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BYRAM, R.G. Pennsylvania Power & Light Co.
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SUBJECT: Provides interim core shroud insp results & draft calculations to support disposition of flaws found in welds at plant.

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TITLE: GL 94-03 Intergranular Stress Corrosion Cracking of Core Shrouds in B

NOTES: 05000387

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Pennsylvania Power & Light Company

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APR 21 1995

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U.S. Nuclear Regulatory Commission
Attn.: Document Control Desk
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**SUSQUEHANNA STEAM ELECTRIC STATION
GENERIC LETTER 94-03 INTERIM INSPECTION
REPORT
PLA-4310**

FILE R41-2

Docket No. 50-387

Reference: PLA-4233 from Mr. R.G. Byram to USNRC, "Interim Response to Generic Letter 94-03," dated December 19, 1995.

This letter serves to provide interim core shroud inspection results and draft calculations to support disposition of flaws found in core shroud welds H2, H4, H5 and H6B during the Susquehanna Steam Electric Station Unit 1 core shroud inspection consistent with the requirements of NRC letter dated March 23, 1995 to our Mr. R.G. Byram from NRC Senior Project Manager Mr. C. Poslusny. As specifically noted on page 6 of the attached safety evaluation to the March 23rd letter, NRC requests submittal of analysis on core shroud cracking.

Pennsylvania Power & Light Company has performed inspections of the Unit 1 core shroud consistent with the referenced PLA-4233 dated December 19, 1995. All of our inspection results are currently under review. Flaws have been found in welds H2, H4, H5 and H6B which required evaluation. The flaws were evaluated in calculations based on a stress analysis of the SSES shroud welds and the analysis guidelines of the BWR VIP found in GENE-523-113-0894, Rev. 1 and Supplement 1 (the Distributed Ligament Length [DLL] analysis program). The stresses are used by the DLL program to calculate the acceptance of the cracking found using a limit load analysis after factors are added to the lengths of the cracks for crack length uncertainty determination and growth of the crack for 3 years. Thus the crack size we evaluated in the DLL program was:

$$I_{max} = l_{isi} + 2CG + 4t$$

l_{isi} = inspected length

$2CG$ = 2*3yr crack growth at a growth rate of 5E-5in/hr.

$4t$ = 4*shroud wall thickness (2")

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It is also assumed in the program that all the detected cracks are thru-wall and growth is only in the circumferential direction, and that all cracks closer than $2t$ (4 inches) together are considered as one crack. This makes the calculations extremely conservative.

If the limit load analysis shows that the factor of safety for the UPSET condition is greater than 2.8, and, for the FAULTED condition, greater than 1.4, then operation for at least 1.5 more years is acceptable before repair or further inspection is necessary. The DLL program also would perform a Linear Elastic Fracture Mechanics (LEFM) analysis of the defects if the fluence on the welds was greater than $3E20$ n/cm², however this was not required since we calculate that we will not reach that limit until after September 1996.

The results of our calculations are summarized in the attached table "SUMMARY OF SSES UNIT 1 SHROUD DEFECTS". The four welds which have the greatest number of cracks and total length of cracks are the H2, H4, H5 and H6B and have passed the limit load analysis as shown in the third and fourth columns. The factors of safety that remain in the welds after 3 more years of operation are as follows:

WELD	UPSET	FAULTED
H2	12.91	6.97
H4	6.2	3.65
H5	2.92	1.87
H6B	5.38	3.56

Examples of the outputs of the DLL program are also attached for the faulted condition to show how the safety factor changes circumferentially around the shroud because of the non-uniformity of the crack distribution. The values in the table above are the minimum values from these printouts which we believe indicate significant margin given the conservatism of the calculations.

Attached is a copy of our draft calculation. These results will be independently verified by Structural Integrity Associates by the end of April 1995. PP&L will advise NRC of the results of this review and the extent of any changes to be made.

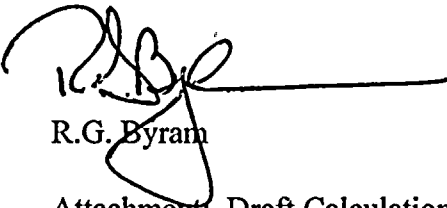
We are completing our Unit 1 8th Refueling and Inspection Outage. Fuel reload is being completed and we expect to have the Reactor Pressure Vessel reassembled by the end of April 1995. Our plan is to end the current outage on or before the scheduled completion of May 8, 1995.

Based on our results to date, we have a high degree of confidence in the structural integrity of our core shroud to assure safe continued operations for our next operating cycle and potentially beyond.

We plan to provide NRC a complete report of our Unit 1 core shroud total inspection results within 30 days of the completion of the inspections as committed to in the above referenced PLA-4233.

Please call our Mr. James B. Wesner if you have any questions.

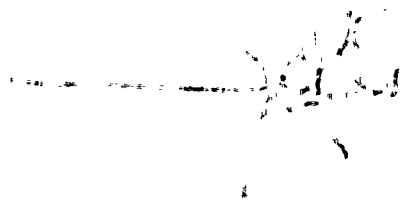
Very truly yours,



R.G. Byram

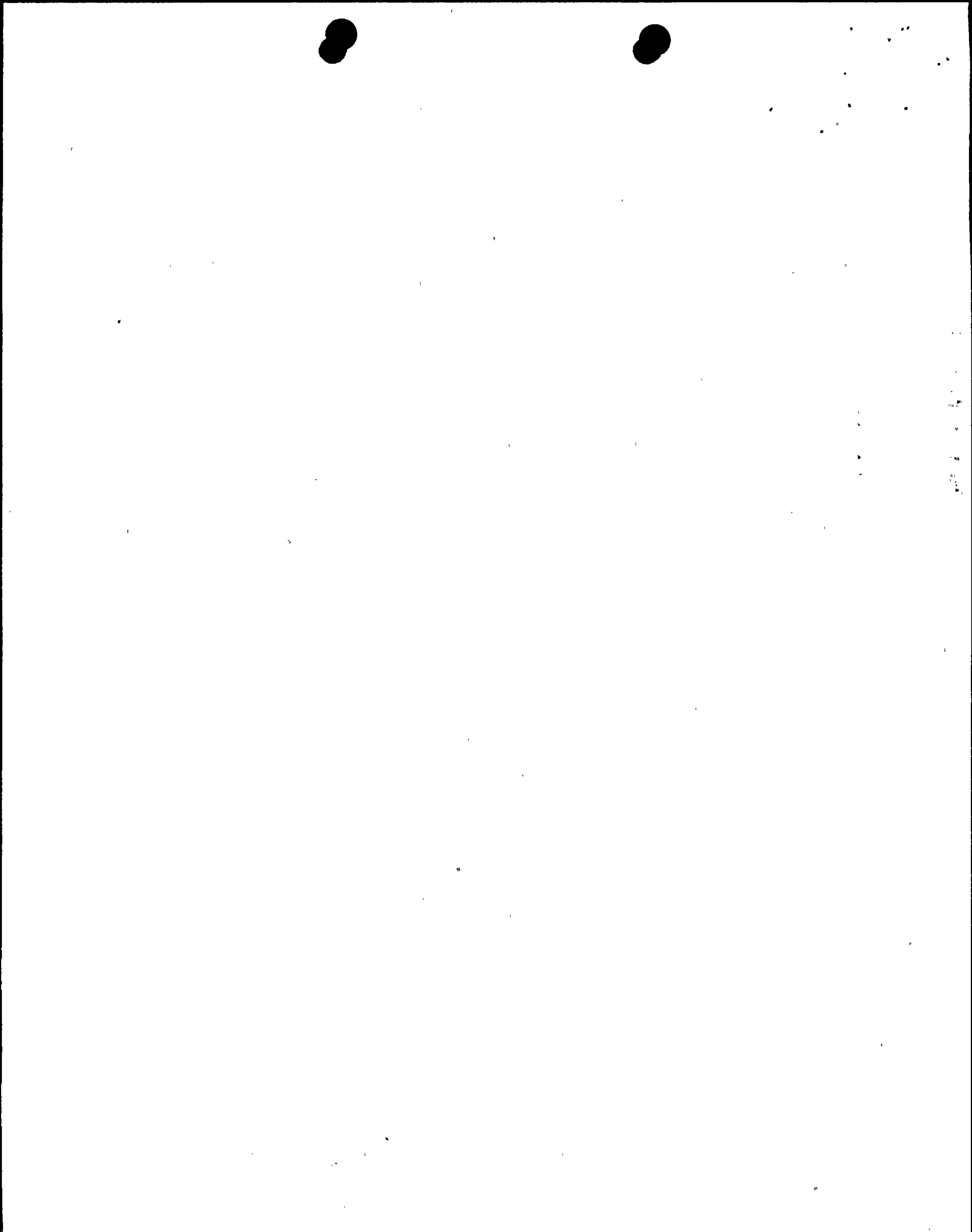
Attachment: Draft Calculation

copy: NRC Region I
Ms. M. Banerjee, NRC Sr. Resident Inspector - SSES
Mr. C. Poslusny, NRC Sr. Project Manager - OWFN



SUMMARY OF SSES UNIT 1 SHROUD DEFECTS

WELD ID	ISITYPE	# DEFECTS	LONGEST (ANGLE/LENGTH)	DEEPEST INCHES	TOTAL LENGTH		LIMIT LOAD ANALYSIS	
					DEGREE	INCHES	UPSET	FAULTED
H1	UT	3	1.27 DEGREES/2.42 INCHES	?	2.58	4.62	TBD	TBD
H2	UT	29	4.8/9.13	TBD	28.6	54.4	PASS	PASS
H3	UT	0	N/A	0"	0	0	N/A	N/A
H4	UT	28	28.19/51.02	0.7"	104.73	187.47	PASS	PASS
H5	UT	27	18.39/32.92	0.65"	106.11	189.94	PASS	PASS
H6A	UT	8	2.7/4.83	0.25"	1.85	2.21	TBD	TBD
H6B	UT	19	7.98/14.28	0.675"	37.68	65.36	PASS	PASS
H7	UT	0	N/A	0"	0	0	N/A	N/A
H8	VT-3	0	N/A	N/A	0	0	N/A	N/A
H9	VT-3	0	N/A	N/A	0	0	N/A	N/A
TO PASS UPSET CONDITION LIMIT LOAD ANALYSIS; THE SAFETY FACTOR CALCULATED WAS >2.8								
TO PASS FAULTED CONDITION LIMIT LOAD ANALYSIS; THE SAFETY FACTOR CALCULATED WAS >1.4								
MAX FLUENCE TO THE END OF THE NEXT FUEL CYCLE, FALL 1996, WAS CALCULATED TO BE <3E20 n/cm^2								



SUMMARY OF INPUTS:

Angle increment = .1 deg. (FINE)
 Membrane Stress, Pm = 740. psi
 Bending Stress, Pb = 1281. psi
 Safety Factor, SF = 1.40
 Mean Radius, Rm = 109.00 inches
 Wall Thickness, t = 2.000 inches
 Material = 304L SS
 Stress Intensity, Sm = 14400. psi
 Fluence = 0.0E+00 n/cm²

ATTACHMENT TO PLA-4310
 Page 2 of 9

H2 FAULT.TXT

(Thus, LEFM evaluation not applicable)

DATE OF THIS ANALYSIS: 04/20/1995

REGION	THETA1 [deg.]	THETA2 [deg.]	THICKNESS [inches]
1	14.9	41.9	2.000
2	57.8	61.0	2.000
3	68.9	102.3	2.000
4	108.4	120.1	2.000
5	206.5	211.6	2.000
6	217.7	222.9	2.000
7	233.6	239.9	2.000
8	261.5	263.9	2.000
9	280.0	314.8	2.000
10	321.1	325.1	2.000
11	336.0	339.3	2.000

H2 FAULT.TXT

LIMIT LOAD RESULTS:

ALPHA [deg.]	MOMENT [in-lbs]	Pb' [psi]	SAFETY FACTOR	RESULT
0.0	1.778E+09	23819.	12.15	ACCEPTABLE
5.0	1.782E+09	23865.	12.17	ACCEPTABLE
10.0	1.770E+09	23716.	12.10	ACCEPTABLE
15.0	1.747E+09	23403.	11.95	ACCEPTABLE
20.0	1.710E+09	22913.	11.70	ACCEPTABLE
25.0	1.661E+09	22248.	11.37	ACCEPTABLE
30.0	1.609E+09	21549.	11.03	ACCEPTABLE
35.0	1.565E+09	20965.	10.74	ACCEPTABLE
40.0	1.531E+09	20512.	10.52	ACCEPTABLE
45.0	1.496E+09	20037.	10.28	ACCEPTABLE
50.0	1.468E+09	19663.	10.10	ACCEPTABLE
55.0	1.448E+09	19396.	9.96	ACCEPTABLE
60.0	1.418E+09	19000.	9.77	ACCEPTABLE
65.0	1.378E+09	18464.	9.50	ACCEPTABLE
70.0	1.328E+09	17786.	9.17	ACCEPTABLE
75.0	1.279E+09	17135.	8.84	ACCEPTABLE
80.0	1.222E+09	16372.	8.47	ACCEPTABLE
85.0	1.162E+09	15563.	8.07	ACCEPTABLE
90.0	1.109E+09	14850.	7.71	ACCEPTABLE
95.0	1.077E+09	14425.	7.50	ACCEPTABLE
100.0	1.067E+09	14293.	7.44	ACCEPTABLE
105.0	1.079E+09	14453.	7.52	ACCEPTABLE

H2 (Cont.)

110.0	1.113E+09	14907.	7.74	ACCEPTABLE
115.0	1.168E+09	15648.	8.11	ACCEPTABLE
120.0	1.243E+09	16651.	8.61	ACCEPTABLE
125.0	1.315E+09	17621.	9.09	ACCEPTABLE
130.0	1.395E+09	18693.	9.62	ACCEPTABLE
135.0	1.473E+09	19734.	10.13	ACCEPTABLE
140.0	1.555E+09	20825.	10.67	ACCEPTABLE
145.0	1.628E+09	21809.	11.16	ACCEPTABLE
150.0	1.687E+09	22600.	11.55	ACCEPTABLE
155.0	1.735E+09	23243.	11.87	ACCEPTABLE
160.0	1.780E+09	23847.	12.17	ACCEPTABLE
165.0	1.822E+09	24402.	12.44	ACCEPTABLE
170.0	1.849E+09	24771.	12.62	ACCEPTABLE
175.0	1.863E+09	24952.	12.71	ACCEPTABLE
180.0	1.862E+09	24943.	12.71	ACCEPTABLE
185.0	1.847E+09	24744.	12.61	ACCEPTABLE
190.0	1.818E+09	24357.	12.42	ACCEPTABLE
195.0	1.776E+09	23785.	12.13	ACCEPTABLE
200.0	1.719E+09	23030.	11.76	ACCEPTABLE
205.0	1.653E+09	22137.	11.32	ACCEPTABLE
210.0	1.597E+09	21388.	10.95	ACCEPTABLE
215.0	1.544E+09	20687.	10.60	ACCEPTABLE
220.0	1.501E+09	20104.	10.31	ACCEPTABLE
225.0	1.454E+09	19484.	10.01	ACCEPTABLE
230.0	1.423E+09	19061.	9.80	ACCEPTABLE
235.0	1.384E+09	18546.	9.54	ACCEPTABLE
240.0	1.336E+09	17891.	9.22	ACCEPTABLE
245.0	1.291E+09	17297.	8.92	ACCEPTABLE
250.0	1.237E+09	16567.	8.56	ACCEPTABLE
255.0	1.190E+09	15936.	8.25	ACCEPTABLE
260.0	1.138E+09	15250.	7.91	ACCEPTABLE
265.0	1.087E+09	14567.	7.57	ACCEPTABLE
270.0	1.037E+09	13897.	7.24	ACCEPTABLE
275.0	1.006E+09	13473.	7.03	ACCEPTABLE
280.0	9.959E+08	13340.	6.97	ACCEPTABLE
285.0	1.008E+09	13501.	7.05	ACCEPTABLE
290.0	1.042E+09	13954.	7.27	ACCEPTABLE
295.0	1.097E+09	14696.	7.64	ACCEPTABLE
300.0	1.162E+09	15570.	8.07	ACCEPTABLE
305.0	1.240E+09	16609.	8.58	ACCEPTABLE
310.0	1.310E+09	17546.	9.05	ACCEPTABLE
315.0	1.384E+09	18538.	9.54	ACCEPTABLE
320.0	1.451E+09	19441.	9.99	ACCEPTABLE
325.0	1.508E+09	20196.	10.36	ACCEPTABLE
330.0	1.553E+09	20798.	10.66	ACCEPTABLE
335.0	1.589E+09	21287.	10.90	ACCEPTABLE
340.0	1.634E+09	21892.	11.20	ACCEPTABLE
345.0	1.687E+09	22603.	11.55	ACCEPTABLE
350.0	1.731E+09	23186.	11.84	ACCEPTABLE
355.0	1.761E+09	23592.	12.04	ACCEPTABLE

ATTACHMENT TO PLA-4310
Page 3 of 9

ACCEPTABLE! MINIMUM SAFETY FACTOR = 6.97 AT 280.0 DEGREES.

SUMMARY OF INPUTS:

ATTACHMENT TO PLA-4310

Page 4 of 9
 44: FAULT.TXT

Angle increment = .1 deg. (FINE)
 Membrane Stress, Pm = 696. psi
 Bending Stress, Pb = 2113. psi
 Safety Factor, SF = 1.40
 Mean Radius, Rm = 102.56 inches
 Wall Thickness, t = 2.000 inches
 Material = 304L SS
 Stress Intensity, Sm = 14400. psi
 Fluence = 3.0E+20 n/cm^2
 Toughness, Kic = 150.0 ksi*in^0.5

REGION	THETA1 [deg.]	THETA2 [deg.]	THICKNESS [inches]
1	87.2	92.0	2.000
2	122.8	128.6	2.000
3	145.4	156.0	2.000
4	203.4	212.6	2.000
5	234.4	241.8	2.000
6	251.3	290.9	2.000
7	299.5	327.8	2.000
8	336.0	339.0	2.000

LIMIT LOAD RESULTS:

ALPHA [deg.]	MOMENT [in-lbs]	SAFETY FACTOR	RESULT
20.0	8.087E+08	4.60	ACCEPTABLE
5.0	8.211E+08	4.67	ACCEPTABLE
10.0	8.401E+08	4.77	ACCEPTABLE
15.0	8.596E+08	4.88	ACCEPTABLE
20.0	8.823E+08	5.00	ACCEPTABLE
25.0	9.134E+08	5.17	ACCEPTABLE
30.0	9.447E+08	5.34	ACCEPTABLE
35.0	9.772E+08	5.51	ACCEPTABLE
40.0	1.003E+09	5.65	ACCEPTABLE
45.0	1.022E+09	5.75	ACCEPTABLE
50.0	1.033E+09	5.81	ACCEPTABLE
55.0	1.036E+09	5.83	ACCEPTABLE
60.0	1.031E+09	5.80	ACCEPTABLE
65.0	1.018E+09	5.73	ACCEPTABLE
70.0	9.979E+08	5.62	ACCEPTABLE
75.0	9.699E+08	5.47	ACCEPTABLE
80.0	9.344E+08	5.28	ACCEPTABLE
85.0	8.918E+08	5.05	ACCEPTABLE
90.0	8.515E+08	4.83	ACCEPTABLE
95.0	8.222E+08	4.68	ACCEPTABLE
100.0	7.869E+08	4.49	ACCEPTABLE
105.0	7.457E+08	4.26	ACCEPTABLE
110.0	7.055E+08	4.05	ACCEPTABLE
115.0	6.827E+08	3.93	ACCEPTABLE
120.0	6.560E+08	3.78	ACCEPTABLE

125.0	6.324E+08	9569.	3.65	ACCEPTABLE
130.0	6.317E+08	9559.	3.65	ACCEPTABLE
135.0	6.461E+08	9777.	3.73	ACCEPTABLE
140.0	6.535E+08	9888.	3.77	ACCEPTABLE
145.0	6.559E+08	9925.	3.78	ACCEPTABLE
150.0	6.533E+08	9885.	3.77	ACCEPTABLE
155.0	6.434E+08	9735.	3.71	ACCEPTABLE
160.0	6.434E+08	9735.	3.71	ACCEPTABLE
165.0	6.417E+08	9709.	3.70	ACCEPTABLE
170.0	6.527E+08	9876.	3.76	ACCEPTABLE
175.0	6.609E+08	10000.	3.81	ACCEPTABLE
180.0	6.616E+08	10011.	3.81	ACCEPTABLE
185.0	6.701E+08	10140.	3.86	ACCEPTABLE
190.0	6.880E+08	10411.	3.95	ACCEPTABLE
195.0	6.972E+08	10550.	4.00	ACCEPTABLE
200.0	7.255E+08	10977.	4.16	ACCEPTABLE
205.0	7.565E+08	11447.	4.32	ACCEPTABLE
210.0	7.942E+08	12017.	4.53	ACCEPTABLE
215.0	8.309E+08	12572.	4.72	ACCEPTABLE
220.0	8.675E+08	13125.	4.92	ACCEPTABLE
225.0	8.974E+08	13579.	5.08	ACCEPTABLE
230.0	9.205E+08	13929.	5.21	ACCEPTABLE
235.0	9.367E+08	14172.	5.29	ACCEPTABLE
240.0	9.456E+08	14308.	5.34	ACCEPTABLE
245.0	9.474E+08	14336.	5.35	ACCEPTABLE
250.0	9.420E+08	14254.	5.32	ACCEPTABLE
255.0	9.294E+08	14063.	5.25	ACCEPTABLE
260.0	9.098E+08	13766.	5.15	ACCEPTABLE
265.0	8.832E+08	13363.	5.01	ACCEPTABLE
270.0	8.506E+08	12870.	4.83	ACCEPTABLE
275.0	8.302E+08	12561.	4.72	ACCEPTABLE
280.0	8.109E+08	12270.	4.62	ACCEPTABLE
285.0	7.855E+08	11885.	4.48	ACCEPTABLE
290.0	7.537E+08	11404.	4.31	ACCEPTABLE
295.0	7.356E+08	11130.	4.21	ACCEPTABLE
300.0	7.240E+08	10955.	4.15	ACCEPTABLE
305.0	7.085E+08	10720.	4.06	ACCEPTABLE
310.0	7.078E+08	10709.	4.06	ACCEPTABLE
315.0	7.250E+08	10969.	4.15	ACCEPTABLE
320.0	7.435E+08	11249.	4.25	ACCEPTABLE
325.0	7.595E+08	11491.	4.34	ACCEPTABLE
330.0	7.697E+08	11646.	4.39	ACCEPTABLE
335.0	7.740E+08	11711.	4.42	ACCEPTABLE
340.0	7.725E+08	11688.	4.41	ACCEPTABLE
345.0	7.690E+08	11636.	4.39	ACCEPTABLE
350.0	7.790E+08	11787.	4.44	ACCEPTABLE
355.0	7.955E+08	12037.	4.53	ACCEPTABLE

ACCEPTABLE! MINIMUM SAFETY FACTOR = 3.65 AT 130.0 DEGREES.

LEFM RESULTS:

FOR ASSUMED CRACK BETWEEN REGIONS # 1 AND # 2:
Ktotal = 91.1 ksi*inch^{0.5} < Kic = 150.0 ksi*inch^{0.5}
O.K.!

FOR ASSUMED CRACK BETWEEN REGIONS # 2 AND # 3:

320.0 7.99E+08 11787
355.0 7.95E+08 12037

SUMMARY OF INPUTS:

ATTACHMENT TO PLA-4310
 Page 6 of 9

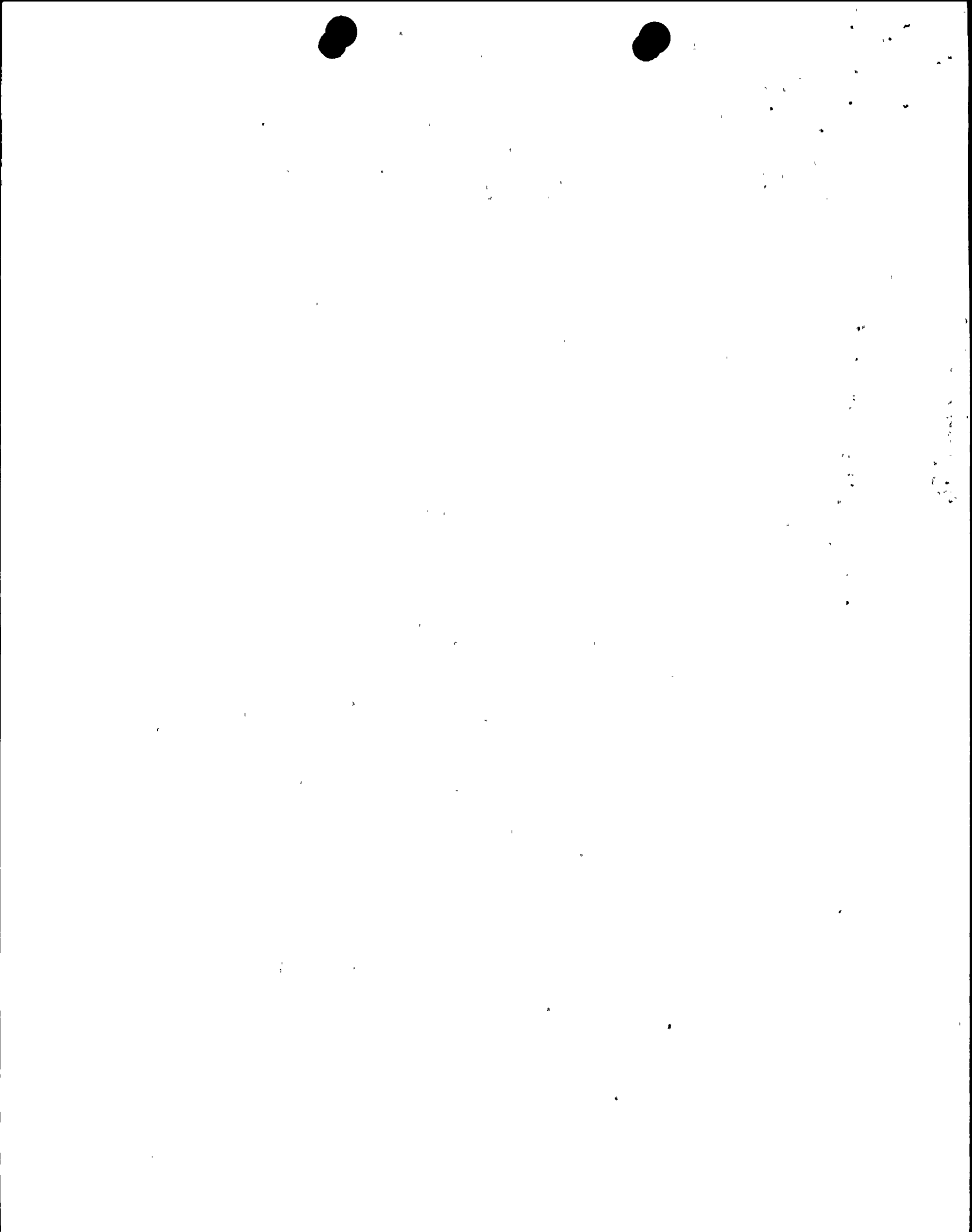
H5FAULT.TXT

Angle increment = .1 deg. (FINE)
 Membrane Stress, Pm = 696. psi
 Bending Stress, Pb = 3587. psi
 Safety Factor, SF = 1.40
 Mean Radius, Rm = 102.56 inches
 Wall Thickness, t = 2.000 inches
 Material = 304L SS
 Stress Intensity, Sm = 14400. psi
 Fluence = 3.0E+20 n/cm^2
 Toughness, Kic = 150.0 ksi*in^0.5

REGION	THETA1 [deg.]	THETA2 [deg.]	THICKNESS [inches]
1	22.4	29.1	2.000
2	99.3	108.8	2.000
3	148.3	151.3	2.000
4	194.4	199.6	2.000
5	218.9	229.6	2.000
6	260.6	277.0	2.000
7	315.2	327.1	2.000

LIMIT LOAD RESULTS:

ALPHA [deg.]	MOMENT [in-lbs]	Pb [psi]	SAFETY FACTOR	RESULT
0.0	6.041E+08	9141.	2.30	ACCEPTABLE
5.0	6.046E+08	9148.	2.30	ACCEPTABLE
10.0	6.156E+08	9315.	2.34	ACCEPTABLE
15.0	6.200E+08	9382.	2.35	ACCEPTABLE
20.0	6.197E+08	9377.	2.35	ACCEPTABLE
25.0	6.147E+08	9301.	2.33	ACCEPTABLE
30.0	6.050E+08	9154.	2.30	ACCEPTABLE
35.0	5.932E+08	8975.	2.26	ACCEPTABLE
40.0	5.985E+08	9056.	2.28	ACCEPTABLE
45.0	6.095E+08	9223.	2.32	ACCEPTABLE
50.0	6.152E+08	9309.	2.34	ACCEPTABLE
55.0	6.164E+08	9326.	2.34	ACCEPTABLE
60.0	6.152E+08	9308.	2.34	ACCEPTABLE
65.0	6.093E+08	9220.	2.32	ACCEPTABLE
70.0	5.988E+08	9061.	2.28	ACCEPTABLE
75.0	5.838E+08	8833.	2.22	ACCEPTABLE
80.0	5.643E+08	8538.	2.16	ACCEPTABLE
85.0	5.403E+08	8175.	2.07	ACCEPTABLE
90.0	5.121E+08	7749.	1.97	ACCEPTABLE
95.0	4.931E+08	7462.	1.90	ACCEPTABLE
100.0	4.976E+08	7529.	1.92	ACCEPTABLE
105.0	5.093E+08	7707.	1.96	ACCEPTABLE
110.0	5.172E+08	7826.	1.99	ACCEPTABLE
115.0	5.211E+08	7885.	2.00	ACCEPTABLE
120.0	5.198E+08	7864.	2.00	ACCEPTABLE
125.0	5.292E+08	8008.	2.03	ACCEPTABLE

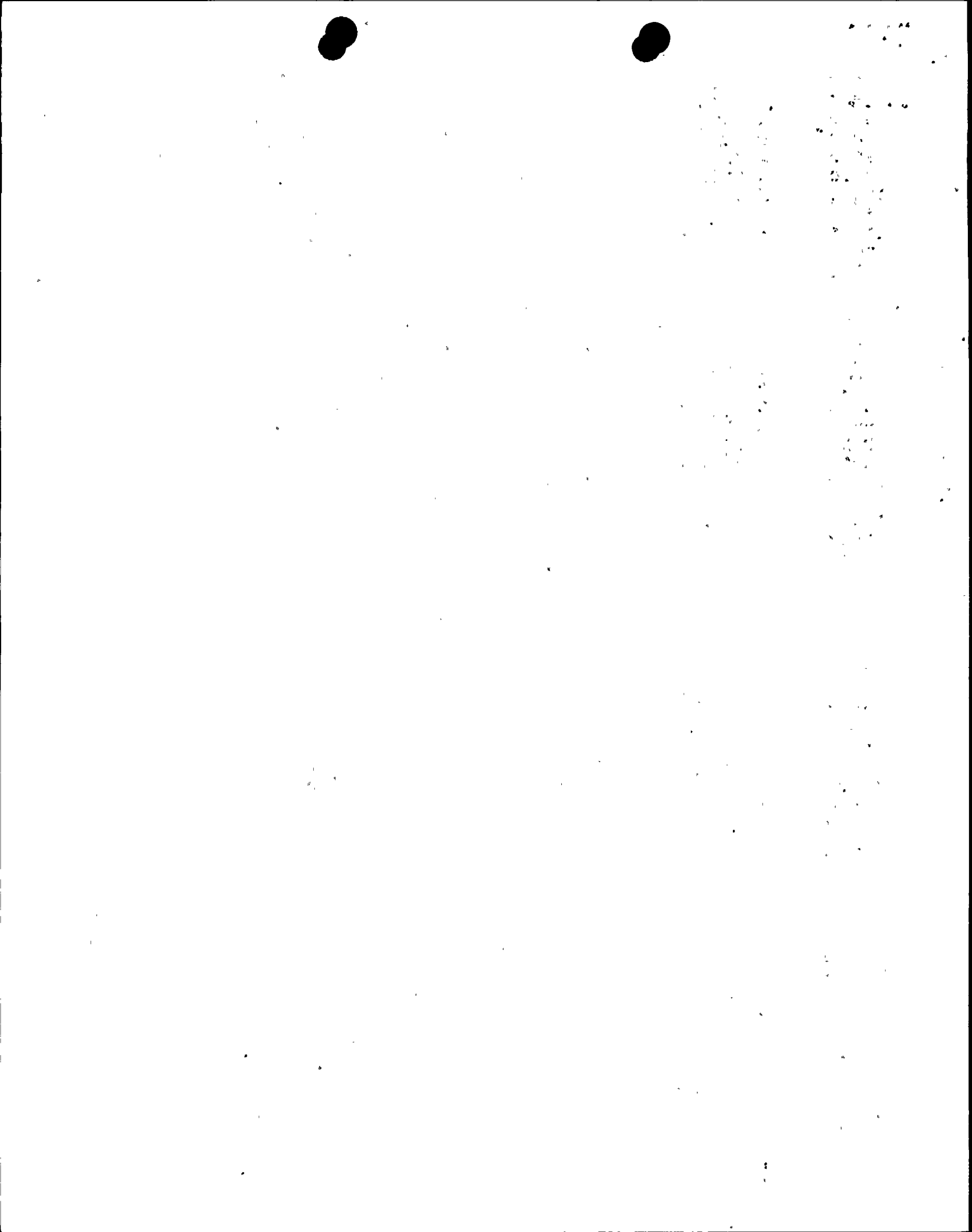


H5 (cont.)

130.0	5.357E+08	8106.	2.06	ACCEPTABLE
135.0	5.381E+08	8142.	2.06	ACCEPTABLE
140.0	5.364E+08	8116.	2.06	ACCEPTABLE
145.0	5.311E+08	8036.	2.04	ACCEPTABLE
150.0	5.318E+08	8047.	2.04	ACCEPTABLE
155.0	5.306E+08	8028.	2.04	ACCEPTABLE
160.0	5.253E+08	7949.	2.02	ACCEPTABLE
165.0	5.161E+08	7809.	1.99	ACCEPTABLE
170.0	5.067E+08	7666.	1.95	ACCEPTABLE
175.0	4.967E+08	7516.	1.92	ACCEPTABLE
180.0	4.829E+08	7307.	1.87	ACCEPTABLE
185.0	4.851E+08	7340.	1.88	ACCEPTABLE
190.0	5.050E+08	7641.	1.95	ACCEPTABLE
195.0	5.230E+08	7913.	2.01	ACCEPTABLE
200.0	5.370E+08	8125.	2.06	ACCEPTABLE
205.0	5.469E+08	8275.	2.09	ACCEPTABLE
210.0	5.526E+08	8362.	2.11	ACCEPTABLE
215.0	5.542E+08	8385.	2.12	ACCEPTABLE
220.0	5.528E+08	8364.	2.12	ACCEPTABLE
225.0	5.475E+08	8285.	2.10	ACCEPTABLE
230.0	5.381E+08	8142.	2.06	ACCEPTABLE
235.0	5.302E+08	8022.	2.04	ACCEPTABLE
240.0	5.392E+08	8159.	2.07	ACCEPTABLE
245.0	5.486E+08	8301.	2.10	ACCEPTABLE
250.0	5.537E+08	8379.	2.12	ACCEPTABLE
255.0	5.547E+08	8393.	2.12	ACCEPTABLE
260.0	5.514E+08	8343.	2.11	ACCEPTABLE
265.0	5.439E+08	8230.	2.08	ACCEPTABLE
270.0	5.320E+08	8049.	2.04	ACCEPTABLE
275.0	5.183E+08	7842.	1.99	ACCEPTABLE
280.0	5.229E+08	7912.	2.01	ACCEPTABLE
285.0	5.474E+08	8283.	2.10	ACCEPTABLE
290.0	5.711E+08	8641.	2.18	ACCEPTABLE
295.0	5.904E+08	8934.	2.25	ACCEPTABLE
300.0	6.053E+08	9158.	2.30	ACCEPTABLE
305.0	6.172E+08	9338.	2.34	ACCEPTABLE
310.0	6.262E+08	9475.	2.37	ACCEPTABLE
315.0	6.304E+08	9539.	2.39	ACCEPTABLE
320.0	6.299E+08	9530.	2.39	ACCEPTABLE
325.0	6.289E+08	9516.	2.38	ACCEPTABLE
330.0	6.314E+08	9554.	2.39	ACCEPTABLE
335.0	6.291E+08	9519.	2.39	ACCEPTABLE
340.0	6.220E+08	9412.	2.36	ACCEPTABLE
345.0	6.102E+08	9233.	2.32	ACCEPTABLE
350.0	6.017E+08	9105.	2.29	ACCEPTABLE
355.0	6.050E+08	9154.	2.30	ACCEPTABLE

ATTACHMENT TO PLA-4310
Page 7 of 9

ACCEPTABLE! MINIMUM SAFETY FACTOR = 1.87 AT 180.0 DEGREES.



SUMMARY OF INPUTS:

Angle increment = .1 deg. (FINE)
 Membrane Stress, Pm = 911. psi
 Bending Stress, Pb = 4810. psi
 Safety Factor, SF = 1.40
 Mean Radius, Rm = 99.38 inches
 Wall Thickness, t = 2.000 inches
 Material = 304L SS
 Stress Intensity, Sm = 14400. psi
 Fluence = 0.0E+00 n/cm²
 (Thus, LEFM evaluation not applicable)

ATTACHMENT TO PLA-4310
 Page 8 of 9

H6B FAULT.TXT

REGION	THETA1 [deg.]	THETA2 [deg.]	THICKNESS [inches]
1	46.1	81.3	2.000
2	90.8	120.0	2.000
3	132.9	136.9	2.000
4	153.5	160.5	2.000
5	195.4	251.6	2.000
6	268.2	279.5	2.000
7	294.4	301.6	2.000
8	312.2	315.0	2.000
9	323.9	340.9	2.000

LIMIT LOAD RESULTS:

ALPHA [deg]	MOMENT [in-lbs]	Pb [psi]	SAFETY FACTOR	RESULT
0.0	1.869E+09	30124.	5.42	ACCEPTABLE
5.0	1.856E+09	29912.	5.39	ACCEPTABLE
10.0	1.829E+09	29468.	5.31	ACCEPTABLE
15.0	1.787E+09	28798.	5.19	ACCEPTABLE
20.0	1.732E+09	27910.	5.04	ACCEPTABLE
25.0	1.663E+09	26806.	4.84	ACCEPTABLE
30.0	1.582E+09	25497.	4.62	ACCEPTABLE
35.0	1.489E+09	23997.	4.35	ACCEPTABLE
40.0	1.404E+09	22622.	4.11	ACCEPTABLE
45.0	1.333E+09	21484.	3.91	ACCEPTABLE
50.0	1.278E+09	20591.	3.76	ACCEPTABLE
55.0	1.238E+09	19949.	3.65	ACCEPTABLE
60.0	1.214E+09	19565.	3.58	ACCEPTABLE
65.0	1.206E+09	19441.	3.56	ACCEPTABLE
70.0	1.215E+09	19576.	3.58	ACCEPTABLE
75.0	1.222E+09	19687.	3.60	ACCEPTABLE
80.0	1.238E+09	19946.	3.65	ACCEPTABLE
85.0	1.269E+09	20455.	3.73	ACCEPTABLE
90.0	1.315E+09	21195.	3.86	ACCEPTABLE
95.0	1.358E+09	21886.	3.98	ACCEPTABLE
100.0	1.395E+09	22477.	4.09	ACCEPTABLE
105.0	1.445E+09	23286.	4.23	ACCEPTABLE
110.0	1.508E+09	24308.	4.41	ACCEPTABLE
115.0	1.566E+09	25238.	4.57	ACCEPTABLE

H6B (cont.)

ATTACHMENT TO PLA-4310

Page 9 of 9

120.0	1.620E+0	26105.	4.72	ACCEPTABLE
125.0	1.667E+0	26866.	4.86	ACCEPTABLE
130.0	1.715E+09	27630.	4.99	ACCEPTABLE
135.0	1.757E+09	28317.	5.11	ACCEPTABLE
140.0	1.788E+09	28807.	5.19	ACCEPTABLE
145.0	1.807E+09	29112.	5.25	ACCEPTABLE
150.0	1.826E+09	29426.	5.30	ACCEPTABLE
155.0	1.842E+09	29687.	5.35	ACCEPTABLE
160.0	1.852E+09	29845.	5.38	ACCEPTABLE
165.0	1.848E+09	29776.	5.36	ACCEPTABLE
170.0	1.829E+09	29480.	5.31	ACCEPTABLE
175.0	1.802E+09	29040.	5.24	ACCEPTABLE
180.0	1.785E+09	28765.	5.19	ACCEPTABLE
185.0	1.778E+09	28654.	5.17	ACCEPTABLE
190.0	1.769E+09	28512.	5.14	ACCEPTABLE
195.0	1.747E+09	28153.	5.08	ACCEPTABLE
200.0	1.711E+09	27580.	4.98	ACCEPTABLE
205.0	1.663E+09	26796.	4.84	ACCEPTABLE
210.0	1.601E+09	25807.	4.67	ACCEPTABLE
215.0	1.528E+09	24616.	4.46	ACCEPTABLE
220.0	1.445E+09	23290.	4.23	ACCEPTABLE
225.0	1.375E+09	22152.	4.03	ACCEPTABLE
230.0	1.319E+09	21258.	3.88	ACCEPTABLE
235.0	1.279E+09	20617.	3.76	ACCEPTABLE
240.0	1.256E+09	20233.	3.70	ACCEPTABLE
245.0	1.248E+09	20109.	3.67	ACCEPTABLE
250.0	1.256E+09	20245.	3.70	ACCEPTABLE
255.0	1.277E+09	20582.	3.76	ACCEPTABLE
260.0	1.296E+09	20884.	3.81	ACCEPTABLE
265.0	1.327E+09	21392.	3.90	ACCEPTABLE
270.0	1.362E+09	21952.	4.00	ACCEPTABLE
275.0	1.387E+09	22350.	4.07	ACCEPTABLE
280.0	1.422E+09	22916.	4.16	ACCEPTABLE
285.0	1.473E+09	23732.	4.31	ACCEPTABLE
290.0	1.522E+09	24530.	4.45	ACCEPTABLE
295.0	1.565E+09	25214.	4.57	ACCEPTABLE
300.0	1.619E+09	26092.	4.72	ACCEPTABLE
305.0	1.670E+09	26916.	4.86	ACCEPTABLE
310.0	1.721E+09	27738.	5.01	ACCEPTABLE
315.0	1.762E+09	28396.	5.12	ACCEPTABLE
320.0	1.791E+09	28864.	5.20	ACCEPTABLE
325.0	1.823E+09	29380.	5.29	ACCEPTABLE
330.0	1.844E+09	29722.	5.35	ACCEPTABLE
335.0	1.861E+09	29984.	5.40	ACCEPTABLE
340.0	1.886E+09	30398.	5.47	ACCEPTABLE
345.0	1.901E+09	30637.	5.51	ACCEPTABLE
350.0	1.902E+09	30642.	5.52	ACCEPTABLE
355.0	1.887E+09	30415.	5.48	ACCEPTABLE

ACCEPTABLE! MINIMUM SAFETY FACTOR = 3.56 AT 65.0 DEGREES.