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Director
Office of Nuclear Reactor Regulation
U S Nuclear Regulatory Commission
Washington, DC 20555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

Control of Heavy Loads (Response to Staff Concerns on the Six Month Submittal)

Attached for your information is our response to Staff questions on Control of Heavy Loads (six month submittal) dated August 31, 1981.

Concerning the open item on the turbine building crane mentioned in our December 9, 1981 submittal, we have concluded that Administration controls will be implemented when loads in excess of 12,500 lb are moved.

Please call us if you have questions concerning this response.

A033

David Musolf
Manager - Nuclear Support Services

DMM/TMP/js

cc: Regional Administrator-III, NRC
NRC Resident Inspector
NRR Project Manager, NRC
G Charnoff

Attachment

this is the certified official copy D C D. Jan PM Prairie Island

Prairie Island Nuclear Generating Plant

Response to Staff Concerns on the
Six Month Control of Heavy Loads Submittal

Item 1

The Licensee should be requested to include the following load handling devices under the safe load handling practices outlined by Section 5.1.1 of NUREG-0612:

- Spent fuel pool crane

- 1-ton trolley above auxiliary building general exhaust fan

- 6-ton trolley above the RHR HX pits

- Temporary 1-ton trolley - fuel rack modification

RESPONSE:

- Spent fuel pool crane - This crane has now been included under the safe load handling practice requirements. Details of the evaluations performed of this load handling system are included in Attachment 1.

- 1-ton trolley above auxiliary building general exhaust fan.

  As stated in the 6-month response this trolley is used for the removal of the Auxiliary Building General Exhaust Fan weighing approximately 1900 lbs. Atmospheric Steam Dump Valve CV-31085 is approximately 3 feet away from the centerline of the monorail. Conceivably, it may be damaged under a load drop accident and impair operability of the valve. However, the atmospheric dump valves are not required for plant shutdown and no other shutdown required equipment is affected by this load handling system. This load handling system can therefore be excluded.

- 6-ton trolley above the RHR pits

  The six ton trolley is used primarily for maintenance of the RHR pumps located in the RHR pits. The trolley is used to lift the motor, pump and RHR pit shield block, weighing anywhere from 2000 pounds to 7500 pounds.

The trolley will be operated, to service one pump, only after assuring the pump has been removed from service in accordance with the Technical Specifications.

Two pumps are provided for each unit. The pumps are redundant to one another. A load drop accident from the trolley in this area will not render both pumps inoperable. The controls for the RHR pumps are located at the opposite ends of the monorail and hence a single accident will not affect operability of both pumps. Mechanical travel limit stops will be placed on the monorail to assure no accidental damage to the control equipment serving the operable unit may occur while servicing the redundant equipment. The possible damage is not from a load drop standpoint, but from a load swing type accident. Procedures are being written for load handling operations in this area to further preclude load handling accidents. For this load handling system the presence of mechanical stops to preclude contact with the redundant trains controls and procedures to govern load handling practices provide sufficient assurance that load handling accidents will be prevented.

- Temporary 1-ton trolley fuel-rack modification

Trolley has been removed from the plant.

Item 2

Prairie Island Units 1 and 2 do not fully comply with Guideline 1 of NUREG-0612. The Licensee should provide specific load paths for Units 1 and 2 containment buildings and for the Auxiliary Building. In addition, deviations from safe load paths should be controlled by written alternative procedures approved by the plant safety review committee.

RESPONSE:

The safe load paths are defined in the load handling procedures used at Prairie Island. These have been illustrated in the 6 month response. Additionally, the following constraints apply at Prairie Island.

1. The dimension of the heavy loads handled in the containment buildings are such that they nearly span the distance between floor beams.

2. Movement of loads in containment are restricted by where the object is designed to rest when not in use. For example, the upper and lower internals are stored under water in the refueling pool. They cannot be moved out of this pool, therefore the load paths are defined. Similarly, the Reactor Vessel head is stored on the permanent head stand. The load path for the head (and its studs) is constrained by the refueling pool and by the Steam Generator Vault walls which extend some 10 to 15 feet about the pool.

3. The physical dimension of and the space available for laydown of heavy loads on floors where the crane can access does not allow deviation from load paths identified in the procedures.

4. For heavy loads not identified in procedures the laydown area and load path to be utlized are dictated by space available and other physical constraints. While procedures currently don't exist for these loads, the general load handling procedure (D58) requires a written procedure be in place for handling these loads when it is necessary to deviate from the defined general safe load path. A typical example of this situation is the Reactor coolant pump. The load is so rarely moved that it is impossible to predict what plant conditions (i.e., Reactor Vessel head on or off, ALARA concerns, etc.) exist. Therefore, this evolution would be planned in detail and procedures then written to take into account for plant conditions as well as the constraints to be applied for load handling concerns.

   Normal operating procedure at Prairie Island requires deviations to procedures be reviewed by the Operations Committee.

Item 3

The Prairie Island plant partially complies with Guideline 2 of NUREG-0612. In order to fully comply, the Licensee should take the following actions:

1. Verify that the vessel studs (in the handling box) are procedurally controlled.

2. Verify that the load handling procedures at the Prairie Island plant include the information specified in Section 5.1.1(2) of NUREG-0612.

RESPONSE:

1. A procedure controlling the vessel studs will be in place prior to handling them again.

2. Load handling procedures were again reviewed and verification made that the procedures comply with NUREG-0612, Section 5.1.1(2).

Item 4

The Prairie Island plant substantially complies with Guideline 4 of NUREG-0612. In order to fully comply, the Licensee should take the following action:

1. Perform a 150% load test on all special lifting devices in accordance with ANSI N14.6, Section 5.2.

2. Re-evaluate stress design factors considering dynamic loads.

3. Verify that the turbine spreader assembly lifting device complies with ANSI 14.6 and NUREG-0612.

RESPONSE:

1. A load test of 150% of the maximum load is impossible to perform at Prairie Island. To provide assurance that the special lifting devices are still capable of lifting their intended loads and that no deleterious defects are present, inspections will be performed in accordance with ANSI N14.6. Inspections will include visual as well as nondestructive testing of major load carrying welds where appropriate.

2. The applicable cranes have been investigated to determine the dynamic impact force imparted on a load due to the sudden applications of the brakes of the hoists.

   The impact factors were computed by first establishing the minimum stopping distance of the load under the maximum braking. A formula given in "Whiting Crane Handbook", 4th Edition, p. 166 was used. The braking distance according to the formula is a function of lowering speed of the load, horsepower for lifting the load, rotational moment of inertia of the motor, gears, drums, etc., the braking torque and the efficiency of the system. The impact factor does not consider flexibility of ropes and cranes.

   The maximum impact factor calculated is 3%.

3. Completed analysis of the turbine spreader assembly substantially complies with ANSI N14.6 and NUREG - 0612, including the dynamic load factor of 3%.

   As with the reactor vessel head and internals lifting rigs, the turbine spreader was designed and built about 1970-1971. At that time, the general design criteria required the resulting stress in the load carrying members, when subjected to the total combined lifting weight, should not exceed one fifth (1/5) of the ultimate strength of the material. No formal stress report was prepared and no design specifications were written. Westinghouse defined the design, fabrication and quality assurance requirements on detailed manufacturing drawings and purchase order documents. Westinghouse issued the field assembly and operating instructions which included an initial load test. Westinghouse's objective was to provide a quality product and this product was designed, fabricated, assembled and inspected in accordance with internal Westinghouse requirements. In general, Westinghouse requirements meet the intent of ANSI N14.6 but not all the specific detailed requirements.

   The remarks previously submitted for the reactor vessel head and internal lifting rigs generally apply also to the turbine spreader assembly. Additionally, the analysis of each component that make up the turbine spreader assembly was performed with a stress design factor of 1, 3, and 5. Using a stress design factor of 5 resulted in stress limits well below the ultimate strength of the material.

Item 5

Prairie Island Units 1 and 2 substantially comply with Guideline 5 of NUREG-0612. In order to fully comply, the Licensee should take the following actions:

1. Verify that the load rating of slings is based upon maximum static and dynamic loads.

2. Verify that slings are marked with static load which produces the maximum static and dynamic loads.

3. Verify that slings restricted in use to certain cranes are clearly marked to so indicate.

RESPONSE:

1. Analyses performed shows that the design load rating of the slings is based upon the maximum static and dynamic loads. Analysis has shown that the loading due to dynamic loads is very small (approximately 3%). Assuming that the design load for a particular sling is based solely on static loads, the combined dynamic and static load, for the cranes at Prairie Island, very closely equal the static design load of the slings.

2 and 3 - Since the dynamic loads have been shown to be very small no penalty is required to be assigned to the slings. Therefore, the actual sling load rating is design load and no further marking or restrictions are necessary.

Item 6

Prairie Island Units 1 and 2 comply with Guideline 7 to a substantial degree, on the basis of their compliance with EOCI-61 criteria. However, the Licensee should provide information to verify that the following CMAA-70 requirements have been satisfied for cranes subject to this review or provide suitable justification for concluding that the requirements of CMAA-70 have been satisfied by equivalent means:

1. nonsymmetrical girder sections were not used in construction of the cranes

2. 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

3. girders with b/c ratios in excess of 38 were not used

4. fatigue failure was considered in crane design and the number of design loading cycles at or near rated load was less that 20,000 cycles

5. 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 manufacturer's published breaking strength

6. drum design calculations were based on the combination of crushing and bending loads

7. drum groove depth and pitch conform to the recommendations of CMAA-70

8. gear horsepower ratings were based on design allowables and calculation methodology equivalent to that incorporated into CMAA-70

9. cab-control, cab-on-trolley configurations were not used

10. mechanical load brakes or hoist holding brakes with torque ratings of approximately 125% of the hoist motor torque were used

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

12. any static control systems in use conform to the requirements of CMAA-70

13. controllers used were of the spring-return or momentary-contact pushbutton type

<u>RESPONSE:</u>

The cranes were designed and manufactured by Whiting Corporation prior to the publication of CMAA-70.

<u>Inquiry 1:</u> Verify that nonsymmetrical girder sections were not used in construction of the cranes.

Response: Nonsymmetrical girder sections were not used for the design of Reactor Building Polar Crane, and Auxiliary Building and Turbine Building Bridge Cranes.

<u>Inquiry 2:</u> Verify that 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.

Response: The following tables provide the comparison between the longitudinal stiffener requirements of CMAA and the cranes at Prairie Island Plant.

Although deviations from CMAA-70 are shown they are not significant in magnitude.

<u>Distance from Inner Surface of Compression Flange to the Center Line of the Stiffener</u>

	As Built	CMAA-70
Reactor Bldg. Crane	28 inches	20.8 inches
Auxiliary Bldg. Crane	20 inches	20.4 inches
Turbine Bldg. Crane	28 inches	20.4 inches

h/t Ratios

	As Built		CMAA-70
Reactor Bldg. Crane	332.8	≤	324
Auxiliary Bldg. Crane	326.4	≤	324
Turbine Bldg. Crane	326.4	≤	324

Inquiry 3: Verify that girders with $^b/c$ ratios in excess of 38 were not used.

Response: The $^b/c$ ratios for the girders of cranes under review do not exceed 38.

Inquiry 4: Verify that fatigue failure was considered in crane design and the number of design loading cycles at or near rated load was less than 20,000 cycles.

Response: The fatigue failure is considered in the crane design. The number of design loading cycles for the heaviest load is assumed to be 800 based on the forty years expected economic life of the facility. This allows for two outages per year and ten liftings of the heaviest load per outage.

Inquiry 5: Verify that the 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 manufacturer's published breaking strength.

Response: The rated capacity load plus the weight of the bottom block divided by the number of parts of rope do not exceed 20% of the published breaking strength of the rope. The breaking strengths for the ropes used for the review are obtained from the Whiting Crane Handbook, Third Edition 1967.

Inquiry 6: Verify that the drum design calculations were based on the combination of crushing and bending loads.

Response: As indicated earlier, the cranes were bought from Whiting Corporation. It is assumed that Whiting Corporation had followed its own published procedures for the design of the drum. Whiting Crane Handbook (3rd Edition), on p. 83, states that the crushing strength is combined with bending strength to arrive at a combined compressive stress which must be within the design allowable limits.

Inquiry 7: Verify that the drum groove depth and pitch conform to the recommendations of CMAA-70.

Response: Drum Groove Depth

The depth of the drum grooves for all cranes, except the main hoist of the Polar Cranes, meet requirements of CMAA-70.

The groove depth of the main hoist drum of the Polar Crane is 0.500 inch whereas the minimum recommended by CMAA-70 is 0.515 inch.

Drum Groove Pitch

CMAA-70 requires the minimum drum groove pitch to be either 1.14 X rope diameter, or rope diameter + 1/8 inch, whichever is smaller. The pitch of drum grooves for Prairie Island cranes meet rope diameter + 1/8" criteria. All auxiliary hoist drums have rope diameters equal to 9/16 inch. The drum groove pitch, based on rope diameter + 1/8 inch, is 11/16 inch. This exceeds the minimum pitch based on 1.14 X rope diameter which equals 10.3/16 inches.

Inquiry 8: Verify that the gear horsepower ratings were based on design allowables and calculation methodology equivalent to that incorporated into CMAA-70.

Response: Based on telephone conversations with Whiting Corporation, gearings were purchased from the gear manufacturers and they complied to the American Gear Manufacturers Association Standards. CMAA-70, Article 4.5.2, design standards are same as those in existence at the time of the crane purchase.

Inquiry 9: Verify that the cab-control, cab on trolley configurations were not used.

Response: The cab-on-trolley control arrangements are not used for the cranes in question.

Inquiry 10: Verify that the mechanical load brakes or hoist holding brakes with torque ratings of approximately 125% of the hoist motor torque were used.

Response: The torque rating for the hoist holding brakes for the cranes in questions have a minimum 125% of the hoist motor torque.

The cranes are equipped with two 13" - SESA Electric Solenoid brakes servicing main hoist, and one 13" - SESA Electric Solenoid brake servicing auxiliary hoist. Each brake has a rated torque capacity of 550 ft-lb. The rated hoist motor torque for the Reactor Building Main Hoist motor is rated at 345 ft-lb. This is the highest ratio among the cranes.

Inquiry 11: Verify that crane operation under load near the end of the bridge or trolley travel is not allowed or is compensated for by bumpers and stops which satisfy the intent of CMAA-70.

Response: Bridge Bumpers and Stops

Auxiliary Building and Turbine Building cranes are both equipped with four spring bumpers with safety cables. Polar Cranes of Reactor Buildings do not have bridge bumpers and stops to allow 360 degree rotation of the cranes.

Bridge stops were designed for the loads established by the Crane manufacturer.

Trolley Bumpers and Stops

All cranes under review are equipped with trolley bumpers and stops. The criteria for the design of bumpers and stops matches with criteria of CMAA-70.

The bridge and trolley bumpers are mounted in such a manner that the attaching bolts are not in shear.

The bridge bumpers were designed for the criteria more stringent than the criteria specified by CMAA-70.

Inquiry 12: Verify that any static control systems in use conform to the requirements of CMAA-70.

Response: Only magnetic control systems were employed for the cranes in question.

Inquiry 13: Verify that the controllers used were of spring-return or momentary-contact pushbutton type.

Response: We have confirmed from the crane manufacturer that all controllers used are of the momentary-contact pushbutton type.

ATTACHMENT 1

SPENT FUEL POOL CRANE

SPENT FUEL POOL CRANE

Item 3 a. Drawings or sketches sufficient to clearly identify the location of safe load paths, spent fuel, and safety-related equipment.

Item 3 b. A discussion of measures taken to ensure that load-handling operations remain within safe load paths, including procedures, if any, for deviation from these paths.

RESPONSE:

Drawings were submitted in the nine-month report.

Spent Fuel Crane

The spent fuel crane is used for the handling of new and spent fuel assemblies (by means of a long handling tool suspended from a hoist), divider gates, and pool covers. The travel of hoist and tool length are designed to limit maximum lift of a fuel assembly to a safe shielding depth.

The spent fuel storage facility is a contained structure, designed so that in case of a dropped fuel element accident, any release of radioactivity to the atmosphere is monitored and will not exceed the guidelines of 10CFR100. Normal and special ventilation systems are provided for the fuel pool enclosures.

Handling of Pool Divider Gates

The pool divider gates are used to seal the fuel transfer openings located between pools 1 and 2 and between each pool and the fuel transfer canal. Each gate is a stainless steel device 27'-6" X 2'-2" x 2/3" and weighs approximately 2620 pounds. To reduce the likelihood of a gate drop due to a single failure of a crane, both hoists of the spent fuel pool bridge crane will be attached to the gate when the gate is moved in a pool containing fuel. The capacity of each hoist is 6000 pounds. The two hoist system will provide total redundancy, and the probability of dropping a gate carried in this manner will be extremely low.

For handling the divider gates, a written procedure is in force at the plant site.

Handling of Pool Covers

In addition to the procedure for fuel handling and divider gates, detailed procedures are written for each lift of the pool covers by the crane (not higher than 6").

Spent fuel pool #1 covers consist of three pieces, each weighing 1.85 tons. The covers are made of 3/16" thick stainless steel plate welded to a frame of built-up, wide flange beams and structural tees of corten B. These covers are used to protect spent fuel stored in pool #1 when maintenance is being performed on pool #2. The pool covers are placed into position over pool #1 using a spent fuel pool bridge crane. Two 3-ton trolleys are used. The hook engages at each end of the pool cover to handle each section. The bottom edge of the cover is never lifted more than six inches above the floor. When the cover is moved above pool #1, the north and south ends of the cover extend past the edge of the fuel pool and over the floor at all times. This ensures that even if a cover section is dropped, it will land on the floor and will not fall into the fuel pool. Movement of the covers occurs very infrequently.

Item 3 c. A tabulation of heavy loads to be handled by each crane which includes the load identification, load weight, its designated lifting device, and verification that the handling of such load is governed by a written procedure containing, as a minimum, the information identified in NUREG 0612, Section 5.1.1(2).

Load	Weight	Lifting Device (if any)	Procedure (Yes/No)
Divider Gates	2620	Slings	Yes
Pool Covers	3700	None	No*

* The covers are moved so infrequently that a procedure is drafted prior to each lift which addresses the plant conditions present at the time and the load handling concerns of NUREG-0612.

Item 3 d. Verification that lifting devices identified in 2.1.3-c, above, comply with the requirements of ANSI N14.6-1978, or ANSI 330.9-1971, as appropriate. For lifting devices where these standards, as supplemented by NUREG 0612, Section 5.1.1(4) or 5.1.1(5), are not met, describe any proposed alternatives and demonstrate their equivalency in terms of load-handling reliability.

RESPONSE:

Slings:

The slings used with these cranes comply with design and inspection requirements of ANSI B30.9, 1971. As discussed in plant procedure D58 "Control of Heavy Loads", the slings will have a minimum factor of safety of five (5) and the rated capacities of the slings shall be taken as those listed in tables 3 thru 14 of ANSI B30.9.

The slings shall be visually inspected each day that they are used. The conditions of their replacement and/or repairs comply with requirements of section 9.2.8 of ANSI B30.9.

The operation of the cranes is controlled by administrative procedures which include inspections for safe operating practices with wire slings, which are compatible to ANSI B30.9, 1971.

The design load rating of the slings is based upon the maximum static and dynamic loads. Analysis has shown that the loading due to dynamic loads is very small. Assuming that the design load for a particular sling is based solely on static loads, the combined dynamic and static load very closely equals the static design load of the slings.

Item 3 e. Verification that ANSI B30.2-1976, Chapter 2-2, has been invoked with respect to crane inspection, testing, and maintenance. Where any exception is taken to this standard, sufficient information should be provided to demonstrate the equivalency of proposed alternatives.

RESPONSE:

Procedures for inspection, testing and maintenance of the cranes are in use that satisfies the criteria of ANSI B30.2-1976, Chapter 2-2. No exceptions to the standard are taken.

Item 3 f. Verification that crane design complies with the guidelines of CMAA Specification 70 and Chapter 2-1 of ANSI B30.2-1976, including the demonstration of equivalency of actual design requirements, for instance, where specific compliance with these standards is not provided.

RESPONSE:

The crane was designed and manufactured by Abell-Howe Company.

Inquiry 1: Verify that nonsymmetrical girder sections were not used in construction of the cranes.

Response: Nonsymmetrical girder sections were not used. Standard I-beams and wide flange shapes were employed for design of the crane.

Inquiry 2: Verify that 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 CMMA-70.

Response: The above CMAA-70 requirements do not apply to standard I-beams and wide flange shapes used for the crane in question.

Inquiry 3: Verify that girders with $^{b}/c$ ratios in excess of 38 were not used.

Response: This requirement of CMAA-70 does not apply to standard I-beams and wide flange shapes used for gantry crane.

Inquiry 4: Verify that fatigue failure was considered in crane design and the number of design loading cycles at or near rated load was less than 20,000 cycles.

Response: The fatigue failure is considered in the crane design. The weight of the largest actual load, 3700 lbs. pool covers, is substantially less than rated crane capacity of 6000 lbs. Moreover, the number of design loading cycles is assumed to be 800 based on 10 liftings per outage, two outages per year and forty years expected economic life of the facility.

Inquiry 5: Verify that the 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 manufacturer's published breaking strength.

Response: The maximum crane load weight (pool covers, 3700 lbs) plus the weight of the bottom block (65 lbs.) divided by the number of parts of rope adds up to 22.6 of the manufacturer's published breaking strength. The manufacturer's breaking strength of the 5/16 stainless steel rope with IWRC is 4.15 ton.

It should be noted that the crane rated load capacity (3 ton) plus the weight of the load block divided by the number of parts of rope adds up to 36.5% of the manufacturer's published breaking strength. Furthermore, it should be noted that 2-3 ton cranes are used simultaneously to afford greater assurance of safe load handling.

Inquiry 6: Verify that the drum design calculations were based on the combination of crushing and bending loads.

Response: Based on telephone conversations with hoist manufacturer, Shepard Niles, it is understood that the drum design calculations were based on the combination of the crushing and bending loads.

Inquiry 7: Verify that the drum groove depth and pitch conform to the recommendations of CMAA-70.

Response: The actual depth of the drum grooves is 0.1953 inches. This is larger than the minimum recommended by CMAA-70. CMAA-70 recommends that the minimum depth of the drum grooves shall be 3/8 x rope diameter. In our case 5/16 inch rope diameter brings the recommended minimum depth of the drum groove to 0.117 inch.

The actual drum groove pitch is 0.400 inches which exceeds the minimum recommended by CMAA-70. CMAA-70 recommends the minimum drum groove pitch to be either 1.14 x rope diameter or rope diameter + 1/8 inch whichever is smaller. Based on 5/16 inch rope diameter the minimum recommended pitch of the drum grooves should be 0.356 inch.

Inquiry 8: Verify that the gear horsepower ratings were based on design allowables and calculation methodology equivalent to that incorporated into CMAA-70.

Response: Based on telephone conversations with Sheperd Niles we understand that gearings comply to the American Gear Manufacturers Association Standards. CMAA-70, Article 4.5.2, design standards are same as those in existence at the time of the crane purchase.

Inquiry 9: Verify that the cab-control, cab on trolley configuration was not used.

Response: The cab-on-trolley control arrangement is not used for the crane in question.

Inquiry 10: Verify that the mechanical load brakes or hoist holding brakes with torque ratings of approximately 125% of the hoist motor torque were used.

Response: The crane is equipped with one Roller Rachet Weston Type hoist holdup brake. The brake torque capacity is 150% of the crane rated hoist motor torque.

Inquiry 11: Verify that crane operation under load near the end of the bridge or trolley travel is not allowed or is compensated for by bumpers and stops which satisfy the intent of CMAA-70.

Response: Bridge Bumpers and Stops

The bridge bumpers and stops conform to CMAA-70 recommendations by complying to original Fluor crane technical specifications. The bumpers are mounted in such a manner that the attaching bolts are not in shear.

Trolley Bumpers and Stops

The trolley is not equipped with bumpers. The trolley stops engage the tread of the wheel and are designed to satisfy the intent of ANSI B30, 2.0-1976 Article 2-1.3.2.

Inquiry 12: Verify that any static control systems in use conform to the requirements of CMAA-70.

Response: Only magnetic control systems were employed for the crane in question.

Inquiry 13: Verify that the controllers used were of the spring-return or momentary-contact pushbutton type.

Response: We have confirmed from the crane manufacturer's catalog that all controllers used are of the spring return pushbutton type.

Item 3 g. Exceptions, if any, taken to ANSI B30.2-1976 with respect to operator training, qualification, and conduct.

RESPONSE:

No exceptions to the guidance in ANSI B30.2-1976 are taken.