Department of Energy
Washington, D.C. 20545
Docket No. 50-537
HQ:S:82:106

OCT 15 1982

Mr. Paul S. Check, Director
CRBR Program Office
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Check:

ASME CODE COMPARISON WORKING MEETING - SUMMARY

This letter transmits a summary of the ASME Code comparison working meeting held on September 17, 1982. The summary provides an overview of the discussions which were conducted and other relevant information.

Sincerely,

John R. Longenecker

John R. Longenecker
Acting Director, Office of the
Clinch River Breeder Reactor
Plant Project
Office of Nuclear Energy

Enclosure

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ASME CODE COMPARISON WORKING MEETING - SUMMARY

A working meeting was held on September 17, 1982 to resolve NRC concerns relative to the CRBRP utilization of the 1974 ASME Code for design of the containment vessel. A presentation was given to show the comparative evaluation results (contained in the response to NRC Question 220.25) of the 1974 ASME Code versus the 1980 ASME Code for buckling. The presentation and resultant discussions indicated the relative comparability of applying the 1974 ASME Code in lieu of the 1980 ASME Code. The NRC reviewers were generally in agreement with the results of the evaluation; however, they requested additional time to consider specific areas. See Attachment #1 for meeting viewgraphs, Attachment #2 for meeting agenda, and Attachment #3 for meeting attendees.

CRBRP CONTAINMENT DESIGN AND EVALUATION

CONTAINMENT BUCKLING EVALUATION - CODE CASE N-284

PRESENTED BY
RICHARD ORR
CHIEF ENGINEER, CIVIL AND STRUCTURAL ENGINEERING
WESTINGHOUSE - OFFSHORE POWER SYSTEMS

SEPTEMBER 17, 1982

ATTACHMENT #1

LOAD COMBINATIONS FOR BUCKLING EVALUATION

LOAD COMBINATION	ASME CLASSIFICATION (SERVICE LEVEL)
$D + L + T' + P_E$	A
$D + L + T_o$ + OBE	B
$D + L + T_o$ + SSE	C
$D + L + L_c + T' +$ OBE $+ P_E$ (1)	B
$D + L + L_c + T' +$ SSE $+ P_E$ (1)	C

WHERE D = DEAD LOAD

L = LIVE LOADS (EXCLUDING CRANE LIVE LOAD)

L_c = CRANE LIVE LOAD

T_o = NORMAL OPERATING THERMAL

T' = ACCIDENT THERMAL LOADS

P_E = EXTERNAL PRESSURE

OBE = OPERATING BASIS EARTHQUAKE

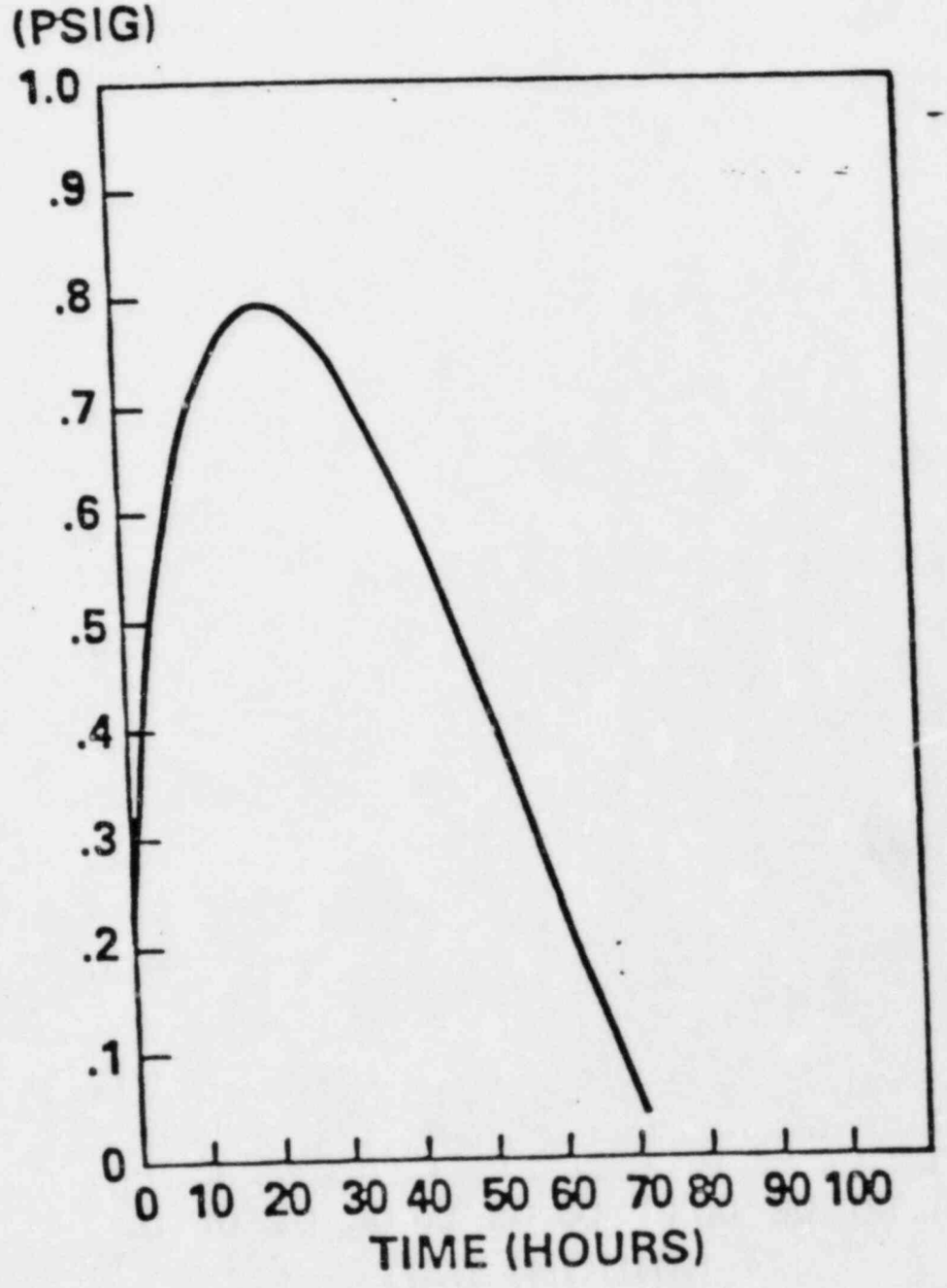
SSE = SAFE SHUTDOWN EARTHQUAKE

(1) THESE LOAD COMBINATIONS ARE USED IN THE BOSOR4 EVALUATION.

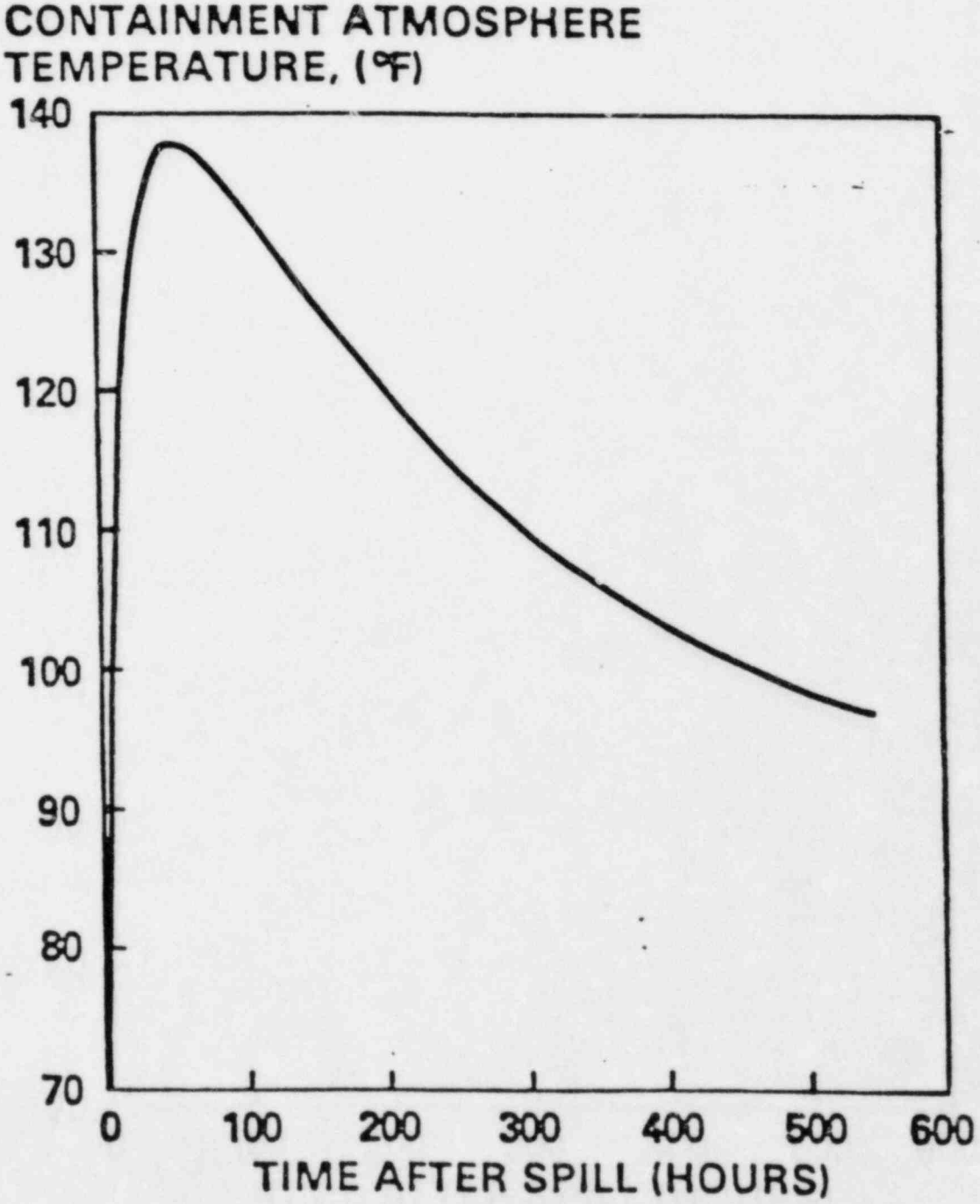
DESIGN BASIS ACCIDENT FOR REACTOR CONTAINMENT BUILDING

- POSTULATED INSTANTANEOUS NON-MECHANISTIC RELEASE OF MAXIMUM AVAILABLE SODIUM VOLUME FROM THE PRIMARY SODIUM STORAGE TANK (35,000 GALLONS)
- POSTULATED DE-INERTED CELL ENVIRONMENT FOR MAINTENANCE WITH PRIMARY SODIUM STORAGE TANK FILLED WITH 400°F SODIUM; 10 DAYS AFTER SHUTDOWN
- ALL AVAILABLE OXYGEN IN CONTAINMENT IS REACTED WITH SODIUM. THIS RESULTS IN BURNING OF APPROXIMATELY 23,000 GALLONS OF SODIUM
- ACCIDENT OCCURS AT END OF PLANT LIFE MAXIMIZING PRIMARY SODIUM COOLANT RADIOLOGICAL ACTIVITY

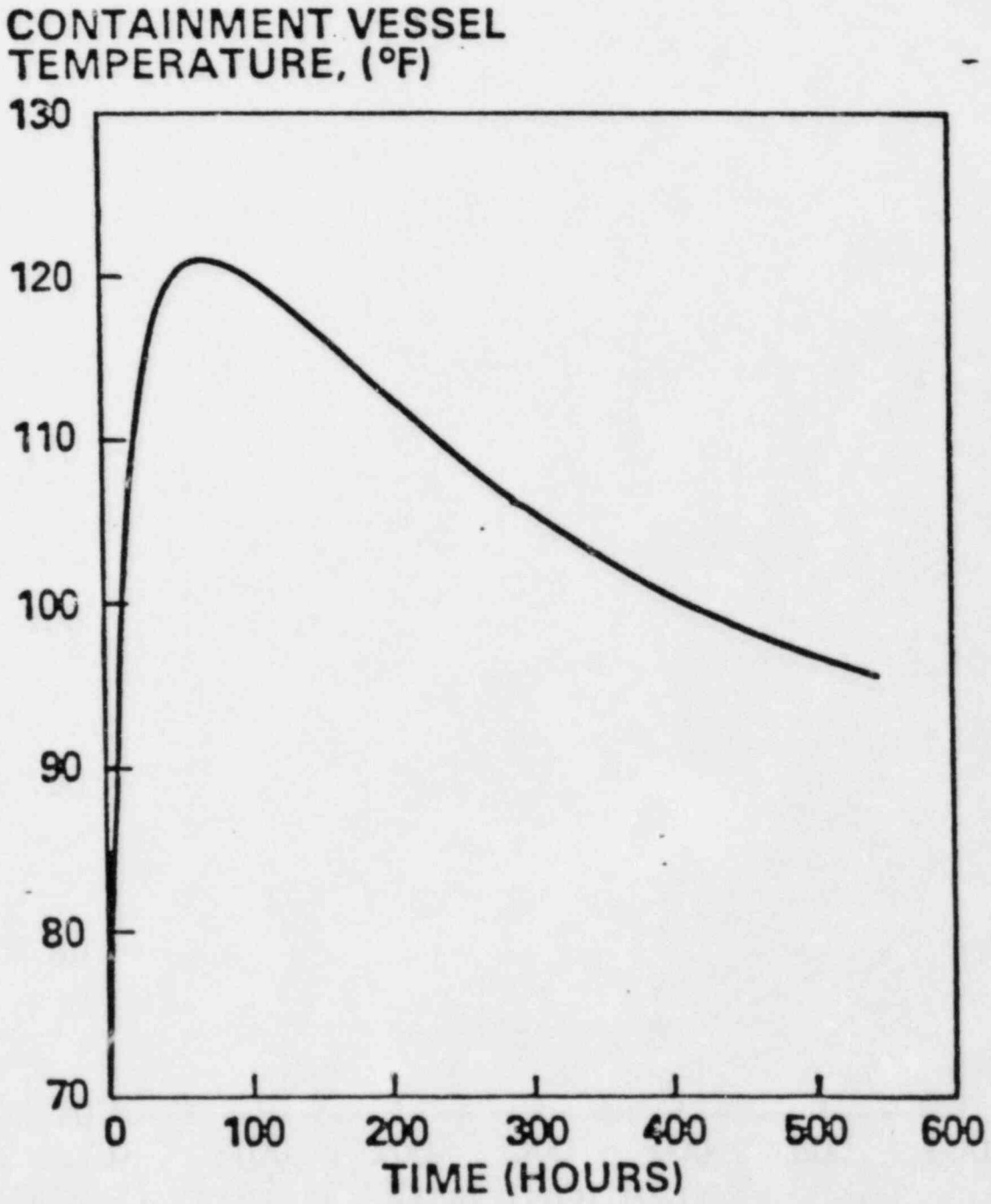
CONTAINMENT ATMOSPHERE PRESSURE-PRIMARY SODIUM IN-CONTAINMENT STORAGE TANK FAILURE DURING MAINTENANCE



CONTAINMENT ATMOSPHERE TEMPERATURE-PRIMARY SODIUM IN-CONTAINMENT STORAGE TANK FAILURE DURING MAINTENANCE

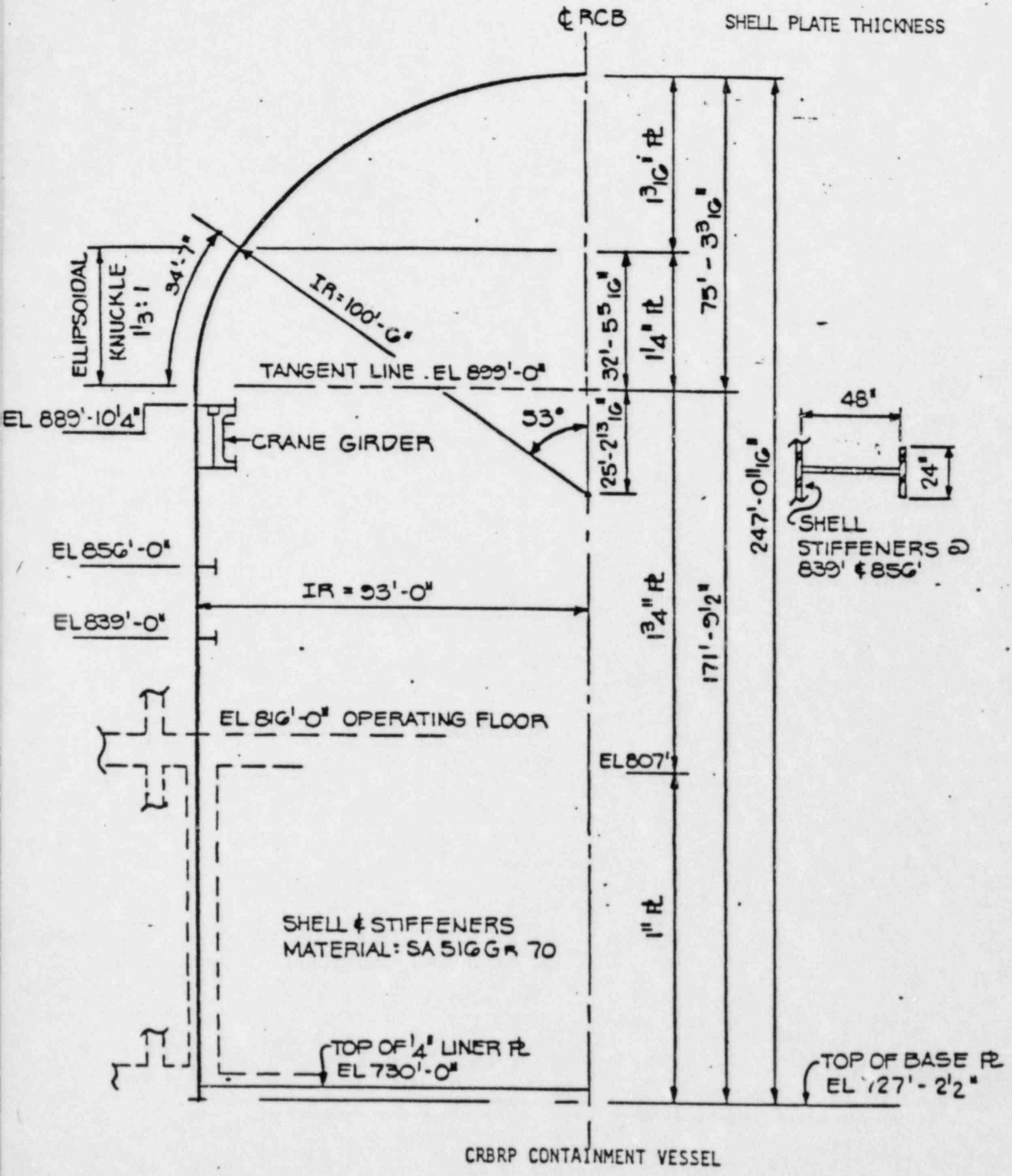


CONTAINMENT VESSEL TEMPERATURE-PRIMARY SODIUM IN-CONTAINMENT STORAGE TANK FAILURE DURING MAINTENANCE



SHELL ANALYSES

SHELL MODEL	FOURIER HARMONICS	LOADS
LUMPED MASS BEAM MODEL	0 & 1	OVERALL SEISMIC RESPONSE
AXISYMMETRIC SHELL OF REVOLUTION	0	DEAD LOAD, PRESSURE, TEMPERATURE, EQUIVALENT STATIC VERTICAL SEISMIC ON SHELL
	1	EQUIVALENT STATIC HORIZONTAL SEISMIC ON SHELL
	0 TO 14	DEAD, LIVE AND SEISMIC CRANE LOADS


℄ RCB
SHELL PLATE THICKNESS
ELLIPSOIDAL
KNUCKLE
1 1/3 : 1
34°-7"
IR = 100'-0"
TANGENT LINE . EL 899'-0"
EL 889'-10 1/4"
CRANE GIRDER
33°
EL 856'-0"
IR = 93'-0"
EL 839'-0"
EL 816'-0" OPERATING FLOOR
EL 807'
SHELL ℄ STIFFENERS
MATERIAL: SA 516 Gr 70
TOP OF 1/4" LINER PL
EL 730'-0"
1 3/16" PL
32'-5 5/16"
1 1/4" PL
75'-3 3/16"
25'-2 13/16"
1 3/4" PL
171'-9 1/2"
247'-0 11/16"
1" PL
48"
24"
SHELL
STIFFENERS @
839' ℄ 856'
TOP OF BASE PL
EL 727'-2 1/2"
CRBRP CONTAINMENT VESSEL

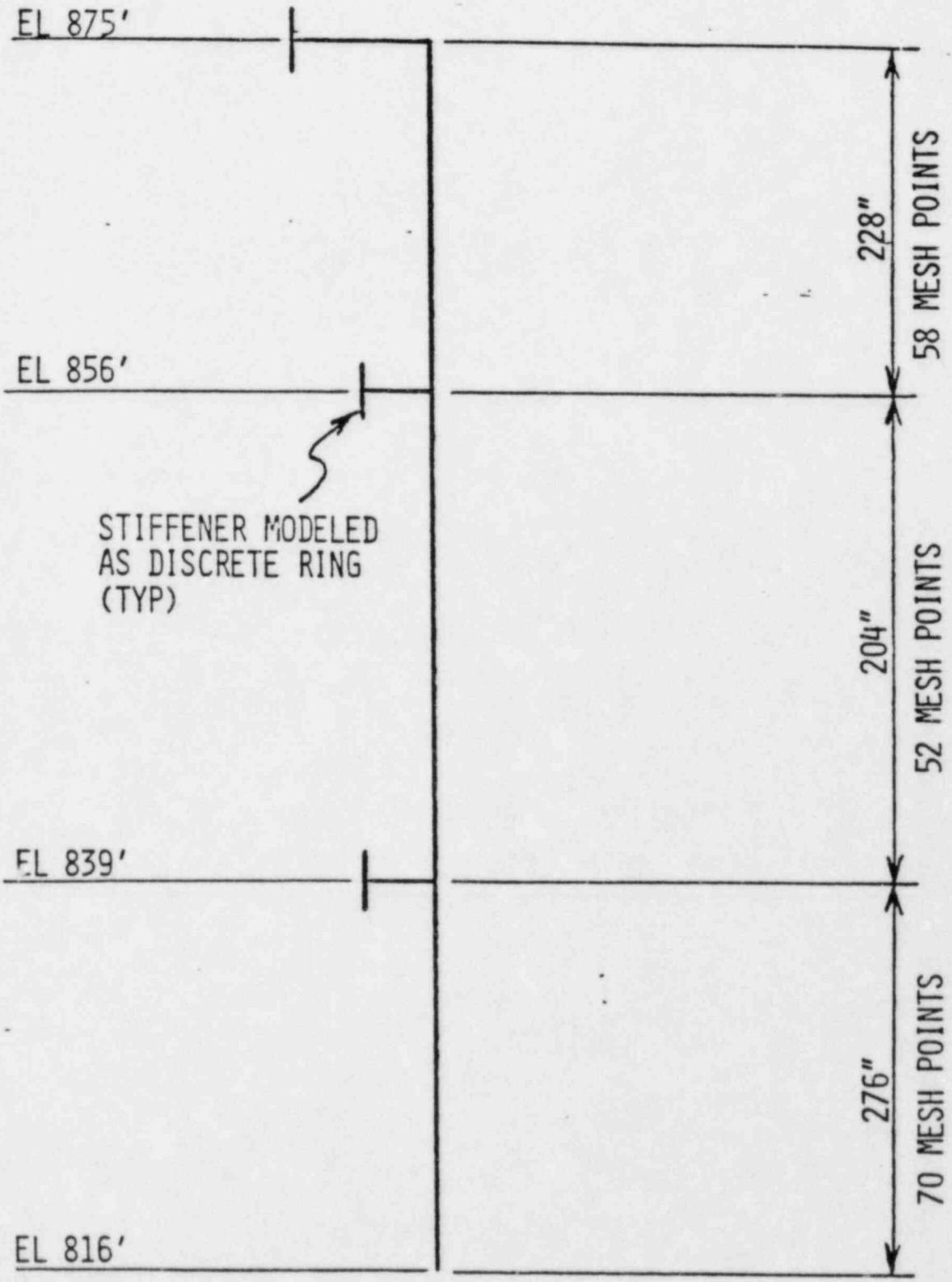
SHELL STRESSES IN THE BAY ABOVE THE OPERATING DECK

(PSI, COMPRESSION POSITIVE)

LOADING	STRESSES AT EL. 816'			STRESSES AT EL. 827'		
	AXIAL	HOOP	SHEAR	AXIAL	HOOP	SHEAR
SHELL DEAD LOAD	683	205		646		
CRANE DEAD + LIVE LOAD	413	123		443	-4	
OBE - VERTICAL	575	172		571	-6	
NORTH-SOUTH	1900	570	65	1553	-241	59
EAST-WEST			1093			1061
SRSS	1985	595	1095	1655	-241	1063
SSE - VERTICAL	907	272		897	-10	
NORTH-SOUTH	2710	813	80	2231	-393	75
EAST-WEST			1711			1655
SRSS	2858	857	1713	2405	-393	1657
DL + LL + OBE	3081	923	1095	2744	-245	1063
DL + LL + SSE	3954	1185	1713	3494	-397	1657

ELEVATION 816' = OPERATING DECK

ELEVATION 827' IS ABOUT THE MIDDLE OF THE BAY



BOSOR4 MODEL

- IMPERFECTION KNOCKDOWN FACTORS

  HOOP: $\alpha_\theta = 0.8$ EL. 816′ TO EL. 875′

  AXIAL: $\alpha_\phi = 0.275$ EL. 816′ TO EL. 839′

  0.330 EL. 839′ TO EL. 856′

  0.309 EL. 856′ TO EL. 875′

- APPLIED PRESTRESS (LB/IN) FOR BOSOR4 LINEAR BIFURCATION ANALYSIS

  HOOP STRESS/α_θ

  AXIAL STRESS/α_ϕ

- ADJUSTMENT FOR SHEAR STRESS

$$\frac{FS}{\lambda} + \left(\frac{FS \cdot \sigma_{\phi\theta}}{\alpha_{\phi\theta} \cdot \sigma_{\phi\theta eL}}\right)^2 \leq 1 \text{ FOR CYLINDER BETWEEN RINGS OR SUPPORTS}$$

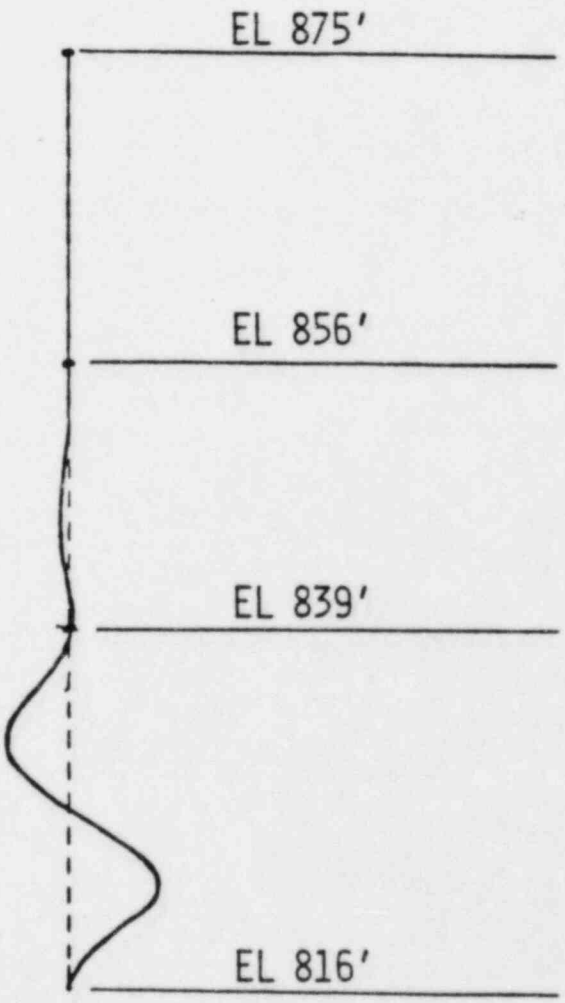
WHERE λ = EIGEN VALUE FROM BOSOR4 ANALYSIS

$\sigma_{\phi\theta}$ = SHEAR STRESS

$\alpha_{\phi\theta}$ = KNOCKDOWN FACTOR FOR SHEAR (= 0.712, EL. 816′ TO EL. 839′)

$\sigma_{\phi\theta eL}$ = CLASSICAL BUCKLING VALUE UNDER SHEAR LOAD BASED ON N-284 FORMULA

FS = FACTOR OF SAFETY



BOSOR4 BUCKLE MODE

RADIAL DISPLACEMENT (N = 21)

DL + LL + SSE + THERMAL + P_E

ATTACHMENT #2

Meeting Notice

ASME Code Comparison Working Meeting

Location: WLLCO, Landow Building, Rm. 1111
7910 Woodmont Avenue
Bethesda, Maryland

Time: 8:30 AM

Date: September 17, 1982

Purpose: To resolve concerns relative to the CRBRP utilization of the 1974 ASME Code

Scope: To show the comparative evaluation results of the 1974 ASME Code vs. the 1980 ASME Code. To highlight the relative comparability of the 1974 ASME Code vs. the 1980 ASME Code, except where specifically noted.

ASME CODE COMPARISON WORKING MEETING AGENDA

I.	Introduction	V. Fayne
II.	Comparison of PSAR to 1980 ASME Code	W-LRM
III.	Comparison of PSAR to N-284	W-LRM
IV.	NRC Concerns with using 1974 ASME Code	PO
V.	Discussion	Open

ATTACHMENT #3
SEPTEMBER 17, 1982

ATTENDANCE

NAME	ORGANIZATION	PHONE NUMBER
P. R. Washer	CRBR-PO	615/576-6179
G. A. Fidler	CRBRP/PO	615/576-6241
C. P. Tan	NRC	301/492-8424
J. G. Bennett	Los Alamos	505/667-7888
Tom Butler	Los Alamos	505/667-5171
P. T. Kuo	NRC	301/492-8442
G. H. Clare	Westinghouse, Oak Ridge	
R. Orr	Westinghouse, Jacksonville	
R. E. Gale	Westinghouse, Oak Ridge	
P. Docherty	WLLCO	
Vincent Fayne	CRBRP/PO	615/576-6394