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BECO 84-214
December 27, 1984

Mr. Domenic B. Vassallo, Chief
Operating Reactors Branch #2
Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

License DPR-35
Docket 50-293

10 CFR 50, Appendix R Exemption Requests
Calculations used in Evaluation
of Structural Steel Supports

- References: 1) Telephone Conversation between P. Leech of NRC
and BECO on 10/25/84
- 2) BECO Letter 83-281 dated 11/16/83, 10 CFR 50,
Appendix R Exemption Requests

Dear Sir:

On October 25, 1984 a telephone conversation was initiated with Project Manager Paul H. Leech concerning the calculations utilized to support Exemption Requests #13 and #14. Your staff requested that BECO submit these calculations to aid your staff's review of the exemption requests.

Reference 2 provided your staff with BECO's initial submittal concerning Exemption Requests #13 and #14. These exemption requests had provided your staff with almost all of the information contained in the calculations except the formula used to derive the final steel temperature. Your staff was apprised of the fact that BECO could provide them with the information missing in Reference 2 in the body of this letter in lieu of submitting copies of the entire calculations.

The heat transfer calculation was performed using $Q = MC\Delta t$ where Q = energy available due to combustible loading in BTUs; M = mass of exposed steel in lbs.; C = specific heat of steel in BTU/LB - degree fahrenheit, and Δt = heat rise in degree fahrenheit.

The change in temperature of the structural steel in the Torus Compartment due to combustible loading is calculated as follows:

$$\Delta t = \frac{Q}{MC} = \frac{65,960,000}{(240,702)(1.07)} = 256^{\circ}\text{F}$$

$$\text{Final Temp} = 256^{\circ}\text{F} + 70^{\circ}\text{F} = 326^{\circ}\text{F}$$

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For Steam Tunnel, since the combustible loading is almost non-existent, a calculation was performed to determine the threshold combustible loading to reach the steel failure point of 650°. This is computed as follows:

$$Q = MC \Delta t$$

$$= (29045) (1.07) (580) = 18025327 \text{ BTU}$$

$$\frac{\text{BTU}}{\text{Ft}^2} = \frac{18025327}{840} = 21,458.7 \frac{\text{BTU}}{\text{Ft}^2}$$

$$\text{Equivalent Wood Loading per sq. ft.} = \frac{21459}{8000} = 2.69 \frac{\text{lb.}}{\text{Ft}^2}$$

The above two calculations along with the information contained in Reference 2 will provide your staff with the required information to process the BECo Exemption Requests.

Boston Edison wishes to emphasize further, the following in support of the exemption requests:

1. The existing combustible loading in both these areas could not create even a one minute standard fire if the combustible is burned under ideal laboratory conditions.
2. Both the steam tunnel and the torus compartment have restrictive access which prohibits combustibles being added on to the current non-existing levels.
3. Existing U.L. Tests show that steel beams smaller in sizes than the beams in the steam tunnel and the torus compartment resisted the standard E-119 fire test for 10 minutes without any protective coatings.

Please do not hesitate to contact us if additional information or clarification is needed to complete your review.

Very truly yours,

W. S. Hamington

TAV/kmc