



Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

July 7, 1983

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Byron Station Unit 1
Response to SQRT and PVORT Audit Items
NRC Docket No. 50-454

References (a): February 3, 1983 SQRT Audit Report

(b): April 4, 1983 PVORT Audit Report

(c): March 9, 1983 Draft SER

Dear Mr. Denton:

The purpose of this letter is to provide the Commonwealth Edison Company response to the References (a) and (b) equipment specific items, and Reference (c) generic items which resulted from the September 13-17, 1982 SQRT (Seismic Qualification Review Team) and PVORT (Pump and Valve Operability Review Team) audits at Byron Station. Also included are responses to additional items discussed at the May 13, 1983 meeting with the NRC Staff in Bethesda on this subject.

Responses to Reference (a) SQRT equipment specific open items and revised SQRT forms are contained in Attachments A1 through A20, and responses to the Reference (c) SQRT generic items are provided in Attachment A21.

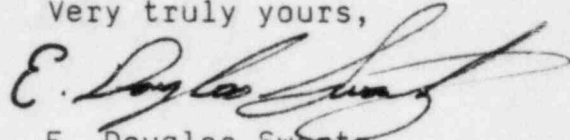
Responses to Reference (b) PVORT equipment specific items are contained in Attachments B1 through B7, and responses to the Reference (c) PVORT generic items are contained in Attachment B8.

Please address any questions that you may have concerning this matter to this office.

*Boo1
1/1 Limited
Dent*

One (1) signed original and fifteen (15) copies of this letter are provided for your use. However, due to the extreme volume of the Attachments, only one (1) set is being provided. Additionally, one (1) set of the Attachments is being sent directly to Mr. L. N. Olshan and one (1) set of the Attachments is being sent directly to Mr. Bruce Miller at Brookhaven National Laboratories.

Very truly yours,



E. Douglas Swartz
Nuclear Licensing Administrator

Attachments

cc: J. G. Keppler - RIII w/o Att.
RIII Inspector - Byron w/o Att.

Mr. Bruce Miller w/Att.
Brookhaven National Laboratories
Building No. 130
Upton, New York 11973

6907N

6/

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INTER-OFFICE MEMORANDUM

END FILE 02735

From N. Damjanovich - 17 X2766

Date Dec. 16, 1980

Dept./Div. Mechanical/Engineering Mechanics

Project No. 4391, 2/4683, 4-00

Spec. No. F/L-2733

File No. EMD-027353

Page No. 1 of 1

Client CECo

Stn. Byron/Braidwood

Unit 1 & 2

Subject Review of Environmental Qualification Report for RCFC Fans

To: S. N. Planjery - 31 (SAFETY-RELATED)

CC: J. C. LaVallee - 22
K. L. Adlon - 17
A. P. Dimopoulos - 17
EBB/AEM/ND - 30/17
EMD File - 30

Reference: 1. Joy Manufacturing Co. Report No. X-604, Dated
3-20-80

2. Joy Manufacturing Co. Letter, Dated 9-18-80

I have reviewed the referenced documents for compliance with seismic requirements and find it to be acceptable.

Please note that this report is intended to qualify only the tested unit. All other units being supplied will be qualified by a separate seismic report, as stated in Ref. 2.

ND/ws

N. Damjanovich
KLA

155 - A C D F

PROJECT: BYRON / BRAIDWOOD - 1st

REVIEWED BY: M. L. Damianovic

DATE: 12/16/80

PROJECT NUMBER: 4391,2-00
4683,4-00

REVIEW

APPROVED BY: K. L. Adlin

DATE: 12-16-80

S&L SPEC. NO.: E/L-2733

EMD FILE NO.: 027353

EQUIPMENT NAME AND NO.: RCFC FANS

EQUIPMENT CLASSIFICATION:

☒ SAFETY-RELATED

☐ NON-SAFETY-RELATED

☒ ACTIVE

☐ NON-ACTIVE

VENDOR: Joy Manufacturing

VENDOR'S REPORT NO. AND DATE: X-604 3-20-80

1. CONCLUSION OF REVIEW

☒ Accepted

☐ Rejected

If rejected, explain:

2. METHOD OF SEISMIC QUALIFICATION

☒ Test

☐ Static Analysis

☐ Dynamic Analysis

☐ Other

3. QUALIFICATION BY TESTING

a. Type of Test: ☒ Single Frequency ☐ Multi Frequency

☐ Single Axis

☒ Multi Axis

☐ Other

b. Testing Machine: _____

c. Supporting Test

☒ Yes

☐ No

d. If yes, explain: resonance search

e. Does test duration fulfill the requirements of IEEE Std. 344-1975?

☒ Yes

☐ No

If no explain:

MECHANICAL DEPARTMENT STANDARD

CHECKLIST FOR SEISMIC ANALYSIS FOR
MECHANICAL AND ELECTRICAL EQUIPMENT

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Page 1 of 5

f. Does test g-level meet our requirements?

☒ Yes ☐ No

g. Was equipment mounting on test table simulating the actual condition?

☐ Yes ☒ No

h. Was equipment in Operating Condition with all operating loads simulated?

☒ Yes ☐ No ☐ NA

i. Were nozzle loads simulated in testing the equipment?

☐ Yes ☐ No ☒ NA

j. Were function monitoring devices used?

☒ Yes ☐ No

k. Did equipment pass the seismic test?

☒ Yes ☐ No

l. Comments

fragility test was used with sufficient intensity and duration - no resonant frequencies found below 40 Hz

4. QUALIFICATION BY ANALYSIS

a. Rigidity of Equipment

i - Rigid: Fundamental Natural Period(0.03 Sec)

ii - Flexible: Fundamental Natural Period(0.03 Sec)

b. Rigidity of Supports As A Member of the Overall System

i - Rigid: Fundamental Natural Period(0.03 Sec)

ii - Flexible: Fundamental Natural Period(0.03 Sec)

c. If Flexible, how was the support amplification considered?

- i - ☐ Considering the support in modeling the equipment
- ii - ☐ Computed by separate analysis
- iii - Comments

d. Computer Programs

- i - Were the computer programs properly referenced?
☐ Yes ☐ No
- ii - Were the computer programs validated?
☐ Yes ☐ No

e. Loading Combinations

- i - Were the nozzle loads considered in the analysis?
☐ Yes ☐ No
- ii - Comments:
- iii - Were the nozzle loads used in the analysis greater than or equal to actual piping loads from PIPSYS?
☐ Yes ☐ No If no explain:

iv - Were the operating loads considered in the analysis?

☐ Yes

☐ No

☐ NA

If no explain:

f. STATIC ANALYSIS

i - Seismic coefficients

	Major Horiz. Axis	Minor Horiz. Axis	Vertical Axis
OBE level			
SSE level			

ii - Were seismic loads applied in the two horizontal and vertical directions simultaneously?

☐ Yes

☐ No

If no explain:

g. DYNAMIC ANALYSIS

i - Response spectra used in the analysis (page numbers)

ii - Damping factor used:

iii - Number of significant modes considered:

iv - Natural period of each

v - Method of combining modal stresses:

☐ Absolute sum

☐ square root of sum of the squares

☐ Other, explain:

h. DEFLECTION AND STRESSES

i - Were deflections within the allowables?

☐ Yes ☐ No ☐ NA

ii - Were stresses within the allowables?

☐ Yes ☐ No ☐ NA

iii - Comments

i. FOUNDATION LOADS ★

i - Were the foundation loads given?

☐ Yes ☐ No ☐ NA

ii - If yes, what are the load values?

 $F_x =$ _____ $F_y =$ _____ $F_z =$ _____ $M_x =$ _____ $M_y =$ _____ $M_z =$ _____

iii - Were the stresses in the anchor bolts within the material's allowables?

☐ Yes ☐ No

iv - Comments:

★ FOR REFERENCE COORDINATE SYSTEM SEE:

A. S&L DWG. NO.: _____

B. MFG. DWG. NO.: _____

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INTER-OFFICE MEMORANDUM

From S. N. Planjery - 31 x6438 Date November 7, 1980
Dept./Div. Mechanical/HVAC Project No. 4391/4392/4683/4684-00
Spec. No. F/L-2733
File No. _____
Page No. 1
Client Commonwealth Edison Co. Sta. Byron/Braidwood Unit 1 & 2
Subject IEEE-323 Qualification Report

To: D. P. Galanis/N. K. Agnihotri - 24
K. L. Adlon - 17
cc: B. G. Treece (1/0) - 24
W. B. Paschal (1/0) - 31
F. A. Kosik (1/1) - 18

Attached is a copy of revised Environmental Qualification Report for RCFC fans and Joy Manufacturing Company's response to our comments on the previous revision (dated April 6, 1977). Please review and provide your comments to D. P. Galanis for processing the report.

SNP:rq
Attachment

November 3, 1980

Sargent and Lundy
55 East Monroe Street
Chicago, Illinois 60603

Attn: Mr. J. C. LaVallee

cc: Mr. F. Wirkus - Commonwealth Edison Company
Traffic & Expediting Agent
Ms. C. Schaffer - Commonwealth Edison Company - SNED
Mr. T. Allen - Carrier Syracuse

Subj: Byron/Braidwood Station
P.O. #213409 and #213410
Specification #F/L-2733
Carrier Job #7500D2093 and 96

Gentlemen:

Enclosed are four (4) copies of Joy Manufacturing Company
X-604 Qualification Test Report.

Very truly yours,
CARRIER MACHINERY AND SYSTEMS DIVISION

W. G. Loots

W. G. Loots
Sales Department

ps

Enclosures

cc: S. Planjery - S & L (Enclosures)

THIS COPY FOR

RECEIVED
BP. NOV 06 '80
SARGENT & LUNDY
NAME ROOM

SPLANJERY

ANS. BY

*Issued 15 DEC 80
for S. Planjery*



September 18, 1980

JOY INDUSTRIAL EQUIPMENT COMPANY

NEW PHILADELPHIA DIVISION
338 SOUTH BROADWAY
P. O. BOX 431
NEW PHILADELPHIA, OHIO 44663

Carrier Air Conditioning
P.O. Box 4808
Syracuse, New York 13221

Attention: Mr. William Bennink
Senior Project Engineer

Subject: Commonwealth Edison Company
Bryon/Braidwood - Units 1 & 2
RCFC Fans; S & L Spec. F/L-2733
JOY NPX-68203
X-604 Qualification Test Report

Gentlemen:

Please note that X-604 is an environmental qualification test report, and is not intended to be a seismic qualification test report. It is not intended for seismic qualification of any unit other than the test unit, via resonance search.

Seismic qualification of individual units is by a combination of Report S-1 and the appropriate seismic report, S-121 for the unit in question.

X-604 did not address inlet and outlet cones or other accessories because there were none for the test unit. These items when supplied as part of the fan are included in the specific seismic analysis.

Calculations for the specific seismic analysis are performed with the fan in the service mounting and response spectra and damping coefficient are per the specification for a particular order (see S-1 and S-121).

The following comments apply to corresponding item numbers on the 6-23 letter.

- 1) The March 20, 1980 revision of X-604 has a statement on qualified life on Page 19.
- 2) Appendix F added on the March 20, 1980 revision, contains information on the radiation resistance of motor components.

- 3) X-604 is a report of an actual test and, therefore, reports specific values of pressure and temperature to which the unit was subjected. (See Figure 5, Page 16 of the March 20, 1980 revision).
- 4) The test motor was of a different rating than that used for this unit. However, the design parameters and materials of construction are identical to the test motor. Report X-604 is intended as a generic document to qualify all motors designed to these parameters and using identical materials of construction. This is in compliance with IEEE 334 type testing parameters.
- 5) Test parameters are listed in Figure 5 on Page 16 of the March 20, 1980 revision.
- 5a) The motor was exposed to 250⁰ F for over one (1) year. This is shown on page 16 of the report.
- 5b) The pressure is not really relevant to the motor design except that it dictates the amount of horsepower required by the fan. With proper motor selection, there is no limit to the length of time the motor can withstand the pressure. It should be noted, however, that the high pressure is always accompanied by high temperature and here the motor is limited. It is designed to operate a minimum of four (4) hours at 340⁰ F. During the test there were two (2), four (4) hour cycles at high pressure and temperature (see Figure 5, Page 16).
- 5c) The chemical composition is listed on Page 8 of Appendix A of the March 20, 1980 revision.
- 6) These curves were provided by the motor vendor and are based on motorette test data.
- 7) Reasons used to determine the implied average aging characteristic are given on Page 5 of the March 20, 1980 revision. We believe these reasons still valid.
- 8) The allowable rise per NEMA for standard motors is as stated. However, because of the environment these motors must be designed for, and the nature of the application, JOY in conjunction with the motor vendor has limited the design temperature rise for this type of motor to 65⁰C.

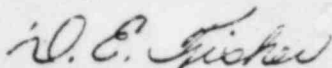
- 9) The latter part of Paragraph 9 of IEEE334 which is referred to gives specific instructions as to how to thermally age a motor. These instructions were followed in aging the test motor. Other parameters mentioned, atmosphere, temperature, humidity, voltage stress and starting forces were part of the qualification test. The only item not covered is radiation, which as stated in Paragraph 6 on Page 4 of the March 20, 1980 revision, is considered unnecessary because of many tests conducted on the motor components which show that direct damage to any material and evolution of radiation produced substances are negligible. See Appendix F for supportive data. Specific substantiation for this approach is provided in IEEE334, Section 5.1.2, note 2.
- 10) The unit was tested in a horizontal position. However, mounting the motor in a vertical position does not affect the results. The test report referenced is a report of an earlier test and is not in accordance with the 1974 revision to IEEE323.
- 11) Photographs as submitted are the best available at this point.
- 12) Maintenance schedules are as specified in the operation and maintenance manual supplied with the unit.
- 13) The only accessories supplied with these motors are thermocouples and space heaters. The insulation and methods of manufacture on these items is the same as provided with the motor and, therefore, are qualified.
- 14) The test report is generic in nature and intended to qualify all motors of this type. This, again in compliance with "type-testing" parameters. Therefore, the report cannot reference a specific project.
- 15) All reference to Report FF-14282 has been deleted from X-604 per the March 20, 1980 revision.

Carrier Air Conditioning
Page #4
September 18, 1980

All data originally contained in FF-14282 has been incorporated into the March 20, 1980 revision, making FF-14282 no longer necessary to submit.

Very truly yours,

JOY MANUFACTURING COMPANY



D.E. Fisher
Administrative Correspondent
Nuclear Fans

DEF/df

cc: CF-NPX-68203
T.A. Bissett
B.W. Scholles