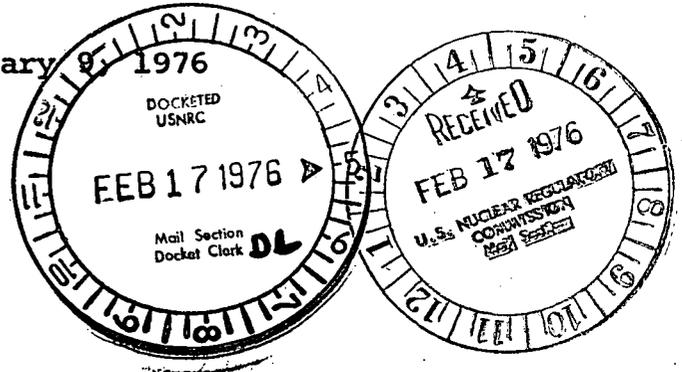




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Regulatory Docket File

February 9, 1976



Mr. Dennis L. Ziemann, Chief
Operating Reactors - Branch 2
Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Dresden Station Units 2 and 3
Quad-Cities Station Units 1 and 2
Supplement to Dresden Station
Special Report No. 41 and Quad-Cities
Station Special Report No. 16, "Reactor
Building Crane and Cask Yoke Assembly
Modifications", NRC Docket Numbers
50-237, ~~50-249~~, 50-254, and 50-265

Dear Mr. Ziemann:

To supplement our letter of December 8, 1975, the following information is submitted to complete our response to your information request of October 16, 1975. The information that follows is keyed to the numbering system of the Branch Technical Position APCSB 9-1.

Paragraph 1.e

Both the bridge and trolley of each crane meet the Crane Manufacturers Association of America's fatigue loading requirements. These requirements are stated in Table 3.3.3.1.3-1 on page 15 of CMAA Specification No. 70. The service classification for these cranes is class A1 which is designed for 100,000 loading cycles. The weldments fall into categories B and C which permit a stress range of 28,000 to 33,000 PSI. Since the maximum allowable stress in the girders with rated load is 17,600 PSI and the minimum stress (no load) is about 2,400 PSI, the maximum range in the girders will not exceed 15,200 PSI. Since the maximum stress permitted in other weldments is 14,000 PSI, they have a smaller range and better fatigue resistance than the girders.

The ranges noted above are satisfactory for approximately 2 million loading cycles which would be equivalent to approximately 50,000 125 ton loads per year handled in the center of span over a 40 year period.

Paragraph 2.a.1

1. Selector Switch - Cab/Floor

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This switch is located on the Pendant Station. This switch is used to select operation of the crane from either the cab or from the floor. Interlocks are provided such that the crane can be operated from only one point. These interlocks control the other crane controls.

2. Selector Switches - Main Hoist/Auxiliary Hoist

One selector switch is located on the Pendant Station and another selector switch is in the cab. These switches are used for selecting either the main hoist or auxiliary hoist for operation. Please note that these selector switches are dependent on the position of the cab/floor selector switch.

3. Pushbuttons - Start/Stop

- a. One start/stop (bridge and trolley) pushbutton is provided in both the cab and the Pendant Station. These pushbuttons are used for starting and stopping the AC motor of the General Electric Max Speed Motor Generator Set which provides power and control for the bridge and trolley.
- b. One start/stop (main and auxiliary hoist) pushbutton is provided in both the cab and the Pendant Station. These pushbuttons are used for starting and stopping the AC motor of the General Electric Max Speed Motor Generator Set which provides power and control for the main and auxiliary hoists.

4. Hoist Master Switches

These are potentiometer type switches. One switch is provided for the main and auxiliary hoist control in the cab and another switch is provided on the Pendant Station.

To initiate a hoist motion, the master switch should be moved in the hoist/lower direction to the required speed. This applies a reference voltage to the regulator and also picks up the hoist motor brake coils. A stop is made by returning the master switch to the "Off" position.

A set of limit switches explained in Item 12 limits the travel of the main and auxiliary hoists.

5. Normal/Restricted Trolley Speed Switch

A selector switch is located in the General Electric Max Speed Trolley control cabinet mounted on the bridge. This switch is used to select either the normal speed or the speed used in conjunction with restricted mode operation.

6. Trolley/Bridge Master Switches

These are potentiometer type switches. One switch is provided for the bridge and trolley control in the cab and another switch is provided on the Pendant Station.

To initiate a bridge or trolley motion, the master switch should be moved in the forward/reverse direction to the required speed. This applies a reference voltage to the regulator and also picks up the bridge or trolley motor brake coils. A stop is made by returning the master switch to the "Off" position.

A set of limit switches explained in Item 12 limits the travel of bridge and trolley.

7. Normal/Restricted Bridge Speed Switch

A selector switch is located in the General Electric Max Speed Bridge control cabinet mounted on this bridge. This switch is used to select either the normal speed or the speed used in conjunction with restricted mode operation.

8. Normal/Restricted Hoist Speed Switch

A selector switch is located in the General Electric Max Speed Hoist control cabinet mounted on the bridge. This switch is used to select either the normal speed or the speed used in conjunction with restricted mode operation.

9. Pushbutton - Pendant Raise/Lower

This switch is located in the cab and is used for raising or lowering the Pendant Station. A pendant raise pushbutton is also provided in the Pendant Station. Limit switches are provided to limit the high and low point of travel of the pendant.

10. Selector Switch - Main Hoist Fast/Slow

This switch is located in the cab and is used for selecting the mode of operation of the main hoist.

When the switch is turned to the "Fast" position, the hoist can be operated at variable speeds as explained in Item 4. When the switch is turned to the "Slow" position, the speed of the hoist is controlled by the slow speed motor. The slow speed motor is used for lifting the critical load to six (6) inches above the floor level (for Dresden) or nine (9) inches above the floor level (for Quad-Cities).

11. Pushbutton - Up/Down for Slow Speed Motor

This is mounted in the cab and is used for moving the hoist up/down by the slow speed motor.

12. Selector Switch - Restricted Mode/Normal Mode

This is a key operated selector switch located on the Pendant Station and selects the normal mode or restricted mode of operation of the bridge and trolley. In the restricted mode of operation, the bridge and trolley movements are restricted to a predetermined path of travel.

13. Bypass Switch - For Equalizer Bar Limit Switches

This is a key operated selector switch located in the cab and is used to restore power only to the bridge and trolley motors when the limit switches on the equalizer bar of the hoist detect an unbalance in the hoist ropes.

14. Bypass Switch - For Trolley and Bridge

One switch each for the trolley and bridge is provided in the cab. This pushbutton switch is used to bypass the limit switches for the bridge and trolley in the normal mode of operation. The bypass switch is inhibited in the restricted mode of operation by relay contacts.

15. Limit Switches

a. Bridge and Trolley Restricted Area Proximity Switches

These ferrous actuated type limit switches are provided to restrict the bridge and trolley to move in a fixed path while carrying a critical load.

b. Limit Switches on Equalizer Bar

Two limit switches connected in a series are provided to trip the crane when the hoist ropes are not adjusted.

c. Main Hoist Limit Switches (Normal and Restricted Mode)

One gear type and one weight type upper limit switch is provided for the hoisting circuit and one gear type for the lowering circuit. One set of these contacts are used for the main hoist motor control and another set is used for the main hoist slow speed motor control. These limit switches inhibit the operation of the hoist in either direction when the upper or lower limit is reached.

d. Auxiliary Hoist Limit Switches

One gear type and one weight type upper limit switch is provided for hoisting circuit and one gear type limit switch is provided for lowering circuit. These limit switches inhibit the operation of the auxiliary hoist in either direction when the upper or lower limit is reached.

e. Weight Indicator Control Panel

This is a digital type weight indicator for the main hoist. The high and low load limits can be set manually on this and contact closures are available for the set weight limits. The contacts are used for the operation of the slow speed motor for the main hoist. When the weight to be lifted is above the set point on the weight indicator, the control circuit for the slow speed motor will prevent its operation.

f. Bridge and Trolley Limit Switches - Normal Operation

Limit switches are provided for both the bridge and trolley forward and reverse directions of travel. When the extreme limits are reached, the limit switches de-energize the control circuits.

g. Main Hoist Limit Switches - Restricted Mode Operation Only

A primary upper limit switch and one redundant upper limit switch is provided for the main hoist. These switches are used to restrict lifting of the load to a predetermined limit in the restricted mode of operation of the crane. The weight type upper limit switch identified in paragraph 15.c is also effective in this mode of operation.

16. Main Hoist DC Brakes

Two DC brakes, each capable of stopping the main hoist when de-energized, are provided to stop the hoist motion.

17. Auxiliary Hoist DC Brakes

Two DC brakes, each capable of stopping the auxiliary hoist when de-energized, are provided to stop the hoist motion.

18. Trolley DC Brakes

Two DC brakes, each capable of stopping the trolley when de-energized, are provided to stop the motion of the trolley.

19. Bridge DC Brakes

One DC brake is provided which is capable of stopping the bridge when de-energized. One hydraulic brake which has to be manually operated by the operator is also provided for stopping the bridge.

Paragraph 2.a.2

A brief description of the mode of operation of the crane while carrying a critical load is given below. It will be seen from the explanation that the critical load will be held in a safe, neutral position if a failure of any one component of the control system occurs.

1. Slow Speed Hoisting Circuit

For carrying the critical load, the restricted mode-normal mode selector switch should be turned to restricted mode. The hoist "Fast-Slow" switch should be turned to the "Slow"

position. This will disable the main hoist fast speed circuitry. The critical load will be lifted by the slow speed motor to the set limits six inches from the floor for Dresden or nine inches from the floor for Quad-Cities. The two main hoist restricted area upper limit switches will open and will prevent the critical load from being lifted above the set limit. Unless both the limit switches are open, neither the bridge nor the trolley can be moved. Any one of the two limit switches failing to function properly would prevent movement of the bridge or trolley.

Limit switches on the hoist equalizer bar will shut off power to the bridge, trolley, and the hoist when they open. Any one of the two limit switches will open the power circuit for the crane.

The brakes for the hoist will set for any one of the following conditions and keep the load in a safe position:

- a. Incoming power supply failure.
- b. Any one of the two limit switches on the equalizer bar open.
- c. Main hoist restricted area upper and final upper limit switches open after reaching the set limit.
- d. Main hoist weight upper limit switch.
- e. Main hoist area upper limit switch.
- f. High load contact of the digital indicator control panel.
- g. Slow speed motor over load trip.
- h. Slow speed motor overspeed trip.
- i. Slow speed motor up/down pushbuttons open.
- j. Overload on hoist General Electric Max Speed Control AC motor.

2. Restricted Mode Operation - Bridge and Trolley

In the restricted mode of operation, the bridge and trolley can be operated only in the restricted path. The bridge and travel trolley are controlled by the limit switches. Administrative control is exercised by the key operated restricted mode switch and the key operated bypass switch for the equalizer bar limit switches.

Interlocks are provided such that only the bridge or trolley can be operated at one time. The bridge and trolley brakes will set for any one of the following conditions and keep the critical load in a safe position:

- a. Incoming power supply failure.
- b. Any one of the two limit switches on the equalizer bar open.
- c. Main hoist restricted area upper and final upper limit switches open after reaching the set unit.
- d. Field loss relay trip.
- e. Instantaneous overcurrent relay trip.
- f. Bridge or trolley forward/reverse limit switch open.
- g. Overload on General Electric Max Speed AC motor.

Paragraph 3.d.

A detailed analysis of the possibility of horizontal displacement of the cask in the event of a failure of one of the redundant rope trains has been conducted and supports the original estimate submitted in our letter of December 8, 1975. It has been confirmed that the horizontal load displacement will not exceed 2 1/2 inches throughout the critical elevations of lift. At the high point of the lift, with the cask above the operating floor the static displacement of the load is approximately 1/2 inch with a total static plus dynamic displacement of approximately one inch. The total horizontal displacement of the load when the cask is submerged in the fuel pool is approximately 2 1/2 inches. A larger

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total horizontal displacement approximately 9 inches, can occur with the load at its lowest elevation, that is with the load at the grade elevations. However, it must be remembered that the 100 ton cask which is the heaviest load to be lifted through the equipment hatchway is 7 feet 4 inches in diameter and 7 feet 10 inches across the cask yoke. The equipment hatchway is a minimum 20 feet 1 inch square opening. Local protrusions of ductwork along the vertical path of the cask through the hatchway reduce the cross section to approximately 19 feet 6 inches. Since the path of the cask is controlled by limit switches which restrict the position of the cask during lifting to +6 inches -6 inches from the center line of the hatchway, lateral clearances in excess of 4 feet are available.

Please contact this office if you have additional questions.

One (1) signed original and 79 copies are provided for your use.

Very truly yours,



G. A. Abrell
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Boiling Water Reactors