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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 - Six Months Report Items

Attached for your information is our response to Staff concerns on the Control of Heavy Loads - Six Month Submittal (letters dated August 31, 1981 and November 8, 1982) expressed during the March 18, 1983 meeting between NSP and the Staff.

Please call us if you have questions concerning this response.

D M Musolf
Manager - Nuclear Support Services

DMM/TMP/js

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

Attachment

B030

Prairie Island Nuclear Generating Plant
April 8, 1983
Response to Staff Concerns on the
Six Month Control of Heavy Loads Submittal

1. NSP should develop and implement safe load paths for major heavy loads which are handled by the reactor building polar cranes. Development of such a program should consist of determination by engineering staff review of the optimum load path or corridor, formalization in drawings and inclusion in appropriate procedures, and development of suitable visual aids to aid the crane operator and ensure compliance without regard for load categories, system redundancy, and intervening floors.

RESPONSE

All load handling operations in containment are controlled by the plant procedure D58. For certain loads (ie, Reactor Head, upper internals, etc.) reference is made to other specific procedures which deal with handling of that particular component. Instructions are provided that when a "new" heavy load is identified, guidance is provided as to what considerations must be addressed in generating a load handling procedure. These considerations include:

1) Identification of load to be moved.
2) Inspection and acceptance criteria required before movement of the load.
3) The steps and proper sequence to be followed in handling the load.
4) Defining the safe load path in accordance with NUREG-0612.
5) Special Precautions

Any new load handling procedure or revisions to existing procedures require plant Operations Committee review in accordance with plant administrative procedures.

Additionally, at least one man of the load handling crew, in addition to the crane operator will be responsible for ensuring that the defined safe load path is followed.

2. NSP should establish exclusion areas for the turbine building main steam and feedwater piping and the auxiliary building BASTs similar to the area established for the 4.16-kV switchgear.

RESPONSE

An exclusion area has been established above the auxiliary building BASTs similar to the area established for the 4.16 kV switchgear.

It has been determined that the turbine building main steam and feedwater piping are not required for safe shutdown or decay heat removal and heavy load handling restrictions are therefore not required.

NSP should conduct a load test of special lifting devices in accordance with ANSI N14.6-1978.

RESPONSE

Three special handling devices were identified at Prairie Island; Reactor Internals Lifting Rig, Reactor Head Lifting Rig, and the Turbine Components Lifting Assembly. Each of these devices will be discussed separately below.

Internals Lifting Rig:

The internals lifting rig is designed to lift both the lower internals and the upper internals. The lower internals have been lifted and are greater than twice the weight of the upper internals. Since the load of concern is upper internals (lifting while fuel is in the reactor), a load test has indeed occurred.

Reactor Head Lifting Device:

Figure 1 is a sketch of the Reactor Head Lifting Device. The three vertical legs and control rod drive mechanism platform assembly are permanently attached to the reactor vessel head lifting legs. The tripod assembly is attached to the three vertical legs and is used when installing and removing the reactor vessel head. During plant operations, the sling assembly is removed and the three vertical legs and platform assembly remain attached to the reactor vessel head. As can be seen from the sketch the lifting device is a rather simple mechanical device with mostly pin connections.

Table 1 summarizes the stresses on each of the parts which make up the Reactor Head Lifting Device. All stresses are below the ANSI N14.6 allowable limits [3(weight) < Yield Strength, 5(weight) < Ultimate Strength].

Turbine Components Lifting Assembly

Figure 2 is a sketch of the Turbine Components Lifting Assembly. The device is used as a spreader assembly for disassembly and reassembly of turbine components. This device is used in conjunction with slings to carry large turbine components.

Table 2 summarizes the stresses on each part which make-up the Reactor Head Lifting Device. All stresses are below the ANSI N14.6 allowable limits.

General

Since the above summarized analysis shows sufficient margins to yield and ultimate strength exist, we conclude the devices meet the intent of the ANSI N14.6 standard. Furthermore, prior to use during an outage certain inspections are conducted to insure the devices continue to comply with the standard. Visual inspection will occur at each outage prior to use of the device. Additionally the specific lifting devices will be included in the plant N.D.E. program so that welds and other critical areas are inspected at an interval consistent with other safety-related components.

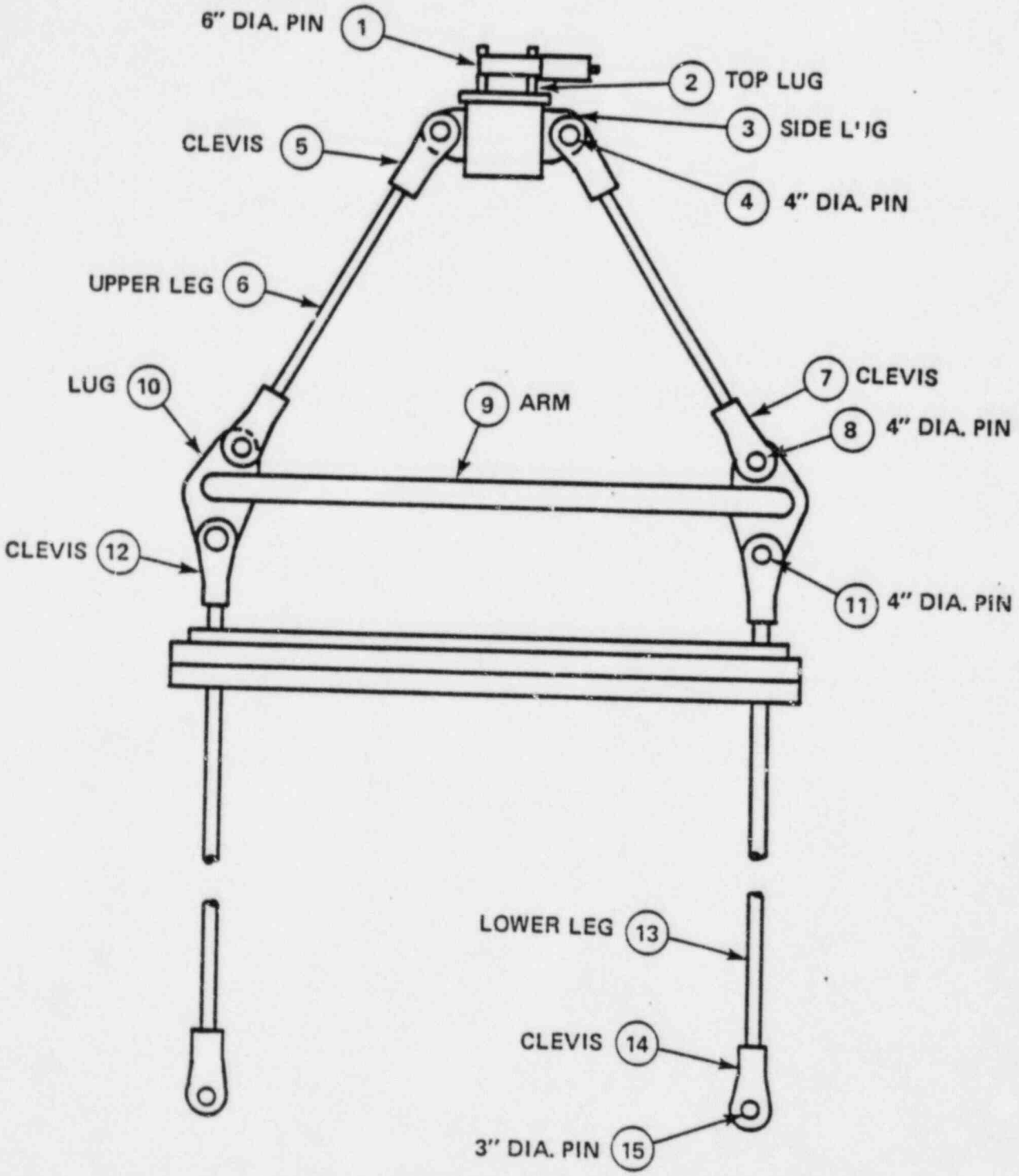

Figure 1 Reactor Vessel Head Lift Rig

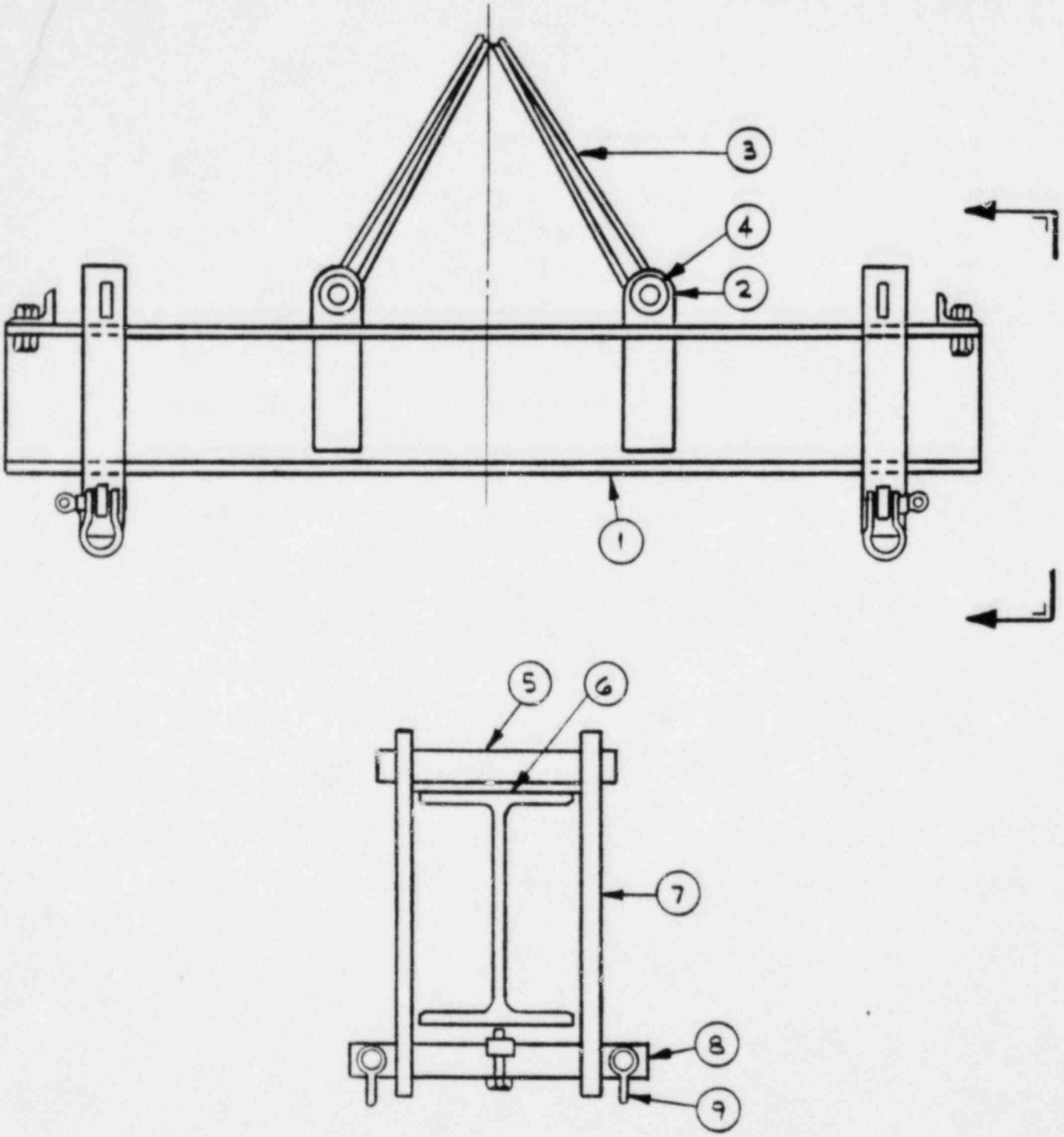

FIGURE 2 TURBINE COMPONENTS LIFTING ASSEMBLY

TABLE 1

SUMMARY OF RESULTS

REACTOR VESSEL HEAD LIFT RIG

Item (a) No.	Part Name And Material	Calculated Stresses (ksi) Designation	Value W(b)	3W	5W	Material Allowable (ksi) S_y (c)	S_{ult} (d)
1	6" Dia Pin	Bending	13.75	41.25	68.75	120	135
	A434	Shear	3.31	9.93	16.55		
	AISI 4340	Bearing	4.98	14.94	24.9		
	CL BD						
2	Top Lug	Tension @ Hole	6.25	18.75	31.25	38	70
	A 515 GR 70	Shear @ Hole	5.35	16.05	26.75		
		Bearing	6.21	18.63	31.05		
3	Side Lug	Tension @ Hole	3.82	11.46	19.1	38	70
	A515 GR 70	Shear @ Hole	3.82	11.46	19.1		
		Combined Bending & Tension	5.13	15.39	25.65		
		Shear	1.73	5.19	8.65		
		Bearing	5.71	17.13	28.55		

(a) See Figure 5-1 for location of item and numbers and section
(b) W is the total statis weight of the component and the lifting device
(c) S_y is the yield stregth of the material (ksi)
(d) S_{ult} is the ultimate stregth of the material (ksi)

TABLE 1

SUMMARY OF RESULTS

REACTOR VESSEL HEAD LIFT RIG

Item (a) No.	Part Name And Material	Designation	Calculated Stresses (ksi) Value W(b)	3W	5W	Material Allowable (ksi) S_y (c)	S_{ult} (d)
4	4" Dia Pin A434 CLBD AISI 4340	Same as Item 8	Same as Item 8	Same as Item 8	Same as Item 8	110	140
5	Clevis A105 GR1	Same as Item 7	Same as Item 7	Same as Item 7	Same as Item 7	30	60
6	Upper Leg A306 GR70	Tension @ Thread	6.19	18.57	30.95	35	70
		Shear @ Thread	1.91	5.73	9.55		
		Tension @ 4" Dia Hole	5.46	16.38	27.3		
7	Clevis A105 GR1	Tension @ Hole	4.28	12.84	21.4	30	60
		Shear @ Hole	2.14	6.42	10.7		
		Bearing	5.99	17.97	29.95		
		Tension @ Th'd Relief	2.21	6.63	11.05		
		Shear @ Thread	1.89	5.67	9.45		
8	4" Dia Pin A434 CLBD AISI 4340	Bending	10.59	31.77	52.95	110	140
		Shear	2.73	8.19	13.65		

TABLE 1

SUMMARY OF RESULTS

REACTOR VESSEL HEAD LIFT RIG

Item (a) No.	Part Name And Material	Calculated Stresses (ksi) Designation	Value W(b)	3W	5W	Material Allowable (ksi) S_y (c)	S_{ult} (d)
9	Arm	Compressive (Buckling)	1.97	5.91	9.85	(*)F_c = 20.4	
	A106 GRB	Shear @ Weld	1.097	3.29	5.48	35	70
		Compression @ Weld	.633	1.89	3.16	35	70
10	Lug	Tension @ Hole	5.72	17.16	28.6	35	70
	A516 GR70	Shear	5.72	17.16	28.6		
		Bearing	5.72	17.16	28.6		
11	4" Dia Pin	Bending	9.62	28.86	48.1	110	140
	A434 CLBD	Shear	2.48	7.44	12.4		
	AISI 4340	Bearing	5.19	15.57	25.95		
12	Clevis	Tension @ Hole	3.89	11.6	19.45	30	60
	A105 GR1	Shear @ Hole	1.95	5.85	9.75		
		Bearing	4.07	12.21	20.35		
		Tension Th'd Relief	2.13	6.39	10.65		
13	Lower Leg	Tension @ Thread	5.62	16.86	28.1	35	70
	A306 GR70	Shear @ Thread	1.73	5.19	8.65		
		Tension @ 4" Dia Hole	4.96	14.88	24.8		

(*) F_c is the compressive buckling strength of the material (ksi)

TABLE 1

SUMMARY OF RESULTS

REACTOR VESSEL HEAD LIFT RIG

Item (a) No.	Part Name And Material	Calculated Stresses (ksi) Designation	Value W(b)	3W	5W	Material Allowable (ksi) S_y (c)	S_{ult} (d)
14	Clevis	Tension @ Hole	2.68	8.04	13.4	30	60
	A105 GR1	Shear @ Hole	1.34	4.02	6.7		
		Bearing	4.67	14.01	23.35		
		Tension @ Th'd Relief	1.72	5.16	8.60		
15	3" Dia Pin	Bending	20.18	60.54	100.9	110	140
	A434 CLBD	Shear	3.79	11.37	18.95		
	AISI 4340	Bearing	8.93	26.79	44.65		

TABLE 2

SUMMARY OF RESULTS

TURBINE COMPONENTS LIFTING ASSEMBLY

Item (a) No.	Part Name And Material	Calculated Stresses (ksi) Designation	Value W(b)	3W	5W	Material Allowable (ksi) S_y (c)	S_{ult} (d)
1	W36x182 Beam	Bearing	10.11	30.33	50.55	36	58
		Shear	3.13	9.39	15.65	36	58
		Bending	10.8	32.4	54.0	36	58
2	Beam Hanger	Bearing	8.80	26.4	44.0	35	65
		Shear	1.27	3.81	6.35	35	65
		Tension	5.60	16.8	28.0	35	65
		Weld	3.61	10.83	18.05		70
3	Sling 1.75"	Tension	23.1	69.3	115.5	125	250
4	Lifting Pin	Shear	4.80	14.4	24.0	30	55
5&6	Yoke Strongback & Bearing Plate	Bending	4.51	13.53	22.55	35	65
		Shear	1.23	3.69	6.15	35	65
7	Yoke Strap	Bearing	6.17	18.51	30.85	35	65
		Tension	5.35	16.05	26.75	35	65

TABLE 2

SUMMARY OF RESULTS

TURBINE COMPONENTS LIFTING ASSEMBLY

Item (a) No.	Part Name And Material	Designation	Calculated Stresses (ksi) Value W(b)	3W	5W	Material Allowable (ksi) S_y (c)	S_{ult} (d)
8	Shackle Bar	Bearing	4.49	13.47	22.45	35	65
		Shear	1.59	4.77	7 95	35	65
		Bending	6.01	18.03	30.05	35	65
9	Shackle 2.5"	Tension	40.1	120.3	200.5	325	650