Attachment 2

TMI-2 RECOVERY PROGRAM

HEAD & INTERNALS HANDLING EQUIPMENT DESIGN LOADS & STRESS EVALUATION SUMMARY

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FEBRUARY 1983

HEAD & INTERNALS HANDLING FIXTURE AND ITEM HANDLING EXTENSION

1. The design load for the Fixture and Extension was as follows:

   (360 KIPS) X (3G's - Allowance for shock or impact effect)

2. The allowable stresses were as follows:

   A. Yield strength (From no particular code) - Where tensile, bending, bearing and shear stresses were concerned.

   B. AISC Manual - Where compressive and weld stresses were concerned.

   C. AISC Manual - Where combined (Compressive and bending or tensile and bending) stresses were concerned except that in the equations the yield strength (Fy) was used for F_b and .6Fy.

TURNBUCKLE PENDANT

1. The design loads were 120 KIPS for the turnbuckle and 360 KIPS for the remaining part numbers.

2. The allowable stress for all part numbers except the turnbuckle was the yield strength (from no particular code).

3. The proof (roughly, yield) and ultimate loads for the turnbuckle were 244.4 KIPS (S.F.2 x 122.2 KIP safe working load) and 611 KIPS (S.F.5 x 122.2 KIP safe working load) respectively.

HANDLING FIXTURE SLING

1. The design load was 360 KIPS

2. The ultimate load for the wire rope was 818 KIPS.

HEAD AND INTERNALS HANDLING FIXTURE ACTUAL VS. ALLOWABLE STRESSES (KSI)

Part No.	Tensile		Bending		Combined Stress Factor	Compressive		Shear		Weld Stress		Bearing		Yield Strength Sy	Ultimate Strength Su
	ft	Ft	fb	Fb		fa	Fa	fv	Fv	Act.	All.	fp	Fp		
247&248	20.3	36	11.6	36	.89 < 1.0	-	-	-	-	-	-	-	-	36	58
249	-	-	21.3	36	.98 < 1.0	11.6	34.8	-	-	-	-	-	-	36	58
245	-	-	-	-	-	10.3	20.1	-	-	-	-	-	-	40	70
241	9.6	36	6.6	36	-	-	-	6.6 (Tearout by P/N 320)	36	-	-	11.4 (P/N 320 Against P/N 241)	36	36	58
320	-	-	18.2	66	-	-	-	8.3	66	-	-	12.5	66	66	100
241 to 247 and 249 weld	-	-	-	-	-	-	-	-	-	11.4	18	-	-	36	58
251	1.5	40	-	-	-	-	-	-	-	-	-	-	-	40	70
242	-	-	8.4	36	-	-	-	-	-	-	-	-	-	36	58
249 to 243 weld	-	-	-	-	-	-	-	-	-	13.2	18	-	-	36	58
240	20.7	36	-	-	-	-	-	18.7 (Tearout)	36	-	-	28.7 (Pin Bearing)	36	36	58
247 or 248 to 240 weld	-	-	-	-	-	-	-	-	-	12	18	-	-	36	58

INTERNALS HANDLING EXTENSION ACTUAL VS. ALLOWABLE STRESSES (KSI)

Part No.	Tensile		Shear		Bearing		Bending		Yield Strength	Ultimate Strength
	ft	Ft	fv	Fv	fp	Fp	fb	Fb	Sy	Su
223	24	36	21.1 (Tearout)	36	23.6 (P/N 229 Against P/N 223)	36	-	-	36	58
224	23.3	36	20.9 (Tearout)	36	28.7 (P/N 230 Against P/N 224)	36	-	-	36	58
222	34.4 *	50	30.5 (Tearout) *	50	38.2 (P/N 230 Against P/N 222) *	50	-	-	50	70
228	-	-	6.2	40	15.7	40	12	40	40	80
229	-	-	14	66	23.7	66	41.1	66	66	100
230	-	-	17.6	66	28.8	66	33.8	66	66	100

*Effect of part numbers 225 and 226 and associated welding was neglected in the calculation of this stress.

TURNBUCKLE PENDANT ACTUAL VS. ALLOWABLE STRESSES (KSI)

Part No.	Tensile		Shear Tearout		Thread Shear		Pin Bearing		Yield Strength	Ultimate Strength
	ft	Ft	fv	Fv	fv	Fv	fp	Fp	Sy	Su
375	9.9	36	8.9	36	8	36	12.2	36	36	58
376/377	43.2	52	-	-	10.6	52	-	-	52	90

*HANDLING FIXTURE SLING END FITTING ACTUAL VS. ALLOWABLE STRESSES (KSI)

Part Name	Shear		Tensile		Bearing		Bending		Yield Strength Sy	Ultimate Strength Su
	fv	Fv	ft	Ft	fp	Fp	fb	Fb		
Open Socket	8.9 (Tearout)	50	16	50	13.7	50	-	-	50	80
Closed Socket	9.2 (Tearout)	50	15.9	50	12.5	50	-	-	50	80
5½" Dia Pin	8.3	40	-	-	13.7	40	18.2	40	40	80

*Assumptions concerning socket geometry and socket and pin materials were made; therefore, the actual stresses in this table are subject to verification.

Water Volume for Unborated Water System Inside Containment

1) Reactor Building Fire Protection: FS-V639-FS-V637, Penetration No. R-543, 1,800 gal.

2) Reactor Building Demineralized Water: Penetration No. R-535, DW-V31-DW-V141, 100 gal.

3) Reactor Building Nuclear Services Closed Cooling Water: Penetration No. R-557 and No. R-658, 900 gal.

4) Reactor Building Intermediate Closed Cooling Water Penetration No. R-563 and No. R-667, 500 gal.

5) Reactor Building Normal Cooling:

   A. Inside the Reactor Building - Penetration No. R-577, R-579, R-580, R-584, R-587, R-588, R-585, R-581, R-582 and R-578 (normal cooling coils), 6,400 gal.

   B. Total Reactor Building Normal Cooling - Volumes consisting of Part A plus the volume outside the Reactor Building, 12,200 gal.

6) Secondary Side of SG Including Steam and FW Piping, 41,000 gal/loop. B Generator drained and A Generator at head removal level and MS and FW lines drained, 12,488 gal.