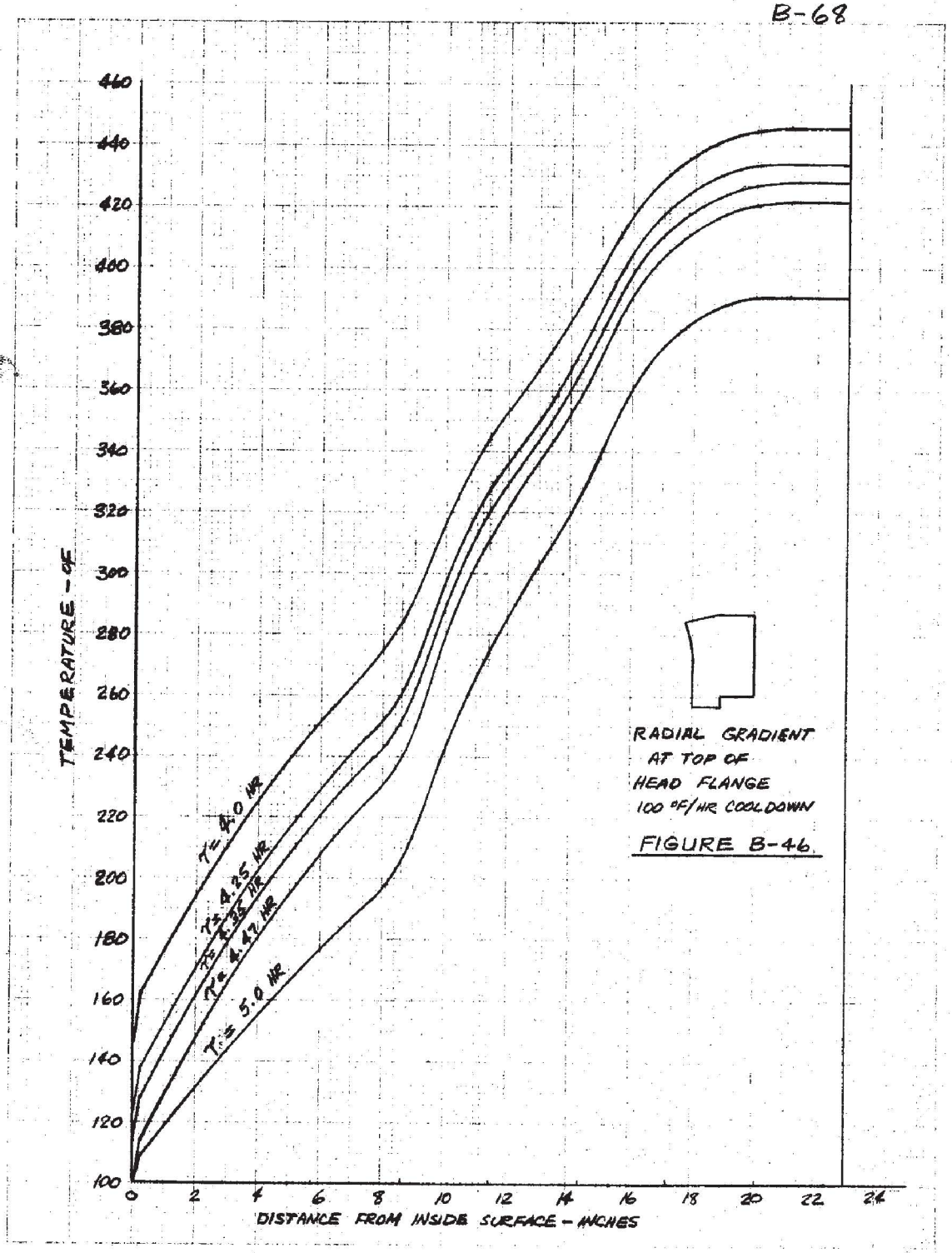
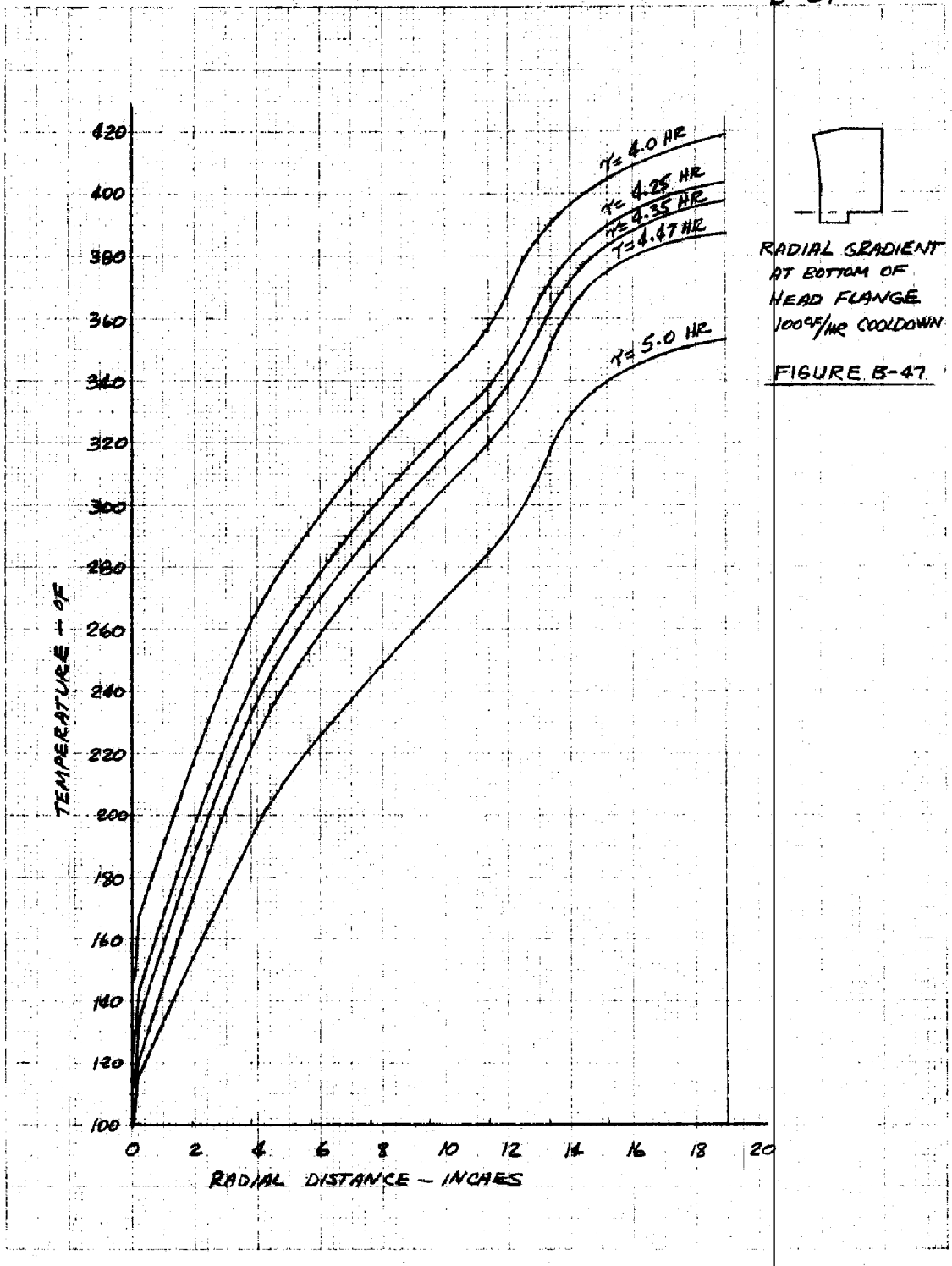


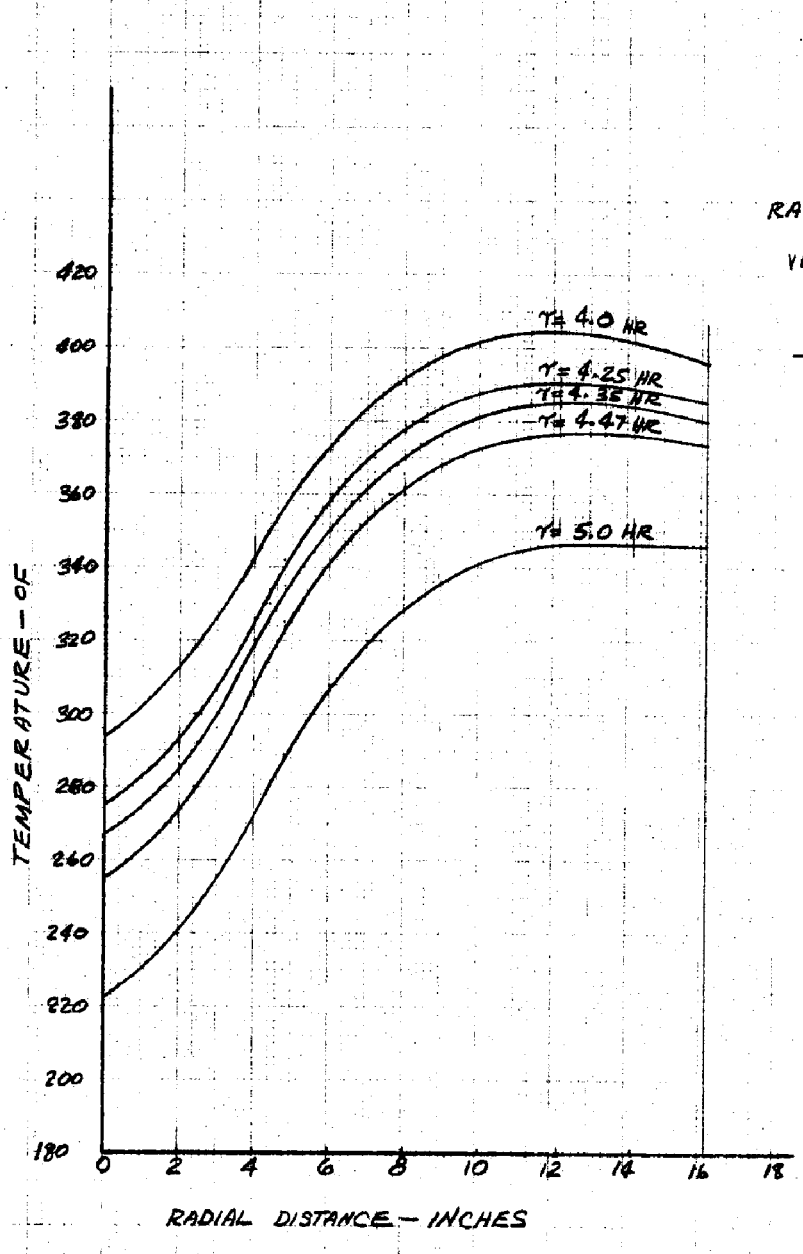
FIGURE B-46

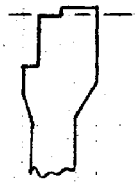
B-69



RADIAL GRADIENT AT BOTTOM OF HEAD FLANGE 100°F/HR COOLDOWN

FIGURE B-47

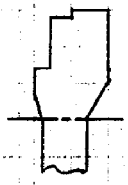




RADIAL GRADIENT
AT TOP OF
VESSEL FLANGE
100 °F/HR COOLDOWN

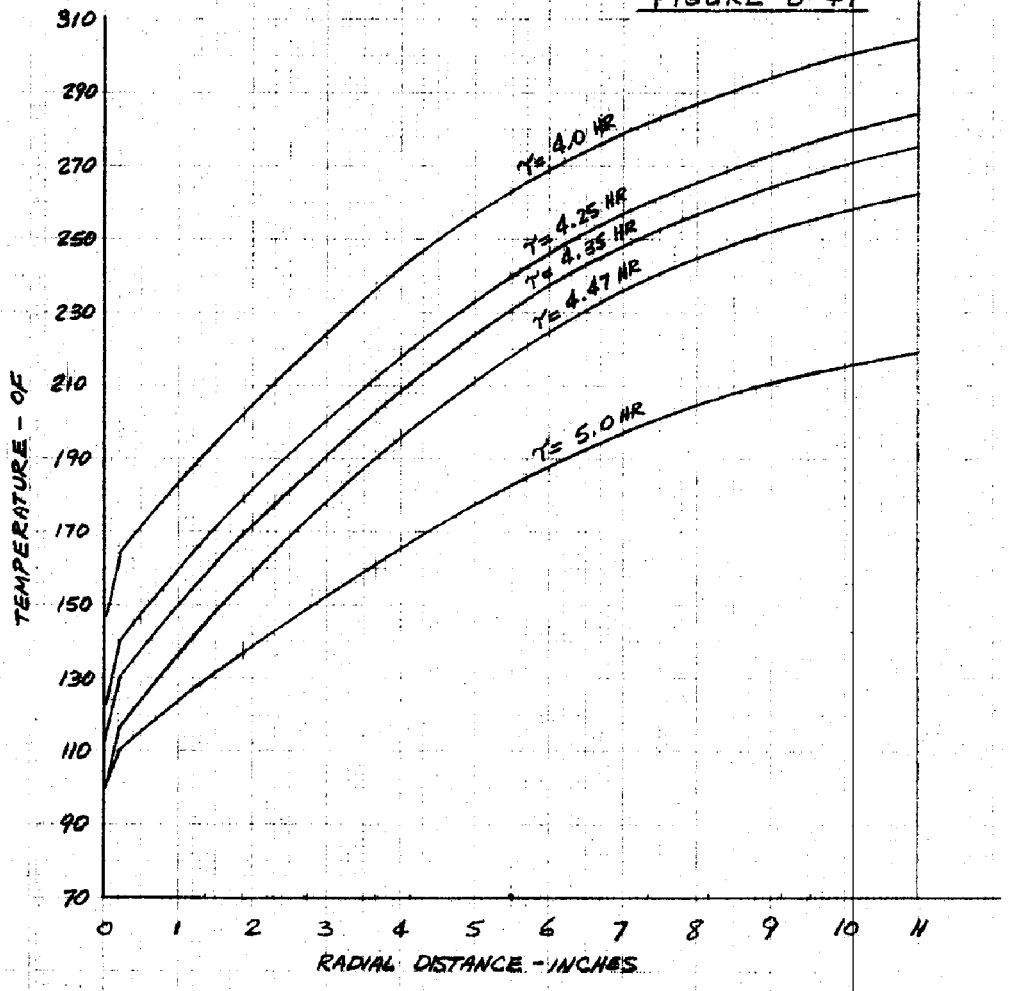
FIGURE B-48

B-71



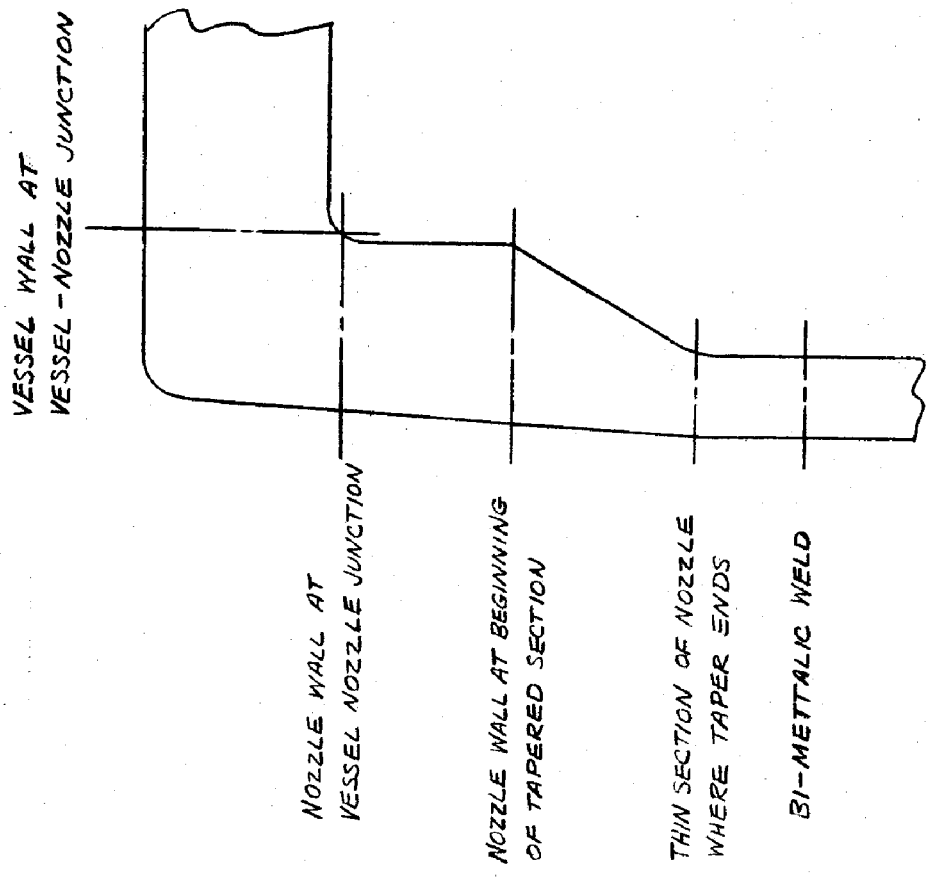
RADIAL GRADIENT AT VESSEL SHELL – FLANGE JUNCTION
100 °F/HR COOLDOWN

FIGURE B-49



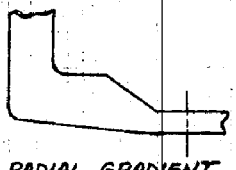
COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION INLET NOZZLE

NUMBER
SHEET B-22 OF
DATE BY
CHECK DATE BY



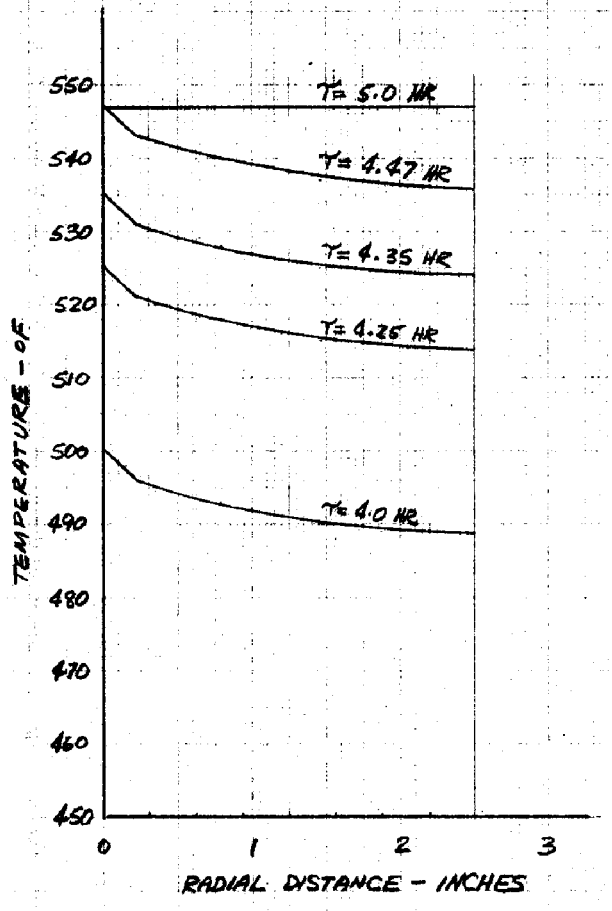
THIS SKETCH INDICATES THE LOCATIONS WHERE RADIAL GRADIENTS WERE PLOTTED AND THE THERMAL MOMENT CALCULATED.

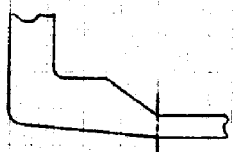
FIGURE B-50



RADIAL GRADIENT THRU INLET NOZZLE AT BI-METTALIC WELD
100 °F/HR HEATUP

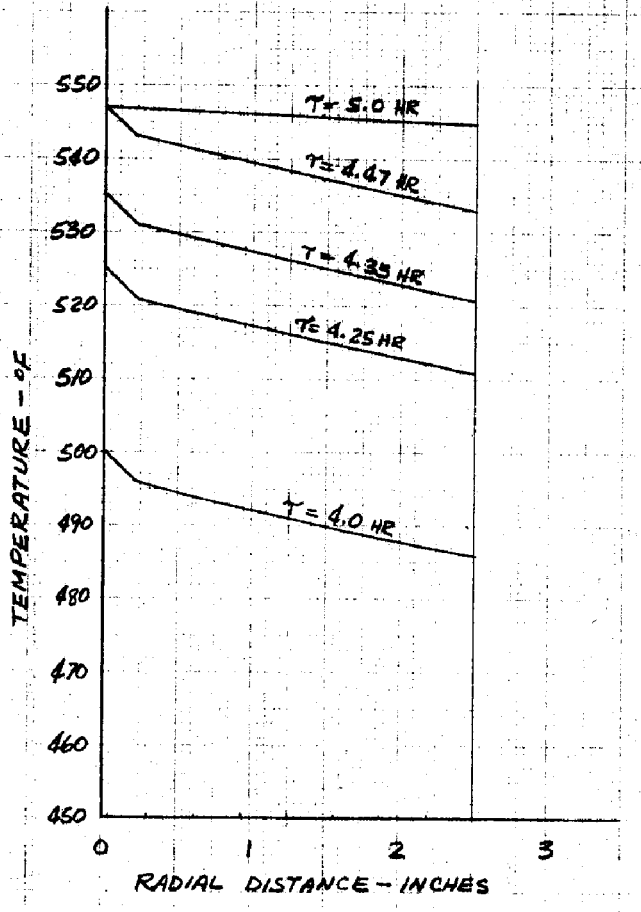
FIGURE B-51



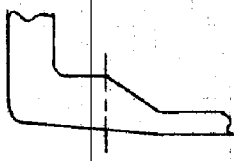


RADIAL GRADIENT AT THIN SECTION OF INLET NOZZLE WHERE TAPER ENDS 100°F/HR HEATUP

FIGURE B-52



B-75



RADIAL GRADIENT THRU NOZZLE WALL AT BEGINNING OF TAPERED SECTION

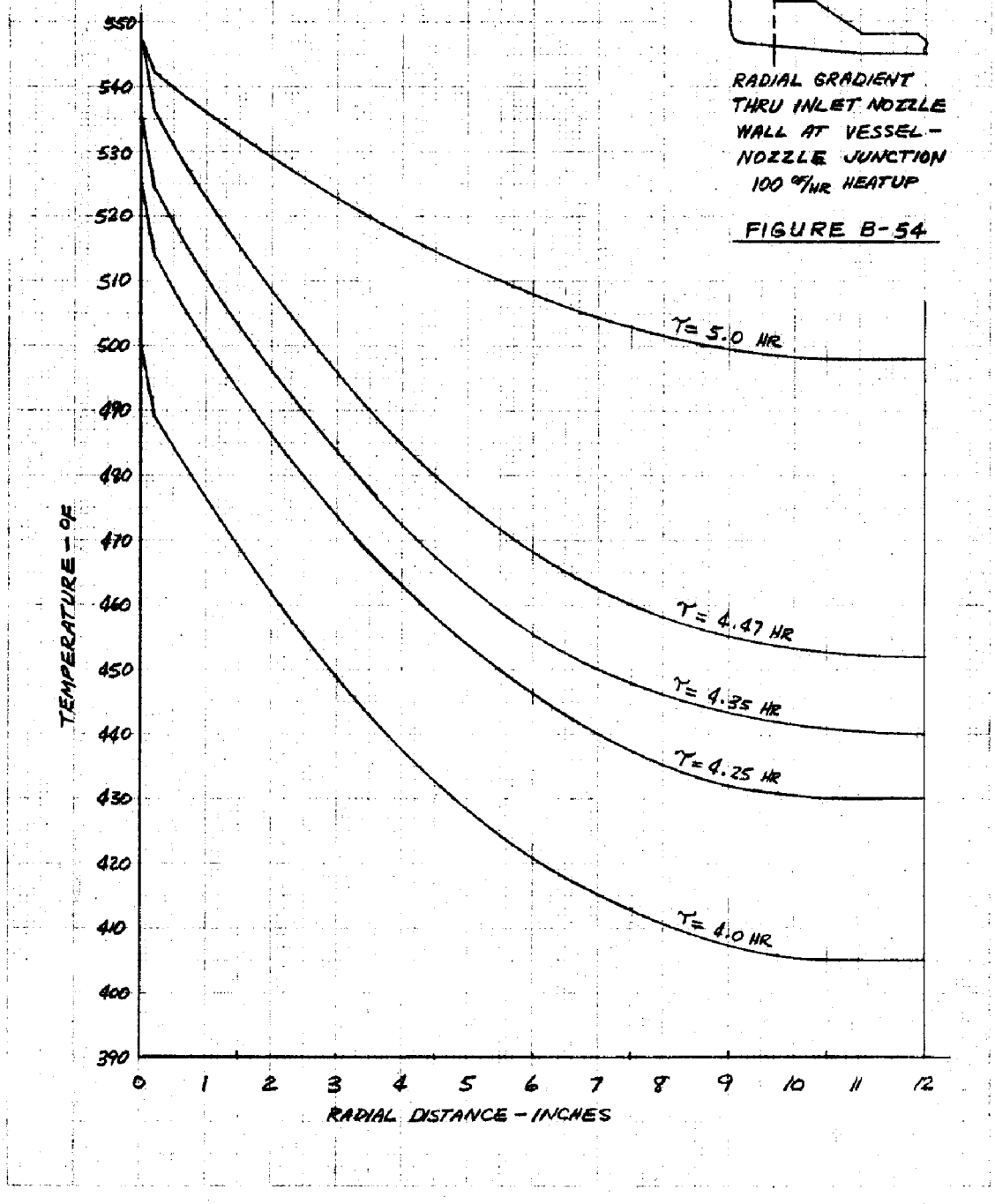
100 °F/HR HEATUP

FIGURE B-53

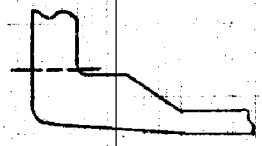
B-76

RADIAL GRADIENT THRU INLET NOZZLE WALL AT VESSEL-NOZZLE JUNCTION 100 °F/HR HEATUP

FIGURE B-54



B-77

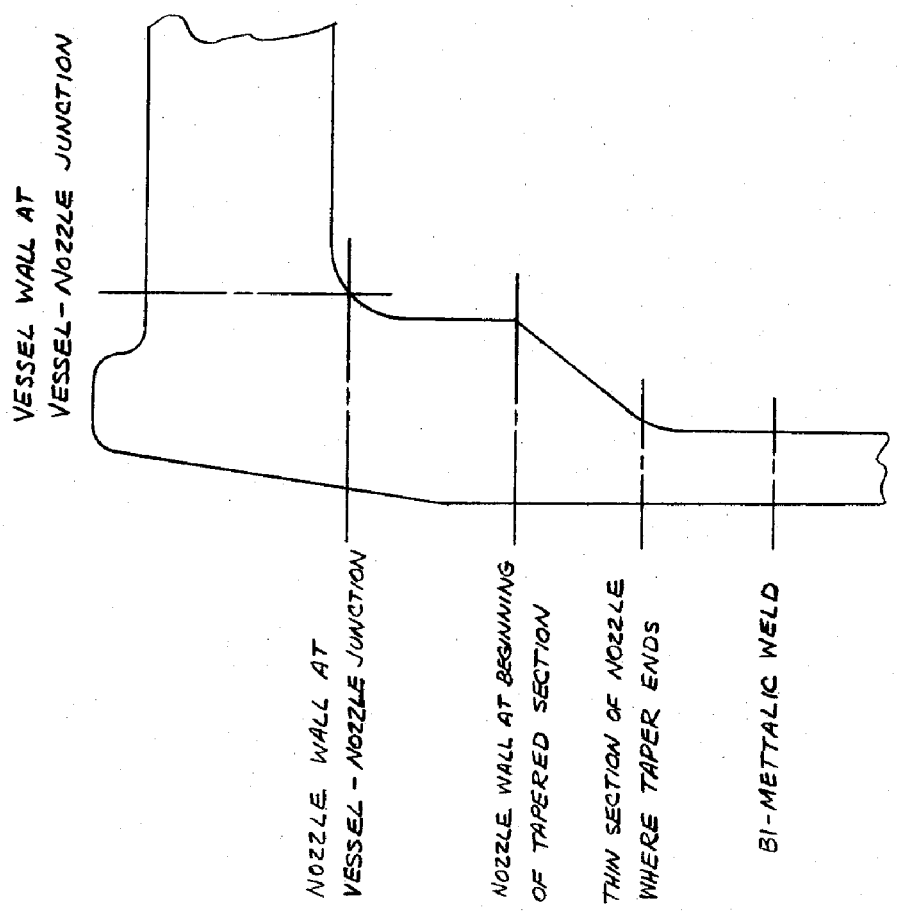


RADIAL GRADIENT THRU VESSEL WALL AT VESSEL-INLET NOZZLE JUNCTION 100 °F/HR HEATUP

FIGURE B-55

COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION OUTLET NOZZLE

NUMBER
SHEET B-78 OF
DATE BY
CHECK DATE BY

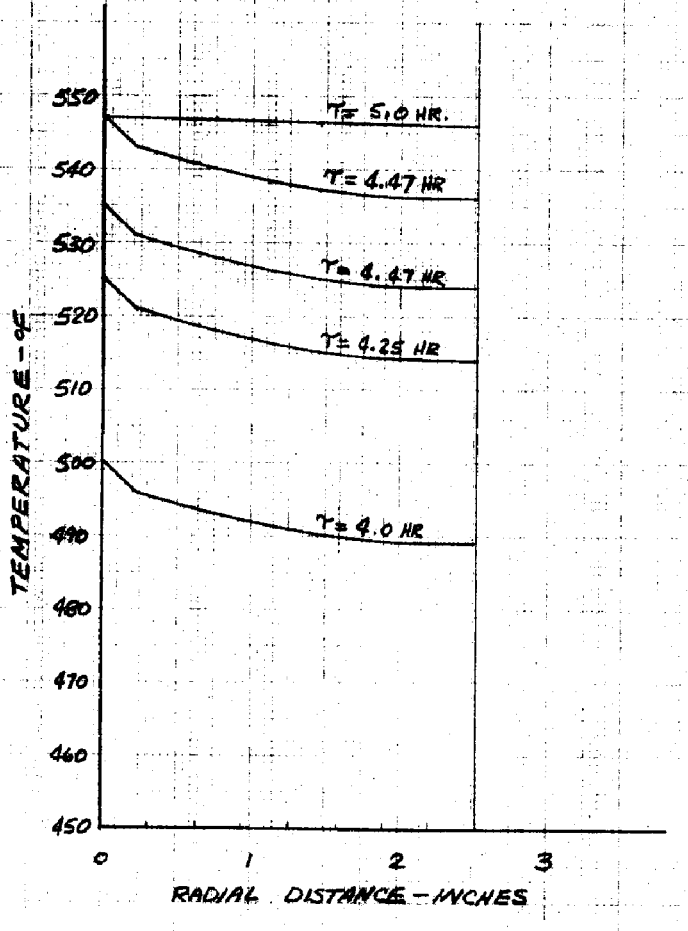


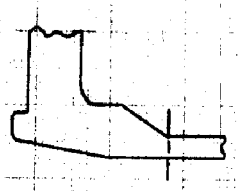
THIS SKETCH INDICATES THE LOCATIONS WHERE RADIAL GRADIENTS WERE PLOTTED AND THE THERMAL MOMENT CALCULATED.

FIGURE B-56

RADIAL GRADIENT
THRU OUTLET NOZZLE
AT BI-METTALIC WELD
100 °F/HR HEATUP

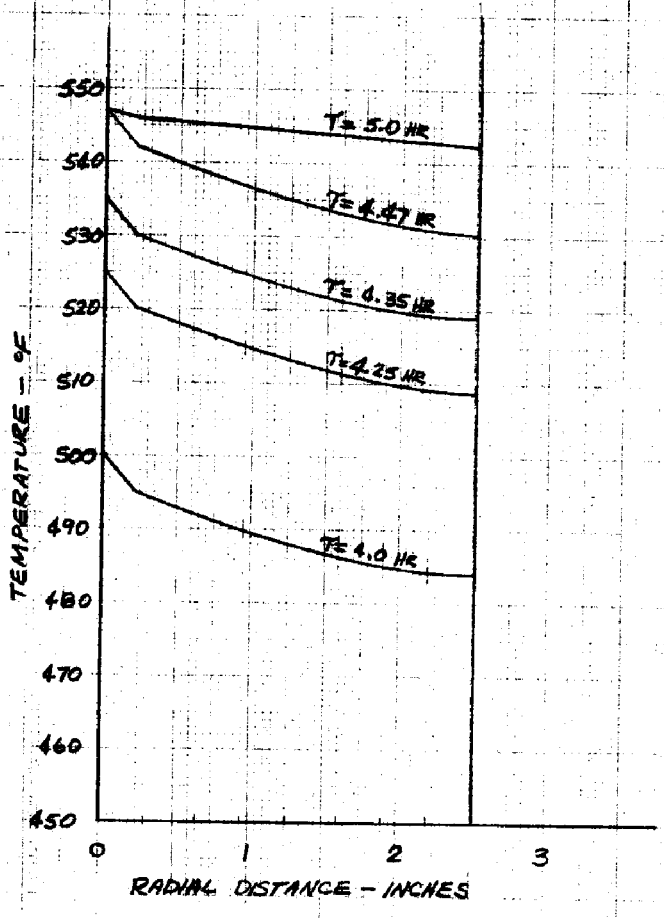
FIGURE B-57





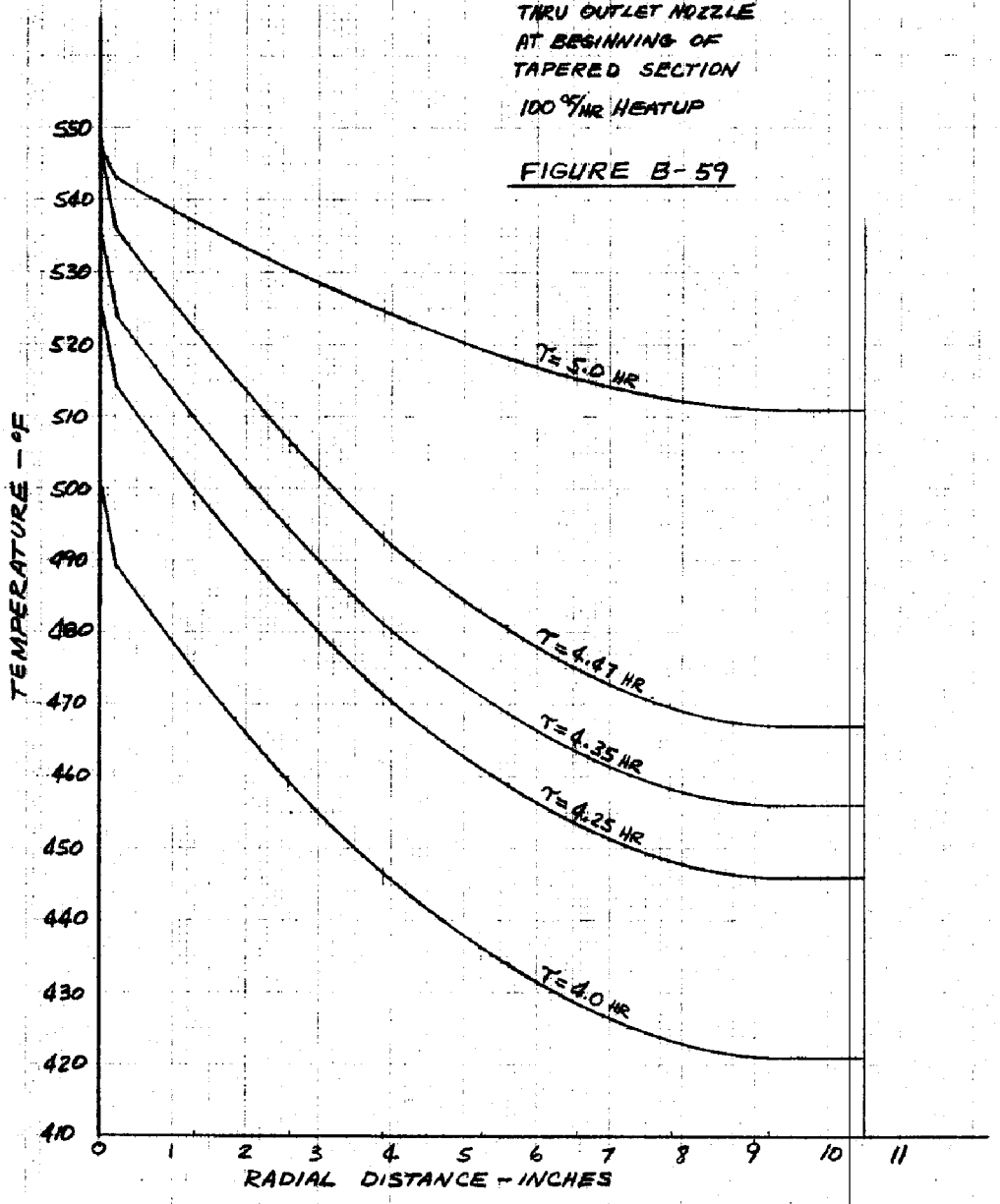
RADIAL GRADIENT AT THIN SECTION OF OUTLET NOZZLE WHERE TAPER ENDS
100 °F/HR HEATUP

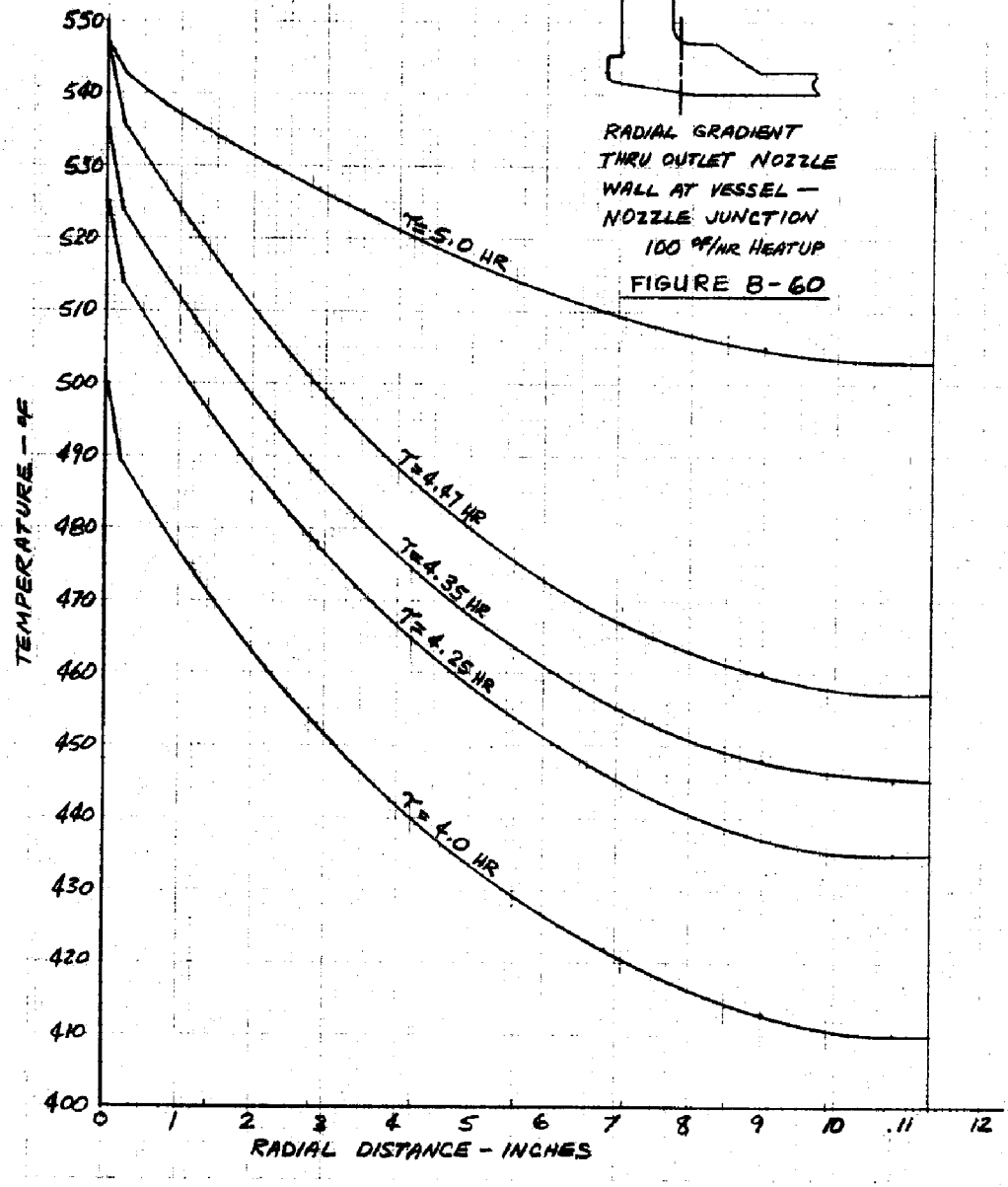
FIGURE B-58



RADIAL GRADIENT THRU OUTLET NOZZLE AT BEGINNING OF TAPERED SECTION
100 °F/HR HEATUP

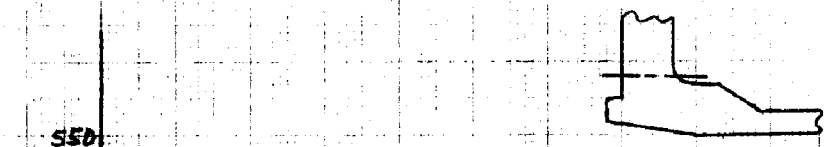
FIGURE B-59





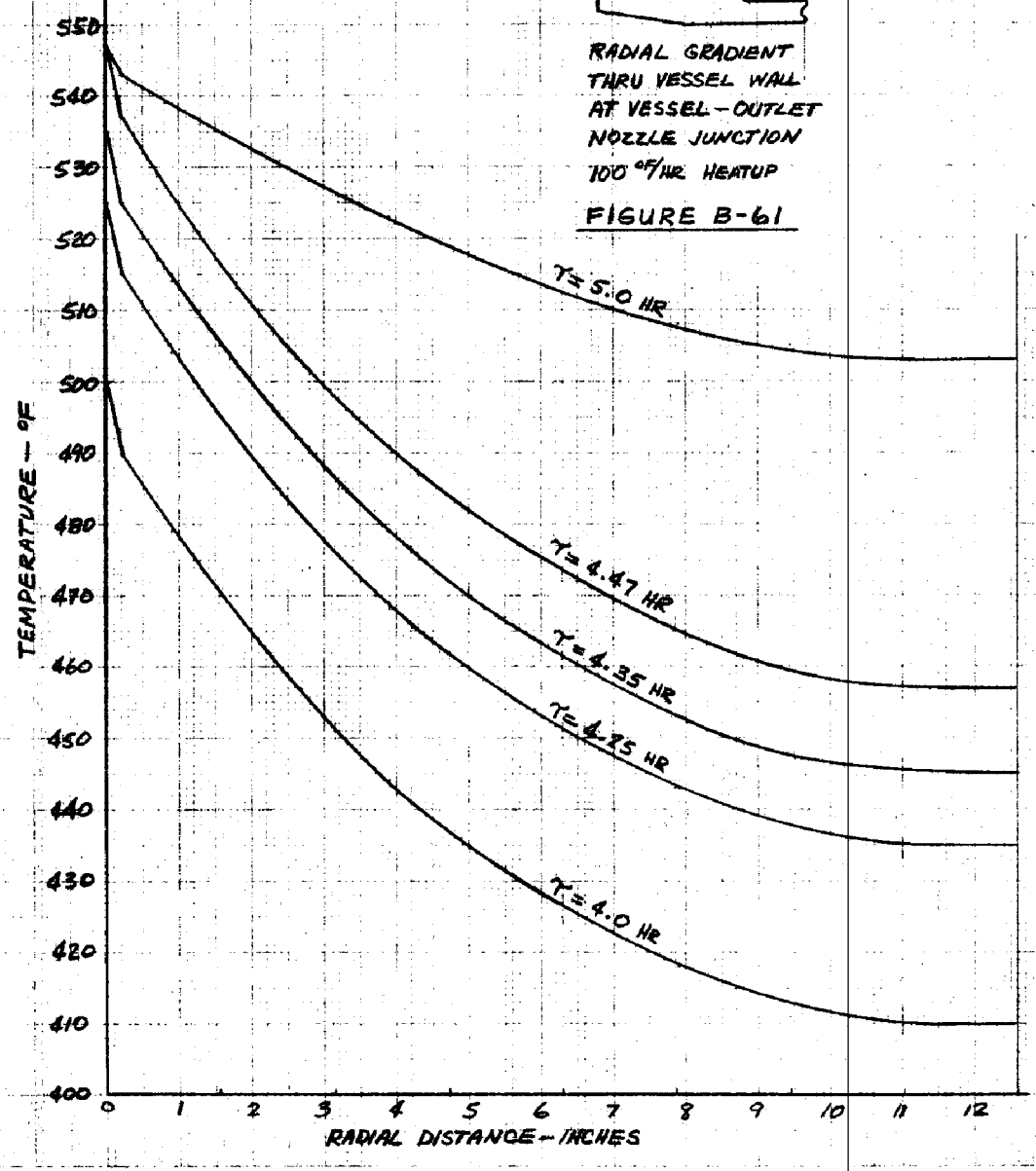
RADIAL GRADIENT THRU OUTLET NOZZLE WALL AT VESSEL — NOZZLE JUNCTION 100 °F/HR HEATUP

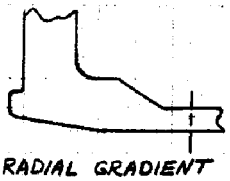
FIGURE B-60



RADIAL GRADIENT
THRU VESSEL WALL
AT VESSEL – OUTLET
NOZZLE JUNCTION
100 °F/HR. HEATUP

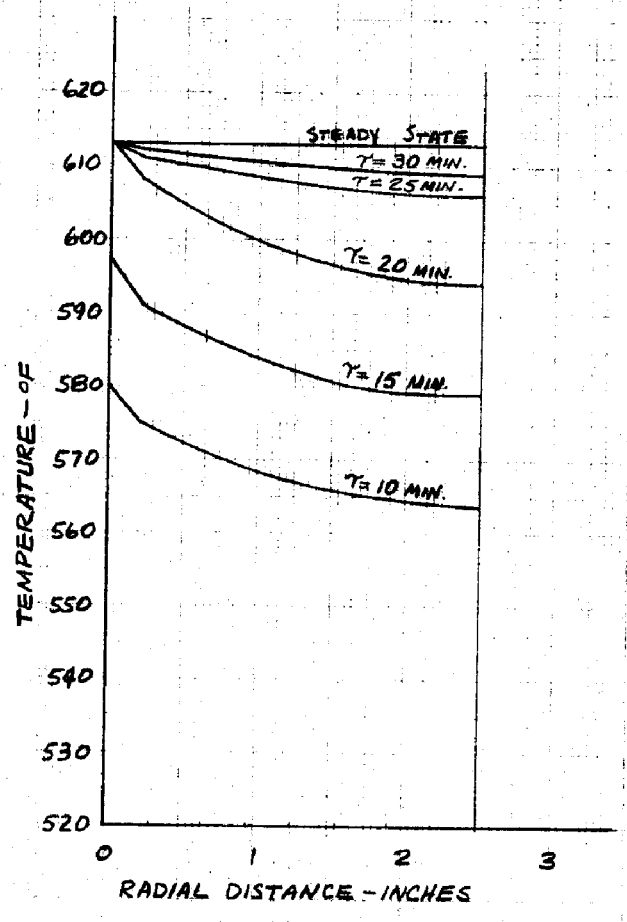
FIGURE B-61



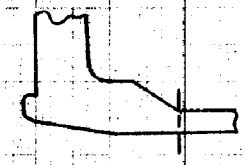


RADIAL GRADIENT
THRU OUTLET NOZZLE
AT BI-METTALIC WELD
PLANT LOADING

FIGURE B-62



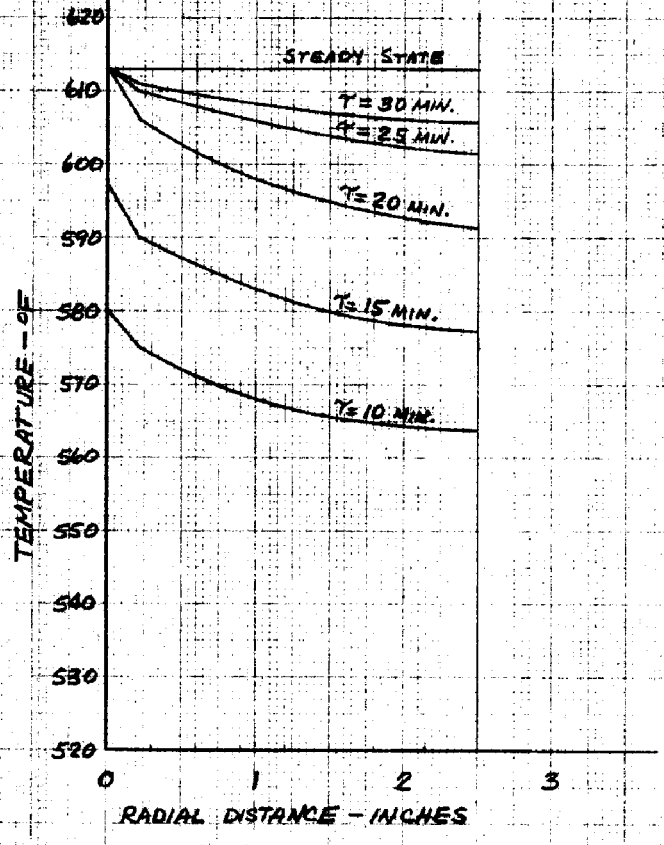
B-85

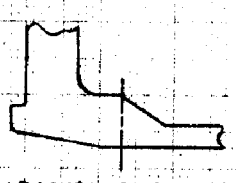


RADIAL GRADIENT AT THIN SECTION OF OUTLET NOZZLE WHERE TAPER ENDS

PLANT LOADING

FIGURE B-63

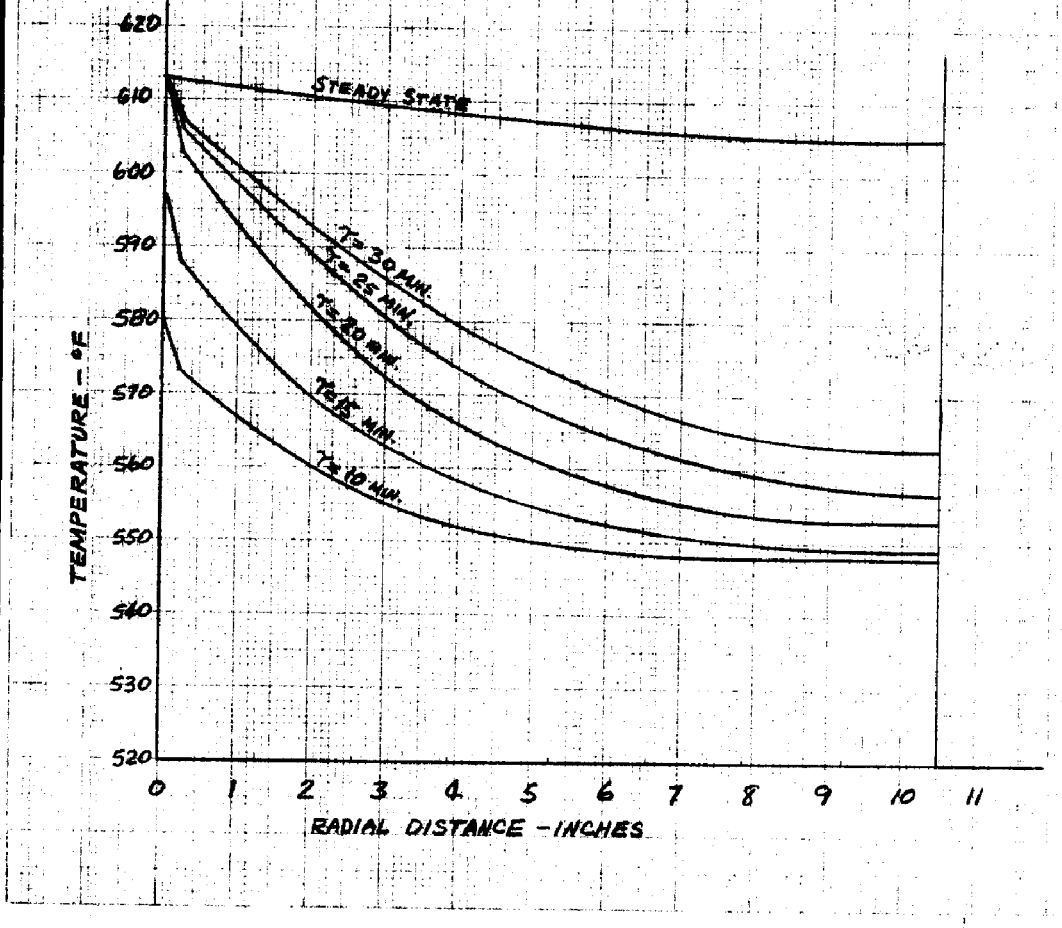


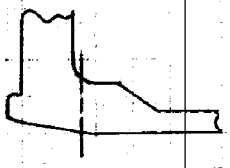


RADIAL GRADIENT
OUTLET NOZZLE WALL
AT BEGINNING OF
TAPERED SECTION

PLANT LOADING

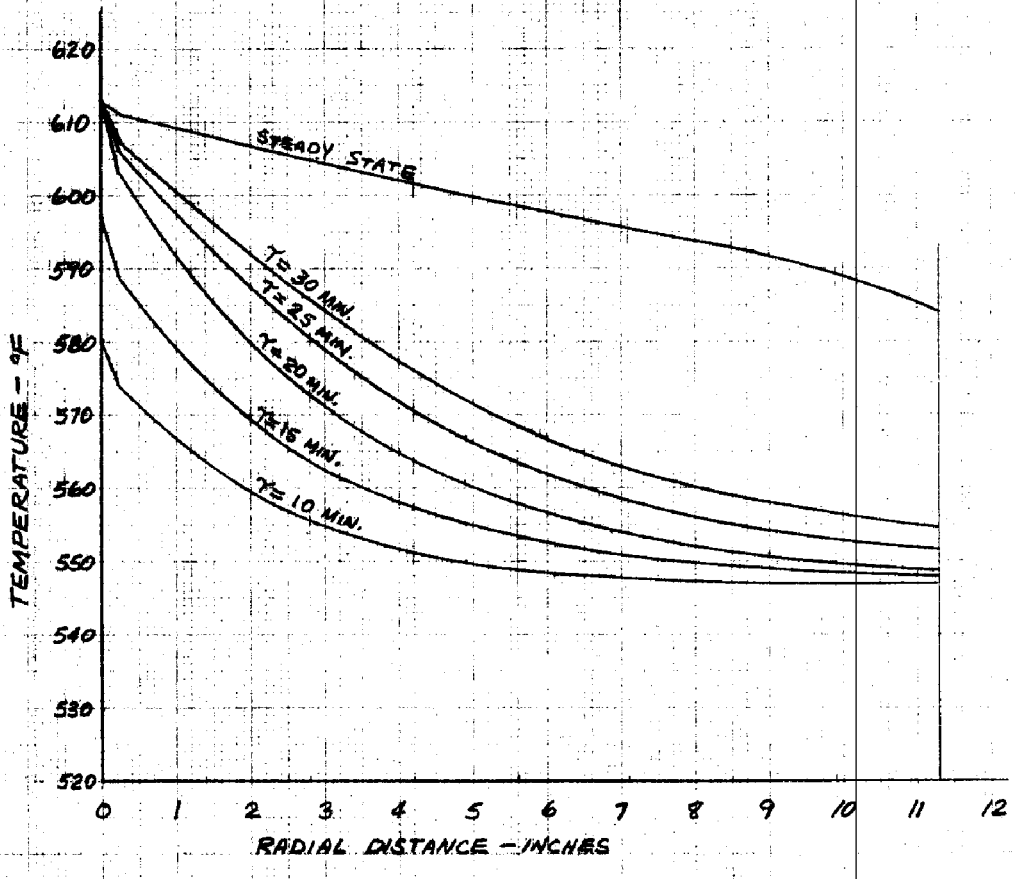
FIGURE B-64





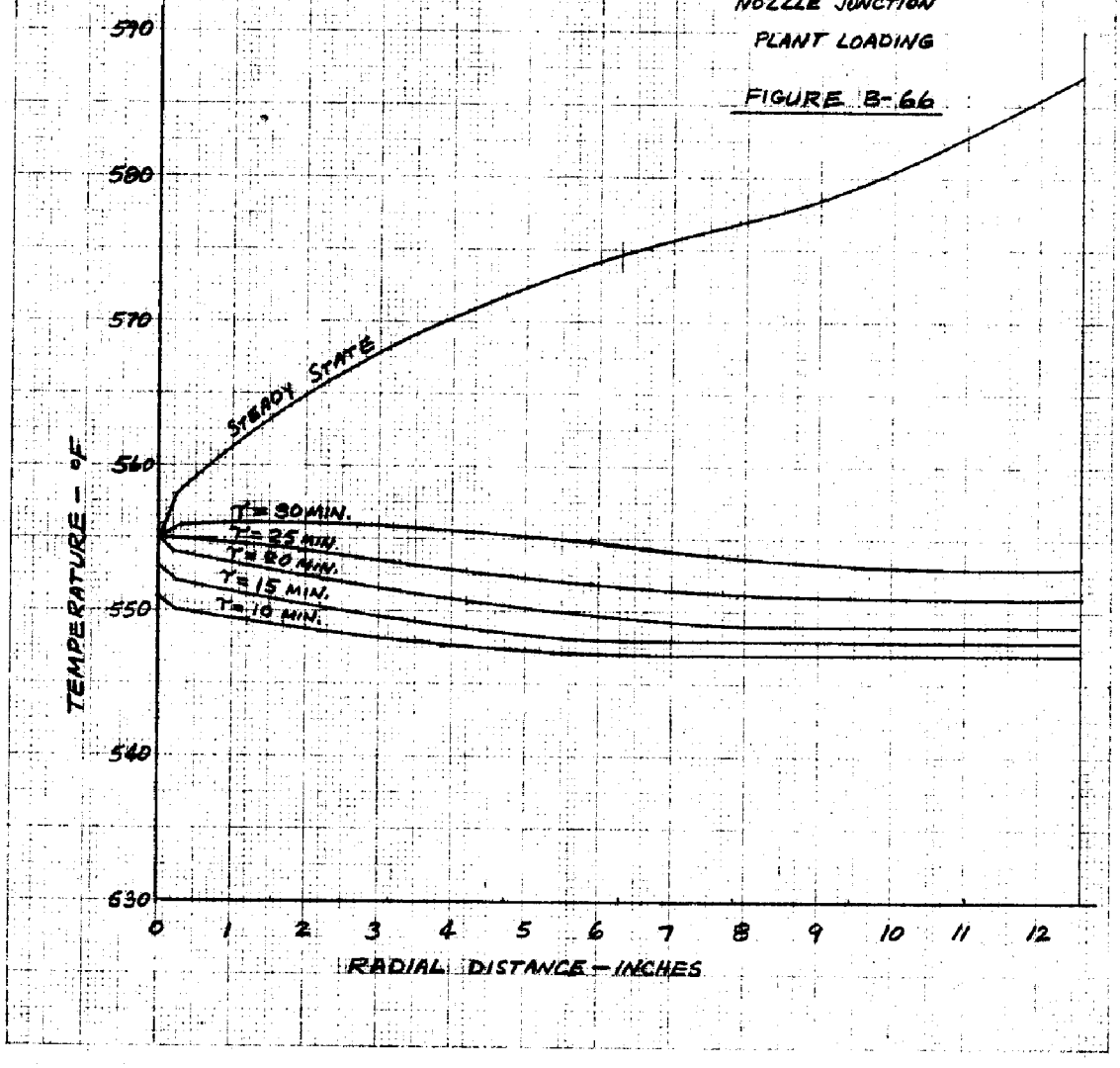
RADIAL GRADIENT
OUTLET NOZZLE WALL
AT VESSEL-NOZZLE
JUNCTION
PLANT LOADING

FIGURE B-65



RADIAL GRADIENT
VESSEL WALL AT
VESSEL - OUTLET
NOZZLE JUNCTION
PLANT LOADING

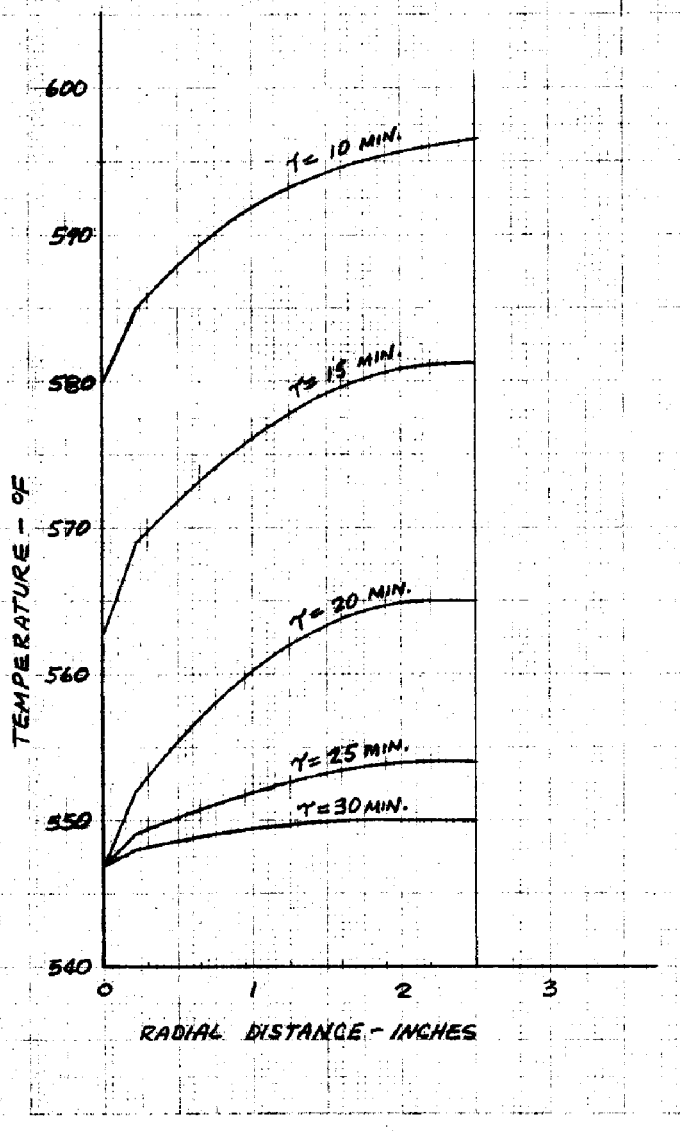
FIGURE B-66

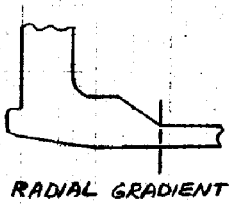


RADIAL GRADIENT
OUTLET NOZZLE WALL
AT BI-METTALIC WELD

PLANT UNLOADING

FIGURE B-67

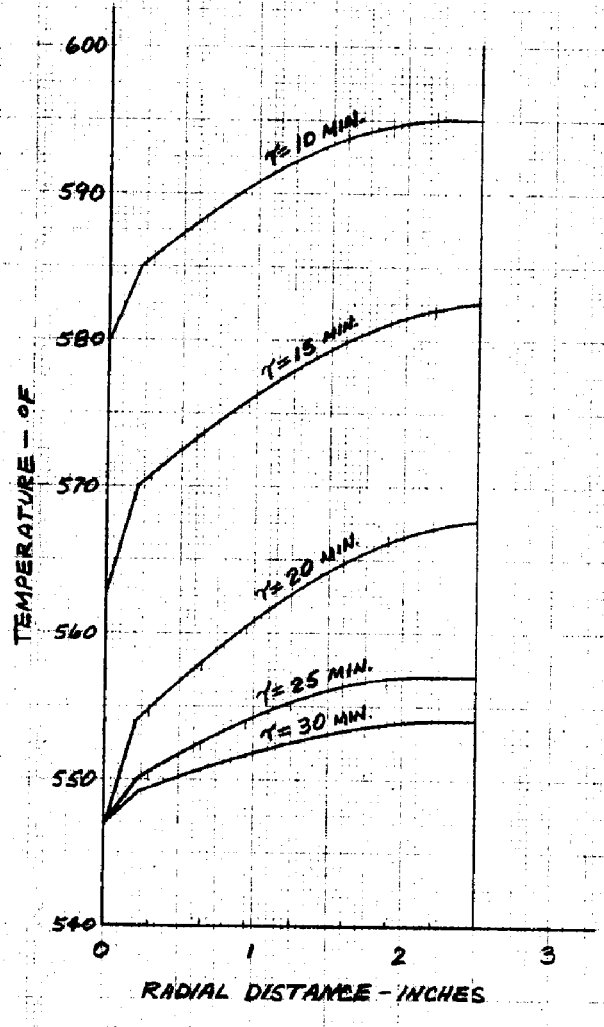




RADIAL GRADIENT AT THIN SECTION OF OUTLET NOZZLE WHERE TAPER ENDS

PLANT UNLOADING

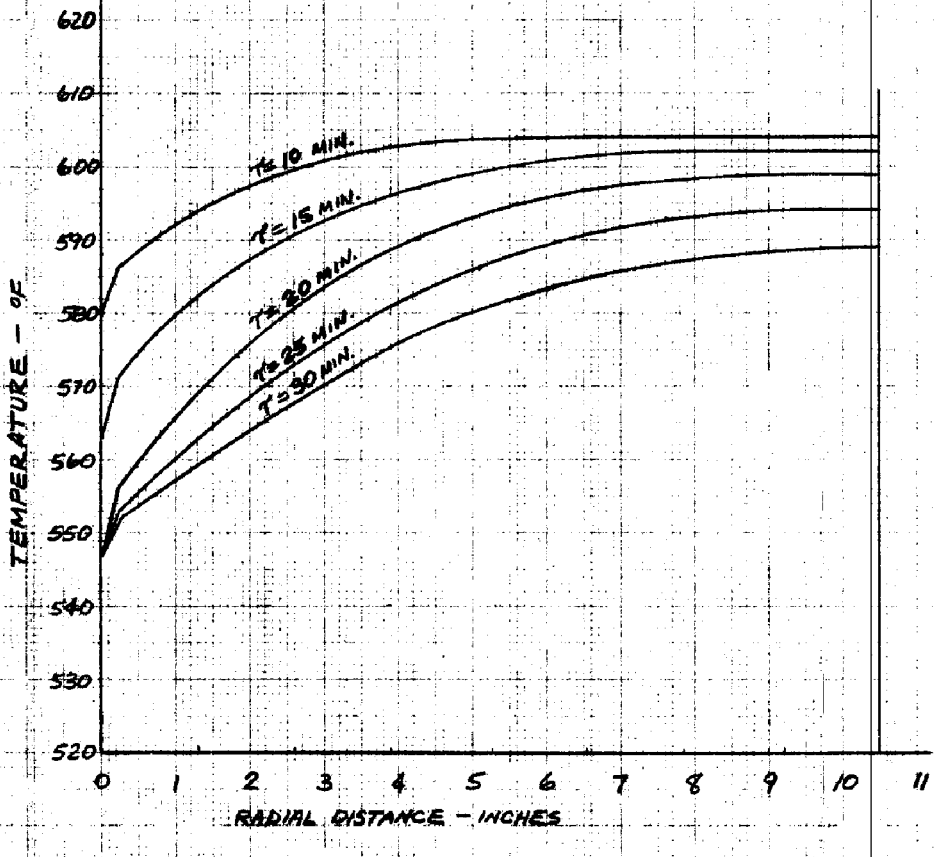
FIGURE B-68



RADIAL GRADIENT
OUTLET NOZZLE WALL
AT BEGINNING OF
TAPERED SECTION

PLANT UNLOADING

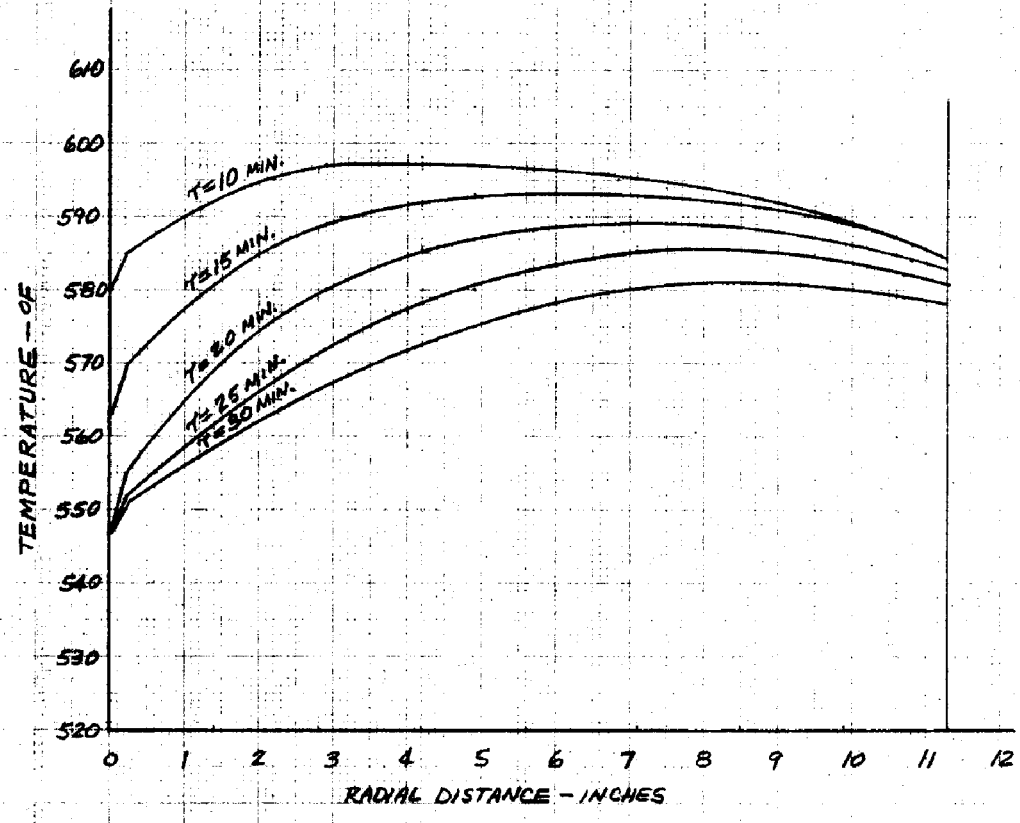
FIGURE B-69



RADIAL GRADIENT
OUTLET NOZZLE WALL
AT VESSEL-NOZZLE
JUNCTION

PLANT UNLOADING

FIGURE B-70

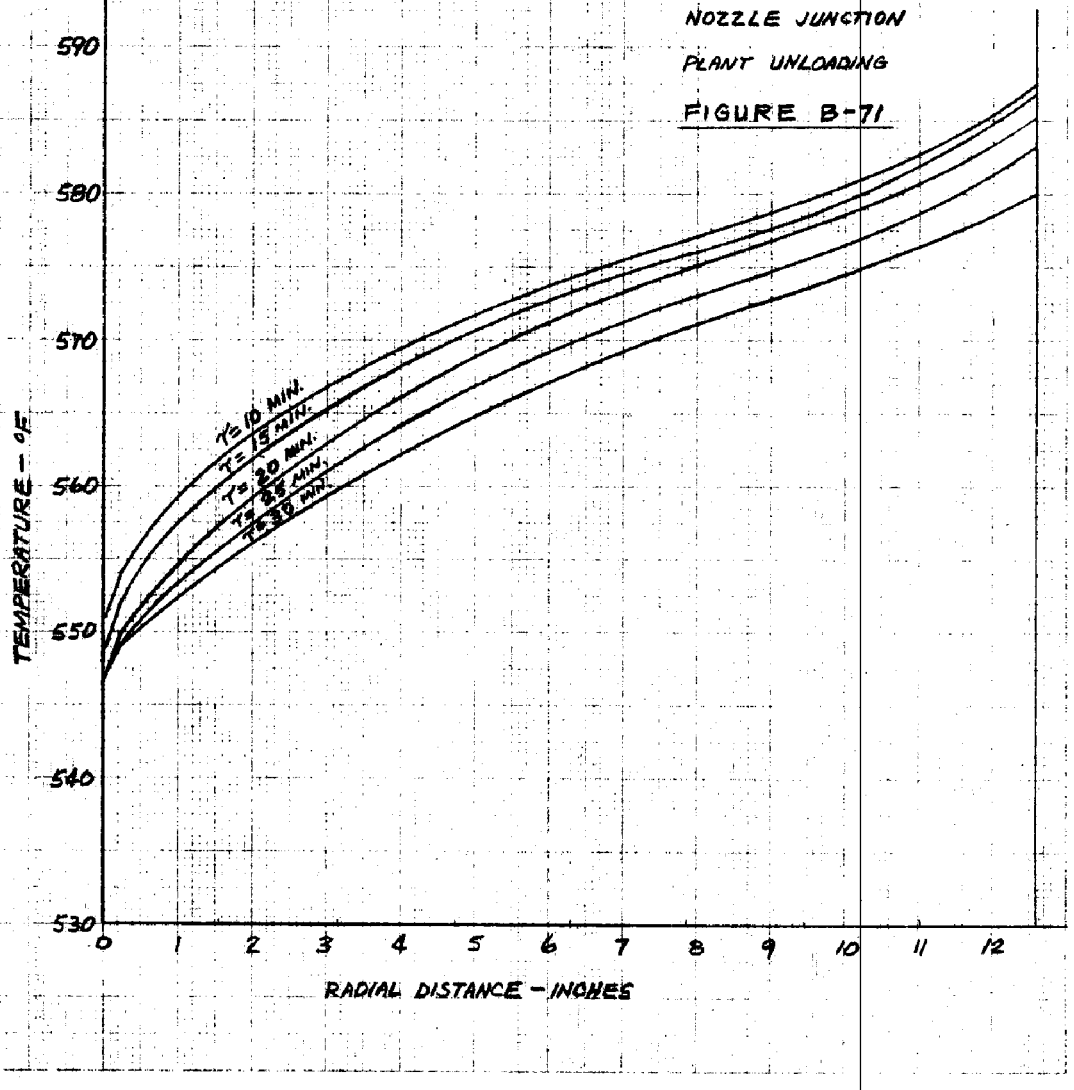


B-93

RADIAL GRADIENT
VESSEL WALL AT
VESSEL - OUTLET
NOZZLE JUNCTION

PLANT UNLOADING

FIGURE B-71



COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION VESSEL WALL

NUMBER
SHEET B-94 OF
DATE BY
CHECK DATE BY

FOLLOWING ARE TEMPERATURE DISTRIBUTIONS IN THE VESSEL WALL FOR NORMAL HEATUP, 100°F → 547°F @ 100°F/HR, AND FOR THE HYDROSTATIC TEST HEATUP, 100°F → 400°F @ 100°F/HR. IN EACH CASE, THE DISTRIBUTION FOR COOLDOWN IS A MIRROR IMAGE OF HEATUP, SINCE THE COOLDOWN TRANSIENT IS OVER THE SAME RANGE AND AT THE SAME RATE AS HEATUP.

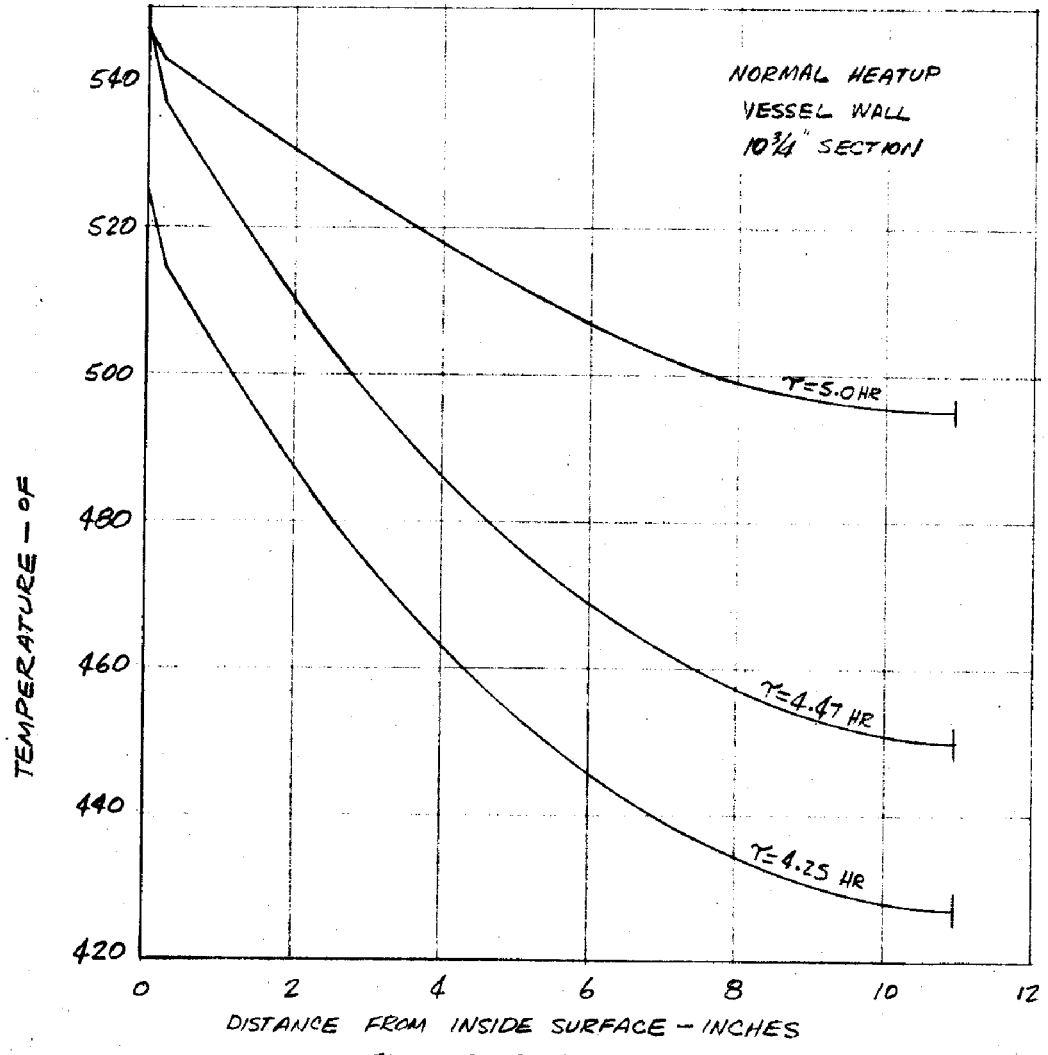


FIGURE B-72

COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION VESSEL WALL

NUMBER
SHEET B-95 OF
DATE BY
CHECK DATE BY

NORMAL HEATUP, VESSEL WALL, 8 5/8" SECTION

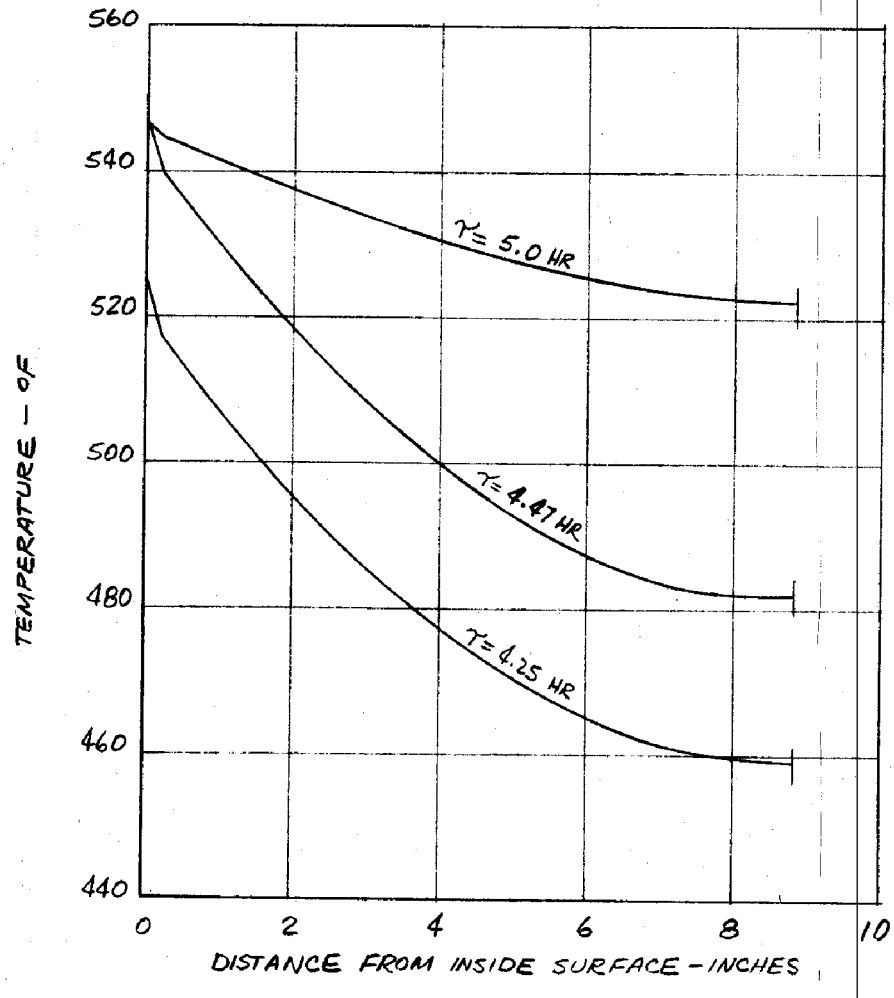


FIGURE B-73

COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION VESSEL WALL

NUMBER
SHEET B-96 OF
DATE BY
CHECK DATE BY

HYDRO HEATUP, VESSEL WALL, $10\frac{3}{4}$" SECTION

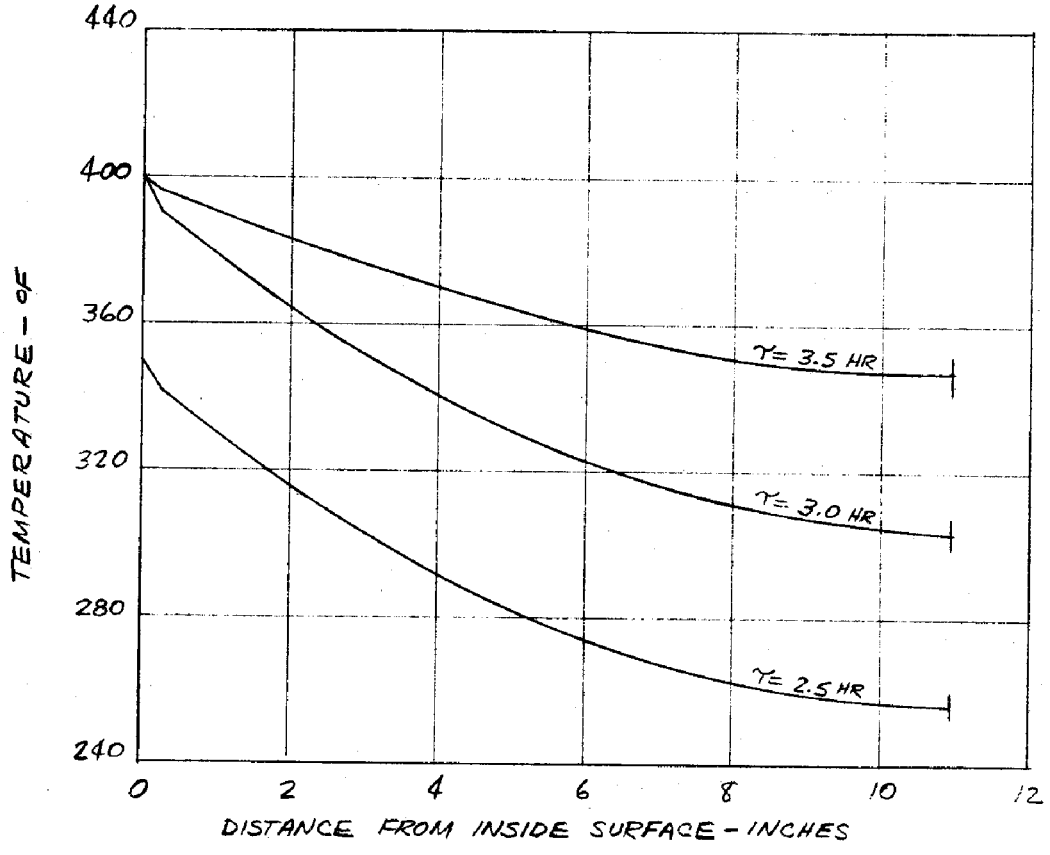


FIGURE B-74

COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION VESSEL WALL

NUMBER
SHEET B-97 OF
DATE BY
CHECK DATE BY

HYDRO HEATUP, VESSEL WALL, 8 5/8" SECTION

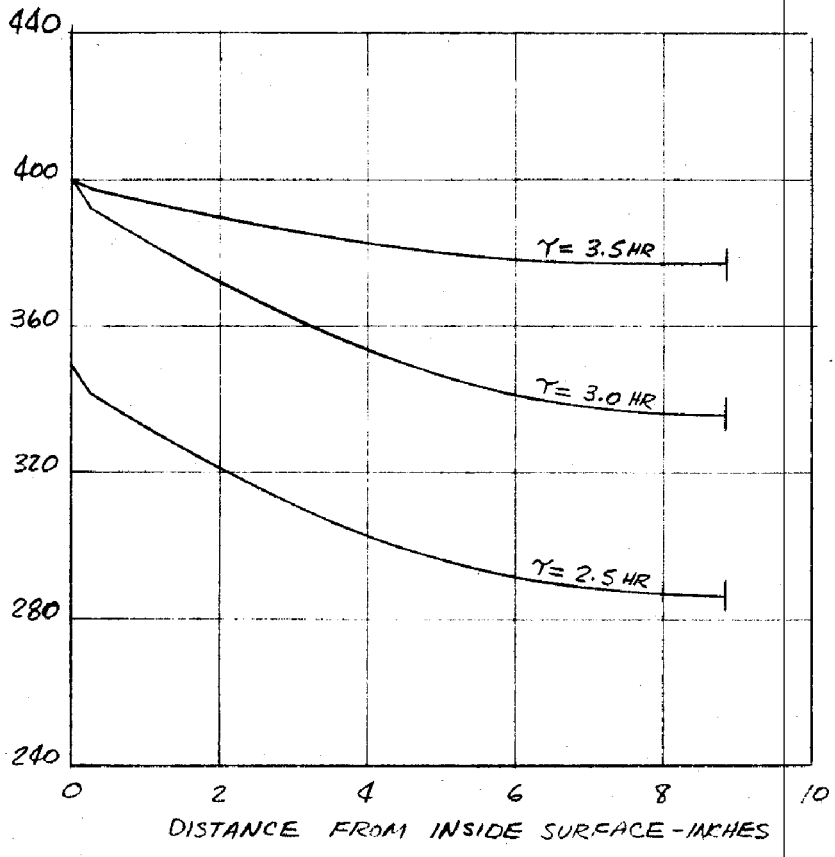
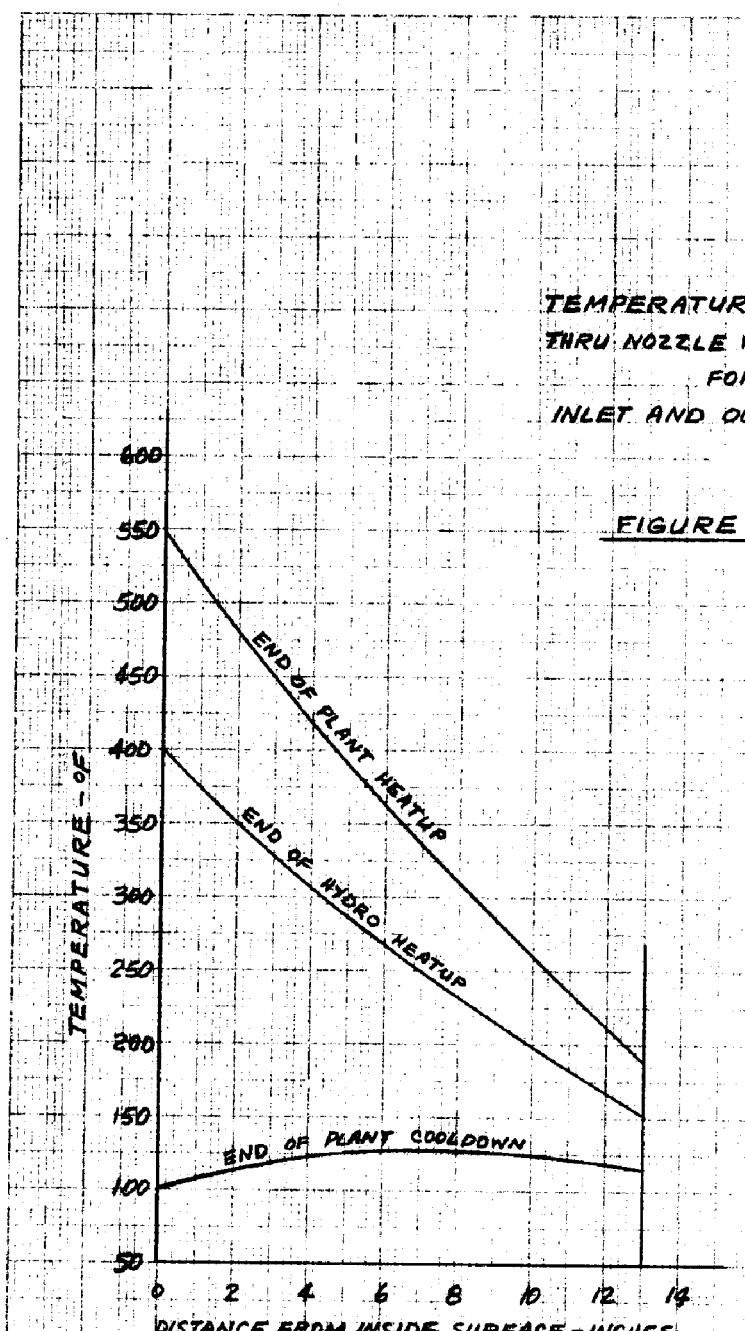


FIGURE B-75

TEMPERATURE DISTRIBUTION
THRU NOZZLE WALL AND PAD
FOR
INLET AND OUTLET NOZZLES

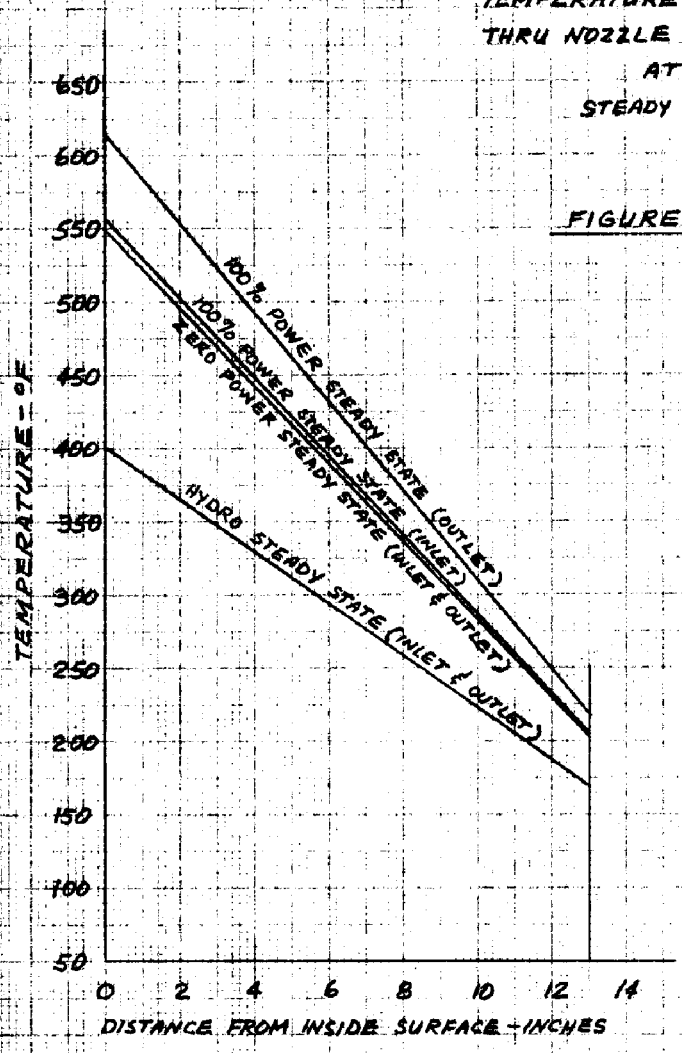
FIGURE B-76



B-99

TEMPERATURE DISTRIBUTION
THRU NOZZLE WALL AND PAD
AT
STEADY STATE

FIGURE B-77



COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION HEAD AND VESSEL FLANGES

NUMBER
SHEET B-100 OF
DATE BY
CHECK DATE BY

THERMAL MOMENTS RESULTING FROM RADIAL GRADIENTS FOR 100 °F/HR HEATUP AND COOLDOWN, 100°F ↔ 547°F

		100 °F/HR HEATUP		100 °F/HR COOLDOWN	
LOCATION	TIME (HR)	T_{MEAN} (°F)	THERMAL MOMENT (IN-LB/IN)	T_{MEAN} (°F)	THERMAL MOMENT (IN-LB/IN)
HEAD FLANGE-HEAD JUNCTION	4.0	412	332271	234	-289429
	4.25	434	334688	212	-292207
	4.35	443	335628	203	-293446
	4.47	456	336991	190	-295197
	5.0	482	259934	164	-225118
	STEADY STATE	546	3217		
TOP OF HEAD FLANGE	4.0	308	4099231	330	-4053144
	4.25	326	4307030	312	-4254050
	4.35	334	4397693	306	-4260472
	4.47	346	4526824	294	-4365332
	5.0	380	4444551	264	-4140627
	STEADY STATE	545	94314		
BOTTOM OF HEAD FLANGE	4.0	307	2178931	332	-2143347
	4.25	325	2267317	314	-2200498
	4.35	334	2295041	306	-2218839
	4.47	344	2332781	295	-2230669
	5.0	375	2180188	264	-2045856
	STEADY STATE	539	64743		
TOP OF VESSEL FLANGE	4.0	243	1023212	374	-726730
	4.25	258	1069229	358	-774763
	4.35	265	1101081	352	-796483
	4.47	274	1134218	343	-821931
	5.0	307	1176806	310	-842210
	STEADY STATE	516	361003		
VESSEL FLANGE-SHELL JUNCTION	4.0	391	458071	193	-402539
	4.25	413	461449	191	-406478
	4.35	423	462890	190	-408144
	4.47	435	464736	189	-410452
	5.0	466	361170	186	-304752
	STEADY STATE	544	17291		

COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION INLET NOZZLE

NUMBER
SHEET B-101 OF
DATE BY
CHECK DATE BY

THERMAL MOMENTS RESULTING FROM RADIAL GRADIENTS

100 °F/HR HEATUP

LOCATION	TIME (HR)	T_{MEAN} (°F)	THERMAL MOMENT (IN-lb/IN)
NOZZLE WALL AT BI-METTALIC WELD	4.0	492	1432
	4.25	517	1439
	4.35	527	1446
	4.47	539	1453
	5.0	547	0
THIN SECTION OF NOZZLE WALL WHERE TAPER ENDS	4.0	490	1884
	4.25	515	1893
	4.35	525	1902
	4.47	537	1910
	5.0	546	398
NOZZLE WALL AT BEGINNING OF TAPERED SECTION	4.0	423	296455
	4.25	448	297894
	4.35	458	299333
	4.47	470	300772
	5.0	508	171974
NOZZLE WALL AT VESSEL-NOZZLE JUNCTION	4.0	426	308138
	4.25	451	311129
	4.35	461	312625
	4.47	473	314121
	5.0	510	169914
VESSEL WALL AT VESSEL-NOZZLE JUNCTION	4.0	435	336543
	4.25	460	338168
	4.35	470	339794
	4.47	482	341420
	5.0	515	184075

NOTE: THERMAL MOMENTS FOR THE COOLDOWN TRANSIENT ARE EQUAL IN MAGNITUDE BUT OPPOSITE IN SIGN FROM THOSE FOR HEATUP.

COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION OUTLET NOZZLE

NUMBER
SHEET B-102 OF
DATE BY
CHECK DATE BY

THERMAL MOMENTS RESULTING FROM RADIAL GRADIENTS

100 °F/HR HEATUP

LOCATION	TIME (HR)	T_{MEAN} (°F)	THERMAL MOMENT (IN-LB/IN)
NOZZLE WALL AT BI-METTALIC WELD	4.0	492	1432
	4.25	517	1439
	4.35	527	1446
	4.47	539	1453
	5.0	547	0
THIN SECTION OF NOZZLE WALL WHERE TAPER ENDS	4.0	488	2296
	4.25	513	2307
	4.35	523	2318
	4.47	535	2328
	5.0	544	677
NOZZLE WALL AT BEGINNING OF TAPERED SECTION	4.0	440	201261
	4.25	465	202228
	4.35	475	203196
	4.47	487	204164
	5.0	521	98858
NOZZLE WALL AT VESSEL-NOZZLE JUNCTION	4.0	433	259971
	4.25	458	262483
	4.35	468	263739
	4.47	480	264995
	5.0	516	136549
VESSEL WALL AT VESSEL-NOZZLE JUNCTION	4.0	435	320808
	4.25	460	322358
	4.35	470	323908
	4.47	481	325458
	5.0	516	174296

NOTE: THERMAL MOMENTS FOR THE COOLDOWN TRANSIENT ARE EQUAL IN MAGNITUDE BUT OPPOSITE IN SIGN FROM THOSE FOR HEATUP.

COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION OUTLET NOZZLE

NUMBER
SHEET B-103 OF
DATE BY
CHECK DATE BY

THERMAL MOMENTS RESULTING FROM RADIAL GRADIENTS

		PLANT LOADING		PLANT UNLOADING	
LOCATION	TIME	T_{MEAN} (°F)	THERMAL MOMENT (IN-lb/IN)	T_{MEAN} (°F)	THERMAL MOMENT (IN-lb/IN)
NOZZLE WALL AT BI-METTALIC WELD	10 MIN.	568	2219	592	- 2300
	15 MIN.	583	2511	577	- 2531
	20 MIN.	599	2825	561	- 2619
	25 MIN.	608	1070	552	- 1020
	30 MIN.	610	646	549	- 420
	STEADY STATE	613	0	547	0
THIN SECTION OF NOZZLE WHERE TAPER ENDS	10 MIN.	568	2199	592	- 2129
	15 MIN.	582	2571	577	- 2601
	20 MIN.	597	2946	562	- 2739
	25 MIN.	605	1655	554	- 1460
	30 MIN.	608	1090	552	- 1040
	STEADY STATE	613	0	547	0
NOZZLE WALL AT BEGINNING OF TAPERED SECTION	10 MIN.	553	67384	602	- 42350
	15 MIN.	558	107043	596	- 82208
	20 MIN.	565	142450	590	- 118670
	25 MIN.	571	145947	584	- 120442
	30 MIN.	576	134611	578	- 111940
	STEADY STATE	607	23488	547	0
NOZZLE WALL AT VESSEL-NOZZLE JUNCTION	10 MIN.	552	78067	593	+ 7834
	15 MIN.	556	123200	589	- 40630
	20 MIN.	562	169119	583	- 82080
	25 MIN.	567	180557	578	-100958
	30 MIN.	571	178923	574	- 94772
	STEADY STATE	598	85758	547	0
VESSEL WALL AT VESSEL-NOZZLE JUNCTION	10 MIN.	548	11628	573	-120431
	15 MIN.	549	16178	572	-125024
	20 MIN.	550	22245	570	-130637
	25 MIN.	552	18706	568	-128000
	30 MIN.	555	15167	566	-121397
	STEADY STATE	574	-105694	547	0

COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION VESSEL WALL

NUMBER
SHEET B-104 OF
DATE BY
CHECK DATE BY

TABULATED RESULTS

		TIME (HR)	T_{MEAN} (°F)	T_{INSIDE} (°F)	$T_{INTERFACE}$ (°F)	$T_{OUTSIDE}$ (°F)	$T_M - T_{IN}$ (°F)	$T_M - T_{INS}$ (°F)	$T_M - T_{OUT}$ (°F)
10¾" SECTION	NORMAL HEATUP	4.25	460	525	515	427	-65	-55	33
		4.47	482	547	537	450	-65	-55	32
		5.00	514	547	543	495	-33	-29	19
	NORMAL COOLDOWN	4.25	187	122	132	220	65	55	-33
		4.47	165	100	110	197	65	55	-32
		5.00	133	100	104	152	33	29	-19
	HYDRO HEATUP	2.50	289	350	341	256	-63	-54	33
		3.00	336	400	390	303	-64	-54	33
		3.50	367	400	396	347	-33	-29	20
	HYDRO COOLDOWN	2.50	211	150	159	244	63	54	-33
		3.00	164	100	110	197	64	54	-33
		3.50	133	100	104	153	33	29	-20
8⅝" SECTION	NORMAL HEATUP	4.25	482	525	517	460	-43	-35	22
		4.47	504	547	540	482	-43	-36	22
		5.00	533	547	544	522	-14	-11	11
	NORMAL COOLDOWN	4.25	165	122	130	187	43	35	-22
		4.47	143	100	107	165	43	36	-22
		5.00	114	100	103	125	14	11	-11
	HYDRO HEATUP	2.50	308	350	342	286	-42	-36	22
		3.00	357	400	393	336	-43	-36	21
		3.50	384	400	397	378	-16	-13	6
	HYDRO COOLDOWN	2.50	192	150	158	214	42	36	-22
		3.00	143	100	107	164	43	36	-21
		3.50	116	100	103	122	16	13	-6

COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION BOTTOM HEAD

NUMBER
SHEET B-105 OF
DATE BY
CHECK DATE BY

TABULATED RESULTS

		TIME (HR)	T_{MEAN} (°F)	T_{INSIDE} (°F)	$T_{OUTSIDE}$ (°F)	$T_M - T_{IN}$ (°F)	$T_M - T_{OUT}$ (°F)
NORMAL	HEATUP	4.25	507	525	499	-18	8
		4.47	529	547	521	-18	8
		5.0	545	547	544	- 2	1
NORMAL	COOLDOWN	4.25	140	122	148	18	- 8
		4.47	118	100	126	18	- 8
		5.0	102	100	103	2	- 1
HYDRO	HEATUP	2.5	332	350	324	-18	8
		3.0	382	400	374	-18	8
		3.5	398	400	397	- 2	1
HYDRO	COOLDOWN	2.5	168	150	176	18	- 8
		3.0	118	100	126	18	- 8
		3.5	102	100	103	2	- 1

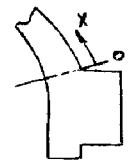
COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION VESSEL SUPPORTS

NUMBER
SHEET B-106 OF
DATE BY
CHECK DATE BY

DIFFERENCES BETWEEN THE MEAN TEMPERATURE AND THE TEMPERATURES OF THE INSIDE AND OUTSIDE SURFACES OF THE NOZZLE WALL AND PAD FOR THE CONDITIONS ANALYZED

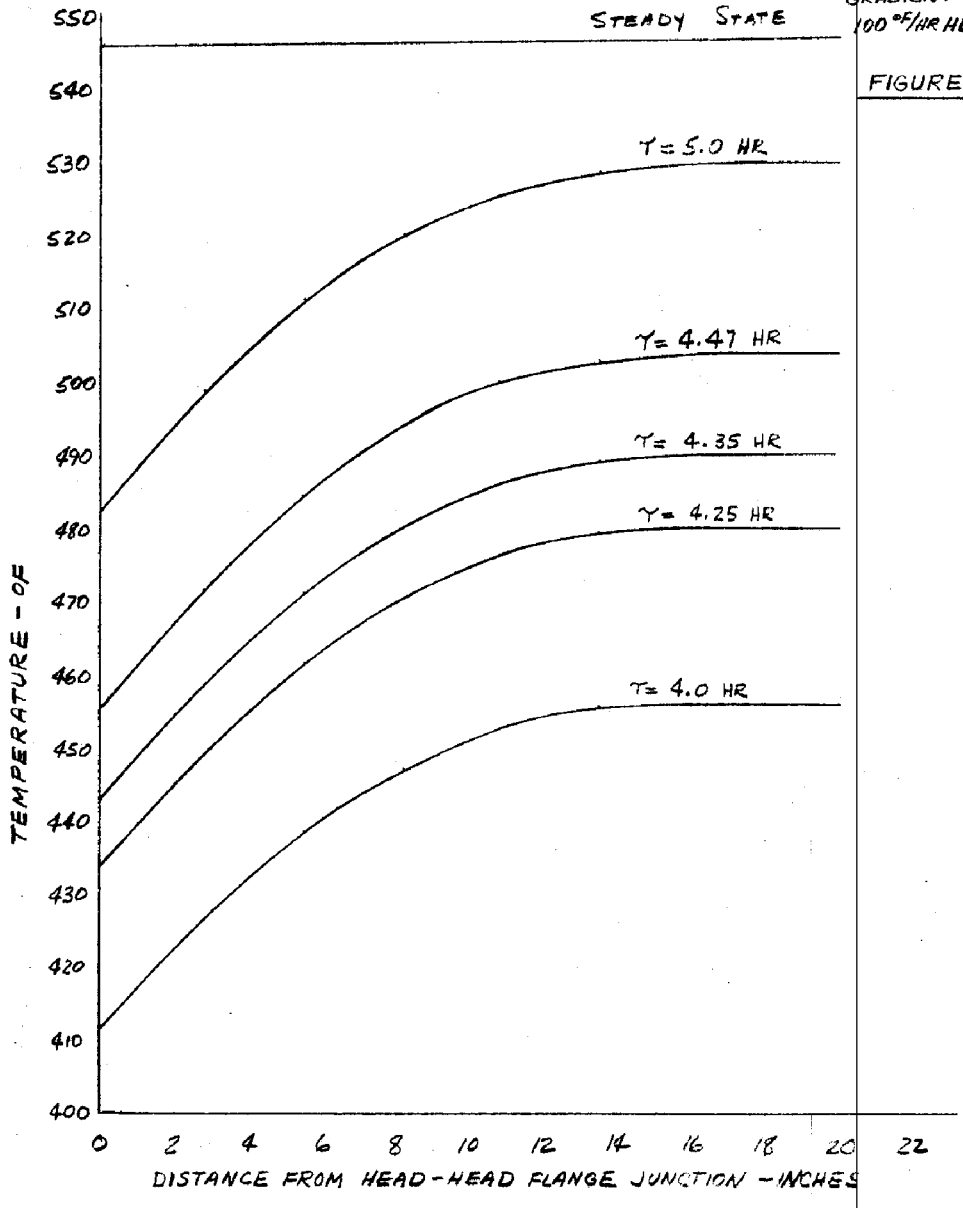
CONDITION	INLET NOZZLE			OUTLET NOZZLE		
	T_{MEAN} °F	$T_M - T_{IN}$ °F	$T_M - T_{OUT}$ °F	T_{MEAN} °F	$T_M - T_{IN}$ °F	$T_M - T_{OUT}$ °F
END OF HYDRO HEATUP	263	-137	113	263	-137	113
END OF PLANT HEATUP	354	-193	168	354	-193	168
HYDRO STEADY STATE	285	-115	115	285	-115	115
ZERO POWER STEADY STATE	375	-172	172	375	-172	172
100% POWER STEADY STATE	379	-176	176	415	-198	198
END OF HYDRO COOLDOWN	120	20	5	120	20	5
END OF PLANT COOLDOWN	120	20	5	120	20	5

B-107



GRADIENT IN HEAD
100 °F/HR HEATUP

FIGURE B-78



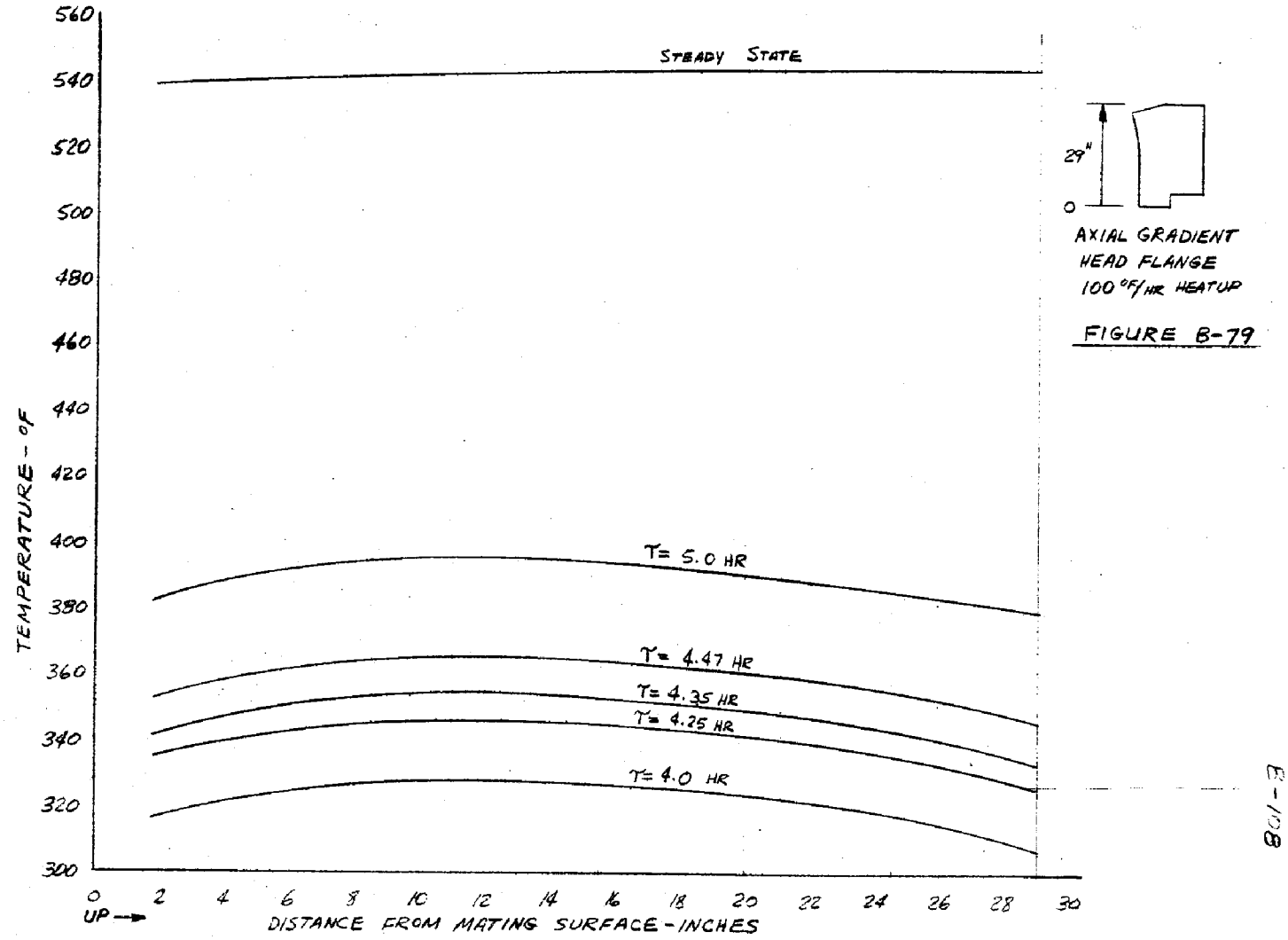
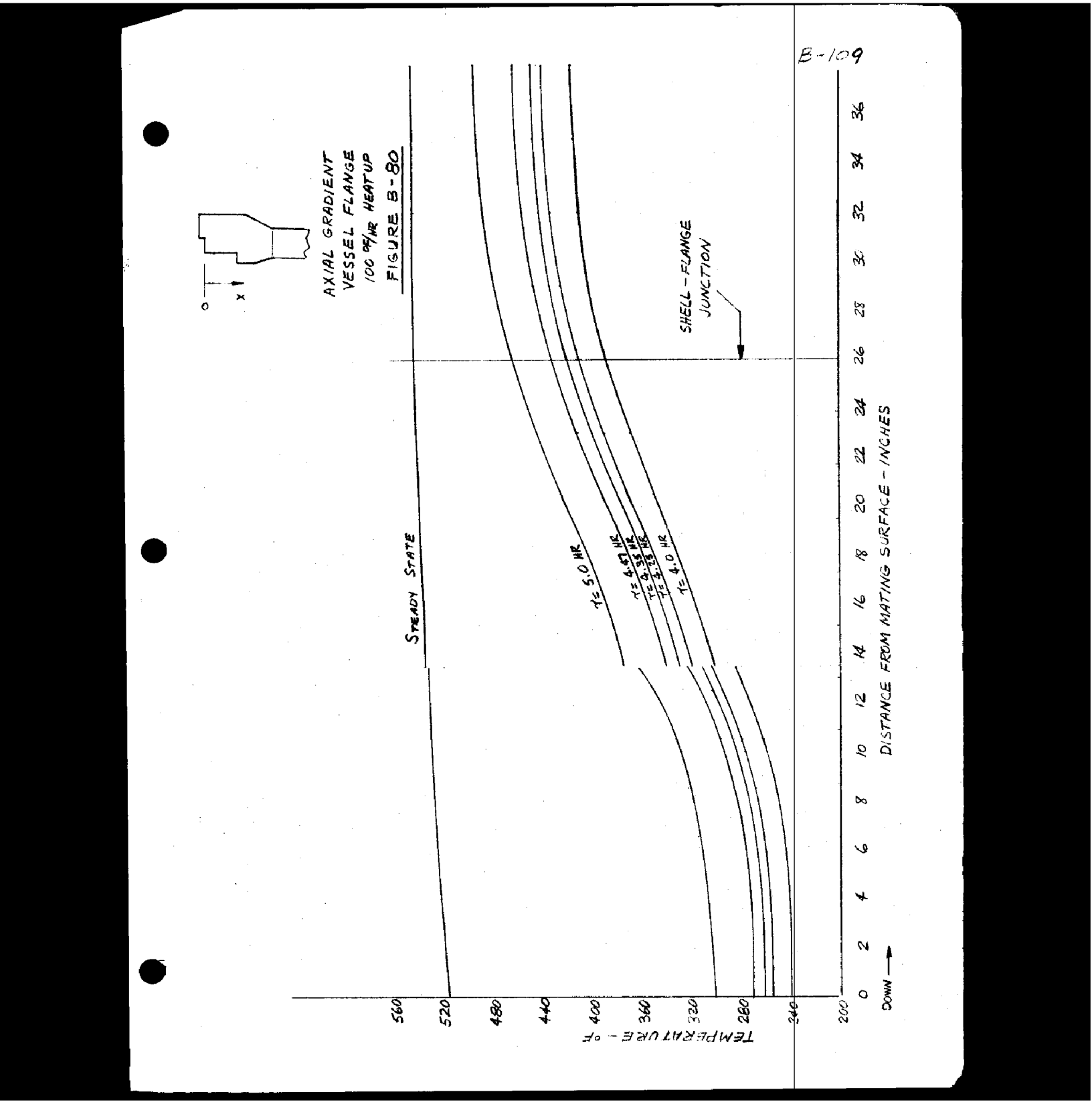
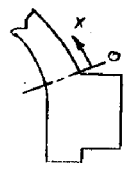


FIGURE B-79

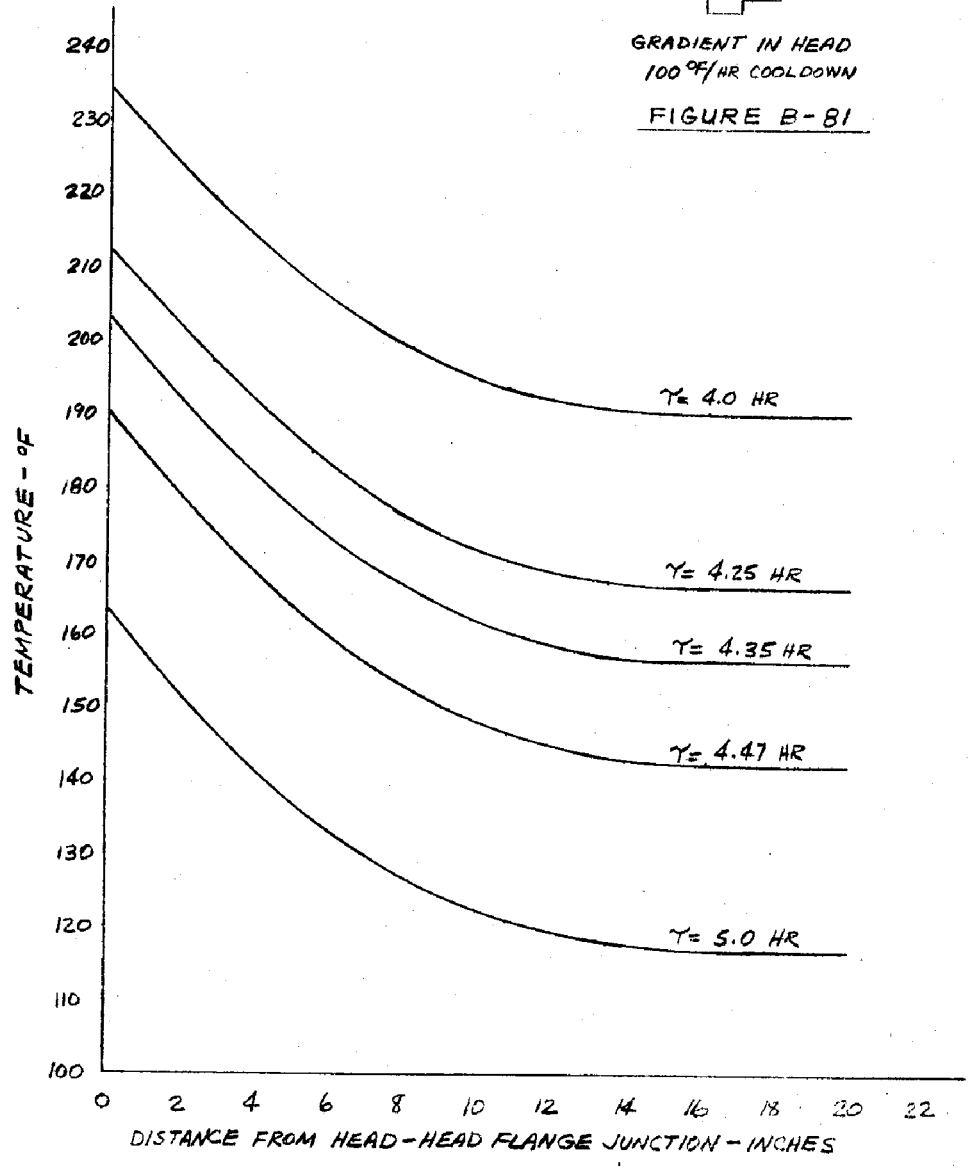
B-108


B-109
AXIAL GRADIENT
VESSEL FLANGE
100 °F/HR HEATUP
FIGURE B-80
STEADY STATE
τ= 5.0 HR
τ= 4.67 HR
τ= 4.33 HR
τ= 4.25 HR
τ= 4.0 HR
SHELL - FLANGE
JUNCTION
TEMPERATURE - °F
560
520
480
440
400
360
320
280
240
200
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
DOWN
DISTANCE FROM MATING SURFACE - INCHES

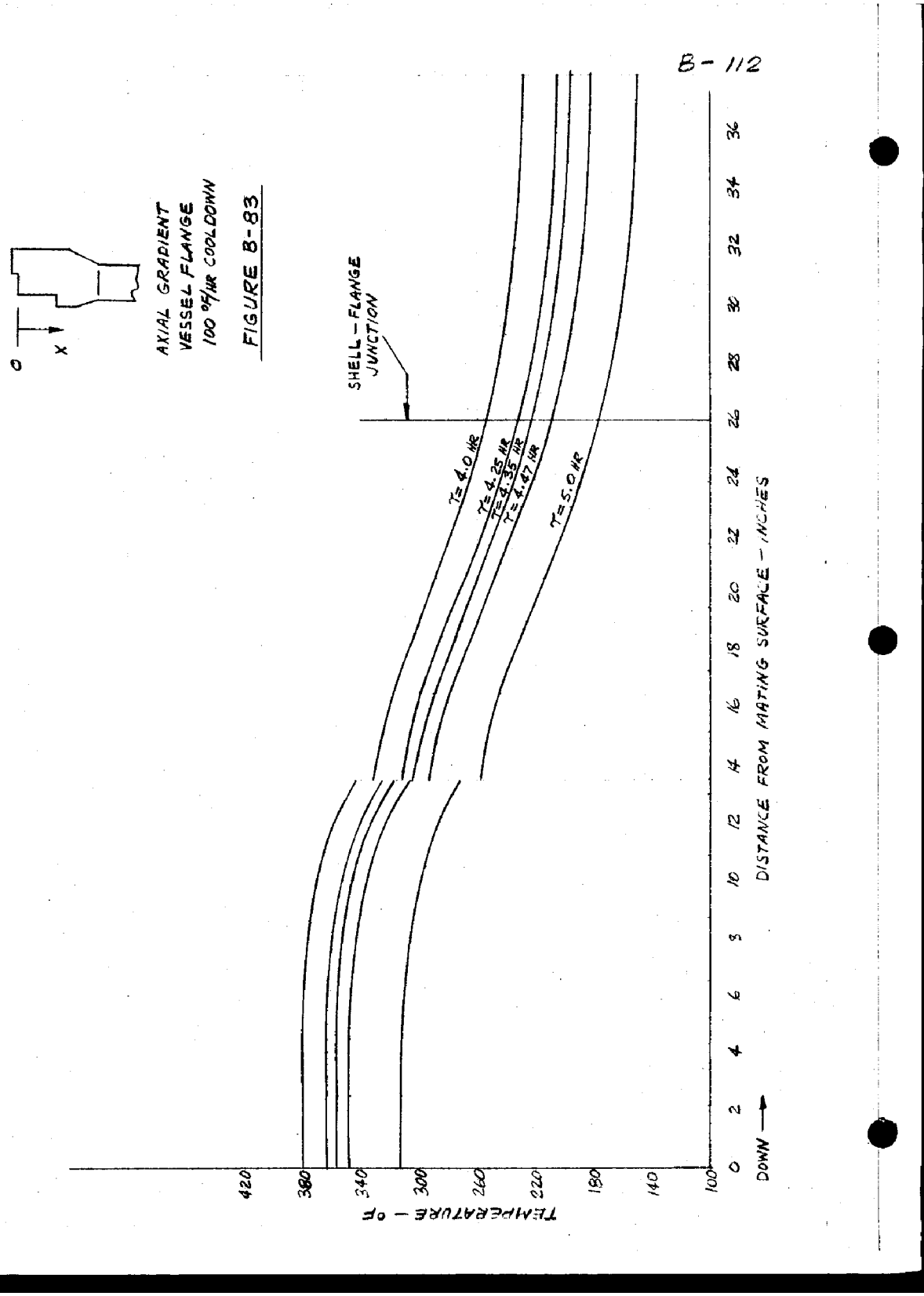


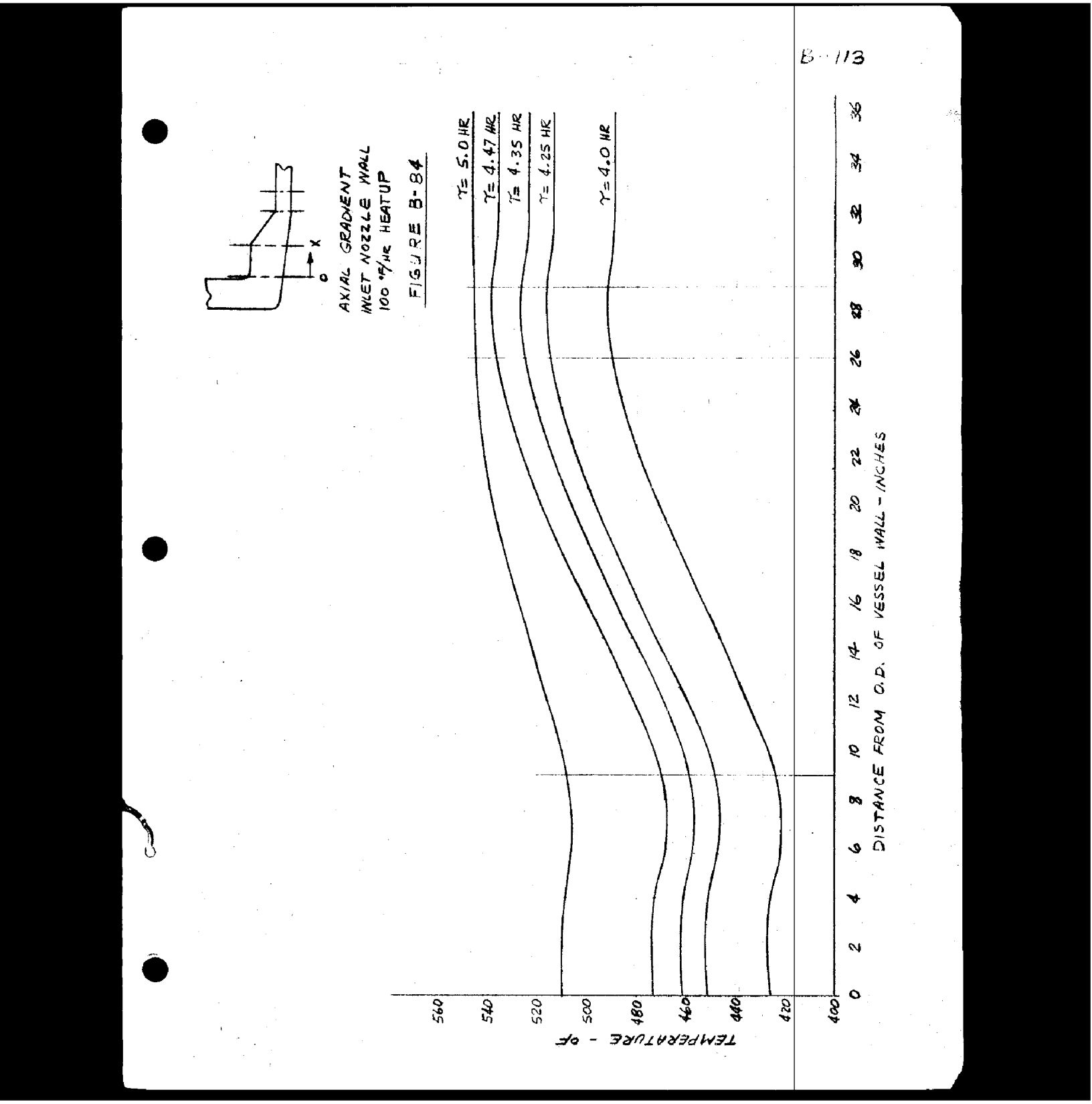
GRADIENT IN HEAD
100 °F/HR COOLDOWN

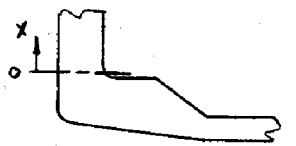
FIGURE B-81



B-111
AXIAL GRADIENT
HEAD FLANGE
100 °F/HR COOLDOWN
FIGURE B-82
29"
0
τ= 4.0 HR
τ= 4.25 HR
τ= 4.35 HR
τ= 4.47 HR
τ= 5.0 HR
TEMPERATURE - °F
360
340
320
300
280
260
240
220
200
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
UP →
DISTANCE FROM MATING SURFACE - INCHES

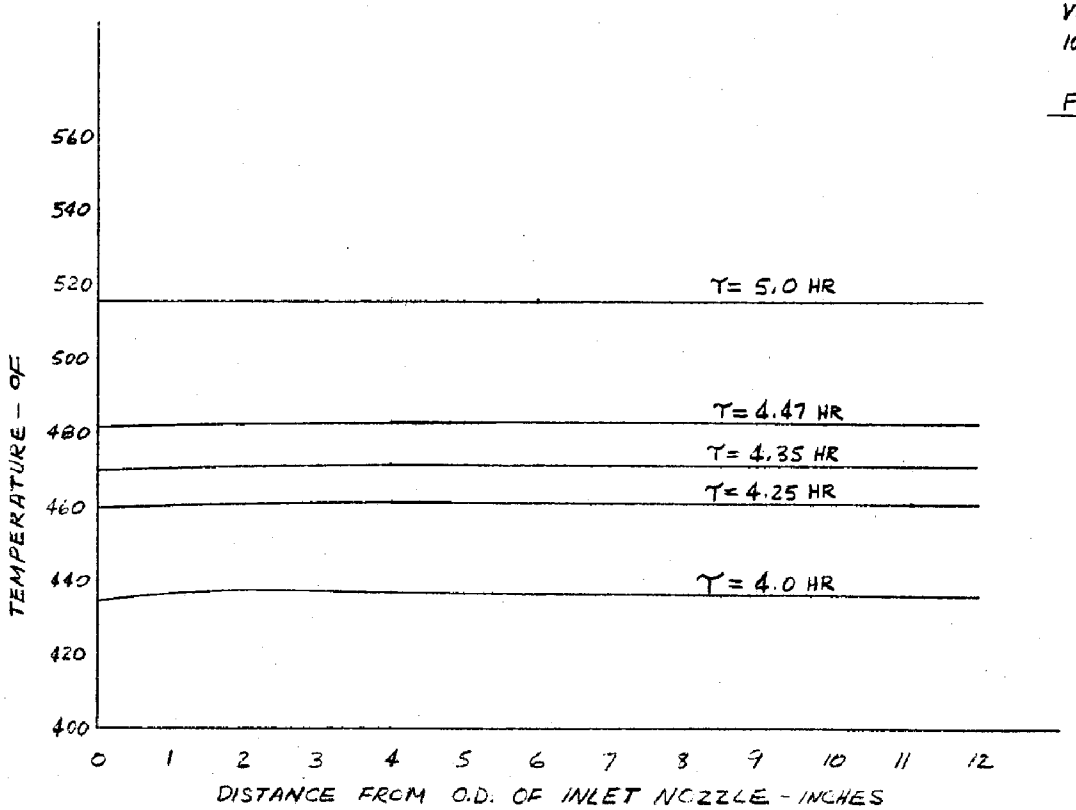

B-112
AXIAL GRADIENT
VESSEL FLANGE
100 °F/HR COOLDOWN
FIGURE B-83
O
X
SHELL-FLANGE JUNCTION
T=4.0 HR
T=4.25 HR
T=4.35 HR
T=4.67 HR
T=5.0 HR
TEMPERATURE - °F
420
380
340
300
260
220
180
140
100
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
DOWN
DISTANCE FROM MATING SURFACE - INCHES

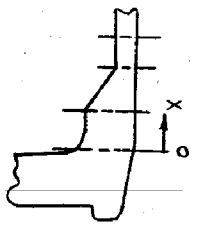

B-113
AXIAL GRADIENT
INLET NOZZLE WALL
100 °F/HR HEATUP
FIGURE B-84
X
0
τ= 5.0 HR
τ= 4.47 HR
τ= 4.35 HR
τ= 4.25 HR
τ= 4.0 HR
TEMPERATURE - °F
560
540
520
500
480
460
440
420
400
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36
DISTANCE FROM O.D. OF VESSEL WALL - INCHES



AXIAL GRADIENT
VESSEL WALL
100 °F/HR HEATUP

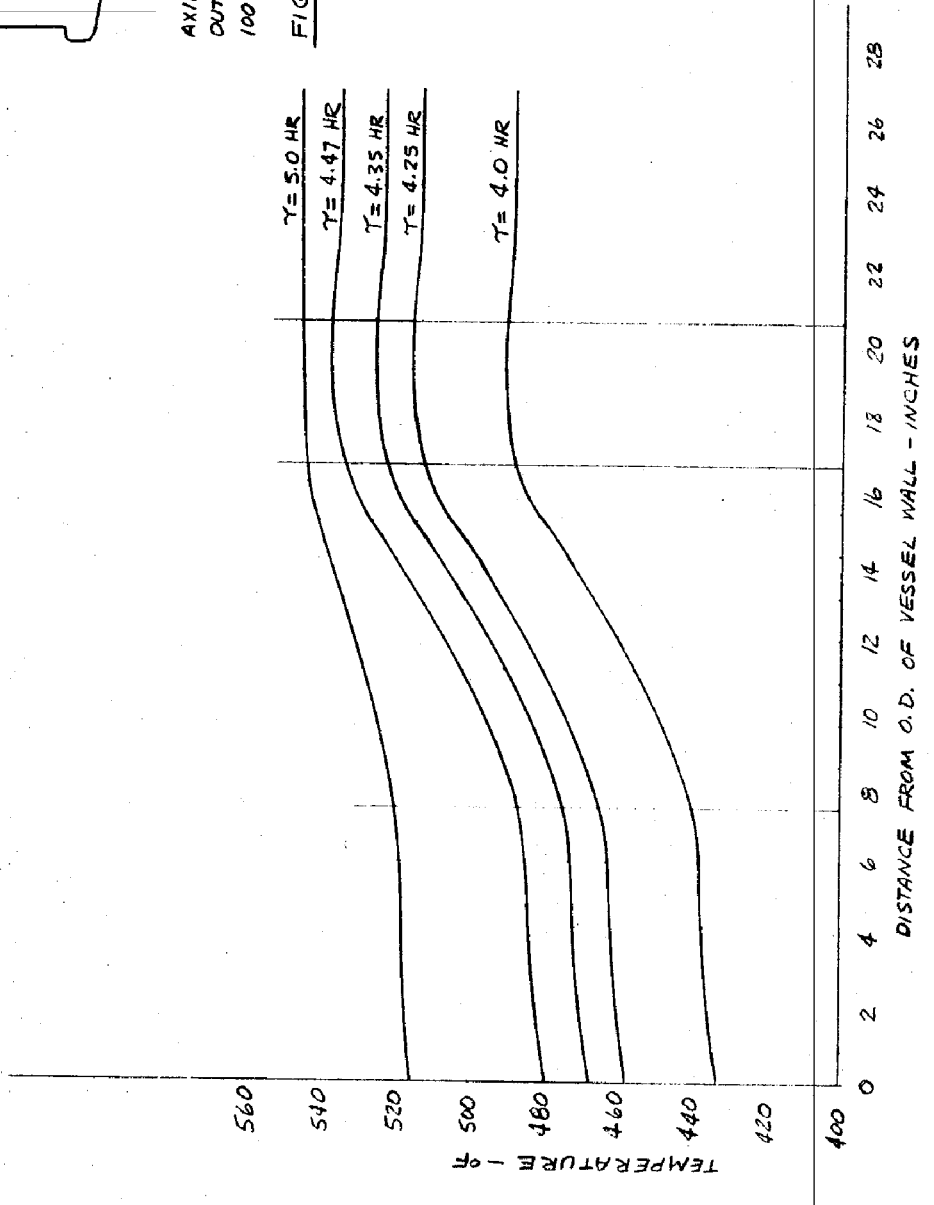
FIGURE B-85

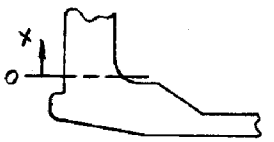




AXIAL GRADIENT
OUTLET NOZZLE WALL
100 °F/HR HEATUP

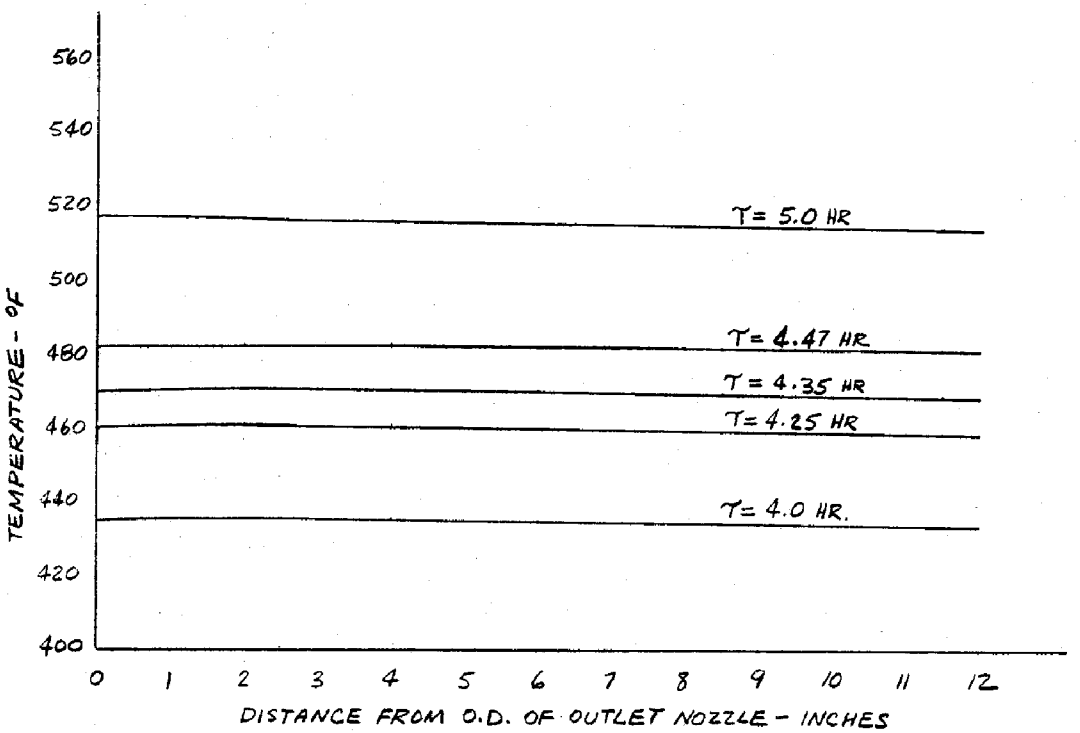
FIGURE B-86

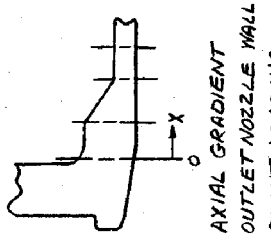




AXIAL GRADIENT
VESSEL WALL
100 °F/HR HEATUP

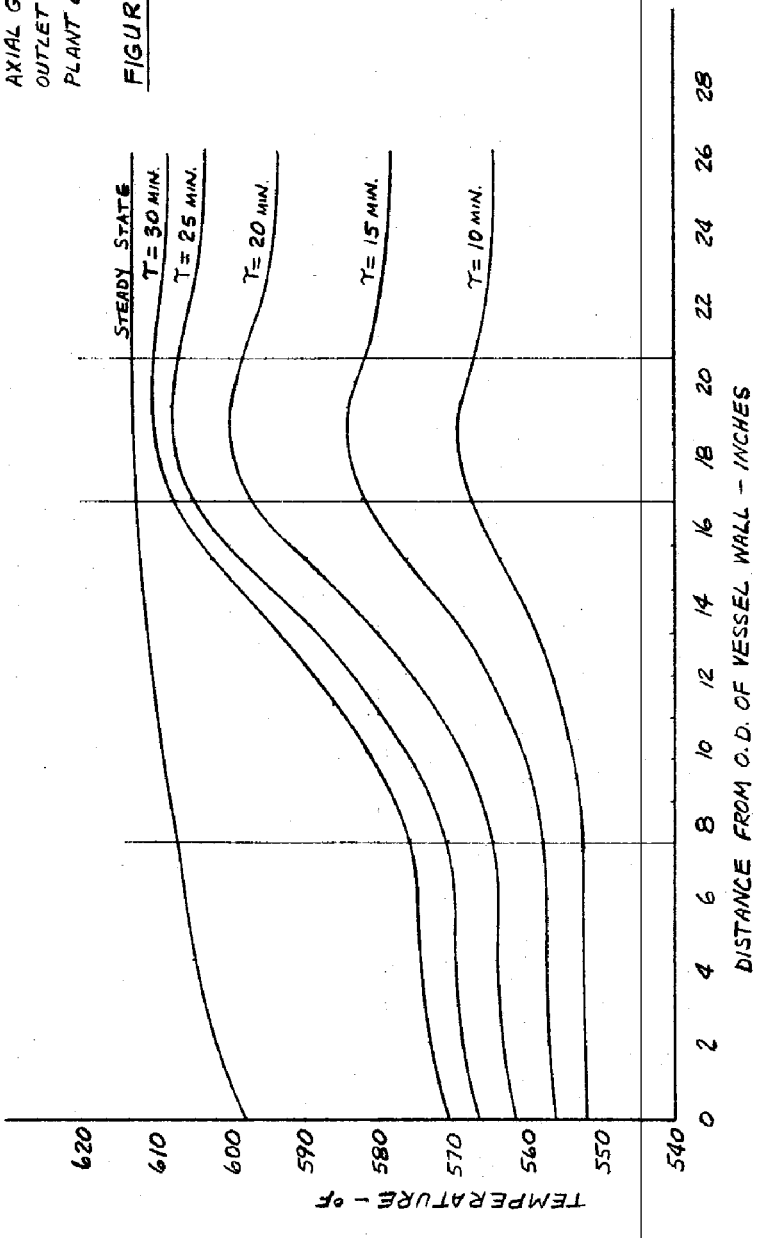
FIGURE B-87

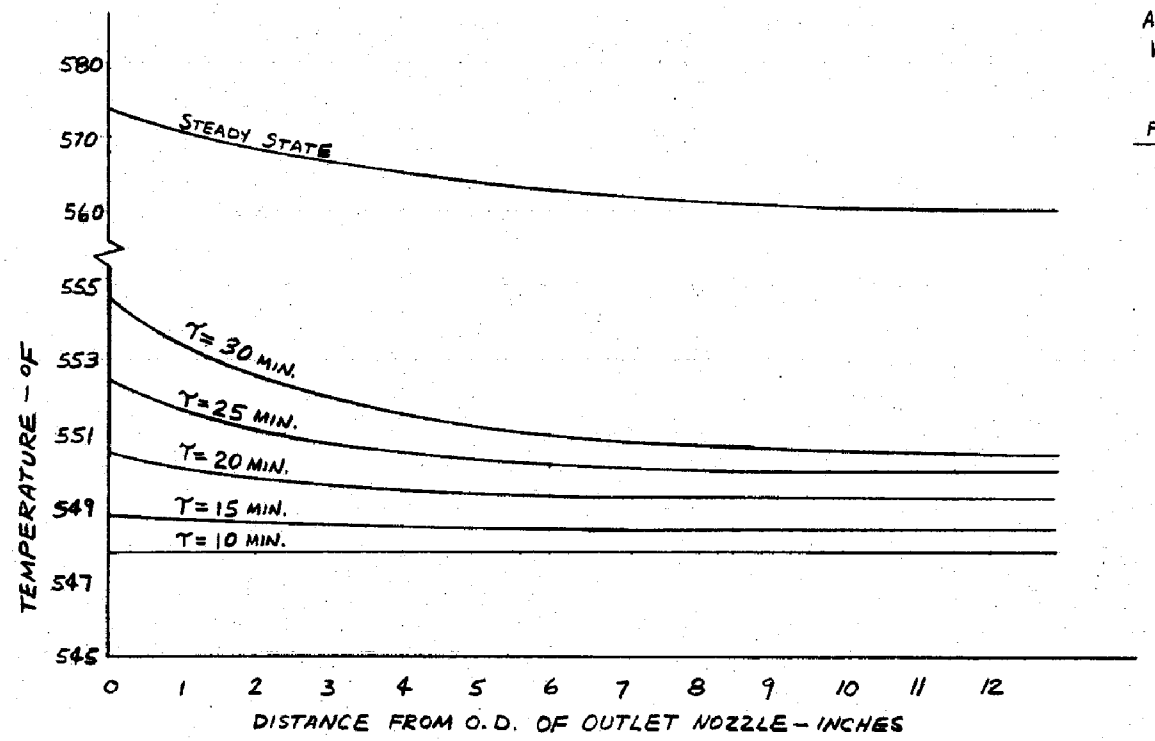




AXIAL GRADIENT
OUTLET NOZZLE WALL
PLANT LOADING

FIGURE B-88





AXIAL GRADIENT
VESSEL WALL
PLANT LOADING

FIGURE B-89

B-119
AXIAL GRADIENT
OUTLET NOZZLE WALL
PLANT UNLOADING
X
0
FIGURE B-90
τ= 10 MIN.
τ= 15 MIN.
τ= 20 MIN.
τ= 25 MIN.
τ= 30 MIN.
620
610
600
590
580
570
560
550
540
TEMPERATURE - °F
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28
DISTANCE FROM O.D. OF VESSEL WALL - INCHES

AXIAL GRADIENT
VESSEL WALL
PLANT UNLOADING

FIGURE B-91

COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION HEAD AND VESSEL FLANGES

NUMBER
SHEET B-121 OF
DATE BY
CHECK DATE BY

$T_{MEAN} - T_{SURFACE}$ FOR OPERATING TRANSIENTS

TRANSIENT	TIME	$T_{MEAN} - T_{SURFACE}$
PLANT LOADING	0 20 MIN.	0 -7.8 °F
PLANT UNLOADING	0 20 MIN.	0 7.8 °F
10% STEP INCREASE (INITIAL POWER 90%)	0 100 SEC. 225 SEC.	0 11.2 °F 1.7 °F
10% STEP DECREASE (INITIAL POWER 100%)	0 40 SEC. 100 SEC. 260 SEC.	0 -9.3 °F -13.3 °F -1.3 °F
STEP REDUCTION 100% TO 50% LOAD	0 2 MIN. 3.2 MIN. 10.4 MIN.	0 -12.0 °F -15.0 °F 0
REACTOR TRIP FROM FULL POWER	0 10 SEC. 65 SEC.	0 -9.5 °F 8.5 °F
LOSS OF FLOW, ONE PUMP	0 12 SEC.	0 33.3 °F
LOSS OF LOAD	0 10 SEC. 28 SEC. 160 SEC.	0 -30.2 °F -41.2 °F 4.8 °F
STEAM BREAK	0 33 SEC. 54 SEC.	0 117 °F 197 °F

COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO.
DESCRIPTION INLET NOZZLE

NUMBER
SHEET B-122 OF
DATE BY
CHECK DATE BY

$T_{MEAN} - T_{SURFACE}$ FOR OPERATING TRANSIENTS

TRANSIENT	TIME	$T_{MEAN} - T_{SURFACE}$
PLANT LOADING	0 20 MIN.	0 -7.8 °F
PLANT UNLOADING	0 20 MIN.	0 7.8 °F
10% STEP INCREASE (INITIAL POWER 90%)	0 100 SEC. 225 SEC.	0 11.2 °F 1.7 °F
10% STEP DECREASE (INITIAL POWER 100%)	0 40 SEC. 100 SEC. 260 SEC.	0 -9.3 °F -13.3 °F -1.3 °F
STEP REDUCTION 100% TO 50% LOAD	0 2 MIN. 3.2 MIN. 10.4 MIN.	0 -12.0 °F -15.0 °F 0
REACTOR TRIP FROM FULL POWER	0 10 SEC. 65 SEC.	0 -9.5 °F 8.5 °F
LOSS OF FLOW, ONE PUMP	0 12 SEC.	0 33.3 °F
LOSS OF LOAD	0 10 SEC. 28 SEC. 160 SEC.	0 -30.2 °F -41.2 °F 4.8 °F
STEAM BREAK	0 33 SEC. 54 SEC.	0 117 °F 197 °F

COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO. 17765
DESCRIPTION OUTLET NOZZLE

NUMBER
SHEET B-123 OF
DATE BY
CHECK DATE BY

$T_{MEAN} - T_{SURFACE}$ FOR OPERATING TRANSIENTS

		NOZZLE WALL AT BI-METTALIC WELD		THIN SECTION OF NOZZLE WHERE TAPER ENDS		NOZZLE WALL AT BEGINNING OF TAPERED SECTION		NOZZLE WALL AT VESSEL-NOZZLE JUNCTION		VESSEL WALL AT VESSEL-NOZZLE JUNCTION	
TRANSIENT	TIME	T_M (°F)	$T_M - T_S$ (°F)	T_M (°F)	$T_M - T_S$ (°F)	T_M (°F)	$T_M - T_S$ (°F)	T_M (°F)	$T_M - T_S$ (°F)	T_M (°F)	$T_M - T_S$ (°F)
10% STEP INCREASE INITIAL POWER 90%	0	584	0	584	0	584	0	584	0	584	0
	100 SEC.	584	11.2	584	11.2	584	11.2	584	11.2	584	11.2
	225 SEC.	584	1.7	584	1.7	584	1.7	584	1.7	584	1.7
10% STEP DECREASE INITIAL POWER 100%	0	584	0	584	0	584	0	584	0	584	0
	40 SEC.	584	-9.3	584	-9.3	584	-9.3	584	-9.3	584	-9.3
	100 SEC.	584	-13.3	584	-13.3	584	-13.3	584	-13.3	584	-13.3
	260 SEC.	584	-1.3	584	-1.3	584	-1.3	584	-1.3	584	-1.3
STEP REDUCTION FROM 100%-50% LOAD	0	613	0	613	0	607	-6	598	-15	574	19
	2 MIN.	616	-9	616	-9	608	-17	599	-26	575	6
	3.5 MIN.	620	-8	620	-8	609	-19	599	-29	575	5
	6 MIN.	620	5	620	5	609	-6	600	-15	576	12
	11 MIN.	604	14	604	14	606	16	597	7	575	21
	15.5 MIN.	591	11	591	11	602	22	594	14	574	22
	17 MIN.	588	8	588	8	601	21	593	13	574	22
REACTOR TRIP FROM FULL POWER	0	613	0	613	0	607	-6	598	-15	574	19
	5 SEC.	613	10	612	9	607	4	598	-5	574	11
	10 SEC.	612	20	612	20	607	15	598	6	574	10
	15 SEC.	611	27	611	27	607	23	598	14	574	11
	40 SEC.	605	46	604	45	605	46	596	37	574	20
	90 SEC.	593	46	592	45	603	56	594	47	573	28

COMBUSTION ENGINEERING, INC.
ENGINEERING DEPARTMENT, CHATTANOOGA, TENN.
CHARGE NO. 17765
DESCRIPTION OUTLET NOZZLE

NUMBER
SHEET B-124 OF
DATE BY
CHECK DATE BY

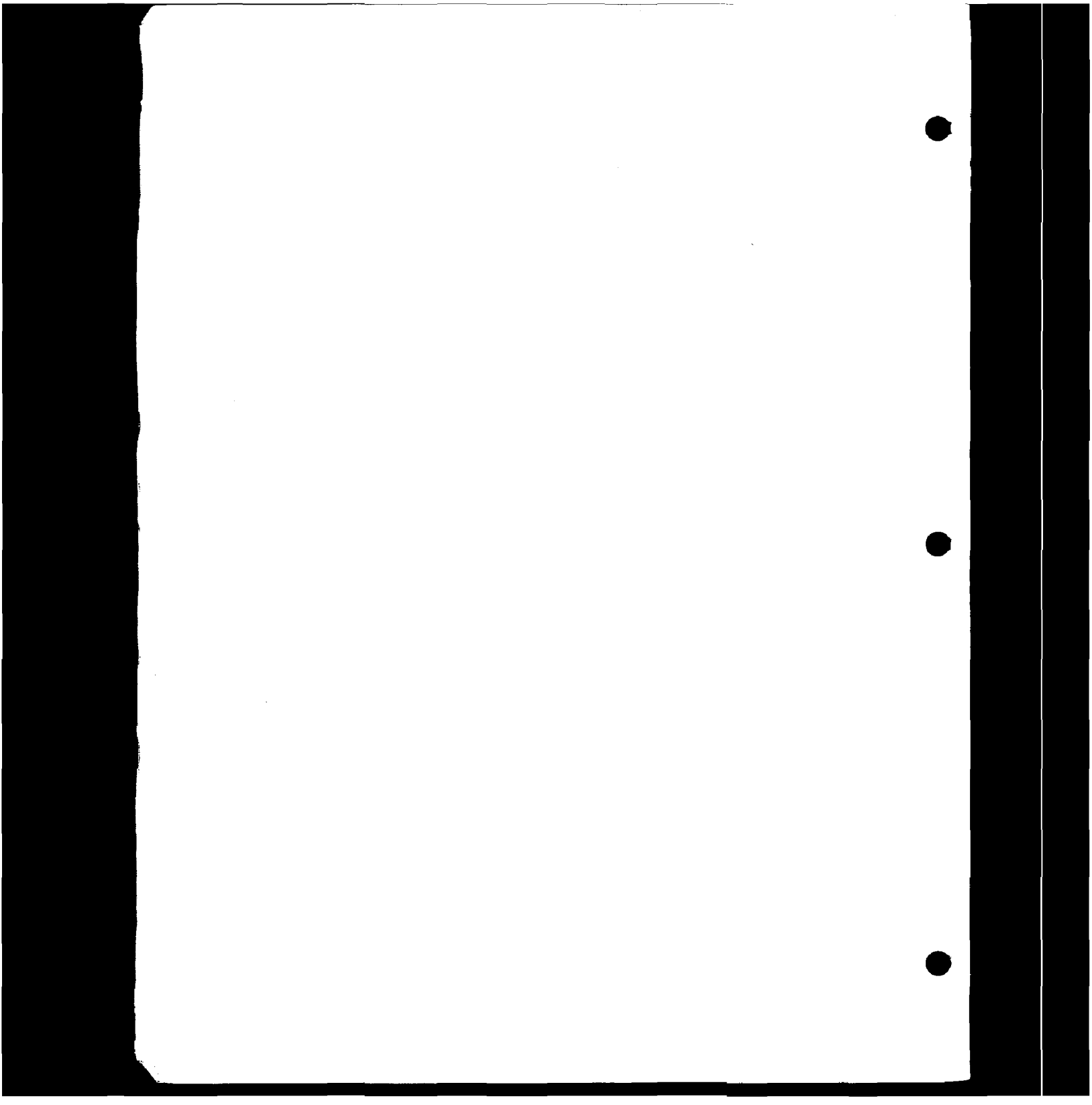
$T_{MEAN} - T_{SURFACE}$ FOR OPERATING TRANSIENTS

		Nozzle Wall at Bi-Metallic Weld		Thin Section of Nozzle Where Taper Ends		Nozzle Wall at Beginning of Tapered Section		Nozzle Wall at Vessel-Nozzle Junction		Vessel Wall at Vessel-Nozzle Junction	
Transient	Time (sec.)	T_M (°F)	$T_M - T_S$ (°F)	T_M (°F)	$T_M - T_S$ (°F)	T_M (°F)	$T_M - T_S$ (°F)	T_M (°F)	$T_M - T_S$ (°F)	T_M (°F)	$T_M - T_S$ (°F)
	0	613	0	613	0	607	-6	598	-15	574	19
	12	613	0	613	0	607	-6	598	-15	573	52
	13	613	33	612	32	607	27	598	18	573	50
Loss of Flow	14	613	48	612	47	607	42	598	33	573	45
One Pump	16	611	71	611	71	607	67	598	58	573	31
	18.5	609	89	609	89	606	86	597	77	573	21
	22	607	81	607	81	606	80	597	71	573	15
	30	603	75	602	74	605	77	596	68	573	15
	0	613	0	613	0	607	-6	598	-15	574	19
	7	614	-37	614	-37	607	-44	598	-53	574	-4
	12	616	-37	615	-38	608	-45	598	-55	574	-11
	20	618	-32	617	-33	608	-42	599	-51	574	-19
Loss of Load	26	618	-17	618	-17	608	-27	599	-36	575	-21
	34	618	3	618	3	608	-7	599	-16	575	-19
	60	613	29	613	29	607	23	598	14	576	3
	115	601	44	600	43	605	48	596	39	575	25
	144	595	45	594	44	603	53	595	45	574	24
	0	547	0	547	0	547	0	547	0	547	0
Steam Break	33	547	117	547	117	547	117	547	117	547	117
	54	547	197	547	197	547	197	547	197	547	197

APPENDIX C

COMBUSTION ENGINEERING DRAWINGS

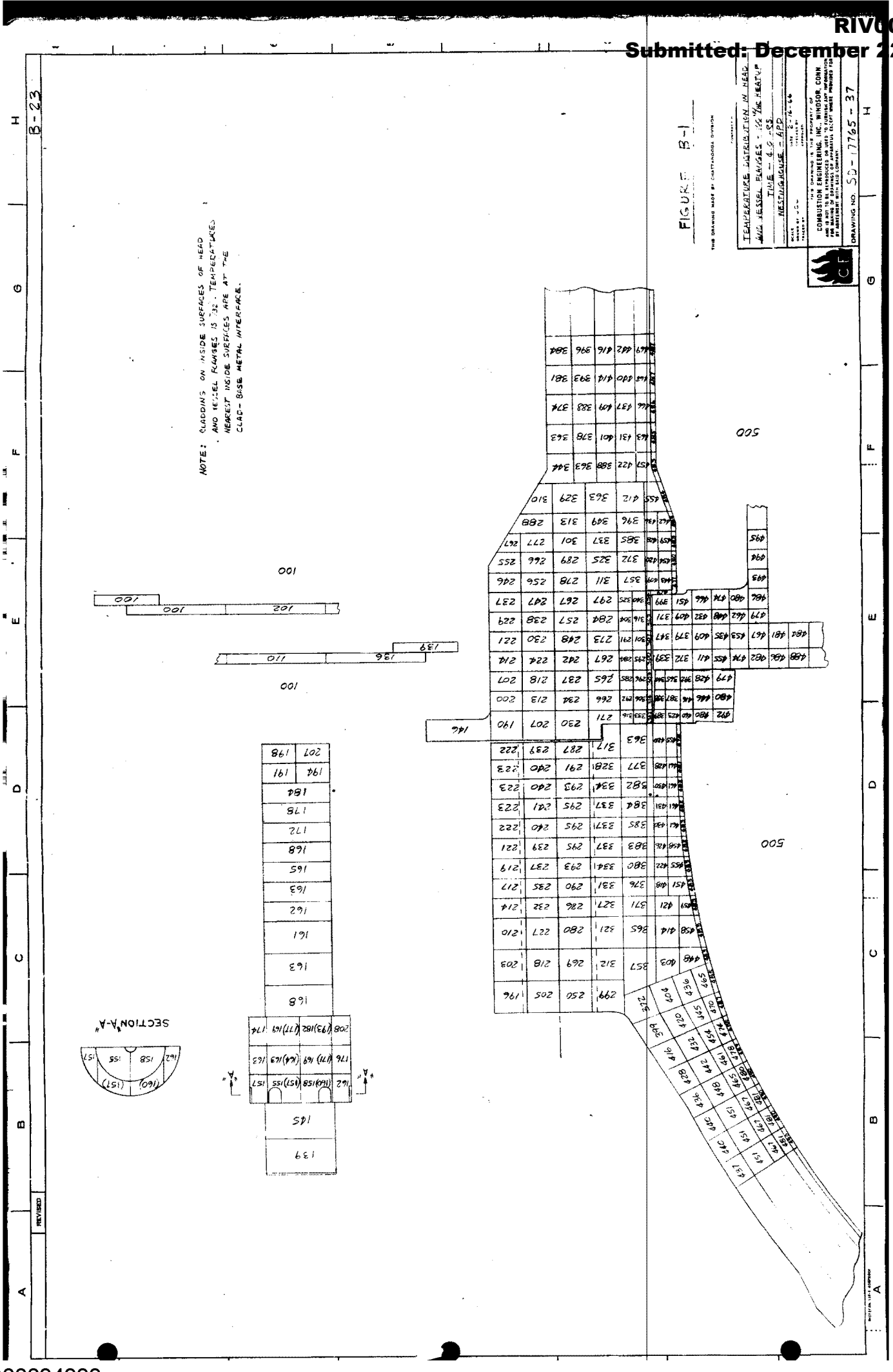
1.	Control Rod Mechanism Housing - Details	E-232-051
2.	Control Rod Penetrations - Details	E-232-052
3.	Closure Head Forming and Welding	E-232-046
4.	Closure Head Machining	E-232-047
5.	Stud, Nut and Washer Details	E-232-049
6.	Pressure Vessel Forming and Welding	E-232-042
7.	Pressure Vessel Final Machining	E-232-044
8.	Nozzle Details	E-232-045
9.	Miscellaneous Attachments	E-232-050
10.	Miscellaneous Details	E-232-055
11.	Bottom Head Forming and Welding	E-232-043
12.	Instrumentation Penetrations Assembly and Details - Bottom Head	E-232-056

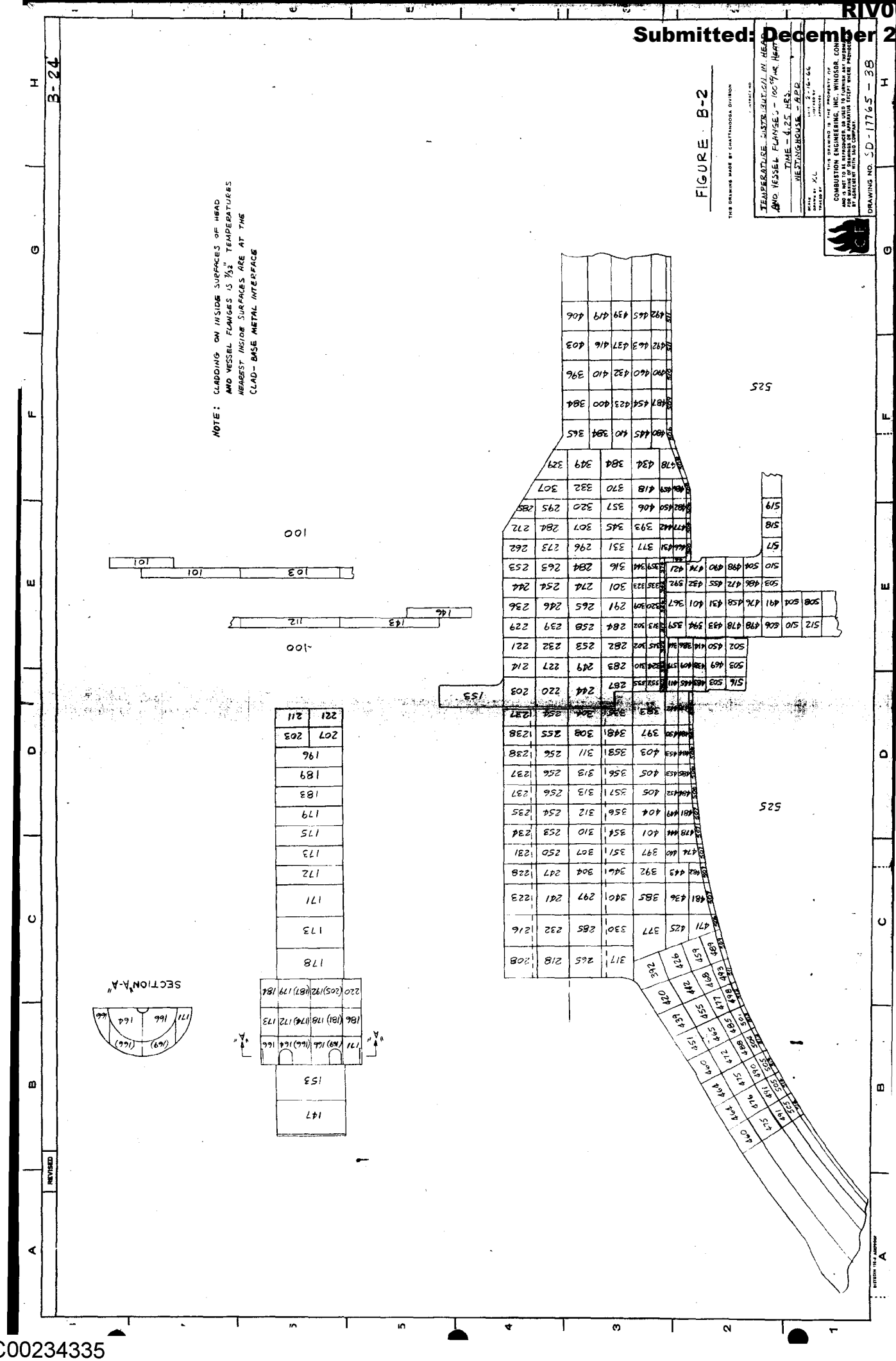


INDICATOR SHEET

(QTY)	*SIZE*	SHEET DESCRIPTIONS
(___)	*8.5x14*	
(12)	*11x17*	
(___)	*Oversized*	

[redacted]





RIV000052D
Submitted: December 22, 2011

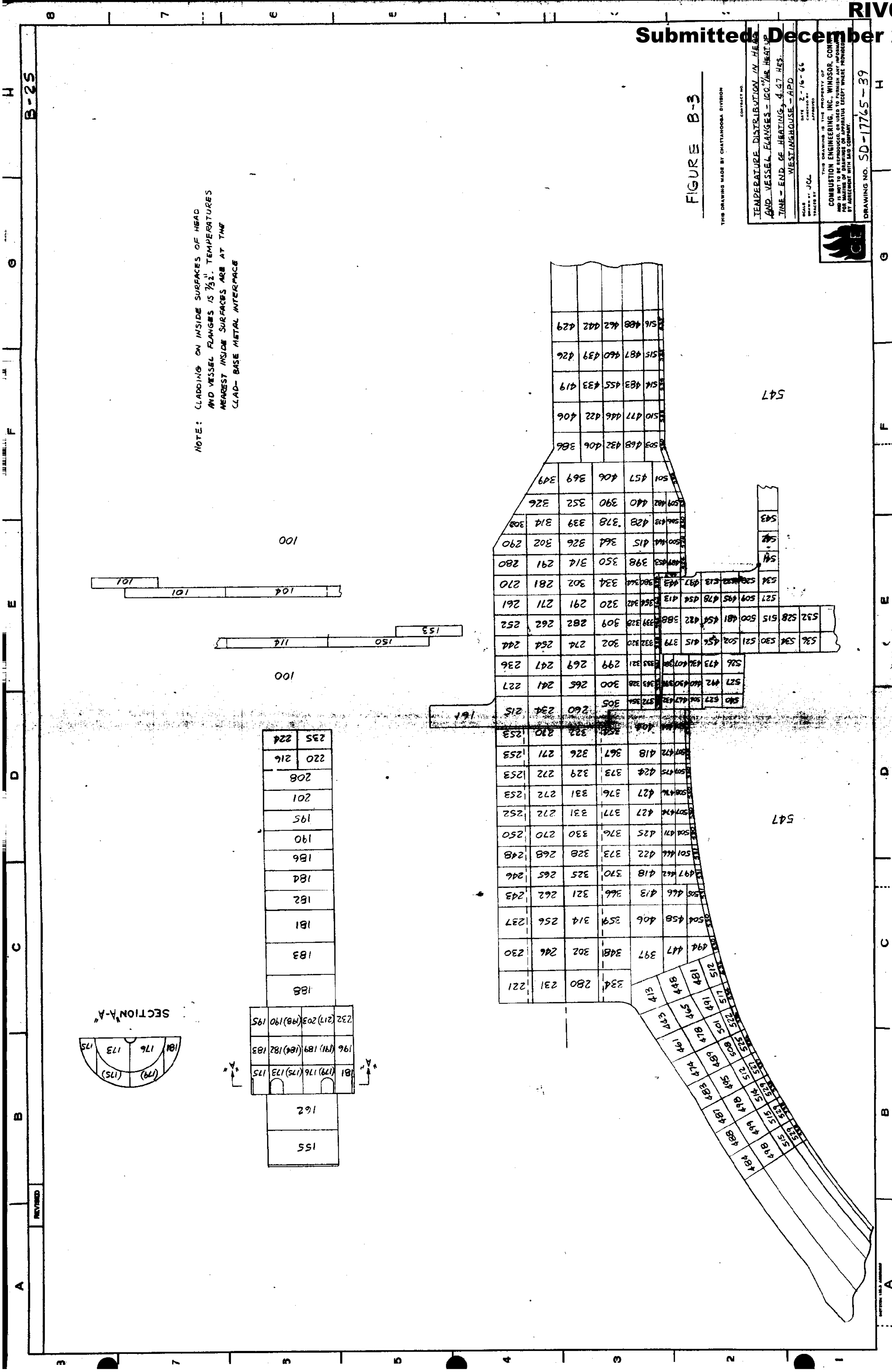
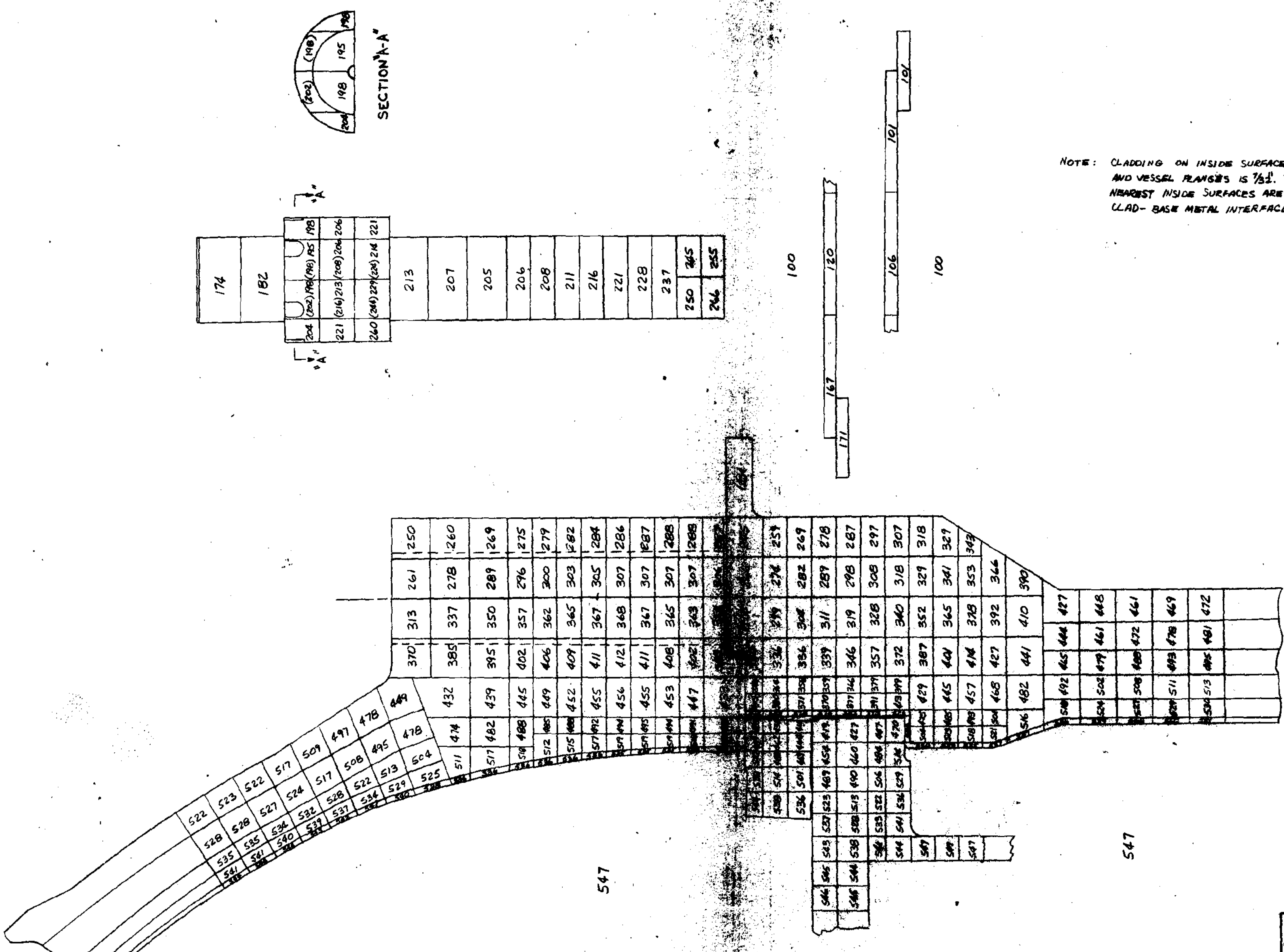

NOTE: CLADDING ON INSIDE SURFACES OF HEAD AND VESSEL FLANGES IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE
SECTION "A-A"
TEMPERATURE DISTRIBUTION IN HEAD AND VESSEL FLANGES - 100°F/HR HEAT UP TIME - END OF HEATING, 4.47 HRS.
WESTINGHOUSE - APD
DATE 2-16-66
THIS DRAWING MADE BY CHATTANOOGA DIVISION
COMBUSTION ENGINEERING, INC., WINDSOR, CONN.
DRAWING NO. SD-17765-39
B-25

FIGURE B-3

IPEC00234337

B-26



NOTE: CLADDING ON INSIDE SURFACES OF HEAD AND VESSEL FLANGES IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD- BASE METAL INTERFACE

FIGURE B-4

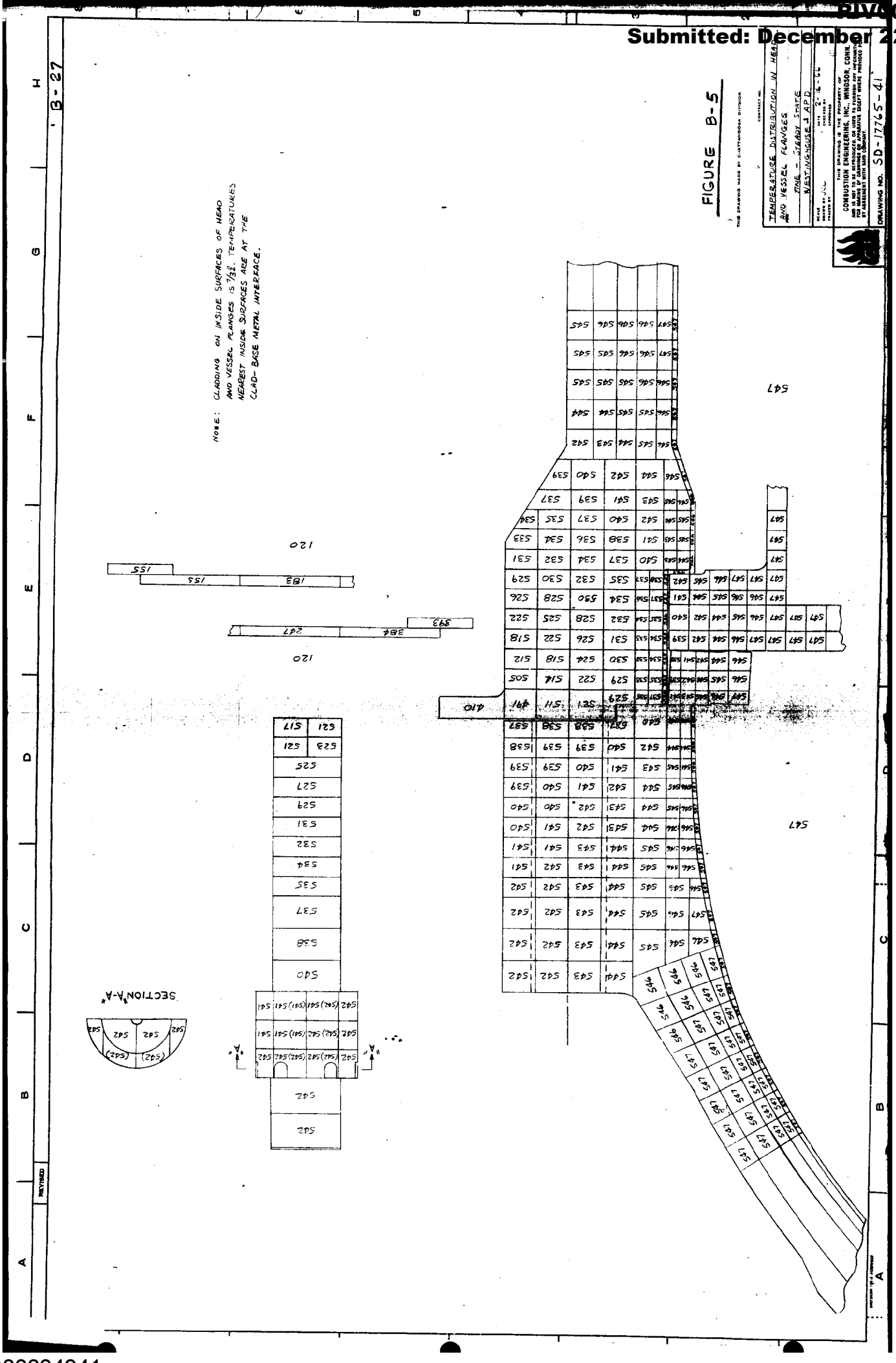
THIS DRAWING MADE BY CHATTANOOGA DIVISION

TEMPERATURE DISTRIBUTION IN HEAD AND VESSEL FLANGES – 100°F/HR HEATUP
TIME – 5.0 HRS.
WESTINGHOUSE – APD

DRAWN BY JCL
DATE 2-16-66

THIS DRAWING IS THE PROPERTY OF COMBUSTION ENGINEERING, INC., WINDSOR, CONN. AND IS NOT TO BE REPRODUCED, OR USED TO FURNISH ANY INFORMATION FOR MAKING OF DRAWINGS OR APPARATUS EXCEPT WHERE PROVIDED FOR BY AGREEMENT WITH SAID COMPANY.

DRAWING NO. SD-17765-40


B-27
FIGURE B-5
TEMPERATURE DISTRIBUTION IN HEAD AND VESSEL FLANGES
ZONE - STEADY STATE
WESTINGHOUSE 4 APD
COMBUSTION ENGINEERING, INC., WINDSOR, CONN.
DRAWING NO. SD-17765-41
NOTE: CLADDING ON INSIDE SURFACES OF HEAD AND VESSEL FLANGES IS 1/32. TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.
SECTION A-A
REVISED

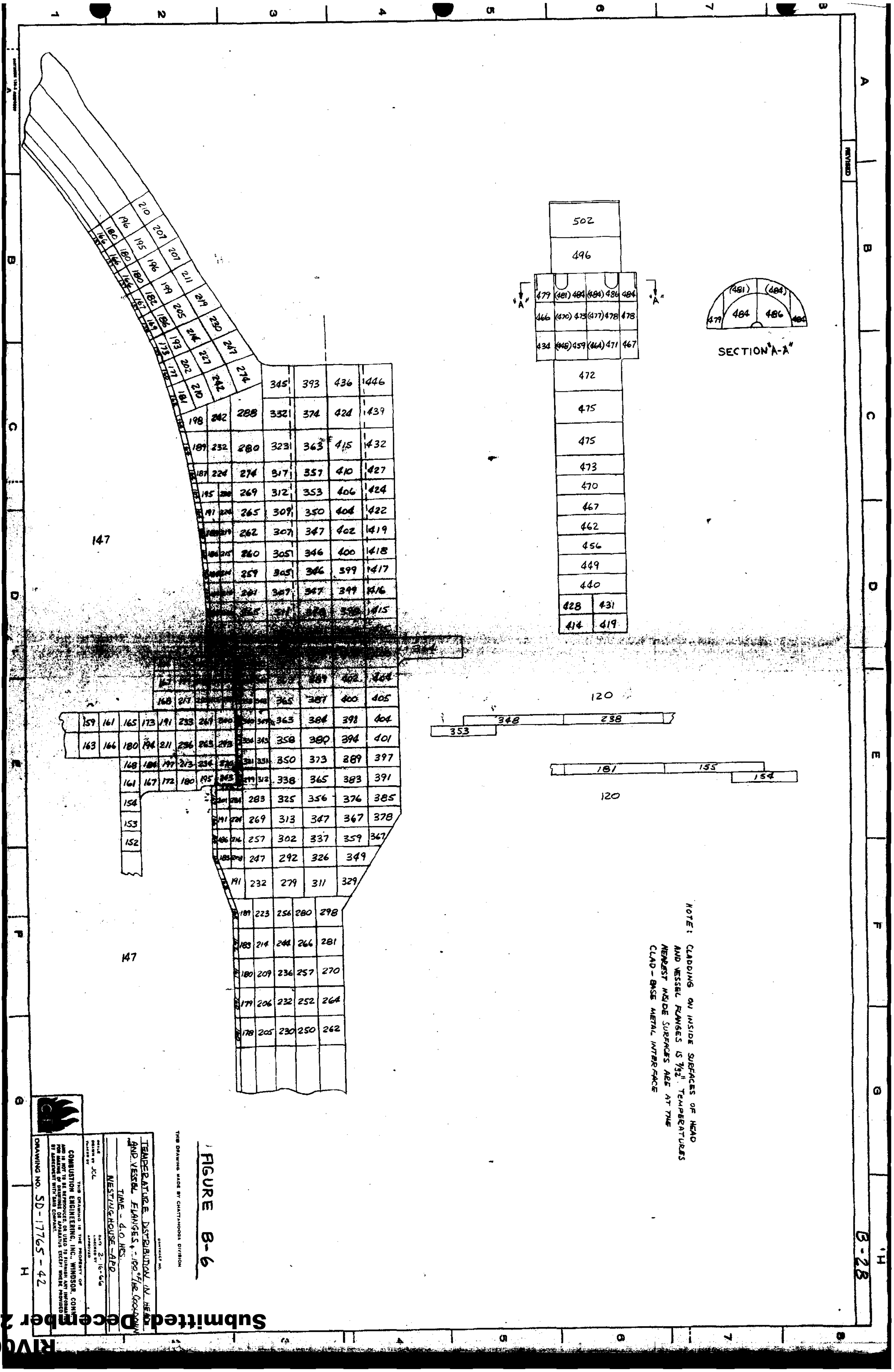


FIGURE B-6

THIS DRAWING MADE BY CHATTANOOGA DIVISION

TEMPERATURE DISTRIBUTION IN HEAD AND VESSEL FLANGES, -100°F/HR COOLDOWN
TIME - 4.0 HRS.
WESTINGHOUSE-APD

DRAWN BY JCL
DATE 2-16-66

THIS DRAWING IS THE PROPERTY OF COMBUSTION ENGINEERING, INC., WINDSOR, CONN. AND IS NOT TO BE REPRODUCED, OR USED TO FURNISH ANY INFORMATION FOR MAKING OF DRAWINGS OR APPARATUS EXCEPT WHERE PROVIDED BY AGREEMENT WITH SAID COMPANY.

DRAWING NO. SD-17765-42

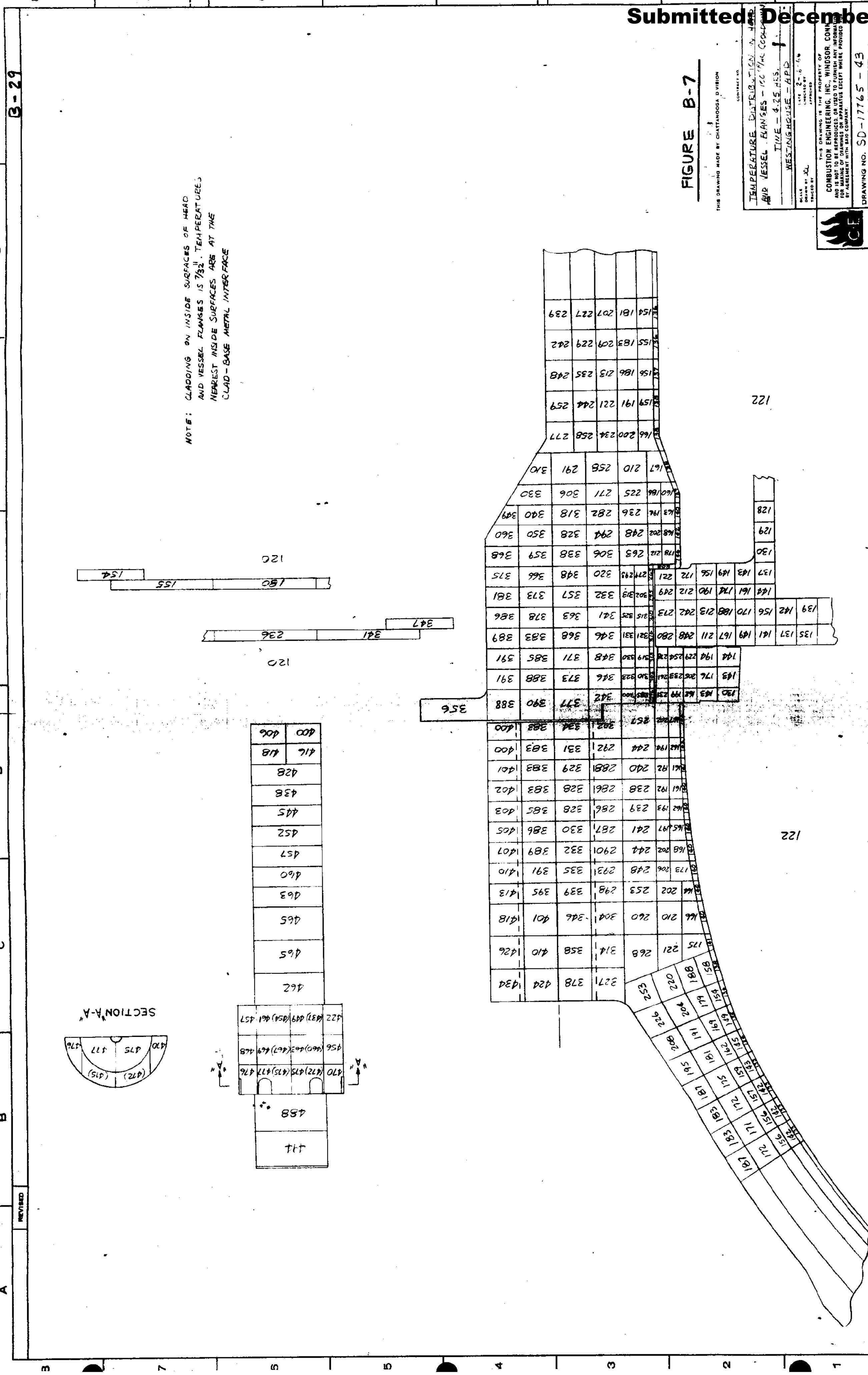


FIGURE B-7
TEMPERATURE DISTRIBUTION IN HEAD AND VESSEL FLANGES - 120 °/HR COOLDOWN
TIME - 4.25 HRS.
WESTINGHOUSE - APD
DRAWING NO. SD-17765-43
COMBUSTION ENGINEERING, INC. WINDSOR CONN.
THIS DRAWING MADE BY CHATTANOOGA DIVISION
NOTE: CLADDING ON INSIDE SURFACES OF HEAD AND VESSEL FLANGES IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE
SECTION "A-A"
B-29

REVISED

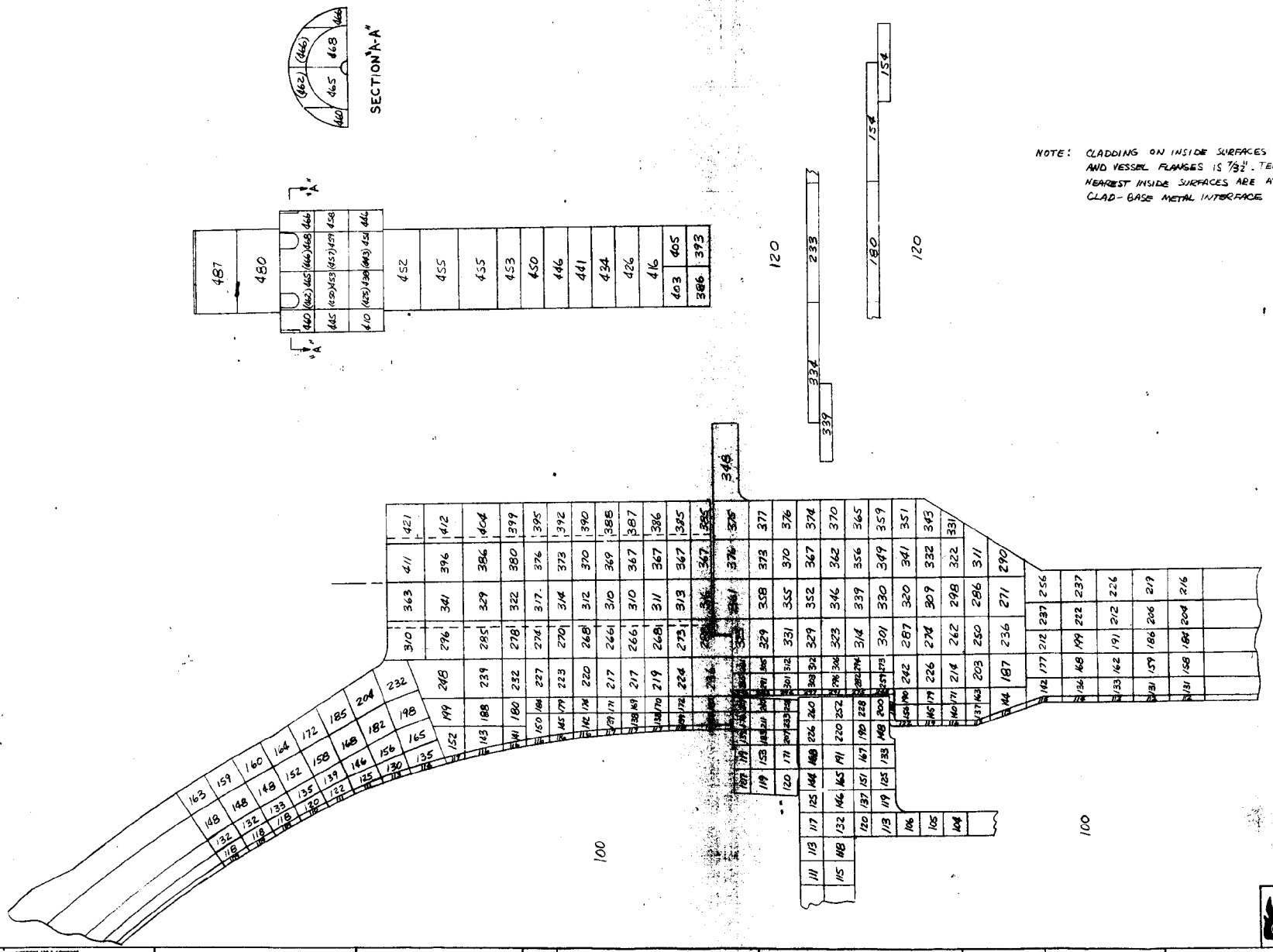


FIGURE B-8

THIS DRAWING MADE BY CHATTANOOGA DIVISION

CONTRACT NO

TEMPERATURE DISTRIBUTION IN HEAD AND VESSEL FLANGES - 100°F/HR COOLDOWN

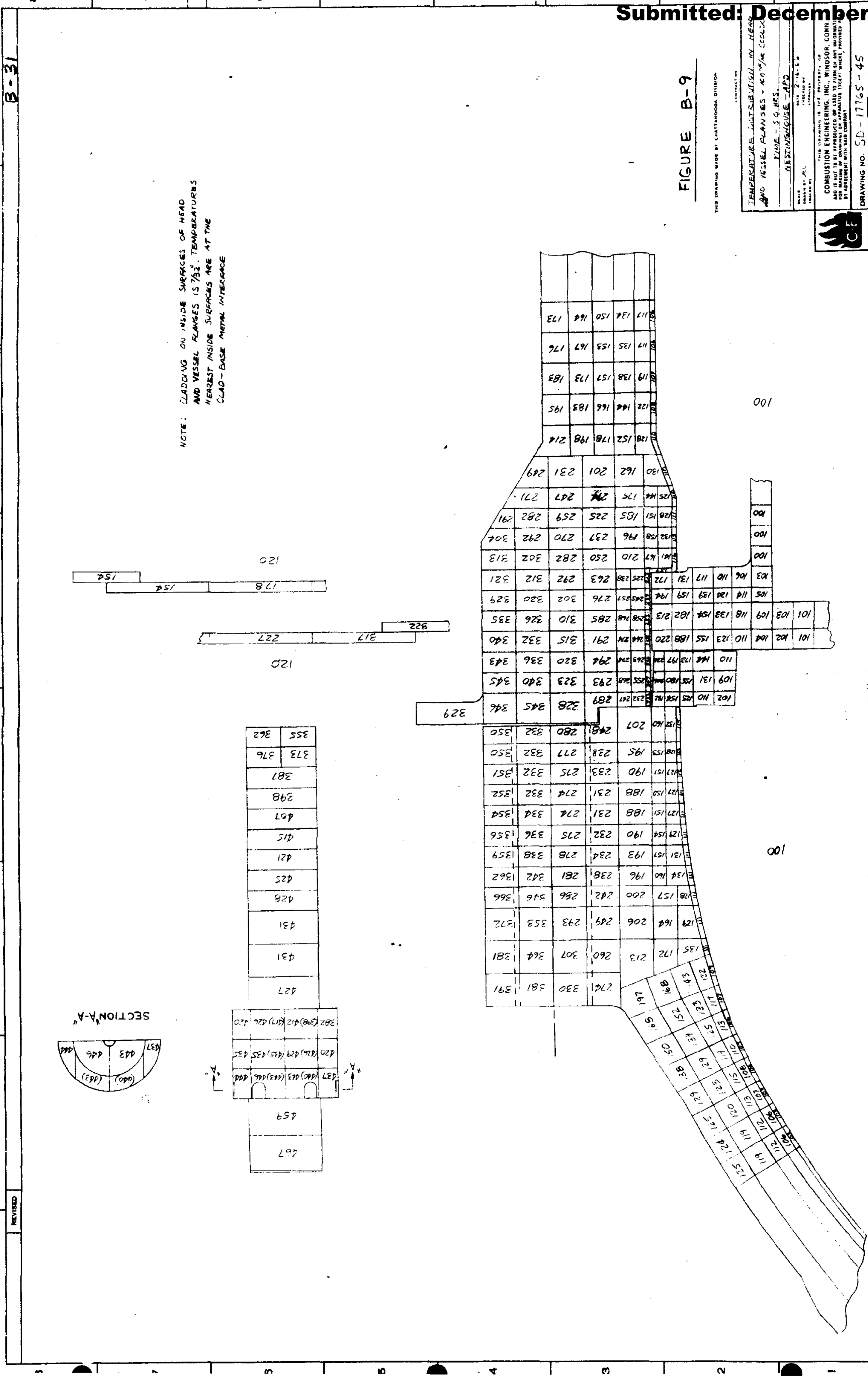
FOR

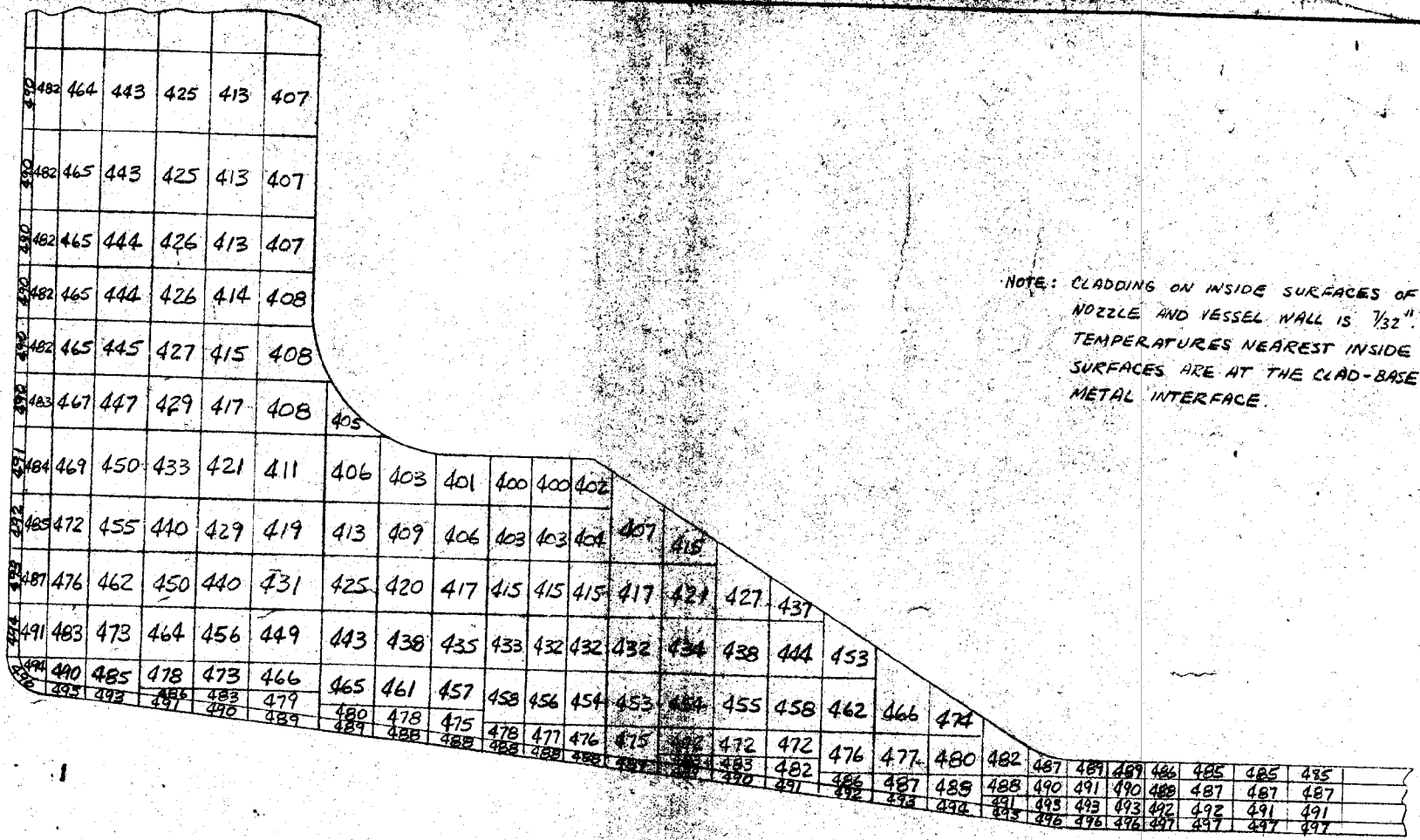
TIME - END OF COOLING, 4.47 HRS.

WESTINGHOUSE - APD

SCALE | DRAWN BY JCL | TRACED BY | DATE 2-16-86 | CHECKED BY | APPROVED

DRAWING NO. SD-17765-44


NOTE: CLADDING ON INSIDE SURFACES OF HEAD AND VESSEL FLANGES IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE
SECTION "A-A"
FIGURE B-9
THIS DRAWING MADE BY CHATTANOOGA DIVISION
WESTINGHOUSE - APD
COMBUSTION ENGINEERING, INC. WINDSOR CONN
DRAWING NO. SD-17765-45
B-31



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 1/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

500

FIGURE B-10

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

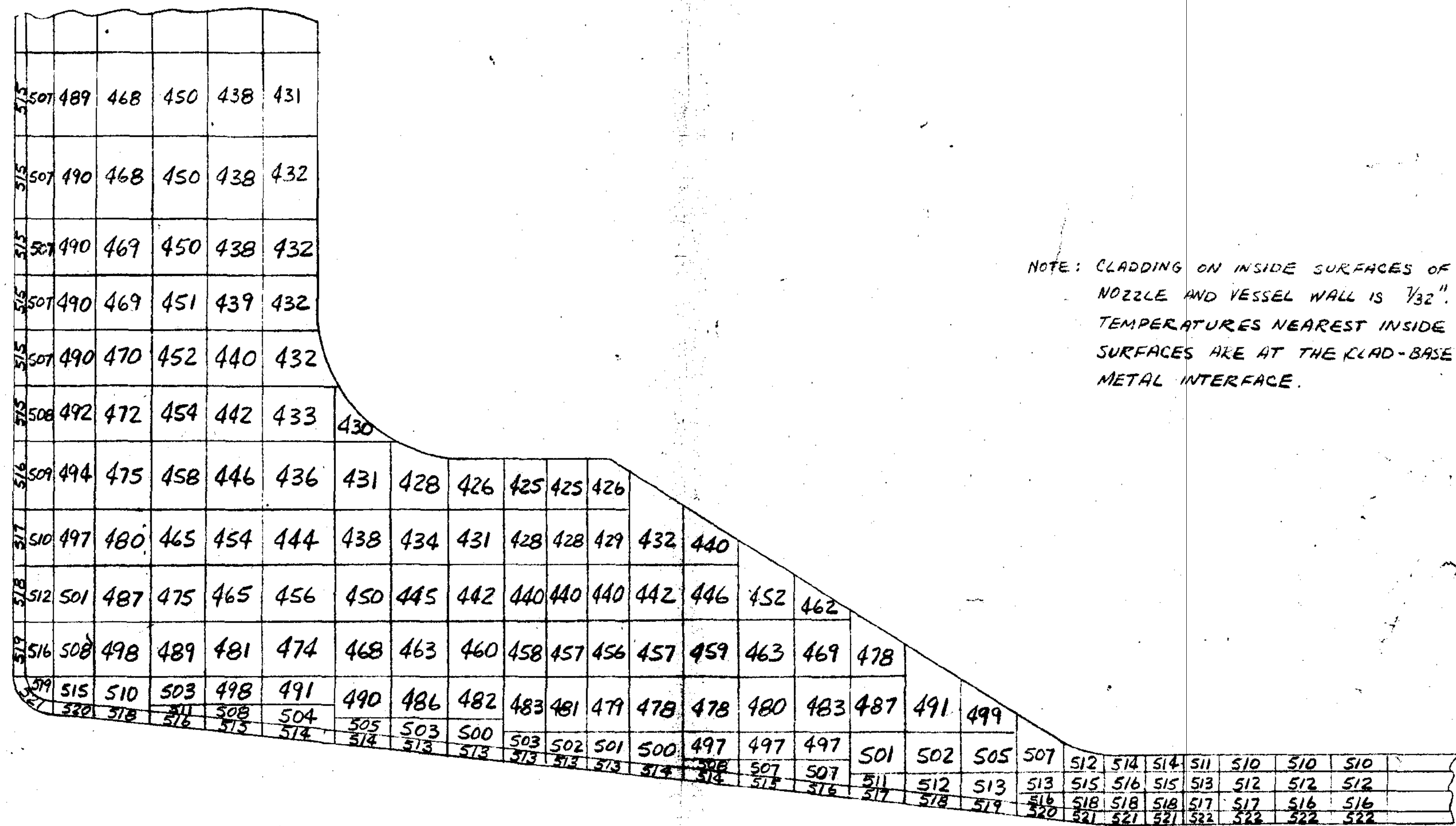
TEMPERATURE DISTRIBUTION IN INLET NOZZLE - 100 °F/HR HEATUP TIME - 4.0 HR WESTINGHOUSE-APD

SCALE DRAWN BY JCL TRACED BY DATE 3/14/66 CHECKED BY APPROVED

DRAWING NO. SB - 17765 - 47

DIETZGEN NO. 188-2 AGEPROOF

REVISIONS



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 1/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-11

525

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

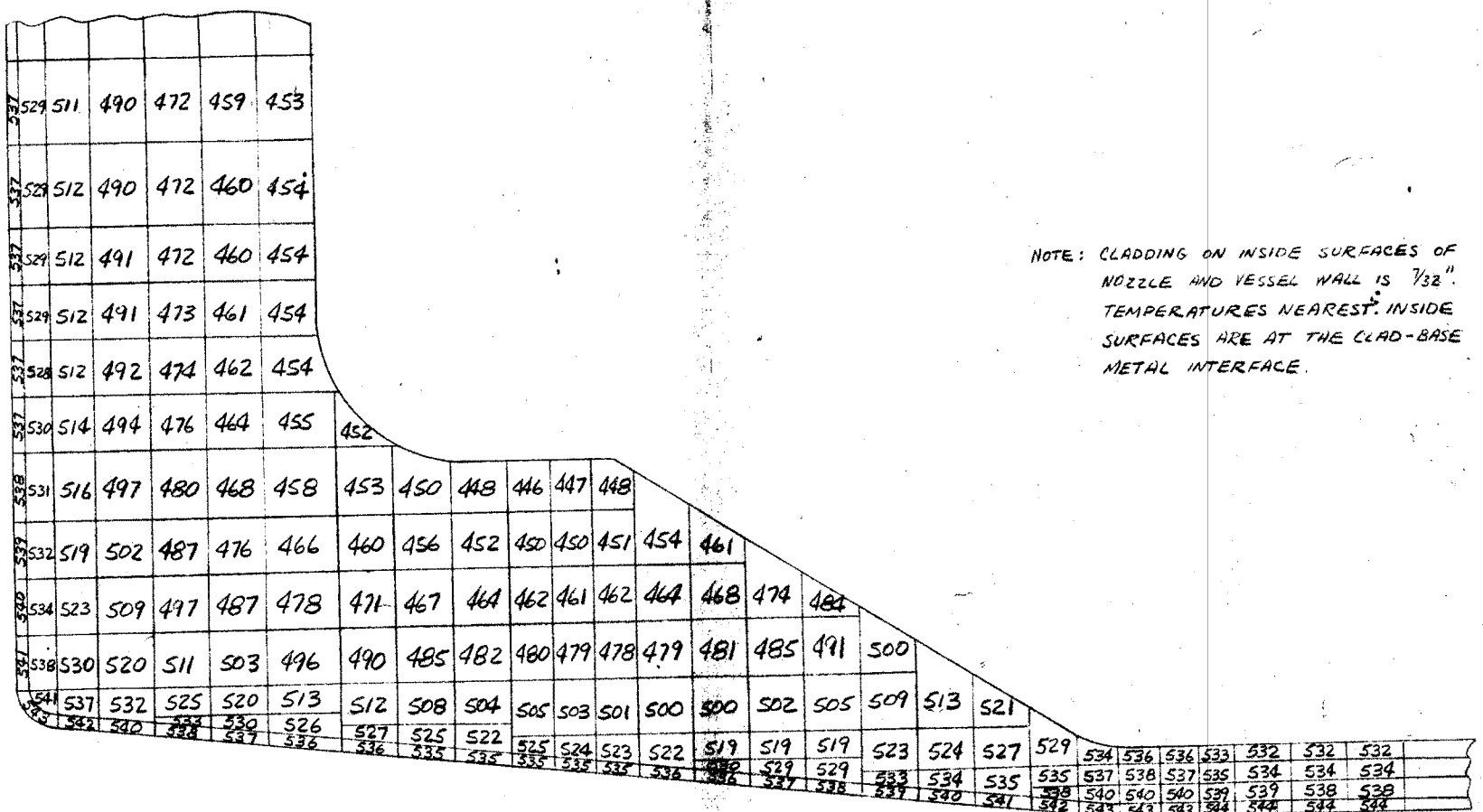
TEMPERATURE DISTRIBUTION IN INLET NOZZLE – 100 °F/HR HEATUP
TIME – 4.25 HR
WESTINGHOUSE – APD

DRAWN BY JCL DATE 3/14/66

C·E

DRAWING NO. SB-17765-48

REVISIONS



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-12

547

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

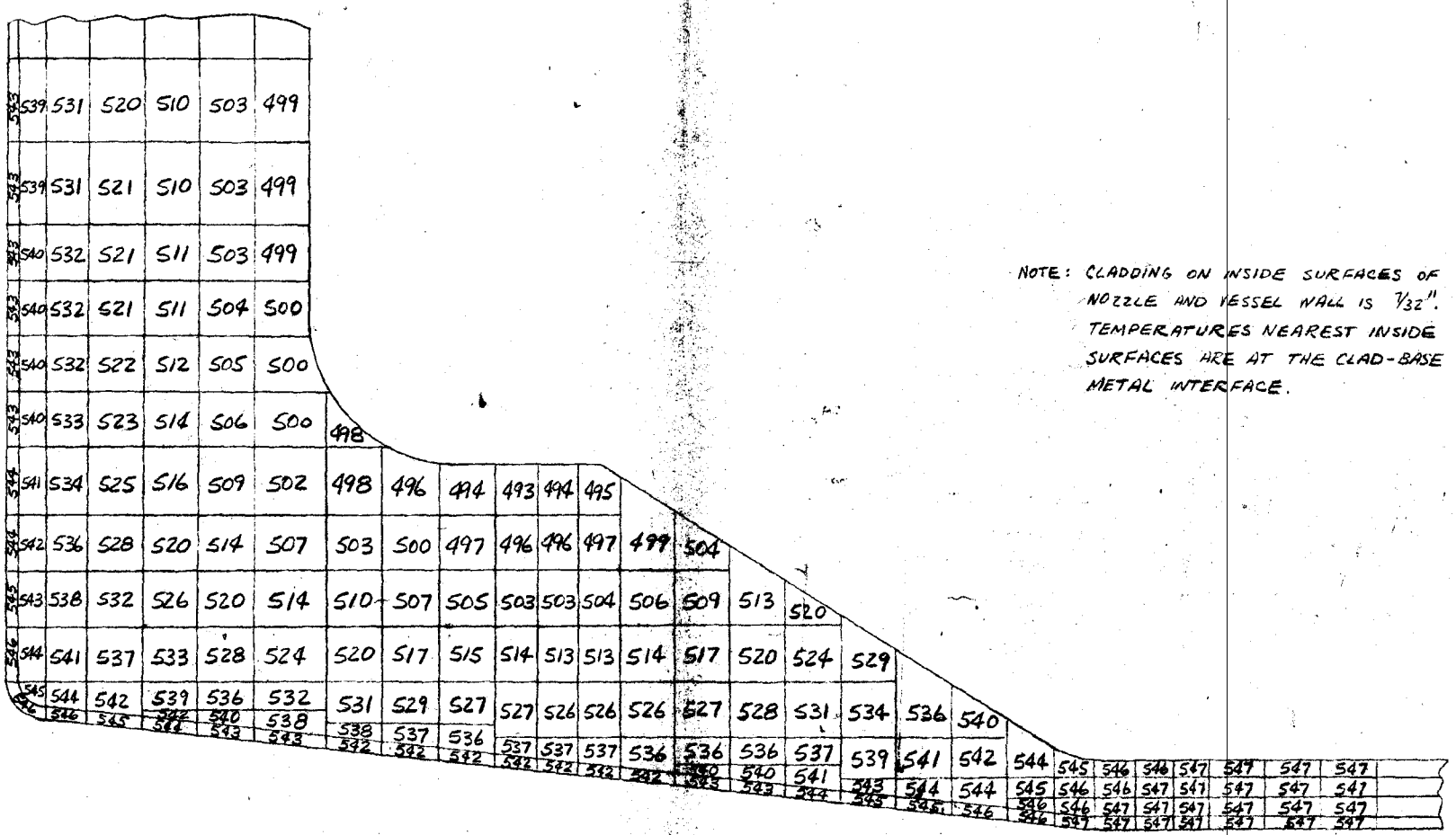
TEMPERATURE DISTRIBUTION IN INLET NOZZLE - 100 °F/HR HEATUP FOR END OF HEATING, 4.47 HR

WESTINGHOUSE - APD

SCALE
DRAWN BY JCL
TRACED BY
DATE 3/14/66
CHECKED BY
APPROVED

DRAWING NO. SB-17765-49

REVISIONS



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-13

547

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMPERATURE DISTRIBUTION IN INLET NOZZLE - 100°F/HR HEATUP

FOR TIME - 5.0 HR

WESTINGHOUSE - APD

SCALE DATE 3/11/66

DRAWN BY JCL CHECKED BY

TRACED BY APPROVED

DRAWING NO. SB-1776 5-50

REVISIONS	

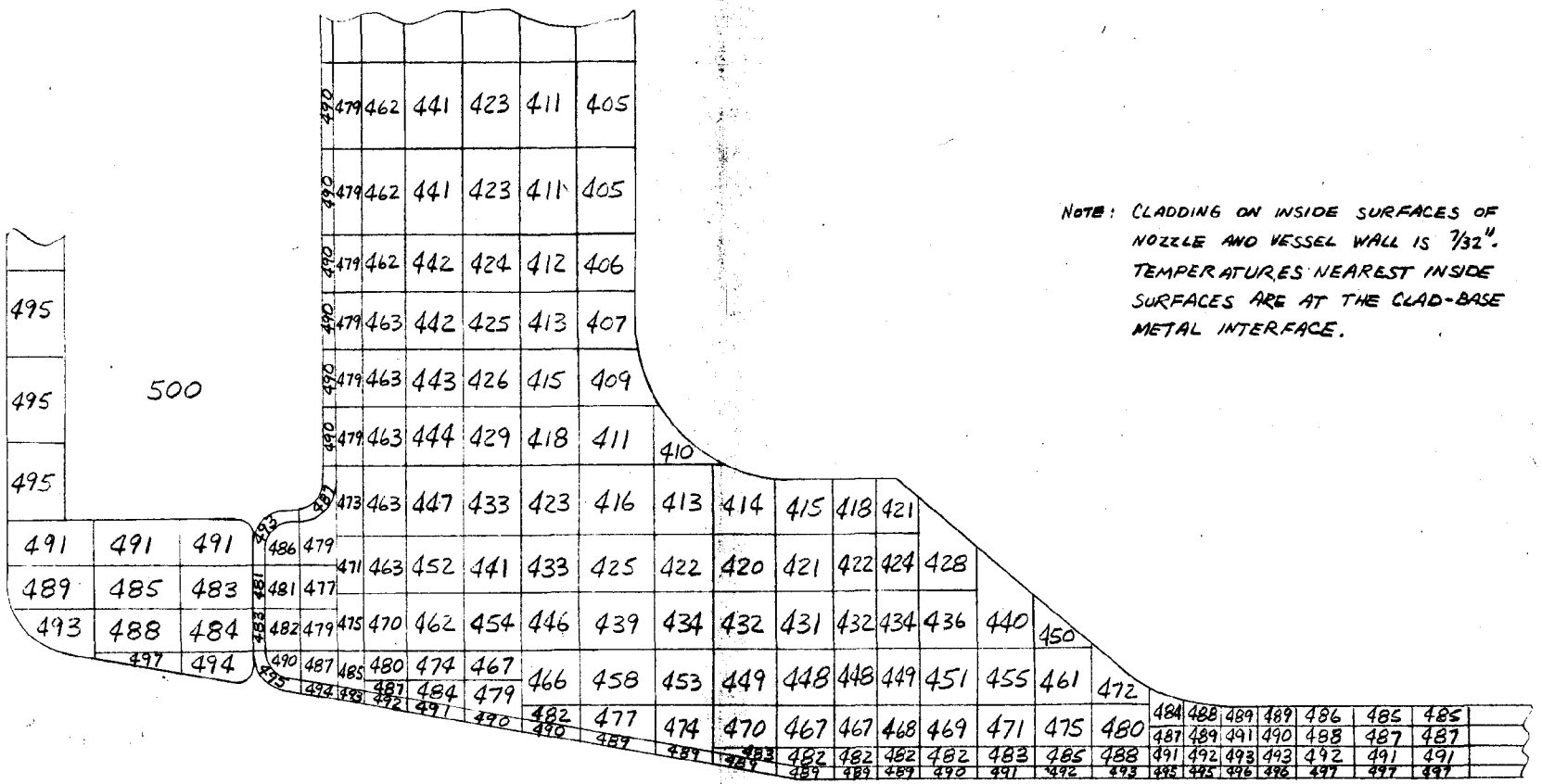


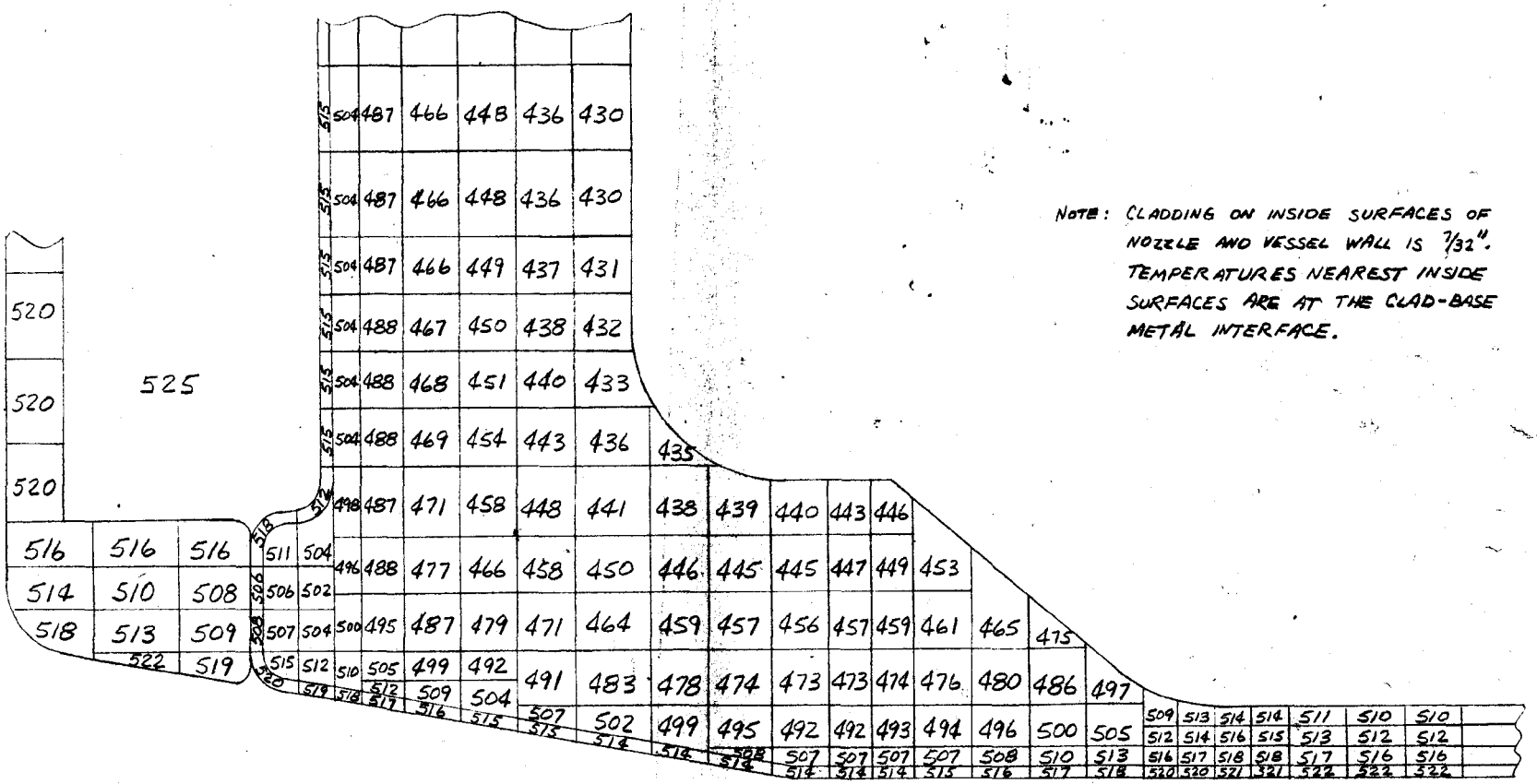
FIGURE B-14

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE
FOR 100°F/HR. HEATUP
TIME - 4.0 HR.
WESTINGHOUSE APD

SCALE
DRAWN BY JCL DATE 4-7-66
TRACED BY CHECKED BY
APPROVED

DRAWING NO. SB-17765-51



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-1

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE

FOR 100°/HR HEATUP

TIME - 4.25 HR.

WESTINGHOUSE APD

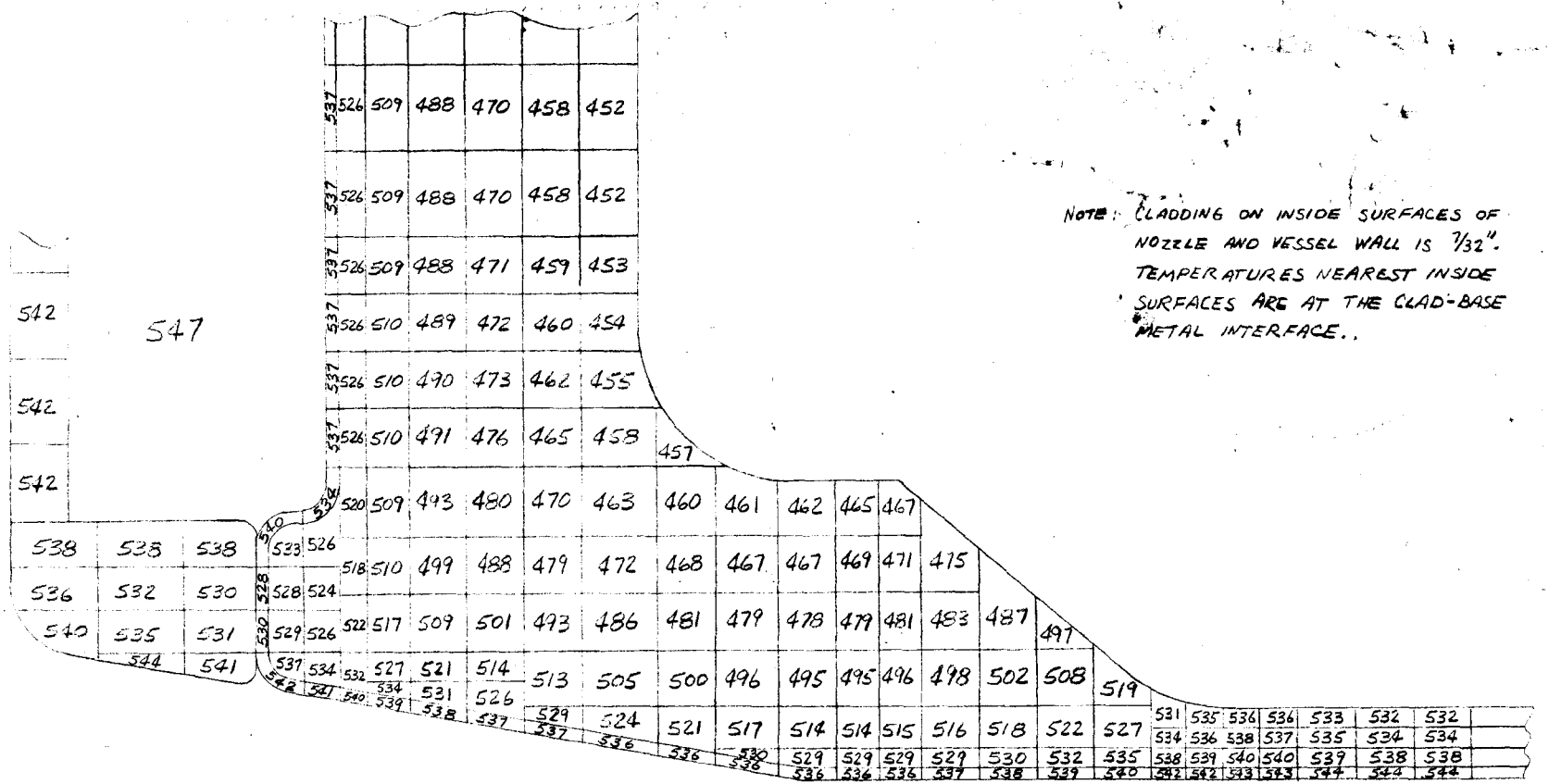
SCALE DATE 4-7-66

DRAWN BY JCL CHECKED BY

TRACED BY APPROVED

DRAWING NO. SB-17765-52

REVISIONS	



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE..

FIGURE B-16

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE

100 °F/HR HEATUP

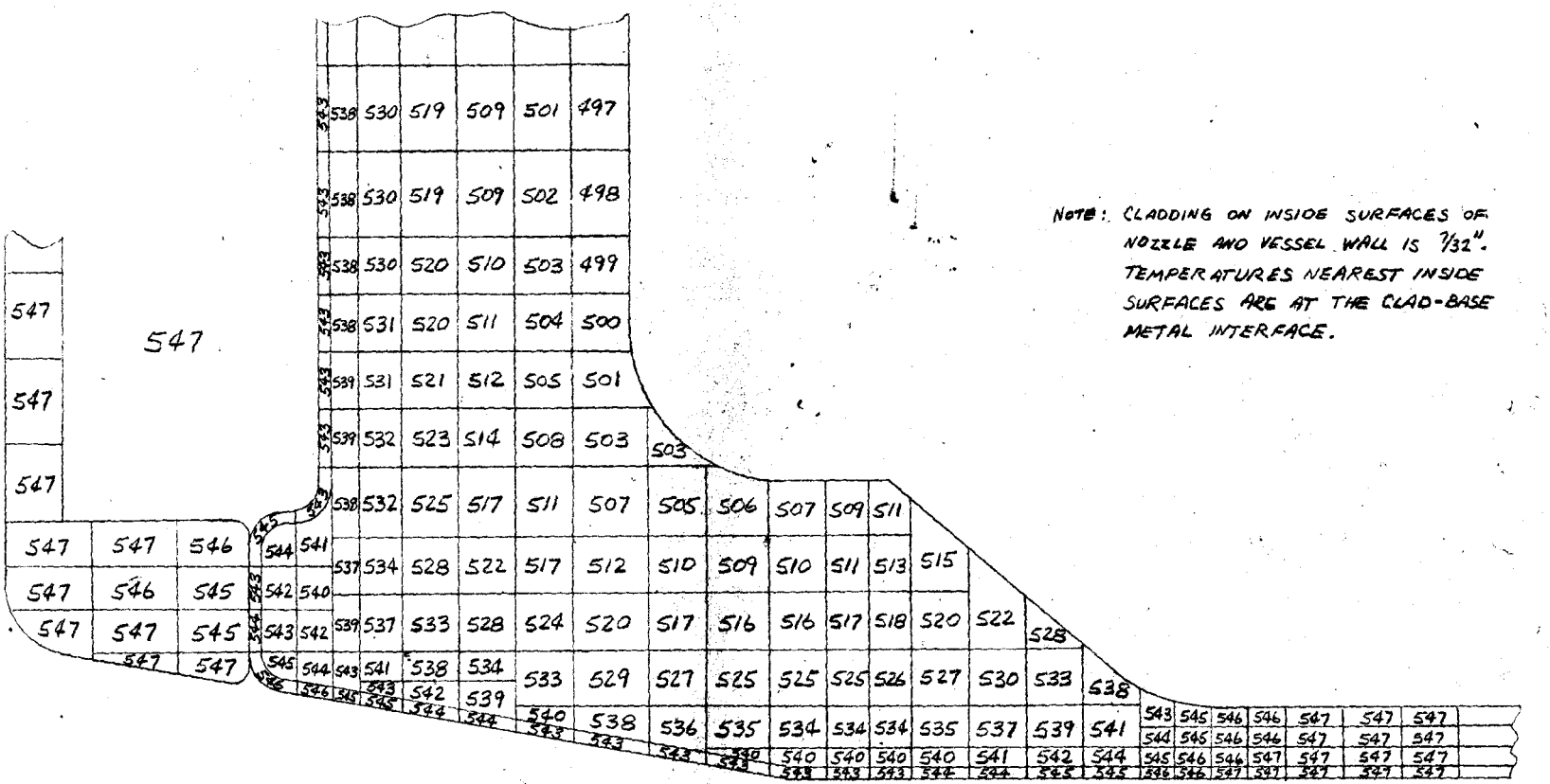
FOR END OF HEATING, 4.47 HR.

WESTINGHOUSE APD

SCALE
DRAWN BY JCL DATE 4-7-66
TRACED BY CHECKED BY
APPROVED

DRAWING NO. SB-17765-53

REVISIONS	B-39



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-17

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE
FOR 100 °F/HR HEATUP
TIME - 5.0 HR.
WESTINGHOUSE APD

SCALE
DRAWN BY JKL DATE 4-7-66
TRACED BY CHECKED BY
APPROVED

DRAWING NO. SB-17765-54

DIETZGEN NO. 138-2 AGEPROOF

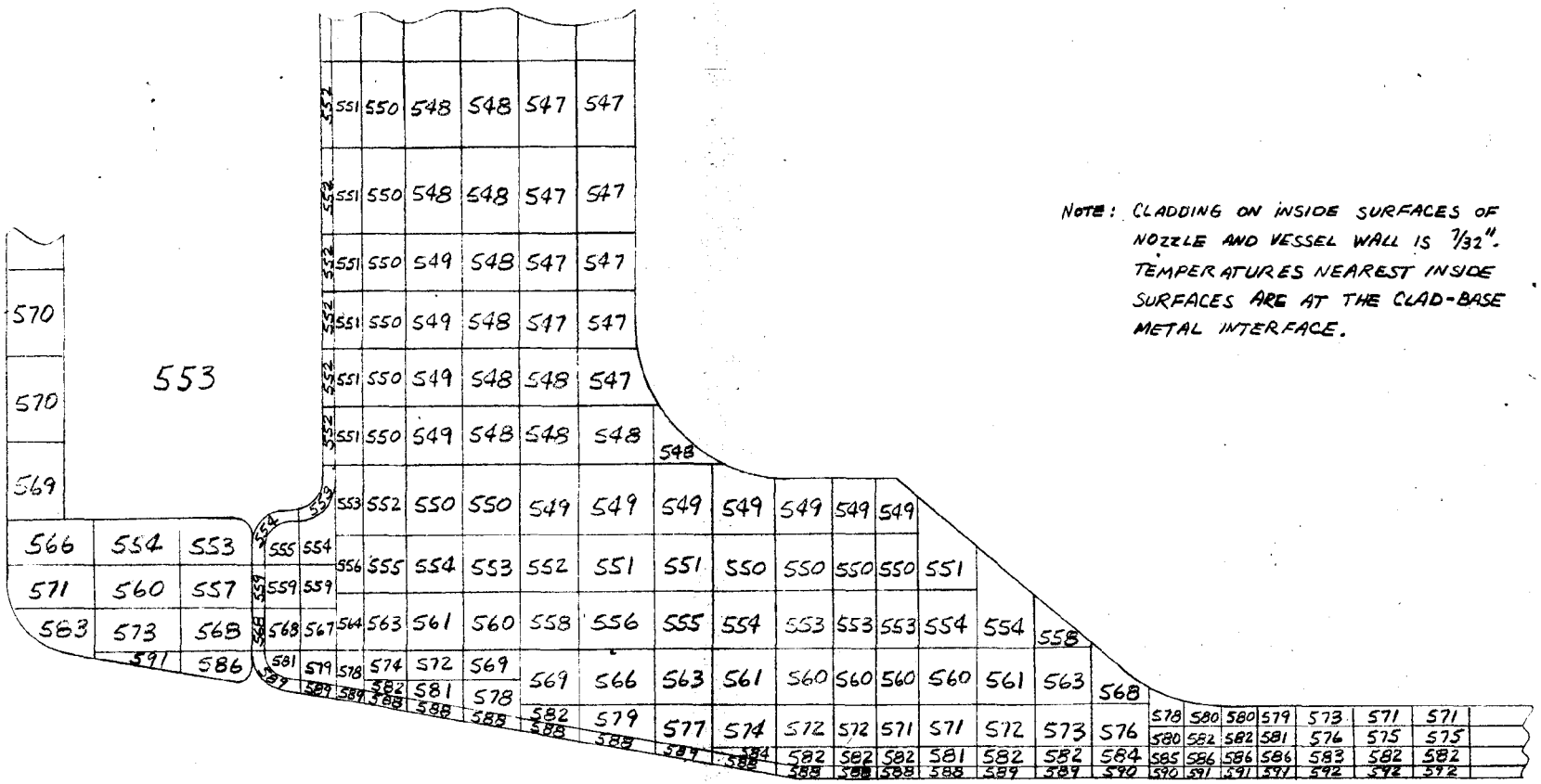


FIGURE B-16

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE

FOR PLANT LOADING

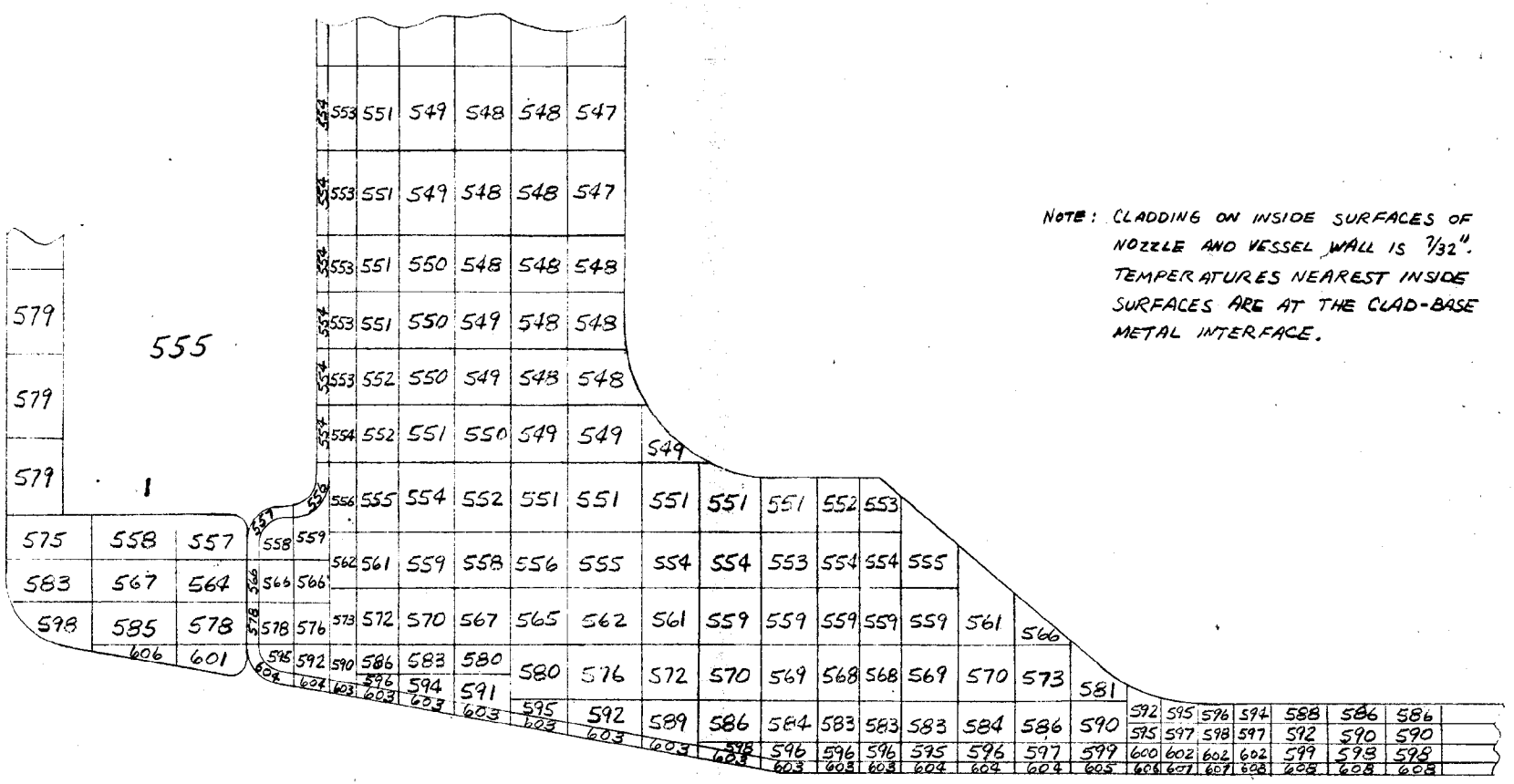
TIME - 15 MIN.

WESTINGHOUSE APD

SCALE DRAWN BY JCL TRACED BY DATE 4-7-66 CHECKED BY APPROVED

DRAWING NO. SB-17765-55

REVISIONS	



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-19

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE

FOR PLANT LOADING

TIME - 20 MIN.

WESTINGHOUSE APD

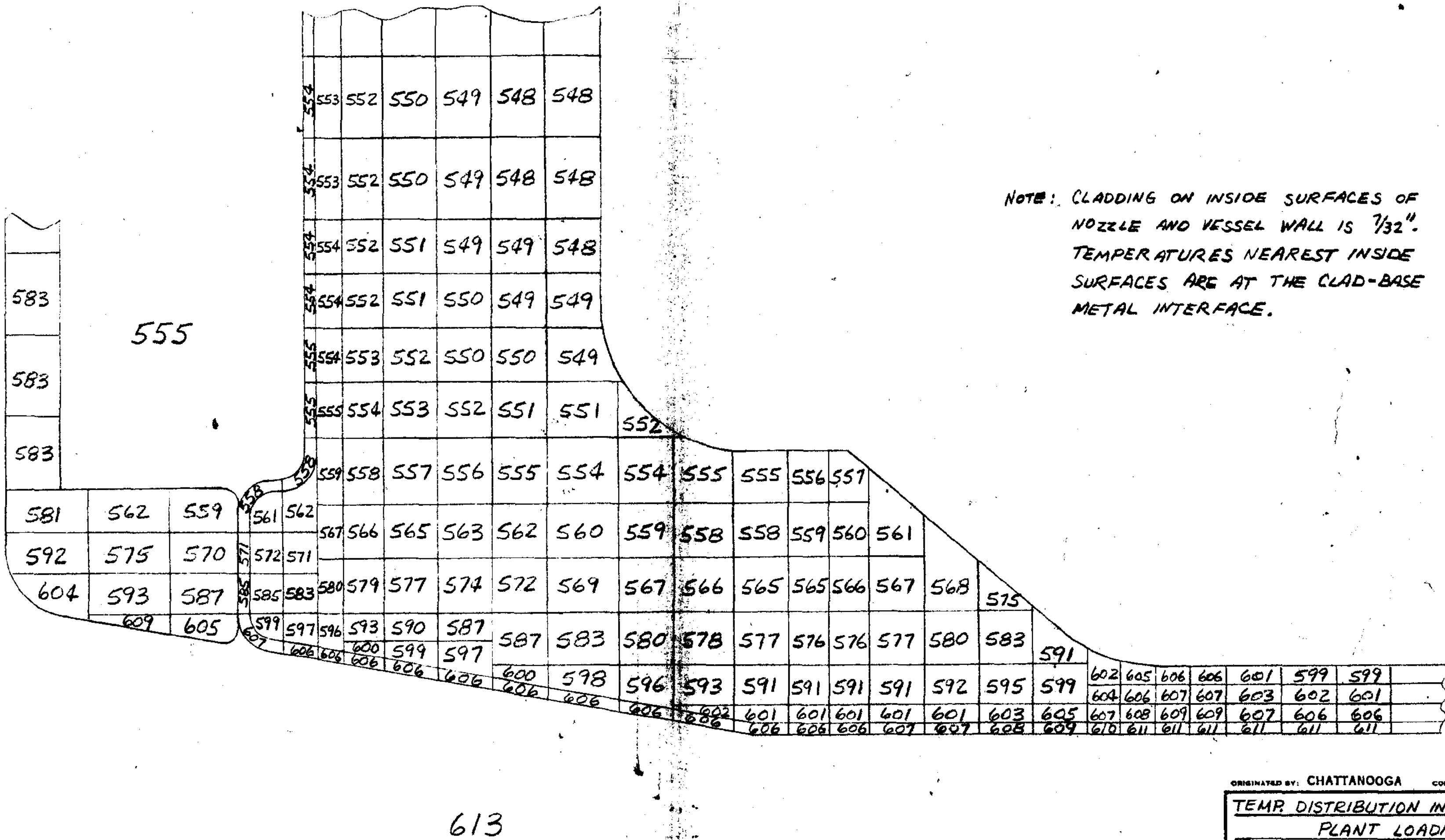
SCALE DATE 4-7-66

DRAWN BY JCL CHECKED BY

TRACED BY APPROVED

DRAWING NO. SB-17765-56

REVISIONS



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-2

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE

FOR PLANT LOADING

TIME – 25 MIN.

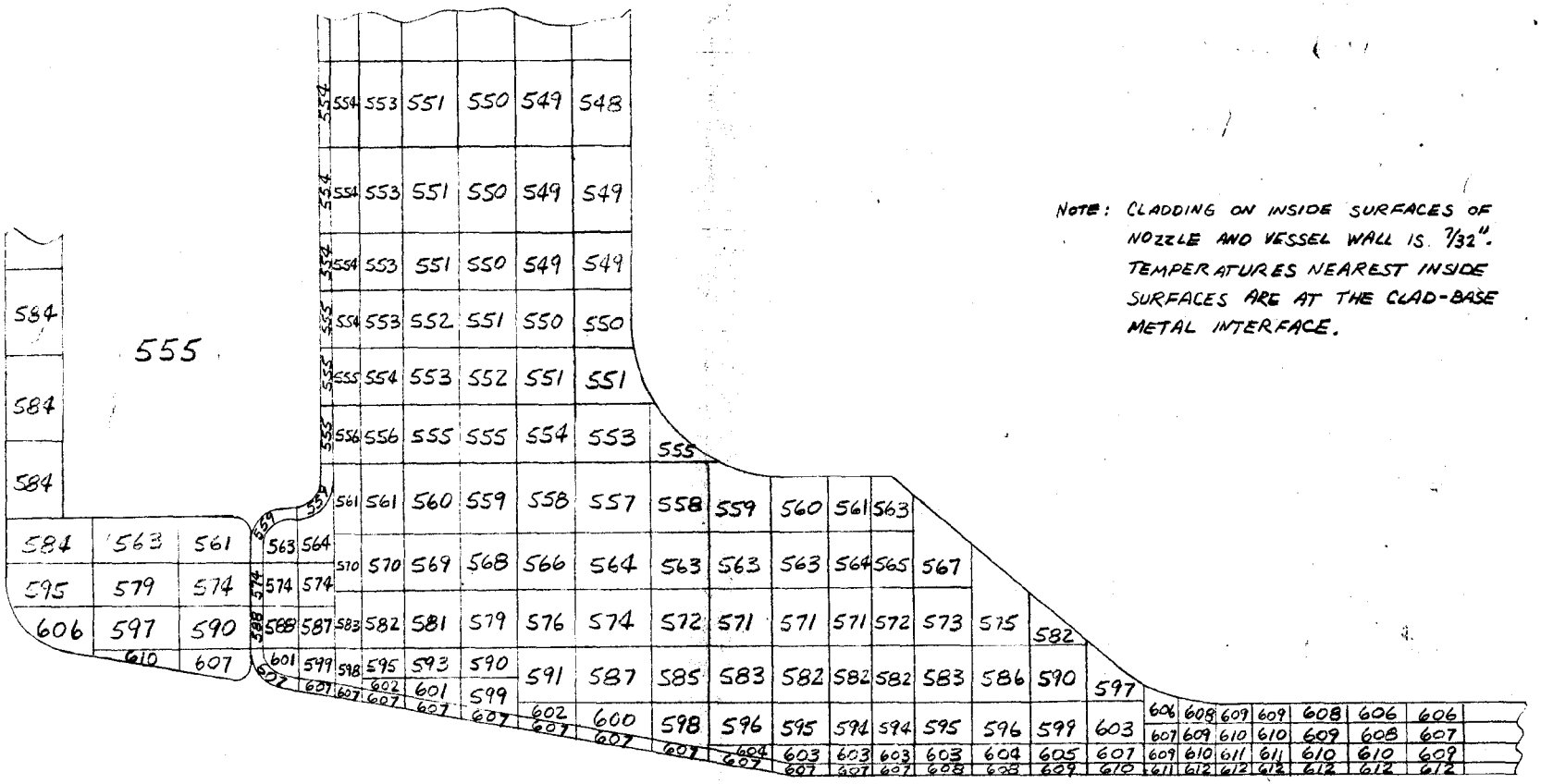
WESTINGHOUSE APD

SCALE DATE 4-7-66
DRAWN BY JCL CHECKED BY
TRACED BY APPROVED

C-E

DRAWING NO. SB-17765-57

REVISIONS	



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

613

FIGURE B-2

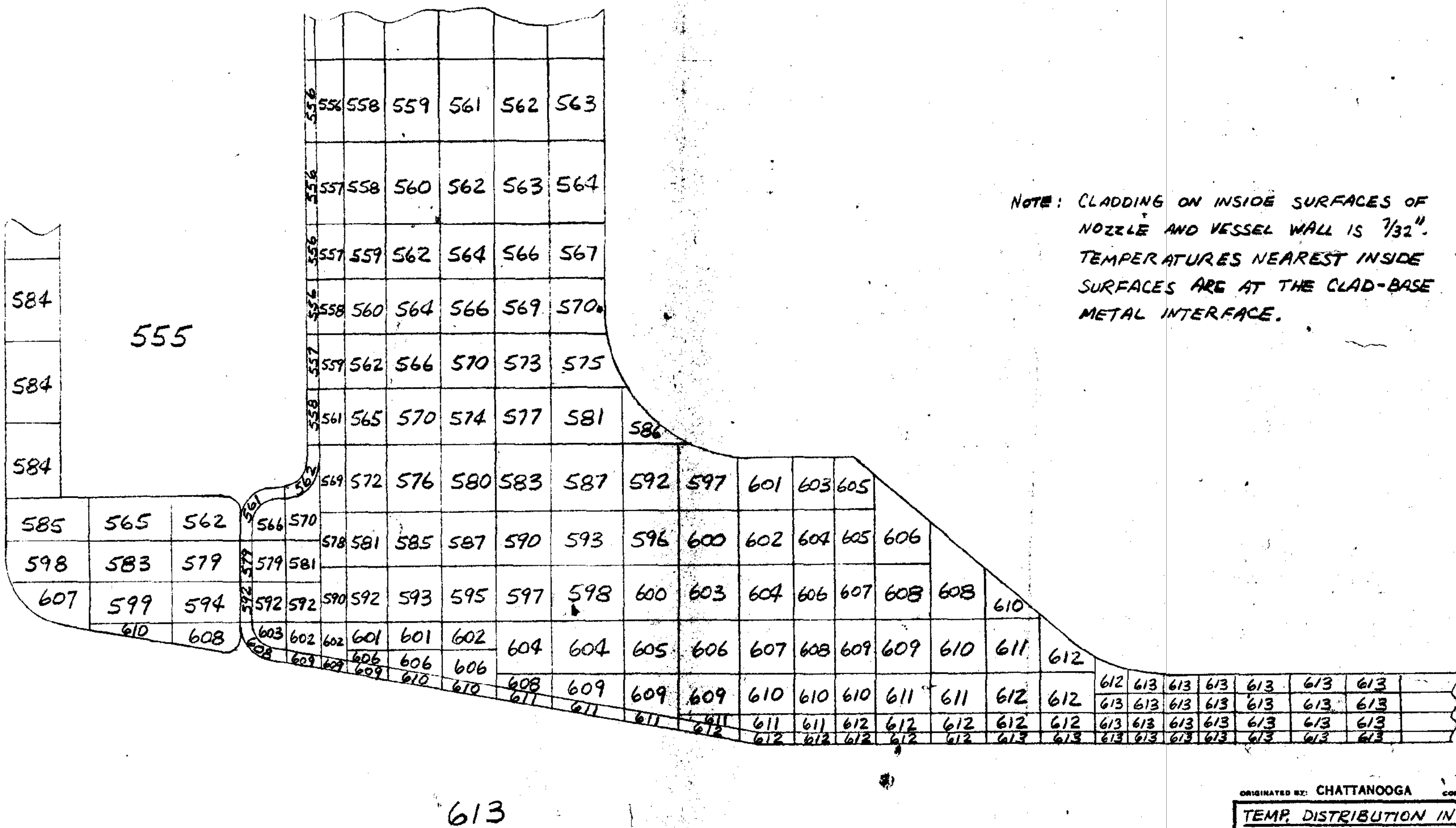
ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE
FOR PLANT LOADING
TIME - 30 MIN.
WESTINGHOUSE APD

SCALE
DRAWN BY JCL
TRACED BY
DATE 4-7-66
CHECKED BY
APPROVED

DRAWING NO. SB-17765-58

REVISIONS



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-2

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

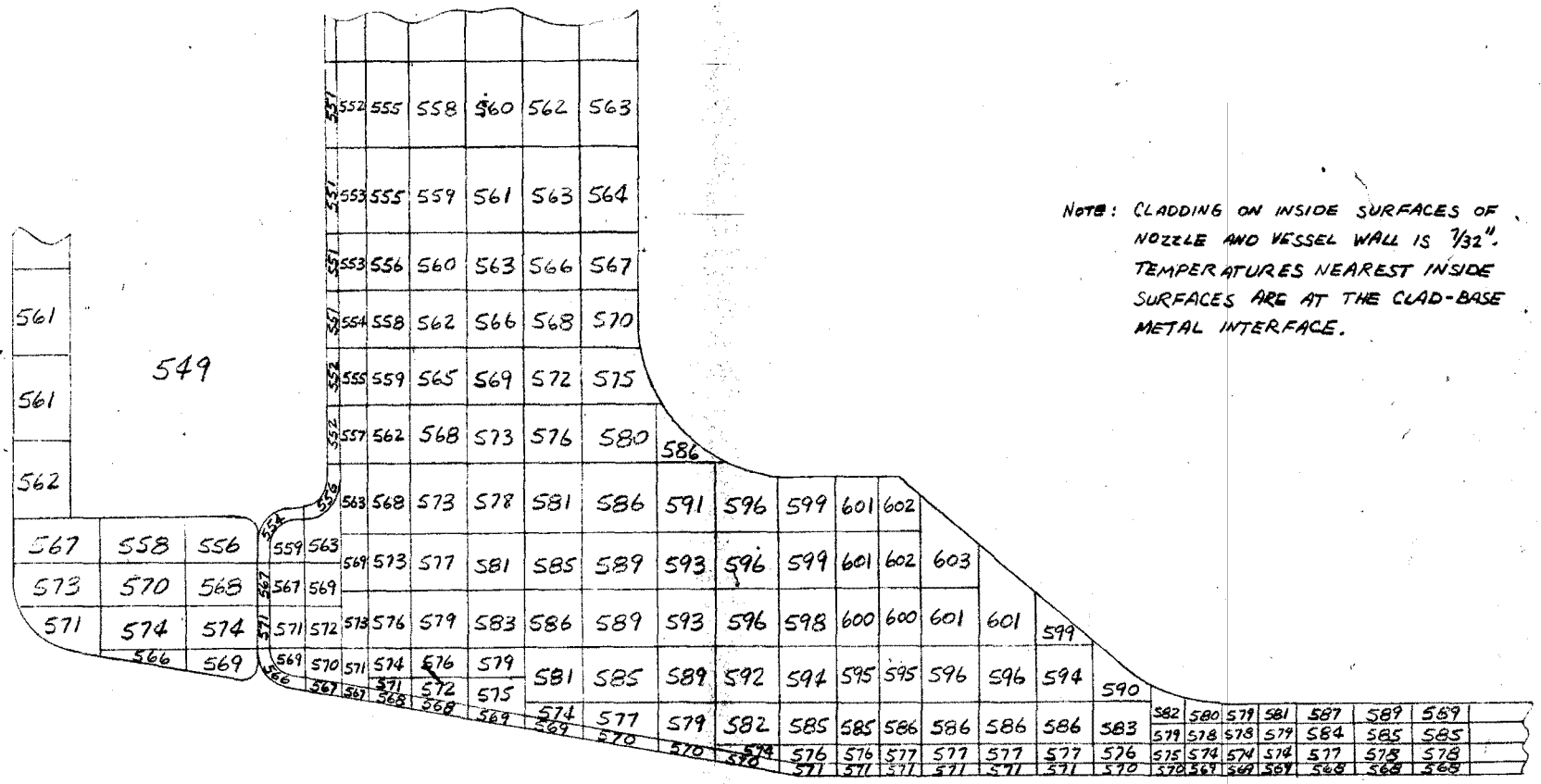
TEMP. DISTRIBUTION IN OUTLET NOZZLE
100 % POWER
FOR STEADY STATE
WESTINGHOUSE APD

SCALE
DRAWN BY JCL
TRACED BY
DATE 4-7-66
CHECKED BY
APPROVED

C-E

DRAWING NO. SB-17765-59

REVISIONS	



Note: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-2

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE

FOR PLANT UNLOADING

TIME - 15 MIN.

WESTINGHOUSE APD

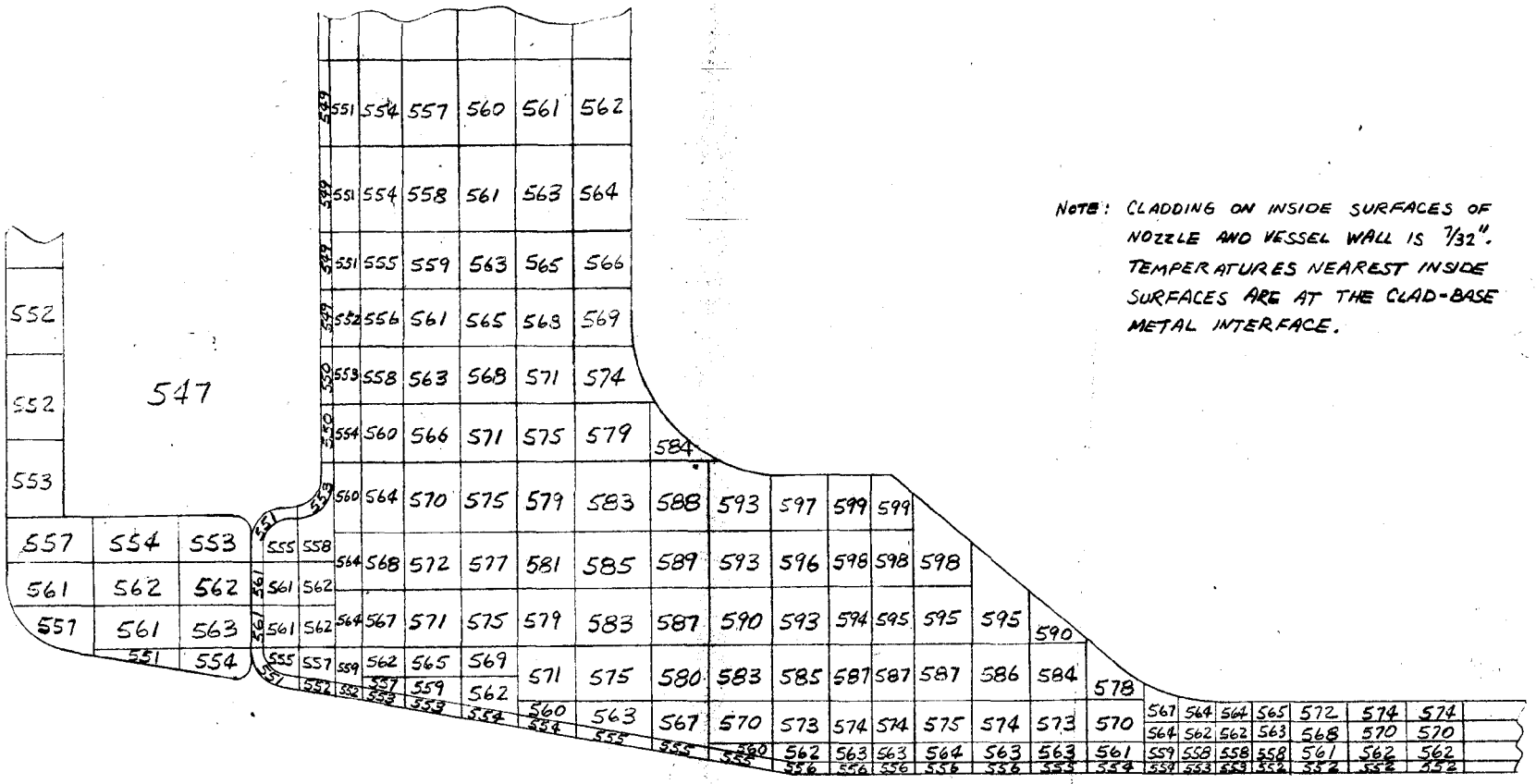
SCALE

DRAWN BY JCL DATE 4-7-66

TRACED BY CHECKED BY

APPROVED

DRAWING NO. SB-1776S-60



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-2

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZ.

FOR PLANT UNLOADING

TIME - 20 MIN.

WESTINGHOUSE APD

SCALE

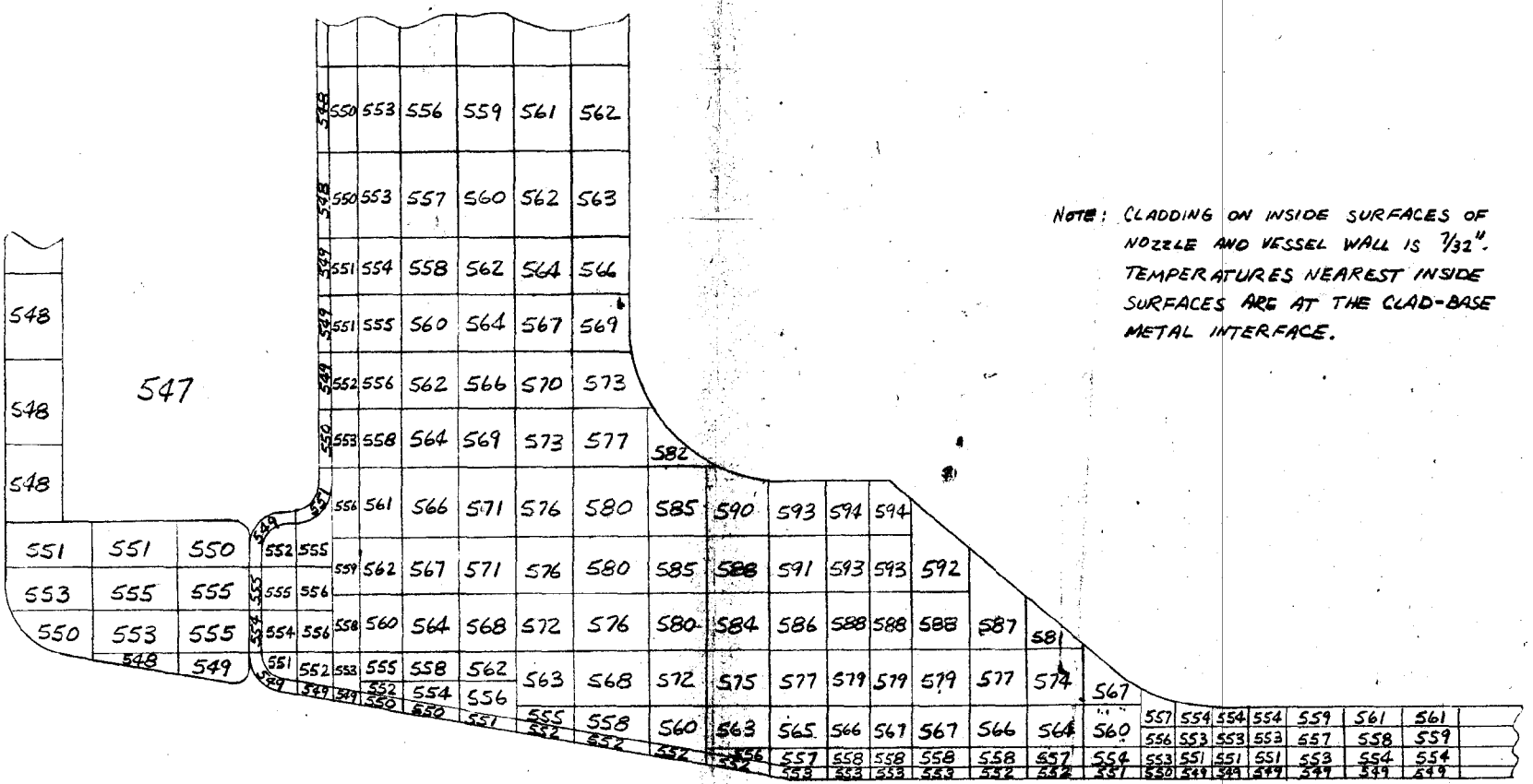
DRAWN BY JCL DATE 4-7-66

TRACED BY CHECKED BY

APPROVED

DRAWING NO. SB-17765-61

REVISIONS	



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-25

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE

FOR PLANT UNLOADING

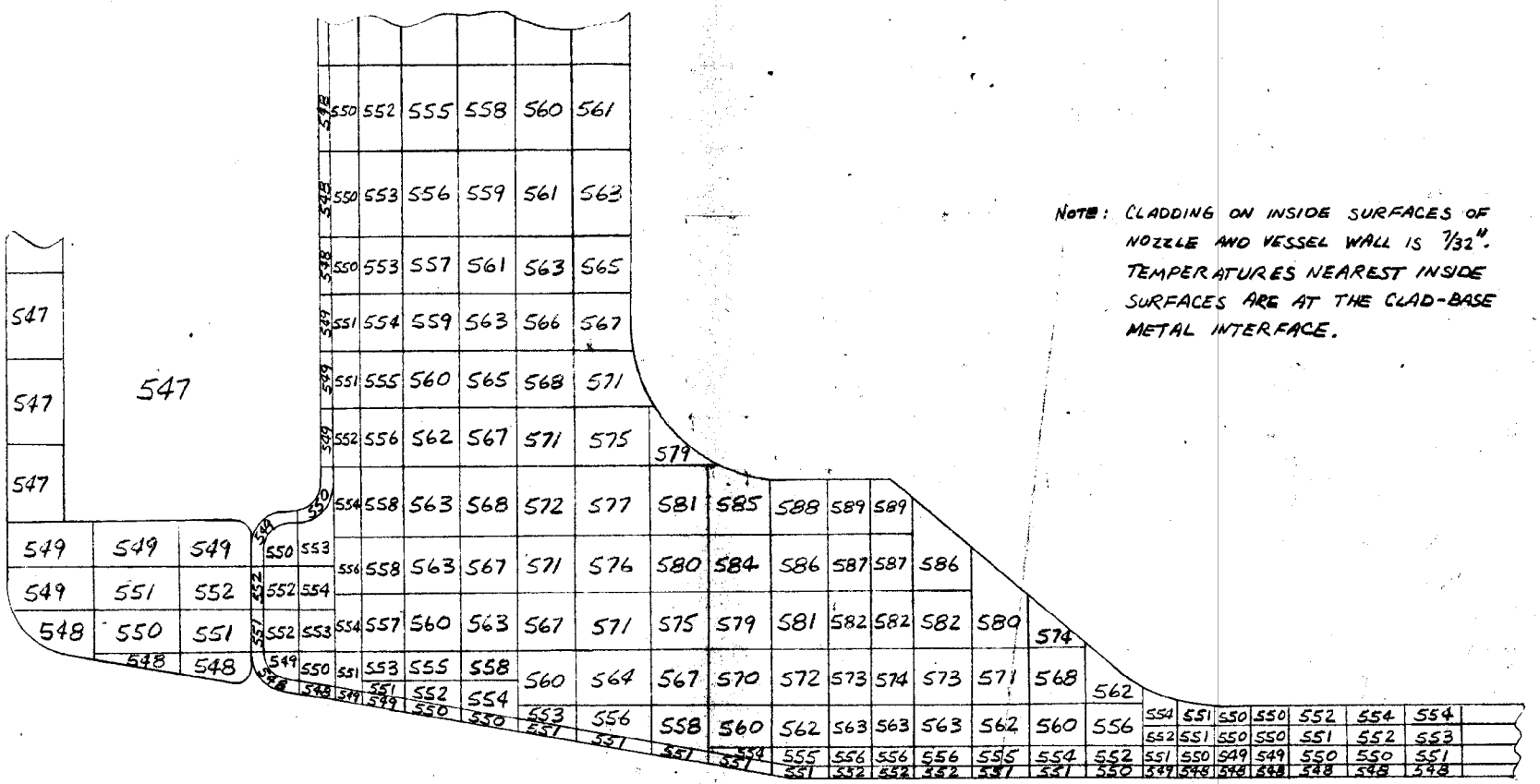
TIME - 25 MIN.

WESTINGHOUSE APD

SCALE DRAWN BY JCL TRACED BY DATE 4-7-66 CHECKED BY APPROVED

DRAWING NO. SB-17765-62

REVISIONS	



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-2

DESIGNATED BY: CHATTANOOGA	CONTRACT NO.
TEMP. DISTRIBUTION IN OUTLET NOZZLE	
FOR PLANT UNLOADING	
TIME - 30 MIN.	
WESTINGHOUSE APD	
SCALE	DATE 4-7-66
DRAWN BY JCL	CHECKED BY
TRACED BY	APPROVED

DRAWING NO. SB-17765-63

REVISIONS	

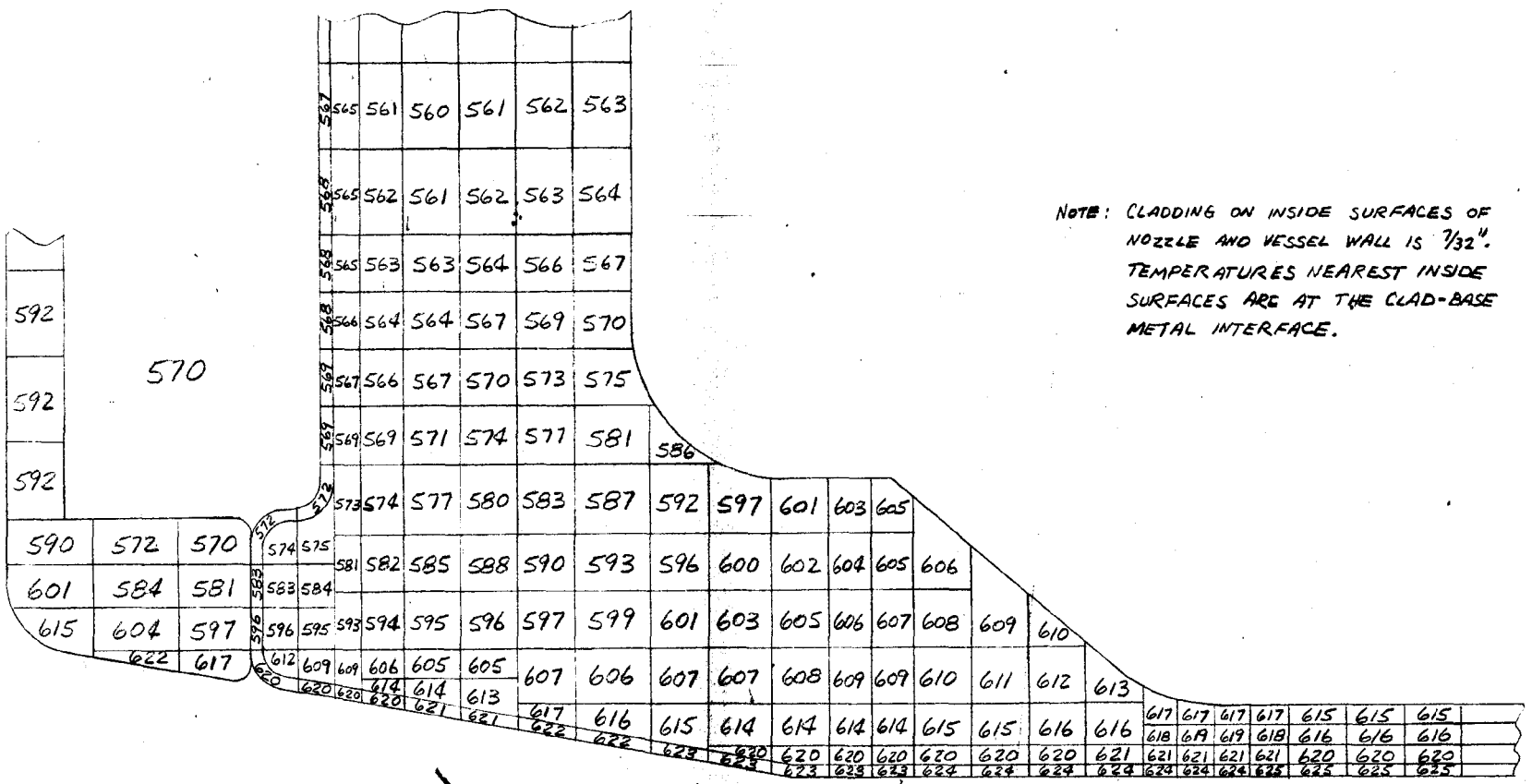


FIGURE B-27

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE FOR STEP REDUCTION FROM 100% TO 50% LOAD

TIME - 3.5 MIN.

WESTINGHOUSE APD

SCALE DRAWN BY JGL TRACED BY DATE 4-7-66 CHECKED BY APPROVED

DRAWING NO. SB-17765-64

REVISIONS

B-50

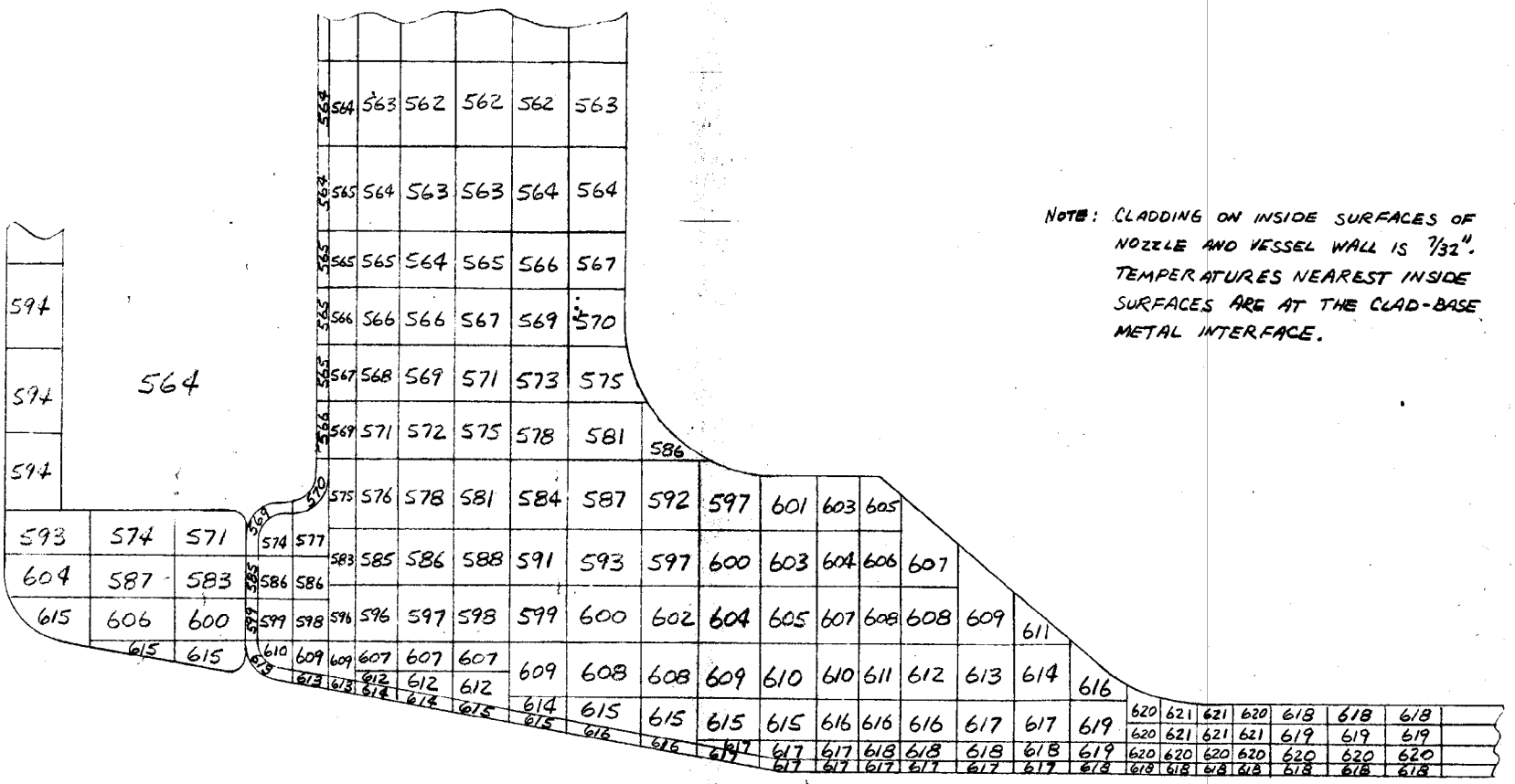


FIGURE B-28

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

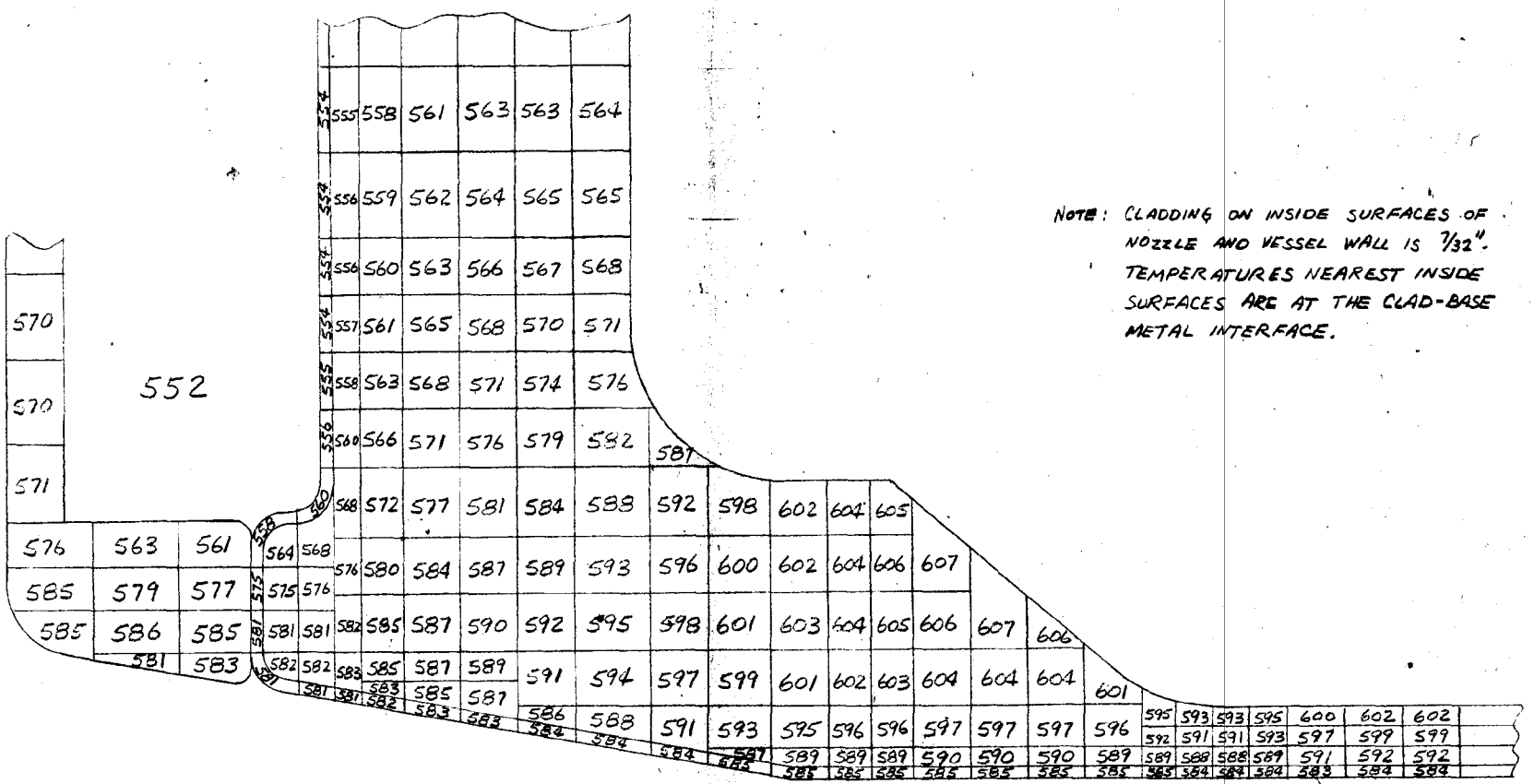
TEMP. DISTRIBUTION IN OUTLET NOZZLE
FOR STEP REDUCTION FROM 100% TO 50% LOAD
TIME – 6 MIN.
WESTINGHOUSE APD

SCALE
DRAWN BY JCL DATE 4-7-66
TRACED BY CHECKED BY
APPROVED

DRAWING NO. SB-17765-65

DIETZGEN NO. 138-Z AGEPROOF

REVISIONS	



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-29

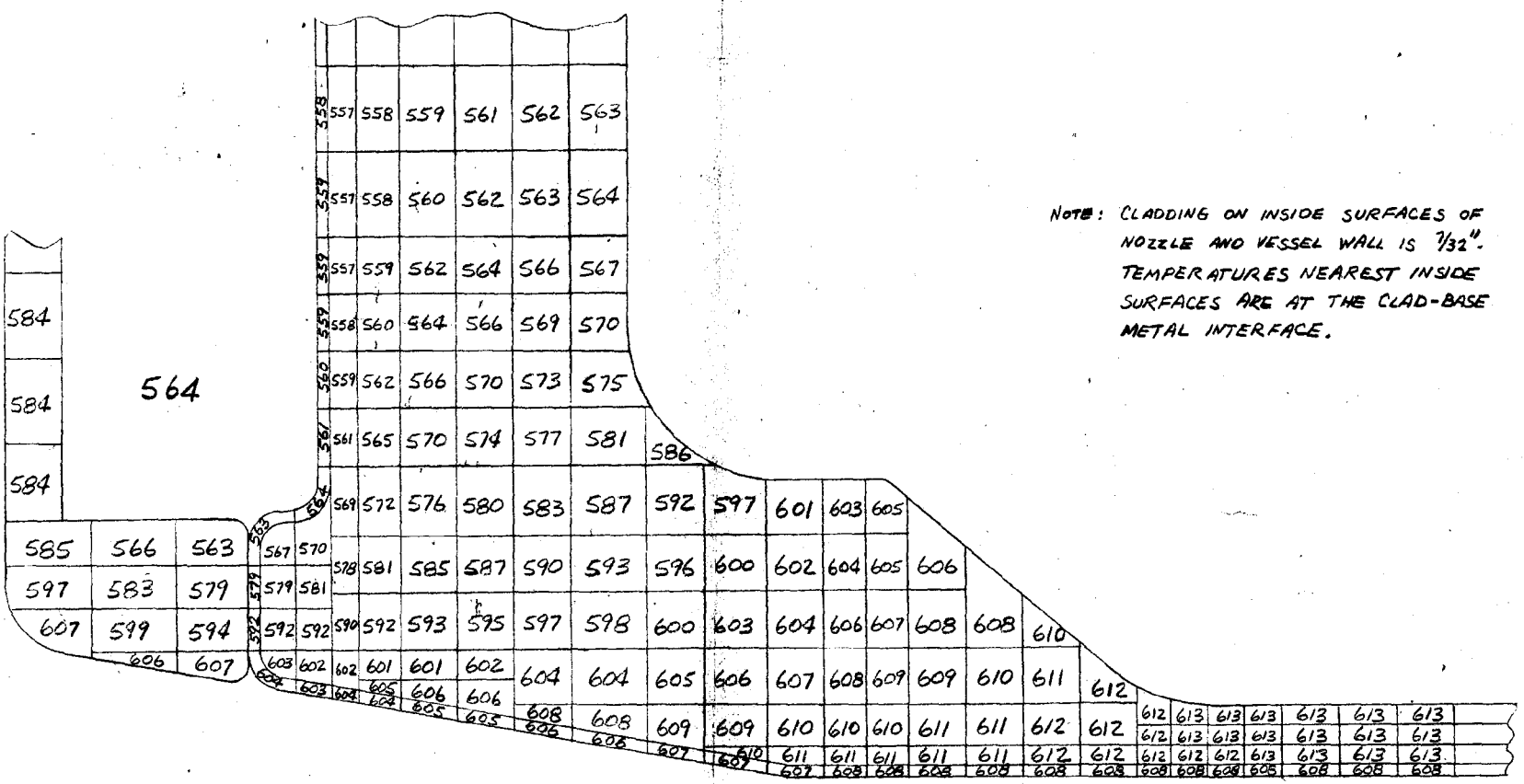
ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE FOR STEP REDUCTION FROM 100% TO 50% LOAD
TIME - 15.5 MIN.
WESTINGHOUSE APD

SCALE
DRAWN BY JCL DATE 4-7-66
TRACED BY CHECKED BY
APPROVED

DRAWING NO. SB-17765-66

REVISIONS



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-30

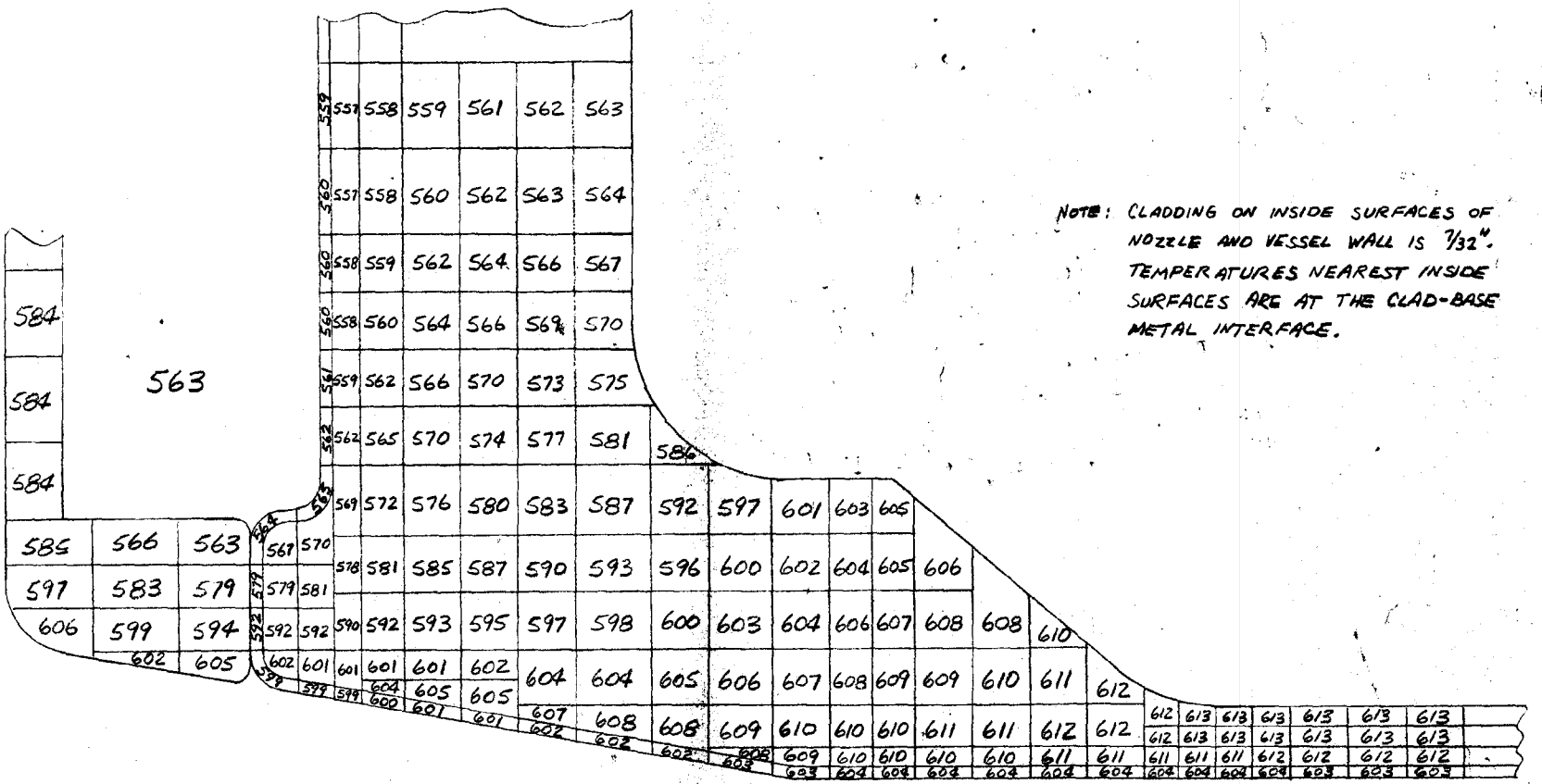
ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE
FOR REACTOR TRIP FROM FULL POWER
TIME - 10 SEC.
WESTINGHOUSE APD

SCALE
DRAWN BY JCL
TRACED BY
DATE 4-7-66
CHECKED BY
APPROVED

DRAWING NO. SB-17765-67

REVISIONS	



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

584

FIGURE B-3

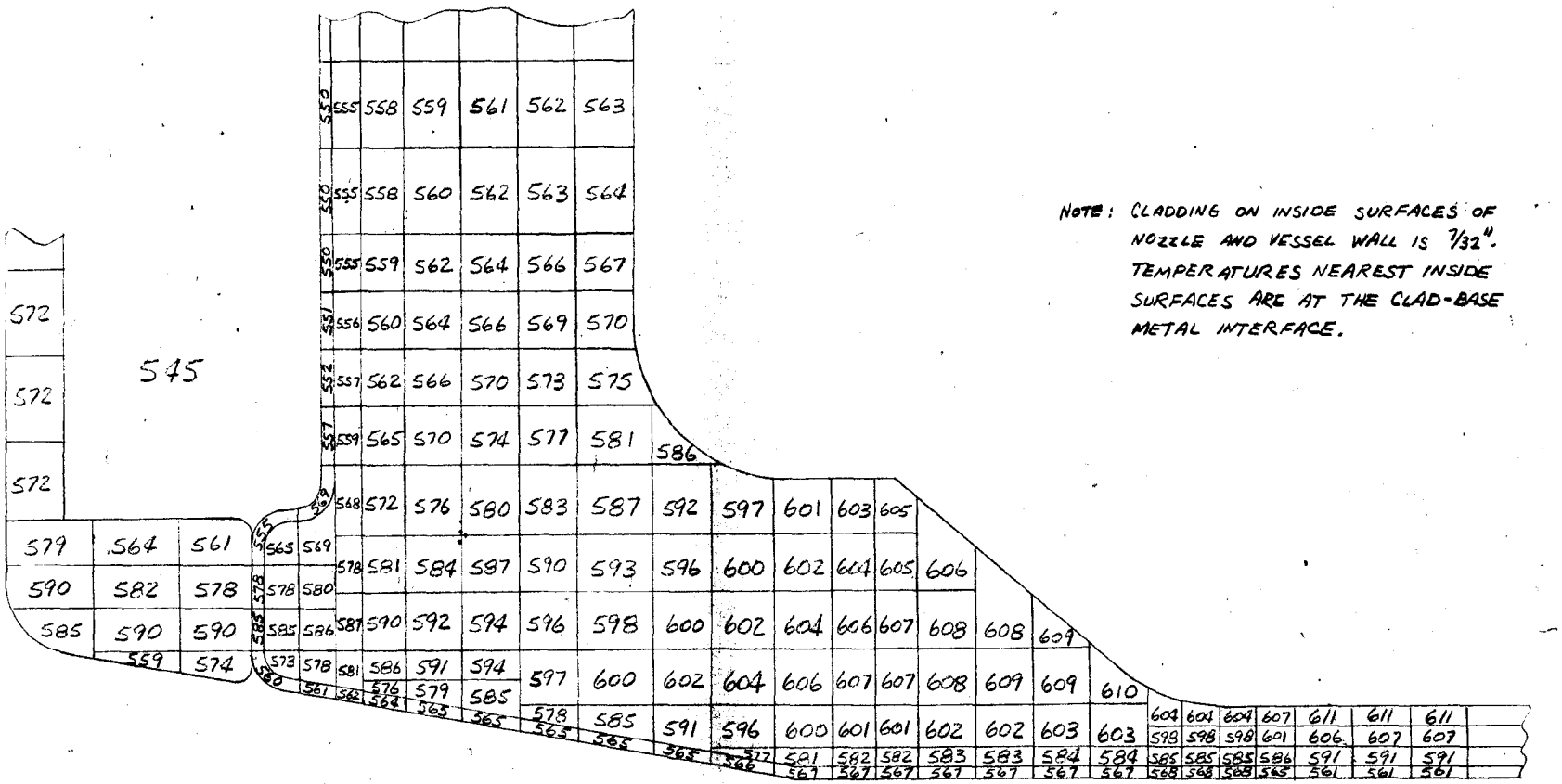
ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE
FOR REACTOR TRIP FROM FULL POWER
TIME – 15 SEC.
WESTINGHOUSE APD

SCALE DRAWN BY JCL TRACED BY DATE 4-7-66 CHECKED BY APPROVED

DRAWING NO. SB-17765-68

REVISIONS	



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-32

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE
FOR REACTOR TRIP FROM FULL POWER
TIME - 90 SEC.
WESTINGHOUSE APD

SCALE
DRAWN BY JCL DATE 4-7-66
TRACED BY CHECKED BY
APPROVED

DRAWING NO. SB-17765-69

REVISIONS	

B-55

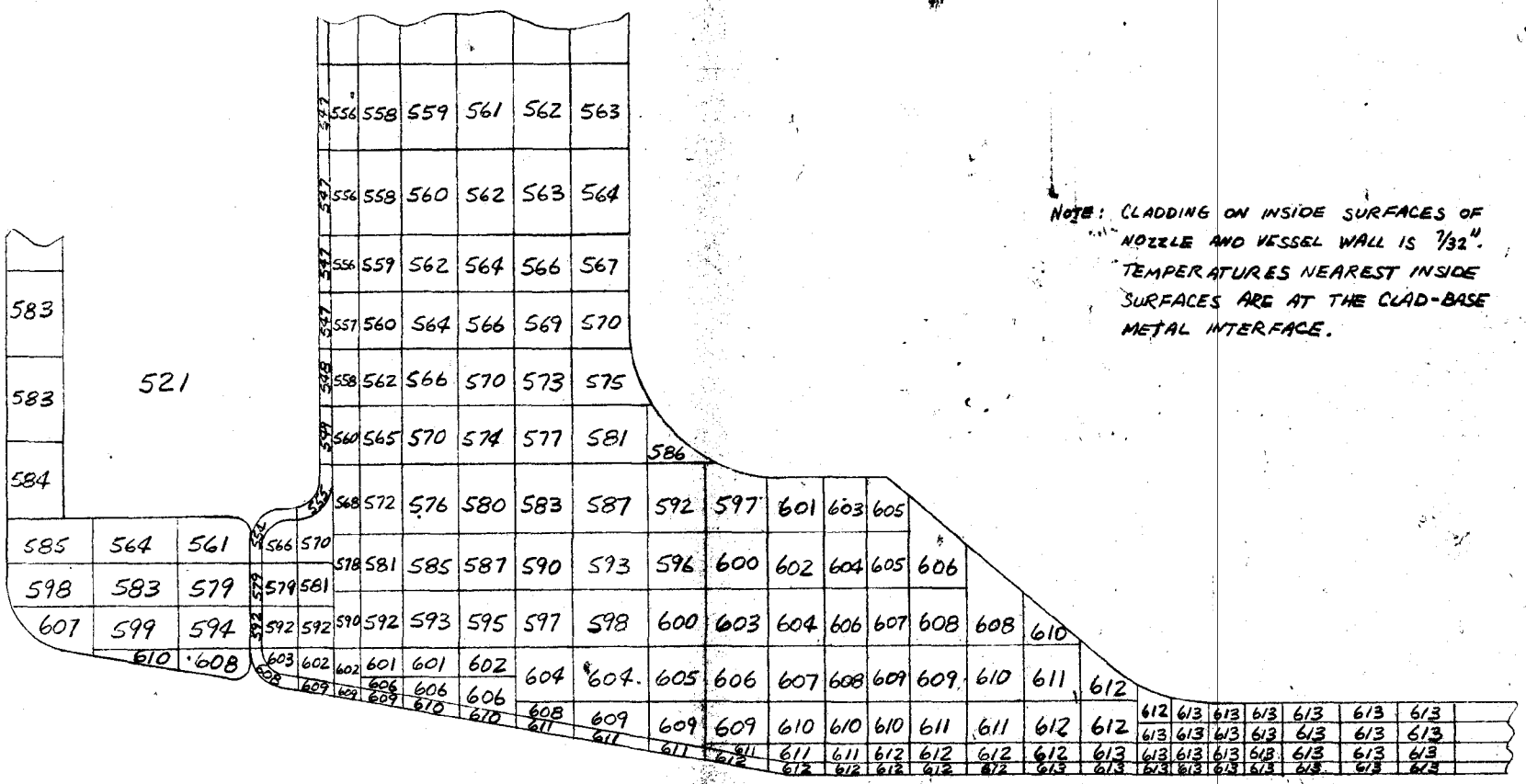


FIGURE B-

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE

FOR LOSS OF FLOW, ONE PUMP

TIME = 12 SEC.

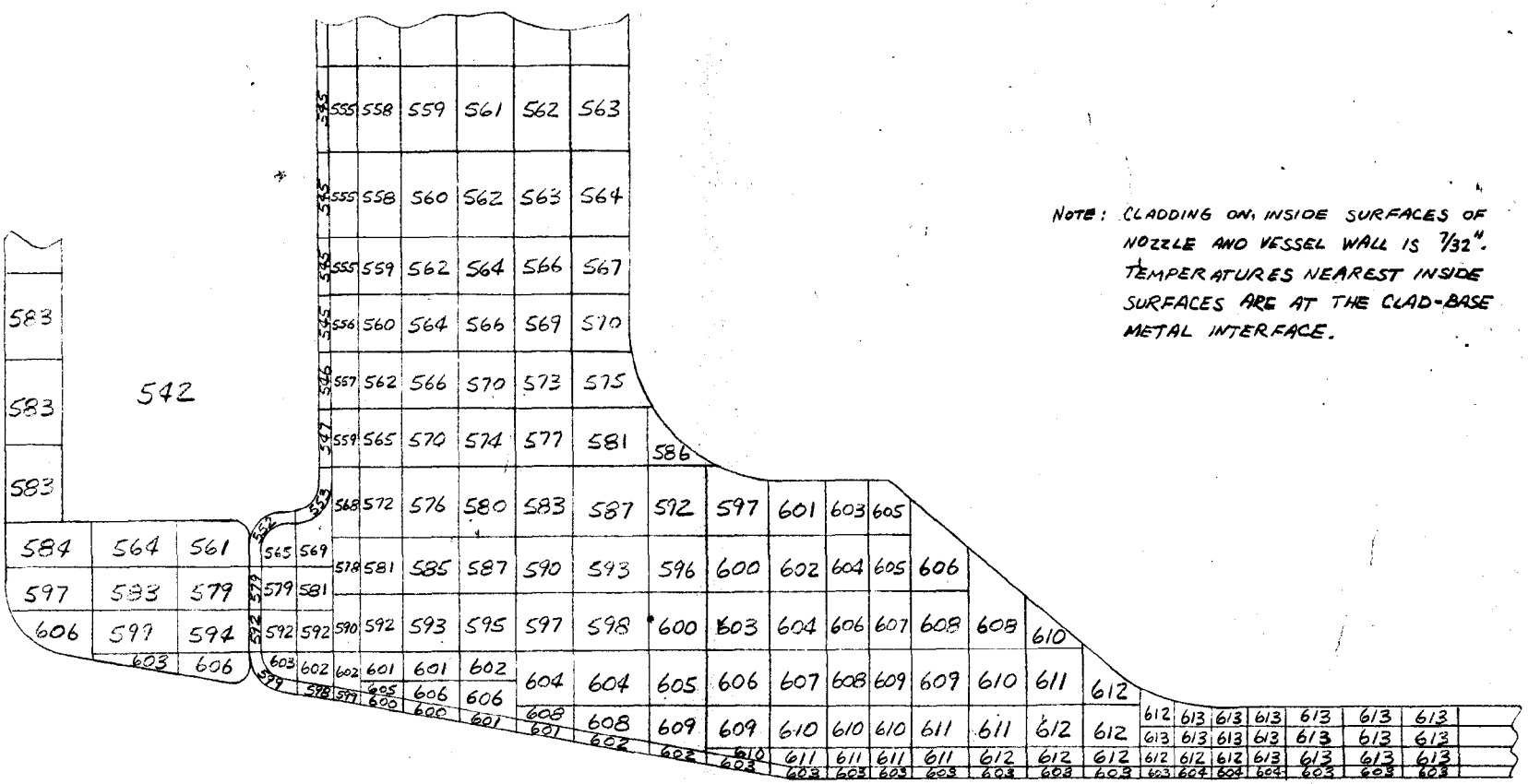
WESTINGHOUSE APD

SCALE DRAWN BY JCL TRACED BY DATE 4-7-66 CHECKED BY APPROVED

DRAWING NO. SB-17765-70

DIETZGEN NO. 135-2 AGEPROOF

REVISIONS	B-56



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

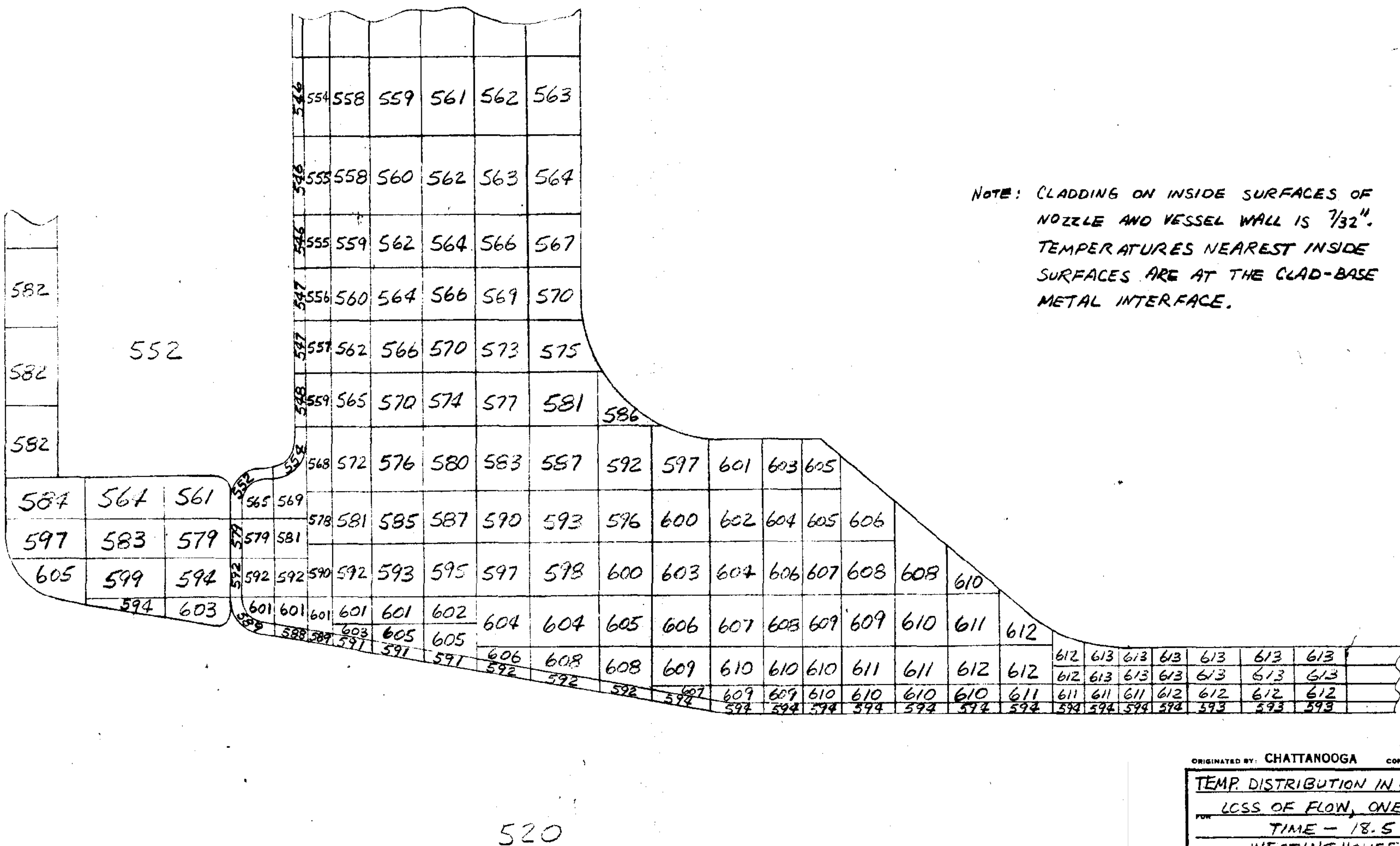
FIGURE B-3

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE
FOR LOSS OF FLOW, ONE PUMP
TIME – 16 SEC.
WESTINGHOUSE APD

SCALE
DRAWN BY JCL
TRACED BY
DATE 4-7-66
CHECKED BY
APPROVED

DRAWING NO. SB-17765-71



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-3

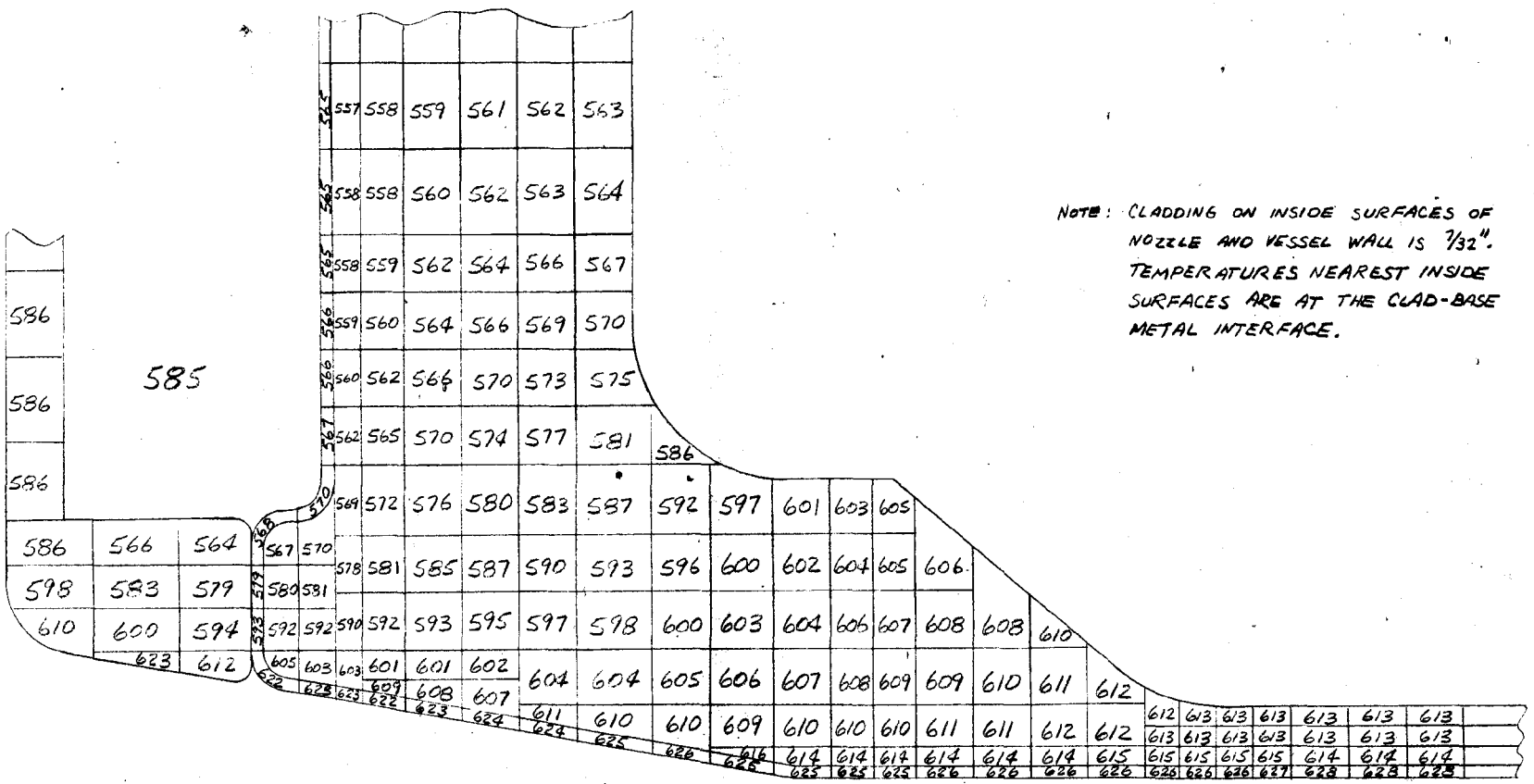
ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE
FOR LOSS OF FLOW, ONE PUMP
TIME — 18.5 SEC.
WESTINGHOUSE APD

SCALE
DRAWN BY JKL
TRACED BY
DATE 4-7-66
CHECKED BY
APPROVED

C-E

DRAWING NO. SB-17765-72



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-36

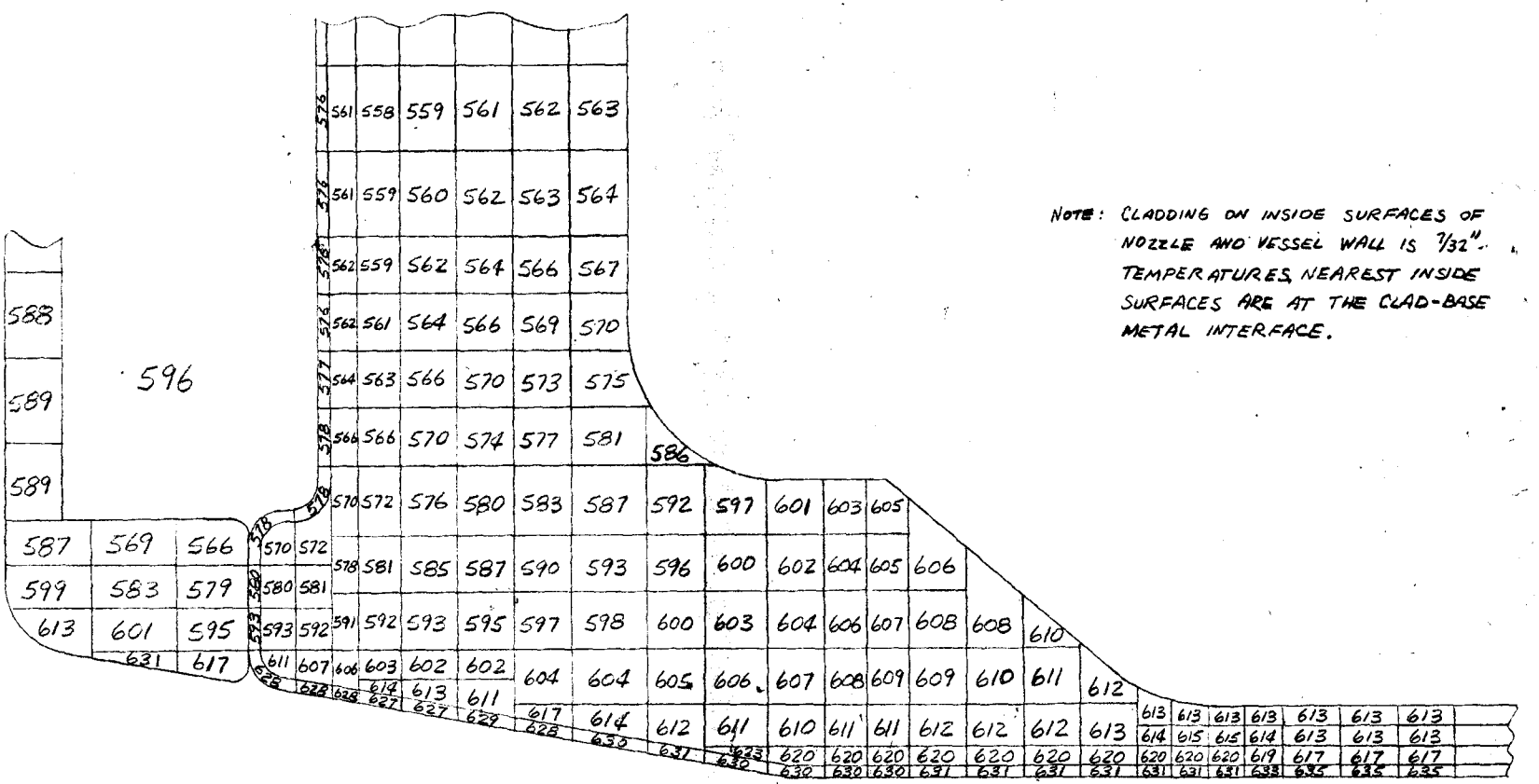
ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE FOR LOSS OF LOAD TIME - 12 SEC. WESTINGHOUSE APD

SCALE
DRAWN BY JCL
TRACED BY
DATE 4-7-66
CHECKED BY
APPROVED

DRAWING NO. SB-17765-73

REVISIONS	



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

FIGURE B-37

ORIGINATED BY: CHATTANOOGA CONTRACT NO.

TEMP. DISTRIBUTION IN OUTLET NOZZLE

FOR LOSS OF LOAD

TIME - 26 SEC.

WESTINGHOUSE APD

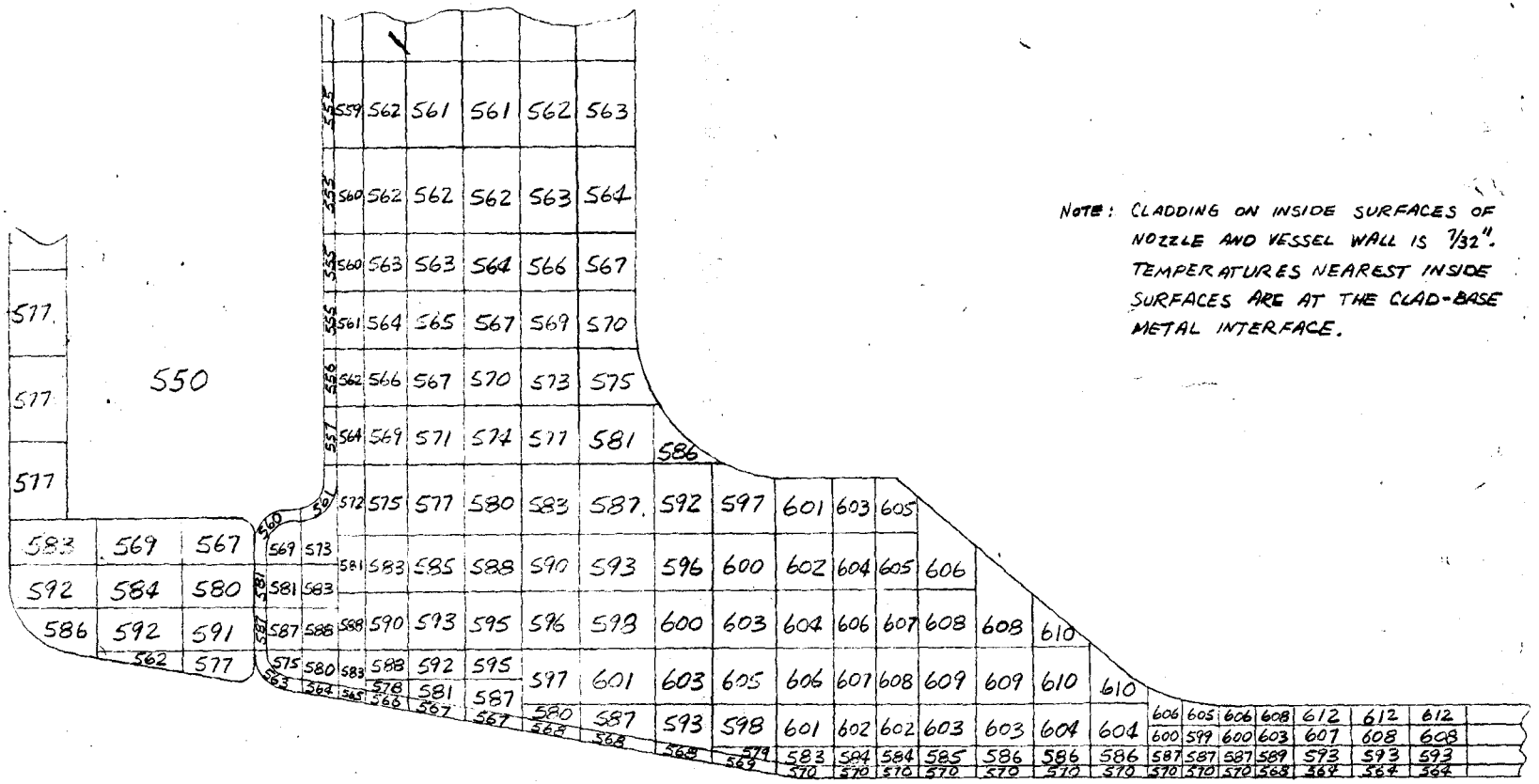
SCALE DATE 4-7-66

DRAWN BY J.G.L. CHECKED BY

TRACED BY APPROVED

DRAWING NO. SB-17765-74

REVISIONS	B-60



NOTE: CLADDING ON INSIDE SURFACES OF NOZZLE AND VESSEL WALL IS 7/32". TEMPERATURES NEAREST INSIDE SURFACES ARE AT THE CLAD-BASE METAL INTERFACE.

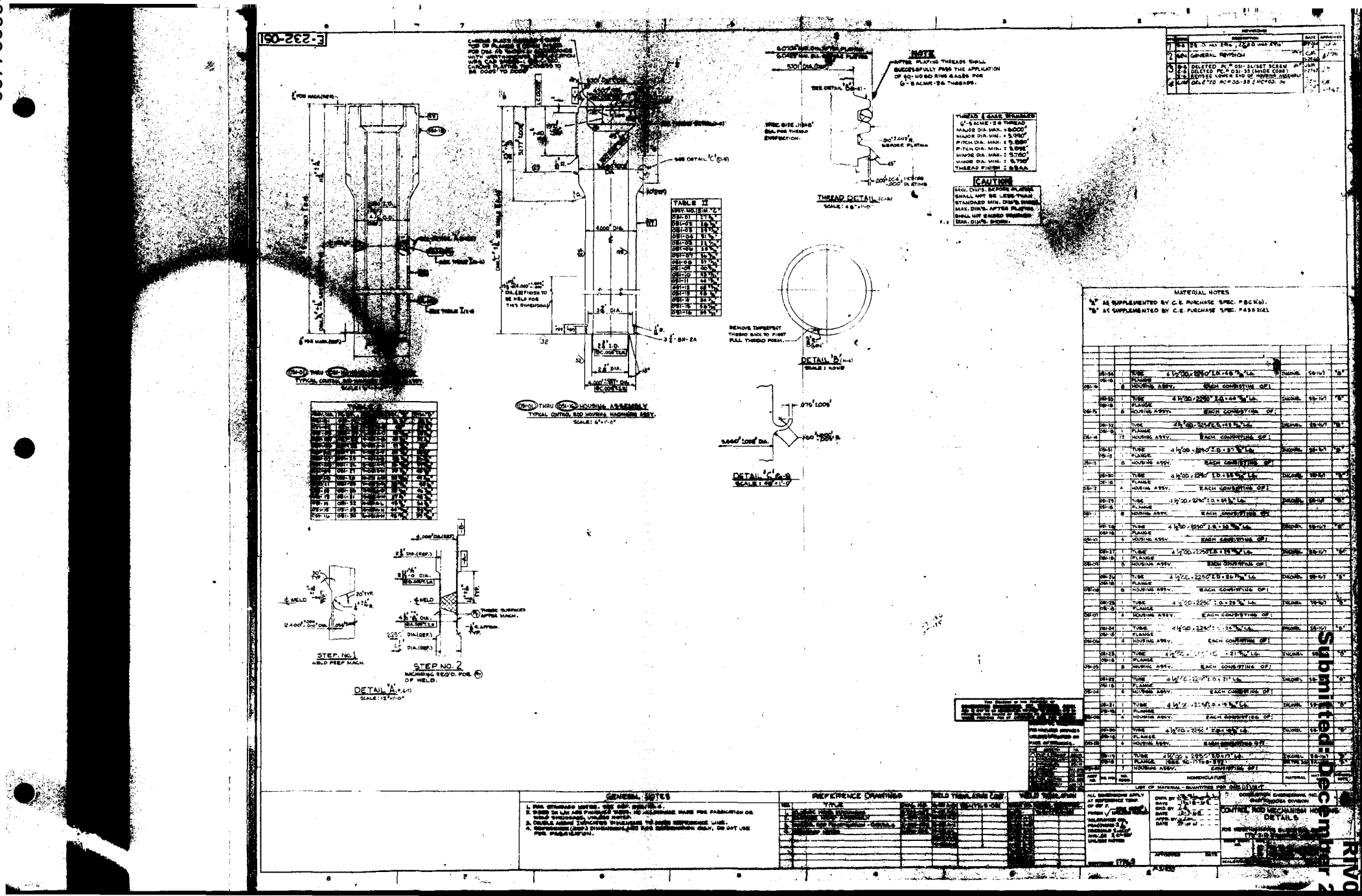
FIGURE B-38

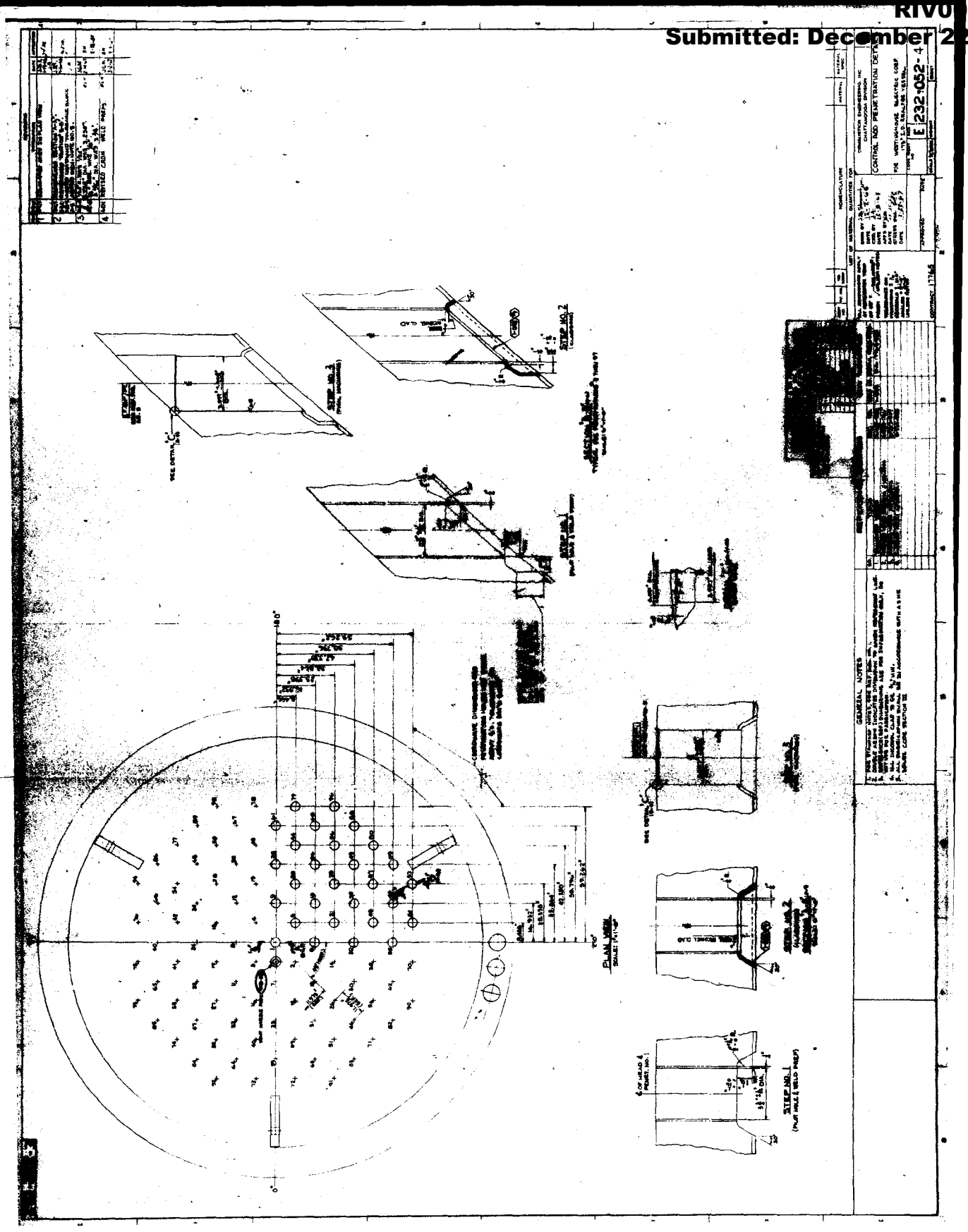
ORIGINATED BY: CHATTANOOGA CONTRACT NO.

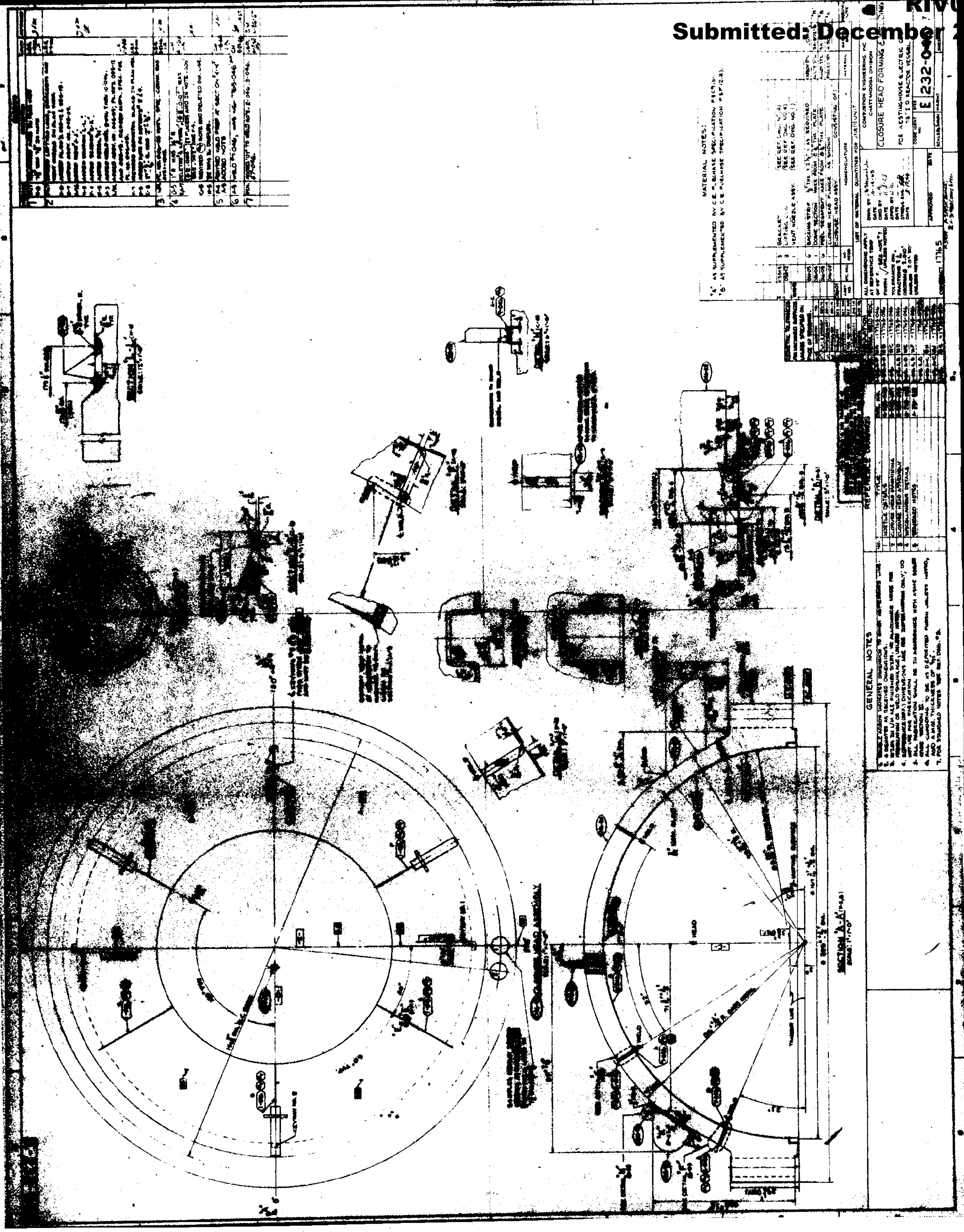
TEMP. DISTRIBUTION IN OUTLET NOZZLE
FOR LOSS OF LOAD
TIME - 144 SEC.
WESTINGHOUSE APD

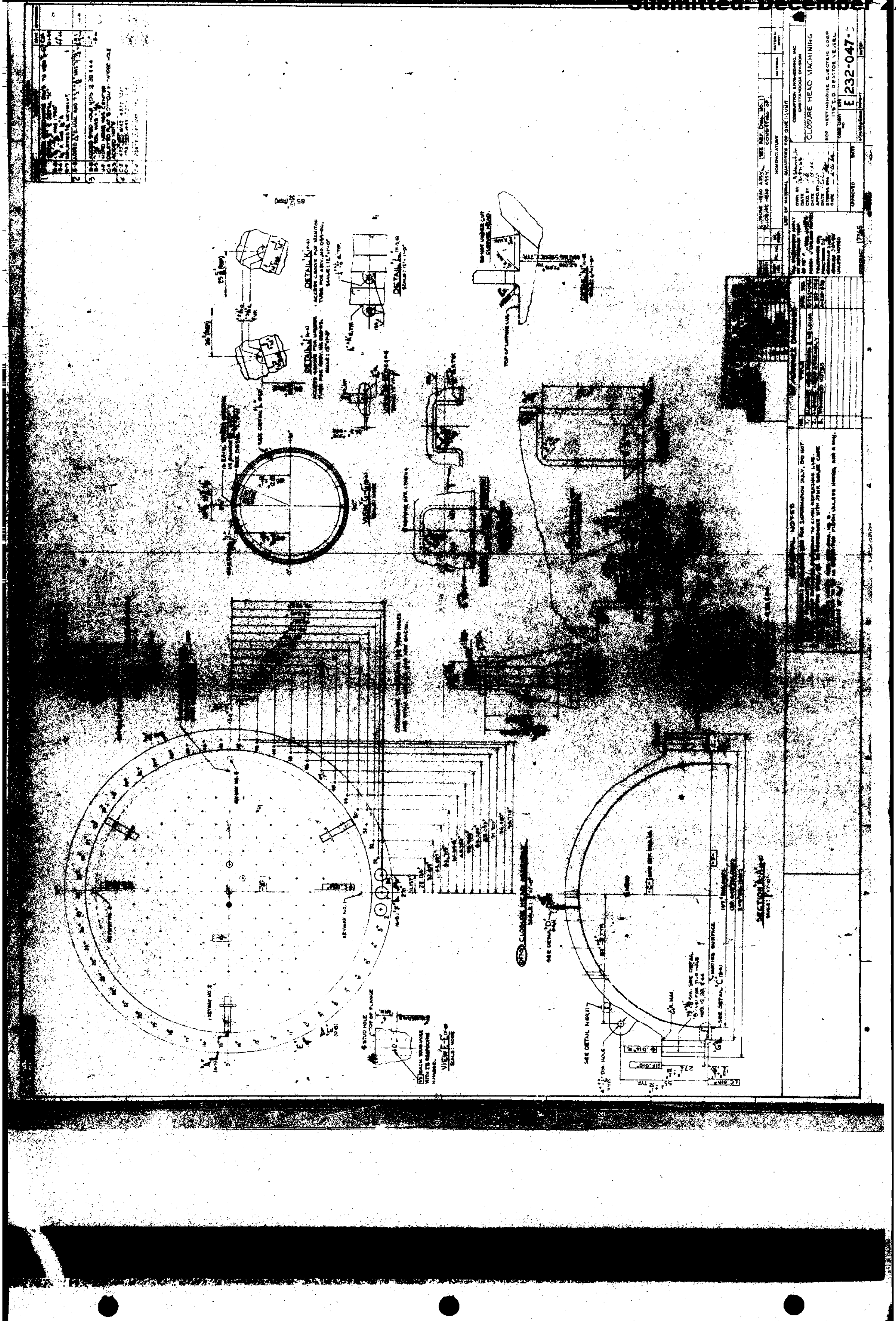
SCALE
DRAWN BY JCL DATE 4-7-66
TRACED BY CHECKED BY
APPROVED

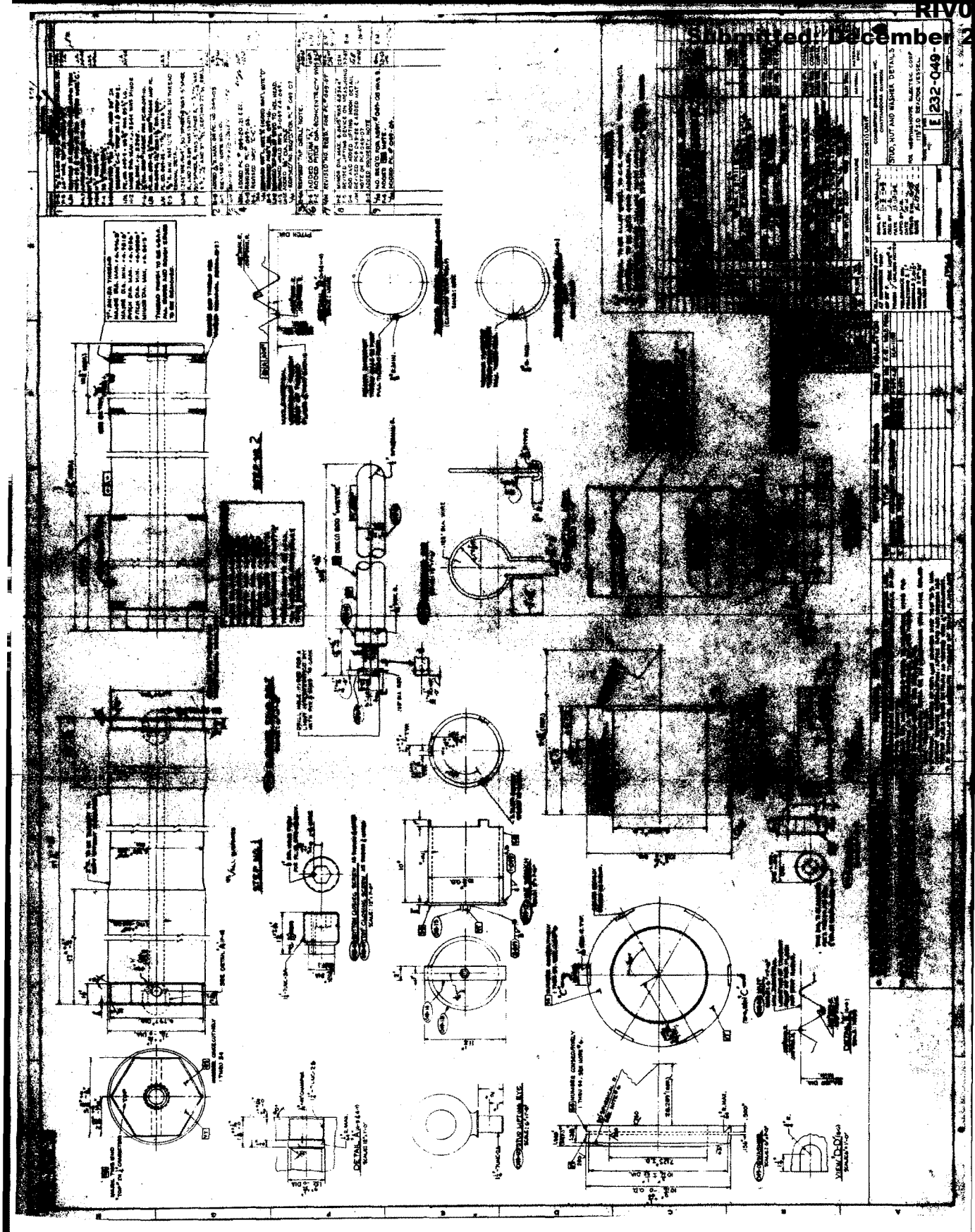
DRAWING NO. SB-17765-75

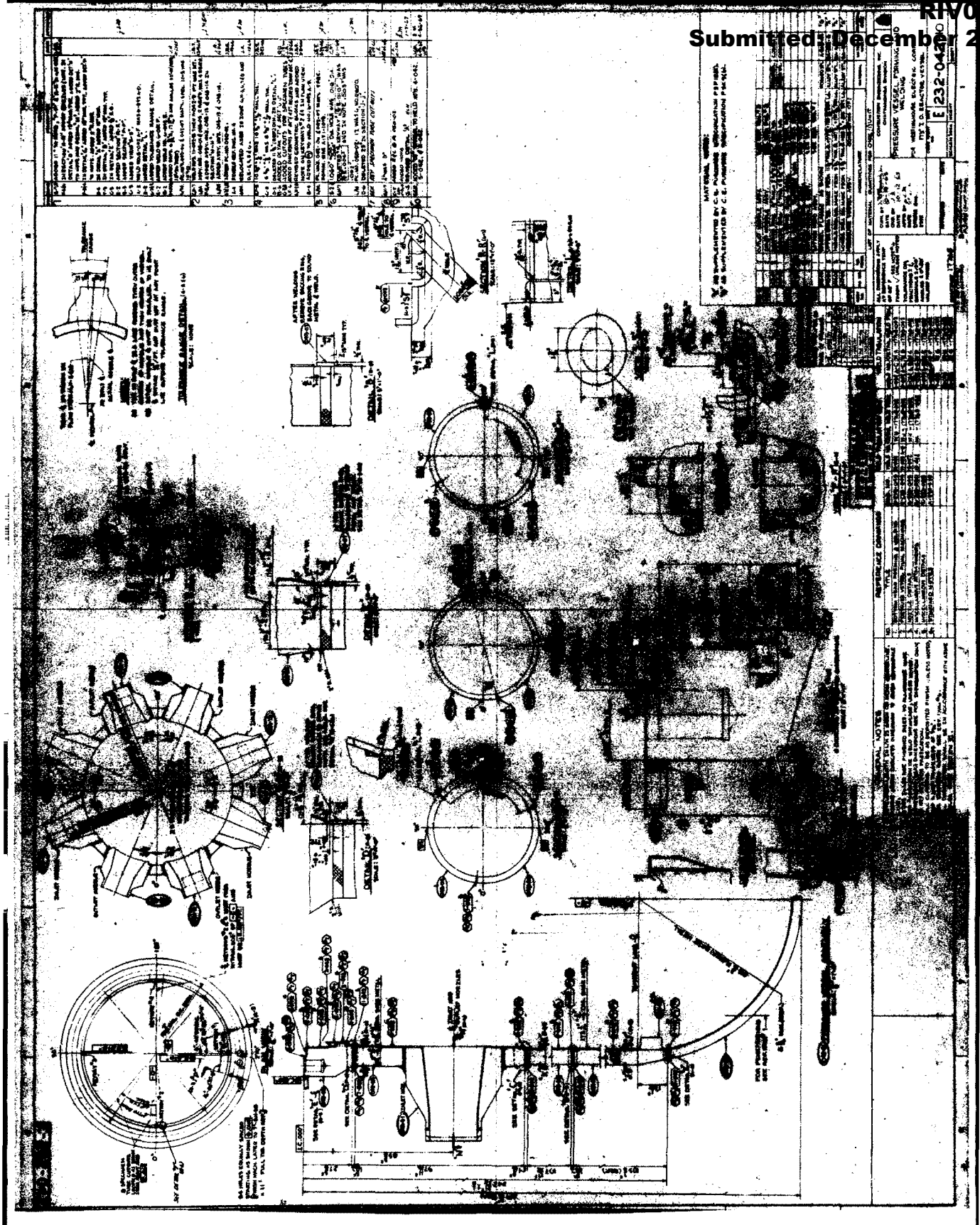


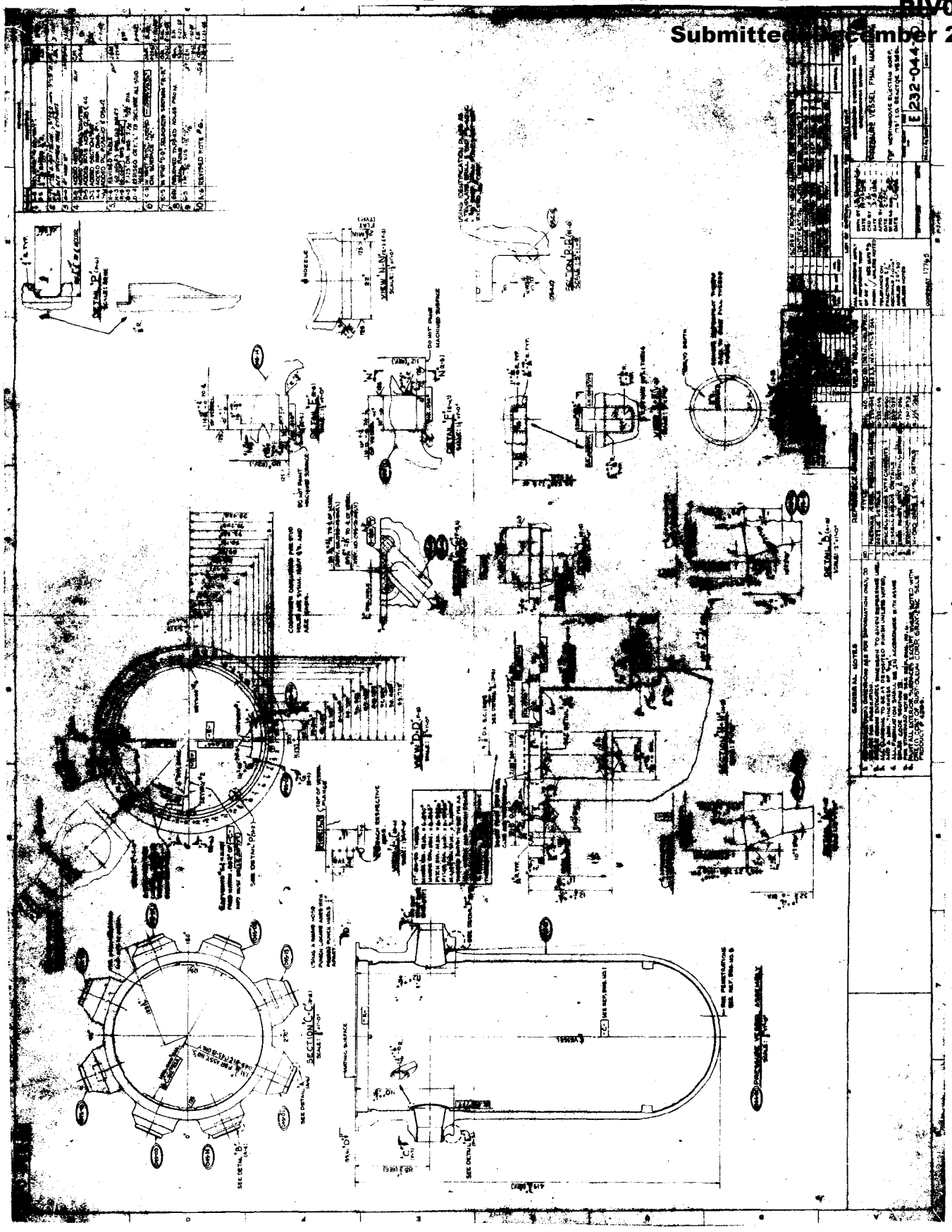


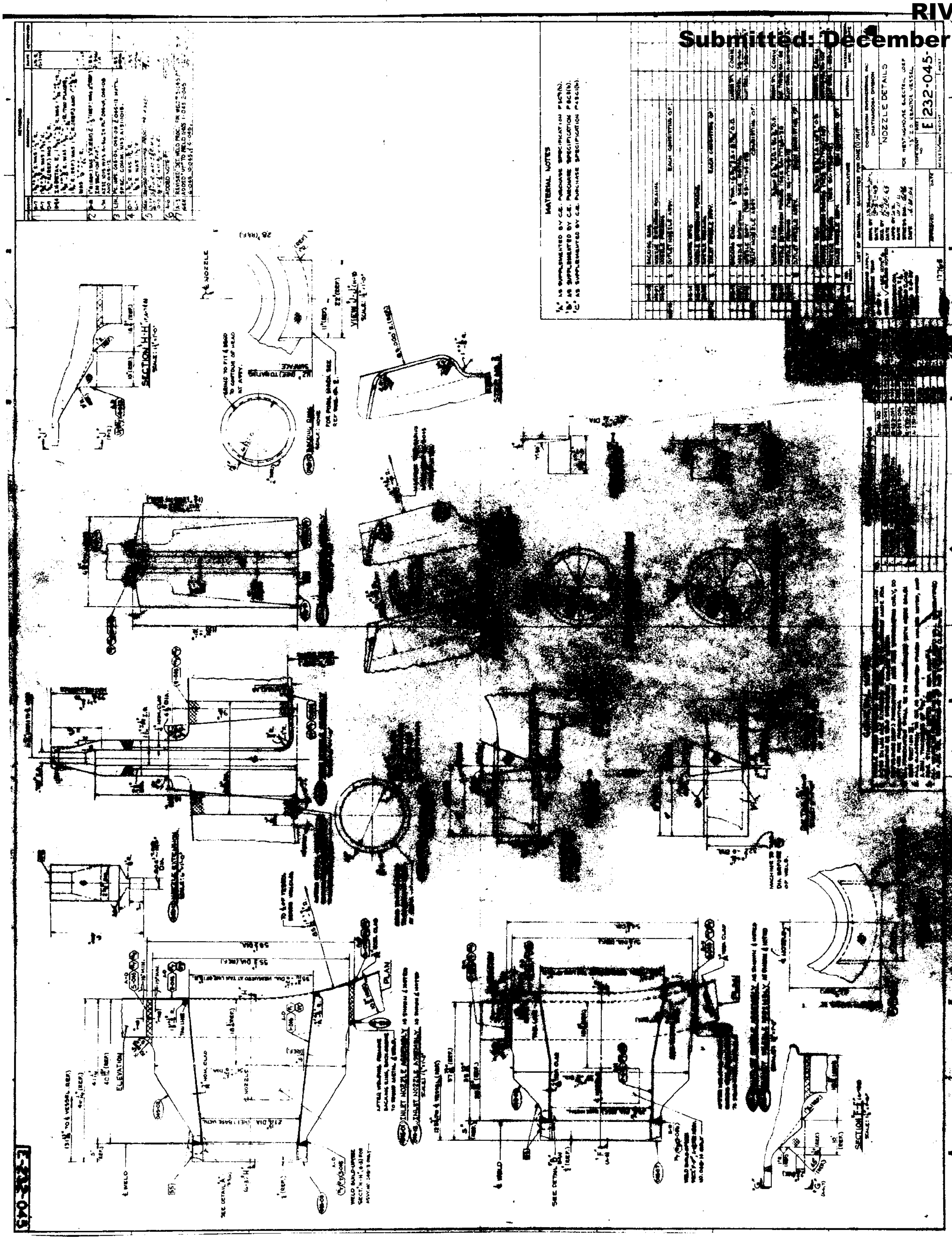


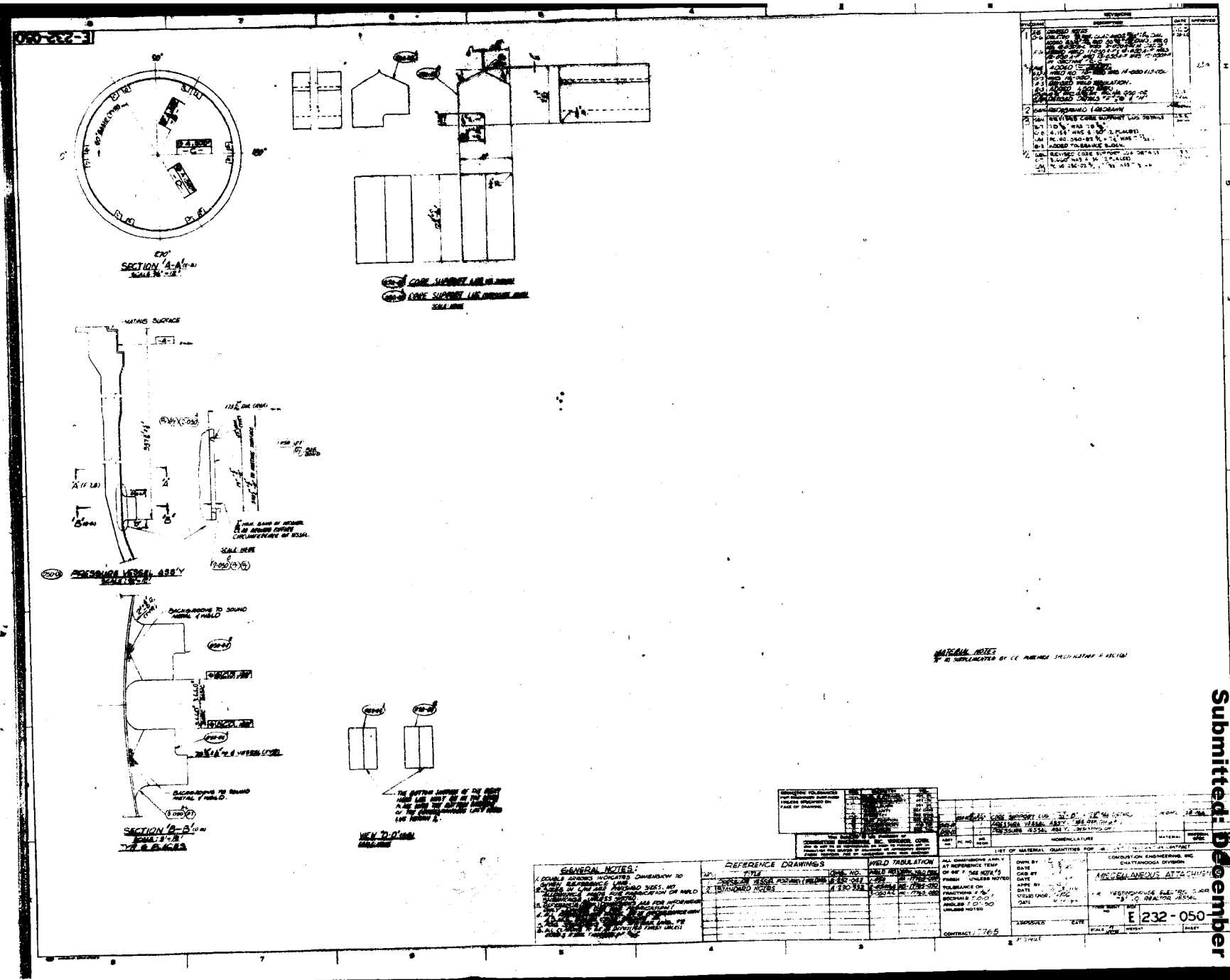


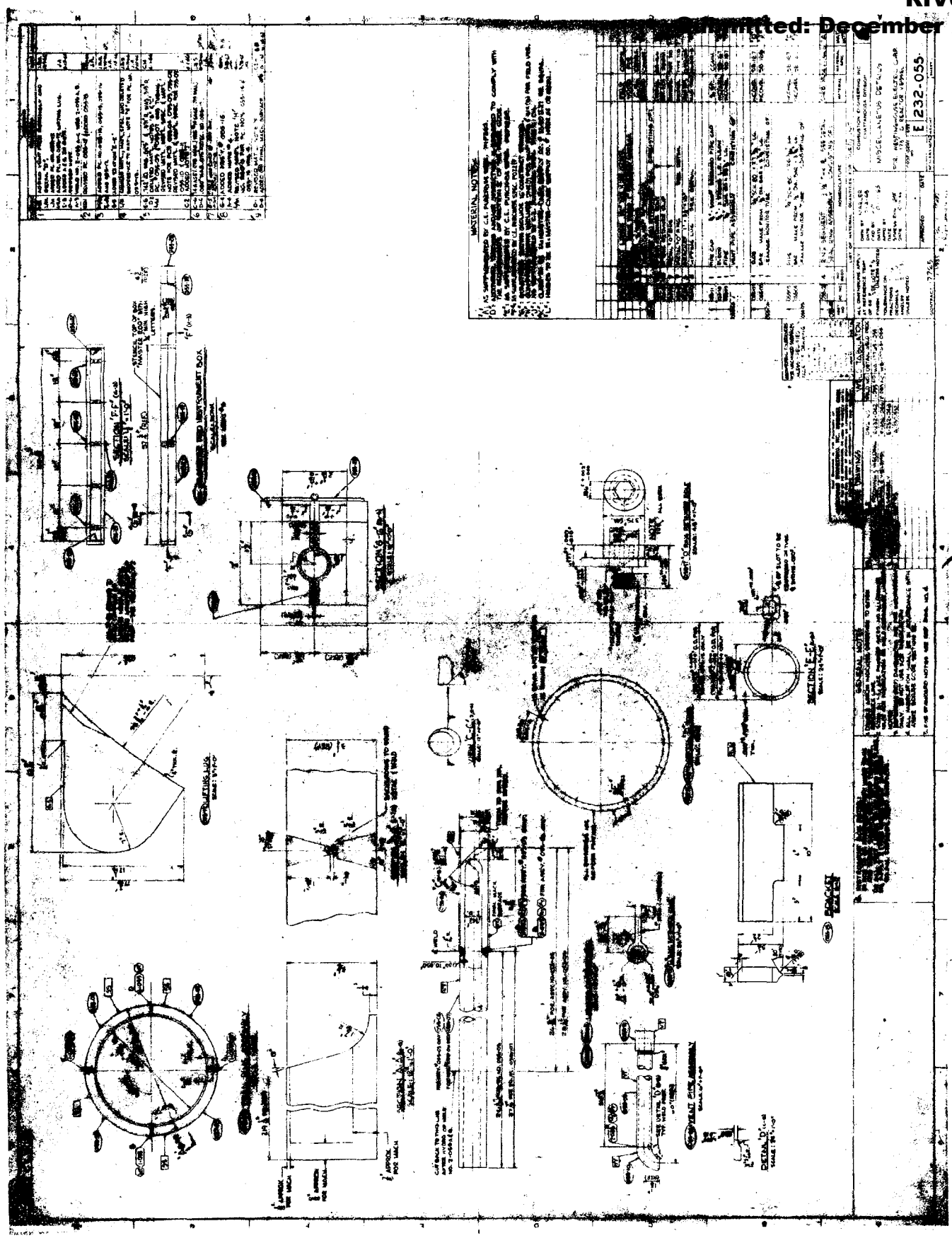


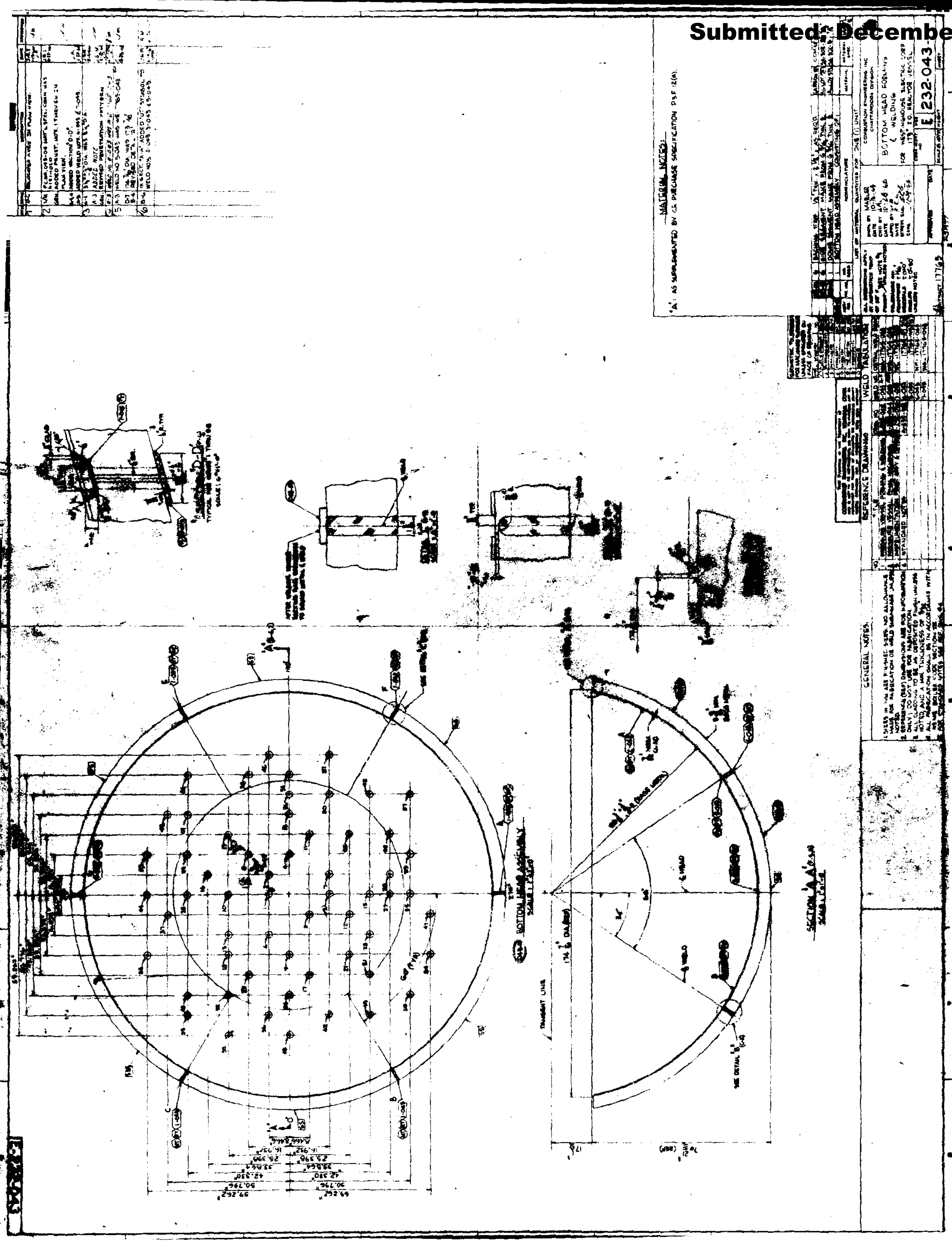





MATERIAL NOTES
NOZZLE DETAILS
E 232-045
ELEVATION
PLAN






MATERIAL NOTES:
232-043-
REFERENCE DRAWINGS
WELD TABULATION
GENERAL NOTES
BOTTOM HEAD ASSEMBLY
SECTION A-A