SNUPPS
Standardized Nuclear Unit
Power Plant System

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U.S. NUCLEAR REGULATORY COMMISSION

August 31, 1981

SLNRC 81-078 FILE: 0541
SUBJ: NRC Request for Additional Information - Materials Engineering

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Docket Nos: STN 50-482, STN 50-483, and STN 50-486

References:
1. NRC (Tedesco) letter to UE (Bryan), dated July 28, 1981, same subject.
2. NRC (Tedesco) letter to KGE (Koester), dated July 28, 1981, same subject.
3. SLNRC 81-69, dated August 14, 1981, same subject.
4. SLNRC 81-74, dated August 26, 1981, same subject.

Dear Mr. Denton:

References 1 and 2 requested additional information for the SNUPPS FSAR. Reference 3 provided responses to questions 123.1, 123.5, 123.8, 123.9, and 123.11. Reference 4 provided the response to question 123.6. The enclosure to this letter provides the responses to the remaining questions, 123.2, 123.3, 123.4, 123.7, and 123.10. This enclosure will be incorporated in the next FSAR Revision.

Very truly yours,

NAPetrick

Nicholas A. Petrick

RLS/bds/10b1

cc: J. K. Bryan UE
G. L. Koester KGE
D. T. McPhee KCPL
W. A. Hansen NRC/CAL
T. E. Vandel NRC/WC

B001
S1/1

Q123.2 Indicate whether the individuals performing the fracture toughness tests were qualified by training and experience and whether their competency was demonstrated in accordance with a written procedure. If the above information cannot be provided, state why the information cannot be provided and identify why the method used for qualifying individuals is equivalent to those of Paragraph III.B.4 Appendix G, 10 CFR Part 50.

RESPONSE

The fracture toughness tests for Callaway Units 1 and 2 and Wolf Creek Unit 1 reactor coolant pressure boundary components were performed by qualified operators in accordance with written procedures.

Q123.3 To demonstrate compliance with the beltline material test requirements of Paragraph III.C.2 of Appendix G, 10 CFR Part 50:

a. Provide a schematic for the reactor vessel showing all welds, p. tes and/or forgings in the beltline. Welds should be identified by shop control number, weld procedure qualification number, the heat of filler metal, and type and batch of flux. Provide the chemical composition for these welds (particularly) Cu, P, and S content).

b. Indicate the post-weld heat treatment used in the fabrication of the test welds.

c. Indicate the plates used to fabricate the test welds.

d. Indicate whether the test specimen for the longitudinal seams were removed from excess material and welds in the vessel shell course following completion of the longitudinal weld joint.

RESPONSE

Figure 123.3-1 identifies the location of the beltline materials and welds for the Callaway Unit 1 reactor vessel. Weld identification information for these welds is given in Table 123.3-1.

Information concerning the fabrication and post-weld heat treatment of the surveillance test specimen weld is identified in WCAP-9842 for Callaway Unit 1. Similar information will be provided in the surveillance program WCAPs for Callaway Unit 2 and Wolf Creek Unit 1 at a later date.

The test weldment is fabricated as a separate weld, not as an extension of a longitudinal weld seam.

Figure 123.3-1

CALLAWAY UNIT 1 REACTOR VESSEL

BELTLINE REGION MATERIAL IDENTIFICATION & LOCATION

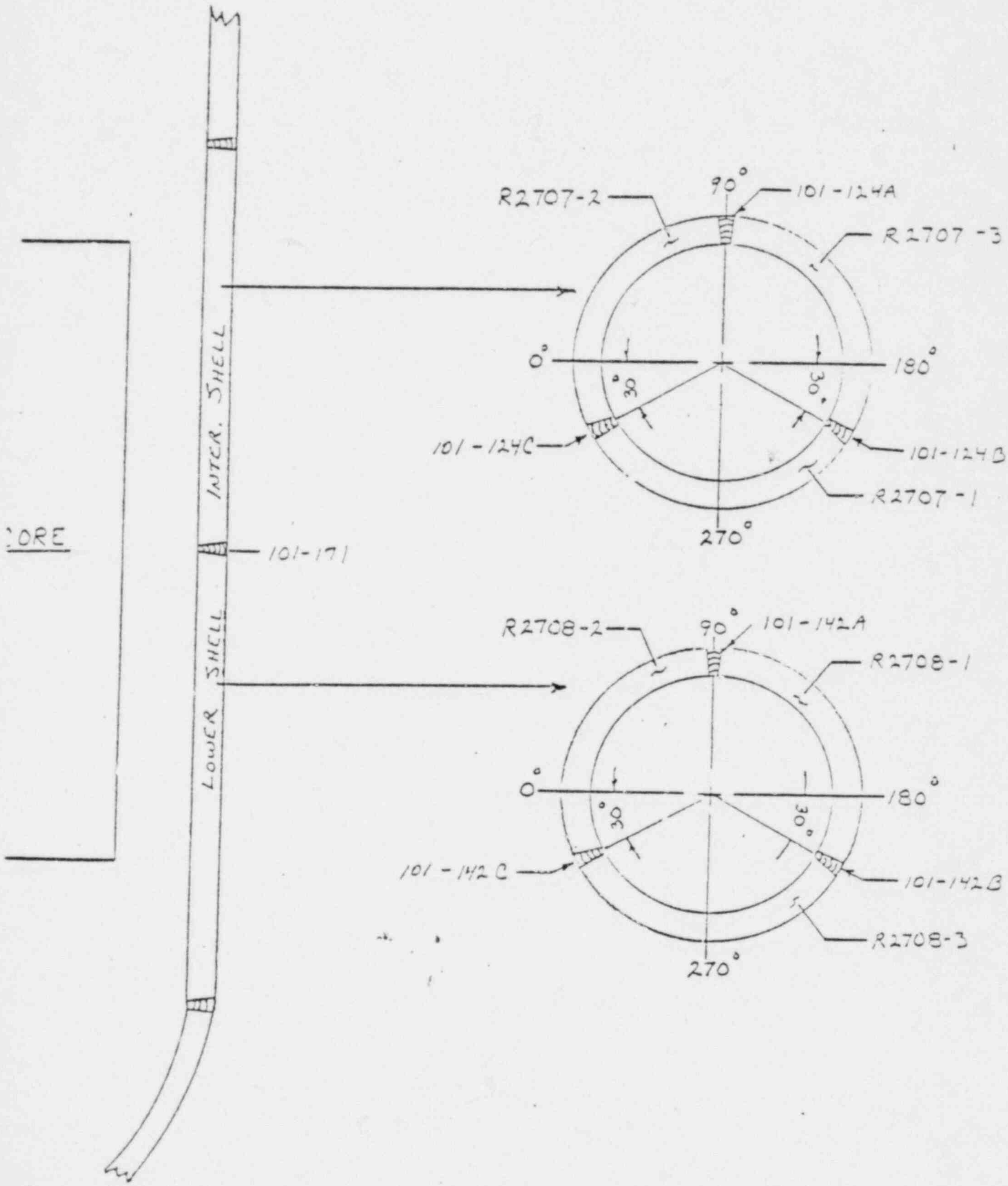

Table 123.3-1

CALLAWAY UNIT 1 VESSEL BELTLINE REGION WELD METAL IDENTIFICATION INFORMATION

WELD SEAM IDENTIFICATION	WELD CONTROL No.	WELD PROCEDURE QUAL. No.	WELD WIRE TYPE	WELD WIRE HEAT No.	FLUX TYPE	FLUX LOT No.
INT. SHELL LONG. WELD SEAM 101-124A, B & C	G2.03	SAA-SMA-12.12-102	B4	90077	LINDE 0091	0842
LOWER " " " " 101-142A, B & C	"	"	"	"	"	"
INTER. TO LOWER SHELL GIRTH SEAM 101-171	E3.14	SAA-SMA-3.3-107	"	"	LINDE 124	1061
SURVEILLANCE TEST WELD	"	"	"	"	"	"

WELD METAL CHEMICAL COMPOSITION (WT. %)

WELD CONTROL No.	C	Mn	P	S	Si	Cr	Ni	Mo	Cu	V
G2.03	.16	1.21	.008	.010	.19	.07	.06	.53	.04	.007
E3.14	.08	1.30	.006	.007	.52	.03	.04	.52	.04	.004

Q123.4 To demonstrate compliance with the fracture toughness requirements of Paragraph IV.A.1 of Appendix G, 10 CFR Part 50:

a. Provide the RT_{NDT} for all RCPB welds which may be limiting for operation of the reactor vessel.

b. Indicate whether there are any RCPB heat-affected zones which require CVN impact testing per paragraph NB-4335.2 of the 1977 ASME Code. Provide CVN impact test data for these heat-affected zones which may be limiting for operation of the reactor vessel.

c. Indicate that there are no ferritic RCPB base metals other than in vessels which require fracture toughness testing to NB-2300 of the ASME Code. If there are ferritic RCPB base metals other than in vessels which require fracture toughness testing to NB-2300 of the ASME Code, provide CVN impact and drop weight data for all materials which will be limiting for operation of the reactor vessel.

RESPONSE

Charpy V-notch test data for the heat-affected zone of the limiting beltline region plate is presented in WCAP-9842 for Callaway Unit 1. Similar information will be provided for the limiting materials of Callaway Unit 2 and Wolf Creek Unit 1 at a later date.

There are no other heat-affected zones which require impact testing per Paragraph NB-4335.2 of the 1977 ASME Code.

There are no ferritic base metals other than in vessels in the reactor coolant pressure boundary.

Q123.7 Provide full CVN impact curves for each weld and plate in the beltline region. Provide the data in tabulated and graphical form.

RESPONSE

Complete Charpy test results for each weld and plate in the Callaway Unit 1 reactor vessel beltline region are provided in Tables 123.7-1 through 123.7-3. Similar information for Callaway Unit 2 and Wolf Creek Unit 1 will be provided at a later date.

Table 123.1-1

Callaway Unit 1 Beltline Region Intermediate Shell Plate Toughness

Plate R2707-1				Plate R2707-2				Plate R2707-3			
Temp. (°F)	Energy (ft lb)	Shear (%)	Lat. Exp. (mils)	Temp. (°F)	Energy (ft lb)	Shear (%)	Lat. Exp. (mils)	Temp. (°F)	Energy (ft lb)	Shear (%)	Lat. Exp. (mils)
-40	15	0	10	-40	10	0	5	-40	14	0	7
-40	10	0	6	-40	19	0	11	-40	16	0	8
-40	9	0	6	-40	10	0	4	-40	12	0	5
20	29	15	20	10	28	10	20	20	35	15	26
20	31	15	23	10	37	15	25	20	35	15	28
20	37	20	26	10	21	5	13	20	33	15	24
60	44	20	32	60	55	25	38	40	55	30	40
60	43	20	33	60	45	20	36	40	46	25	34
60	41	20	35	60	46	20	35	40	50	30	46
80	50	40	40	70	52	25	40	50	64	40	42
80	58	60	47	70	62	40	46	50	51	30	38
80	47	50	42	70	59	30	45	50	50	25	37
90	47	50	39	80	62	40	48	60	79	35	53
90	59	60	42	80	60	40	48	60	54	25	38
90	56	60	43	80	66	40	47	60	62	30	44
100	70	80	52	100	74	60	54	100	79	40	59
100	67	70	51	100	88	80	62	100	80	50	58
100	61	70	49	100	65	60	51	100	76	40	57
160	76	100	58	160	100	100	71	160	96	100	67
160	78	100	62	160	98	100	65	160	103	100	69
160	81	100	61	160	103	100	72	160	98	100	68
T_{NDT}	-40°F			T_{NDT}	-50°F			T_{NDT}	-40°F		
RT_{NDT}	40°F			RT_{NDT}	10°F			RT_{NDT}	-10°F		

Table [illegible]

Callaway Unit 1 Beltline Region Lower Shell Plate Toughness

Plate R2708-1

Temp. (°F)	Energy (ft lb)	Shear (%)	Lat. Exp. (mils)
20	10	0	5
20	9	0	4
20	11	0	5
60	18	0	13
60	16	0	13
60	18	0	15
80	22	5	18
80	27	10	23
80	27	10	22
100	45	20	35
100	41	15	32
100	40	15	33
110	58	25	41
110	57	25	41
110	50	25	35
160	79	60	52
160	89	70	56
160	79	60	52
212	[illegible]	100	57
212	7[illegible]	100	58
212	74	100	58

T_{NDT} 0°F
RT_{NDT} 50°F

Plate R2708-2

Temp. (°F)	Energy (ft lb)	Shear (%)	Lat. Exp. (mils)
-40	7	0	3
-40	8	0	3
-40	7	0	3
30	29	15	19
30	22	5	16
30	21	5	14
60	43	20	29
60	43	20	28
60	42	20	28
70	51	25	35
70	57	30	39
70	51	25	36
100	68	30	47
100	57	25	40
100	81	40	51
160	90	90	60
160	98	95	62
160	101	90	65
212	105	100	63
212	110	100	74
212	100	100	64

T_{NDT} -30°F
RT_{NDT} 10°F

Plate R2708-3

Temp. (°F)	Energy (ft lb)	Shear (%)	Lat. Exp. (mils)
-40	6	0	2
-40	7	0	3
-40	6	0	3
0	14	0	11
0	13	0	9
0	15	0	11
50	32	15	26
50	33	10	28
50	47	20	32
70	46	20	31
70	52	25	35
70	45	20	31
80	52	25	37
80	54	25	38
80	57	30	39
100	71	25	54
100	64	30	46
100	67	30	48
160	94	80	60
160	92	80	66
160	100	90	68
212	95	100	61
212	100	100	62
212	109	100	68

T_{NDT} -10°F
RT_{NDT} 20°F

Table 123.7-3

CALLAWAY UNIT 1 BELTLINE REGION WELD METAL TOUGHNESS

WELD CONTROL No. G2.03

TEMP. (°F)	ENERGY (ft lb)	SHEAR (%)	LAT. EXP. (mils)
-80	16	0	7
-80	18	0	8
-80	18	0	7
-40	38	20	26
-40	32	15	17
-40	34	15	19
0	79	40	52
0	61	70	39
0	95	70	60
10	96	70	62
10	101	70	60
10	84	60	58
60	118	80	78
60	130	90	80
60	117	80	75
100	137	100	82
100	132	100	82
100	141	100	83
180	142	100	82
180	145	100	85
180	143	100	83

T_{NDT} -60°F
RT_{NDT} -60°F

WELD CONTROL No. E3.14

TEMP. (°F)	ENERGY (ft lb)	SHEAR (%)	LAT. EXP. (mils)
-80	16	0	9
-80	17	0	13
-80	21	0	15
-40	38	15	29
-40	59	30	42
-40	50	25	36
0	84	60	59
0	83	60	57
0	72	40	48
60	108	90	76
60	106	90	76
60	109	90	79
100	109	100	77
100	114	100	80
100	108	100	79
160	115	100	83
160	108	100	80
160	114	100	81

T_{NDT} -60°F
RT_{NDT} -60°F

Q123.10 Indicate the normal operating temperature of the flywheels and provide CVN impact and drop weight test data from each flywheel that indicates the RT_{NDT} of the flywheels are $100^{o}F$ less than their normal operating temperatures.

RESPONSE

As stated in WCAP-8163 (Reference 1 to Section 5.4), the normal operating temperature of the reactor coolant pump motor flywheels is $120^{o}F$. The Westinghouse specifications require a maximum RT_{NDT} of $10^{o}F$ as discussed in Section 5.4.1.5.2.2. The Charpy V-Notch and dropweight tests confirm that the normal operating temperature is in excess of $100^{o}F$ above the RT_{NDT} of the flywheel material.