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IN-REACTOR OPERATING CONDITIONS FOR THREE CHANNELS OF KSE-3 ELEMENTS IN THE KER LOOPS

• AUTHOR

W. K. Kratzer

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June 26, 1961

IN-REACTOR OPERATING CONDITIONS FOR THREE CHARGES OF KSE-3 ELEMENTS IN THE KER LOOPS

The KSE-3⁽¹⁾ element, a 1.6% enriched Zr-2 jacketed tubular element nominally 1.74 inch O.D. by 1.05 inch I.D., was designed for irradiation in the KER loops to simulate the behavior of an N-reactor outer fuel tube. Three charges of these fuel elements have been irradiated under PT-IP-363-A: ⁽²⁾ one in KER-2 to 1985 MWD/T, one in KER-3 to 3555 MWD/T, and one in KER-4 to 1195 MWD/T.

This document provides the calculated powers and temperatures for each fuel element during the time it was irradiated.

Table 1 gives the identification of the fuel elements in each charge. Complete preparation and pre-irradiation measurement data for these elements are given in HW-69243. ⁽³⁾ Table 2 lists reactor shutdowns, equivalent days of equilibrium operation, and process tube outlet temperatures and ΔT 's chronologically for the period the fuel elements were in the reactor. Table 3 gives the individual fuel element operating conditions for the charge in KER-2. Table 4 provides

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the same information for the elements in KER-4. Table 5 lists the average fuel element operating conditions for each element in KER-3 during each operating period. Average values for each operating period are reported in Table 5, rather than daily values as are given in Tables 3 and 4, to reduce the effort required to calculate individual fuel temperatures for the considerably longer irradiation time covered by Table 5.

Detailed KER loop operating experience for each of the charges is given in the KER operating reports. (4,5,6)

W. K. Kratzer

W. K. Kratzer
Reactor Fuels
Process and Reactor Development
Research and Engineering Section
IRRADIATION PROCESSING DEPARTMENT

This document classified by

W. Ambrose

WKK/gb

References

1. Kusler, L.E. and W.K. Kratzer, Method for Designating Experimental Co-extruded Zircaloy-2 Jacketed Fuel Elements, HW-67225, October 26, 1960, (UNDOCUMENTED)
2. Kratzer, W.K., PT-IP-363-A, Irradiation of Zr-2 Jacketed Enriched Single Tube Fuel Elements in the KER Loops, HW-67168, October 19, 1960 (UNDOCUMENTED)
3. Hays, D.D. and L.E. Kusler, Processing Data for KSE-3 Loop Charges (PT-363), HW-69243, April 13, 1961 (UNDOCUMENTED)
4. Young, K.L. KER-4 Operating Report, Test Number K-4-9, PT-IP-363, HW-68755 March 17, 1961 (UNDOCUMENTED)
5. Richardson, C.A. KER-3 Operating Report, Test K-3-13, PT-IP-363-A, HW-69857, June 12, 1961 (UNDOCUMENTED)
6. KER-2 Operating Report is in Preparation.

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TABLE 1

<u>Element</u>	<u>Fuel Element Identification</u>		
	<u>KER-2</u>	<u>KER-3</u>	<u>KER-4</u>
1 (upstream)	64-253	67-215	65-195
2	64-234	67-176	64-176
3	64-195	67-234	64-116
4	64-135	67-77	64-58

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TABLE 2

Chronological Operating Times and Process Tube Temperatures

Date	Reactor Shutdown- Startup Times	Number of Shutdowns	Equivalent Days of Equilibrium Operation	KER-2		KER-3		KER-4	
				T °C	ΔT °C	T °C	ΔT °C	T °C	ΔT °C
Nov. 11, '60	D0020		0	charged				charged	
12	U2255		0						
13			.8	124	59			73	60
14			1	136	61			75	63
15			1	225	57			70	58
16			1	236	56			70	58
17			1	237	56			70	58
18			1	239	56			72	60
19			1	238	56			72	60
20			1	238	57			71	59
21			1	239	58			71	59
22			1	239	56			70	58
23			1	240	56			70	59
24			1	242	56			69	59
25			1	242	55			69	59
26			1	242	56			70	59
27	D2215	1	.9	242	56			69	59
28			0						
29			0						
30	U2152		0						
Dec. 1, '60			.5						
2			1	242	56			243	57
3			1	243	54			243	55
4			1	242	55			242	54
5			1	243	54			243	55
6			1	242	56			242	54
7	D0154	1	.1						
8	U2039, D2335	1	0						
9	U0237, D0450, U1104	1	.1						
10	D1752	1	.2						
11			0						
12	U0617		.1						
13			.8	242	57				
14			1	242	58			241	53
15	D1426	1	.6	242	56			242	53
16			0			charged			
17	U0108		.2						
18	D0607, U0639, D0642	2	.1						
19	U1415		.1						
20	D1423, U1448	1	.6	242	57	239	51		
21	D1415	1	.5						
22	U2102		0						
23			.8						
24			1	242	54	237	59	240	56
25			1	243	57	239	59	242	53
26			1	242	57	234	60	242	54
27			1	242	56	234	58	242	53
28			1	242	55	235	58	242	53
29			1	242	57	235	58	242	53
30			1	242	55	235	58	243	54
31			1	242	55	235	58	243	52

Table 2 (cont'd)

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Date	Reactor Shut-down-Startup Times	Number of Shut-downs	Equivalent Days of Equilibrium Operation	KER-2		KER-3		KER-4	
				T ₀ °C	ΔT °C	T ₀ °C	ΔT °C	T ₀ °C	ΔT °C
Jan. 1, '61			1	242	55	235	59	242	55
2			1	242	56	235	60	242	54
3			1	242	56	235	59	242	55
4			1	242	56	235	60	242	55
5			1	242	56	235	60	242	56
6			1	242	56	220	60	242	55
7			1	242	55	190	63	242	54
8			1	243	57	189	64	242	56
9			1	129	64	189	58	242	52
10			1	130	63	189	63	241	53
11			1	131	64	190	62	242	53
12			1	128	61	190	63	248	52
13	D2208	1	.9	131	64	191	63	249	53
14			0					Discharged	
15			0						
16			0						
17	U0837		.4						
18			.9	242	52	189	58		
19	D2242	1	.9	242	56	189	61		
20			0						
21	U0837		.2	242	53	190	40		
22			.9	242	57	190	54		
23			1	242	60	190	66		
24			1	235	60	190	66		
25			1	235	60	189	66		
26			1	235	60	189	64		
27			1	235	60	190	65		
28			1	235	60	190	66		
29			1	235	60	190	67		
30			1	137	67	190	67		
31			1	137	67	190	67		
Feb. 1, '61	D1430	1	.6	138	68	190	67		
2			0						
3	U1415		.1						
4			.8	247	45	189	60		
5			1	247	51	190	58		
6			1	247	50	190	58		
7			1	247	50	189	57		
8			1	248	50	190	57		
9			1	248	51	189	58		
10			1	247	50	189	56		
11			1	248	50	190	57		
12			1	248	50	190	56		
13			1	248	50	190	57		
14			1	248	50	190	57		
15			1	248	50	190	57		
16			1	248	50	190	57		
17			1	248	51	190	59		
18			1	248	49	190	58		

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Table 2 (cont'd)

Date	Reactor Shut-down-Startup Times	Number of Shutdowns	Equivalent Days of Equilibrium Operation	KER-2		KER-3	
				T °C	ΔT °C	T °C	ΔT °C
Feb. 19, '61			1	248	48	190	58
20			1	248	51	190	57
21			1	247	48	190	55
22			1	248	49	190	56
23	D0808	1	.3	248	49	190	54
24			0	discharged			
25	U1306, D1444, 41708 D2059, U2119	2	0				
26			.9			190	68
27			1			190	68
28			1			190	65
Mar. 1, '61			1			190	65
2			1			190	65
3			1			189	64
4			1			190	66
5			1			190	65
6			1			190	65
7			1			190	65
8	D2013	1	.8			190	65
9			0				
10			0				
11	U0831, D1055, U1120	1	.3				
12			1			186	61
13	D1955	1	.8			187	60
14			0				
15	U1615		.2				
16			1			190	68
17			1			190	65
18			1			190	66
19	D1310	1	.5			190	65
20			0				
21	U0005, D0049, U0118	1	.5				
22	D0151	1	0				
23	U1752		0				
24			.9				
25	D0218	1	.1				
26	U1015, D1055, U1225	1	.2				
27			.9			190	55
28			1			190	67
29			1			190	66
30			1			190	64
31			1			190	62
Apr. 1, '61			1			190	65
2			1			190	65
3			1			190	64
4			1			190	63
5			1			190	64
6			1			190	62
7			1			190	63
8	D0810	1	.3			190	63
9			0				
10	U0655, D0846	1	0				
11	U0712, D0729, U0746	1	.3				

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Table 2 (cont'd)

Date	Reactor Shut-down-Startup Times	Number of Shutdowns	Equivalent Days of Equilibrium Operation	KER-3	
				T °C	ΔT °C
Apr. 12, '61			.8	190	70
13			1	190	67
14			1	190	68
15			1	190	65
16			1	190	65
17			1	190	66
18			1	190	66
19	D0203	1	.1		
20	U1212		.2		
21			.9		
22			1	122	67
23			1	125	69
24			1	125	69
25			1	120	67
26	D0124	1	.1		
27	U1242		.2		
28			.9	189	54
29			1	190	62
30			1	190	65
May 1, '61			1	190	65
2			1	190	65
3			1	190	66
4			1	190	65
5			1	190	66
6			1	190	66
7			1	190	66
8			1	190	65
9			1	190	65
10	D2335	1	1	190	65
11			0		
12	U1621, D2250	1	0		
13	U0127		.5		
14			1	190	55
15			1	190	59
16			1	190	60
17			1	190	60
18			1	190	60
19			1	190	60
20			1	190	61
21			1	190	61
22			1	190	62
23			1	190	61
24			1	190	61
25			1	190	61
26	D2220	1	.9	190	61
27				discharged	

TABLE 3
Operating Conditions, 4 KSE-3 Elements in KER-2, Charged N

[illegible]

TABLE 3

-3 Elements in KER-2, Charged Nov. 11, 1960, Discharged Feb. 23, 1961

Individual Element Characteristics																
w	Specific Power, Kw/ft				Surface Temp. °C				Interface Temp. °C				Max. U Temp. °C			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	142	145	145	140	157	166	174	181	252	262	270	274	383	395	403	403
	148	151	151	146	165	175	183	192	264	276	283	290	401	415	422	425
	145	148	148	143	233	246	258	269	330	345	356	364	464	481	492	496
	144	147	146	142	243	256	269	279	339	354	365	373	472	489	500	504
	144	147	147	142	244	257	270	280	340	355	366	374	473	490	501	505
	145	147	147	143	246	259	272	282	342	357	368	376	476	493	504	508
	144	147	147	142	245	258	271	281	341	356	367	375	475	492	503	507
	147	150	150	145	246	259	271	282	343	359	270	378	479	497	508	512
	150	153	153	148	247	260	273	283	346	362	374	382	485	503	515	518
	145	147	147	143	246	259	272	282	342	357	368	376	476	493	504	508
	145	147	147	143	247	260	273	283	343	358	369	377	477	494	505	509
	145	148	147	143	249	262	275	285	345	360	372	380	479	496	507	511
	142	145	145	140	249	262	274	284	343	358	369	377	474	491	502	506
	145	148	147	143	249	262	275	285	345	360	372	380	479	496	507	511
	145	148	147	143	249	262	275	285	345	360	372	380	479	496	507	511
	145	148	147	143	249	262	275	285	345	360	372	380	479	496	507	511
	140	142	142	138	250	264	274	284	342	357	366	376	472	489	500	503
	142	145	145	140	249	262	274	284	343	358	369	377	474	491	502	506
	140	142	142	138	250	264	274	284	342	357	366	376	472	489	500	503
	145	148	147	143	249	262	275	285	345	360	372	380	479	496	507	511
	148	151	150	146	249	263	275	286	348	363	374	382	483	501	512	516
	151	153	153	149	250	263	276	287	350	365	377	385	488	506	518	521
	145	148	147	143	249	262	275	285	345	360	372	380	479	496	507	511

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Table 3 (cont'd)

Date	Equivalent Days of Equilibrium Operation	Tube Conditions			Charge Power, Kw	Specific Power, Kw/ft				Individ	
		T _O , °C	ΔT, °C	Power, Kw		Surface				1	2
						1	2	3	4		
Dec. 20, '60	.6	242	57	922	867	148	151	150	146	249	2
21	.5										
22	0										
23	.8										
24	1	242	54	874	819	140	142	142	138	249	2
25	1	243	57	923	868	148	151	150	146	250	2
26	1	242	57	922	867	148	151	150	146	249	2
27	1	242	56	906	851	145	148	147	143	249	2
28	1	242	55	890	835	142	145	145	140	249	2
29	1	242	57	922	867	148	151	150	146	249	2
30	1	242	55	890	835	142	145	145	140	249	2
31	1	242	55	890	835	142	145	145	140	249	2
Jan. 1, '61	1	242	55	890	835	142	145	145	140	249	2
2	1	242	56	906	851	145	148	147	143	249	2
3	1	242	56	906	851	145	148	147	143	249	2
4	1	242	56	906	851	145	148	147	143	249	2
5	1	242	56	906	851	145	148	147	143	249	2
6	1	242	56	906	851	145	148	147	143	249	2
7	1	242	55	890	835	142	145	145	140	249	2
8	1	243	57	923	868	148	151	150	146	250	2
9	1	129	64	1004	917	156	159	159	154	165	2
10	1	130	63	988	901	154	156	156	152	166	2
11	1	131	64	1004	917	156	159	159	154	167	2
12	1	128	61	956	868	148	151	151	146	162	2
13	.9	131	64	1004	917	156	159	159	154	167	2
14	0										
15	0										
16	0										
17	.4										
18	.9	242	52	842	786	134	137	136	132	248	2
19	.9	242	56	906	851	145	148	147	143	249	2
20	0										
21	.2	242	53	858	803	137	139	139	135	248	2
22	.9	242	57	922	867	148	151	150	146	249	2
23	1	242	60	972	914	156	159	158	154	250	2
24	1	235	60	966	909	155	158	158	153	244	2
25	1	235	60	966	909	155	158	158	153	244	2
26	1	235	60	966	909	155	158	158	153	244	2
27	1	235	60	966	909	155	158	158	153	244	2

Individual Element Characteristics

Specific Power, Kw/ft				Surface Temp. °C				Interface Temp. °C				Max. U Temp. °C			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
148	151	150	146	249	263	275	286	348	363	374	382	483	501	512	516

140	142	142	138	249	262	273	283	341	358	369	377	470	496	496	501
148	151	150	146	250	264	275	287	349	364	376	384	485	503	514	518
148	151	150	146	249	263	275	286	348	363	374	382	483	501	512	516
145	148	147	143	249	262	275	285	345	360	372	380	479	496	507	511
142	145	145	140	249	262	274	284	343	358	369	377	474	491	502	506
148	151	150	146	249	263	275	286	348	363	374	382	483	501	512	516
142	145	145	140	249	262	274	284	343	358	369	377	474	491	502	506
142	145	145	140	249	262	274	284	343	358	369	377	474	491	502	506
142	145	145	140	249	262	274	284	343	358	369	377	474	491	502	506
145	148	147	143	249	262	275	285	345	360	372	380	479	496	507	511
145	148	147	143	249	262	275	285	345	360	372	380	479	496	507	511
145	148	147	143	249	262	275	285	345	360	372	380	479	496	507	511
145	148	147	143	249	262	275	285	345	360	372	380	479	496	507	511
145	148	147	143	249	262	275	285	345	360	372	380	479	496	507	511
142	145	145	140	249	262	274	284	343	358	369	377	474	491	502	506
148	151	150	146	250	264	275	287	349	364	376	384	485	503	514	518
156	159	159	154	165	174	182	189	269	280	288	292	413	427	434	434
154	156	156	152	166	175	183	190	268	278	287	290	409	422	430	430
156	159	159	154	167	176	184	191	271	282	290	294	415	429	436	436
148	151	151	146	162	170	179	186	261	270	279	283	397	409	418	417
156	159	159	154	167	176	184	191	271	282	290	294	415	429	436	436

134	137	136	132	248	261	273	284	337	352	364	372	460	428	489	494
145	148	147	143	249	262	275	285	345	360	372	380	479	496	507	511

137	139	139	135	248	261	274	285	339	354	367	375	465	482	495	499
148	151	150	146	249	263	275	286	348	363	374	382	483	501	512	516
156	159	158	154	250	264	277	288	354	369	382	390	497	515	528	531
155	158	158	153	244	257	270	281	347	362	375	383	490	507	520	524
155	158	158	153	244	257	270	281	347	362	375	383	490	507	520	524
155	158	158	153	244	257	270	281	347	362	375	383	490	507	520	524
155	158	158	153	244	257	270	281	347	362	375	383	490	507	520	524

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Table 3 (cont'd)

Date	Equivalent Days of Equilibrium Operation	Tube Conditions			Charge Power, Kw	Specific Power, Kw/ft				Indiv Surfac	
		T _O , °C	ΔT, °C	Power, Kw		1 2 3 4				1	2
Jan. 28, '61	1	235	60	966	909	155	158	158	153	244	25
29	1	235	60	966	909	155	158	158	153	244	25
30	1	137	67	1050	964	164	168	167	162	173	18
31	1	137	67	1050	964	164	168	167	162	173	18
Feb. 1, '61	.6	138	68	1066	980	167	170	170	165	175	18
2	0										
3	.1										
4	.8	247	45	732	678	116	118	118	114	251	26
5	1	247	51	829	775	132	135	134	130	253	26
6	1	247	50	813	760	129	132	131	127	252	26
7	1	247	50	813	760	129	132	131	127	252	26
8	1	248	50	813	759	129	132	131	127	253	26
9	1	248	51	829	775	132	135	134	130	254	26
10	1	247	50	813	760	129	132	131	127	252	26
11	1	248	50	813	759	129	132	131	127	253	26
12	1	248	50	813	759	129	132	131	127	253	26
13	1	248	50	813	759	129	132	131	127	253	26
14	1	248	50	813	759	129	132	131	127	253	26
15	1	248	49	797	743	126	129	128	124	252	26
16	1	248	50	813	759	129	132	131	127	253	26
17	1	248	51	829	775	132	135	134	130	254	26
18	1	248	49	797	743	126	129	128	124	252	26
19	1	248	48	781	727	124	126	126	122	252	26
20	1	248	51	829	775	132	135	134	130	254	26
21	1	248	48	781	727	124	126	126	122	251	26
22	1	248	48	781	727	124	126	126	122	252	26
23	.3	248	49	797	743	126	129	128	124	252	26

Individual Element Characteristics

Specific Power, Kw/ft				Surface Temp. °C				Interface Temp. °C				Max. U. Temp. °C			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
155	158	158	153	244	257	270	281	347	362	375	383	490	507	520	524
155	158	158	153	244	257	270	281	347	362	375	383	490	507	520	524
164	168	167	162	173	181	191	199	282	292	302	307	434	447	456	457
164	168	167	162	173	181	191	199	282	292	302	307	434	447	456	457
167	170	170	165	175	183	193	201	286	296	306	311	440	453	462	463
116	118	118	114	251	262	272	280	328	340	350	356	434	448	458	461
132	135	134	130	253	264	276	286	341	354	365	373	463	478	489	493
129	132	131	127	252	264	275	285	339	352	362	370	458	473	484	488
129	132	131	127	252	264	275	285	339	352	362	370	458	473	484	488
129	132	131	127	253	264	276	286	340	353	363	371	459	474	485	489
132	135	134	130	254	265	277	287	342	355	366	374	464	479	490	494
129	132	131	127	252	264	275	285	339	352	362	370	458	473	484	488
129	132	131	127	253	264	276	286	340	353	363	371	459	474	485	489
129	132	131	127	253	264	276	286	340	353	363	371	459	474	485	489
129	132	131	127	253	264	276	286	340	353	363	371	459	474	485	489
129	132	131	127	253	264	276	286	340	353	363	371	459	474	485	489
126	129	128	124	252	264	275	285	338	351	360	368	454	469	480	484
129	132	131	127	253	264	276	286	340	353	363	371	459	474	485	489
132	135	134	130	254	265	277	287	342	355	366	374	464	479	490	494
126	129	128	124	252	264	275	285	338	351	360	368	454	469	480	484
124	126	126	122	252	264	274	284	335	348	358	365	449	464	474	478
132	135	134	130	254	265	277	287	342	355	366	374	464	479	490	494
124	126	126	122	251	263	273	283	334	347	357	364	448	463	473	477
124	126	126	122	252	264	274	284	335	348	358	365	449	464	474	478
126	129	128	124	252	264	275	285	338	351	360	368	454	469	480	484

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TABLE 4
Operating Conditions, 4 KSE-3 Elements in KER-4, Charged

[illegible]

TABLE 4

3-3 Elements in KER=4, Charged Nov. 11, 1960, Discharged Jan. 14, 1961

E No.	Individual Element Characteristics															
	Specific Power, Kw/ft				Surface Temp. °C				Interface Temp. °C				Max. U Temp. °C			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
143	146	146	141	161	157	155	155	256	254	252	249	388	388	386	379	
151	154	154	149	172	166	163	162	273	268	265	261	412	410	406	398	
138	141	140	136	152	149	149	149	244	243	242	240	371	372	371	365	
138	141	140	136	152	149	149	149	244	243	242	240	371	372	371	365	
138	141	140	136	152	149	149	149	244	243	242	240	371	372	371	365	
143	146	146	141	160	156	154	154	255	253	251	248	387	387	385	378	
143	146	146	141	160	156	154	154	255	253	251	248	387	387	385	378	
141	143	143	139	156	153	152	151	250	248	247	243	379	380	379	371	
141	143	143	139	156	153	152	151	250	248	247	243	379	380	379	371	
138	141	140	136	152	149	149	149	245	244	243	241	372	373	372	366	
141	143	143	139	155	152	151	150	249	247	246	242	378	379	378	370	
141	143	143	139	154	151	150	149	248	246	245	241	377	378	377	369	
141	143	143	139	154	151	150	149	248	246	245	241	377	378	377	369	
141	143	143	139	155	152	151	150	249	247	246	242	378	379	378	370	
141	143	143	139	154	151	150	149	248	246	245	241	377	378	377	369	
148	151	151	146	250	264	277	288	349	364	377	385	485	503	516	520	
143	145	145	141	250	264	276	287	345	361	372	381	476	495	505	510	
140	142	142	138	249	263	274	285	342	358	369	377	471	489	500	504	
143	145	145	141	250	264	276	287	345	361	372	381	476	495	505	510	
140	142	142	138	249	263	274	285	342	358	369	377	471	489	500	504	
137	139	139	135	247	260	273	284	338	353	366	374	464	481	494	498	
137	139	139	135	248	261	274	285	339	354	367	375	465	482	495	499	

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Table 4 (cont'd)

Date	Equivalent Days of Equilibrium Operation	Tube Conditions			Charge Power, Kw	Specific Power, Kw/ft				Indiv:
		T _o , °C	ΔT, °C	Power, Kw						Surf
						1	2	3	4	1
Dec. 20, '60	.6									
21	.5									
22	0									
23	.8									
24	1	240	56	908	852	145	148	148	143	247
25	1	242	53	858	803	137	139	139	135	248
26	1	242	54	875	819	140	142	142	138	249
27	1	242	53	858	803	137	139	139	135	248
28	1	242	53	858	803	137	139	139	135	248
29	1	242	53	858	803	137	139	139	135	248
30	1	243	54	875	819	140	142	142	138	250
31	1	242	54	875	819	140	142	142	138	249
Jan. 1, '61	1	242	55	892	836	143	145	145	141	249
2	1	242	54	875	819	140	142	142	138	249
3	1	242	55	892	836	143	145	145	141	249
4	1	242	55	892	836	143	145	145	141	249
5	1	242	56	908	852	145	148	148	143	249
6	1	242	55	892	836	143	145	145	141	249
7	1	242	54	875	819	140	142	142	138	249
8	1	242	56	908	852	145	148	148	143	249
9	1	242	52	842	786	134	137	136	132	248
10	1	241	53	858	803	137	139	139	135	247
11	1	242	53	858	803	137	139	139	135	248
12	1	248	52	842	786	134	137	136	132	254
13	.9	249	53	858	803	137	139	139	135	255

Individual Element Characteristics

Element No.	Specific Power, Kw/ft				Surface Temp. °C				Interface Temp. °C				Max U Temp. °C			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2	145	148	148	143	247	261	274	285	344	360	372	380	478	496	508	512
3	137	139	139	135	248	261	274	285	339	354	367	375	465	482	495	499
9	140	142	142	138	249	263	274	285	342	358	369	377	471	489	500	504
3	137	139	139	135	248	261	274	285	339	354	367	375	465	482	495	499
3	137	139	139	135	248	261	274	285	339	354	367	375	465	482	495	499
3	137	139	139	135	248	261	274	285	339	354	367	375	465	482	495	499
9	140	142	142	138	250	264	275	286	343	359	370	378	472	490	501	505
9	140	142	142	138	249	263	274	285	342	358	369	377	471	489	500	504
5	143	145	145	141	249	263	275	286	344	360	371	380	475	494	504	509
9	140	142	142	138	249	263	274	285	342	358	369	377	471	489	500	504
6	143	145	145	141	249	263	275	286	344	360	371	380	475	494	504	509
6	143	145	145	141	249	263	275	286	344	360	371	380	475	494	504	509
2	145	148	148	143	249	263	276	287	342	362	374	382	480	498	510	514
6	143	145	145	141	249	263	275	286	344	360	371	380	475	494	504	509
9	140	142	142	138	249	263	274	285	342	358	369	377	471	489	500	504
2	145	148	148	143	249	263	276	287	346	362	374	382	480	498	510	514
6	134	137	136	132	248	261	273	284	337	352	364	372	460	478	489	494
3	137	139	139	135	247	260	273	284	338	353	366	374	464	481	494	498
3	137	139	139	135	248	261	274	285	339	354	367	375	465	482	495	499
6	134	137	136	132	254	267	279	290	343	358	370	378	466	484	495	499
3	137	139	139	135	255	268	281	292	346	361	374	382	472	489	502	506

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TABLE 5
Average Operating Conditions, 4 KSE-3 Ele:
Charged December 15, 1960, Discharged M

Operating Period From - To	Equivalent Days of Equilibrium Operation	Avg. Tube Conditions			Charge Power, Kw	Avg. Individu					Surfac	
		T ₀ , °C	ΔT, °C	Power, Kw		Specific Power, Kw/ft					1	
						1	2	3	4		1	
12/17/60- 12/21/60	1.5	212	47.0	746	683	116	119	118	115		218	2
12/23/60- 1/6/61	14.8	235	59.0	951	893	152	155	155	150		243	2
1/7/61- 1/13/61	6.9	190	62.3	984	913	156	159	158	154		203	2
1/17/61- 1/19/61	2.2	189	60.0	945	874	150	153	152	148		202	2
1/21/61- 2/1/61	10.7	190	66.0	1042	970	165	168	168	163		206	2
2/3/61- 2/23/61	19.2	190	57.1	903	832	142	145	144	140		202	2
2/26/61- 3/8/61	10.7	190	65.5	1034	958	164	167	167	162		205	2
3/11/61- 3/19/61	5.8	190	64.2	1012	940	161	164	163	159		205	2
3/21/61- 4/8/61	13.9	190	63.3	1000	929	158	161	161	156		204	2
4/11/61- 4/19/61	7.2	190	66.2	1044	973	166	169	169	164		206	2
4/20/61- 4/26/61	5.2	123	68.0	1065	975	166	169	169	164		170	2
4/27/61- 5/10/61	13.1	190	64.3	1013	942	161	164	164	159		205	2
5/12/61- 5/26/61	13.4	190	60.2	949	878	150	153	152	148		203	2

TABLE 5
Operating Conditions, 4 KSE-3 Elements in KER-3
December 15, 1960, Discharged May 27, 1961

Avg. Individual Element Characteristics															
Specific Power, Kw/ft				Surface Temp. °C				Interface Temp. °C				Max. U Temp. °C			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
116	119	118	115	218	229	240	248	296	308	319	324	403	417	428	430
152	155	155	150	243	257	269	280	344	360	372	380	484	503	514	518
156	159	158	154	203	216	229	240	307	322	335	343	449	467	480	484
150	153	152	148	202	214	227	236	301	315	328	335	439	456	468	471
165	168	168	163	206	219	232	243	316	331	344	352	468	487	498	502
142	145	144	140	202	214	226	235	297	310	322	328	428	443	455	457
164	167	167	162	205	218	231	242	314	330	342	350	465	484	496	500
161	164	163	159	205	218	231	242	311	327	339	347	459	477	489	493
158	161	161	156	204	217	230	241	309	324	337	345	455	473	485	489
166	169	169	164	206	219	232	243	316	332	344	352	469	488	499	503
166	169	169	164	170	177	183	190	281	290	296	299	434	446	452	450
161	164	164	159	205	218	231	242	312	327	340	348	460	478	490	494
150	153	152	148	203	215	227	238	303	317	330	337	441	457	470	473

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