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November 14, 1984

TMI Program Office Attn: Dr. B. J. Snyder Program Director US Nuclear Regulatory Commission Washington, DC 20555

Dear Dr. Snyder:

Three Mile Island Nuclear Station, Unit 2 (TMI-2) Operating License No. DPR-73 Docket No. 50-320 Polar Crane Auxiliary Hoist Inspection and Refurbishment Plan

Attached for your review and approval is the plan for inspection and refurbishment of the Polar Crane Auxiliary Hoist. It is GPU Nuclear's intention to use this plan to guide the refurbishment and qualification of the Auxiliary Hoist to its original rated capacity of twenty-five (25) tons. This plan is intended only as a guide for inspection and refurbishment activities and is subject to change based on actual conditions found during the inspection activities described herein. GPU Nuclear will advise the NRC staff of any significant deviations from the plan if such deviations are determined to be necessary.

GPU Nuclear will submit, at a future date, a safety evaluation for the actual requalification and load testing of the Polar Crane Auxiliary Hoist.

Per the requirements of 10 CFR 170, enclosed is a check in the amount of \$150.00 for the application fee required for review of this submittal.

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GPU Nuclear Corporation is a subsidiary of the General Public Utilities Corporation

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Rec d weneck \$150.00

Dr. B. J. Snyder

If you have any questions concerning this information, please call Mr. J. J. Byrne of my staff.

Sincerely,

R. Standerfer

Vice President/Director, TMI-2

FRS/RBS/jep

Attachment

cc: Acting Deputy Program Director - TMI Program Office, Dr. W. D. Travers

POLAR CRANE AUXILIARY HOIST REFURBISHMENT PLAN

Number	Date	Revision	Ву	Recovery	Site Engineering
1	11/2/84	Comments Incorporated	TOH	Wille	Boulat

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- 1.0 PURPOSE
 - 1.1 The purpose of the refurbishment plan is intended to provide a comprehensive and logistical outline to renovate and restore the auxiliary hoist feature of the TMI-2 refurbished polar crane to its original rated capacity of 25 tons.
 - 1.2 This plan is only intended for use as a guide and is subject to change based on actual events.

2.0 APPLICABILITY/SCOPE

- 2.1 This plan is applicable to Site Engineering and Recovery Operations to assist in achieving refurbishment of the auxiliary hoist feature of the TMI-2 polar crane.
- 2.2 Safety classification is NITS. See Section 4.7 for explanation and QC scope.

3.0 DEFINITIONS

- 3.1 Crane Maintenance Any work required by means of rework or repair.
 - 3.1.1 Rework Any work required to maintain conformance to specified manufacturer's requirements. Rework includes replacement with like kind. Any rework required will be reviewed and approved by Site Engineering.
 - 3.1.2 <u>Repair</u> Site Engineering shall evaluate and approve any repair work, prepare any required ECA's and specify applicable QA/QC requirements.
- 3.2 Crane Modifications Crane modifications are defined as replacement with unlike kind or any engineering changes to the crane components or functions. The authorizing document will be prepared by Site Engineering and will be reviewed and approved in accordance with Procedure 4000-ADM-7350.03. Appropriate QA/QC requirements will be specified.

4.0 PLAN

4.1 General

All major components of the auxiliary hoist are required to function properly for the auxiliary hoist to be operational except for the load sensing related components.

Each component shall be inspected for signs of wear and deterioration. Individual parts may be replaced and/or cleaned and lubricated based upon the initial inspection results. After performing the required maintenance, each component shall be checked or inspected as necessary to assure proper function. Following a successful checkout of all required components, a no load operational test and a rated load test shall be performed. Prior to and immediately following the load tests, the wire rope and the crane hook shall be inspected per the applicable sections of ANSI B30.2-1976 and ANSI B30.10-1982 for wear, deterioration, cracking, and deformation and shall be replaced if necessary. Prior to and immediately following the load test, the crane hook shall also be non-destructively examined in accordance with Procedure 6110-QAP-7209.01. The refurbishment task shall also comply with procedure 4000-PLN-3891.01 as applicable. After review and approval of all test data and examination, Site Engineering shall approve use of the auxiliary hook for the determined rated capacity. The auxiliary hoist shall be turned over to Site Operations after approval for use.

4.2 Refurbishment

:

4.2.1 Electrical Power Supply

Prior to performing any functional check of the individual components. The installation of power supply to the hoist system should be verified and checked (See Attachment 1 for details).

4.2.2 Component Walkdown and Refurbishment

See Table 1 and Attachment 2 for a list of the major auxiliary hoist components and the required walkdown task.

4.3 Operational Test

An operational test for the auxiliary hoist feature will be performed in accordance with ANSI B30.2.1976, Paragraph 2-2.2.1.1 and 4. The bridge and trolley features were tested with the main hoist operational test and has met all of the criteria in the referenced paragraph. Testing methods shall be conducted and documented in accordance with Procedure 4000-ADM-3055.01, TMI-2 Start-up and Test Program.

4.4 Rated Load Test

A rated load test using the auxiliary hoist shall be performed in accordance with ANSI B30.2-1976, Paragraph 2-2.2.2b, 1 and 4. Similar to the Operational Test, the trolley and bridge features were tested with a greater load during the main hoist load test than is required by the auxiliary hoist load test and has therefore surpassed the requirements of the referenced paragraph as applicable to the auxiliary hoist. The original 25 ton rating of the auxiliary hoist will be re-established by load testing. See Attachment 3 for the proposed method for achieving a 25 ton rated load test. Testing methods shall be conducted and documented in accordance with procedure 4000-ADM-3055.01 "TMI-2 Start-Up and Test Program."

4.5 Post-Load Test Inspection

The auxiliary hoist wire rope and crane hook will be inspected by a person qualified for the inspection prior to and immediately following the associated operational and rated load tests. ANSI B30.2-1976, Paragraphs 2-2.4.1 and 2-2.4.2 will be used for guidance in inspecting the wire rope. ANSI B30.2-1976, Paragraphs 2-2.1.2a.4 and 2-2.3.3c.1 shall be used for guidance in inspecting the crane hook. Nondestructive testing of the crane hook shall be performed in accordance with Procedure 6110-QAP-7209.01.

4.5.1 Rated Load Marking

The present load capacity signs attached to the crane shall illustrate the auxiliary hoist rated capacity based on a successfully executed load test. The rated load signs shall be installed in accordance with ANSI

B30,2-1976, Paragraph 2-1.1.1.

4.6 Division of Responsibility

All walkdowns, refurbishment tasks, preoperational test, operational test, and load test shall be prepared by Recovery Operations per Procedure 4000-ADM-3000.01, "TMI-2 Unit Work Instruction".

Site Engineering shall be responsible for review of all walkdowns, refurbishment tasks, preoperational test, operational test, and load test per Procedure 4000-ADM-3000.01, "TMI-2 Unit Work Instruction". Site Engineering's review will be to insure fulfillment of functional and licensing requirements and provide any suggestions/recommendations.

Suggestions to repair/replace major components or make modifications may be identified by Recovery Operations. Site Engineering shall authorize any modifications (Reference 3.2) and shall concur on decisions to repair or replace major components.

Load test methods, rigs, and/or rigging components to be used shall be mutually agreed by Site Engineering and Recovery Operations. Any rig design needed for load test shall be performed by Site Engineering. Recovery Operations shall review all rig designs prior to being issued for construction for constructability and function. Recovery Operations shall be responsible for planning and scheduling. Recovery Operations shall also be responsible for preparing all material requisitions for refurbishment materials including any replacement components.

Site Engineering shall perform any load drop analysis required to satisfy any licensing concerns.

4.7 QA/QC Requirements

The TMI-2 Recovery Quality Classification list contained in Procedure 4000-ENG-7313.01 identifies the polar crane's structure as an important to safety item. None of the auxiliary hoist's major components required for refurbishment (see Attachment 2, Table 1) affect the polar crane's structural integrity and shall be considered not important to safety. However, Quality Control (QC) shall be requested by Site Engineering to witness several of the refurbishment activities which may be identified as critical towards the safe operation of the auxiliary hoist. Upon completing the inspection and refurbishment of the identified components, the operational and rated load test shall be performed to verify the crane's structural ability to handle its load.

QC shall witness the operational and load tests and crane hook examinations. The crane hook shall be examined in accordance with ANSI B30.10-1982 and Procedure 6110-QAP-7209.01, as applicable. QC receipt inspection is required for any replacement parts for the load bearing components of the auxiliary hoist.

4.8 Crane Turnover

The method for crane turnover of the auxiliary hoist maintenance responsibilities to Site Operations shall be per Procedure 4000-ADM-7350.04.

4.9 Safety Evaluation Report

A Safety Evaluation Report (SER) shall be prepared for load testing the auxiliary hoist as described in Attachment 3.

4.10 Spare Parts

Prior to turnover, a spare parts list for the auxiliary hoist shall be established with the recommended parts procurred and available or requisitioned.

5.0 RESPONSIBILITIES

5.1 Responsibilities are as stated within Section 4.0 of this plan.

6.0 REFERENCES

- 6.1 Procedure 4000-ADM-3000.01, "TMI-2 Unit Work Instruction"
- 6.2 Procedure 4000-ADN-7350.03, "Engineering Change Authorizations"
- 6.3 Procedure 4000-ADM-7350.04, "TMI-2 Turnover Procedure"
- 6.4 Procedure 4000-ADM-3055.01, "TMI-2 Start-Up and Test Program"
- 6.5 Procedure 6110-QAP-7209.01, "Magnetic Particle Examination"
- 6.6 ANSI B30.2.0-1976, "Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)"
- 6.7 ANSI/ASME B30.10-1982, "Hooks"
- 6.8 2-M72-M402, Rev. 2, "Polar Crane Functional Description"
- 6.9 Procedure 4000-IMP-3891.01, "TMI-2 Recovery Operations Polar Crane Operation"

6.10 Procedure 4000-PLN-3891.01, "TNI-2 Lifting and Handling Program"

7.0 ATTACHMENTS AND TABLES

- 7.1 Attachment 1 Electrical Power Supply Refurbishment Plan and Details
- 7.2 Attachment 2 Auxiliary Hoist Major Components Refurbishment Plan and Details
 - 7.2.1 Table 1 Required Auxiliary Hoist Components List
- 7.3 Attachment 3 Auxiliary Hoist Load Test Method and Details

Electrical Power Supply Refurbishment Plan

AUXILIARY HOIST REFURBISHMENT .

NOTE: The auxiliary hoist is completed for wiring--previous refurbishment included control (pendant) and power cables.

VISUAL WALKDOWN REQUIRED

Control Cabinet (on walkway) Slow Speed Panel (on trolley) Slow & Fast motors include wiring, brushes, etc. Terminations for pendant and power Brakes Resistors

ELECTRICAL CHECKS/FUNCTIONAL TEST

Voltage/Current/Megger Readings: All motors w/directions, brakes and resistors

NEW INSTALLATIONS

Relays/Contactors Thermal Overloads Resistors

AUXILIARY HOIST MAJOR COMPONENTS WALKDOWN

I. COMPONENT

.

Brake Wheels (Auxiliary Hoist)

11. TYPE OF WALKDOWN

Visual examination

III. SPECIFIC AREA OF CONCERN

Corrosion of brake wheel

IV. REFERENCE DRAWINGS

Whiting Drawing No. U-61901 General Arrangement for Trolley Attached diagrams of Trolley Arrangement

- V. DESCRIPTION OF WALKDOWN
 - Visually examine each brake wheel to determine the severity of corrosion.
 - 2. Photograph each brake wheel to document condition.
- VI. WALKDOWN RESULTS
 - 1. Brake wheel corrosion is:

		Slight	Moderate	Severe
Auxiliary Hoist	#1			
Brake ·	#2			
Additional	Comments:			

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VII. FIELD ENGINEERING COMPONENT CONDITION EVALUATION

			Use-As-Is	Re	epair	Replace
Auxiliary Hoi	st #1			<u> - 1</u>		
brake	#2			- -		
Describe	conditions	requiring	component	repair o	or replace	ement:

Field Engineer's Signature

:

.

Date



I. COMPONENT

Auxiliary Hoist Drive Flexible Couplings

II. TYPE OF WALKDOWN

Visual examination

111. SPECIFIC AREAS OF CONCERN

Corrosion of coupling internals. Deterioration of seals.

IV. REFERENCE DRAWING

Whiting Drawing No. U-61901 - General Arrangement of Trolley Amerigear Installation, Lubrication and Maintenance Instructions

- V. DESCRIPTION OF WALKDOWN
 - Remove: coupling guard covers from the auxiliary hoist drive train flexible coupling located between the auxiliary hoist 40 hp motor and the drive shaft support bearing.
 - Visually examine the couplings for deterioration of the coupling seals.
 - Uncouple the coupling and slide the coupling sleeves apart to examine the coupling internals.

If the coupling is full of grease do not remove grease to further examine coupling.

- 4. Note the amount of grease in the coupling.
- 5. Photograph each coupling while separated.
- Reassemble the coupling in accordance with the referenced Amerigear instructions.
- VI. WALKDOWN RESULTS
 - 1. Coupling seal condition is:

Good

Poor

Auxiliary hoist flexible couplings

.

2. Coupling cavity is generally full of grease:

		Yes	No	
	Auxiliary hoist flexible couplings			
3.	Coupling internal genera	l condition is	•	
		Good	Poor	
	Auxiliary hoist flexible couplings		-	
II. FIEL	D ENGINEERING COMPONENT C	ONDITION EVALU	ATION	
		Use-As-Is	Repair	Replace
uxiliary lexible	Hoist coupling	•		
Desc	ribe conditions requiring	component rep	air or replaceme	nt:
			na di Managara Na Bungha ana ila	

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I. COMPONENT

Auxiliary Hoist Driveshaft Support Bearings

II. TYPE OF WALKDOWN

Visual examination

III. SPECIFIC AREAS OF CONCERN

Deterioration of bearing seals.

IV. REFERENCE DRAWING

Whiting Drawing No. U-61901 - General Arrangement of Trolley

V. DESCRIPTION OF WALKDOWN

For each of the two auxiliary hoist driveshaft support bearings:

- Visually examine the driveshaft seal penetration for deterioration or leaking lubricant.
- 2. Photograph and driveshaft seal penetration.
- 3. Visually examine bearing for general condition.

VI. WALKDOWN RESULTS

Bearing seal condition is:

		Good	Poor
Auxiliary bearings	hoist drive shaft		
Bearing g	eneral condition is:		
		Good	Poor
Auxiliary bearings	hoist driveshaft		
Additiona	1 comments:		

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VII. FIELD ENGINEERING COMPONENT CONDITION EVALUATION

		Use-As-Is	Repair	Replace
Auxi	iliary hoist veshaft bearings			
	Describe conditions re	quiring component rep	pair or replacer	nent:
				alas verin 🕈 oraș tere

Field Engineer's Signature _____ Date____

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Attachment 2 Page 8 of 17

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I. COMPONENT

Auxiliary Hoist Drum Support Bearing

II. TYPE OF WALKDOWN

Visual examination

III. SPECIFIC AREA OF CONCERN

Corrosion of bearing internals. Deterioration of bearing seals.

IV. REFERENCE DRAWINGS

Whiting Drawing No. U-61901 General Arrangement for Trolley Attached diagrams of Trolley Arrangement

- V. DESCRIPTION OF WALKDOWN
 - Remove 'the closed bearing cover (away from the drum) from the auxiliary hoist drum suport bearing.
 - Inspect bearing for corrosion. If bearing cavity is full of grease and there is no visible corrosion, do not remove grease to further inspect bearing. Inspect bearing seal at the drum shaft penetration for deterioration of leaking lubricant.
 - 3. Photograph bearing with cover removed.
 - 4. Replace bearing cover.
- VI. WALKDOWN RESULTS

If

1.	Bearing internals are corroded:	Yes No	
	Slight	Moderate	Severe
yes, d	corrosion is:		
2	Bearing general condition is:	Cood Boon	<u> </u>
	bearing general condition is.	GOOD POOF	
3.	Bearing cavity is generally full o	of grease: Yes	No

 Additional Con 	ments:			
a fan de Statue				
				er er er an sammer er
FIELD ENGINEERING C	OMPONENT CO	ONDITION EVA	LUATION	
		Use-As-Is	Repair	Replace
is not bedget down				
rt bearings			and the second second	
Describe conditions	s requiring	component r	epair or repla	acement:
Describe conditions	s requiring	component r	epair or repla	acement:
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Describe conditions	s requiring	component r	epair or repla	acement:

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I. COMPONENT

Auxiliary Hoist Clutch

II. TYPE OF WALKDOWN/TESTING

Visual examination and manual rotation testing

III. SPECIFIC AREA OF CONCERN

Corrosion of clutch faces. Deterioration of power lead connections.

IV. REFERENCE DRAWINGS

Whiting Drawing No. U-61901 General Arrangement for Trolley Cutler Hammer Clutch Instruction Sheet, Publ. No. 9231 (contained in Whiting Crane Instruction Manual)

- V. DESCRIPTION OF WALKDOWN/TESTING
 - 1. Remove canopy covering the clutch and eddy current brake.
 - Visually inspect the clutch for general condition. Examine clutch for corrosion of clutch faces (do not disassemble clutch). Inspect power lead connections for deterioration or corrosion.
 - Manually rotate the clutch half on the inching motor side to verify the clutch halves rotate independently of each other when the clutch is deenergized. Note any difficulties such as dragging or binding.
 - 4. Photograph clutch to document the condition.
 - Replace canopy if eddy current brake inspection has been completed or will not be performed during this entry.
- VI. WALKDOWN/TEST RESULTS

1. Clut	ch general condition	on: Good	d Poo	or	
2. Clut	ch faces are corro	ded: Yes	No		
If yes, corros	ion is:	Slight	Modera	ate	Severe
3. Clut	ch power leads con	dition:	Good	 Poor	

Clutch halves rotated independently: Yes _____ No ____

. . . ATTACHMENT 2 Page 13 of 17 5. Additional Comments: VII. FIELD ENGINEERING COMPONENT CONDITION EVALUATION Use-As-Is Repair Replace Describe conditions requiring component repair or replacement: Field Engineer's Signature _____ Date_____

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I. COMPONENT

Auxiliary Hoist No. 25 Herringbone Gear Unit

II. TYPE OF WALKDOWN

Visual examination

III. SPECIFIC AREA OF CONCERN

Corrosion of gears or gear shafts. Deterioration of shaft bearing seals. Corrosion of gearshaft bearings.

IV. REFERENCE DRAWINGS

Whiting Drawing No. U-61901 General Arrangement for Trolley Whiting Drawing No. T-18353 Assembly of No. 25 Gear Unit

- V. DESCRIPTION OF WALKDOWN/TESTING
 - 1. Remove gear unit cover.
 - 2. Visually inspect gears, gear shafts and bearings for corrosion.
 - 3. Photographs gears and bearing(s) as accessible.
 - 4. Inspect the gearshaft bearing seals for deterioration of leaking oil.
 - 5. Photographs the external gearshaft/bearing seal interfaces.
 - 6. Replace gear unit cover.

ALKDOWN RESULTS

1.	Condition of gears:	Good	Poor	
2.	Gears have corrosion:	Yes	No	
If yes,	corrosion is:	Slight	Moderate	Severe
				 .
3.	Bearing condition is:	Good	Poor	
4.	Bearing seal condition	is: Good	Poor	

5. Additional Co	mments:		
FIELD ENGINEERING	COMPONENT CONDITION EVAL	UATION	•
	Use-As-Is	Repair	Replace
•			
: Describe condition	ns requiring component re	pair or replace	ment:
: Describe condition	ns requiring component re	pair or replace	ment:
: Describe condition	ns requiring component re	pair or replace	ment:
: Describe condition	ns requiring component re	pair or replace	ment:
: Describe condition	ns requiring component re	pair or replace	ment:
: Describe condition	ns requiring component re	pair or replace	ment:
: Describe condition	ns requiring component re	pair or replace	ment:

5.44

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COMPONENT

. ..

Auxiliary Hoist DC Clutch At Auxiliary Hoist Panel on Trolley UFT outgoing Wires 58 and 60 at terminal block and megger either of the disconnected wires and record.

PROCEDURE

Reconnect Wires 58 and 60 Signature

Field Engineer's Signature

:

.

Date •

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COMPONENT

Fie

Auxiliary Hoist Eddy Current Brake (Auxiliary Hoist Control Panel)

PROCEDURE (insulation test)

 At Auxiliary Hoist Control Panel, lift leads 43, Z-X1, AB and A-B2 from rectifiers (assure rectifiers are not subject to megger the potential) megger secondary of transformer (X1) and megger A-B1 and record both readings.

Wire X		Megohms
Wire A-B2		Megohms
Verify lifted leads replaced		
:		
Id Engineer's Signature	Date	

FOR P CRANE AUXILIARY HOIST REFURBISHMENT PLAN

TABLE 1. REQUIRED AUXILIARY HOIST COMPONENTS

Component	Required	Remarks
Auxiliary Hoist Main Drive Train		
Hoist Motor	Yes	
Hoist Drive Motor Resistors	Yes	
Motor Zero Speed Swithe	Yes	
Coupling, Hoist Motor to Zero Speed Siwtch	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 (IA-4A), overload devices & fueses related to Auxiliary Hoist System	Yes	
Auxiliary Hoisting Unit		
Noist Solenoid Brakes (2)	Yes	
Hoist Solenoid Brakes Rectifiers & Transformers	Yes	
Drum Support Bearing	Yes	
Hoist Wire Rope	Yes	
Noist Weight Type Limit Switch	Yes	
Hoist Screw Type Limit Swithc	Yes	
Hoist Lood 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
Noist Upper Sheave Nest	Yes	
Noist Bottom Block Assembly	Yes	
Hook	Yes	

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

TABLE 1. REQUIRED AUXILIARY HOIST COMPONENTS (continued)

ATTACHMENT 3 Page 1 of 2

AUXILIARY HOIST LOAD TEST METHOD AND DETAILS

Upon completion of all auxiliary hoist refurbishment efforts and a successful operational test, a rated load test shall be performed to certify the hoist's capability for lifting loads up to but not exceeding 25 tons. The test will generally meet the requirement of ANSI B30.2-1976, Paragraph 2-2.2.2. An exception to be noted is that no movement of the bridge and trolley features under load (auxiliary hoist) shall be conducted. These features were tested during the main hoist load test with a much greater load than required by the auxiliary hoist, and has therefore surpassed the functioning capabilities needed for the auxiliary hoist.

The test load will consist of the lift rigging a load indicating device, and the pressurizer missile shield. Because the pressurize missle shield exceeds the maximum 31.25 tons required for performing a load test at the recommended 125 percent of the 25 ton rated load, it shall be necessary to obtain approval from the crane manufacturer for the excessive load as permitted by ANSI B30.2-1976, Paragraph 2-2.2.2.

The test load will be lifted so it is supported by the crane and held by the hoist brakes.

The test load will be lowered, stopped and held by the hoist brakes and finally lowered to the floor.

The pressurizer missile shield shall be lifted and relocated with the main hoist along the load path as shown on the attached sketch.

Operation of the polar crane for movement of the test load shall be in accordance with procedure 4000-1MP-3891.01.

