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November 18, 1982

Mr. Darrell G. Eisenhut, Director
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Dresden Station Units 2 and 3
Quad Cities Station Units 1 and 2
NUREG 0612 Control of Heavy Loads
Supplemental Response to Draft TER
NRC Docket Nos. 50-237/249 and 50-254/265

References (a): E. D. Swartz letter to D. G. Eisenhut dated May 4, 1982

(b): T. A. Ippolito letter to L. O. DelGeorge dated December 15, 1981

(c): D. B. Vassallo letter to L. O. DelGeorge dated January 20, 1982

Dear Mr. Eisenhut:

Reference (a) provided the Commonwealth Edison Company response to the concerns raised in the Reference (b) and (c) Franklin Research Center draft Technical Evaluation Reports (TERs) regarding the control of heavy loads at our Dresden and Quad Cities Stations. In telephone conversations with Mr. Dennis Vito of Westec Services on October 8 and 19, 1982, the Commonwealth Edison Company was advised of the remaining "Phase I" concerns and was requested to provide certain additional information.

The Attachment to this letter provides our response to each of the remaining concerns brought forth by Westec Services. We are hopeful that this supplemental information will enable the NRC Staff to issue favorable Safety Evaluations of "Phase I" for our Dresden and Quad Cities Stations.

Please address any further questions that you or your staff may have concerning this matter to this office.

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One (1) signed original and sixty (60) copies of this letter with the Attachment are provided for your use. Additionally, a copy of this letter is being sent directly to Westec Services.

Very truly yours,

E. Douglas Swartz
Nuclear Licensing Administrator

Attachment

cc: J. G. Keppler - Region III
RIII Inspector - Dresden
RIII Inspector - Quad Cities

Paul W. O'Connor - ORB 5
Roby B. Bevan - ORB 2
Dennis Vito - Westec Services

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ATTACHMENT

COMMONWEALTH EDISON COMPANY

Dresden Station Units 2 and 3
Quad Cities Station Units 1 and 2

NUREG 0612 Control of Heavy Loads - Supplemental Response to Draft TER concerns brought forth by Westec Services

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Dresden and Quad Cities Stations

Westec Services Additional Concerns

Concern #1

Insufficient information has been made available to verify that the following CMAA-70 requirements have been satisfied for Turbine Building Cranes. The Licensee should make this information available or provide suitable justification for concluding that the requirements of CMAA-70 have been satisfied by equivalent means.

1. Hoist lifting speeds do not exceed 30 feet per minute.

2. Nonsymmetrical girder sections were not used in crane construction.

3. Any longitudinal stiffeners in use conform to the requirements of CMAA-70 and allowable h/t ratios in box girders using these stiffeners do not exceed ratios specified in CMAA-70.

4. Girders with b/c ratios in excess of 38 were not used.

5. Fatigue failure was considered in crane design and the number of design loading cycles at or near rated load is less than 20,000 cycles.

6. Maximum crane load weight plus the weight of the bottom block, divided by the number of parts of rope does not exceed 20% of the manufacturers published breaking strength.

7. Drum design calculations were based on the combination of crushing and bending loads.

8. Drum groove depth and pitch conform to the recommendations of CMAA-70.

9. Gear horsepower ratings were based on design allowables and calculation methodology equivalent to that incorporated in CMAA-70.

10. A cab-control, cab-on-trolley configuration was not used.

11. Mechanical load breaks or hoist holding brakes with torque ratings of approximately 125% of the hoist motor torque were used.

12. Crane operation under load near the end of bridge or trolley travel is not allowed or is compensated for by bumpers and stops which satisfy the intent of CMAA-70.

13. Any static control systems in use conform to the requirements of CMAA-70.

14. Controllers in use are the spring-return or momentary-contact pushbutton type or are equipped with a device which disconnects all motors on power failure and will not permit restart until the controller handle is brought to the OFF position.

Dresden and Quad Cities Response:

The following information is provided to verify that CMAA-70 requirements have been satisfied for each identified concern.

1. A. The 175 ton/25 ton turbine building crane has a 175-ton main hoist maximum vertical speed of 5.0 ft/min. and a 25-ton auxiliary hoist maximum vertical speed of 35.0 ft/min.

   The main hoist vertical speed conforms to CMAA-70, Figure 70-6.

   Although the Auxiliary Hook vertical speed is greater than the suggested value in CMAA-70, Figure 70-6, its respective impact allowance value (a measure of the acceleration/deceleration of the load) of 17% is within the acceptable impact allowance range in CMAA-70, Subsection 3.3.2.1.1.3, i.e., 15% to 50%.

   B. The 125 ton/10 ton turbine building crane has a 125-ton main hoist maximum vertical speed of 5.0 ft/min. and a 10-ton auxiliary hoist maximum vertical speed of 92.0 ft/min.

   The main hoist vertical speed conforms to CMAA-70, Figure 70-6.

   Although the Auxiliary Hook vertical speed is greater than the suggested value in CMAA-70, Figure 70-6, its respective impact allowance value of 46% is within the acceptable impact allowance range in CMAA-70, Subsection 3.3.2.1.1.3, i.e., 15% to 50%.

2. The shear center coincides with the centroid of the girder section, therefore, the girder sections are symmetrical.

3. The longitudinal stiffeners in use conform to the requirements of CMAA-70, Article 3.3.3.1.2 and allowable h/t ratios in box girders using the stiffeners do not exceed ratios specified in CMAA-70.

4. The b/c ratio is 21.6 for the 125 ton/10 ton turbine building crane and 17.5 for the 175 ton/25 ton turbine building crane, both ratios are less than 38.

5. Fatigue failure was considered in the design. Assuming two cycle per lift and 8 lifts of 50% or more of rated load per year for a design plant life of 40 years gives an estimated number of lifts

$$\frac{2 \text{ cycle}}{\text{lift}} \times \frac{8 \text{ lifts}}{\text{year}} \times 40 \text{ years} = 640$$

which is much less than 20,000.

6. Fatigue Factor

175 ton/25 ton turbine building crane

-- 175 ton main hook

A rated load capacity	=	350,000 lbs	
Block and rope weight	=	20,500 lbs	(assumed)
Total weight lifted	=	370,500 lbs	

This is supported by 16 parts of wire rope with a published breaking strength of 123,000 lbs.

$$\frac{\text{Total weight lifted/Number of parts rope}}{\text{Breaking strength of rope}} = \frac{370,500}{16 \times 123,000} = 18.8\%$$

which is less than 20%.

--25 ton auxiliary hook

A rated load capacity	=	50,000 lbs	
Block and rope weight	=	5,000 lbs	(assumed)
Total weight lifted	=	55,000 lbs	

This is supported by 8 parts of wire rope with a published breaking strength of 45,200 lbs.

$$\frac{\text{Total weight lifted/Number of parts rope}}{\text{Breaking strength of rope}} = \frac{55,000}{8 \times 45,200} = 15.2\%$$

which is less than 20%.

*Note: Breaking strength depends in part on wire rope diameter wire rope is improved plow steel-hemp center (IPS-H) 6 x 37 wire rope in Whiting Crane Handbook, 1967 Page 81.

6. (Continued)

125 ton/10 ton turbine building crane

-- 125 ton main hook

A rated load capacity	=	250,000 lbs	
Block and rope weight	=	20,500 lbs	(assumed)
Total weight lifted	=	270,500 lbs	

This is supported by 16 parts of wire rope with a published breaking strength of 79,600 lbs.

$$\frac{\text{Total weight lifted/Number of parts rope}}{\text{Breaking strength of rope}} = \frac{270{,}500}{16 \times 79{,}600} = 21.2\%$$

which is slightly more than the 20% recommended by the CMAA-70 Standard.

-- 10 ton auxiliary hook

A rated load capacity	=	20,000 lbs	
Block and rope weight	=	2,000 lbs	(assumed)
Total weight lifted	=	22,000 lbs	

This is supported by 4 parts of wire rope with a published breaking strength of 25,800 lbs.

$$\frac{\text{Total weight lifted/Number of parts rope}}{\text{Breaking strength of rope}} = \frac{22{,}000}{4 \times 25{,}800} = 21.3\%$$

which is slightly more than the 20% recommended by the CMAA-70 Standard.

7. The turbine bulding crane drum diameters and lengths

	Drum Diameter	Length
175 Main	38.75"	17.75'
25 Aux	20.25"	19.0'
125 Main	32.0"	17.33'
10 Aux	16.44"	18.5'

The length to diameter ratio of this configuration is less than the requirement to consider the drum as a beam in bending.

*Note: Breaking strength depends in part on wire rope diameter wire rope is improved plow steel-hemp center (1PS-H) 6 x 37 wire rope in Whiting Crane Handbook, 1967 Page 81.

8. The turbine building 175 ton/25 ton and 125 ton/10 ton crane drum groove depths are equal to their respective rope diameters. Also for all four drums, the groove pitch has minimum value of 1/8 inch plus the rope diameter. The drum groove depth and pitch conform to the recommendations of CMAA-70.

9. GE motors and GE Maxspeed Drive and Controls were specified for the Dresden/Quad Cities cranes.

10. Cab-on-trolley configuration is not used.

11. The main and auxiliary hoists for the 175 ton/25 ton and 125 ton/10 ton cranes have power braking and two holding brakes. The brakes provided are DC magnet-operated electric shoe-type brakes with a maximum torque rating of 200% of motor torque. In addition, eddy current brakes are provided.

12. Spring bumpers effective for both direction of travel are provided on the outboard ends of the bridge trucks. Crane runway stops with four spring-type trolley bumpers are mounted on runway girders at the ends of the runway rails.

13. GE Maxspeed control system was specified.

14. Momentary push buttons are used on the pendent control station.

Concern #2

Sling selection should be based upon the sum of the static and maximum dynamic load.

Dresden and Quad Cities Response

As stated in our Reference (a) submittal, Section 2.1.5.C, the slings used at Dresden and Quad Cities Stations are selected in accordance with ANSI B30.9-1971.

The slings are not sized with a 15% dynamic loading margin, however the cranes used at Dresden and Quad Cities Stations have controllers which provide smooth lift and low speed during the start of the lift without any jerking effect.

Concern #3

a. Verify that programs exist for all special lifting devices which satisfy the requirements in Section 5 (acceptance testing, maintenance, and assurance of continued compliance) of ANSI N14.6-1978.

b. Conduct 150% load test of the reactor head strong back.

Dresden and Quad Cities Response

Dresden and Quad Cities Station procedures comply with the intent of Section 5, "Acceptance Testing, Maintenance, and Assurance of Continued Compliance" with some exceptions. In Commonwealth Edison's judgement, the periodic load testing of the special lifting devices to 150% of the maximum load is not practical nor warranted, and may invalidate any vendor product guarantees. Additionally, the logistics of moving heavy test loads into the Reactor Building to accommodate such periodic load testing are difficult.

Prior to the use of specially designed lifting assemblies, visual inspection will be performed and certain critical and accessible parts or members such as hooks and pins will be non-destructively examined at appropriate time intervals. In our judgement, the visual inspection and limited NDE are adequate to detect potential failures.

However, should an incident occur in which a special lifting device is overloaded, damaged, or distorted, and engineering assessment will be performed. This assessment will address ANSI N14.6 and include consideration of the load test up to the original procurement load test value or 150% whichever is less. The requirement to perform this assessment will be incorporated into plant procedures.

Please note that this response replaces our previous Reference (a) Item 3 response to Section 2.1.4.c.

Concern #4

Provide the basis for determining the impact allowance of the turbine building 10 ton auxiliary hook.

Dresden and Quad Cities Response

CMAA-70 Section 3.3.2.1.1.3 determines that impact allowance as 1/2% of the load per foot per minute of hoisting speed. Based on the CMAA-70 standard, the impact allowance of the turbine building 10 ton auxiliary hook is 46% which is within the CMAA acceptable limits as discussed in our response 1.B of concern #1 above.

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