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15.3.8 REFUELING

Applicability:

Applies to operating limitations during refueling operations.

Objective:

To ensure that no incident could occur during refueling operations that would affect public health and safety.

Specifications:

During refueling operations:

1. The equipment hatch shall be closed and the personnel locks shall be capable of being closed. A temporary third door on the outside of the personnel lock shall be in place whenever both doors in a personnel lock are open (except for initial core loading).
2. Radiation levels in fuel handling areas, the containment and spent fuel storage pool shall be monitored continuously.
3. Core subcritical neutron flux shall be continuously monitored by at least two neutron monitors, each with continuous visual indication in the control room and one with audible indication in the containment available whenever core geometry is being changed. When core geometry is not being changed at least one neutron flux monitor shall be in service.
4. At least one residual heat removal loop shall be in operation. However, if refueling operations are affected by the residual heat removal loop flow, the operating residual heat removal loop may be removed from operation for up to one hour per eight hour period.
5. During reactor vessel head removal and while loading and unloading fuel from the reactor, a minimum boron concentration of 1800 ppm shall be maintained in the primary coolant system.

6. Direct communication between the control room and the operating floor of the containment shall be available whenever changes in core geometry are taking place.
7. The containment vent and purge system, including the radiation monitors which initiate isolation shall be tested and verified to be operable immediately prior to refueling operations.
8. If any of the specified limiting conditions for refueling are not met, refueling of the reactor shall cease. Work shall be initiated to correct the violated conditions so that the specified limits are met, and no operations which may increase the reactivity of the core shall be made.

Basis

The equipment and general procedures to be utilized during refueling are discussed in the Final Safety Analysis Report. Detailed instructions, the above specified precautions, and the design of the fuel handling equipment incorporating built-in interlocks and safety features, provide assurance that no incident could occur during the refueling operations that would result in a hazard to public health and safety.[(1)]

Whenever changes are not being made in core geometry one flux monitor is sufficient. This permits maintenance of the instrumentation. Continuous monitoring of radiation levels (A2 above) and neutron flux provides immediate indication of an unsafe condition. The residual heat pump is used to maintain a uniform boron concentration.

The shutdown margin indicated in Part A5 will keep the core subcritical, even if all control rods were withdrawn from the core. During refueling, the reactor refueling cavity is filled with approximately 275,000 gallons of borated water. The boron concentration of this water is sufficient to maintain the reactor

subcritical approximately by 10% ΔK/K in the cold condition with all rods inserted, and will also maintain the core subcritical even if no control rods were inserted into the reactor.[2] Periodic checks of refueling water boron concentration insure that proper shutdown margin is maintained. Part A6 allows the control room operator to inform the manipulator operator of any impending unsafe condition detected from the main control board indicators during fuel movement.

During the refueling operation a substantial number of station personnel and perhaps some regulatory people will be in the containment. The requirements are to prevent an unsafe amount of radioactivity from escaping to the environment in the case of a refueling accident, and also to allow safe avenues of escape for the personnel inside the containment as required by the Wisconsin Department of Industry, Labor and Human Relations. To provide for these requirements, the personnel locks (both doors) are open for the normal refueling operations with a third temporary door which opens outward installed across the outside end of the personnel lock.[3] This hollow metal third door is equipped with weather stripping and an automatic door closer to minimize the exchange of inside air with the outside atmosphere under the very small differential pressures expected while in the refueling condition. Upon sounding of the containment evacuation alarm, all personnel will exit through the temporary door(s) and then all personnel lock doors shall be closed. As soon as possible, the fuel transfer gate value shall be closed to back up the 30 foot water seal to prevent escape of fission products.

The spent fuel storage pool at the Point Beach Nuclear Plant consists of a single pool with a four foot thick reinforced concrete divider wall which separates the pool into a north half and south half. The divider wall is notched to a point sixteen feet above the pool floor to allow transfer of assemblies from one half of the pool to the other.

subcritical approximately by 5% $\Delta K/K$ in the cold condition with all rods inserted.[2] Periodic checks of refueling water boron concentration insure that proper shutdown margin is maintained. Part A6 allows the control room operator to inform the manipulator operator of any impending unsafe condition detected from the main control board indicators during fuel movement.

During the refueling operation a substantial number of station personnel and perhaps some regulatory people will be in the containment. The requirements are to prevent an unsafe amount of radioactivity from escaping to the environment in the case of a refueling accident, and also to allow safe avenues of escape for the personnel inside the containment as required by the Wisconsin Department of Industry, Labor and Human Relations. To provide for these requirements, the personnel locks (both doors) are open for the normal refueling operations with a third temporary door which opens outward installed across the outside end of the personnel lock.[3] This hollow metal third door is equipped with weather stripping and an automatic door closer to minimize the exchange of inside air with the outside atmosphere under the very small differential pressures expected while in the refueling condition. Upon sounding of the containment evacuation alarm, all personnel will exit through the temporary door(s) and then all personnel lock doors shall be closed. As soon as possible, the fuel transfer gate value shall be closed to back up the 30 foot water seal to prevent escape of fission products.

The spent fuel storage pool at the Point Beach Nuclear Plant consists of a single pool with a four foot thick reinforced concrete divider wall which separates the pool into a north half and south half. The divider wall is notched to a point sixteen feet above the pool floor to allow transfer of assemblies from one half of the pool to the other.

Previous Technical Specifications in this section had addressed maximum load limits and limitations on load movements by the auxiliary building crane over a spent fuel pool. These specifications were deleted upon modification of the crane to meet the single-failure-proof criteria outlined in NUREG-0612.

References

(1) FSAR - Section 9.5.2

(2) FSAR - Table 3.2.1-1

15.4.14 SURVEILLANCE OF AUXILIARY BUILDING CRANE LIFTING DEVICES

Applicability:

Applies to surveillance requirements for the auxiliary building crane special lifting devices and slings before handling heavy ($\geq$1750 lbs.) loads carried over or near the spent fuel pool.

Objective:

To verify that special lifting devices and slings used in conjunction with the auxiliary building crane are operable prior to their use in supporting heavy loads over the spent fuel pool.

Specification:

1. All slings and special lifting devices which will be used in supporting heavy loads from either the main or auxiliary hoist of the auxiliary building crane shall be inspected immediately prior to use.

Basis:

The auxiliary building crane has been modified to conform with single-failure-proof criteria. This modification evolved as a result of concern over the movement of heavy loads over or near the spent fuel pool when spent fuel is stored there. The crane is designed to not allow a load drop as a result of any single constituent component failure. As the slings and special lifting devices are, by their nature, an integral part of the load bearing path, their surveillance is necessary to ensure against a load drop as a result of deficient rigging.

Reference:

1. NUREG-0612

EDERER INCORPORATED

EDERER CRANES
WASHINGTON CRANES

APPENDIX B SUPPLEMENT TO GENERIC LICENSING TOPICAL REPORT EDR-1

SUMMARY OF PLANT SPECIFIC CRANE DATA SUPPLIED BY EDERER INCORPORATED FOR WISCONSIN ELECTRIC POWER COMPANY POINT BEACH NUCLEAR PLANT AUXILIARY BUILDING CRANE

P.O NO. B-15166-S
EDERER S.O. NO. F-1440

REVISION 2 1/31/84

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EDR-1 APPENDIX B SUPPLEMENT
SUMMARY OF PLANT SPECIFIC CRANE DATA SUPPLIED BY EDERER FOR POINT BEACH AUXILIARY BUILDING CRANE

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Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.1.a	III.C (C.1.a)	1. The actual crane duty classification of the crane specified by the applicant.	1. The crane has a Class C crane duty classification in accordance with CMAA Specification #70.
C.1.b	III.C (C.1.b)	1. The minimum operating temperature of the crane specified by the applicant.	1. The trolley was designed and fabricated for a minimum operating temperature of 40 degrees F.
C.2.b	III.C (C.2.b) III.E.4	1. The maximum extent of load motion and the peak kinetic energy of the load following a drive train failure.	1. The main hoist is designed such that the maximum load motion following a drive train failure is less than .5 foot and the maximum kinetic energy of the load is less than that resulting from .5 inch of free fall of the maximum critical load. The auxiliary hoist is designed such that the maximum load motion following a drive train failure is less than 1 foot and the maximum kinetic energy of the load is less than that resulting from 2 inches of free fall of the maximum critical load.

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Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
		2. Provisions for actuating the Emergency Drum Brake prior to traversing with the load, when required to accommodate the load motion following a drive train failure.	2. Provisions for automatically actuating the Emergency Drum Brake prior to traversing with the load are not required since the maximum amount of load motion and kinetic energy can be accommodated by the facility design.
C.3.e	III.C (C.3.e)	1. The maximum cable loading following a wire rope failure in terms of the acceptance criteria established in Section III.C (C.3.e.)	1. The maximum cable loading following a wire rope failure in either the main or auxiliary hoist meets the maximum allowed by the acceptance criteria established in Section III.C (C.3.e).
C.3.f	--	1. Maximum fleet angle	1. 3.5 degrees.
		2. Number of reverse bends	2. None, other than the one between the wire rope drum and the first sheave in the load block.
		3. Sheave diameter	3. Per CMAA Specification #70

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Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.3.h	III.C (C.3.h) III.E.11	1. The maximum extent of motion and peak kinetic energy of the load following a single wire rope failure.	1. The main hoist is designed such that the maximum load motion following a single wire rope failure is less than .5 foot and the maximum kinetic energy of the load is less than that resulting from .5 inch of free fall of the maximum critical load. The auxiliary hoist is designed such that the maximum load motion following a single wire rope failure is less than one foot and the maximum kinetic energy of the load is less than that resulting from 2 inches of free fall of the maximum critical load.
C.3.i	III.C (C.3.i)	1. The type of load control system specified by the applicant.	1. The existing Westinghouse Class 22-506 and Class 22-501 A-C thyristor static-stepless crane drive units have not been replaced. The maximum lowering speed permitted by the auxiliary hoist controls is 17.8 FPM, which is greater than the 15 FPM maximum recommended by CMAA #70.
		2. Whether interlocks are recommended by Regulatory Guide 1.13 to prevent trolley and bridge movements while fuel elements are being lifted and whether they are provided for this application.	2. The crane will not be used to lift fuel elements from the reactor core or spent fuel racks. Therefore, interlocks to prevent trolley and bridge movements while hoisting have not been provided.

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Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.3.j	III.C (C.3.j)	1. The maximum cable and machinery loading that would result in the event of a high speed two blocking, assuming a control system malfunction that would allow the full breakdown torque of the motor to be applied to the drive motor shaft.	1. The Energy Absorbing Torque Limiters (EATL) were designed such that the maximum machinery load, which would result in the event of a two blocking occurs while lifting the rated load at the rated speed that allows the full breakdown torque of the motor to be applied to the drive shaft, will not exceed twice the machinery's design rating. In addition, the EATL designs do not allow the maximum cable loading to exceed the acceptance criteria established in Section III.C (C.3.e) during the above described two-blockings.
		2. Means of preventing two blocking of auxiliary hoist, if provided.	2. The auxiliary hoist has the same X-SAM features as the main hoist to prevent two blockings and to protect the crane and load in the event that one occurs.

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Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.3.k	III.C(C.3.k)	1. Type of drum safety support provided.	1. The alternate design drum safety restraint shown in figure III.D.4 of EDR-1 is augmented with brackets that counter any upward forces imposed by the drive gear. These brackets act on the lower portion of the inside diameter of the gear end of the drum. The alternate design restraint is also used for the auxiliary hoist. Since output shaft of the gear case also serves as the drum shaft, the alternate type of restraint has been extended to completely encircle the drum shell at both ends.
C.3.o	—	1. Type of hoist drive to provide incremental motion.	1. The existing Westinghouse Class 22-506 and Class 22-501 A-C thyristor static-stepless crane drive units, which have not been replaced, provide incremental load motion.
C.3.p	—	1. Maximum trolley speed.	1. 50 FPM
		2. Maximum bridge speed.	2. The maximum bridge travel speed permitted by the existing crane controls is 75 FPM, compared to the 50 FPM maximum recommended by the 1975 Revision of CMAA #70.

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Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
C.3.p	—	3. Type of overspeed protection for the trolley and bridge drives.	3. Both the trolley and bridge drives are powered by AC motors that can inherently not overspeed, since their maximum speed is limited by the 60 HZ line frequency. Therefore, overspeed sensors that actuate the trolley and bridge drive brakes have not been provided.
C.3.q	—	1. Control station location.	1. The complete operating control system, including the emergency stop button, is located on a pendant.
--	III.D.1	1. The type of Emergency Drum Brake used, including type of release mechanism.	1. A single pneumatically released band brake will be used in each hoist.
		2. The relative location of the Emergency Drum Brake.	2. The Emergency Drum Brake engages the wire rope drum in each hoist.
		3. Emergency Drum Brake Capacity.	3. The Emergency Drum Brake in each hoist has a minimum capacity of 130% of that required to hold the design rated load.

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Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
--	III.D.2	1. Number of friction surfaces in EATL.	1. The EATLs have 21 friction surfaces.
		2. EATL Torque Setting.	2. The specified EATL torque setting is approximately 130% of the rated motor torque at the design rated speed that corresponds to lifting the design rated load.
--	III.D.3	1. Type of Failure Detection System.	1. A totally mechanical drive train continuity detector and emergency drum brake actuator have been provided in accordance with Appendix G of Revision 3 of EDR-1 in each hoist.
--	III.D.5	1. Type of Hydraulic Load Equalization System.	1. In both hoists, the Hydraulic Load Equalization System includes both features described in this section.
--	III.D.6	1. Type of hook.	1. Both the main and auxiliary hooks have a single load path.
		2. Hook design load.	2. The main hook design load is 125 Tons with a 10:1 factor of safety on ultimate. The auxiliary hook design load is 20 Tons with a 10:1 factor of safety on ultimate.

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Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
--	III.D.6	3. Hook test load.	3. The test load for each load path of the main hook will be 250 Tons. The test load for each load path of the auxiliary hook will be 40 Tons.
--	III.F.1	1. Design rated load.	1. Main hoist - 125 Tons. Auxiliary hoist - 20 Tons.
		2. Maximum critical load rating.	2. Main hoist - 125 Tons. Auxiliary hoist - 20 Tons.
		3. Trolley weight (net).	3. 95,000 lbs. (including hooks)
		4. Trolley weight (with load).	4. 345,000 lbs.
		5. Hook lift.	5. Main hook - 68 feet Auxiliary hook - 114 feet
		6. Number of wire rope drums.	6. The main and the auxiliary hoists each have one wire rope drum.

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Regulatory Position	Topical Report Section	Information to be Provided	Specific Crane Data
--	III.F.1	7. Number of parts of wire rope.	7. Main hoist - 8 parts per wire rope. Auxiliary hoist - 4 parts per wire rope.
		8. Drum size (pitch diameter).	8. Main hoist - 45 inches. Auxiliary hoist - 23.75 inches.
		9. Wire rope diameter.	9. Main hoist - 1 1/8 inch. Auxiliary hoist - 5/8".
		10. Wire rope type.	10. 6x37 class IWRC.
		11. Wire rope material.	11. Stainless steel.
		12. Wire rope breaking strength.	12. Main hoist - 135,700 lbs. Auxiliary hoist - 43,100 lbs.
		13. Wire rope yield strength.	13. Main hoist - 108,600 lbs. Auxiliary hoist - 34,500 lbs.
		14. Wire rope reserve strength.	14. Main hoist - .661 Auxiliary hoist - .571
		15. Number of wire ropes.	15. The main and auxiliary hoists each have two ropes.