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Reg. Guide

March 20, 1978

Secretary of the Commission
U.S. Nuclear Regulatory Commission
Attention Docketing and Service Station
Washington, DC 20555

Gentlemen:

We are pleased to submit our comments on the attached pages on proposed Revision 1 to Regulatory Guide 1.104 "Overhead crane handling systems for nuclear power plants" issued January 1978. The attachments are four pages of text.

Stone & Webster Engineering Corporation appreciates this opportunity to contribute to the improvement of Regulatory Guide 1.104.

Very truly yours,

S. B. Jacobs
Chief Licensing Engineer

Enclosures

DFG:wcs

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ATTACHMENT

Stone & Webster Engineering Corporation
Comments on the January 1978 Proposed Revision 1 to the
February 1976 For Comment Issue of
Regulatory Guide 1.104
Overhead Crane Handling Systems
for Nuclear Power Plants

Item No.

(1) B. Discussion (first Paragraph, first Sentence): "The Safe Handling of Critical Loads (loads of magnitude or kind that if dropped could result in damage leading to unacceptable release of radioactivity, or impair the capability to safely shut down the plant) can be accomplished by adding safety features to the handling equipment, by adding special features to the structures and areas over which the critical load is carried, or a combination of the two, thus enabling these areas to withstand the effects of a load drop in case the handling equipment fails."

Requested modification: The term "unacceptable release of radioactivity" should be revised to state "release of radioactivity that would endanger public safety by exceeding the offsite limits of 10CFR100."

Comments: Any uncontrolled release of radioactivity could jeopardize personnel safety and is, therefore, considered unacceptable. Existing safety standards and OSHA requirements are used to ensure personnel safety. The basic concern of the Regulatory Guide should be with public safety, not personnel safety, and, therefore, the offsite radiation limits of 10CFR100 should be referenced.

It is noted that the Regulatory Guide is directed toward functional requirements; however, since the Guide does specify nonfunctional requirements such as rope safety factors, fleet angles, and speeds, the referencing of the 10CFR100 radiation limits is not inconsistent.

(2) B. Discussion (Maintenance): "After installation, equipment generally suffers degradation due to use and exposure. A certain degree of wear on such moving parts as wire ropes, gearing, bearings, and brakes will reduce the original design factors and the capacity of the equipment to handle the rated load. With good maintenance practice, degradation is not expected to exceed 15% of the design load rating, and periodic inspection coupled with a maintenance

program should ensure that the crane is restored to the design condition if such degradation is found. Essentially, the maximum work load (MWL) rating of the crane should be established as 85% of the design rated load, the crane thus having a 15% conservatism in load rating. Conservatism in design, design factors, individual selection of component parts, and balance of auxiliary-ancillary and dual items in the design will determine or dictate the maximum working load."

Requested modification: Delete and replace with the following:

"Maintenance procedures should be established to specifically ensure that wear items such as ropes, gearing, bearings, and brakes do not suffer degradation due to use of the extent that would reduce the original design factors required for safely handling the maximum critical load. Where the maximum working load (MWL) or rated load of a crane is reduced because of component wear below that of the original design rated load (DRL), this reduction should not be less than 85 percent of the DRL. Worn components of the extent which would necessitate a load reduction of more than 85 percent should be replaced."

Comments: "Requiring that all cranes be designed 15 percent larger than necessary because some components exhibit wear does not necessarily mean that the crane will be safer. As written, the Guide indicates that up to a 15 percent reduction in the design factors due to use is acceptable for wear type items. This should be an unacceptable situation which should be avoided by the use of a stringent maintenance procedure. It should also be noted that wear items on cranes, which could result in loss of the lifted load, are presently designed per the overhead Codes with more conservatism than the nonwear items."

(3) C. Regulatory Position (3.c last sentence): "Maximum hoisting speed for design rated load should be no greater than 2 1/2 cm/s(5 fpm)."

(3.p last sentence): "The speed limits indicated for slow operating speeds for trolley and bridge in Specification CMAA #70 are recommended for handling maximum critical loads."

Requested modification:

"Maximum hoisting speed for critical loads should be no greater than the slow operating speeds of Specification No. 70 when the control provides a speed regulation (high speed to low speed) of 10 to 1 or less. For controls that provide a speed regulation greater than 10 to 1, the medium speeds of CMAA may be used. All hoist controls should provide gradual acceleration and deceleration between high and low speeds.

"Maximum trolley and bridge speeds for critical loads should be no greater than the slow operating speeds of CMAA Specification No. 70 when the control provides a speed regulation (high speed to low speed) of 10 to 1 or less. For controls that provide a speed regulation greater than 10 to 1, the medium speeds of CMAA may be used. All bridge and trolley controls should provide gradual acceleration between high and low speeds."

Comments:

Referencing one speed as was done for the hoist does not assure safety in handling loads. The maximum permissible safe operating speed is dependent upon several factors of which the most important are the weight of the load being handled and the type of crane controls being used. As presently specified, critical load handling cranes may not have the capability to safely handle loads while meeting the Regulatory Guide recommendations of a maximum hoist speed of 5 fPM and slow bridge and trolley speeds per CMAA. On the other hand, dependent upon the weight of the load to be lifted and the type of crane that controls the medium hoist, bridge and trolley speeds of CMAA can be used while providing a safe load handling capability.

(4) C. Regulatory Position (3.c last sentence):

"The maximum load (static and dynamic) on each wire rope in the dual reeving system with the design rated load attached should not exceed 10% of the manufacturer's published breaking strength with all ropes intact in accordance with USAS B30.2 Safety Codes for Cranes."

Requested modification:

The word "dynamic" should be deleted. The following requirement should be added to the 10 percent static breaking strength requirement. "All rope loads must be considered. Rope loads due to seismic forces and load transfer between dual reeving systems should be within 40 percent of the manufacturer's published breaking strength for any single part of rope in the reeving system.

Comments:

The 10 to 1 safety factor (10 percent of the breaking strength) with all cables intact provides 5 to 1 (20 percent of the breaking strength) on each dual reeving system. In accordance with USAS B30.2.0 (or ANSI B30.2.0), this 20 percent is based on the maximum static load to be lifted.

The term dynamic, with regard to a reeving system, refers to either impact stresses or lead line stresses. The impact stresses are due to accelerations and decelerations of the load, and the lead line stresses are due to the frictional losses of the reeving system. The rope safety factor in the B30.2.0 Safety Codes has been established at 5 to 1 in order to accommodate these dynamic loads and, therefore, need not be added to the normal static loads. However, construction cranes, covered by the ANSI B30.5 and B30.6 Safety Codes, require only a 3.5 to 1 hoisting rope safety factor and, therefore, as stated by these codes, the dynamic forces such as frictional losses must be considered separately.

All rope loads should be considered; the most important of which are those due to seismic forces and those due to a load transfer between a dual reeving system. The rope safety factor for these infrequent loading conditions should be not less than 2.5 to 1 (40 percent of the breaking strength) as specified in ANSI B30.5 for standing ropes.

(5) C. Regulatory Position (3.0 second and third sentences):

"Jogging or plugging should not be permitted. Controls to prevent jogging or plugging should be included in the electrical circuits and the control system."

Requested modification:

Jogging should not be permitted. Controls to prevent jogging should be included in the electrical circuits and control systems. Controls should be designed to withstand the effects of plugging.

Comments:

Plugging generally applies to the bridge and trolley. Controls that are designed for plugging should be allowed since this operation provides a braking means which could result in safer crane operations. Devices preventing plugging of the hoist motion should not be used since on some controls this could result in the uncontrolled lowering of the load. All controls should be designed to withstand the effects of plugging.