied from two-bolt to four-bolt configurations using bolts of 1/8-in. to 1/4-in. diameter.

A static analysis of six common anchorage configurations for electrical devices was performed for bolts of 1/8-in., 3/16-in., and 1/4-in. diameter. The stresses from dead load and the vertical seismic load were combined by the absolute-sum method with those from the more critical of the two horizontal directions in each case. This method is in agreement with the method described in the final safety analysis report for the Palisades plant.[4] Maximum allowable weights were then calculated for various aspect ratios of the electrical devices, with static loads being applied at the geometric center of the device. The structural acceptance criteria for the bolts were those defined in the NRC's standard review plan,[5] Section 3.8.4, for the safe-shutdown earthquake (SSE) load combination. Thus, the allowable stress limits used for the bolts were 1.6 times the allowable values for elastic design defined in the American Institute of Steel Construction (AISC) manual.[6]

Results of the Evaluation

The methods and criteria described above were applied to the electrical devices in MCC 1 and MCC 2. All electrical device anchorages for these two MCCs were found to be acceptable. Consumers Power Company will evaluate devices located in other electrical equipment cabinets by using the methods and criteria applied to MCC 1 and MCC 2.

3. MOTOR CONTROL CENTERS 1 AND 2

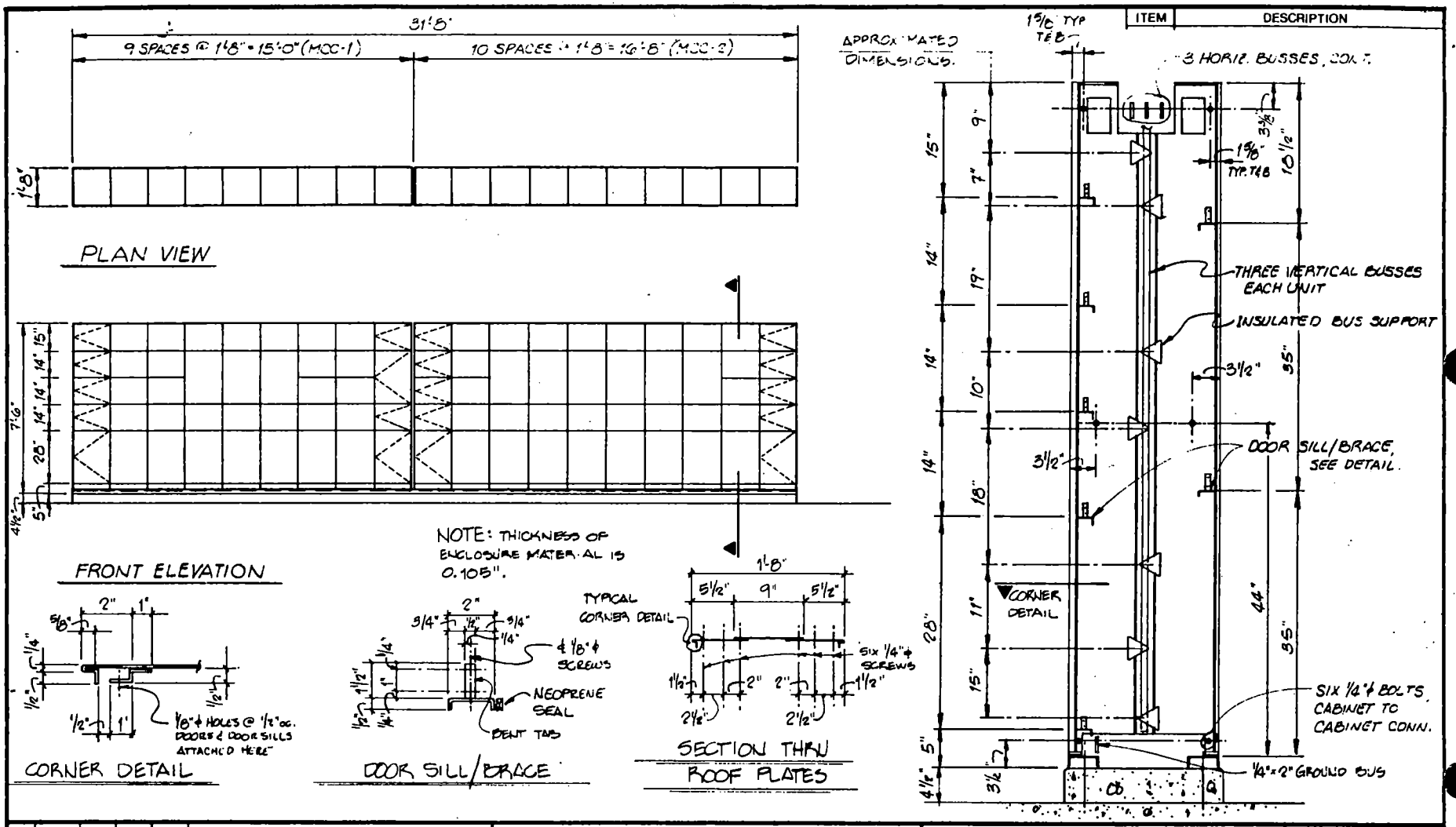
Description of the MCC

The evaluation of MCC 1 and MCC 2 was based on dimensional information obtained from the manufacturer and on data gathered during a field visit by URS/Blume personnel. These MCCs are Cutler-Hammer products. They comprise 19 units of essentially identical basic construction. (See Figure 1.) The only significant difference among units is in the size of the shelves to which electrical devices are anchored. The entire MCC assembly is attached to two C4 X 5.4 channels, which are themselves anchored to a concrete pedestal. Each unit is approximately 7 ft 4 in. high, 1 ft 8 in. wide, and 1 ft 8 in. deep and is constructed of 12-gauge bent-steel plates.

Z-shaped vertical stiffeners and channels running the height of the side plates of the MCC units are used for the attachment of doors, device shelves, and electrical bus bars. These are shown in the details of Figures 1 and 2. The two side plates are connected structurally through the door sills, the insulated vertical bus supports, and the device shelves, as shown in Figure 2.

All electrical devices within MCC units are anchored to the backboard of a U-shaped removable shelf consisting of a top plate, a bottom plate, and a back plate. The shelf is anchored to the vertical channel of the MCC through a latch-and-bracket arrangement (see Figure 2). Each MCC unit is supported by four legs, which are part of the 12-gauge bent-steel plate. Each leg is bolted to the supporting C4 X 5.4 channel by a 3/8-in.-diameter bolt. Three pairs of 1/4-in.-diameter bolts connect the units to each other. The bottom pair is approximately 1-7/8 in. above the legs, ensuring composite behavior of the two side-by-side legs of adjoining units.

The mass of each of the 19 units of the MCCs was estimated on the basis of drawings and from information obtained from the manufacturer. An average value for the 19 units was calculated, and that value was increased by 20% to account for miscellaneous bolts and nuts, to allow for the estimated weight of devices, and for conservatism. The resultant value, which was used in the evaluation, was 630 lb per unit.



ITEM	DESCRIPTION

REV	DATE	BY	CHK	APV	DESCRIPTION
0	8-14-82	RLB	[illegible]	[illegible]	TRANSCRIBED FIELD SKETCHES

URS/Blume
URS/John A. Blume & Associates, Engineers
130 Sylvan Street
Danvers, Massachusetts 01923

Consumers Power Company
Palisades Nuclear Generating Plant

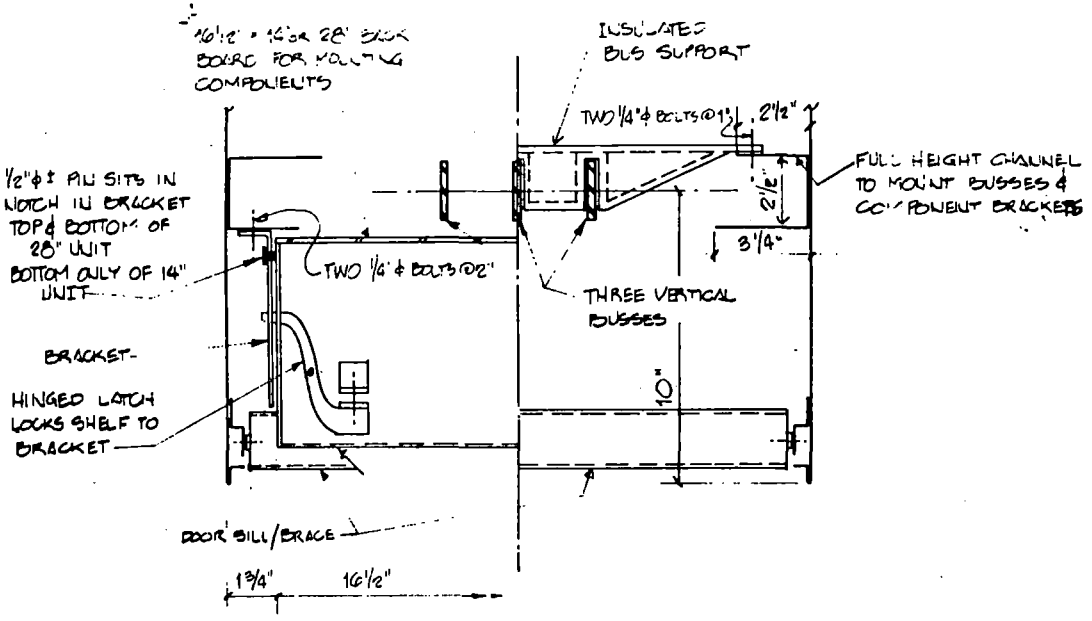
URS/Blume Job No 8249

Item No MCC-1 & MCC-2
Location
Elevation

8249-D-001
Drawing No

Sheet 1 of 2
REV 0

FIGURE 1 MOTOR CONTROL CENTERS 1 AND 2 AND DETAILS



PLAN VIEW - PARTIAL SECTION

ITEM	DESCRIPTION

REV	DATE	BY	CHK	APV	DESCRIPTION
0	8-16-82	RRC	[illegible]	[illegible]	TRANSCRIBED FIELD SKETCHES

URS/Blume
URS/John A. Blume & Associates, Engineers
130 Sylvan Street
Danvers, Massachusetts 01923

Consumers Power Company
Palisades Nuclear Generating Plant

Item No MCC-1 & MCC-2
Location
Elevation

URS/Blume Job No 8249
Drawing No 8249-D-001
Sheet 2 of 2
REV 0

FIGURE 2 DETAIL OF REMOVABLE SHELF AND VERTICAL BUS SUPPORT, MOTOR CONTROL CENTERS 1 AND 2

Methods and Criteria

The dynamic characteristics of the MCCs were estimated by using simple analytical models. The lowest frequency calculated was 21.6 Hz for the rocking mode in the lateral (front-to-back) direction. That value is significantly beyond the peak frequency of the floor-response spectra at elevation 610 ft of the auxiliary building.[3] However, since the dynamic properties were determined on the basis of a simple analytical evaluation, without substantiation by testing, the equivalent-static-load method was used for the structural-integrity evaluation. The peak frequency of the 5%-damped DBE floor-response spectrum was increased by 50% for the horizontal direction, in accordance with the requirements of Section 3.7.2 of the NRC's standard review plan.[5] The vertical-acceleration level was based on the ZPA of the vertical spectrum because of the rigidity of the MCCs in that direction. The horizontal-acceleration value used was S_h = 2.5g. A vertical-acceleration value of S_v = 0.21g was added to the dead-load component.

The general approach that was used was to calculate the maximum horizontal capacity of each of the critical segments of the load path of the MCC. Those segments are:

- The mechanism connecting the supporting plate for the electrical devices to the structural framing of the MCC cabinet
- The structural framing and side plate panel of the MCC cabinet
- The supporting legs of the MCC cabinet and their anchor bolts
- The channel, bolted to the concrete floor, that supports the entire MCC

The structural calculations were performed for the lateral and longitudinal directions of the MCC by combining stresses due to the vertical loads (the DBE and dead loads) with those due to a 1g horizontal-acceleration component of seismic motion in each direction on an absolute-sum basis.

The structural acceptance criteria for the evaluation were those defined in Section 3.8.4 of the NRC's standard review plan[5] for the SSE load combina-

tion. All allowable stress limits used were 1.6 times the allowable stresses for elastic design defined in the AISC manual[6] and in the American Iron and Steel Institute's (AISI) specifications for cold-formed steel members.[7] However, no values greater than the material yield stress were used. Because of a lack of information on the type of material used for the construction of the MCCs, a yield-stress value of 36 ksi was assumed. Various ASTM grades of structural steel range in yield stress from 25 to 50 ksi and others could reach 65 ksi; however, as stated in Section B.1 of the AISI specification, "sheet and strip steel with yield points lower than 33 ksi and plate steels lower than 36 ksi are rarely used for structural purposes."[7]

Results of the Evaluation

Conservative assumptions were made throughout the evaluation, and judgment was used to decide which of the segments of the load path were critical.

All critical elements were found to have sufficient seismic capacity to meet the requirements of acceptance criteria for postulated DBE motion at elevation 610 ft of the auxiliary building.[3] The leg of the MCC was found to have the lowest capacity for combined axial and bending stresses due to dead load and to vertical and longitudinal earthquake loads. This structural element was found to possess a conservatively calculated horizontal-seismic-load capacity of 2.5g.

The horizontal-seismic-load capacity of the support for the shelf to which the electrical devices are anchored was calculated to be about 25g. This high capacity is due primarily to the light weight of the shelf and the devices. The maximum weight of small shelves is approximately 45 lb; that of large shelves is approximately 62 lb. The horizontal capacity of the unit's structural framing and side panels was calculated to be about 9g, the controlling stress being the allowable elastic buckling stress due to dead load and vertical and lateral earthquake loads. This directional combination was also the controlling combination for the stress in the C4 X 5.4 channel that supports the entire MCC assembly, resulting in a horizontal-load capacity of 2.6g.

Because the capacities of all critical elements of the MCC cabinet were conservatively estimated to be at the required 2.5g horizontal level or above, it is concluded that MCC 1 and MCC 2 can be expected to survive the postulated DBE event without significant structural failure.

4. SUMMARY

This report presents the methodology and criteria for a structural-integrity evaluation of MCC 1 and MCC 2 of the Palisades Nuclear Power Plant, concentrating on the critical segments of the load path. Because the evaluation resulted in a judgment that all of the verified elements of the cabinets are structurally acceptable, the MCCs are expected to survive the postulated DBE for the site without significant structural failure. Furthermore, because all of the switchgears have been provided with two-point support, the same statement can be made of those items.

In addition, an evaluation of the anchorage of electrical devices within the MCC cabinets was performed. All items were found to be acceptable. Maximum allowable weights for electrical devices were developed for six commonly found anchorage patterns and for three bolt diameters, on the basis of very conservative assumptions. Because of these conservative assumptions and because the evaluation was based on a generic review, the maximum allowable weights obtained for the electrical-device anchorages are applicable to all items of safety-related electrical equipment cabinets at the Palisades plant.

REFERENCES

1. URS/John A. Blume & Associates, Engineers, *Consultation for Safety-Related Electrical Equipment at Palisades Nuclear Power Plant*, Revision 1, URS/JAB 8013, Danvers, Massachusetts, January 1982.

2. Bechtel Engineering Corporation, *Reactor Building Seismic Analysis, Consumers Power Company, Palisades Plant*, CPCO-GWO-8428, Bechtel Job 10512-031, San Francisco, California, 1969.

3. Bechtel Engineering Corporation, *Seismic Design Requirements for Equipment Located in the Auxiliary Building, Consumers Power Company, Palisades Plant*, Specification 10512-034-C-17507, Attachment 2, Revision 0, San Francisco, California.

4. Consumers Power Company, *Final Safety Analysis Report for Palisades Plant*, Appendix A, Design Basis for Structures, Systems, and Equipment (Except Containment Structure) for Palisades Plant, Jackson, Michigan, Revised October 24, 1980.

5. U.S. Nuclear Regulatory Commission, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants*, LWR Edition, NUREG-0800, Office of Nuclear Reactor Regulation, July 1981.

6. American Institute of Steel Construction, Inc., *Manual of Steel Construction: Specification for Design, Fabrication, and Erection of Structural Steel for Buildings*, 8th Edition, New York, New York, 1980.

7. American Iron and Steel Institute, *Specification for the Design of Cold-Formed Steel Structural Members and Commentary*, Washington, D.C., 1968.

Consumers Power Company

General Offices: 212 West Michigan Avenue, Jackson, MI 49201 • (517) 788-0550

January 14, 1983

Dennis M Crutchfield, Chief
Operating Reactor Branch No 5
Nuclear Reactor Regulation
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 -
PALISADES PLANT - SEP TOPIC III-6, "SEISMIC DESIGN CONSIDERATIONS", RESPONSE TO COMMITMENT CONCERNING ELECTRICAL COMPONENTS EVALUATIONS

By letter dated August 17, 1982, Consumers Power Company provided the NRC with a status update and schedule for addressing one outstanding safety issue related to SEP Topic III-6, "Seismic Design Considerations", for the Palisades Plant. In that letter we indicated that evaluations of electrical cabinet integrity and mounting adequacy of internal components were being conducted and it was expected that this work would be completed by 12/20/82. This letter submits our response to this commitment.

The attached preliminary report by URS/John A Blume & Associates, Engineers, entitled "Seismic Structural - Integrity Evaluation of Selected Electrical Equipment at Palisades Nuclear Power Plant", provides Consumers Power Company seismic analysis of Motor Control Centers (MCC) 1 & 2. In addition to the MCC 1 & 2 analysis, component anchorage of devices (ie, transformers, circuit breakers, ~~transformers,~~ etc) in switchgear 1D, ~~considered to be representative of medium voltage switchgear at Palisades~~, was analyzed using the methodology developed in the attached report for evaluating anchorage of subcomponents at the Palisades Plant. The methodology developed in the attached report was extended as required for additional anchorage configurations and for additional bolt diameters. In all cases, the anchorage of devices in switchgear 1D ~~were~~ found to be acceptable. An investigation of the control room resulted in the identification of Control Room Panels C-11, C-11A, C-12, C-13, C-04, C-06 and C-126 as safety-related control panels. In addition to the safety-related control panels in the control room, ~~there is Control Panel C-33~~ located at elevation 590'-0 of the auxiliary building. ~~Panel C-11A has been~~ recently added in the control room and has been qualified separately. ~~However,~~ results of the qualification are not incorporated in the attached evaluation report.

In addition to evaluating anchorage of devices, the components in safety-related cabinets outside the control room and containment were checked

DMCrutchfield, Chief
Palisades Plant
SEP Topic III-6
January 14, 1983

to ensure that anchor devices (ie, bolts and screws) were in place as required by the original construction specifications. The component check revealed all anchor devices to be in place.

The ~~remaining~~ control room panels (such as safety-related Panels C-11, C-12, C-13, ~~C-04~~ and C-06) were part of an earlier study by URS/John A Blume to insure stability of safety-related electrical equipment at Palisades. These panels were provided with additional base support plus bracing from the top of the control panels. Such support arrangement results in higher natural frequencies, lower response accelerations and therefore, lower stresses in the control panel structures. Although Consumers Power Company has not performed a rigorous stress analysis for structural integrity of control room panels for the Palisades Safe Shutdown Earthquake (SSE), structural integrity of the control room panels is adequate due to their two-point support. This conclusion is also substantiated by the results of an evaluation conducted by EQE, Inc entitled "Program For The Development Of An Alternative Approach To Seismic Equipment Qualification", which indicated that adequately supported electrical equipment has proven not to be a problem during an earthquake event.

Control Panel C-33, located at elevation 590'-0 of the Auxiliary Building is supported only at its base. Since MCC 1 & 2 are supported only at the base and ~~the fact that~~ they are located at a higher elevation which exposes them to ~~higher~~ accelerations, it was determined that MCC 1 & 2 represent the worst case for the structural integrity issue. It was, therefore, concluded that since the results of the enclosed report show MCC 1 & 2 to be structurally adequate, Control Panel C-33 is also expected to be capable of withstanding the Palisades SSE.

The issue of anchorage of subcomponents in the control panels and structural integrity of Control Panel C-126 remains to be addressed. Control Panel C-126, which is supported only at its base, contains safety-related temperature and pressure indicators and control switches for hydrazine addition. ~~and is supported only at its base.~~ Consumers Power Company expects that evaluations of these remaining items will show adequate seismic resistance based on our experience to date. It is expected that these evaluations will be completed by July 1, 1983.

Kerry A Toner (Signed)

Kerry A Toner
Senior Licensing Engineer

CC Administrator, Region III, USNRC
NRC Resident Inspector - Palisades

OC0183-0005A-NL02

This cover sheet should conform to NLD-06 attachment E.

Consumers Power Company

Docket 50-255

SEISMIC STRUCTURAL - INTEGRITY EVALUATION OF SELECTED ELECTRICAL EQUIPMENT AT PALISADES NUCLEAR POWER PLANT

DECEMBER 1982

LICENSING CORRESPONDENCE - RECORD SUMMARY

DATE: January 17, 1983

DOCKET 50-255 - LICENSE DPR-20 -
PALISADES PLANT - SEP TOPIC III-6, "SEISMIC DESIGN CONSIDERATIONS", RESPONSE TO COMMITMENT CONCERNING ELECTRICAL COMPONENTS EVALUATIONS

SUMMARY: This letter provides CPCO response regarding the electrical cabinet integrity and mounting adequacy evaluations. The evaluations, conducted by URS/John A Blume & Associates and documented in a report entitled "Seismic Structural - Integrity Evaluation of Selected Electrical Equipment at Palisades Nuclear Power Plant", demonstrated that all the cabinets investigated are structurally acceptable. One final commitment remains to be completed (see below).

COMMITMENTS MADE: Perform evaluations of anchorage of subcomponents in the control panels and structural integrity of Control Panel C-126 by July 1, 1983.

PREVIOUS NRC/CP CO CORRESPONDENCE
CPCo 8/17/82

SPECIAL DISTRIBUTION
JLKuemin
KWBerry

AIR NO

UFI NO
950-02000/13100
99*12

INDIVIDUALS PROVIDING INFORMATION
PJKlein
URS/John A Blume & Associates

INDIVIDUALS ASSIGNED RESPONSIBILITY FOR IMPLEMENTING COMMITMENTS:
AIR A-NL-83-003 prepared and forwarded to DRHughes (NPS)

CONCURRENCES

PJKlein
JLKuemin
KAToner

COST/BUDGET IMPACT

	Actual/Potential
Year(s)	1983
Materials/Parts	NO
Labor	4 Man-Months
Capital	NO
Contractors	NO

ORIGINATOR
JDaiza

MI0183-0009A-NL02

LICENSING CORRESPONDENCE - RECORD SUMMARY

DATE: ~~DRAFT~~ date

DOCKET 50-255 - LICENSE DPR-20 -
PALISADES PLANT - SEP TOPIC III-6, "SEISMIC DESIGN CONSIDERATIONS", RESPONSE TO COMMITMENT CONCERNING ELECTRICAL COMPONENTS EVALUATIONS

SUMMARY: This letter provides CPCO response regarding the electrical cabinet integrity and mounting adequacy evaluations. The evaluations, conducted by URS/John A Blume & Associates and documented in a report entitled "Seismic Structural - Integrity Evaluation of Selected Electrical Equipment at Palisades Nuclear Power Plant", demonstrated that all the cabinets investigated are structurally acceptable. One final commitment remains to be completed (see below).

COMMITMENTS MADE: Perform evaluations of anchorage of subcomponents in the control panels and structural integrity of Control Panel C-126 by July 1, 1983.

PREVIOUS NRC/CP CO CORRESPONDENCE
CPCo 8/17/82

SPECIAL DISTRIBUTION
JLKuemin
KWBerry

AIR NO

UFI NO
950-02000/13100
99*12

AIR-A-NL-83-003 prepared and forwarded to DR Hughes (NPS)

INDIVIDUALS PROVIDING INFORMATION
PJKlein
URS/John A Blume & Associates

INDIVIDUALS ASSIGNED RESPONSIBILITY FOR IMPLEMENTING COMMITMENTS:
~~JDaiza (NLD) to write AIR by 1/21/83~~
~~PJKlein (NPS to perform evaluations by 6/15/83~~

put the AIR # here!!

CONCURRENCES

PJKlein
JLKuemin
KAToner

COST/BUDGET IMPACT

	Actual/Potential
Year(s)	1983
Materials/Parts	NO
Labor	4 (M - Man) Months
Capital	NO
Contractors	NO

ORIGINATOR
JDaiza

MI0183-0009A-NL02

Consumers Power Company

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January 18, 1983

Dennis M Crutchfield, Chief
Operating Reactor Branch No 5
Nuclear Reactor Regulation
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 -
PALISADES PLANT - SEP TOPIC III-6, "SEISMIC DESIGN CONSIDERATIONS", RESPONSE TO COMMITMENT CONCERNING ELECTRICAL COMPONENTS EVALUATIONS

By letter dated August 17, 1982, Consumers Power Company provided the NRC with a status update and schedule for addressing one outstanding safety issue related to SEP Topic III-6, "Seismic Design Considerations", for the Palisades Plant. In that letter we indicated that evaluations of electrical cabinet integrity and mounting adequacy of internal components were being conducted and it was expected that this work would be completed by 12/20/82. This letter submits our response to this commitment.

The attached preliminary report by URS/John A Blume & Associates, Engineers, entitled "Seismic Structural - Integrity Evaluation of Selected Electrical Equipment at Palisades Nuclear Power Plant", provides Consumers Power Company seismic analysis of Motor Control Centers (MCC) 1 & 2. In addition to the MCC 1 & 2 analysis, component anchorage of devices (ie, transformers, circuit breakers, etc) in switchgear 1D was analyzed using the methodology developed in the attached report for evaluating anchorage of subcomponents at the Palisades Plant. It should be noted that switchgear 1D is considered to be representative of medium voltage switchgear at the plant. The methodology developed in the attached report was extended as required for additional anchorage configurations and for additional bolt diameters. In all cases, the anchorage of devices in switchgear 1D was found to be acceptable. An investigation of the control room resulted in the identification of Control Room Panels C-11, C-11A, C-12, C-13, C-04, C-06 and C-126 as safety-related control panels. In addition to the safety-related control panels in the control room, there exists safety-related Control Panel C-33 located at elevation 590'-0 of the auxiliary building . Panel C-11A has been recently added in the control room and has been qualified separately. The results of the qualification, however, are not incorporated in the attached evaluation report.
In addition to evaluating anchorage of devices, the components in safety-related cabinets outside both the control room and the containment were checked to ensure that anchor devices (ie, bolts and screws) were in place as required by the original construction specifications. The component check revealed all anchor devices to be in place.

DMCrutchfield, Chief
Palisades Plant
SEP Topic III-6
January 18, 1983

The ~~remaining~~ control room panels (~~such as~~ safety-related Panels C-11, C-12, C-13, C-04 and C-06) were part of an earlier study by URS/John A Blume to ensure stability of safety-related electrical equipment at Palisades. These panels were provided with additional base support plus bracing from the top of the control panels. Such support arrangement results in higher natural frequencies, lower response accelerations and therefore, lower stresses in the control panel structures. Although Consumers Power Company has not performed a rigorous stress analysis for structural integrity of control room panels for the Palisades Safe Shutdown Earthquake (SSE), structural integrity of the control room panels is adequate due to their two-point support. This conclusion is also substantiated by the results of an evaluation conducted by EQE, Inc entitled "Program For The Development Of An Alternative Approach To Seismic Equipment Qualification", which indicated that adequately supported electrical equipment has proven not to be a problem during an earthquake event.

Control Panel C-33, located at elevation 590'-0 of the Auxiliary Building, is supported only at its base. Since MCC 1 & 2 are supported only at the base and they are located at a higher elevation which exposes them to higher accelerations, it was determined that MCC 1 & 2 represent the worst case for the structural integrity issue. It was, therefore, concluded that since the results of the enclosed report show MCC 1 & 2 to be structurally adequate, Control Panel C-33 is also expected to be capable of withstanding the Palisades SSE.

The issue of anchorage of subcomponents in the control panels and structural integrity of Control Panel C-126 remains to be addressed. Control Panel C-126, which is supported only at its base, contains safety-related temperature and pressure indicators and control switches for hydrazine addition. Consumers Power Company expects that evaluations of these remaining items will show adequate seismic resistance based on our experience to date. It is expected that these evaluations will be completed by July 1, 1983.

Kerry A Toner (Signed)

Kerry A Toner
Senior Licensing Engineer

CC Administrator, Region III, USNRC
NRC Resident Inspector - Palisades

OC0183-0005A-NL02