TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

November 10, 1982

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

In the Matter of the Application of) Docket Nos. 50-390
Tennessee Valley Authority) 50-391

During an April 1, 1982 telephone conference call with the NRC's Mechanical Engineering Branch, TVA was requested to provide additional information on Watts Bar Nuclear Plant. At the NRC's request, TVA performed a sampling program to verify that the buckling stresses in axial compression members used in pipe support configurations do not exceed 90 percent of the yield strength when their slenderness ratio is less than 30.

TVA investigated 515 randomly selected supports in 19 different systems. The results show that all 252 supports with slenderness ratios less than 30 met the applicable requirements for prevention of critical buckling. The remaining supports sampled had slenderness ratios greater than or equal to 30. Enclosed is a tabular summary of the results of TVA's evaluation.

If you have any questions concerning this matter, please get in touch with D. P. Ormsby at FTS 858-2682.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Licensing

Sworn to and subscribed before me
this 10th day of November 1982
Paulette H. White
Notary Public
My Commission Expires 9-5-84

Enclosure
cc: See page 2

B001

cc: U.S. Nuclear Regulatory Commission (Enclosure)
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

TVA 4890 (CON-3-58)

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 8-26-82

CHECKED RL ILICH DATE 10-1-82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.	SYSTEM
1	12-1AAB-R17 (BP)	COLUMN	3.92 K	47.6 IN-K	73.1	f_a = 1.07	.64	1.5	MAC 8/25	GLP 9-15		AUX BOILER
2	62-1CVC-R12 (BP)	"	.03 K	0	BUCKLING NOT INVOLVED				MAC 8/25	GLP 9-15		CVCS
3	62-1LCV-R71 (BP)	"	.112 K	0	>30				MAC 8/25	GLP 9-15		L.P. CVCS
4	" -R75 (BP)	"	.208 K	0	>30				MAC 8/25	GLP 9-15		"
5	" -R76 (BP)	"	.240 K	0	>30				MAC 8/25	GLP 9-15		"
6	" -R83 (BP)	"	.256 K	0	>30				MAC 8/25	GLP 9-15		"
7	" -R90 (BP)	"	.304 K	0	>30				MAC 8/25	GLP 9-15		"
8	" R91 (BP)	"	.160 K	0	>30				MAC 8/25	GLP 9-15		"
9	47A406-7-64 (TVA)	"	.032 K	0	BUCKLING NOT INVOLVED				MAC 8/25	GLP 9-15		CVCS
10	" -7-66 (TVA)	"	.032 K	0	BUCKLING NOT INVOLVED				MAC 8/25	GLP 9-15		"
11	" -7-67 (TVA)	"	.032 K	0	BUCKLING NOT INVOLVED				MAC 8/25	GLP 9-15		"
12	" -7-68 (TVA)	"	.048 K	.152 K/IN	BUCKLING NOT INVOLVED				MAC 8/25	GLP 9-15		"
13	" -7-69 (TVA)	"	.032 K	0	BUCKLING NOT INVOLVED				MAC 8/25	GLP 9-15		"
14	" -7-70 (TVA)	"	.032 K	0	BUCKLING NOT INVOLVED				MAC 8/25	GLP 9-15		"
15	" -7-71 (TVA)	"	.048 K	0	BUCKLING NOT INVOLVED				MAC 8/25	GLP 9-15		"
16	" -7-72 (TVA)	"	.032 K	0	BUCKLING NOT INVOLVED				MAC 8/25	GLP 9-15		CVCS
17	1-70-979 (EDS)	"	.658 K	1.65 K/IN	13.83	f_a = .414	.110	1.5	MAC 8/25	GLP 9-15		COMP COOL
18	70-1CC-R249 (BP)	COLUMN	39.84 K	0	12.12	f_a = 5.42	.265	1.5	MAC 8/26	GLP 9-15		COMP COOL

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 8-27-82

CHECKED R ILIN DATE 10-1-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL	MOMENT	KL/r	BUCKLING STRESS	INT-VALUE	ALL. INT. VAL.	REG. BY / DATE	CHK. BY / DATE	COMMENT
(BP) 67-1ERCW-R343	COLUMN	22.24 K	0	7.6	f_a = 1.87	.088	1.5			SYSTEM
		53.44 K	0	3.92	f_a = 4.49	.209	1.5	MAC 8/26	GLP 9-16	ITEM # 3 ESSENTIAL RAW COOLING WATER
(BP) 67-1ERCW-R96	"	11.04 K	0	20.58	f_a = 2.89	.142	1.5	MAC 8/26	GLP 9-16	ITEM # 5 ESSENTIAL RAW COOLING WATER
(EDS) 1-03A-209	"	22.35 K	0	7.52	f_a = 3.04	.143	1.5	MAC 8/26	GLP 9-16	FEED WATER
(EDS) 1-03A-208	"	20.77 K	0	8.72	f_a = 2.82	.133	1.5	MAC 8/26	GLP 9-16	FEED WATER
(EDS) 1-03A-247	"	9.1 K	0	8.8	f_a = 1.24	.058	1.5	MAC 8/26	GLP 9-16	FEED WATER
(EDS) 1-03A-246	"	4.95 K	0	6.58	f_a = .81	.038	1.5	MAC 8/26	GLP 9-16	FEED WATER
(EDS) 1-03A-249	"	11.73 K	0	8.18	f_a = 1.6	.075	1.5	MAC 8/26	GLP 9-16	FEED WATER
(EDS) 1-03A-284	"	33.04 K	0	6.18	f_a = 4.06	.19	1.5	MAC 8/26	GLP 9-16	FEED WATER
(EDS) 1-03A-286	"	12.3 K	6.92 K/IN	8.8	f_a = 1.61	.146	1.5	MAC 8/26	GLP 9-16	FEED WATER
(EDS) 1-03A-291	"	12.42 K	0	7.88	f_a = 1.69	.08	1.5	MAC 8/26	GLP 9-16	FEED WATER
(EDS) 1-03A-325	"	42.64 K	0	6.52	f_a = 6.04	.284	1.5	MAC 8/26	GLP 9-16	FEED WATER
(EDS) 1-03A-329	"	7.91 K	7.41 K/IN	6.84	f_a = 1.73	.187	1.5	MAC 8/26	GLP 9-16	FIRE PROTECTION
(EDS) 1-03A-331	"	12.45 K	7.0 K/IN	8.63	f_a = 1.69	.147	1.5	MAC 8/26	GLP 9-16	FEED WATER
(TVA) 47A491-10-1	"	.24 K	1.9 K/IN	21.3	f_a = .151	.13	1.5	MAC 8/27	RLI 9/15	FIRE PROTECTION
(TVA) 47A491-10-2	"	.24 K	1.95 K/IN	21.3	f_a = .151	.13	1.5	MAC 8/27	RLI 9/14	FIRE PROTECTION
(TVA) 47A491-10-6	"	.064 K	3.5 K/IN	18.3	f_a = .4	.237	1.5	MAC 8/27	RLI 9/15	FIRE PROTECTION
(BP) 26-1FP-R56	"	4.8 K	0	30	f_a = .36	.04	1.5	MAC 8/27	RLI 9/15	H.P. FIRE PROTECTION
(BP) 26-1FP-R57	"	4.8 K	0	30.1	f_a = .86	.04	1.5	MAC 8/27	RLI 9/15	H.P. FIRE PROTECTION
(BP) 26-1FP-R59-1	COLUMN	2.56 K	0	14.04	f_a = 1.0	.05	1.5	MAC 8/27	RLI 9/15	H.P. FIRE PROTECTION

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 8-27-82

CHECKED R ILICH DATE 10-1-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT-VALUE	ALL. INT. VAL.	DES. BY/DATE	CHK. BY/DATE	COMMENT.
(TVA) 47A491-8-10	COLUMN	.096 K	.87 K/IN	30	fa=.025	.002	1.5	MAC 8/27	RLI 9/15	SYSTEM FIRE PROTECTION
(TVA) 47A491-8-12	"	.24 K	1.28 K/IN	14.6	fa=.068	.018	1.5	MAC 8/27	RLI 9/15	FIRE PROTECTION
(TVA) 47A491-8-14	"	.24 K	1.31 K/IN	21.3	fa=.15	.082	1.5	MAC 8/27	RLI 9/15	FIRE PROTECTION
(BP) 78-1FPC-R73	"	32 K	0	13.7	fa=10.6	.51	1.5	MAC 8/27	RLI 9/15	FUEL COOLING
(BP) 78-1FPC-R59	"	.96 K	0	30	fa=.43	.021	1.5	MAC 8/27	RLI 9/15	FUEL POOL COOLING
(BP) 78-1FPC-R58	"	.32 K	0	30	fa=.143	.007	1.5	MAC 8/27	RLI 9/16	FUEL POOL COOLING
(BP) 78-1FPC-R46	"	2A K	0	13.7	fa=.79	.038	1.5	MAC 8/27	RLI 9/16	FUEL POOL COOLING
(TVA) 47A462-8-39	"	.09 K	11.8 K/IN	30	fa=.054	.002	1.5	MAC 8/30	RLI 9/16	ICE CONDENSER
(TVA) 47A462-8-40	"	.09 K	8.05/10	30	fa=.05	.51.5	1.5	MAC 8/30	RLI 9/16	ICE CONDENSER
(TVA) 47A462-8-38	"	.15 K	12.5 K/IN	30	fa=.10	.79	1.5	MAC 8/30	RLI 9/16	ICE CONDENSER
(TVA) 47A462-8-37	"	.15K	12.5 K/IN	30	fa=.10	.79	1.5	MAC 8/30	RLI 9/16	ICE CONDENSER
(TVA) 47A462-8-17	"	.72K	0	30	fa=.2	.01	1.5	MAC 8/30	RLI 9/16	ITEM #3 ICE COND
(EDS) 1-01A-426	"	206.5 K	0	1.86	fa=26.1	1.21	1.5	MAC 9/1	RLI 9/16	MAIN STEAM
(EDS) 1-01A-385	"	82.3 K	0	4.65	fa=10.4	.483	1.5	MAC 9/1	RLI 9/16	MAIN STEAM
(EDS) 1-01A-345	"	56.7K	0	4.65	fa=7.17	.333	1.5	MAC 9/1	RLI 9/16	MAIN STEAM
(EDS) 1-01A-347	"	137.0 K	0	7.1	fa=16.8	.79	1.5	MAC 9/1	RLI 9/16	MAIN STEAM
(EDS) 1-01A-315	"	92.2K	0	19.5	fa=7.8	.36	1.5	MAC 9/1	RLI 9/16	MAIN STEAM
(EDS) 1-01A-311	"	96.7 K	0	20.9	fa=13.7	.67	1.5	MAC 9/2	RLI 9/16	MAIN STEAM
(EDS) 1-01A-310	COLUMN	168.3	0	22.3	fa=11.7	.57	1.5	MAC 9/2	RLI 9/16	MAIN STEAM.

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 9/14

CHECKED RLI DATE 10/1/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	Kℓ/r	BUCKLING STRESS.	INT. VALUE.	ALL. INT. VAL.	DES: BY / DATE	CHK: BY / DATE	COMMENT.	SYSTEM
(EDS) 2-01A-385	COLUMN	38.0K	0	46	f_a = 4.78	.227	1.5	MAC 9/15	RLI 9/16		MAIN STEAM
(EDS) 2-01A-347	"	176.2K	0	16.4	f_a = 21	1.01	1.5	MAC 9/13	RLI 9/16		MAIN STEAM
(EDS) 2-01A-345	"	31.5K	0	3.7	f_a = 3.96	.184	1.5	MAC 9/13	RLI 9/16		MAIN STEAM
(EDS) 2-01A-315	"	214.1K	0	20.2	f_a = 18.15	.88	1.5	MAC 9/14	RLI 9/16		MAIN STEAM
(EDS) 2-01A-311	"	96.7K	0	20.9	f_a = 13.63	.67	1.5	MAC 9/14	RLI 9/16		MAIN STEAM
(EDS) 2-01A-306	"	18.02K	0	3.7	f_a = 2.67	.11	1.5	MAC 9/14	RLI 9/16		MAIN STEAM
(EDS) 1-68-270	"	.43	6.95K/IN	30	f_a = .21	.43	1.5	MAC 9/14	RLI 9/16		REACTOR COOLANT
(EDS) 1-68-273	"	.443K	0	19.27	f_a = .171	.008	1.5	MAC 9/14	GLP 9/16		REACTOR COOLANT
(EDS) 1-68-320	"	.677K	4.8K/IN	8.65	f_a = .43	.310	1.5	MAC 9/14	GLP 9-16		REACTOR COOLANT
(TVA) 47A465-8-1	"	.816K	0	13.77	f_a = 1.65	.079	1.5	MAC 9/14	GLP 9-16		REACTOR COOLANT
(TVA) 47A465-8-17	"	.032K	0	7.30				MAC 9/14	GLP 9-16		REACTOR COOLANT
(TVA) 47A432-3-1	"	.099K	.22K/IN	4.25	f_a = .06	.016	1.5	MAC 9/14	GLP 9-16		RHR
(BP) L3-1515-R28	"	1.76K	0	4.57	f_a = 1.65	.077	1.5				SAFETY INJECTION
(EDS) PROB(15-02) 1-87-037	"	1.76K	0	12.78	f_a = 1.04	.05	1.5	MAC 9/14	GLP 9-16	ITEM #1 ~~2nd 150.~~ ITEM #2 ~~2nd 150.~~	UPPER HEAD INJECTION
(EDS) PROB.(15-02) 1-87-058	"	20.8K	0	10.34	f_a = 4.41	.208	1.5	MAC 9/14	GLP 9-16		UPPER HEAD INJECTION
(EDS) PROB(15-02) 1-87-59	"	6.28K	0	1.76	f_a = 1.65	.076	1.5	MAC 9/14	GLP 9-16		UPPER HEAD INJECTION
(EDS) PROB:(15-02) 1-87-60	"	13.70K	0	10.86	f_a = 2.92	.138	1.5	MAC 9/14	GLP 9-16		UPPER HEAD INJECTION
(EDS) PROB:(15-02) 1-87-61	"	16.0K	0	30.0	f_a = 3.39	.16	1.5	MAC 9/14	RLI 9/16		UPPER HEAD INJECTION
(EDS) PROB:(15-02) 1-87-63	COLUMN	13.8K	0	17.6	f_a = 2.79	.135	1.5	MAC 9/14	RLI 9/16		UPPER HEAD INJECTION
		47.1K	0	30.5	f_a = 10.11	.58	1.5	MAC 9/14	RLI 9/16		UPPER HEAD INJECTION

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 9/29

CHECKED RLI DATE 10/1/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	Kl/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES: BY / DATE	CHK: BY / DATE	COMMENT.	SYSTEM
(EDS) PROB: (15-02) 1-87-64	COLUMN	28.3K	0	130	f_a=6.0	.30	1.5	MAC 9/4	RLI 9/16		UPPER HEAD INJECTION
(EDS) PROB: (15-02) 1-87-067	"	2.88K	0	30	f_a=.76	.04	1.5	MAC 9/15	RLI 9/16		UPPER HEAD INJECTION
(EDS) PROB: (15-02) 1-87-79	"	3.85K	92.4 K/in	15.7	f_a=.545	.788	1.5	MAC 9/15	RLI 9/16		UPPER HEAD INJECTION
(EDS) PROB: (15-02) 1-87-078	"	5.88K	0	30	f_a=1.29	.061	1.5	MAC 9/15	RLI 9/16		UPPER HEAD INJECTION
(EDS) PROB: (15-01) 1-87-036	"	39.8K	0	130	f_a=8.43	.42	1.5	MAC 9/15	RLI 9/16		UPPER HEAD INJECTION
(EDS) PROB: (15-01) 1-87-032	COLUMN	5.48K	0	30	f_a=2.29	.12	1.5	MAC 9/15	RLI 9/16		UPPER HEAD INJECTION
03B-1AFW-R82	"	.112K	0	77.84				JRH 8/26	MAC 9/27	Kl/r > 30	AFW
1-03A-324	"	27.642K	0	2.25	f_a= 3.77KSI	.18	1.5	JRH 8/31	MAC 9/27		FW
1-018-16	"	.14K	0	21.0				GP 9/7	MAC 9/27	OK BY INSPECTION	BLOW DOWN
1-03A-245	"	19.6K	0	3.4	9.71	.45	1.5	DWO 9/27	MAC 9/28		FEED WATER
1-01A-432	"	231	0	37	11.8	.61	1.5	RLI 9/29	MAC 9/29	Kl/r > 30	MAIN STEAM
1-01A-388 2-01A-388	"	197	0	87	8.71	.6	1.5	RLI 9/29	MAC 9/29	Kl/r > 30	MAIN STEAM
12-1AAB-R027	"	1.42	0	32	1.89	.1	1.5	RLI 9/29	MAC 9/29	Kl/r > 30	AUXILIARY BOILER
12-1AAB-R055	"	"	"	"	"	"	"	RLI 9/29	MAC 9/29	"	AUXILIARY BOILER
72-1CS-R31	"	2.72	0	9	1.2	.06	1.5	RLI 9/29	MAC 9/29		CONTAIN-MENT SPRAY
1-72-7	"	58.8	0	18	13	.63	1.5	RLI 9/29	MAC 9/29		RESIDUAL HEAT REMOVAL
1-03A-242	"	51.5	0	47	3.8	.21	1.5	RLI 9/29	MAC 9/29	Kl/r > 30	FEED WATER
1-03A-202	"	"	"	"	"	"	"	RLI 9/29	MAC 9/29	"	FEED WATER
1-01A-430	"	139	0	40	11.8	.61	1.5	RLI 9/29	MAC 9/29	Kl/r > 30	MAIN STEAM

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED EJP DATE 8/16/82

CHECKED RLJ DATE 10-1-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING. MAXI. LOADS (1.6) AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY DATE.	CHK. BY DATE.	COMMENT.	SYSTEM
PROB: (06-01) 1-01A-319 (EDS)	SLEEVE	45.5 K	—	.075	f_a = 3.0 KSI	0.14	1.5	EJP 8/16	GLP 9-22-82	RADIAL GRND FLAT PLATE	MN STM
(06-02) 1-01A-356 (EDS)	"	95.4 K	—	.075	f_a = 6.36 KSI	0.30	"	EJP 8/16	GLP 9-22-82	"	"
(06-03) 1-01A-398 (EDS)	"	46.5 K	—	.075	f_a = 3.1 KSI	0.14	"	EJP 8/16	GLP 9-22-82	"	"
(06-04) 1-01A-433 (EDS)	"	89.2 K	—	.075	f_a = 2.0 KSI	0.09	"	EJP 8/16	GLP 9-22-82	"	"
(04-08) 1-70-336 (EDS)	"	0.230 K	0.172 11-K	BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	L's IN BENDIX	COMP COOL.
(04-09) 2-70-136 (EDS)	"	1.58 K	0.79 11-K	BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	RADIAL GRND L's W/R IN BND'G	"
(04-04) 2-70-157 (EDS)	"	0.094 K	—	BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	RADIAL GRND L's ONLY	"
(02-02) 1-03A-243 (EDS)	"	17.8 K	—	0.33	f_a = 0.5 KSI	0.02	1.5	EJP 8/16	GLP 9-22-82	RADIAL GRND FLAT PLATE	FEED WATER
(02-03) 1-03A-282 (EDS)	"	17.1 K	—	0.33	f_a = 0.4 KSI	0.02	1.5	EJP 8/16	GLP 9-22-82	RADIAL GRND FLAT PLATE	FEED WATER
(02-04) 1-03A-322 (EDS)	"	34.6 K	—	0.33	f_a = 0.85 KSI	0.04	1.5	EJP 8/16	GLP 9-22-82	"	"
(09-01) 1-63-010 (EDS)	"	17.2 K	—	2.45	f_a = 2.87 KSI	0.13	1.5	EJP 8/16	GLP 9-22-82	Short 1K RAD GRND ON END	SIS
(03-01) 1-74-2 (EDS)	"	40.8 K	—	2.45	f_a = 4.08 KSI	0.19	1.5	EJP 8/16	GLP 9-22-82	"	RH
ISO: 47W432-206 74-1RHR-R163 (BP)	"	4.8 K	—	BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	RADIAL GRND L's ONLY	RHR
ISO: 47W432-205 74-1RHR-R158 (BP)	"	4.8 K	—	BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	"	"
Anal: N3-26-3A 47A491-6-1 (TVA)	"	0.32 K	—	BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	L's ON OUTSIDE of SLV	FP
Anal: N3-81-1A 47A492-2-9 (TVA)	"	1.23 K	—	BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	"	PRIMARY WATER
Anal: N3-81-1R 47A492-2-5 (TVA)	"	0.34 K	—	BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	"	"
Anal: N3-33-1A 47A492-2-15 (TVA)	SLEEVE	0.9 K	—	1.3	f_a = 0.3 KSI	0.01	1.5	EJP 8/16	GLP 9-22-82	R welded all around inside SLV	SERVICE AIR
19 2-70-315 (EDS)	SLEEVE	0.09 K	—	BUCKLING NOT INVOLVED				EJP 9/22	GLP 9-22-82	RADIAL GRND L's ONLY	COMP COOL

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED GLP DATE 9/7/82

CHECKED RLT DATE 10/1/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING. MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE.	CHK. BY / DATE.	COMMENT. SYSTEM
03B-2AFW-R1	SLEEVE	4.8K	/	BUCKLING NOT INVOLVED				GP 9/7	MAC 9/27	AFW

SHEET 1 OF 1

FINAL EVALUATION REPORT FOR BUCKLING SAMPLE PROGRAM OF PIPE SUPPORTS

COMPUTED RLE DATE 10-14-82

CHECKED MAC DATE 9-21-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT-VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.	SYSTEM
1-70-095	RIGID FRAME	1568 #	/	NO BUCKLING INVOLVED				JRH 8/28	MAC 9/20	ok	COMPONENT COOLING
1-70-816	"	3067.2 #	/	7.08	1.31 KSI	.362	1.5	JRH 8/28	MAC 9/20	hand calcs. ok	"
70-1CC-R312	"	42080 #	/	5.44	4.96 KSI	.355	"	JRH 8/28	MAC 9/20	"	"
1-74-6	"	50801.6 #	/	6.90	10.0 KSI	.470	"	JRH 9/20	MAC 9/20	ok	RESIDUAL HEAT REMOVAL
1-62A-307	"	1892.8 #	/	NO BUCKLING INVOLVED				JRH 8/28	MAC 9/20	ok	H.P. CHEM & VOL. CONTROL
1-87-035	"	7505.6 #	/	NO BUCKLING INVOLVED				JRH 8/28	MAC 9/20	ok	UPPER HEAD INJECTION
1-74-5	"	88216 #	/	6.98	17.37 KSI	.816	1.5	JRH 8/28	MAC 9/20	hand calc's ok	RESIDUAL HEAT REMOVAL
1-74-10	"	30372.8 #	/	5.09	5.98 KSI	.281	"	JRH 8/28	MAC 9/20	"	"
1-74-1	"	12321.6 #	/	3.89	2.43 KSI	.114	"	JRH 8/30	MAC 9/20	"	"
70-1CC-R505	"	3200 #	/	3.16	3.20 KSI	.329	"	JRH 8/30	MAC 9/20	"	COMPONENT COOLING
1-62A-301	"	2816 #	/	2.03	1.02 KSI	.425	"	JRH 8/30	MAC 9/20	"	H.P. CHEM & VOLUME CONTROL
1-62A-302	"	"	/	"	"	"	"	JRH 8/30	MAC 9/20	"	"
62-1CVC-R13	"	2400 #	/	3.49	.619 KSI	.199	"	JRH 8/30	MAC 9/20	"	"
1-74-4	"	24910.4 #	/	2.30	2.49 KSI	.742	"	JRH 8/31	MAC 9/20	"	RESIDUAL HEAT REMOVAL
1-87-62	"	18400 #	/	1.10	0.87 KSI	.041	"	JRH 8/31	MAC 9/21	"	UPPER HEAD INJECTION
47A454-2-46	"	6940.8 #	/	4.51	/	.995	"	JRH 9/2	MAC 9/21	STRUDL CODE CHECK	SFPC
47A454-1-15	"	"	/	4.51	/	"	"	JRH 9/2	MAC 9/21	"	FUEL POOL COOL & CLEAN
1-87-80	"	5920 #	/	19.38	3.56 KSI	1.17	"	JRH 9/2	MAC 9/21	hand calc's ok	UPPER HEAD INJECTION
47A406-3-11	"	192 #	/	21.80	.32 KSI	.087	"	JRH 9/3	MAC 9/21	" UP	CVC

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JRH DATE 9-8-82

CHECKED RLI DATE 10-14-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT	SYSTEM
47A454-3-10	RIGID FRAME	5604.8 #		10.16	1.5 KSI	.229	1.5	JRH 9/3	MAC 9/21	hand calc's ok	SFPS
26-1FP-R232	"	3200 #		22.39	.79 KSI	.039	"	JRH 9/7	MAC 9/21	"	H.P. FIRE PROTECTION
47A492-2-11	"	1443.2 #		6.61	.75 KSI	.213	"	JRH 9/7	MAC 9/21	"	PRIMARY WATER
47A431-9-7	"	1025.6 #		6.91	.36 KSI	.093	"	JRH 9/7	MAC 9/21	"	AUX BOILER PIPING
03B-1AFW-R23	"	6400 #		5.67	.84 KSI	.039	"	JRH 9/7	MAC 9/21	"	AUX FEEDWATER
78-1FAC-R-38	"	3200 #		17.95	1.14 KSI	.67	"	JRH 9/7	MAC 9/21	"	FUEL POOL COOLING
62-1LCV-R81	"	896 #		12.42	.13 KSI	.454	"	JRH 9/8	MAC 9/23	"	L.P. CHEM & VOL CONTR
72-1CS-R20	"	3200 #		5.32	.69 KSI	.188	"	JRH 9/8	MAC 9/23	"	CONTAINMENT SPRAY
70-1CC-R577	"	240 #		3.99	.12 KSI	.046	"	JRH 9/8	MAC 9/23	"	COMPONENT COOLING
62-1LCV-R86	"	208 #		21.44	.05 KSI	.144	"	JRH 9/8	MAC 9/23	"	L.P. CHEM & VOL. CONTR
2-70-804	"	1073.6 #		8.56	.39 KSI	.294	"	JRH 9/8	MAC 9/23	"	COMPONENT COOLING
12-1AAB-R57	"	2240 #		7.01	1.10 KSI	.799	"	JRH 9/8	MAC 9/23	"	AUX BOILER
12-1AAB-R67	"	"		"	"	"	"	JRH 9/8	MAC 9/23	"	"
12-1AAB-R053	"	"		"	"	"	"	JRH 9/8	MAC 9/23	"	"
12-1AAB-R052	"	"		"	"	"	"	JRH 9/6	MAC 9/23	"	"
47A435-2-11	"	288 #		10.27	.183 KSI	.199	"	JRH 9/8	MAC 9/23	"	SIS
26-1FP-R61	"	6400 #		3.16	.734 KSI	.034	"	JRH 9/8	MAC 9/23	"	H.P. FIRE PROTECTION
26-1FP-R63	"	2400 #		6.35	.813 KSI	.61	"	JRH 9/9	MAC 9/23	"	"
62-1LCV-R80	"	480 #		21.05	.114 KSI	.01	"	JRH 9/9	MAC 9/23	"	L.P. CHEM & VOL. CONTR

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JRH DATE 9/9/82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE.	ALL. INT. VAL.	DES. BY / DATE.	CHK. BY / DATE.	COMMENT.	SYSTEM
78-1FRC-R18	RIGID FRAME	1280 #		17.26	.806 KSI	.288	1.5	JRH 9/9	MAC 9/23	hand calc's ok	FUEL POOL COOLING
67-1ERCW-R116	"	"		"	"	"	"	JRH 9/9	MAC 9/23	"	ESSENTIAL RAW COOLING WATER
62-1LCV-R84	"	NO BUCKLING INVOLVED						JRH 9/9	RLI 10/7		L.P. CHEM & VOL. CONT.
78-1FRC-R7	"	640 #		21.42	.676 KSI	.60	"	JRH 9/9	MAC 9/23	"	FUEL COOLING
78-1FRC-R4	"	"		21.42	"	.60	"	JRH 9/9	MAC 9/23	"	"
78-1FRC-R19	"	1280 #		26.39	2.02 KSI	1.03	"	JRH 9/9	MAC 9/23	"	"
62-1LCV-R87	"	"		"	"	"	"	JRH 9/9	MAC 9/23	"	L.P. CHEM & VOL CONTR
62-1LCV-R82	"	"		"	"	"	"	JRH 9/9	MAC 9/23	"	"
47A435-2-8	"	848 #		26.15	1.25 KSI	1.01	"	JRH 9/9	MAC 9/23	"	SAFETY INJECTION
63-1SIS-R24	"	"		"	"	"	"	JRH 9/9	MAC 9/23	"	"
70-1CC-R186	"	400 #		BUCKLING NOT INVOLVED				JRH 9/9	MAC 9/23	ok	COMPONENT COOLING
70-1CC-R118	"	304 #		.722	.034 KSI	.002	1.5	JRH 9/9	MAC 9/23	hand calc's ok	
47A555-10-2	"	96 #		21	.192	.01	1.5	JRH 9/9	RLI 10/8	ok	LP CVCS
47A555-10-4	"	160 #		.21	.32	.02	1.5	JRH 9/9	RLI 10/8	ok	LP "
1-03B-9	"	3505.6 #		3.99		.364	1.5	JRH 9/10	MAC 9/23	Strud code check	AUX FEEDWATER
-356	"	"		"		"	"				
1-63-16	"	"		"		"	"	JRH 9/10	MAC 9/23	"	SAFETY INJECTION
-351	"	"		"		"	"				
								JRH 9/10	MAC 9/23	"	"

TVA 4890 (CON-3-56)

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FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED RLT DATE 9/23/82

CHECKED MAC DATE 9/23/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	Kℓ/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.	SYSTEM
47A431-9-21	RIGID FRAME	259.2 #	/	30.99	/	/		JRH 9/15	MAC 9/23	Kℓ/r > 30 ∴ ok	AUX BOILER
2-70-067	RIGID FRAMES	5589 #	/	3.01	/	1164	1.5	JRH 9/16	MAC 9/23	STRUDL CODE CHECK	COMPONENT COOLING
47A462-8-27	RIGID FRAME	2980.8 #	/	15.50	2.01 KSI	1.13	"	JRH 9/20	MAC 9/23	hand calc ok	I.C.

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED DWO DATE 9/7/82

CHECKED RLI DATE 10/14/82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS.	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.	SYSTEM
TVA	47A431-9-10	RIGID FRAME	.675K		9.13	.177	.957	1.5	GLP 9-8-82	JRH 9/27		AUX BOILER
EDS	1-63-001	RIGID FRAME	8.68 K		54.5	5.46	.305		GLP 9-8-82	JRH 9/27		SI
EDS	1-01A-352		13.28 K		2.21	3.48	.162		GLP 9-9-82	JRH 9/27		MS
	2-01A-352		236.29 K		.23	1.64	.076					
EDS	1-01A-394		37.88 K		.18	2.37	.11		GLP 9-9-82	JRH 9/27		MS
			92.4 K		.281	4.29	.199					
EDS	1-63-007		11.88 K		.488	2.813	.488		GLP 9-13-82	JRH 9/27		SI
			74.25 K		.314	3.956	.316					
EDS	1-63-006		10.86 K		8.125	2.19 K	.103		GLP 9-13-82	JRH 9/27		SI
	1-74-12		23.76	0	3.64	9.17	.43		GLP 9-29-82	RLI 9/30/82		RHR
			11.88	86.1	16.5	1.68	.27					
	1-87-006				12.1		1.34		JRH 10-7-82	GLP 10-8-82		UHI
	17A586-1-12		10788.8#		3.88		.677		JRH 8/26	MAC 9/82	STRUDL CODE CHECK	ERCW
	17A586-1-13		"		"		"		JRH 8/26	MAC 9/82	"	"
	17A586-1-35		"		"		"		JRH 8/26	MAC 9/82	"	"
	17A586-5-13		"		"		"		JRH 8/26	MAC 9/82	"	"
	47A462-8-6		3327#		8.79	S_a = 1.28 Ksi	.775		DWO 8/27	JBS 9/14	STRUDL CODE CHECK	ICE CONDENSER
	47A462-8-14		"		"	"	"		DWO 8/27	JBS 9/14	"	"
	47A462-8-13		"		"	"	"		DWO 8/27	JBS 9/14	"	"
	47A462-8-5		"		"	"	"		DWO 8/27	JBS 9/14	"	"
	1-03B-39		4320#		10.8				GP 9/7	MAC 9/27	"	AFW

TVA 4690 (CON-3-561)

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED RVI DATE 9/20/82

CHECKED MAC DATE 9-20-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MAXI. LOADS MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT	SYSTEM
1-68-340	RIGID FRAME	379 #	—	Buckling not involved				JRH 8/14	MAC 9/20	ok	RC
26-1FP-R75	"	/	/	"	"	/		JRH 8/14	MAC 9/20	-	HPFP
26-1FP-R77	"	"	/	"	"	/		JRH 8/14	MAC 9/20	"	"
	"	"	—	"	"						
26-1FP-R65	"	"	/	"	"	/		JRH 8/14	MAC 9/20	"	"
26-1FP-R69	"	"	/	"	"	/		JRH 8/14	MAC 9/20	"	"
26-1FP-R71	"	"	/	"	"	/		JRH 8/14	MAC 9/20	"	"
26-1FP-R73	"	"	/	"	"	/		JRH 8/14	MAC 9/20	"	"
26-1FP-R67	"	"	/	"	"	/		JRH 8/14	MAC 9/20	"	"
17-A586-1-1	"	5379 #	/	11.6	/	.733	1.5	JRH 8/16	MAC 9/20	STRUDL CODE CHECK	ERCW
17-A586-1-2	"	"	/	"	/	"	"	JRH 8/16	MAC 9/20	"	"
17-A586-1-5	"	"	/	"	/	"	"	JRH 8/16	MAC 9/20	"	"
17-A586-1-70	"	"	/	"	/	"	"	JRH 8/16	MAC 9/20	"	"
17-A586-5-3	"	"	/	"	/	"	"	JRH 8/16	MAC 9/20	"	"
17-A586-5-4	"	"	/	"	/	"	"	JRH 8/16	MAC 9/20	"	"
17-A586-5-5	"	"	/	"	/	"	"	JRH 8/16	MAC 9/20	"	"
17-A586-5-26	"	"	/	"	/	"	"	JRH 8/16	MAC 9/20	"	"
17-A586-5-33	"	5680 #	/	.91	/	.347	"	JRH 8/16	MAC 9/20	"	"

TVA 4880 (CON-3-58)

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FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED RLT DATE 9-20-82

CHECKED MAC DATE 9-20-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS.	INT. VALUE.	ALL. INT. VAL.	DES. BY / DATE.	CHK. BY / DATE	COMMENT.	SYSTEM
47A465-1-33	RIGID FRAME	24 #		Buckling not involved				JRH 8/18	MAC 9/20	ok	RC
47A450-4-29	"	928 #		9.00	f_a=.247KSI	.031	1.5	JRH 8/18	MAC 9/20	SAGS ok	ERCW
1-03B-11	"	816 #		3.99		.299	"	JRH 8/19	MAC 9/20	"	AFW
47A450-3-157	"	8480 #		6.67	f_a=1.24KSI	.163	"	JRH 8/19	MAC 9/20	"	ERCW
47A450-3-105	"	10400 #		6.67	f_a=1.64KSI	.77	"	JRH 8/19	MAC 9/20	"	"
47A450-21-201	"	1648 #		10.19		.524	"	JRH 8/19	MAC 9/20	Strudl code check	"
03B-1AFW-R10	"	1680 #		6.80		.082	"	JRH 8/20	MAC 9/20	"	"
1-03B-7	"	2880 #		3.99		.344	"	JRH 8/25	MAC 9/20	SAGS ok	AFW
1-03B-12	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
1-03B-13	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
1-03B-14	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
1-03B-60	"	3580.8#		"		.840	"	JRH 8/25	MAC 9/20	"	"
1-03B-10	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
1-03B-8	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
1-63-355	"	"		"		"	"	JRH 8/25	MAC 9/20	"	SAFETY INJECTION
1-63-357	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
1-63-358	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
17A586-5-27	"	2924.8#		7.59		.499	"	JRH 8/25	MAC 9/20	STRUDL CODE CHECK	ERCW

TVA 4890 (CON-3-56)

SHEET 1 OF 7

BRACED CANTILEVER
FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JBJ DATE 8/24/82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL-K	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT GT STRUDL	COMMENT System
~~47A454-1-12~~	Br. Cant.	1.246	1.061	12.58	—	.059	1.5	JBJ 8/18	GLP 9-25-82	Passed Code Check	Fuel Pool cooling + Clean
~~47A454-2-44~~	"	1.245	—	28	—	.08	1.5	JBJ 8/19	GLP 9-28-82	"	"
~~47A454-2-36~~	"	5.32	—	25	—	.87	1.5	JBJ 8/19	GLP 9-25-82	"	"
~~1-63-004~~ (09-01)	"	7.08		11	—	.37	1.5	JBJ 8/20	GLP 9-25-82	"	Safety Injection
~~1-03A-365~~ (02-03)	"	.400	—	19 / AXIAL	Load is Negligible			JBJ 8/20	GLP 9-25-82	Feedwater	OK
~~1-03A-366~~ (02-05)	"	14.32		13	Actual Stress = 3.75 KSI < .9(36 KSI) ∴ OK			JBJ 8/20	GLP 9-25-82	"	OK
~~1-03A-367~~ (02-04)	"	31.28	—	19 <	Actual Stress = 6.86 KSI < .9(36 KSI) ∴ OK			JBJ 8/20	GLP 9-25-82	"	OK
~~1-03B-27~~ (05-01)	"	3.415	—	18.4	Actual stress = .894 < .9(36 KSI) ∴ OK			JBJ 8/23	GLP 9-25-82	Auxiliary feedwater	ok
~~67-1ERCW-R13~~	"	7.012	—	17	Actual Stress = 6.89 KSI < .9(36 KSI) ∴ OK			JBJ 8/23	GLP 9-25-82	ERCW	OK
~~47A450-3-76~~	"		→	95 / 30	OK because $\frac{KL}{r} > 1$			JBJ 8/23	GLP 9-25-82	ERCW	OK
< 30 ~~67-1ERCW-R314~~	"	13.290	50.370	Combined $\frac{KL}{r}$=15.8 member	stress in Compression < .9(36 KSI) ∴ OK			JBJ 8/23	GLP 9-25-82	ERCW $\frac{KL}{r}$=15.8	factor of 1.6 still OK
> 30 ~~67-1ERCW-R314~~	"	9.274	—	$\frac{KL}{r}$=38	MAX STRESS = 1.6 (22 KSI) < .9(36) KSI ∴ OK			JBJ 8/23	GLP 9-25-82	ERCW	OK
~~03B-1AFW-R2~~	"		→	32.38	$\frac{KL}{r} > 30$ ∴ OK			JBJ 8/24	GLP 9-25-82	Aux Feed-water	ok
~~03B-1AFW-R11~~	"		→	46.5	$\frac{KL}{r} > 30$ ∴ OK			JBJ 8/24	GLP 9-25-82	Aux feed-water	OK
		VOID									
~~70-2CC-R42~~	"		→	37.5	$\frac{KL}{r} > 30$ ∴ OK			JBJ 8/24	GLP 9-25-82	Component cooling	OK
< 30 ~~62-1LCV-R88~~	"	.091		$\frac{KL}{r}$=85	AXIAL LOAD NEGLIGIBLE			JBJ 8/24	GLP 9-25-82	L.P. Chemical + Volume Control	OK
		VOID									
~~62-1LCV-R88~~		1.81		29.79	.86 KSI	.043	1.5	JBJ 8/24	GLP 9-25-82	L.P. Chemical + Volume Contr	OK

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BRACED CANTILEVER
FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JBJ DATE 8-31-82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.	
04.10 1-70-800	Braced Cant	5K	-	11.06	4.79 KSI	.228	1.5	JBJ 8-24	GLP 9-27-82	Component Cooling Sys	OK
12-1AAB-R13	"	1.58K		23.7	.414 KSI	.02	1.5	JBJ 8-25	GLP 9-28-82	Aux Boiler	OK
03B-1AFW-R18	"	→		30.4	KL/r 730 :	OK		JBJ 8-25	GLP 9-27-82	Aux Feedwater	OK
78-1FPC-R13	"	→		34.2	KL/r 730 :	OK		JBJ 8-25	GLP 9-27-82	Fuel Pool Cooling	OK
47A435-2-10	"	1.4K		23.1	.62 KSI	.03	1.5	JBJ 8-25	GLP 9-27-82	SIS	OK
63-1SIS-R07	"	→		31.2	KL/r 730	OK		JBJ 8-25	GLP 9-27-82	SIS	OK
72-1CS-R38	"	→		52	KL/r 730	OK		JBJ 8-25	GLP 9-27-82	Containment Spray	OK
63-1SIS-R29	"	→		63.3	KL/r 730	: OK		JBJ 8-25	GLP 9-27-82	Safety Injection	OK
72-1CS-R40	"	→		78	KL/r 730	: OK		JBJ 8-25	GLP 9-27-82	Containment Spray	OK
47A435-2-2	"	→		45	KL/r 730	.01		JBJ 8-25	GLP 9-27-82	SIS	OK
47A435-1-2	"	→		45	KL/r 730	: OK		JBJ 8-25	GLP 9-27-82	SIS	OK
47A451-1-39	"	→		58.8	KL/r 730	OK		JBJ 8-26	GLP 9-27-82	Fuel Pool Cool & cleaning	OK
17A586-5-7	"			passed 65	Stradl Code	CK .9	1.5	JBJ 8-26	GLP 9-28-82	ERCW	OK
17A586-1-30	"			passed 65	Stradl Code	CK .9	1.5	JBJ 8-26	GLP 9-28-82	ERCW	OK
17A586-1-7	"			passed 65	Stradl Code	CK .9	1.5	JBJ 8-26	GLP 9-28-82	ERCW	OK
17A586-1-19	"			passed 43	Stradl Code	.11 CK	1.5	JBJ 8-31	GLP 9-28-82	ERCW	OK
17A586-1-88	"			passed 43	Stradl Code	CK .11	1.5	JBJ 8-31	GLP 9-28-82	ERCW	OK
17A586-1-42	"			passed 43	Stradl Code	CK .11	1.5	JBJ 8-31	GLP 9-28-82	ERCW	OK
1-68-215	"			12.3	X	.73	1.5	DWJ 9/15	JBJ 9/14	REACTOR COOLANT	OK

BRACED CANTILEVER
FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED DWO DATE 9/27/82

CHECKED RLI DATE 10/14/82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL	MOMENT.	kl/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE		CHK. BY / DATE		COMMENT.
DWGS ARE SIMILAR	47A450-21-203 A & B	BRACED CANT.	4.6K		80		1.4	1.5	DWO	9/9	JBJ	9/24	kl/r > 30 CCCW
	47A454-1-5	"	"		"		"	"	DWO	9/9	JBJ	9/24	" FPC
DWGS ARE SIMILAR	47A454-1-29	"	7.3K		10.18		.71	1.5	DWO	9/10	GLP	9-23-82	FUEL POOL COOL & CLEAN
	47A491-10.4	"	"		15.47		"	"	DWO	9/10	GLP	9-23-82	FIRE PROTECTION
DWGS ARE SIMILAR	47A432-1-28	"	41.6K		24	11.75ksi	.92	1.5	DWO	9/8	GLP	9-24-82	RHR
	1-87-031	"	"		"	"	"	"	DWO	9/8	GLP	9-24-82	UPPER HEAD INJECTION
	47A454-3-25	"	"		"	"	"	"	DWO	9/8	GLP	9-24-82	SFPC
DWGS ARE SIMILAR	74-1RHR-R160	"	36.6K		26	9.6ksi	.86	1.5	DWO	9/13	GLP	9-23-82	RHR
	74-1RHR-R155	"	"		"	"	"	"	DWO	9/13	GLP	9-23-82	RHR
	70-1CC-R103	"	"		"	"	"	"	DWO	9/13	GLP	9-23-82	COMP. COOLING
	70-1CC-R91	"	"		"	"	"	"	DWO	9/13	GLP	9-23-82	COMP. COOLING
	1-03A-360	"	5.54		>30	1.45ksi	.27	1.5	DWO	9/10	GLP	9-24-82	FEED WATER
	72-1CS-R25	"	38.4K		15.1		1.1	1.5	DWO	9/10	JRH	9/29	CONTAINMENT SPRAY
	1-03A-368	"	4.5K		>30				DWO	9/10	GLP	9-24-82	FEEDWATER kl/r > 30
	63-1516-R40, R30 & R32	"	3.77	4.8	34.3	2.77	.77	1.5	DWO	9/27	MAC	9/28	kl/r > 30 SAFETY INJECTION
	1-03B-53	"	8.2		53.8	.83	.31	1.5	DP	9/25	MAC	9/28	kl/r > 30 AUX. FEED WATER
	1-03B-3	"	"	"	"	"	"	"	DP		MAC	9/28	" "

TVA 4890 (CON-3-56)

SHEET 4 OF 7

BRACED CANTILEVER

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED DWO DATE 9/27/82

CHECKED RLT DATE 10-14-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MAXI. LOADS MOMENT.	Kl/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.	
1-87-073	BRACED CANT	11.5	NEGLIGIBLE	7.5	1.1	.05	1.5	DWO 9/20/82	RLT 9/20/82		SYS UHI
67-1ERCW-RS18	"	3.41	12.3	20.9	.9	.36	1.5	DWO 9/20/82	RLT 9/20/82		ERCW
26-1FP-R58	"	4.56	—	730	1.2	.3	1.5	DWO 9/20/82	RLT 9/28/82		HP
12-1AAB-R60	"	1.73		730		1.7	1.5	GP 9/27/82	RLT 9/28/82	* SUPPORT IS OVERSTRESSED	AUX BOILER
1-63-005	"	14.84	13.8	39.3	5.9	.57	1.5	DWO 9/27/82	RLT 9/29/82	$\frac{Kl}{r}$ 730	SAFETY INJECTION

SHEET 1 OF 1

BRACED CANTILEVER
FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 8-20-82

CHECKED RLI DATE 10-14-87

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.
PROB: (ALT. ANAL) 47A431-9-15 (TVA)	BRACED CANTILEVER	1.04K		(1) > 30 (2) > 30				MAC 8/19	JRH 9/22	SYSTEM AUXILIARY BOILER ISO. ITEM (1) ISO. ITEM (2)
PROB: (ALT. ANAL) 47A431-9-23 (TVA)	"	3.30K	17.8 IN/K	(1) HORIZONAL (2) 27.32	f_a = 0.73	0.25	1.5	MAC 8/19	JRH 9/23	ISO. ITEM (1) ISO. ITEM (2)
PROB: (ALT. ANAL) 47A431-9-28 (TVA)	"	5.8K 6.1K		(1) > 30 (2) > 30				MAC 8/18	JRH 9/22	ISO. ITEM (1) ISO. ITEM (2)
PROB: (ALT. ANAL) 47A431-9-30 (TVA)	"	2.9K 3.4K	13.9 IN/K 13.9 IN/K	(1) 19.55 (2) 20.48	f_a = 1.12 f_a = 1.33	0.36 0.37	1.5 1.5	MAC 8/18	JRH 9/23	ISO. ITEM (1) ISO. ITEM (2)
PROB: (ALT. ANAL) 47A431-9-31 (TVA	"	1.9K 3.6K		(1) > 30 (2) > 30				MAC 8/18	JRH 9/22	ISO. ITEM (1) ISO. ITEM (2)
PROB: (ALT. ANAL) 47A431-9-34 (TVA	"	3.6K 3.1K	38.5 IN/K 38.5 IN/K	(1) 20.73 (2) 10.42	f_a = 1.38 f_a = 1.20	0.915 0.904	1.5 1.5	MAC 8/19	JRH 9/22	ISO. ITEM (1) ISO. ITEM (2)
PROB: (ALT. ANAL) 47A431-9-36 (TVA	"	8.2K 8.5K	14.2 IN/K 14.2 IN/K	(1) 19.2 (2) 32.06	f_a = 2.32 f_a = 2.40	0.55 0.55	1.5 1.5	MAC 8/19	JRH 9/22	ISO. ITEM (1) ISO. ITEM (2)
PROB: (ALT. ANAL) 47A431-9-37 (TVA)	"	1.9K 3.1K	16.4 IN/K 22.6 IN/K	(1) 11.2 (2) 12.87	f_a = 0.54 f_a = 1.16	0.22 0.38	1.5 1.5	MAC 8/19	JRH 9/22	ISO. ITEM (1) ISO. ITEM (2)
PROB: (ALT. ANAL) 47A431-9-39 (TVA)	"	1.9K 10.2K	65.3 IN/K 10.4 IN/K	(1) 22.27 (2) 14.83	f_a = 0.54 f_a = 3.94	0.78 0.99	1.5 1.5	MAC 8/9	JRH 9/23	ISO. ITEM (1) ISO. ITEM (2)
PROB: (ALT. ANAL) 47A431-9-42 (TVA)	"	1.3K 1.3K	0 " 9.2 IN/K	(1) 10.67 (4) 12.26	f_a = 0.52 f_a = 0.52	0.03 0.23	1.5 1.5	MAC 8/19	JRH 9/22	ISO. ITEM (1) ISO. ITEM (4)
PROB: (ALT. ANAL) [illegible]	BRACED CANTILEVER	.5K .5K								(3) (4)

BRACED CANTILEVER

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED GLP DATE 9-30-82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MAXI. LOADS MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT	SYS
17A586-1-23	Braced Cantilever	—	—	7	Passed Code Chk	Stadl .56	1.5	GLP 9-29-82	GLP 9-29-82	OK	ERCW
17A586-1-69	Braced Cantilever	—	—	7	Passed Code Chk	Stadl .56	1.5	GLP 9-29-82	GLP 9-29-82	O/K	ERCW
47A462-8-65	"	—	—	>30		1.66	1.5	GLP 9/30/82	RLI 9/30/82	OVERSTRESSED	1
47A462-8-52	"	—	—	>30		.44	1.5	GLP 9-30-82	RLI 9/30/82		1C.

BRACED CANTILEVER

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED DWO DATE 9/29/82

CHECKED RLI DATE 10-14-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL		MOMENT.	Kl/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE		CHK. BY / DATE		COMMENT. STRUDL CODE	CHECK	SYSTEM
1-74-8	BRACED CANT.	26.27	K		14.3		.23	1.5	DWO	9/25	JRH	9/27			RESIDUAL HEAT REMOVAL
67-1ERCW-R540	"	3.17	K		55.			"	DWO	9/25	JRH	9/28			ERCW
67-1ERCW-R511	"				40.6			"	DWO	9/25	JRH	9/28			ERCW
47A454-1-44	"	.448	K		26.45		.40	"	DWO	9/25	JRH	9/28			FPC
47A454-2-31	"	1.86	K		18.4		.06	"	DWO	9/25	JRH	9/28			SFPC
1-70-338	"				43.3			"	DWO	9/25	JRH	9/28			COMPONENT COOLING
1-01A-424	"	85.1	K		4.5		.94	"	DWO	9/25	JRH	9/28			MAIN STEAM
47A492-2-24	"	.675	K		30.5	.424		"	DWO	9/29	JRH	9/29			PRIMARY WATER (LP)
62-1LCV-R78	"	.166			11.8	.634	.81	"	GLP	9-8-82	JRH	9/29			CVC

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS (UNIQUE FRAMES)

COMPUTED GP DATE 9-3-82

CHECKED MAC/RLI DATE 9-20-82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	Kl/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.
BLOWDOWN	1-01B-142	SIMPLE FRAME	SUPPORT subject to Bending only						GP 8/12	MAC/9-16-82	No. Buckling evaluation req'd.
"	1-01B-144	SIMPLE FRAME	1647 #	16740.0 in-#	60	10030 psi	0.52	1.5	GP 8/12/82	MAC/9-16-82	Mem. is adequate & O.K
CHEM & (HP) VOL CONTROL	1-62A-310	"	984 #	-	13.64	O.K	0.12	1.5	GP 8/13	MAC/9-16-82	Kl/r < 30 O.K.
COMP. COOLING	70-ICC-R259	SIMPLE FRAME	SUPPORT subject to pure bending no.		Axil Tension & compression.				GP 8/12/82	RLI 9/11/82	* No buckling evaluation req'd
CVCS (LP)	47A555-0.5	SIMPLE FRAME	MEM. AXIAL	subject to very small loading & O.K					GP 8/12/82	RLI 9/11/82	O.K for buckling stress. Kl/r = 27
FEEDWATER	1-03P-327	SIMPLE FRAME	5674 #	-	21.2	-	.07 O.K	-	GP 8/13/82	RLI 9/11/82	Mem. is O.K for Buckling.
"	1-03P-204	FREE-COL.	28775 #	-	24.3	-	.23 O.K		GP 8/13/82	RLI 9/11/82	Mem. is O.K & adequate.
ERCW	47A450-21-226 & 226A	BRACED FRAME.	MULTI-LOADED (BEND & COMP)	-	730	1.44	1.1 O.K	1.5	GP 8/24/82	RLI 9/11/82	MEM. is ok. for Buckling.
FEEDWATER	1-03A-290	L-CANT & SHORT COLUMN			730				GP 8/13/82	RLI 9/11/82	OUT OF SCOPE
REACTOR COOLANT	1-68-240	CANTI.	Kl/r Support is free canti. U/Axial & Bending. O.K by inspection.						GP 8/14/82	RLI 9/11/82	Axial load & moment too small O.K.
"	1-68-251	PLATFORM BEAMS	NO BUCKLING INVOLVED					-	GP 8/14/82	RLI 9/11/82	O.K No buckling by E.J.
"	1-68-410	CANTI. BRACKET	717 #	=	17	SMALL	<< 1.5	1.5	GP 8/14/82	RLI 9/11/82	No. evaluation req'd
UPPER HEAD INJECTION	1-87-075	SIMPLE FRAME	MEM. subject to small Compression		Kl/r = 5	Major Bending O.K	<< 1.5	& 1.5	GP 8/17/82	RLI 9/11/82	Small Buckling stress involved.
"	1-87-065	BRACED FRAME.	9900 #	297330 in-#	37	19.42 ksi	1.35	1.5	GP 8/14/82	MAC/9-16-82	Analysis is much conservative. O.K
ERCW	47A-450-4-45	DOUBLE CANTI. FRAME	876 #	-	46	551 psi	0.22	1.5	GP 8/17/82	MAC/9-20-82	Support mem. OK for Buckling
"	47A450-3-158	SIMPLE FRAME	NO BUCKLING INVOLVED						GP 8/17/82	GLP 9-17-82	OK BY INSPECTION
"	47A450-21-219	BRACED FRAME.	538 #	-	138	0.27 ksi	.034	1.5	GP 8/17/82	GLP 9-17-82	Buckling stress is very low & O.K
ICE CONDENSER	47A462-829	SIMPLE FRAME	1120 #	9890 in-#	22	0.704 ksi	.632	1.5	GP 8/17/82	GLP 9-17-82	Mem. are ok for Buckling

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING

PROGRAM OF PIPE SUPPORTS (UNIQUE FRAMES)

COMPUTED MAC DATE 9/24/82

CHECKED RLI DATE 10-14-82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING. MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE.	CHK. BY / DATE.	COMMENT.
I.C.	47A462-8-19	SIMPLE CANT. FRAME	MEM. are o.k,		KL/r = 23	See support 47A462-8-23			BP 8/20/82	GLP 9-17-82	o.k
"	47A462-8-20	SIMPLE CANT. FRAME -5	MEM. are o.k. see		KL/r = 23	support 47A462-8-23			BP 8/20/82	GLP 9-17-82	OK
"	47A462-8-23	SIMPLE CANT. FL. FRAME	3851#	78.62 in-k	40	778 psi	0.76	1.5	BP 8/21/82	GLP 9-17-82	o.k for buckling
"	47A462-8-24	"	MEM. are o.k, see		KL/r = 30	support 47A462-8-23			BP 8/20/82	GLP 9-17-82	
HPFP	47A491-8-13	CANTI-LEVER	240#	1377.2 in-#	20	160 psi	.17	1.5	BP 9/2/82	RLI 9/17	MEM. o.k FOR BUCKLING
SERVICE AIR	47A492-2-13	CANTI. FRAME.	see calc &	computer run	KL/r = 30		1.26	1.5	BP 9/1/82	RLI 9/17	MEM. o.k for buckling
ERCW	17A586-1-68	BRACED CANT. FR.	MEM. are o.k		KL/r = 21	see attached computer run			BP 8/31/82	RLI 9/17	O.k.
"	67-1ERCW-R513	CANTI. FRAME.			730				RLI 9/24/82	VRH 10-6	OUT OF SCOPE
"	67-1ERW-R362	BRACED CANTI.	see calc		63.2	2.2 ksi	0.32	1.5	BP 9/3/82	RLI 9/18/82	MEM. o.k for BUCKLING.
AUX. FEEDWATER	1-03B-5	RIGID FRAME	See computer Run		20.1	—	.11	1.5	GLP 9/18/82	RLI 9/25/82	
(LPI) CVCS	62-1LCV-V13	DS - WITH FRAME	.2	.23	82	Low	Low	1.5	RLI 9/29/82	MAC 9-29-82	KL/r 730 Low Loads
RHR	1-74-11	UNIQUE FRAME-DS	M1 18.9	—	62	4.14	.24	1.5	RLI 9/29/82	MAC 9-29-82	KL/r 730
			M2 18.9	89.8	78	4.15	.77	1.5			

TVA 4000

SHEET 1 OF 5

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 9/28/82

CHECKED RLI DATE 10-14-82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING. MAXI. LOADS AXIAL.	MAXI. LOADS MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY DATE.	CHK. BY DATE.	COMMENT.
REACTOR COOL.	47A465-8-22	CANTILEVER	SMALL	SMALL	8	SMALL	SMALL	1.5	DP 9/24/82	RLI 9/28/82	OK BY INSPECTION
"	47A465-8-9	"	SMALL	SMALL	8	SMALL	SMALL	1.5	GP 9/25/82	RLI 9/28/82	OK BY INSPECTION
"	47A465-8-14	"	—	3.52	—	—	—	1.5	GP 9/25/82	RLI 9/28/82	No Buckling Involved
"	47A465-8-20	"	—	SMALL	—	—	—	1.5	DP 9/25/82	RLI 9/28/82	No Buckling Involved
HPFP	47A491-10-3	"	.16K	—	178	.06	.01	1.5	GP 9/25/82	RLI 9/28/82	
"	47A491-6-2	"	—	10.3	—	—	.62	1.5	GP 9/25/82	RLI 9/28/82	No Buckling Involved
REACTOR COOL	47A465-8-27	"	.03K	2.5	63	—	—	1.5	GP 9/25/82	RLI 9/28/82	O.K. By Inspection Small Loads
FEED WATER	47A492-2-23	"	.03	.63	46	—	—	1.5	DP 9/25/82	RLI 9/28/82	OK. By Inspection
"	47A492-2-2	"	.46	4.97	27	.28	.32	1.5	DP 9/25/82	RLI 9/28/82	
SERVICE AIR	47A492-2-17	"	.21	9.26	85	.08	.21	1.5	DP 9/25/82	RLI 9/28/82	
VHI	1-87-074	"	—	Moment only	—	—	—	1.5	GP 9/25/82	RLI 9/28/82	No Buckling Involved
"	1-87-071	"	10.7	136	30.2	1.34	.53	1.5	GP 9/24/82	RLI 9/28/82	
"	1-87-039	"	—	Moment only	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	No Buckling Involved
"	1-87-077	"	—	Moment only	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	No Buckling Involved
REACTOR COOLANT	1-68-299	"	.48	3.02	42.1	.07	1.32	1.5	RLI 9/28/82	MAC 9/28/82	Checked Stiffener Only
RHR	47A432-2-1	"	1.79K	11.5	134.4	.4	.78	1.5	RLI 9/28/82	MAC 9/28/82	
REACTOR COOLANT	1-68-310	"	.022	15	44	.32	.42	1.5	RLI 9/28/82	MAC 9/28/82	
"	47A465-1-29	"	—	Moment only	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	No Buckling Involved

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 9-28-82

CHECKED RLI DATE 10/4/82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING. MAXI. LOADS AXIAL.	MAXI. LOADS MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE.	CHK. BY / DATE.	COMMENT.
Reac Coolant	47A465-1-35	CANT	—	ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	No Buckling Involved
"	47A465-1-31	"	—	ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	No Buckling Involved
UHI	1-87-038	"	—	ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	No Buckling Involved
Reac. Coolant	47A465-8-24	"	Small	Small	61	Small	Small	1.5	RLI 9/28/82	MAC 9/28/82	O.K. By Inspection Small Loads
ERCW	47A450-3-171	"	1.12	27	36	.02	.034	1.5	RLI 9/27/82	MAC 9/28/82	$\frac{KL}{r} > 30$
RHR	47A432-1-4	"	.045	.186	166	.06	.19	1.5	RLI 9/26/82	MAC 9/28/82	$\frac{KL}{r} > 30$
SIS	47A435-2-5	"	—	ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	No Buckling Involved
"	63-1515-031	"	—	ONLY	—	—	—	1.5	RLI 9/25/82	MAC 9/28/82	No Buckling Involved
"	1-63-008	"	1.05	26.1	18	1.02	.75	1.5	RLI 9/26/82	MAC 9/28/82	
"	1-63-003	"	—	ONLY	—	—	—	1.5	RLI 9/25/82	MAC 9/28/82	No Buckling Involved
"	1-63-002	"	—	ONLY	—	—	—	1.5	RLI 9/15/82	MAC 9/28/82	No Buckling Involved
Fuel Pool Cooling	78-1FPC-R50	"	3.2	—	18.1	1.43	.07	1.5	RLI 9/26/82	MAC 9/28/82	
"	78-1FPC-R2	"	.13	2.64	38	—	—	1.5	RLI 9/26/82	MAC 9/28/82	OK By Inspection
"	78-1FPC-R1	"	.05	1.1	38	—	—	1.5	RLI 9/26/82	MAC 9/28/82	O.K By Inspection
"	47A454-1-14	"	.67	47.3	18	.26	1.05	1.5	RLI 9/26/82	MAC 9/28/82	
Feedwater	1-03A-36f	"	.7	34.4	29	.27	.77	1.5	RLI 9/26/82	MAC 9/28/82	
"	1-03A-363	"	12.1	85.2	39.4	1.97	.8	1.5	RLI 9/26/82	MAC 9/28/82	1) MEMBER $\frac{KL}{r} > 30$
			12.1	—	47	4.8	.26	1.5			2) LUG
"	1-03A-361	"	5.9	189.3	36	.59	.57	1.5	RLI 9/24/82	MAC 9/28/82	$\frac{KL}{r} > 30$

TVA 489D (CON-3-56)

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JRH DATE 9/28/82

CHECKED RLT DATE 10-4-82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MAXI. LOADS MOMENT.	$\frac{kl}{r}$	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY DATE	CHK. BY DATE	COMMENT
ERCW	47A450-21-210	CANT	1.65	45.5	34.4	.64	1.04	1.5	RLI 9/27/82	MAC 9-28-82	$\frac{kl}{r} > 30$
"	67-1ERCW-R522	"	2.24	85.8	51	.36	.61	1.5	RLI 9/27/82	MAC 9-28-82	$\frac{kl}{r} > 30$
CONT. SPRAY	72-1CS-R33	"	—	ONLY	—	—	—	1.5	RLI 9/27/82	MAC 9-28-82	NO BUCKLING INVOLVED
"	72-1CS-R36	"	—	ONLY	—	—	—	1.5	RLI 9/27/82	MAC 9-28-82	NO BUCKLING INVOLVED
COMP. COOLING	70-1CC-R367	"	—	ONLY	—	—	—	1.5	RLI 9/27/82	MAC 9-28-82	NO BUCKLING INVOLVED
"	70-1CC-R76	"	—	ONLY	—	—	—	1.5	RLI 9/27/82	MAC 9-28-82	NO BUCKLING INVOLVED
"	2-70-844	"	.05	1.65	29	.03	.1	1.5	RLI 9/27/82	MAC 9-28-82	
"	2-70-824	"	.09	2.6	55.4	.03	.06	1.5	RLI 9/27/82	MAC 9-28-82	$\frac{kl}{r} > 30$
"	1-70-258	"	1.02	11.9	72.4	.04	.37	1.5	RLI 9/27/82	MAC 9-28-82	$\frac{kl}{r} > 30$
"	1-70-186	"	'OK BY INSPECTION'		29			1.5	RLI 9/27/82	MAC 9-28-82	SMALL LOADS
(LPI) CHEMICAL CONTROL	47A555-10-3	"	.05	.82	73	.03	.05	1.5	RLI 9/27/82	MAC 9-28-82	$\frac{kl}{r} > 30$
"	47A555-10-1	"	.06 .06	3.03 —	130 45	.01 .03	.03 <1.5	1.5 1.5	RLI 9/27/82	MAC 9-28-82	$\frac{kl}{r} > 30$ 1) MEMBER 2) LUG
LP "	47A555-3-10	"	SMALL	—	12	SMALL	SMALL	1.5	RLI 9/27/82	MAC 9-28-82	OK BY INSPECTION SMALL LOADS
"	47A555-3-9	"	SMALL	—	12	SMALL	SMALL	1.5	RLI 9/27/82	MAC 9-28-82	OK BY INSPECTION SMALL LOADS
"	47A555-3-8	"	—	ONLY	—	—	—	1.5	RLI 9/27/82	MAC 9-28-82	NO BUCKLING INVOLVED
"	47A555-3-7	"	—	ONLY	—	—	—	1.5	RLI 9/27/82	MAC 9-28-82	NO BUCKLING INVOLVED
"	47A555-3-6	"	SMALL	—	18	SMALL	SMALL	1.5	RLI 9/27/82	MAC 9-28-82	OK BY INSPECTION SMALL LOADS
HP "	47A406-1-65	CANT	.048	3.74	55	.03	.23	1.5	RLI 9/27/82	JRH 9-28-82	$\frac{kl}{r} > 30$
HP "	47A406-1-73	"	"	"	"	"	"	"	RLI 9/27/82	JRH 9-28-82	

TVA 499D (CON-3-56)

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 9-30-82

CHECKED RLI DATE 10-14-82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	kl/r	BUCKLING STRESS.	INTERACTION VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.
HP CHEM & VOL CONT	47A406-3-9	CANT	—	ONLY	—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	NO BUCKLING INVOLVED
"	47A406-3-10	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
LP "	62-1LCV-R19	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
LP "	62-1LCV-R14	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
HP "	62-1CVC-R11	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
HP "	62-1CVC-R10	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
HP "	1-62A-305	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
HP "	1-62A-304	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
AUX. BOILER	12-1AAB-R056	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
HP CHEM & VOL CONT	1-62A-306	"	.84	28.7	35.3	.32	.65	1.5	RLI 9/27/82	JRH 9/28/82	$\frac{kl}{r} > 30$ 1) MEMBER 2) LUG
			1.55	—	30	.36	<1.5	1.5			
LP CHEM & VOL CONT	62-1LCV-R17	"	.42		43	.3	<1.5	1.5	RLI 9/27/82	JRH 9/28/82	$\frac{kl}{r} > 30$ 1) LUG 2) MEMBER
			.42	41	35	.12	.48	1.5			
AUX. BOILER	12-1AAB-R51	"	1.06	—	183.3	.41	<1.5	1.5	RLI 9/27/82	JRH 9/28/82	$\frac{kl}{r} > 30$
			.723		35	1.54	<1.5	1.5			
"	47A431-9-4	"	.723	14.2	44	.28	.32	1.5	RLI 9/27/82	JRH 9/28/82	$\frac{kl}{r} > 30$
SAFETY INJ.	1-63-011	"	NO BUCKLING INVOLVED						RLI 9/30/82	MAC 9-30-82	
REAC COOLANT	47A463-8-25	"	NO BUCKLING INVOLVED						RLI 9/30/82	MAC 9-30-82	
RHR	74-1RHR-R159	"	NO BUCKLING INVOLVED						RLI 9/30/82	MAC 9-30-82	

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 9-27-82

CHECKED RLI DATE 10-14-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING. MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE.		CHK. BY / DATE.		COMMENT.	SYSTEM
038-1AFW-R72	CANTILEVER	960 #		BUCKLING NOT INVOLVED				JRU	8/26	MAC	9/27	OK	AFW
1-038-23	11	3708.8 #		40.79		.62	1.5	GP	9/8	MAC	9/27	KL/r > 30	AFW

TVA 4890 (CON-3-56)

SHEET 1 OF 1

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JRH DATE 10/1/82

CHECKED RLI DATE 10/4/82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT
FEEDWATER	1-03A-206	L-CANT	4.69	23.75	24	1.23	.26	1.5	GP 9/23/82	RLI 9/24/82	
RHR	47A432-1-3	"	.048	—	94	SMALL	SMALL	1.5	GP 9/22/82	RLI 9/24/82	OK PER INSPECTION
CONT. SPRAY	72-1CS-R35	"	4.0	84.0	30.9	SMALL	.17	1.5	GP 9/22/82	RLI 9/24/82	
SIS	47A435-1-3	"	NO BUCKLING INVOLVED						GP 9/22/82	RLI 9/24/82	
"	47A435-2-4	"	.37[E]	4.44	73	.143	.11	1.5	GP 9/22/82	RLI 9/24/82	KL/r > 30
HPFP	47A491-10-5	"	.32[E]	3.42	12.3	.09	.17	1.5	GP 9/22/82	RLI 9/24/82	
AUX BOILER	47A431-9-27	"	1.9	FA.117	17.2	.37	.29	1.5	GP 9/22/82	RLI 9/24/82	
COMP. COOLING	70-1CC-R15	"	2.4	18.0	187	.53	.21	1.5	GP 9/21/82	RLI 9/25/82	KL/r > 30
REAC COOLANT	1-68-260	"	.5	10.65	55	.06	.05	1.5	GP 9/20/82	RLI 9/25/82	KL/r > 30
"	1-68-290	"	.17	3.3	70	.08	.09	1.5	GP 9/20/82	RLI 9/25/82	KL/r > 30
"	1-68-380	"	.09	5.7	57	.04	.16	1.5	GP 9/20/82	RLI 9/25/82	KL/r > 30
"	47A465-8-18	"	.2	1.2	73	.08	.11	1.5	GP 9/18/82	RLI 9/25/82	KL/r > 30
ICE CONDENSER	47A462-8-25	"	1.02	4.59	37	.39	.12	1.5	GP 9/18/82	RLI 9/25/82	KL/r > 30
"	47A462-8-35	"	2.97[E]		12	1.15	1.1	1.5	DWO 10/1/82	JRH 10/1/82	
"	47A462-8-36	"	"		"	"	"	"	DWO 10/1/82	JRH 10/1/82	

TVA 489D (CON-3-56)

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED GLP DATE 9-21-82 (VENDOR COMPONENTS)

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY DATE	CHK. BY DATE	COMMENT. SYSTEM
47A462-8-9	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	ICE COND.
47A462-8-1	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	ICE COND.
47A481-8-11	ROD	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	FP
47A481-8-9	ROD	NO BUCKLING CONSIDERED						GLD 9-21-82	RLI 9/29/82	FP
47A465-8-12	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	REACTOR COOLANT
1-68-370	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	REACTOR COOLANT
1-87-076	CONSTANT SUPPORT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	UHI
1-87-072	VARIABLE SUPPORT	NO BUCKLING CONSIDERED						GLD 9-21-82	RLI 9/29/82	UHI
1-87-068	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	UHI
1-87-040	ROD	NO BUCKLING CONSIDERED						GLD 9-21-82	RLI 9/29/82	UHI
1-87-034	SPRING	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	UHI
1-87-033	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	UHI
1-87-030	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	UHI
74-1RHR-R156	SWAY STRUT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	RHR
74-1RHR-R161	SWAY STRUT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	RHR
74-1RHR-R164	SWAY STRUT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	RHR
74-1RHR-R165	SWAY STRUT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	RHR
74-1RHR-168	SWAY STRUT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	RHR

TVA 489D (CON-3-56)

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED GLP DATE 9-21-82 (Vessel Components)

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MAXI. LOADS MOMENT.	Kl/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT	SYSTEM
47A432-1-1A	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		RHR
47A432-1-2A	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		RHR
63-1515-R33	SNUBBER	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		S1
63-1515-R31	SNUBBER	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		S1S
72-1CS-R23-1	SNUBBER	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R21	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R24	ROD	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R27	SNUBBER	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R28	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R32	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R34	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R37	SNUBBER	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R39	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R41	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
70-1CC-R491	SHEAR LUGS	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CC
47A406-3-8	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82	HP	CVC

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS (VENDOR COMPONENTS)

COMPUTED GLP DATE 9-21-82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MAXI. LOADS MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.	SYSTEM
47A406-3-7	SWAY STRUT	NO						GLP 9-21-82	RLI 9/29/82	HP	CVC
62-1LCV-R72	STRUT							GLP 9-21-82	RLI 9/29/82	LP	CVC
62-1CVC-R14	ROD							GLP 9-21-82	RLI 9/29/82	HP	CVC
1-62A-311	SNUBBER							GLP 9-21-82	RLI 9/29/82	HP	CVC
1-01A-396	SWAY STRUT							GLP 9-21-82	RLI 9/27/82		MS
1-01A-354	SWAY STRUT							GLP 9-21-82	RLI 9/29/82		MS
2-01A-354											
1-01A-318	SWAY STRUT							GLP 9-21-82	RLI 9/29/82		MS
2-01A-318											
1-01A-307	SNUBBER							GLP 9-21-82	RLI 9/27/82		MS
1-63-590	SNUBBER							JRH 8-26-82	MAC 9-27-82		SI
1-63-591	SNUBBER							JRH 8-26-82	MAC 9-27-82		SI
1-63-592	SNUBBER							JRH 8-26-82	MAC 9-27-82		SI
03B-1AFW-R7	STRUT							JRH 8-24-82	MAC 9-27-82		AFW

BUCKLING CONSIDERED

TVA 4690 (CON-3-56)

SHEET 4 OF 4

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS (VENDOR COMPONENTS)

COMPUTED JRH DATE 8-26-82

CHECKED RLT DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING						DES. BY / DATE	CHK. BY / DATE	COMMENT	
		MAXI. LOADS		$\frac{Kl}{r}$	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.				SYSTEM
		AXIAL.	MOMENT.								
03B-1AFW-R9	STRUT	NO BUCKLING CONSIDERED						JRH / 8-26-82	MAC / 9-27-82		AFW
03B-1AFW-R3	ROD	NO BUCKLING CONSIDERED						JRH / 8-26-82	MAC / 9-27-82		AFW
03B-1AFW-R6	STRUT	NO BUCKLING CONSIDERED						JRH / 8-26-82	MAC / 9-27-82		AFW

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JRH DATE 6/7/82

CHECKED RLE DATE 10/4/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL	MOMENT	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT	SYS.
47A450-4-28	Braced Rigid frame	1248 #		31.36				JRH 8/20	MAC 9/27	KL/r 730 ok	ERCW
47A450-3-100	"	11040 #		7.81	fa= 1.34 KSI	.128	1.5	JRH 8/24	MAC 9/27	SAGS OK	"
67ERCW-R289	"	6720 #		15.02	fa= 1.47 KSI	.24	"	JRH 8/24	MAC 9/28	"	"
67ERCW-R95	"	37120 #		9.62		.267	"	DWO 8/24	MAC 9/28	STRUDL CODE CHECK	"
03B-1AFW-R4	"	17600 #		8.54		.427	"	DWO 8/24	MAC 9/28	"	AFW
03B-1AFW-R22	"	"		"		"	"	DWO 8/24	MAC 9/28	"	"
03B-1AFW-R5	"	"		"		"	"	DWO 8/24	MAC 9/28	"	"
47A450-4-33	"	4960 #		22.25	fa= .183 KSI	.096	"	JRH 8/26	MAC 9/28	SAGS OK	ERCW
70-1CC-R446	"	15520 #		9.47		.366	"	DWO 8/26	MAC 9/28	STRUDL CODE CHECK	COMPONENT COOLING
17A586-5-25	"	2665.6 #		18.87	.48 KSI	.21	"	JRH 9/10	MAC 9/23	HAND CALC'S OK	ERCW
26-1FP-R60	"	11040 #		14.61		.307	"	JRH 9/15	MAC 9/23	STRUDL CODE CHECK	HPFP
17A586-5-20	"	9646.4 #		9.7		1.12	"	JRH 9/17	MAC 9/23	"	ERCW
17A586-1-20	"	"		"		"	"	JRH 9/27	MAC 9/26	"	ERCW
78-1FPC-R15	"			7.30			"	JRH 9/27	RLE 10/6	OUT OF SCOPE	Fuel Pool Cool

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED DWO DATE 9/1/82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.	SYSTEM
1-03B-25	BRACED RIGID FRAME	5379 #		63				DWO 8/30	JBJ 9/15	KL/r > 30 ∴ OK	AUX FEEDW.
26-1FP-R233	"	"		"				DWO 8/30	JBJ 9/15	"	H.P FIRE PROTECT.
47A454-2-25	"	"		"				DWO 8/30	JBJ 9/15	"	SFPC
47A454-2-26	"	"		"				DWO 8/30	JBJ 9/15	"	SFPC
17A586-1-100	"	17626 #		44				DWO 8/30	JBJ 9/24	KL/r = 44 > 30 ∴ OK	INT & EXH ERCW
17A586-1-101	"	"		"				DWO 8/30	JBJ 9/24	"	INT & EXH ERCW
12-1AAB-R42	"	"		"				DWO 8/30	JBJ 9/24	"	AUX BOILER
12-1AAB-R12	"	"		"				DWO 8/30	JBJ 9/24		AUX BOILER
12-1AAB-R016	"	4600 #		30.4				DWO 8/31	JBJ 9/16	KL/r = 30.4 > 30 ∴ OK	AUX BOILER
67-1ERCW-R556	"	"		"				DWO 8/31	JBJ 9/16	"	ERCW
67-1ERCW-R515	"	"		"				DWO 8/31	JBJ 9/16	"	ERCW
12-1AAB-R019	"	1470 #		16.06		.0227	1.5	DWO 8/31	GLP 9-24	STRUDL CODE CHECK	AUX BOILER
78-1FPC-R17	"	"		"		"	"	DWO 8/31	GLP 9-24	"	FUEL POOL COOL.
		"		"							
17A586-1-87	"	5344 #		26		.36	1.5	DWO 9/1	GLP 9-24	STRUDL CODE CHECK	ERCW
17A586-1-18	"	"		"		"	"	DWO 9/1	GLP 9-25	"	ERCW
47A462-B-3	"	"		"		"	"	DWO 9/1	GLP 9-25	"	ICE COND. SYSTEM
47A462-B-4	"	"		"		"	"	DWO 9/1	GLP 9-25	"	ICE COND. SYSTEM
47A462-B-12	"	"		"		"	"	DWO 9/1	GLP 9-25	"	ICE COND. SYSTEM

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED DNO DATE 9/1/82

CHECKED RVI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING						DES. BY / DATE	CHK. BY / DATE	COMMENT	
		MAXI. LOADS AXIAL.	MOMENT.	$\frac{Kl}{r}$	BUCKLING STRESS.	INT. VALUE	ALL. INT. VAL.				SYSTEM
47A462-B-11	BRACED FRAME	5394#	/	26	/	.36	1.5	DNO 9/1	GLP 9-25	STAAD CODE CHECK	ICE COND. SYSTEM
47A462-B-16	"	15675#	/	21	/	.116	1.5	DNO 9/1	TBJ 9/14	STAAD CODE CHECK	ICE COND SYSTEM
47A462-B-7	"	"	/	"	/	"	"	DNO 9/1	TBJ 9/14	"	ICE COND SYSTEM
47A462-B-15	"	"	/	"	/	"	"	DNO 9/1	TBJ 9/14	"	ICE COND SYSTEM

TENNESSEE VALLEY AUTHORITY
CHATTANOOGA TENNESSEE 37401
400 Chestnut Street Tower II

November 10, 1982

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

In the Matter of the Application of) Docket Nos. 50-390
Tennessee Valley Authority) 50-391

During an April 1, 1982 telephone conference call with the NRC's Mechanical Engineering Branch, TVA was requested to provide additional information on Watts Bar Nuclear Plant. At the NRC's request, TVA performed a sampling program to verify that the buckling stresses in axial compression members used in pipe support configurations do not exceed 90 percent of the yield strength when their slenderness ratio is less than 30.

TVA investigated 515 randomly selected supports in 19 different systems. The results show that all 252 supports with slenderness ratios less than 30 met the applicable requirements for prevention of critical buckling. The remaining supports sampled had slenderness ratios greater than or equal to 30. Enclosed is a tabular summary of the results of TVA's evaluation.

If you have any questions concerning this matter, please get in touch with D. P. Ormsby at FTS 858-2682.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Licensing

Sworn to and subscribed before me
this 10th day of November 1982
Paulette H. White
Notary Public
My Commission Expires 9-5-84

Enclosure
cc: See page 2

B001

Director of Nuclear Reactor Regulation November 10, 1982

cc: U.S. Nuclear Regulatory Commission (Enclosure)
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

TVA 4800 (CON-3-56)

SHEET 1 OF 5

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 8-26-82

CHECKED RL Ilich DATE 10-1-82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE		CHK. BY / DATE		COMMENT. SYSTEM
1	12-1AAB-R17 (BP)	COLUMN	3.92 K	47.6 IN-K	73.1	f_a = 1.02	.64	1.5	MAC	8/25	GLP	9-15	AUX BOILER
2	62-1CVC-R12 (BP)	"	.083K	0	BUCKLING NOT INVOLVED				MAC	8/25	GLP	9-15	CVCS
3	62-1LCV-R71 (BP)	"	.112 K	0	>30				MAC	8/25	GLP	9-15	L.P. CVCS
4	" -R75 (BP)	"	.208 K	0	>30				MAC	8/25	GLP	9-15	"
5	" -R76 (BP)	"	.240 K	0	>30				MAC	8/25	GLP	9-15	"
6	" -R83 (BP)	"	.256 K	0	>30				MAC	8/25	GLP	9-15	"
7	" -R90 (BP)	"	.304 K	0	>30				MAC	8/25	GLP	9-15	"
8	" R91 (BP)	"	.160 K	0	>30				MAC	8/25	GLP	9-15	"
9	47A406-7-64 (TVA)	"	.032 K	0	BUCKLING NOT INVOLVED				MAC	8/25	GLP	9-15	CVCS
10	" -7-66 (TVA)	"	.032 K	0	BUCKLING NOT INVOLVED				MAC	8/25	GLP	9-15	"
11	" -7-67 (TVA)	"	.032 K	0	BUCKLING NOT INVOLVED				MAC	8/25	GLP	9-15	"
12	" -7-68 (TVA)	"	.048 K	.152 K-IN	BUCKLING NOT INVOLVED				MAC	8/25	GLP	9-15	"
13	" -7-69 (TVA)	"	.032 K	0	BUCKLING NOT INVOLVED				MAC	8/25	GLP	9-15	"
14	" -7-70 (TVA)	"	.032 K	0	BUCKLING NOT INVOLVED				MAC	8/25	GLP	9-15	"
15	" -7-71 (TVA)	"	.048 K	0	BUCKLING NOT INVOLVED				MAC	8/25	GLP	9-15	"
16	" -7-72 (TVA)	"	.032 K	0	BUCKLING NOT INVOLVED				MAC	8/25	GLP	9-15	CVCS
17	1-70-979 (EDS)	"	.658 K	1.65 K-IN	13.83	f_a = .414	.110	1.5	MAC	8/25	GLP	9-15	COMP COOL
18	70-1CC-R249 (BP)	COLUMN	39.84 K	0	12.12	f_a = 5.42	.265	1.5	MAC	8/26	GLP	9-15	COMP COOL

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 8-27-82

CHECKED RILICN DATE 10-1-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	Kl/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE		CHK. BY / DATE		COMMENT
(BP) 67-1ERCW-R343	COLUMN	22.24 K	0	7.6	fa = 1.87	.088	1.5	MAC	8/26	GLP	9-16	SYSTEM
		53.44 K	0	3.92	fa = 4.49	.209	1.5					ITEM # 3 ESSENTIAL RAW COOLING WATER
(BP) 67-1ERCW-R96	"	11.04 K	0	20.58	fa = 2.89	.142	1.5	MAC	8/26	GLP	9-16	ITEM # 5 ESSENTIAL RAW COOLING WATER
(EDS) 1-03A-209	"	22.35 K	0	7.52	fa = 3.04	.143	1.5	MAC	8/26	GLP	9-16	FEED WATER
(EDS) 1-03A-208	"	20.77 K	0	8.72	fa = 2.82	.133	1.5	MAC	8/26	GLP	9-16	FEED WATER
(EDS) 1-03A-247	"	9.1 K	0	8.8	fa = 1.24	.058	1.5	MAC	8/26	GLP	9-16	FEED WATER
(EDS) 1-03A-246	"	4.95 K	0	6.58	fa = .81	.038	1.5	MAC	8/26	GLP	9-16	FEED WATER
(EDS) 1-03A-249	"	11.73 K	0	8.18	fa = 1.6	.075	1.5	MAC	8/26	GLP	9-16	FEED WATER
(EDS) 1-03A-284	"	33.06 K	0	6.18	fa = 4.06	.19	1.5	MAC	8/26	GLP	9-16	FEED WATER
(EDS) 1-03A-286	"	12.3 K	6.92 K/IN	8.8	fa = 1.61	.146	1.5	MAC	8/26	GLP	9-16	FEED WATER
(EDS) 1-03A-291	"	12.42 K	0	7.88	fa = 1.69	.08	1.5	MAC	8/26	GLP	9-16	FEED WATER
(EDS) 1-03A-325	"	42.64 K	0	6.52	fa = 6.04	.284	1.5	MAC	8/26	GLP	9-16	FEED WATER
(EDS) 1-03A-329	"	7.91 K	7.41 K/IN	6.84	fa = 1.73	.187	1.5	MAC	8/26	GLP	9-16	FIRE PROTECTION
(EDS) 1-03A-331	"	12.45 K	7.0 K/IN	8.69	fa = 1.69	.147	1.5	MAC	8/26	GLP	9-16	FEED WATER
(TVA) 47A491-10-1	"	.24 K	1.95 K/IN	21.3	fa = .151	.13	1.5	MAC	8/27	RLI	9/15	FIRE PROTECTION
(TVA) 47A491-10-2	"	.24 K	1.95 K/IN	21.3	fa = .151	.13	1.5	MAC	8/27	RLI	9/14	FIRE PROTECTION
(TVA) 47A491-10-6	"	.004 K	3.5 K/IN	18.3	fa = .4	.237	1.5	MAC	8/27	RLI	9/15	FIRE PROTECTION
(BP) 26-1FP-R56	"	4.8 K	0	30	fa = .36	.04	1.5	MAC	8/27	RLI	9/15	H.P. FIRE PROTECTION
(BP) 26-1FP-R57	"	4.8 K	0	30.1	fa = .86	.04	1.5	MAC	8/27	RLI	9/15	H.P. FIRE PROTECTION
(BP) 26-1FP-R59-1	COLUMN	2.5 K	0	14.04	fa = 1.0	.05	1.5	MAC	8/27	RLI	9/15	H.P. FIRE PROTECTION

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 8-27-82

CHECKED R ILICH DATE 10-1-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	RES. BY / DATE		CHK. BY / DATE		COMMENT.	SYSTEM
(TVA) 47A491-8-10	COLUMN	.096 K	.87 K/IN	30	fa=.02	.002	1.5	MAC	8/27	RLI	9/15		FIRE PROTECTION
(TVA) 47A491-8-12	"	.24 K	1.28 K/IN	14.6	fa=.068	.018	1.5	MAC	8/27	RLI	9/15		FIRE PROTECTION
(TVA) 47A491-8-14	"	.24 K	1.31 K/IN	21.3	fa=.15	.082	1.5	MAC	8/27	RLI	9/15		FIRE PROTECTION
(BP) 78-1FPC-R73	"	.32 K	0	13.7	fa=16.6	.51	1.5	MAC	8/27	RLI	9/16		FUEL P COOLING
(BP) 78-1FPC-R59	"	.96 K	0	30	fa=.43	.021	1.5	MAC	8/27	RLI	9/15		FUEL POOL COOLING
(BP) 78-1FPC-R58	"	.32 K	0	30	fa=.143	.007	1.5	MAC	8/27	RLI	9/16		FUEL POOL COOLING
(BP) 78-1FPC-R46	"	2A K	0	13.7	fa=.79	.038	1.5	MAC	8/27	RLI	9/16		FUEL POOL COOLING
(TVA) 47A462-8-39	"	.09 K	11.8 K/IN	30	fa=.054	.052	1.5	MAC	8/30	RLI	9/16		ICE CONDENSER
(TVA) 47A462-8-40	"	.09 K	8.05 K/IN	30	fa=.05	.515	1.5	MAC	8/30	RLI	9/16		ICE CONDENSER
(TVA) 47A462-8-38	"	.15 K	12.5 K/IN	30	fa=.107	.79	1.5	MAC	8/30	RLI	9/16		ICE CONDENSER
(TVA) 47A462-8-37	"	.15K	12.5 K/IN	30	fa=.107	.79	1.5	MAC	8/30	RLI	9/16		ICE CONDENSER
(TVA) 47A462-8-17	"	.72K	0	30	fa=.2	.01	1.5	MAC	8/30	RLI	9/16	ITEM #3	ICE CONDEN
(EDS) 1-01A-426	"	206.5K	0	1.86	fa=26.1	1.21	1.5	MAC	9/1	RLI	9/16		MAIN STEAM
(EDS) 1-01A-385	"	82.3K	0	4.65	fa=10.4	.483	1.5	MAC	9/1	RLI	9/16		MAIN STEAM
(EDS) 1-01A-345	"	56.7K	0	4.65	fa=7.19	.353	1.5	MAC	9/1	RLI	9/16		MAIN STEAM
(EDS) 1-01A-347	"	137.0K	0	7.6	fa=16.8	.79	1.5	MAC	9/1	RLI	9/16		MAIN STEAM
(EDS) 1-01A-315	"	92.2K	0	18.5	fa=7.8	.38	1.5	MAC	9/1	RLI	9/16		MAIN STEAM
(EDS) 1-01A-311	"	96.7K	0	30.9	fa=13.7	.67	1.5	MAC	9/2	RLI	9/16		MAIN STEAM
(EDS) 1-01A-310	COLUMN	168.3	0	22.3	fa=11.7	.57	1.5	MAC	9/2	RLI	9/16		MAIN STEAM.

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 9/14

CHECKED RLI DATE 10/1/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS.	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE.	CHK. BY / DATE.	COMMENT.	SYSTEM
(EDS) 2-01A-385	COLUMN	38.0K	0	41.6	f_a = 4.78	.2277	1.5	MAC 9/15	RLI 9/16		MAIN STEAM
(EDS) 2-01A-347	"	171.2K	0	16.4	f_a = 21	1.01	1.5	MAC 9/13	RLI 9/16		MAIN STEAM
(EDS) 2-01A-345	"	31.5K	0	3.7	f_a = 3.96	.184	1.5	MAC 9/13	RLI 9/16		MAIN STEAM
(EDS) 2-01A-315	"	219.1K	0	20.2	f_a = 18.15	.88	1.5	MAC 9/14	RLI 9/16		MAIN STEAM
(EDS) 2-01A-311	"	96.7K	0	20.9	f_a = 13.63	.67	1.5	MAC 9/14	RLI 9/16		MAIN STEAM
(EDS) 2-01A-306	"	18.02K	0	3.7	f_a = 2.27	.11	1.5	MAC 9/14	RLI 9/16		MAIN STEAM
(EDS) 1-68-270	"	.43	6.95K/IN	30	f_a = .21	.43	1.5	MAC 9/14	RLI 9/16		REACTOR COOLANT
(EDS) 1-68-273	"	.443K	0	19.27	f_a = .171	.008	1.5	MAC 9/14	GLP 9/16		REACTOR COOLANT
(EDS) 1-68-320	"	.677K	4.8K/IN	8.65	f_a = .43	.312	1.5	MAC 9/14	GLP 9-16		REACTOR COOLANT
(TVA) 47A465-8-1	"	.816K	0	13.77	f_a = 1.65	.078	1.5	MAC 9/14	GLP 9-16		REACTOR COOLANT
(TVA) 47A465-8-17	"	.032K	0	230				MAC 9/14	GLP 9-16		REACTOR COOLANT
(TVA) 47A432-3-1	"	.099K	.22K/IN	4.25	f_a = .06	.016	1.5	MAC 9/14	GLP 9-16		RHR
(BP)		1.76K	0	4.57	f_a = 1.65	.077	1.5				
63-1515-R28	"	1.76K	0	12.78	f_a = 1.04	.05	1.5	MAC 9/14	GLP 9-16	ITEM #1 ~~ON 150.~~ ITEM #2 ~~ON 180.~~	SAFETY INJECTION
(EDS) PROB(15-02) 1-87-037	"	20.8K	0	10.34	f_a = 4.41	.208	1.5	MAC 9/14	GLP 9-16		UPPER HEAD INJECTION
(EDS) PROB.(15-02) 1-87-058	"	6.28K	0	1.76	f_a = 1.65	.076	1.5	MAC 9/14	GLP 9-16		UPPER HEAD INJECTION
(EDS) PROB(15-02) 1-87-59	"	13.70K	0	10.86	f_a = 2.92	.138	1.5	MAC 9/14	GLP 9-16		UPPER HEAD INJECTION
(EDS) PROB:(15-02) 1-87-60	"	16.0K	0	80.0	f_a = 3.39	.16	1.5	MAC 9/14	RLI 9/16		UPPER HEAD INJECTION
(EDS) PROB:(15-02) 1-87-61	"	13.8K	0	17.6	f_a = 2.79	.135	1.5	MAC 9/14	RLI 9/16		UPPER HEAD INJECTION
(EDS) PROB:(15-02) 1-87-63	COLUMN	47.7K	0	80.6	f_a = 10.11	.51	1.5	MAC 9/14	RLI 9/16		UPPER HEAD INJECTION

5 TVA 4898 (COM-3-56)

SHEET 5 OF 5

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 9/29

CHECKED RLI DATE 10/1/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE		CHK. BY / DATE		COMMENT.	SYSTEM
(EDS) PROB: (15-02) 1-87-64	COLUMN	28.3K	0	130	f_a=6.0	.30	1.5	MAC	9/14	RLI	9/16		UPPER HEAD INJECTION
(EDS) PROB: (15-02) 1-87-067	"	2.88K	0	30	f_a=.76	.04	1.5	MAC	9/15	RLI	9/16		UPPER HEAD INJECTION
(EDS) PROB: (15-02) 1-87-79	"	3.85K	92.4 K/in	15.7	f_a=.545	.788	1.5	MAC	9/15	RLI	9/16		UPPER HEAD INJECT
(EDS) PROB: (15-02) 1-87-078	"	5.88K	0	30	f_a=1.29	.061	1.5	MAC	9/15	RLI	9/16		UPPER HEAD INJECTION
(EDS) PROB: (15-01) 1-87-036	"	39.8K	0	130	f_a=8.43	.42	1.5	MAC	9/15	RLI	9/16		UPPER HEAD INJECTION
(EDS) PROB: (15-01) 1-87-032	COLUMN	5.48K	0	130	f_a=2.29	.11	1.5	MAC	9/15	RLI	9/16		UPPER HEAD INJECTION
03B-1AFW-R82	"	.112K	0	77.84				JRH	8/26	MAC	9/27	KL/r > 30	AFW
1-03A-324	"	27.642K	0	7.25	f_a= 3.77 KSI	.18	1.5	JRH	8/31	MAC	9/27		FW
1-01B-16	"	.14K	0	21.0				GP	9/7	MAC	9/27	OK BY INSPECTION	BLOW DOWN
1-03A-245	"	19.6 K	0	3.4	9.71	.45	1.5	DWO	9/29	MAC	9/28		FEED WATER
1-01A-432	"	231	0	37	11.8	.61	1.5	RLI	9/29	MAC	9/29	KL/r > 30	MAIN STEAM
1-01A-388 2-01A-388	"	197	0	87	8.77	.6	1.5	RLI	9/29	MAC	9/29	KL/r > 30	MAIN STEAM
12-1AAB-R027	"	1.42	0	32	1.89	.1	1.5	RLI	9/29	MAC	9/29	KL/r > 30	AUXILIARY BOILER
12-1AAB-R058	"	"	"	"	"	"	"	RLI	9/29	MAC	9/29	"	AUXILIARY BOILER
72-1CS-R31	"	2.72	0	9	1.2	.04	1.5	RLI	9/29	MAC	9/29		CONTAIN-MENT SPRAY
1-74-7	"	58.8	0	18	13	.63	1.5	RLI	9/29	MAC	9/29		RESIDUAL HEAT REMOVAL
1-03A-242	"	51.5	0	47	3.8	.21	1.5	RLI	9/29	MAC	9/29	KL/r > 30	FEED WATER
1-03A-202	"	"	"	"	"	"	"	RLI	9/29	MAC	9/29	"	FEED WATER
1-01A-430	"	139	0	40	11.8	.61	1.5	RLI	9/29	MAC	9/29	KL/r > 30	MAIN STEAM

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED EJP DATE 8/16/82

CHECKED RLI DATE 10-1-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS (1.6) AXIAL	MOMENT	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY DATE	CHK. BY DATE	COMMENT	SYSTEM
PROB: (06-01) 1-01A-319 (EDS)	SLEEVE	45.5 K		.075	$f_a = 3.0$ KSI	0.14	1.5	EJP 8/16	GLP 9-22-82	RADIAL GRND FLAT PLATE	MN STM
(06-02) 1-01A-356 (EDS)	"	95.4 K		.075	$f_a = 6.36$ KSI	0.30	"	EJP 8/16	GLP 9-22-82	"	"
(06-03) 1-01A-398 (EDS)	"	46.5 K		.075	$f_a = 3.1$ KSI	0.14	"	EJP 8/16	GLP 9-22-82	"	"
(06-04) 1-01A-433 (EDS)	"	89.2 K		.075	$f_a = 2.0$ KSI	0.09	"	EJP 8/16	GLP 9-22-82	"	"
(04-08) 1-70-336 (EDS)	"	0.230 K	0.172 IN-K	BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	L's IN BENDING	COMP COOL.
(04-09) 2-70-136 (EDS)	"	1.58 K	0.79 IN-K	BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	RADIAL GRND L's W/R IN BND'G	"
(04-04) 2-70-157 (EDS)	"	0.094 K		BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	RADIAL GRND L's ONLY	"
(02-02) 1-03A-243 (EDS)	"	17.8 K		0.33	$f_a = 0.5$ KSI	0.02	1.5	EJP 8/16	GLP 9-22-82	RADIAL GRND FLAT PLATE	FEED WATER
(02-03) 1-03A-282 (EDS)	"	17.1 K		0.33	$f_a = 0.4$ KSI	0.02	1.5	EJP 8/16	GLP 9-22-82	RADIAL GRND FLAT PLATE	FEED WATER
(02-04) 1-03A-322 (EDS)	"	34.6 K		0.33	$f_a = 0.85$ KSI	0.04	1.5	EJP 8/16	GLP 9-22-82	"	"
(09-01) 1-63-010 (EDS)	"	17.2 K		2.45	$f_a = 2.87$ KSI	0.13	1.5	EJP 8/16	GLP 9-22-82	Short IR RAD GRND ON END	SIS
(03-01) 1-74-2 (EDS)	"	40.8 K		2.45	$f_a = 4.08$ KSI	0.19	1.5	EJP 8/16	GLP 9-22-82	"	RHR
ISO: 47W432-206 74-1RHR-R163 (BP)	"	4.8 K		BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	RADIAL GRND L's ONLY	RHR
ISO: 47W432-205 74-1RHR-R158 (BP)	"	4.8 K		BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	"	"
Anal: N3-26-3A 47A491-6-1 (TVA)	"	0.32 K		BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	L's ON OUTSIDE of SLV	FP
Anal: N3-B1-1A 47A492-2-9 (TVA)	"	1.23 K		BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	"	PRIMARY WATER
Anal: N3-81-1R 47A492-R-5 (TVA)	"	0.34 K		BUCKLING NOT INVOLVED				EJP 8/16	GLP 9-22-82	"	"
Anal: N3-33-1A 47A492-2-15 (TVA)	SLEEVE	0.9 K		1.3	$f_a = 0.3$ KSI	0.01	1.5	EJP 8/16	GLP 9-22-82	R welded on around inside SLV	SERVICE AIR
2-70-315 (EDS)	SLEEVE	0.09 K		BUCKLING NOT INVOLVED				EJP 9/22	GLP 9-22-82	RADIAL GRND L's ONLY	COMP COOL.

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED GLP DATE 9/7/82

CHECKED RLT DATE 10/1/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING. MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE.	CHK. BY / DATE.	COMMENT. SYSTEM
03B-2AFW-R1	SLEEVE	4.8K	/	BUCKLING NOT INVOLVED				GP 9/7	MAC 9/27	AFW

SHEET 1 OF 1

FINAL EVALUATION REPORT FOR BUCKLING SAMPLE PROGRAM OF PIPE SUPPORTS

COMPUTED RLI DATE 10-14-82

CHECKED MAC DATE 9-21-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.	SYSTEM
1-70-095	RIGID FRAME	1568 #		NO BUCKLING INVOLVED				JRH 8/28	MAC 9/20	ok	COMPONENT COOLING
1-70-816	"	3067.2 #		7.08	1.31 KSI	.362	1.5	JRH 8/28	MAC 9/20	hand calcs. ok	"
70-1CC-R312	"	42080 #		5.44	4.96 KSI	.355	"	JRH 8/28	MAC 9/20	"	"
1-74-6	"	50801.6 #		6.90	10.0 KSI	.470	"	JRH 9/20	MAC 9/20	ok	RESIDUAL HEAT REMOVAL
1-62A-307	"	1892.8 #		NO BUCKLING INVOLVED				JRH 8/28	MAC 9/20	ok	H.P. CHEM & VOL. CONTOL
1-87-035	"	7505.6 #		NO BUCKLING INVOLVED				JRH 8/28	MAC 9/20	ok	UPPER HEAD INJECTION
1-74-5	"	88216 #		6.98	17.37 KSI	.816	1.5	JRH 8/28	MAC 9/20	hand calc's ok	RESIDUAL HEAT REMOVAL
1-74-10	"	30372.8 #		5.09	5.98 KSI	.281	"	JRH 8/28	MAC 9/20	"	"
1-74-1	"	12321.6 #		3.89	2.43 KSI	.114	"	JRH 8/30	MAC 9/20	"	"
70-1CC-R505	"	3200 #		3.16	3.20 KSI	.329	"	JRH 8/30	MAC 9/20	"	COMPONENT COOLING
1-62A-301	"	2816 #		2.03	1.02 KSI	.425	"	JRH 8/30	MAC 9/20	"	H.P. CHEM & VOLUME CONTROL
1-62A-302	"	"		"	"	"	"	JRH 8/30	MAC 9/20	"	"
62-1CVC-R13	"	2400 #		3.49	.619 KSI	.199	"	JRH 8/30	MAC 9/20	"	"
1-74-4	"	24910.4 #		2.30	2.49 KSI	.742	"	JRH 8/31	MAC 9/20	"	RESIDUAL HEAT REMOVAL
1-87-62	"	18400 #		1.10	0.87 KSI	.041	"	JRH 8/31	MAC 9/21	"	UPPER HEAD INJECTION
47H454-2-46	"	6940.8 #		4.51		.995	"	JRH 9/2	MAC 9/21	STRUDL CODE CHECK	FPC
47A454-1-15	"	"		4.51		"	"	JRH 9/2	MAC 9/21	"	FUEL POOL COOL & CLEAN
1-87-80	"	5920 #		19.38	3.56 KSI	1.17	"	JRH 9/2	MAC 9/21	hand calc's ok	UPPER HEAD INJECTION
47A406-3-11	"	192 #		21.80	.32 KSI	.087	"	JRH 9/3	MAC 9/21	" HP	CVC

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JRH DATE 9-8-82

CHECKED RLI DATE 10-14-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING						RES. BY / DATE		CHK. BY / DATE		COMMENT		
		MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INTERACTION VALUE	ALLOWABLE INTERACTION VAL.							SYSTEM
47A454-3-10	RIGID FRAME	5604.8 #		10.16	1.5 KSI	.229	1.5	JRH	9/3	MAC	9/21	hand calc's ok		SFPS
26-1FP-R232	"	3200 #		22.39	.79 KSI	.039	"	JRH	9/7	MAC	9/21	"		H.P. FIRE PROTECTION
47A492-2-11	"	1443.2 #		6.61	.75 KSI	.213	"	JRH	9/7	MAC	9/21	"		PRIMARY WATER
47A431-9-7	"	1025.6 #		6.91	.36 KSI	.093	"	JRH	9/7	MAC	9/21	"		AUX BOILER BLDG
03B-1AFW-R23	"	6400 #		5.67	.84 KSI	.039	"	JRH	9/7	MAC	9/21	"		AUX FEEDWATER
78-1FPC-R-38	"	3200 #		17.95	1.14 KSI	.67	"	JRH	9/7	MAC	9/21	"		FUEL POOL COOLING
62-1LCV-R81	"	896 #		12.42	.13 KSI	.451	"	JRH	9/8	MAC	9/23	"		L.P. CHEM & VOL CONTR
72-1CS-R20	"	3200 #		5.32	.69 KSI	.188	"	JRH	9/8	MAC	9/23	"		CONTAINMENT SPRAY
70-1CC-R577	"	240 #		3.99	.12 KSI	.046	"	JRH	9/8	MAC	9/23	"		COMPONENT COOLING
62-1LCV-R86	"	208 #		21.44	.05 KSI	.144	"	JRH	9/8	MAC	9/23	"		L.P. CHEM & VOL CONTR
2-70-804	"	1073.6 #		8.56	.39 KSI	.294	"	JRH	9/8	MAC	9/23	"		COMPONENT COOLING
12-1AAB-R57	"	2240 #		7.01	1.10 KSI	.799	"	JRH	9/8	MAC	9/23	"		AUX BOILER
12-1AAB-R67	"	"		"	"	"	"	JRH	9/8	MAC	9/23	"		"
12-1AAB-R053	"	"		"	"	"	"	JRH	9/8	MAC	9/23	"		"
12-1AAB-R052	"	"		"	"	"	"	JRH	9/6	MAC	9/23	"		"
47A435-2-11	"	288 #		10.27	.183 KSI	.193	"	JRH	9/8	MAC	9/23	"		SIS
26-1FP-R61	"	6400 #		3.16	.734 KSI	.034	"	JRH	9/8	MAC	9/23	"		H.P. FIRE PROTECTION
26-1FP-R63	"	2400 #		6.35	.813 KSI	.61	"	JRH	9/9	MAC	9/23	"		"
62-1LCV-R80	"	480 #		21.05	.114 KSI	.01	"	JRH	9/9	MAC	9/23	"		L.P. CHEM & VOL. CONTR

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JRH DATE 9/9/82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXT. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	RES. BY / DATE	CHK. BY / DATE	COMMENT.	SYSTEM
78-1FRC-R18	RIGID FRAME	1280 #		17.26	.806 KSI	.288	1.5	JRH 9/9	MAC 9/23	hand calc's ok	FUEL POOL COOLING
67-1ERW-R116	"	"		"	"	"	"	JRH 9/9	MAC 9/23	"	ESSENTIAL RAW COOLING WATER
62-1LCV-R84	"	NO BUCKLING INVOLVED						JRH 9/9	RLI 10/7	"	L.P. SI & VOL. CH.
78-1FPC-R7	"	640 #		21.42	.676 KSI	.60	"	JRH 9/9	MAC 9/23	"	FUEL POOL COOLING
78-1FPC-R4	"	"		21.42	"	.60	"	JRH 9/9	MAC 9/23	"	"
78-1FPC-R19	"	1280 #		26.39	2.02 KSI	1.03	"	JRH 9/9	MAC 9/23	"	"
62-1LCV-R87	"	"		"	"	"	"	JRH 9/9	MAC 9/23	"	L.P. CHEM. & VOL. CONTR.
62-1LCV-R82	"	"		"	"	"	"	JRH 9/9	MAC 9/23	"	"
47A435-2-8	"	848 #		26.15	1.25 KSI	1.01	"	JRH 9/9	MAC 9/23	"	SAFETY INJECTION
63-1SI-R24	"	"		"	"	"	"	JRH 9/9	MAC 9/23	"	"
70-1CC-R186	"	400 #		BUCKLING NOT INVOLVED				JRH 9/9	MAC 9/23	ok	COMPONENT COOLING
70-1CC-R118	"	304 #		.722	.034 KSI	.002	1.5	JRH 9/9	MAC 9/23	hand calc's ok	"
47A555-10-2	"	96 #		21	.192	.01	1.5	JRH 9/9	RLI 10/8	ok	LP CVCS
47A555-10-4	"	160 #		21	.32	.02	1.5	JRH 9/9	RLI 10/8	ok	LP "
1-035-9	"	3505.6 #		3.99		.364	1.5	JRH 9/10	MAC 9/23	Strud code check	AUX FEEDWATER
-356	"	"		"		"	"				
1-63-16	"	"		"		"	"	JRH 9/10	MAC 9/23	"	SAFETY INJECTION
-351	"	"		"		"	"				
								JRH 9/10	MAC 9/23	"	"

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED RLT DATE 9/23/82

CHECKED MAC DATE 9/23/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	RES: BY / DATE		CHK: BY / DATE		COMMENT.	SYSTEM
47A431-9-21	RIGID FRAME	259.2 #	/	30.9	/	/		JRH	9/15	MAC	9/23	KL/r > 30 ∴ ok	AUX BOILER
2-70-067	RIGID FRAMES	5589 #	/	3.01	/	1164	1.5	JRH	9/16	MAC	9/23	STRUDL CODE CHECK	COMPONENT COOLING
47A462-8-27	RIGID FRAME	2980.8 #	/	15.50	2.01 KSI	1.13	"	JRH	9/20	MAC	9/23	hand calc ok	I.C.

SHEET 2 OF 7

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED DWO DATE 9/7/82

CHECKED RLI DATE 10/14/82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	RES. BY / DATE	CHK. BY / DATE	COMMENT	SYSTEM
TVA	47A431-9-10	RIGID FRAME	.675K		9.13	.177	.957	1.5	GLP 9-8-82	JRH 9/27		AUX BOILER
EDS	1-63-001	RIGID FRAME	8.68 K		54.5	5.46	.305		GLP 9-8-82	JRH 9/27		S1
EDS	1-01A-352		13.28 K		2.21	3.48	.162		GLP 9-9-82	JRH 9/27		MS
EDS	2-01A-352		236.24 K		.23	1.64	.076					
EDS	1-01A-354		37.88 K		.18	2.37	.11		GLP 9-9-82	JRH 9/27		MS
EDS	1-63-007		92.4K		.281	4.29	.199		GLP 9-13-82	JRH 9/27		S1
EDS	1-63-006		11.88K		.488	2.813	.488		GLP 9-13-82	JRH 9/27		S1
	1-74-12		74.25K		.314	3.956	.316		GLP 9-29-82	RLI 9/30/82		RHR
	1-87-006		10.86K		8.125	2.19K	.103		JRH 10-7-82	GLP 10-8-82		UHI
	17A586-1-12		23.76	0	3.64	9.17	.43					
			11.88	86.1	16.5	1.68	.27					
					12.1		1.34					
	17A586-1-12		10788.8#		3.88		.677		JRH 8/26	MAC 9/82	STRUDL CODE CHECK	ERCW
	17A586-1-13		"		"		"		JRH 8/26	MAC 9/82	"	"
	17A586-1-35		"		"		"		JRH 8/26	MAC 9/82	"	"
	17A586-5-13		"		"		"		JRH 8/26	MAC 9/82	"	"
	47A462-8-6		3327#		8.79	F_a = 1.28 KSI	.735		DWO 8/27	JBS 9/14	STRUDL CODE CHECK	ICE CONDENSER
	47A462-8-14		"		"	"	"		DWO 8/27	JBS 9/14	"	"
	47A462-8-13		"		"	"	"		DWO 8/27	JBS 9/14	"	"
	47A462-8-5		"		"	"	"		DWO 8/27	JBS 9/14	"	"
	1-03B-39		4320#		10.8				GP 9/7	MAC 9/27	"	AFW

TVA 4640 (CON-3-561)

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED RLE DATE 9/20/82

CHECKED MAC DATE 9-20-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING						DES. BY / DATE	CHK. BY / DATE	COMMENT	
		MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.				SYSTEM
1-68-340	RIGID FRAME	379 #		Buckling not involved				JRH 8/14	MAC 9/20	ok	RC
26-1FP-R75	"			"	"			JRH 8/14	MAC 9/20		HPFP
26-1FP-R77	"	"		"	"			JRH 8/14	MAC 9/20	"	"
	"	"		"							
26-1FP-R65	"	"		"	"			JRH 8/14	MAC 9/20	"	"
26-1FP-R69	"	"		"	"			JRH 8/14	MAC 9/20	"	"
26-1FP-R71	"	"		"	"			JRH 8/14	MAC 9/20	"	"
26-1FP-R73	"	"		"	"			JRH 8/14	MAC 9/20	"	"
26-1FP-R67	"	"		"	"			JRH 8/14	MAC 9/20	"	"
17-A586-1-1	"	5379 #		11.6		.733	1.5	JRH 8/16	MAC 9/20	STRUDL CODE CHECK	ERCW
17-A586-1-2	"	"		"		"	"	JRH 8/16	MAC 9/20	"	"
17-A586-1-5	"	"		"		"	"	JRH 8/16	MAC 9/20	"	"
17-A586-1-70	"	"		"		"	"	JRH 8/16	MAC 9/20	"	"
17-A586-5-3	"	"		"		"	"	JRH 8/16	MAC 9/20	"	"
17-A586-5-4	"	"		"		"	"	JRH 8/16	MAC 9/20	"	"
17-A586-5-5	"	"		"		"	"	JRH 8/16	MAC 9/20	"	"
17-A586-5-26	"	"		"		"	"	JRH 8/16	MAC 9/20	"	"
17-A584-5-33	"	5680 #		.91		.347	"	JRH 8/16	MAC 9/20	"	"

TVA 4480 (CON-3-561)

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FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED RLI DATE 9-20-82

CHECKED MAC DATE 9-20-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL	MOMENT	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	RES. BY / DATE	CHK. BY / DATE	COMMENT	SYSTEM
47A465-1-33	RIGID FRAME	24 #		Buckling not involved				JRH 8/18	MAC 9/20	ok	RC
47A450-4-29	"	928 #		9.00	f_a=.247 KSI	.031	1.5	JRH 8/18	MAC 9/20	SAGS ok	ERCW
1-03B-11	"	816 #		3.99		.299	"	JRH 8/19	MAC 9/20	"	AFW
47A450-3-157	"	8480 #		6.67	f_a=1.24 KSI	.63	"	JRH 8/19	MAC 9/20	"	ERCW
47A450-3-105	"	10400 #		6.67	f_a=1.64 KSI	.77	"	JRH 8/19	MAC 9/20	"	"
47A450-21-201	"	1648 #		10.19		.524	"	JRH 8/19	MAC 9/20	Strudl code check.	"
03B-1AFW-R10	"	1680 #		6.80		.082	"	JRH 8/20	MAC 9/20	"	"
1-03B-7	"	2880 #		3.99		.344	"	JRH 8/25	MAC 9/20	SAGS OK	AFW
1-03B-12	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
1-03B-13	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
1-03B-14	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
1-03B-60	"	3580.8 #		"		.840	"	JRH 8/25	MAC 9/20	"	"
1-03B-10	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
1-03B-8	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
1-63-355	"	"		"		"	"	JRH 8/25	MAC 9/20	"	SAFETY INJECTION
1-63-357	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
1-63-358	"	"		"		"	"	JRH 8/25	MAC 9/20	"	"
17A586-5-27	"	2924.8 #		7.59		.499	"	JRH 8/25	MAC 9/20	STRUDL CODE CHECK	ERCW

TVA 4800 (CON-3-86)

SHEET 1 OF 7

BRACED CANTILEVER
FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JBJ DATE 8/24/82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL K	MOMENT.	$\frac{KL}{r}$	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT: GT STRUCT	System
~~47A454-1-12~~	Br. Cant.	1.246	1.081	12.58	—	.059	1.5	JBJ 8/18	GLP 9-25-82	Pressure Code Check	Feed Pool cooling other
~~47A454-2-44~~	"	1.245	—	28	—	.08	1.5	JBJ 8/19	GLP 9-28-82	"	"
~~47A454-2-36~~	"	5.32	—	25	—	.87	1.5	JBJ 8/19	GLP 9-25-82	"	"
~~1-63-004~~ (09-01)	"	7.08		11	—	.37	1.5	JBJ 8/20	GLP 9-25-82	"	Safety Injection
~~1-03A-365~~ (02-05)	"	.400	—	19 / AXIAL	Load is Negligible			JBJ 8/20	GLP 9-25-82	Feedwater	OK
~~1-03A-366~~ (02-05)	"	14.32		13	Actual Stress = 3.75 KSI < .9(36 KSI) ∴ OK			JBJ 8/20	GLP 9-25-82	"	OK
~~1-03A-367~~ (02-06)	"	31.28	—	19 ∠	Actual Stress = 6.86 KSI < .9(36 KSI) ∴ OK			JBJ 8/20	GLP 9-25-82	"	ok
~~1-03B-27~~ (05-01)	"	3.415	— —	16.4	Actual stress = .894 < .9(36 KSI) ∴ OK			JBJ 8/23	GLP 9-25-82	Auxiliary feedwater	ok
~~67-1ERCW-R13~~	"	7.012	— —	17	Actual stress = 1.49 KSI < .9(36 KSI) ∴ OK			JBJ 8/23	GLP 9-25-82	ERCW	OK
~~47A450-3-76~~	"	—	→	45	OK because $\frac{KL}{r}$ > 30			JBJ 8/23	GLP 9-25-82	ERCW	OK
∠30 ~~67-1ERCW-R314~~	"	13.290	-50.370	Combined $\frac{KL}{r}$=15.8 member	stress in compression < .9(36 KSI) ∴ OK			JBJ 8/23	GLP 9-25-82	ERCW $\frac{KL}{r}$=15.8	factor of 1.6 still OK
>30 ~~67-1ERCW-R314~~	"	9.274	—	$\frac{KL}{r}$ = 38	MAX Stress = 1.6 (22 KSI) < .9(36) KSI ∴ OK			JBJ 8/23	GLP 9-25-82	ERCW	OK
~~03B-1AFW-R2~~	"	—	→	32.38	$\frac{KL}{r}$ > 30 ∴ OK			JBJ 8/24	GLP 9-25-82	Aux Feed-water	ok
~~03B-1AFW-R11~~	"	—	→	46.5	$\frac{KL}{r}$ > 30 ∴ OK			JBJ 8/24	GLP 9-25-82	Aux Feed-water	OK
		VOID									
~~70-2CC-R42~~	"	—	—	37.5	$\frac{KL}{r}$ > 30 ∴ OK			JBJ 8/24	GLP 9-25-82	Component cooling	OK
∠30 ~~62-1CCW-R89~~	"	.091	—	$\frac{KL}{r}$ = 85 AXIAL	LOAD NEGLIGIBLE			JBJ 8/24	GLP 9-26-82	L.P. Chemical Volume Control	OK
		VOID									
~~62-1CCW-R88~~		1.81		29.79	.86 KSI	.043	1.5	JBJ 8/24	GLP 9-25-82	L.P. Chemical & Volume Cont. OK	

BRACED CANTILEVER
FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JBJ DATE 8-31-82

CHECKED RLI DATE 10/4/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL	MOMENT	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES: BY / DATE	CHK: BY / DATE	COMMENT	
04.10 1-70-800	Braced Cant	5K		11.06	4.79 KSI	.228	1.5	JBJ 8-24	GLP 9-27-82	Component Cooling Sys	OK
12-1AAB-R13	"	1.58K		23.7	.414 KSI	.02	1.5	JBJ 8-25	GLP 9-28-82	Aux Boiler	OK
03B-1AFW-R18	"	→	→	30.4	KL/r 730 :	OK		JBJ 8-25	GLP 9-27-82	Aux Feedwater	OK
78-1FPC-R13	"	→	→	34.2	KL/r 730 :	OK		JBJ 8-25	GLP 9-27-82	Fuel Pool Cooling	OK
47A435-2-10	"	1.4K		23.1	.62 KSI	.03	1.5	JBJ 8-25	GLP 9-27-82	SIS	OK
63-1S15-R17	"	←	→	31.2	KL/r 730 :	OK		JBJ 8-26	GLP 9-27-82	SIS	OK
72-1CS-R38	"	→	→	52	KL/r 730 :	OK		JBJ 8-25	GLP 9-27-82	Containment Spray	OK
63-1S15-R29	"	→	→	63.3	KL/r 730 :	OK		JBJ 8-25	GLP 9-27-82	Safety Injection	OK
72-1CS-R40	"	→	→	78	KL/r 730 :	OK		JBJ 8-25	GLP 9-27-82	Containment Spray	OK
47A435-2-2	"	→	→	45	KL/r 730 :	.01		JBJ 8-25	GLP 9-27-82	SIS	OK
47A435-1-2	"	→	→	45	KL/r 730 :	OK		JBJ 8-25	GLP 9-27-82	SIS	OK
47A454-1-37	"	→	→	58.8	KL/r 730 :	OK		JBJ 8-26	GLP 9-27-82	Fuel Pool Cool & cleaning	OK
17A586-5-7	"	passed 65	Strudl Code	CK	.9	1.5		JBJ 8-26	GLP 9-28-82	ERCW	OK
17A586-1-30	"	Passed 65	Strudl Code	CK	.9	1.5		JBJ 8-26	GLP 9-28-82	ERCW	OK
17A586-1-7	"	passed 65	Strudl Code	CK	.9	1.5		JBJ 8-26	GLP 9-28-82	ERCW	OK
17A586-1-19	"	passed 43	Strudl Code	.11	CK	1.5		JBJ 8-31	GLP 9-28-82	ERCW	OK
17A586-1-88	"	passed 43	Strudl Code	CK	.11	1.5		JBJ 8-31	GLP 9-28-82	ERCW	OK
17A586-1-42	"	passed 43	Strudl Code	CK	.11	1.5		JBJ 8-31	GLP 9-28-82	ERCW	OK
1-68-215	"			12.3		.73	1.5	DWD 9/15	JBJ 9/14	REACTOR COOLANT	OK

TVA 4000 (CON-3-561)

SHEET 3 OF 7

BRACED CANTILEVER
FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED DWO DATE 3/27/82

CHECKED RLI DATE 10/14/82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT
DWGS ARE SIMILAR	47A450-21-203 A & B	BRACED CANT.	4.6K		80		1.4	1.5	DWO 9/9	JBT 9/24	KL/r > 30 ERCW
	47A454-1-5	"	"		"		"	"	DWO 9/9	JBT 9/24	" FPC
DWGS ARE SIMILAR	47A454-1-29	"	7.3K		10.18		.71	1.5	DWO 9/10	GLP 9-23-82	FUEL POOL COOLING CLEAN
	47A491-10.4	"	"		15.47		"	"	DWO 9/10	GLP 9-23-82	FIRE PROTECTION
DWGS ARE SIMILAR	47A432-1-28	"	41.6 K		24	11.75 KSI	.92	1.5	DWO 9/8	GLP 9-24-82	RHR
	1-87-031	"	"		"	"	"	"	DWO 9/8	GLP 9-24-82	UPPER HEAD INJECTION
	47A454-3-23	"	"		"	"	"	"	DWO 9/8	GLP 9-24-82	SFPC
DWGS ARE SIMILAR	74-1RHR-R160	"	36.6 K		26	9.6 KSI	.86	1.5	DWO 9/13	GLP 9-23-82	RHR
	74-1RHR-R155	"	"		"	"	"	"	DWO 9/13	GLP 9-23-82	RHR
	70-1CC-R100	"	"		"	"	"	"	DWO 9/13	GLP 9-23-82	COMP. COOLING
	70-1CC-R91	"	"		"	"	"	"	DWO 9/13	GLP 9-23-82	COMP. COOLING
	1-03A-360	"	5.54		>30	1.45 KSI	.27	1.5	DWO 9/10	GLP 9-24-82	FEED WATER
	72-1CS-R25	"	38.4 K		15.1		1.1	1.5	DWO 9/10	JRH 9/29	CONTAINMENT SPRAY
	1-03A-368	"	4.5 K		>30				DWO 9/10	GLP 9-24-82	FEEDWATER KL/r > 30
	63-1516-R40, R30 & R32	"	3.17	4.8	34.3	2.77	.77	1.5	DWO 9/27	MAC 9/28	KL/r > 30 SAFETY INJECTION
	1-03B-53	"	8.2		23.8	.83	.31	1.5	DP 9/25	MAC 9/28	KL/r > 30 AUX. FEED WATER
	1-03B-3	"	"	"	"	"	"	"	DP 9/25	MAC 9/28	" " "

SHEET 1 OF 7

BRACED CANTILEVER
FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED DWO DATE 9/27/82

CHECKED RLT DATE 10-14-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES: BY / DATE	CHK: BY / DATE	COMMENT	
1-87-073	BRACED CANT	11.5	NEGLIGIBLE	7.5	1.1	.05	1.5	DWO 9/27/82	RLT 9/28/82		SNS UHI
67-1ERCW-RS18	"	3.41	123	20.9	19	.36	1.5	DWO 9/30/82	RLT 9/28/82		ERCW
26-1FP-R58	"	4.56	—	730	1.2	.3	1.5	DWO 9/30/82	RLT 9/28/82		HPF
12-1AAB-R66	"	1.73		730		1.7	1.5	GP 9/24/82	RLT 9/28/82	* SUPPORT IS OVERSTRESSED	AUX BOILER
1-63-005	"	14.84	13.8	39.3	5.9	.57	1.5	DWO 9/27/82	RLT 9/29/82	$\frac{KL}{r} > 730$	SAFETY INJECTION

SHEET ___ OF ___

BRACED CANTILEVER
FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED NIAC DATE 8-20-82

CHECKED RLI DATE 10-14-87

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL	MOMENT	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY DATE	CHK. BY DATE	COMMENT
PROB: (ALT. ANAL)	BRACED			(1) > 30						SYSTEM
47A431-9-15 (TVA)	CANTILEVER	1.04K		(2) > 30				MAC 8/19	JRH 9/22	ISO. ITEM (1) AUXILIARY
PROB: (ALT. ANAL)	"			(1) HORIZONAL	LOAD	ONLY				ISO. ITEM (2) BOILER
47A431-9-23 (TVA)	"	3.30K	17.8 IN/K	(2) 27.32	f_a = 0.73	0.26	1.5	MAC 8/19	JRH 9/23	ISO. ITEM (1)
PROB: (ALT. ANAL)	"	5.8K		(1) > 30						ISO. ITEM (2)
47A431-9-28 (TVA)	"	6.1K		(2) > 30				MAC 8/18	JRH 9/22	ISO. ITEM (1)
PROB: (ALT. ANAL)	"	2.9K	13.9 IN/K	(1) 19.55	f_a = 1.12	0.36	1.5			ISO. ITEM (2)
47A431-9-30 (TVA)	"	3.4K	13.9 IN/K	(2) 20.48	f_a = 1.33	0.37	1.5	MAC 8/18	JRH 9/23	ISO. ITEM (1)
PROB: (ALT. ANAL)	"	1.9K		(1) > 30						ISO. ITEM (2)
47A431-9-31 (TVA	"	3.6K		(2) > 30				MAC 8/18	JRH 9/22	ISO. ITEM (1)
PROB: (ALT. ANAL)	"	3.6K	38.5 IN/K	(1) 20.73	f_a = 1.38	0.915	1.5			ISO. ITEM (2)
47A431-9-34 (TVA	"	3.1K	38.5 IN/K	(2) 10.42	f_a = 1.80	0.904	1.5	MAC 8/19	JRH 9/22	ISO. ITEM (1)
PROB: (ALT. ANAL)	"	8.2K	14.2 IN/K	(1) 19.2	f_a = 2.32	0.55	1.5			ISO. ITEM (2)
47A431-9-36 (TVA)	"	8.5K	14.2 IN/K	(2) 22.06	f_a = 2.40	0.55	1.5	MAC 8/19	JRH 9/22	ISO. ITEM (1)
PROB: (ALT. ANAL)	"	1.9K	16.4 IN/K	(1) 11.2	f_a = 0.54	0.22	1.5			ISO. ITEM (2)
47A431-9-37 (TVA)	"	4.1K	22.6 IN/K	(2) 12.87	f_a = 1.16	0.32	1.5	MAC 8/19	JRH 9/22	ISO. ITEM (1)
PROB: (ALT. ANAL)	"	1.9K	65.3 IN/K	(1) 22.27	f_a = 0.54	0.78	1.5			ISO. ITEM (2)
47A431-9-39 (TVA)	"	10.2K	10.4 IN/K	(2) 14.83	f_a = 3.91	0.19	1.5	MAC 8/19	JRH 9/23	ISO. ITEM (1)
PROB: (ALT. ANAL)	"	1.3K	0 "	(1) 10.67	f_a = 0.52	0.03	1.5			ISO. ITEM (2)
47A431-9-42 (TVA)	"	1.3K	9.2 IN/K	(4) 12.26	f_a = 0.52	0.23	1.5	MAC 8/19	JRH 9/22	ISO. ITEM (1)
PROB: (ALT. ANAL)	BRACED	.5K								ISO. ITEM (4)
47A431-9-43 (TVA)	CANTILEVER	.5K								(3)
										(4)

TVA 4890 (CON-3-561)

SHEET 6 OF 7

BRACED CANTILEVER
FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED GLP DATE 9-30-82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL	MAXI. LOADS MOMENT	KL/r	BUCKLING STRESS	INT. VALUE	RLT. INT. VAL.	DES: BY / DATE	CHK: BY / DATE	COMMENT	
17A586-1-23	Braced Cantilever	—	—	7	Passed Code	Strudl C/C .56	1.5	GLP 9-30-82	GLP 9-29-82		OK ERCW
17A586-1-69	Braced Cantilever	—	—	7	Passed Code	Strudl C/C .56	1.5	GLP 9-30-82	GLP 9-29-82		OK ERCW
47A462-8-65	"	—	—	>30		1.60	1.5	GLP 9/30/82	RLI 9/30/82	OVERSTRESSED	I.C.
47A462-8-52	"	—	—	>30		.44	1.5	GLP 9/30/82	RLI 9/30/82		I.C.

TVA 4800 (COM-3-56)

SHEET 1 OF 1

BRACED CANTILEVER
FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED DWO DATE 9/29/82

CHECKED RLT DATE 10-14-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL		MOMENT	kl/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT	
1-74-8	BRACED SANT	26.27	K		14.3		.23	1.5	DWO 9/25	JRH 9/27	STRUDL CODE CHECK	RESIDUAL HEAT REMOVAL
67-1ERCW-RS40	"	3.17	K		55.			"	DWO 9/25	JRH 9/28	"	ERCW
67-1ERCW-RS11	"				40.6			"	DWO 9/25	JRH 9/28	"	ERCW
47A454-1-44	"	.448	K		26.45		.40	"	DWO 9/25	JRH 9/28	"	FPC
47A454-2-31	"	.186	K		18.45		.06	"	DWO 9/25	JRH 9/28	"	SFPC
1-70-338	"				43.62			"	DWO 9/25	JRH 9/28	"	COMPONENT COOLING
1-01A-424	"	85.1	K		4.5		.94	"	DWO 9/25	JRH 9/28	"	MAIN STEAM
47A492-2-2	"	.675	K		30.5	.424		"	DWO 9/29	JRH 9/29		PRIMARY WATER (LP)
62-1LCV-R78	"	.166			11.8	.634	.87	"	GLP 9-8-82	JRH 9/29		CVC

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS (UNIQUE FRAMES)

COMPUTED [initials] DATE 9-3-82
CHECKED MAC/RLI DATE 9-20-82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL	MAXI. LOADS MOMENT	$\frac{Kl}{r}$	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT
BLOWDOWN	1-01B-142	SIMPLE FRAME	SUPPORT SUBJECT TO BENDING ONLY						[initials] 8/12	MAC/9-16-8	NO. BUCKLING EVALUATION REQ'D.
"	1-01B-144	SIMPLE FRAME	1647#	16740.0 in-#	60	1003.0 psi	0.52	1.5	[initials] 8/12/82	MAC/9-16-8	MEM. IS ADEQUATE & O.K.
CHEM & (HP) VOL CONTROL	1-62A-310	"	884#	—	13.64	O.K	0.12	1.5	[initials] 8/13	MAC/9-16-8	Kl/r < 30. O.K.
COMP. COOLING	70-1CC-R259	simple frame	Support subject to Axil Tension & pure bending no compression.						[initials] 8/12/82	RLI 9/17/82	NO BUCKLING EVALUATION REQ'D
CVCS (LP)	47A555-10-5	simple frame	MEM. SUBJECT TO VERY SMALL AXIAL LOADING & O.K						[initials] 8/12/82	RLI 9/17/82	O.K FOR BUCKLING STRESS. Kl/r = 22
FEEDWATER	1-03A-327	simple frame	5674#	—	21.2	—	.07 O.K	—	[initials] 8/13/82	RLI 9/17/82	MEM. IS O.K FOR BUCKLING.
"	1-03A-204	Free-col.	28775#	—	24.3	—	.23 O.K		[initials] 8/13/82	RLI 9/17/82	MEM. IS O.K & ADEQUATE.
ERCW	47A450-21-226 & 226A	Braced frame.	MULTI-LOADED (BEND & COMP)	—	>30	1.4	1.1 O.K	1.5	[initials] 8/24/82	RLI 9/17/82	MEM. IS OK. FOR BUCKLING.
FEEDWATER	1-03A-290	CANT & SHORT COLUMN			>30				[initials] 8/13/82	RLI 9/17/82	OUT OF SCOPE
REACTOR COOLANT	1-68-240	canti	Kl/r Support is free canti. w/Axial & Bending. O.K by inspection.						[initials] 8/14/82	RLI 9/17/82	Axial load & moment too small O.K.
"	1-68-251	platform beams	NO BUCKLING INVOLVED					—	[initials] 8/14/82	RLI 9/17/82	O.K No buckling by E.J.
"	1-68-410	canti. bracket	717#	=	17	SMALL	<<1.5	1.5	[initials] 8/14/82	RLI 9/17/82	NO EVALUATION REQ'D
UPPER HEAD INJECTION	1-87-075	Simple Frame	MEM. SUBJECT TO MAJOR BENDING & SMALL COMPRESSION		Kl/r = 5	O.K	<<1.5	1.5	[initials] 8/17/82	RLI 9/17/82	SMALL BUCKLING STRESS INVOLVED.
"	1-87-065	Braced Frame.	9900#	297330 in-#	37	19.42 ksi	1.35	1.5	[initials] 8/14/82	MAC/9-16-8	ANALYSIS IS MUCH CONSERVATIVE. O.K.
ERCW	47A-450-4-45	Double canti frame	876#	—	46	551 psi	0.22	1.5	[initials] 8/17/82	MAC/9-20-8	SUPPORT MEM. OK FOR BUCKLING
"	47A450-3-158	simple frame	NO BUCKLING INVOLVED						[initials] 8/17/82	GLP 9-17-82	OK BY INSPECTION
"	47A450-21-219	Braced frame.	538#	—	138	0.27 ksi	.034	1.5	[initials] 8/17/82	GLP 9-17-82	BUCKLING STRESS IS VERY LOW & O.K
ICE CONDENSER	47A462-8-29	simple frame	1120#	9890 in-#	22	0.704 ksi	.632	1.5	[initials] 8/17/82	GLP 9-17-82	MEM. ARE OK FOR BUCKLING

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING

PROGRAM OF PIPE SUPPORTS (UNIQUE FRAMES)

COMPUTED MAC DATE 9/24/82

CHECKED RLI DATE 10-14-82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL	MOMENT.	$\frac{Kl}{r}$	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE.	CHK. BY / DATE.	COMMENT.
I.C.	47A462-8-19	SIMPLE CANT. FRAME	MEM. are O.K.,		$\frac{Kl}{r}=27$	SEE SUPPORT	47A462-8-23		SP 8/20/82	GLP 9-17-82	O.K
"	47A462-8-20	SIMPLE CANT. FRAME-5	MEM. are O.K. see		$\frac{Kl}{r}=27$	SUPPORT	47A462-8-23		SP 8/20/82	GLP 9-17-82	OK
"	47A462-8-23	SIMPLE CANT. FL. FRAME	3851#	78.62 in-k	48	778 psi	0.76	1.5	SP 8/21/82	GLP 9-17-82	O.K for buckling
"	47A462-8-24	"	MEM. are O.K, see		$\frac{Kl}{r}>30$	SUPPORT	47A462-8-23		SP 8/20/82	GLP 9-17-82	
HPFP	47A491-8-13	CANTILEVER	240#	13772 in-#	20	1600 psi	.17	1.5	SP 9/2/82	RLI 9/17	MEM. O.K FOR BUCKLING
SERVICE AIR	47A492-2-13	CANTI. FRAME.	see calc. & computer run		$\frac{Kl}{r}=30$		1.26	1.5	SP 9/1/82	RLI 9/17	MEM. O.K for BUCKLING
ERCW	17A586-1-68	BRACED CANT. FR.	MEM. are O.K		$\frac{Kl}{r}=21$	see attached computer run			SP 8/31/82	RLI 9/17	O.K.
"	67-1ERCW-R363	CANTI. FRAME.			730				RLI 9/24/82	URH 10-6	OUT OF SCOPE
"	67-1ERW-R362	BRACED CANTI.	see calc		63.2	2.2 ksi	0.32	1.5	SP 9/3/82	RLI 9/18/82	MEM. O.K for BUCKLING.
AUX. FEEDWATER	1-038-5	RIGID FRAME	SEE COMPUTER RUN		20.1	—	.11	1.5	GP 9/10/82	RLI 9/20/82	
(LP) CVCS	62-1LCV-V13	DS - WITH FRAME	.2	.23	82	Low	Low	1.5	RLI 9/29/82	MAC 9-29-82	$\frac{Kl}{r}$ 730 Low LOADS
RHR	1-74-11	UNIQUE FRAME-DS	M1 18.9	—	62	4.14	.24	1.5	RLI 9/29/82	MAC 9-29-82	$\frac{Kl}{r}$ 730
			M2 18.9	89.8	78	4.15	.77	1.5			

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 9/28/82

CHECKED RLI DATE 10-14-82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	Kl/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY DATE.	CHK. BY DATE.	COMMENT.
REACTOR COOL.	47A465-B-22	CANTILEVER	SMALL	SMALL	8	SMALL	SMALL	1.5	DP 9/25/82	RLI 9/28/82	OK BY INSPECTION
"	47A465-B-9	"	SMALL	SMALL	8	SMALL	SMALL	1.5	GP 9/25/82	RLI 9/28/82	OK BY INSPECTION
"	47A465-B-14	"	—	3.52	—	—	—	1.5	GP 9/25/82	RLI 9/28/82	No Buckling Involved
"	47A465-B-20	"	—	SMALL	—	—	—	1.5	DP 9/25/82	RLI 9/28/82	No Buckling Involved
HPFP	47A491-B-3	"	.16[K]	—	178	.06	.01	1.5	GP 9/25/82	RLI 9/28/82	
"	47A491-B-2	"	—	10.3	—	—	.62	1.5	GP 9/25/82	RLI 9/28/82	No Buckling Involved
REACTOR COOL	47A465-B-27	"	.03[K]	2.5	63	—	—	1.5	GP 9/25/82	RLI 9/28/82	O.K. BY INSPECTION SMALL LOADS
PRIM WATER	47A492-B-23	"	.03	.63	46	—	—	1.5	DP 9/25/82	RLI 9/28/82	OK. BY INSPECTION
"	47A492-B-2	"	.46	4.97	27	.18	.32	1.5	DP 9/25/82	RLI 9/28/82	
SERVICE AIR	47A492-B-17	"	.21	9.26	85	.08	.21	1.5	DP 9/25/82	RLI 9/28/82	
VHI	1-87-074	"	—	MOMENT ONLY	—	—	—	1.5	GP 9/25/82	RLI 9/28/82	No Buckling Involved
"	1-87-071	"	10.7	136	30.2	1.34	.53	1.5	GP 9/24/82	RLI 9/28/82	
"	1-87-039	"	—	MOMENT ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	No Buckling Involved
"	1-87-077	"	—	MOMENT ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	No Buckling Involved
REACTOR COOLANT	1-68-299	"	.18	3.02	42.1	.07	1.32	1.5	RLI 9/28/82	MAC 9/28/82	CHECKED STIFFENER ONLY
RHR	47A432-B-1	"	1.79[K]	11.5	134.4	.4	.78	1.5	RLI 9/28/82	MAC 9/28/82	
REACTOR COOLANT	1-68-310	"	.022	15	44	.32	.42	1.5	RLI 9/28/82	MAC 9/28/82	
"	47A465-1-29	"	-	MOMENT ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	No Buckling Involved

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 9-28-82

CHECKED RLI DATE 10/4/82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL	MAXI. LOADS MOMENT	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES: BY DATE	CHK: BY DATE	COMMENT
Reac Coolant	47A465-1-35	CANT	—	ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	NO BUCKLING INVOLVED
"	47A465-1-31	"	—	ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	NO BUCKLING INVOLVED
UHI	1-87-038	"	—	ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	NO BUCKLING INVOLVED
Reac. Coolant	47A465-8-24	"	SMALL	SMALL	61	SMALL	SMALL	1.5	RLI 9/28/82	MAC 9/28/82	O.K. BY INSPECTION SMALL LOADS
GRCW	47A450-3-171	"	1.12	27	36	.02	.034	1.5	RLI 9/28/82	MAC 9/28/82	$\frac{kl}{r} > 30$
RHR	47A432-1-4	"	.045	.186	166	.06	.19	1.5	RLI 9/28/82	MAC 9/28/82	$\frac{kl}{r} > 30$
SIS	47A435-2-5	"	—	ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	NO BUCKLING INVOLVED
"	63-1SIS-R31	"	—	ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	NO BUCKLING INVOLVED
"	1-63-008	"	1.05	26.1	18	1.02	.75	1.5	RLI 9/28/82	MAC 9/28/82	
"	1-63-003	"	—	ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	NO BUCKLING INVOLVED
"	1-63-002	"	—	ONLY	—	—	—	1.5	RLI 9/28/82	MAC 9/28/82	NO BUCKLING INVOLVED
FUEL POOL COOLING	78-1FPC-R50	"	3.2	—	18.1	1.43	.07	1.5	RLI 9/28/82	MAC 9/28/82	
"	78-1FPC-R2	"	.13	2.64	38	—	—	1.5	RLI 9/28/82	MAC 9/28/82	OK BY INSPECTION
"	78-1EPC-R1	"	.05	1.1	38	—	—	1.5	RLI 9/28/82	MAC 9/28/82	O.K BY INSPECTION
"	47A454-1-14	"	.67	47.3	18	.26	1.05	1.5	RLI 9/28/82	MAC 9/28/82	
FEEDWATER	1-03A-36f	"	.9	34.4	29	.27	.77	1.5	RLI 9/28/82	MAC 9/28/82	
"	1-03A-363	"	12.1	85.2	39.4	1.97	.8	1.5	RLI 9/28/82	MAC 9/28/82	1) MEMBER $\frac{kl}{r} > 30$
"			12.1	—	47	4.8	.26	1.5			2) LUG
"	1-03A-361	"	5.9	189.3	36	.59	.57	1.5	RLI 9/28/82	MAC 9/28/82	$\frac{kl}{r} > 30$

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JRH DATE 9/28/82

CHECKED RLI DATE 10-4-82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT
ERCW	47A450-21-210	CANT	1.65	45.5	34.4	.16	1.04	1.5	RLI 9/27/82	MAC 9-28-82	$\frac{KL}{r} > 30$
"	67-1ERCW-R522	"	2.24	86.8	51	.36	.16	1.5	RLI 9/27/82	MAC 9-28-82	$\frac{KL}{r} > 30$
CONT. SPRAY	72-1CS-R33	"	—	ONLY	—	—	—	1.5	RLI 9/27/82	MAC 9-28-82	NO BUCKLING INVOLVED
"	72-1CS-R36	"	—	ONLY	—	—	—	1.5	RLI 9/27/82	MAC 9-28-82	NO BUCKLING INVOLVED
COMP. COOLING	70-1CC-R567	"	—	ONLY	—	—	—	1.5	RLI 9/27/82	MAC 9-28-82	NO BUCKLING INVOLVED
"	70-1CC-R76	"	—	ONLY	—	—	—	1.5	RLI 9/27/82	MAC 9-28-82	NO BUCKLING INVOLVED
"	2-70-844	"	.05	1.65	29	.03	.1	1.5	RLI 9/27/82	MAC 9-28-82	
"	2-70-824	"	.09	2.6	55.4	.03	.06	1.5	RLI 9/27/82	MAC 9-28-82	$\frac{KL}{r} > 30$
"	1-70-258	"	1.02	11.9	72.4	.04	.37	1.5	RLI 9/27/82	MAC 9-28-82	$\frac{KL}{r} > 30$
"	1-70-186	"	'OK BY INSPECTION'		29			1.5	RLI 9/27/82	MAC 9-28-82	SMALL LOADS
(LP) CHEMICAL VOL CONTROL	47A555-10-3	"	.05	.82	73	.03	.05	1.5	RLI 9/27/82	MAC 9-28-82	$\frac{KL}{r} > 30$
"	47A555-10-1	"	.06 .06	3.03 —	130 45	.01 .03	.03 <1.5	1.5 1.5	RLI 9/27/82	MAC 9-28-82	$\frac{KL}{r} > 30$ 1) MEMBER 2) LUG
LP "	47A555-3-10	"	SMALL	—	12	SMALL	SMALL	1.5	RLI 9/27/82	MAC 9-28-82	OK BY INSPECTION SMALL LOADS
"	47A555-3-9	"	SMALL	—	12	SMALL	SMALL	1.5	RLI 9/27/82	MAC 9-28-82	OK BY INSPECTION SMALL LOADS
"	47A555-3-8	"	—	ONLY	—	—	—	1.5	RLI 9/27/82	MAC 9-28-82	NO BUCKLING INVOLVED
"	47A555-3-7	"	—	ONLY	—	—	—	1.5	RLI 9/27/82	MAC 9-28-82	NO BUCKLING INVOLVED
"	47A555-3-6	"	SMALL	—	18	SMALL	SMALL	1.5	RLI 9/27/82	MAC 9-28-82	OK BY INSPECTION SMALL LOADS
HP "	47A406-1-65	CANT	.048	3.74	55	.03	.23	1.5	RLI 9/27/82	JRH 9-28-82	$\frac{KL}{r} > 30$
HP "	47A406-1-73	"	"	"	"	"	"	"	RLI 9/27/82	JRH 9-28-82	

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SHEET 4 OF 5

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED HAC DATE 9-30-82

CHECKED RLI DATE 10-14-82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INTERACTION VALUE	ALLOW. INTERACTION VAL.	DES: BY / DATE	CHK: BY / DATE	COMMENT.
HP CHEM & VOL CONT	47A406-3-9	CANT	—	ONLY	—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	NO BUCKLING INVOLVED
"	47A406-3-10	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
LP "	62-1CV-R19	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
LP "	62-1CV-R14	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
HP "	62-1CVC-R11	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
HP "	62-1CVC-R10	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
HP "	1-62A-305	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
HP "	1-62A-304	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
AUX. BOILER	12-1AAB-R056	"	—		—	—	—	1.5	RLI 9/27/82	JRH 9/28/82	
HP CHEM & VOL CONT	1-62A-306	"	.84	28.7	35.3	.32	.65	1.5	RLI 9/27/82	JRH 9/28/82	$\frac{kl}{r} > 30$ 1) MEMBER 2) LUG
			1.55	—	30	.36	<1.5	1.5			
LP CHEM & VOL CONT	62-1CV-R77	"	.42	—	43	.3	<1.5	1.5	RLI 9/27/82	JRH 9/28/82	$\frac{kl}{r} > 30$ 1) LUG 2) MEMBER
			.42	41	35	.12	.48	1.5			
AUX. BOILER	12-1AAB-R51	"	1.06	—	183.3	.41	<1.5	1.5	RLI 9/27/82	JRH 9/28/82	$\frac{kl}{r} > 30$
"	47A431-9-4	"	.723	—	35	1.54	<1.5	1.5			
			.723	14.2	44	.28	.32	1.5	RLI 9/27/82	JRH 9/28/82	$\frac{kl}{r} > 30$
SAFETY INJ.	1-63-011	"	NO BUCKLING INVOLVED						RLI 9/30/82	MAC 9-30-82	
REAC COOLANT	47A465-8-25	"	NO BUCKLING INVOLVED						RLI 9/30/82	MAC 9-30-82	
RHR	74-1RHR-R139	"	NO BUCKLING INVOLVED						RLI 9/30/82	MAC 9-30-82	

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED MAC DATE 9-27-82

CHECKED RLI DATE 10-14-82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING. MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE.		CHK. BY / DATE.		COMMENT.	SYSTEM
038-1AFW-R72	CANTILEVER	960 #		BUCKLING NOT INVOLVED				JRU	8/26	MAC	9/27	OK	AFW
1-038-23	11	3708.8 #		40.79		.62	1.5	GP	9/8	MAC	9/27	KL/r > 30	AFW

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SHEET 1 OF 1

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JRH DATE 10/1/82

CHECKED RLI DATE 10/4/82

	HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT VALUE	RLT INT. VAL.	DES: BY DATE	CHK: BY DATE	COMMENT
FEEDWATER	1-03A-206	L-CANT	4.69	23.75	24	1.23	.26	1.5	GP 9/23/82	RLI 9/24/82	
RHR	47A432-1-3	"	.048	—	94	SMALL	SMALL	1.5	GP 9/22/82	RLI 9/24/82	OK BY INSPECTION
CONT. SPRAY	72-1CS-R35	"	4.0	84.0	30.9	Small	.17	1.5	GP 9/22/82	RLI 9/24/82	
SIS	47A435-1-3	"	No Buckling		INVOLVED				GP 9/22/82	RLI 9/24/82	
"	47A435-2-4	"	.37k	4.44	73	.143	.11	1.5	GP 9/22/82	RLI 9/24/82	$\frac{KL}{r} > 30$
HPFP	47A491-10-5	"	.32k	8.42	12.3	.09	.17	1.5	GP 9/22/82	RLI 9/24/82	
AUX BOILER	47A431-9-27	"	1.9	FA.117	17.2	.34	.29	1.5	GP 9/23/82	RLI 9/24/82	
Comp. Cooling	70-1CC-R15	"	2.4	18.0	187	.53	.21	1.5	GP 9/21/82	RLI 9/25/82	$\frac{KL}{r} > 30$
Reac Coolant	1-68-260	"	.5	10.65	55	.06	.05	1.5	GP 9/20/82	RLI 9/25/82	$\frac{KL}{r} > 30$
"	1-68-290	"	.17	3.3	70	.08	.09	1.5	GP 9/20/82	RLI 9/25/82	$\frac{KL}{r} > 30$
"	1-68-380	"	.09	5.7	57	.04	.16	1.5	GP 9/20/82	RLI 9/25/82	$\frac{KL}{r} > 30$
"	47A465-8-18	"	.2	1.2	73	.08	.11	1.5	GP 9/18/82	RLI 9/25/82	$\frac{KL}{r} > 30$
ICE CONDENSER	47A462-8-25	"	1.02	4.59	37	.39	.12	1.5	GP 9/18/82	RLI 9/25/82	$\frac{KL}{r} > 30$
"	47A462-8-35	"	2.97k		12	1.15	1.1	1.5	DWO 10/1/82	JRH 10/1/82	
"	47A462-8-36	"	"		"	"	"	"	DWO 10/1/82	JRH 10/1/82	

TVA 4890 (CON-3-56)

SHEET 1 OF 4

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS (VENDOR COMPONENTS)

COMPUTED GLP DATE 9-21-82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING					RES. BY / DATE	CHK. BY / DATE	COMMENT	
		MAXI. LOADS AXIAL	MOMENT	KL/r	BUCKLING STRESS	INT. VALUE	RLL. INT. VAL.				SYSTEM
47A462-8-9	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		ICE COND.
47A462-8-1	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		ICE COND.
47A491-8-11	ROD	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		FP
47A491-8-9	ROD	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		FP
47A465-8-12	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		REACTOR COOLANT
1-68-370	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		REACTOR COOLANT
1-87-076	CONSTANT SUPPORT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		UHI
1-87-072	VARIABLE SUPPORT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		UHI
1-87-068	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		UHI
1-87-040	ROD	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		UHI
1-87-034	SPRING	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		UHI
1-87-033	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		UHI
1-87-030	SNUBBER	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		UHI
74-1RHR-R156	SWAY STRUT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		RHR
74-1RHR-R161	SWAY STRUT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		RHR
74-1RHR-R164	SWAY STRUT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		RHR
74-1RHR-R165	SWAY STRUT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		RHR
74-1RHR-168	SWAY STRUT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82		RHR

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS (Vendor Components)

COMPUTED GLP DATE 9-21-82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING MAXI. LOADS AXIAL	MAXI. LOADS MOMENT	KL/r	BUCKLING STRESS	INTERPOLATION VALUE	ALLOWABLE INTERPOLATION VALUE	DES. BY / DATE	CHK. BY / DATE	COMMENT	SYSTEM
47A432-1-1A	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		RHR
47A432-1-2A	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		RHR
63-1515-R33	SNUBBER	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		SIS
63-1515-R31	SNUBBER	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		SIS
72-1CS-R23-1	SNUBBER	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R21	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R24	ROD	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R27	SNUBBER	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R28	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R32	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R34	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R37	SNUBBER	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R39	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
72-1CS-R41	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CS
70-1CC-R491	SHEAR LUGS	No Buckling Considered						GLP 9-21-82	RLI 9/29/82		CC
47A400-3-8	SWAY STRUT	No Buckling Considered						GLP 9-21-82	RLI 9/29/82	HP	CCC

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS (Vendor Components)

COMPUTED GLP DATE 9-21-82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING — MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT-VALUE	ALL-INT. VAL.	REV. B DATE	CHK. BY DATE	COMMENT	SYSTEM
47A906-3-7	SWAY STRUT	NO BUCKLING CONSIDERED						GLP 9-21-82	RLI 9/29/82	HP	CVC
62-1CVC-R72	STRUT							GLP 9-21-82	RLI 9/29/82	LP	CVC
62-1CVC-R14	ROD							GLP 9-21-82	RLI 9/29/82	HP	CVC
1-62A-311	SNUBBER							GLP 9-21-82	RLI 9/29/82	HP	CVC
1-01A-396	SWAY STRUT							GLP 9-21-82	RLI 9/21/82		MS
1-01A-354	SWAY STRUT							GLP 9-21-82	RLI 9/29/82		MS
2-01A-354											
1-01A-318	SWAY STRUT							GLP 9-21-82	RLI 9/29/82		MS
2-01A-318											
1-01A-307	SNUBBER							GLP 9-21-82	RLI 9/27/82		MS
1-63-590	SNUBBER							JRH 8-26-82	MAC 9-27-82		SI
1-63-591	SNUBBER							JRH 8-26-82	MAC 9-27-82		SI
1-63-592	SNUBBER							JRH 8-26-82	MAC 9-27-82		SI
03B-1AFW-R7	STRUT							JRH 8-26-82	MAC 9-27-82		AFW

TVA 4690 (CON-3-56)

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS (VENDOR COMPONENTS)

COMPUTER JRH DATE 8-26-82

CHECKED RLT DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MAXI. LOADS MOMENT.	Kℓ/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT	SYSTEM
03B-1AFW-R9	STRUT	NO BUCKLING CONSIDERED						JRH/8-26-82	MAC/9-27-82		AFW
03B-1AFW-R3	ROD	NO BUCKLING CONSIDERED						JRH/8-26-82	MAC/9-27-82		AFW
03B-1AFW-R6	STRUT	NO BUCKLING CONSIDERED						JRH/8-26-82	MAC/9-27-82		AFW

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED JRH DATE 6/7/82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INTERACTION VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.	SYS.
47A450-4-28	Braced Rigid frame	1248 #		31.36				JRH 8/20	MAC 9/27	KL/r < 130 ok	ERCW
47A450-3-100	"	11040 #		7.81	fa = 1.31 KSI	.128	1.5	JRH 8/24	MAC 9/27	SAGS OK	"
67ERCW-R289	"	60720 #		15.02	fa = 1.47 KSI	.24	"	JRH 8/24	MAC 9/28	"	"
67ERCW-R95	"	37120 #		9.62		.267	"	DWO 8/24	MAC 9/28	STRUDL CODE CHECK	"
03B-1AFW-R4	"	17600 #		8.54		.427	"	DWO 8/24	MAC 9/28	"	AFW
03B-1AFW-R22	"	"		"		"	"	DWO 8/24	MAC 9/28	"	"
03B-1AFW-R5	"	"		"		"	"	DWO 8/24	MAC 9/28	"	"
47A450-4-33	"	4960 #		22.25	fa = .1831	.096	"	JRH 8/26	MAC 9/28	SAGS OK	ERCW
70-1CC-R446	"	15520 #		9.47		.366	"	DWO 8/26	MAC 9/28	STRUDL CODE CHECK	COMPONENT COOLING
17A586-5-25	"	2665.6 #		18.87	.48 KSI	.21	"	JRH 9/10	MAC 9/23	HAND CALC OK	ERCW
26-1FP-R60	"	11040 #		14.61		.307	"	JRH 9/15	MAC 9/23	STRUDL CODE CHECK	HPFP
17A586-5-20	"	9646.4 #		9.7		1.12	"	JRH 9/17	MAC 9/23	"	ERCW
17A586-1-20	"	"		"		"	"	JRH 9/27	MAC 9/26	"	ERCW
38-1FPC-R15	"			730			"	JRH 9/27	RLI 10/6	OUT OF SCOPE	From Pool Cool

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED DWO DATE 9/1/82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL.	MOMENT.	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT.	SYSTEM
1-03B-25	BRACED RIGID FRAME	5379 #		63				DWO 8/30	JBS 9/15	KL/r > 30 ∴ OK	AUX FEEDW.
26-1FP-R253	"	"		"				DWO 8/30	JBS 9/15	"	H.P FIRE PROTECT.
47A454-2-25	"	"		"				DWO 8/30	JBS 9/15	"	SFPC
47A454-2-26	"	"		"				DWO 8/30	JBS 9/15	"	SFPC
17A586-1-100	"	17626 #		44				DWO 8/30	JBS 9/24	KL/r = 44 > 30 ∴ OK	INT & EXH ERCW
17A586-1-101	"	"		"				DWO 8/30	JBS 9/24	"	INT & EXH ERCW
12-1AAB-R42	"	"		"				DWO 8/30	JBS 9/24	"	AUX BOILER
12-1AAB-R12	"	"		"				DWO 8/30	JBS 9/24		AUX BOILER
12-1AAB-R016	"	4600 #		80.4				DWO 8/31	JBS 9/16	KL/r = 80.4 > 30 ∴ OK	AUX BOILER
67-1ERCW-R556	"	"		"				DWO 8/31	JBS 9/16	"	ERCW
67-1ERCW-R515	"	"		"				DWO 8/31	JBS 9/16	"	ERCW
12-1AAB-R019	"	1470 #		16.06		.0227	1.5	DWO 8/31	GLP 9-24	STRUDL CODE CHECK	AUX BOILER
73-1FPC-R17	"	"		"		"	"	DWO 8/31	GLP 9-24	"	FUEL POOL COOL.
17A586-1-87	"	5344 #		26		.36	1.5	DWO 9/1	GLP 9-24	STRUDL CODE CHECK	ERCW
17A586-1-13	"	"		"		"	"	DWO 9/1	GLP 9-25	"	ERCW
47A462-8-3	"	"		"		"	"	DWO 9/1	GLP 9-25	"	ICE COND. SYSTEM
47A462-8-4	"	"		"		"	"	DWO 9/1	GLP 9-25	"	ICE COND. SYSTEM
47A462-8-12	"	"		"		"	"	DWO 9/1	GLP 9-25	"	ICE COND. SYSTEM

FINAL EVALUATION REPORT FOR BUCKLING SAMPLING PROGRAM OF PIPE SUPPORTS

COMPUTED DWO DATE 9/1/82

CHECKED RLI DATE 10/14/82

HANGER NO.	SUPPORT TYPE	MEMBER SUBJECT TO BUCKLING: MAXI. LOADS AXIAL	MOMENT	KL/r	BUCKLING STRESS	INT. VALUE	ALL. INT. VAL.	DES. BY / DATE	CHK. BY / DATE	COMMENT	SYSTEM
47A462-B-11	BRACED FRAME	5344 #	/	26	/	.36	1.5	DWO 9/1	GLR 9-25	STEEL CODE CHECK	ICE COND. SYSTEM
47A462-B-16	"	15675 #	/	21	/	.116	1.5	DWO 9/1	TBJ 9/14	STEEL CODE CHECK	ICE COND SYSTEM
47A462-B-7	"	"	/	"	/	"	"	DWO 9/1	TBJ 9/14	"	ICE COND SYSTEM
47A462-B-15	"	"	/	"	/	"	"	DWO 9/1	TBJ 9/14	"	ICE COND. SYSTEM