

March 27, 1985

Docket No. 50-320

Mr. F. R. Standerfer
Vice President/Director
Three Mile Island Unit 2
GPU Nuclear Corporation
P.O. Box 480
Middletown, PA 17057

Dear Mr. Standerfer:

Subject: Three Mile Island Nuclear Station Unit 2
Operating License DPR-73
Docket No. 50-320
Polar Crane Auxiliary Hoist Operational and Load Test

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On November 14, 1984, General Public Utilities Nuclear Corporation (GPUNC) requested NRC approval of the Polar Crane Auxiliary Hoist Inspection and Refurbishment Plan. On January 18, 1985 GPUNC also submitted the Auxiliary Hoist Load Test Safety Evaluation Report for NRC review and approval. We have reviewed both documents and have prepared the enclosed safety evaluation. The NRC staff's review focused on the following areas: refurbishment methodology, including the replacement of unlike kind parts, the replacement of the wire rope, the refurbishment of the brakes, general auxiliary hoist component inspections, quality assurance involvement during the refurbishment and load test, load test components and worker exposure.

Based on our detailed review as discussed in the enclosed Safety Evaluation, we conclude that:

1. Pending the successful completion of the proposed Auxiliary Hoist (AH) operational test, the AH will be functionally ready for the load test.
2. According to information provided by the licensee, all unlike kind replacements were either recommended by the vendor, or functionally equivalent or functionally superior to the original component.
3. The replacement of the wire rope was satisfactorily completed with a like-kind component.
4. The inspection and maintenance plans for the AH are adequate to ensure its safe use.
5. The planned load test sequence, notwithstanding exceptions taken to certain ANSI standards, is sufficient to demonstrate the ability of the AH to lift 25 tons and be used throughout the TMI-2 cleanup.

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DATE	3/27/85	3/27/85	3/27/85	PDR	ADOCK 05000320
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Mr. F. R. Standerfer

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6. Quality assurance, quality control and procedural controls for the auxiliary hoist's refurbishment and requalification are sufficient to ensure the safe use of the hoist/crane and the safety of the planned test.
7. The likelihood of a load drop is extremely small and even if a drop did occur, the consequences of such an event are bounded by the staff's Safety Evaluation for the Refurbishment of the Reactor Building Polar Crane, Load Test and Recertification for Use, dated November 18, 1983.
8. The estimated occupational exposure for the load test is significantly less than that predicted by the staff's Supplement to the Programmatic Environmental Impact Statement dated October 1984.
9. Based on the criteria contained in 10 CFR 50.59, the AH operational and load tests do not constitute an Unreviewed Safety Question.

Therefore, the Polar Crane Auxiliary Hoist Inspection and Refurbishment Plan and the load test safety evaluation are acceptable as stated in our enclosed Safety Evaluation.

Sincerely,

Original signed by
Michael T. Masnik for

Bernard J. Snyder, Program Director
Three Mile Island Program Office
Office of Nuclear Reactor Regulation

Enclosure:
As stated

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

GPU NUCLEAR CORPORATION

METROPOLITAN EDISON COMPANY

PENNSYLVANIA ELECTRIC COMPANY

JERSEY CENTRAL POWER & LIGHT COMPANY

DOCKET NO. 50-320

THREE MILE ISLAND NUCLEAR STATION UNIT NO. 2

REFURBISHMENT AND TESTING OF THE REACTOR BUILDING

POLAR CRANE AUXILIARY HOIST

1.0 Refurbishment of the Auxiliary Hoist

The Reactor Building Polar Crane's Auxiliary Hoist was damaged as a result of high temperatures experienced during the March 28, 1979 accident and subsequent environmental conditions. Pre-inspection assumptions based on experience gained during the refurbishment of the main hoist were that the damage would probably be concentrated in the crane's electrical system and that most mechanical components would only require lubrication, resurfacing or readjustment. These assumptions were later confirmed during auxiliary hoist inspections.

As a part of the auxiliary hoist refurbishment effort, the licensee performed mechanical and electrical walkdowns, performed electrical circuit and component checks, conducted a visual examination of the drum and brake components and inspected the block and the wire rope. A visual and non-destructive examination of the hook was also performed.

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The most significant component replacements were the auxiliary hoist self actuated (SESA) brakes and the replacement of the wire rope. The licensee stated that the brakes and the wire rope were replaced in their entirety with "like-kind" components. However, there were numerous "unlike-kind" component replacements, most electrical in nature. In response to NRC questions on these replacements, GPUNC stated that most unlike-kind replacements were due to the unavailability of the exact part. All replacements were either functionally equivalent or conservatively affected the original component's operating characteristics (see discussion in Section 2.0).

The only component that was not refurbished was the hoist load sensing device on the trolley. In lieu of this part, load weight indication during the load test will be provided by a Dillon load cell included as a part of the rigging. (See Table 1.0 for a list of refurbished/inspected components.) Based on the staff's review of refurbishment documents, we conclude that the auxiliary hoist for the reactor building polar crane was properly refurbished and is capable of performing a load test without adversely affecting public health and safety.

2.0 Unlike-Kind Component Replacements

In an NRC letter to the licensee dated February 14, 1985, the staff requested from GPUNC a complete list of "unlike-kind" component replacements. A portion of their response is included as Table 2.0.

It states that; (1) All unlike-kind replacements, except the weight type limit switch wire rope, were for electrical components. (2) The unlike-kind replacements that were not specifically recommended or approved by the vendor are functionally equivalent or superior. Based on information provided by the licensee, the staff concludes that the above referenced unlike-kind replacements are acceptable.

3.0 Load Test Components

The auxiliary hoist load test utilizes many identical components used during the reactor building polar crane main hoist test. All rigging below the missile shield rigging plate that will be used to lift the pressurizer missile shield during the auxiliary hoist load test is identical to that previously used to stage the missile shields for the polar crane main hoist load test. As illustrated in Figure 1.0, rigging components are composed of the 25 ton auxiliary hook, a 50 ton capacity Dillon load cell with an accuracy of $\pm .5\%$ and a factor of safety of five to ultimate; a Crosby anchor shackle with a factor of safety of six to ultimate; a missile shield rigging plate with a factor of safety of five to ultimate, plus an impact factor and additional design conservatism to equal a reserve margin of 25% above the design load of 32.625 tons; four (4) 1 3/4" diameter, 6 x 37 class IWRC wire ropes with a minimum breaking strength of 153 tons each; four (4) 1 3/4" diameter screw pin anchor shackles each rated at 25 tons and the pressurizer missile shield and its associated lifting lugs.

It is anticipated that the missile shield will weigh approximately 32 tons and the associated rigging approximately 0.625 tons. The staff concurs with the design characteristics of the load test components.

4.0 Load Test Standards

The load test will be performed in accordance with ANSI B30.2 with some exceptions. Since the reactor building polar crane has previously been successfully load tested, the staff agrees with the licensee that a repeat of the trolley and bridging portion of that test is not required. The emphasis during the subject test is to verify the operability of the auxiliary hoist (no load test) and verify the load lifting capability (load test). The load lifting capability verification primarily involves testing the braking system. The staff concurs with the licensee's proposal to use ANSI B30.2 - 1983, paragraphs 2-2.2.2 as the basis for the load test with the bridging and trolleying maneuvers eliminated (2-2.2.2.b.2,3). As stated above, these capabilities have already been confirmed during the reactor building polar crane load test.

The staff also concurs with the licensee using ANSI B.30.2 - 1983, paragraphs 2-2.4.1 and 2-2.4.2 for wire rope inspection/replacement guidance in addition to the wire rope user's manual. Paragraphs 2-2.1.2a.4 and 2-2.3.3c.1 of ANSI B.30.2 - 1983 and paragraphs 10-1.4.2 and 10-1.4.6 of ANSI B30.10 - 1982 are appropriate as

proposed by GPUNC for hook inspections. The licensee has also committed to performing a magnetic particle inspection of the hook and inspecting the wire rope before and after the auxiliary hoist test.

It should be noted that the subject load test will be at approximately 32.6 tons or 130.5% of the rating of the auxiliary hoist (25 tons). ANSI B30.2 - 1983, paragraph 2-2.2.2a states that "Test loads shall not be more than 125 percent of the rated load, unless otherwise recommended by the manufacturer." The licensee has obtained the approval from Whiting Crane Co. to use a 32.6 ton test weight which is approximately 5.5% greater than that recommended in ANSI standards for a one time load test (see Attachment 1). The staff concurs with the above discussed exceptions to ANSI standards.

5.0 Quality Assurance/Quality Control

The TMI-2 Recovery Quality Classification List states that the polar crane's structure is the only Important-to-Safety (ITS) item on the crane. The staff agrees with the licensee that none of the refurbished auxiliary hoist components impact the polar crane's structural capabilities. However, the load test does exercise the crane's structure. Therefore, the test Unit Work Instruction (UWI) is labeled ITS. Even though refurbishment activities were labeled Not-Important-to-Safety (NITS) for the auxiliary hoist, Quality Assurance (QA) did witness some critical events such as the replacement of the auxiliary hoist brakes, the non-destructive examination of the auxiliary hoist hook, and reviewed many unlike-kind replacements. A

Quality Control (QC) receipt inspection is required for any replacement parts for the load bearing components.

Because of the ITS classification of the auxiliary hoist load test, QC will witness this test. There are also several QC Hold Points in the load test UWI to inspect or ensure that certain test parameters have been met.

6.0 Occupational Exposure

Based on information provided to the staff, GPU has estimated that the expected occupational exposure for the operational and load test will be between 7.5 to 22.5 person-rem. We consider GPU's estimate to be reasonable and conclude that the proposed activity and its potential environmental impacts are well within those previously assessed in the NRC's Programmatic Environmental Impact Statement (PEIS).

7.0 Load Drop Analysis and 50.59 Review

In a February 18, 1983 safety evaluation for the Polar Crane Load Test, GPUNC performed an analysis of the effects of dropping a missile shield in the areas being utilized for this load test. The staff reviewed that information and after obtaining additional information approved the licensee's safety evaluation on November 18, 1983. The load pathway and lift height restrictions for the auxiliary hoist load test are well within the bounds of the staff's previous analysis for the Polar Crane Load Test. Therefore, no additional analysis is required. See Figure 2.0 for the pressurizer missile shield pathway.

Since the movement of the pressurizer missile shield, its pathway, and containment isolation will be consistent with what was previously approved by the staff in a November 18, 1983 letter, the 50.59 evaluation and conclusions presented by the licensee and approved by the staff in that letter are also applicable to the auxiliary hoist load test.

8.0 Load Test

The pressurizer missile shield will first be moved from the reactor building "A" D-ring by the polar crane main hook. After staging the shield at its load test position on the 347' elevation, the auxiliary hook will be rigged for the operational test. The no-load operational test will be performed to ensure that the control functions of the auxiliary hoist (including limit switch actuation) operate properly. The load test will then be conducted in accordance with ANSI B30.2 - 1983 as previously stated per an NRC approved UWI. The load test incorporates individual brake tests to insure that both redundant trains are functioning properly. Following the load test, the pressurizer missile shield will be replaced on the "A" D-ring using the main hook. Containment integrity during the auxiliary hoist load test will be set at a level equal to that used during the previous polar crane test (e.g., containment purge, most non-borated water sources isolated, at least one personnel air lock door closed).

Pending the successful completion of the operational and load test of the auxiliary hoist and satisfactory hook and wire rope inspection results, the licensee will modify the Polar Crane Operating Procedure 4000-IMP-3891.01 to include the auxiliary hoist and present it to the staff for approval. The licensee is not permitted to use the auxiliary hoist for any load lifts before the NRC has concurred with a modification to the subject procedure.

Conclusion

Based on the above discussions, the staff concludes that:

1. Pending the successful completion of the proposed Auxiliary Hoist (AH) operational test, the AH will be functionally ready for the load test.
2. According to information provided by the licensee, all unlike-kind replacements were either recommended by the vendor, or functionally equivalent or functionally superior to the original component.
3. The replacement of the wire rope was satisfactorily completed with a like-kind component.
4. The inspection and maintenance plans for the AH are adequate to insure its safe use.

5. The planned load test sequence, notwithstanding exceptions taken to ANSI certain standards, is sufficient to demonstrate the ability of the AH to lift 25 tons and be used throughout the TMI-2 cleanup.
6. Quality assurance, quality control and procedural controls for the auxiliary hoist's refurbishment and requalification are sufficient to ensure the safe use of the hoist/crane and the safety of the planned test.
7. The likelihood of a load drop is extremely small and even if a drop did occur, the consequences of such an event are bounded by the staff's Safety Evaluation for the Refurbishment of the Reactor Building Polar Crane, Load Test and Recertification for Use dated November 18, 1983.
8. The estimated occupational exposure for the load test is significantly less than that predicted by the staff's Supplement to the Programmatic Environmental Impact Statement dated October 1984.
9. Based on the criteria contained in 10 CFR 50.59, the AH operational and load tests do not constitute an Unreviewed Safety Question.

Therefore, the Polar Crane Auxiliary Hoist Inspection and Refurbishment Plan and the load test safety evaluation is acceptable as stated in our enclosed Safety Evaluation.

Table 1.0
POLAR CRANE AUXILIARY HOIST REFURBISHMENT PLAN

Component	Required	Remarks
<u>Auxiliary Hoist Main Drive Train</u>		
Hoist Motor	Yes	
Hoist Drive Motor Resistors	Yes	
Motor Zero Speed Switch	Yes	
Coupling, Hoist Motor to Zero Speed Switch	Yes	
Flexible Couplings - Amerigear F-102	Yes	
Drive Gear Unit	Yes	
Driveshaft Support Bearings (2)	Yes	
All control components such as breakers, starters, switches & relays in Auxiliary Hoist Control Panel & Auxiliary Hoist Slow Speed Control Panel.	Yes	
All contractors (1A-4A), overload devices & fuses related to Auxiliary Hoist System	Yes	
<u>Auxiliary Hoisting Unit</u>		
Hoist Solenoid Brakes (2)	Yes	
Hoist Solenoid Brakes Rectifiers & Transformers	Yes	
Drum Support Bearing	Yes	
Hoist Wire Rope	Yes	
Hoist Weight Type Limit Switch	Yes	
Hoist Screw Type Limit Switch	Yes	
Hoist Load Sensing Device on Trolley	No	Load indication will be provided at load
Adjustable Dial for Hoist Load Sensing Device	No	Since load sensing device on crane is not required
Hoist Upper Sheave Nest	Yes	
Hoist Bottom Block Assembly	Yes	
Hook	Yes	

POLAR CRANE AUXILIARY HOIST REFURBISHMENT PLAN

<u>Component</u>	<u>Required</u>	<u>Remarks</u>
<u>Auxiliary Hoist Inching Drive Train</u>		
Drive Gear Motor	Yes	
Drive Magnetic Clutch	Yes	
Drive Magnetic Clutch Rectifier & Transformer	Yes	" "
Drive Eddy Current Brake	Yes	
Drive Eddy Current Brake Rectifier, Resistors & Transformers	Yes	
Flexible Coupling - Amerigear F-102	Yes	