PWR FLECHT SEASET 21-Rod Bundle Flow Blockage Task Data and Analysis Report

Volume 2

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Pittsburgh, Pennsylvania

EPRI PERSPECTIVE

PROJECT DESCRIPTION

A major consideration in the design of engineered safety systems and licensing of PWRs is that there is sufficient heat transfer to cool the reactor core in the event of a loss-of-coolant accident (LOCA) or for long-term decay heat removal. Areas of technical concerns include reflooding (large-break LOCA), core uncovery (small-break LOCA), and natural circulation (long-term cooling). A program called FLECHT SEASET (Full-Length Emergency Core Cooling Heat Transfer--Separate-Effects Tests And System-Effects Tests) is under way to address these concerns. It is a multi-facility six-year test and analysis program. The program is jointly managed and funded by NRC, EPRI, and Westinghouse Electric Corporation (W). This work for RP959-1 is closely coordinated as appropriate with major national and international research programs in the heat transfer areas of natural circulation, reflooding, and core uncovery.

PROJECT OBJECTIVE

The overall objective of this program is to provide experimental heat transfer and two-phase flow data in simulated PWR geometries for postulated conditions of reflooding, core boiloff, and natural circulation. The test parameters cover a spectrum of conditions that encompass both the best-estimate and current licensing calculations. The test bundle simulates a full-length portion of PWR cores, with fuel rod geometry typified by a W 17 x 17 assembly design.

The program consists of two major subprograms, each with experimentation and analysis efforts: (1) the flow blockage subprogram to address safety and licensing requirements for steam cooling and the flow blockage effects and (2) the system effects subprogram to examine system and bundle reflood response for a postulated LOCA. Both subprograms have flexibility to address small-break core uncovery and natural circulation phenomena.

PROJECT RESULTS

Accomplishments to date are documented in the following FLECHT SEASET Program NRC/EPRI/W reports:

1. Report No. 1—Program Plan, December 1977

2. Report No. 2—Steam Generator Separate-Effects Task Plan, March 1978

3. Report No. 3—Unblocked Bundle Reflood Task Plan, March 1978

4. Report No. 4—Steam Generator Separate-Effects Task Data Report, January 1980

5. Report No. 5—PWR FLECHT SEASET 21-Rod Bundle Flow Blockage Task—Task Plan Report, EPRI Interim Report NP-1382, October 1980

6. Report No. 6—PWR FLECHT SEASET 161-Rod Bundle Flow Blockage Task—Task Plan Report, EPRI Interim Report NP-1458, January 1981

7. Report No. 7—PWR FLECHT SEASET Unblocked Bundle, Forced and Gravity Reflood Task Data Report (Volumes 1 and 2), EPRI Interim Report NP-1459, September 1981

8. Report No. 8—PWR FLECHT SEASET Unblocked Bundle, Forced and Gravity Reflood Task—Data Evaluation and Analysis Report, EPRI Topical Report NP-2013, February 1982

9. Report No. 9—PWR FLECHT SEASET Steam Generator Separate-Effects Task—Data Analysis and Evaluation Report, EPRI Topical Report, NP-1461, February 1982

This report, presented in two volumes, systematically compiles the experimental data obtained from the 21-rod bundle forced reflooding, gravity reflooding, and steam cooling tests. There were six 21-rod bundle configurations to account for various blockage shapes and distributions. The report describes in detail the test loop, the instrumentation, the test procedure, the data reduction methods, and an uncertainty analysis. Also included is the analysis of data in terms of the thermal-hydraulic parameters such as the quenching rate, the flow loss coefficient, and the heat transfer coefficient. Data obtained from specific blockage configurations were compared with the reference case of straight bundle without blockage. The result indicates that flow blockage can greatly enhance the local heat transfer in the vicinity of the blockage.

This could alleviate the NRC Appendix K licensing concern about the core coolability in the event of a large-break LOCA. The report should be useful to those who are interested in reactor safety analysis.

Bill K. H. Sun, Project Manager
Nuclear Power Division

ABSTRACT

This report presents data and limited analysis from the 21-Rod Bundle Flow Blockage Task of the Full-Length Emergency Cooling Heat Transfer Separate Effects and Systems Effects Test Program (FLECHT SEASET). The tests consisted of forced and gravity reflooding tests utilizing electrical heater rods with a cosine axial power profile to simulate PWR nuclear core fuel rod arrays. Steam cooling and hydraulic characteristics tests were also conducted. These tests were utilized to determine effects of various flow blockage configurations (shapes and distributions) on reflooding behavior, to aid in development/assessment of computational models in predicting reflooding behavior of flow blockage configurations, and to screen flow blockage configurations for future 163-rod flow blockage bundle tests.

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GLOSSARY

This glossary explains definitions, acronyms, and symbols included in the text which follows.

Axial peaking factor -- ratio of the peak-to-average power for a given power profile

Blocked -- a situation in which the flow area in the rod bundle or single tube is purposely obstructed at selected locations so as to restrict the flow

Bottom of core recovery (BOCR) -- a condition at the end of the refill period in which the lower plenum is filled with injected ECC water as the water is about to flood the core

Carryout rate fraction -- the fraction of the inlet flooding flow rate which flows out the rod bundle exit by upflowing steam

Carryover -- the process in which the liquid is carried in a two-phase mixture out of a control volume, that is, the test bundle

Core rod geometry (CRG) -- a nominal rod-to-rod pitch of 12.6 mm (0.496 inch) and outside nominal diameter of 9.50 mm (0.374 inch) representative of various nuclear fuel vendors' new fuel assembly geometries (commonly referred to as the 17 x 17 or 16 x 16 assemblies)

Cosine axial power profile -- the axial power distribution of the heater rods in the CRG bundle that contains the maximum (peak) linear power at the midplane of the active heated rod length. This axial power profile will be used on all FLECHT SEASET tests as a fixed parameter.

ECC -- emergency core cooling

Entrainment -- the process by which liquid, typically in droplet form, is carried in a flowing stream of gas or two-phase mixture

Fallback -- the process whereby the liquid in a two-phase mixture flows countercurrent to the gas phase

FLECHT -- Full-Length Emergency Core Heat Transfer test program

FLECHT SEASET -- Full-Length Emergency Core Heat Transfer - Systems Effects and Separate Effects Tests

Loss-of-coolant accident -- a break in the pressure boundary integrity resulting in loss of core cooling water

PMG -- Program Management Group

Separation -- the process whereby the liquid in a two-phase mixture is separated and detached from the gas phase

Silicon-controlled rectifier (SCR) -- a rectifier control system used to supply dc current to the bundle heater rods

Spacer grids -- the metal matrix assembly (egg crate design) used to support and space the heater rods in a bundle array

APPENDIX K
DATA TABLES AND PLOTS

This appendix contains a sampling of data collected for each of the six 21-rod bundle test configurations. All the valid measured data and reduced data are available in the NRC Data Bank. The data reported herein represent those data measured and subsequently reduced for each of the four types of tests: hydraulic characteristics tests, steam cooling tests, forced reflood tests, and gravity reflood tests. The data have not been analyzed or evaluated in great detail, and caution should be observed that erroneous data may exist despite efforts made to ensure correct and valid data. A data evaluation report, to be published at a later date, will present the results of the data analysis in greater detail.

For each of the six bundles, the heater rod thermocouples and steam temperature instrumentation which were found to provide valid data for each of the reflood and steam cooling tests are shown in tables K-1 through K-6. Generally there were few bundle instrumentation failures except for configuration D. Table K-7 lists the tests which were considered invalid and the reasons for the invalidity. Table K-8 lists the tests which were found to be valid but, for the reasons stated, were not considered suitable for further analysis. The measured data for these tests will also be available in the NRC Data Bank.

For each valid reflood test run, the following tables are included:

-- Summary and Comment Sheet - lists the type of test, as-run test conditions, summary results, and comments on the as-run test conditions relative to the pertinent unblocked bundle test

-- Heater Rod Temperature Data - lists the characteristics of the temperature history for heater rod thermocouples at the same location for all six bundles

-- Heater Rod Temperature Statistical Data - lists the maximum, minimum, and average of the temperature characteristics of all heater rod thermocouples as a function of elevation

For the hydraulic characteristics tests, only the Summary and Comment Sheets are provided.

Tables of heat transfer data are included with the Summary and Comment sheets for the steam cooling tests. (See paragraph 6-12 for actual flow.)

For the reference forced reflood test in each of the six bundles, the following plots are included to illustrate the data available from the NRC Data Bank:

-- Heater rod temperatures and heat transfer coefficients calculated by DATAR for the following locations:

Rod	Elevation [m (in.)]	Computer Channel Number A	B	C	D	E	F
4C	0.99 (39)	11	11	11	9	10	6
2D	1.90 (75)	53	53	53	50	39	39
3C	2.01 (79)	95	95	95	97	72	69
3D	2.44 (96)	98	136	136	137	129	138
4B	3.05 (120)	164	164	164	163	164	168
1C	1.22 (98)	14	14	14	10	12	7
4B	1.93 (76)	68	68	68	66	52	51
3D	2.13 (84)	115	115	115	115	98	113
4B	2.59 (102)	145	145	145	145	143	153
4C	3.35 (132)	170	170	170	169	169	172
2A	1.52 (60)	17	17	17	13	16	12
3D	2.01 (79)	79	79	79	98	86	85
3B	2.29 (90)	124	124	124	125	115	125
3D	2.82 (111)	154	154	154	155	150	159
1B	3.51 (138)	172	172	172	170	171	174

-- Bundle vapor temperatures for the following locations:

Vapor Temperature Measurement Elevation [m (in.)]/Subchannel	Type of Instrument	Computer Channel Number A	B	C	D	E	F
1.50 (59)/10	Steam probe	200	180	180	180	180	180
1.98 (78)/11	Steam probe	192	188	188	188	188	188
2.44 (96)/10	Steam probe	186	195	195	195	195	195
3.05 (120)/14	Bare fluid	181	198	198	198	198	198
3.05 (120)/6	Steam probe	179	199	199	199	199	199
1.70 (67)/11	Steam probe	198	184	184	184	184	184
1.98 (78)/8	Bare fluid	194	186	186	186	186	186
1.98 (78)/9	Steam probe	193	187	187	187	187	187
2.29 (90)/10	Steam probe	189	191	191	191	191	191
2.82 (111)/10	Steam probe	183	197	197	197	197	197

-- Housing wall temperatures for the following locations:

Thermocouple Elevation [m (in.)]	Channel Number[a]
1.22 (48)	261
1.52 (60)	263
1.83 (72)	267
2.44 (96)	275
3.05 (120)	281

a. Same for all six bundles

-- Filler rod temperatures for the following locations:[1]

Filler Rod Thermocouple Location	Computer Channel Number B	C	D	E	F
1.82 m (72 in.) at 45°	207	210	210	211	211
1.98 m (78 in.) at 315°	210	211	211	212	212
2.13 m (84 in.) at 45°	208	213	213	214	214
2.13 m (84 in.) at 315°	211	212	212	213	213
2.98 m (111 in.) at 315°	212	215	215	216	216

-- Blockage sleeve temperatures for the following locations:[1]

Blockage Sleeve Thermocouple Location		Computer Channel Number B	C	D	E	F
Rod	Elevation [m (in.)]					
4D	1.79 (70)	-	-	203	203	203
4B	1.83 (72)	-	-	205	206	-
2D	1.85 (73)	203	207	-	-	-
3C	1.85 (73)	204	204	-	-	-
3D	1.85 (73)	205	206	-	-	-
3B	1.85 (73)	-	-	207	-	-
3A	1.85 (73)	-	-	-	-	204
4D	1.85 (73)	206	203	-	-	-
3C	1.90 (75)	-	-	208	-	-
3C	1.90 (75) at 135°	-	-	-	207	207
3C	1.90 (75) at 112°	-	-	-	208	208
3C	1.90 (75) at 90°	-	-	-	209	209

1. Not applicable to configuration A

-- Fluid and exit vapor temperatures for the following locations:

Temperature Measurement Location	Computer Channel Number[a]
Lower plenum	291
Upper plenum	293
Upper plenum aspirating steam probe	295
Exhaust line aspirating steam probe downsteam of upper plenum	311
Exhaust line aspirating steam probe downstream of steam separator	313

a. Same for all six bundles

-- Overall bundle level, steam separator, and carryover tank levels for the following locations:

Fluid Level Location	Computer Channel Number[a]
Housing	348
Upper plenum	347
Carryover tank	349
Steam separator drain tank	351
Steam separator	350

a. Same for all six bundles

-- Flooding rate

-- Exhaust steam flow rate

-- Overall mass balance

-- All heater rod and housing quench times as a function of elevation

-- Heater rod bundle axial differential pressures and void fractions

TABLE K-1

VALID THERMOCOUPLE CHANNELS
CONFIGURATION A, 0.30 m (12 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A				1										2		3		4			
42108A				1										2		3		4			
42207A				1										2		3		4			
42430A				1										2		3		4			
42514A				1										2		3		4			
42606A				1										2		3		4			
42705A				1										2		3		4			
42804A				1										2		3		4			
42907A				1										2		3		4			
43013A				1										2		3		4			
43112A				1										2		3		4			
43209A				1										2		3		4			
43511A				1										2		3		4			
43610A				1										2		3		4			
43715A				1										2		3		4			
43916A				1										2		3		4			
44117A				1										2		3		4			
44303A				1										2		3		4			
44401A				1										2		3		4			
44529A				1										2		3		4			
44602A				1										2		3		4			

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION A, 0.61 m (24 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A	5	6															7		8		
42108A	5	6															7		8		
42207A	5	6															7		8		
42430A	5	6															7		8		
42514A	5	6															7		8		
42606A	5	6															7		8		
42705A	5	6															7		8		
42804A	5	6															7		8		
42907A	5	6															7		8		
43013A	5	6															7		8		
43112A	5	6															7		8		
43209A	5	6															7		8		
43511A	5	6															7		8		
43610A	5	6															7		8		
43715A	5	6															7		8		
43916A	5	6															7		8		
44117A	5	6															7		8		
44303A	5	6															7		8		
44401A	5	6															7		8		
44529A	5	6															7		8		
44602A	5	6															7		8		

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 0.99 m (39 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A				9										10		11					
42108A				9										10		11					
42207A				9										10		11					
42430A				9										10		11					
42514A				9										10		11					
42606A				9										10		11					
42705A				9										10		11					
42804A				9										10		11					
42907A				9										10		11					
43013A				9										10		11					
43112A				9										10		11					
43208A				9										10		11					
43511A				9										10		11					
43610A				9										10		11					
43715A				9										10		11					
43916A				9										10		11					
44117A				9										10		11					
44303A				9										10		11					
44401A				9										10		11					
44529A				9										10		11					
44602A				9										10		11					

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 1.22 m (48 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A	13	14															15		16		
42108A	13	14															15		16		
42207A	13	14															15		16		
42430A	13	14															15		16		
42514A	13	14															15		16		
42606A	13	14															15		16		
42705A	13	14															15		16		
42804A	13	14															15		16		
42907A	13	14															15		16		
43013A	13	14															15		16		
43112A	13	14															15		16		
43208A	13	14															15		16		
43511A	13	14															15		16		
43610A	13	14															15		16		
43715A	13	14															15		16		
43916A	13	14															15		16		
44117A	13	14															15		16		
44303A	13	14															15		16		
44401A	13	14															15		16		
44529A	13	14															15		16		
44602A	13	14															15		16		

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 1.52 m (60 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A				17										18		19		20			
42109A				17										18		19		20			
42207A				17										18		19		20			
42430A				17										18		19		20			
42514A				17										18		19		20			
42606A				17										18		19		20			
42705A				17										18		19		20			
42904A				17										18		19		20			
42907A				17										18		19		20			
43013A				17										18		19		20			
43112A				17										18		19		20			
43208A				17										18		19		20			
43511A				17										18		19		20			
43610A				17										18		19		20			
43715A				17										18		19		20			
43916A				17										18		19		20			
44117A				17										18		19		20			
44303A				17										18		19		20			
44401A				17										18		19		20			
44529A				17										18		19		20			
44602A				17										18		19		20			

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 1.70 m (67 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A				21										22		23		24			
42109A				21										22		23		24			
42207A				21										22		23		24			
42430A				21										22		23		24			
42514A				21										22		23		24			
42606A				21										22		23		24			
42705A				21										22		23		24			
42904A				21										22		23		24			
42907A				21										22		23		24			
43013A				21										22		23		24			
43112A				21										22		23		24			
43208A				21										22		23		24			
43511A				21										22		23		24			
43610A				21										22		23		24			
43715A				21										22		23		24			
43916A				21										22		23		24			
44117A				21										22		23		24			
44303A				21										22		23		24			
44401A				21										22		23		24			
44529A				21										22		23		24			
44602A				21										22		23		24			

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 1.78 m (70 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A	25	26					27				28						29		30		
42109A	25	26					27				28						29		30		
42207A	25	26					27				28						29		30		
42430A	25	26					27				28						29		30		
42514A	25	26					27				28						29		30		
42606A	25	26					27				28						29		30		
42705A	25	26					27				28						29		30		
42804A	25	26					27				28						29		30		
42907A	25	26					27				28						29		30		
43013A	25	26					27				28						29		30		
43112A	25	26					27				28						29		30		
43208A	25	26					27				28						29		30		
43511A	25	26					27				28						29		30		
43610A	25	26					27				28						29		30		
43715A	25	26					27				28						29		30		
43916A	25	26					27				28						29		30		
44117A	25	26					27				28						29		30		
44303A	25	26					27				28						29		30		
44401A	25	26					27				28						29		30		
44529A	25	26					27				28						29		30		
44602A	25	26					27				28						29		30		

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 1.80 m (71 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A			31			32	33				34		35		36						37
42109A			31			32	33				34		35		36						37
42207A			31			32	33				34		35		36						37
42430A			31			32	33				34		35		36						37
42514A			31			32	33				34		35		36						37
42606A			31			32	33				34		35		36						37
42705A			31			32	33				34		35		36						37
42804A			31			32	33				34		35		36						37
42907A			31			32	33				34		35		36						37
43013A			31			32	33				34		35		36						37
43112A			31			32	33				34		35		36						37
43208A			31			32	33				34		35		36						37
43511A			31			32	33				34		35		36						37
43610A			31			32	33				34		35		36						37
43715A			31			32	33				34		35		36						37
43916A			31			32	33				34		35		36						37
44117A			31			32	33				34		35		36						37
44303A			31			32	33				34		35		36						37
44401A			31			32	33				34		35		36						37
44529A			31			32	33				34		35		36						37
44602A			31			32	33				34		35		36						37

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 1.83 m (72 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A	38	39					41	42	43	44	45	46							48	49	
42109A	38	39					41	42	43	44	45	46							48	49	
42207A	38	39					41	42	43	44	45	46							48	49	
42430A	38	39					41	42	43	44	45	46							48	49	
42514A	38	39					41	42	43	44	45	46							48	49	
42606A	38	39					41	42	43	44	45	46							48	49	
42705A	38	39					41	42		44	45	46							48	49	
42804A	38	39					41	42		44	45	46							48	49	
42907A	38	39					41	42		44	45	46							48	49	
43013A	38	39					41	42		44	45	46							48	49	
43112A	38	39					41	42		44	45	46							48	49	
43209A	38	39					41	42		44	45	46							48	49	
43511A	38	39					41	42		44	45	46							48	49	
43610A	38	39					41			44	45	46							48	49	
43715A	38	39					41			44	45	46							48	49	
43916A	38	39					41			44	45	46							48	49	
44117A	38	39					41			44	45	46							48	49	
44303A	38	39					41			44	45	46							48	49	
44401A	38	39					41			44	45	46							48	49	
44529A	38	39					41			44	45	46							48	49	
44602A	38	39					41			44	45	46							48	49	

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 1.88 m (74 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A			50		51	52	53	54		56	57	58	59		60					61	62
42109A			50			52	53	54		56	57	58	59		60					61	62
42207A			50			52	53	54		56	57	58	59		60					61	62
42430A			50			52	53	54		56	57	58	59		60					61	62
42514A			50			52	53	54		56	57	58	59		60					61	62
42606A			50			52	53	54		56	57	58	59		60					61	62
42705A			50			52	53	54		56	57	58	59		60					61	62
42804A			50			52	53	54		56	57	58	59		60					61	62
42907A			50			52	53	54		56	57	58	59		60					61	62
43013A			50			52	53	54		56	57	58	59		60					61	62
43112A			50			52	53	54		56	57	58	59		60					61	62
43209A			50			52	53	54		56	57	58	59		60					61	62
43511A			50			52	53	54		56	57	58	59		60					61	62
43610A			50			52	53	54		56	57	58	59		60					61	62
43715A			50			52	53	54		56	57	58	59		60					61	62
43916A			50			52	53	54		56	57	58	59		60					61	62
44117A			50			52	53	54		56	57	58	59		60					61	62
44303A			50			52	53	54		56	57	58	59		60					61	62
44401A			50			52	53	54		56	57	58	59		60					61	62
44529A			50			52	53	54		56	57	58	59		60					61	62
44602A			50			52	53	54		56	57	58	59		60					61	62

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 1.90 m (75 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A			63			64	65				66		67		68						69
42108A			63			64	65				66		67		68						69
42207A			63			64	65				66		67		68						69
42430A			63			64	65				66		67		68						69
42514A			63			64	65				66		67		68						69
42606A			63			64	65				66		67		68						69
42705A			63			64	65				66		67		68						69
42804A			63			64	65				66		67		68						69
42907A			63			64	65				66		67		68						69
43013A			63			64	65				66		67		68						69
43112A			63			64	65				66		67		68						69
43208A			63			64	65				66		67		68						69
43511A			63			64	65				66		67		68						69
43610A			63			64	65				66		67		68						69
43715A			63			64	65				66		67		68						69
43916A			63			64	65				66		67		68						69
44117A			63			64	65				66		67		68						69
44303A			63			64	65				66		67		68						69
44401A			63			64	65				66		67		68						69
44529A			63			64	65				66		67		68						69
44602A			63			64	65				66		67		68						69

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 1.93 m (76 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A				70	71		72	73		75	76	77		78		96		80		81	
42108A				70	71		72	73		75	76	77		78		96		80		81	
42207A				70	71		72	73		75	76	77		78		96		80		81	
42430A				70	71		72	73		75	76	77		78		96		80		81	
42514A				70	71		72	73		75	76	77		78		96		80		81	
42606A				70	71		72	73		75	76	77		78		96		80			
42705A				70	71		72	73		75	76	77		78		96		80			
42804A				70	71		72	73		75	76	77		78		96		80			
42907A				70	71		72	73		75	76	77		78		96		80			
43013A				70	71		72	73		75	76	77		78		96		80			
43112A				70	71		72	73		75	76	77		78		96		80			
43208A				70	71		72	73		75	76	77		78		96		80			
43511A				70	71		72	73		75	76	77		78		96		80			
43610A				70	71		72	73		75	76	77		78		96		80			
43715A				70	71		72	73		75	76	77		78		96		80			
43916A				70	71		72	73		75	76	77		78		96		80			
44117A				70	71		72	73		75	76	77		78		96		80			
44303A				70	71		72	73		75	76	77		78		96		80			
44401A				70	71		72	73		75	76	77		78		96		80			
44529A				70	71		72	73		75	76	77		78		96		80			
44602A				70	71		72	73		75	76	77		78		96		80			

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 1.96 m (77 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A			82			83	84				85		86		87						88
42108A			82			83	84				85		86		87						88
42207A			82			83	84				85		86		87						88
42430A			82			83	84				85		86		87						88
42514A			82			83	84				85		86		87						88
42606A			82			83	84				85		86		87						88
42705A			82			83	84				85		86		87						88
42804A			82			83	84				85		86		87						88
42907A			82			83	84				85		86		87						88
43013A			82			83	84				85		86		87						88
43112A			82			83	84				85		86		87						88
43208A			82			83	84				85		86		87						88
43511A			82			83	84				85		86		87						88
43610A			82			83	84				85		86		87						88
43715A			82			83	84				85		86		87						88
43916A			82			83	84				85		86		87						88
44117A			82			83	84				85		86		87						88
44303A			82			83	84				85		86		87						88
44401A			82			83	84				85		86		87						88
44529A			82			83	84				85		86		87						88
44602A			82			83	84				85		86		87						88

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 1.98 m (78 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A				89	90		91	92		94	95	79		97		136		100		101	
42108A				89			91	92		94	95	79		97		136		100		101	
42207A				89			91	92		94	95	79		97		136		100		101	
42430A				89			91	92		94	95	79		97		136		100		101	
42514A				89			91	92		94	95	79		97		136		100		101	
42606A				89			91	92		94	95	79		97		136		100		101	
42705A				89			91	92		94	95	79		97		136		100		101	
42804A				89			91			94	95	79		97		136		100		101	
42907A				89			91			94	95	79		97		136		100		101	
43013A				89			91			94	95	79		97		136		100		101	
43112A				89			91			94	95	79		97		136		100		101	
43208A				89			91			94	95	79		97		136		100			
43511A				89			91			94	95	79		97		136		100			
43610A				89			91			94	95	79		97		136		100			
43715A				89			91			94	95	79		97		136		100			
43916A				89			91			94	95	79		97		136		100			
44117A				89			91			94	95	79		97		136		100			
44303A				89			91			94	95	79		97		136		100			
44401A				89			91			94	95	79		97		136		100			
44529A				89			91			94	95	79		97		136		100			
44602A				89			91			94	95	79		97		136		100			

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 2.13 m (84 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A	109	110			111			112	113	114		115					116		117	118	
42109A	109	110			111			112	113	114		115					116		117	118	
42207A	109	110			111			112	113	114		115					116		117	118	
42430A	109	110			111			112	113	114		115					116		117	118	
42514A	109	110			111			112	113	114		115					116		117		
42606A	109	110			111			112	113	114		115					116		117		
42705A	109	110			111			112	113	114		115					116		117		
42904A	109	110			111			112	113	114		115					116		117		
42907A	109	110			111			112	113	114		115					116		117		
43013A	109	110			111			112	113	114		115					116		117		
43112A	109	110			111			112	113	114		115					116		117		
43209A	109	110			111			112	113	114		115					116		117		
43511A	109	110			111			112	113	114		115					116		117		
43610A	109	110			111			112	113	114		115					116		117		
43715A	109	110			111			112	113	114		115					116		117		
43916A	109	110			111			112	113	114		115					116		117		
44117A	109	110			111			112	113	114		115					116		117		
44303A	109	110			111			112	113	114		115					116		117		
44401A	109	110			111			112	113	114		115					116		117		
44529A	109	110			111			112	113	114		115					116		117		
44602A	109	110			111			112	113	114		115					116		117		

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 2.29 m (90 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A			119		120	121		122	123	124		125	126		127					128	129
42109A			119		120	121		122	123	124		125	126		127					128	129
42207A			119		120	121		122	123	124		125	126		127					128	129
42430A			119		120	121		122	123	124		125	126		127					128	129
42514A			119		120	121		122	123	124		125	126		127					128	129
42606A			119			121		122	123	124		125	126		127					128	129
42705A			119			121		122	123	124		125	126		127					128	129
42904A			119			121		122	123	124		125	126		127					128	129
42907A			119			121		122	123	124		125	126		127					128	129
43013A			119			121		122	123	124		125	126		127					128	129
43112A			119			121		122	123	124		125	126		127					128	129
43209A			119			121		122	123	124		125	126		127					128	129
43511A			119			121		122	123	124		125	126		127					128	129
43610A			119			121		122	123	124		125	126		127					128	129
43715A			119			121		122	123	124		125	126		127					128	129
43916A			119			121		122	123	124		125	126		127					128	129
44117A			119			121		122	123	124		125	126		127					128	129
44303A			119			121		122	123	124		125	126		127					128	129
44401A			119			121		122	123	124		125	126		127					128	129
44529A			119			121		122	123	124		125	126		127					128	129
44602A			119			121		122	123	124		125	126		127					128	129

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 2.44 m (96 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A	140	141	142			143							144		145		146		147		148
42108A	140	141	142			143							144		145		146		147		148
42207A	140	141	142			143							144		145		146		147		148
42430A	140	141	142			143							144		145		146		147		148
42514A	140	141	142			143							144		145		146		147		148
42606A	140	141	142			143							144		145		146		147		148
42705A	140	141	142			143							144		145		146		147		148
42804A	140	141	142			143							144		145		146		147		148
42907A	140	141	142			143							144		145		146		147		148
43013A	140	141	142			143							144		145		146		147		148
43112A	140	141	142			143							144		145		146		147		148
43209A	140	141	142			143							144		145		146		147		148
43511A	140	141	142			143							144		145		146		147		148
43610A	140	141	142			143							144		145		146		147		148
43715A	140	141	142			143							144		145		146		147		148
43916A	140	141	142			143							144		145		146		147		148
44117A	140	141	142			143							144		145		146		147		148
44303A	140	141	142			143							144		145		146		147		148
44401A	140	141	142			143							144		145		146		147		148
44529A	140	141	142			143							144		145		146		147		148
44602A	140	141	142			143							144		145		146		147		148

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 2.59 m (102 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A	130	131			132			133	134	135		98					137		138	139	
42108A	130	131			132			133	134	135		98					137		138	139	
42207A	130	131			132			133		135		98					137		138	139	
42430A	130	131			132			133		135		98					137		138	139	
42514A	130	131			132			133		135		98					137		138	139	
42606A	130	131			132			133		135		98					137		138	139	
42705A	130	131			132			133		135		98					137		138	139	
42804A	130	131			132			133		135		98					137		138	139	
42907A	130	131			132			133		135		98					137		138	139	
43013A	130	131			132			133		135		98					137		138	139	
43112A	130	131			132			133		135		98					137		138	139	
43209A	130	131			132			133		135		98					137		138	139	
43511A	130	131			132			133		135		98					137		138	139	
43610A	130	131			132			133		135		98					137		138	139	
43715A	130	131						133		135		98					137		138	139	
43916A	130	131						133		135		98					137		138	139	
44117A	130	131						133		135		98					137		138	139	
44303A	130	131						133		135		98					137		138	139	
44401A	130	131						133		135		98					137		138	139	
44529A	130	131						133		135		98					137		138	139	
44602A	130	131						133		135		98					137		138	139	

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 2.82 m (111 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A				149	150			151	152	153		154		162		156		157		158	
42109A				149	150			151	152	153		154		162		156		157		158	
42207A				149	150			151	152	153		154		162		156		157		158	
42430A				149	150			151	152	153		154		162		156		157		158	
42514A				149	150			151	152	153		154		162		156		157		158	
42606A				149	150			151	152	153		154		162		156		157		158	
42705A				149	150			151	152	153		154		162		156		157		158	
42904A				149	150			151	152	153		154		162		156		157		158	
42907A				149	150			151	152	153		154		162		156		157		158	
43013A				149	150			151	152	153		154		162		156		157		158	
43112A				149	150			151	152	153		154		162		156		157		158	
43209A				149	150			151	152	153		154		162		156		157		158	
43511A				149	150			151	152	153		154		162		156		157		158	
43610A				149	150			151	152	153		154		162		156		157		158	
43715A				149	150			151	152	153		154		162		156		157		158	
43916A				149	150			151	152	153		154		162		156		157		158	
44117A				149	150			151	152	153		154		162		156		157		158	
44303A				149	150			151	152	153		154		162		156		157		158	
44401A				149	150			151	152	153		154		162		156		157		158	
44529A				149	150			151	152	153		154		162		156		157		158	
44602A				149	150			151	152	153		154		162		156		157		158	

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 3.05 m (120 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A	159	160	161			155							163		164		165		166		167
42109A	159	160	161			155							163		164		165		166		167
42207A	159	160	161			155							163		164		165		166		167
42430A	159	160	161			155							163		164		165		166		167
42514A	159	160	161			155							163		164		165		166		167
42606A	159	160	161			155							163		164		165		166		167
42705A	159	160	161			155							163		164		165		166		167
42904A	159	160	161			155							163		164		165		166		167
42907A	159	160	161			155							163		164		165		166		167
43013A	159	160	161			155							163		164		165		166		167
43112A	159	160	161			155							163		164		165		166		167
43209A	159	160	161			155							163		164		165		166		167
43511A	159	160	161			155							163		164		165		166		167
43610A	159	160	161			155							163		164		165		166		167
43715A	159	160	161			155							163		164		165		166		167
43916A	159	160	161			155							163		164		165		166		167
44117A	159	160	161			155							163		164		165		166		167
44303A	159	160	161			155							163		164		165		166		167
44401A	159	160	161			155							163		164		165		166		167
44529A	159	160	161			155							163		164		165		166		167
44602A	159	160	161			155							163		164		165		166		167

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 3.35 m (132 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A				168										169		170		171			
42108A				168										169		170		171			
42207A				168										169		170		171			
42430A				168										169		170		171			
42514A				168										169		170		171			
42606A				168										169		170		171			
42705A				168										169		170		171			
42804A				168										169		170		171			
42907A				168										169		170		171			
43013A				168										169		170		171			
43112A				168										169		170		171			
43209A				168										169		170		171			
43511A				168										169		170		171			
43610A				168										169		170		171			
43715A				168										169		170		171			
43916A				168										169		170		171			
44117A				168										169		170		171			
44303A				168										169		170		171			
44401A				168										169		170		171			
44529A				168										169		170		171			
44602A				168										169		170		171			

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION A, 3.51 m (138 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41909A			172			173							174		175						176
42108A			172			173							174		175						176
42207A			172			173							174		175						176
42430A			172			173							174		175						176
42514A			172			173							174		175						176
42606A			172			173							174		175						176
42705A			172			173							174		175						176
42804A			172			173							174		175						176
42907A			172			173							174		175						176
43013A			172			173							174		175						176
43112A			172			173							174		175						176
43209A			172			173							174		175						176
43511A			172			173							174		175						176
43610A			172			173							174		175						176
43715A			172			173							174		175						176
43916A			172			173							174		175						176
44117A			172			173							174		175						176
44303A			172			173							174		175						176
44401A			172			173							174		175						176
44529A			172			173							174		175						176
44602A			172			173							174		175						176

TABLE K-1 (cont)

VALID STEAM TEMPERATURE CHANNELS

CONFIGURATION A

Subchannel Number Elevation [m (in.)]	6 3.5 (138)	11 3.35 (132)	6 3.05 (120)	15 3.05 (120)	14 3.05 (120)	5 2.82 (111)	10 2.82 (111)	9 2.44 (96)	8 2.44 (96)	10 2.44 (96)	5 2.29 (90)	7 2.29 (90)	10 2.29 (90)	6 2.29 (90)	6 1.98 (78)	11 1.98 (78)	9 1.98 (78)	8 1.98 (78)	7 1.88 (74)	8 1.70 (67)	9 1.70 (67)	11 1.70 (67)	Special 1.70 (67)	10 1.50 (59)	15 1.50 (59)	10 1.22 (48)	10 0.97 (38)
Run																											
41909A	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203
42108A																											
42207A																											
42430A																											
42514A																											
42606A																											
42705A																											
42804A																											
42907A																				↓							
43013A																					↓	↓		↓	↓		
43112A																							↓				↓
43208A																										↓	
43511A																											
43610A																					↓						
43715A																											
43916A																											
44117A																											
44303A																											
44401A																											
44529A																											
44602A	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓								

TABLE K-2

VALID THERMOCOUPLE CHANNELS
CONFIGURATION B, 0.30 m (12 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B				1										2		3		4			
41401B				1										2		3		4			
41709B				1										2		3		4			
41908B				1										2		3		4			
41907B				1										2		3		4			
42014B				1										2		3		4			
42105B				1										2		3		4			
42204B				1										2		3		4			
42306B				1										2		3		4			
42415B				1										2		3		4			
42711B				1										2		3		4			
42810B				1										2		3		4			
42915B				1										2		3		4			
43129B				1										2		3		4			
43202B				1										2		3		4			
43412B				1										2		3		4			
43513B				1										2		3		4			
43717B				1										2		3		4			
43816B				1										2		3		4			

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION B, 0.61 m (24 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B	5	6															7		8		
41401B	5	6															7		8		
41709B	5	6															7		8		
41908B	5	6															7		8		
41907B	5	6															7		8		
42014B	5	6															7		8		
42105B	5	6															7		8		
42204B	5	6															7		8		
42306B	5	6															7		8		
42415B	5	6															7		8		
42711B	5	6															7		8		
42810B	5	6															7		8		
42915B	5	6															7		8		
43129B	5	6															7		8		
43202B	5	6															7		8		
43412B	5	6															7		8		
43513B	5	6															7		8		
43717B	5	6															7		8		
43816B	5	6															7		8		

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION B, 0.99 m (39 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B				9										10		11		12			
41401B				9										10		11		12			
41709B				9										10		11		12			
41808B				9										10		11		12			
41907B				9										10		11		12			
42014B				9										10		11		12			
42105B				9										10		11		12			
42204B				9										10		11		12			
42306B				9										10		11		12			
42415B				9										10		11		12			
42711B				9										10		11		12			
42810B				9										10		11		12			
42915B				9										10		11		12			
43129B				9										10		11		12			
43202B				9										10		11		12			
43412B				9										10		11		12			
43513B				9										10		11		12			
43717B				9										10		11		12			
43816B				9										10		11		12			

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION B, 1.22 m (48 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B	13	14															15		16		
41401B	13	14															15		16		
41709B	13	14															15		16		
41808B	13	14															15		16		
41907B	13	14															15		16		
42014B	13	14															15		16		
42105B	13	14															15		16		
42204B	13	14															15		16		
42306B	13	14															15		16		
42415B	13	14															15		16		
42711B	13	14															15		16		
42810B	13	14															15		16		
42915B	13	14															15		16		
43129B	13	14															15		16		
43202B	13	14															15		16		
43412B	13	14															15		16		
43513B	13	14															15		16		
43717B	13	14															15		16		
43816B	13	14															15		16		

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 1.52 m (60 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B				17										18		19		20			
41401B				17										18		19		20			
41709B				17										18		19		20			
41808B				17										18		19		20			
41907B				17										18		19		20			
42014B				17										18		19		20			
42105B				17										18		19		20			
42204B				17										18		19		20			
42306B				17										18		19		20			
42415B				17										18		19		20			
42711B				17										18		19		20			
42810B				17										18		19		20			
42915B				17										18		19		20			
43129B				17										18		19		20			
43202B				17										18		19		20			
43412B				17										18		19		20			
43513B				17										18		19		20			
43717B				17										18		19		20			
43916B				17										18		19		20			

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 1.70 m (67 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B				21										22		23		24			
41401B				21										22		23		24			
41709B				21										22		23		24			
41808B				21										22		23		24			
41907B				21										22		23		24			
42014B				21										22		23		24			
42105B				21										22		23		24			
42204B				21										22		23		24			
42306B				21										22		23		24			
42415B				21										22		23		24			
42711B				21										22		23		24			
42810B				21										22		23		24			
42915B				21										22		23		24			
43129B				21										22		23		24			
43202B				21										22		23		24			
43412B				21										22		23		24			
43513B				21										22		23		24			
43717B				21										22		23		24			
43916B				21										22		23		24			

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 1.78 m (70 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B	25	26					27				28						29		30		
41401B	25	26					27				28						29		30		
41709B	25	26					27				28						29		30		
41808B	25	26					27				28						29		30		
41907B	25	26					27				28						29		30		
42014B	25	26					27				28						29		30		
42105B	25	26					27				28						29		30		
42204B	25	26					27				28						29		30		
42306B	25	26					27				28						29		30		
42415B	25	26					27				28						29				
42711B	25	26					27				28						29				
42910B	25	26					27				28						29				
42915B	25	26					27				28						29				
43129B	25	26					27				28						29				
43202B	25	26					27				28						29				
43412B	25	26					27				28						29				
43513B	25	26					27				28						29				
43717B	25	26					27				28						29				
43816B	25	26					27				28						29				

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 1.80 m (71 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B			31			32	33				34		35		36						37
41401B			31			32	33				34		35		36						37
41709B			31			32	33				34		35		36						37
41808B			31			32	33				34		35		36						37
41907B			31			32	33				34		35		36						37
42014B			31			32	33				34		35		36						37
42105B			31			32	33				34		35		36						37
42204B			31			32	33				34		35		36						37
42306B			31			32	33				34		35		36						37
42415B			31			32	33				34		35		36						37
42711B			31			32	33				34		35		36						37
42910B			31			32	33				34		35		36						37
42915B			31			32	33				34		35		36						37
43129B			31			32	33				34		35		36						37
43202B			31			32	33				34		35		36						37
43412B			31			32	33				34		35		36						37
43513B			31			32	33				34		35		36						37
43717B			31			32	33				34		35		36						37
43816B			31			32	33				34		35		36						37

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 1.83 m (72 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B	38	39			40		41	42	43	44	45	46					47		48	49	
41401B	38	39			40		41	42	43	44	45	46					47		48	49	
41709B		39			40		41	42	43	44	45	46					47		48	49	
41808B		39			40		41	42	43	44	45	46					47		48	49	
41907B		39			40		41	42	43	44	45	46					47		48	49	
42014B		39			40		41	42	43	44	45	46					47		48	49	
42105B		39			40		41	42	43	44	45	46					47		48	49	
42204B		39			40		41	42	43	44	45	46					47		48	49	
42306B		39			40		41	42	43	44	45	46					47		48	49	
42415B		39			40		41	42	43	44	45	46					47		48	49	
42711B		39			40		41	42	43	44	45	46					47		48	49	
42810B		39			40		41	42	43	44	45	46					47		48	49	
42915B		39			40		41	42	43	44	45	46					47		48	49	
43129B		39			40		41	42	43	44	45	46					47		48	49	
43202B		39			40		41	42	43	44	45	46					47		48	49	
43412B		39			40		41	42	43	44	45	46					47		48	49	
43513B		39			40		41	42	43	44	45	46					47		48	49	
43717B		39			40		41	42	43	44	45	46					47		48	49	
43816B		39			40		41	42	43	44	45	46					47		48	49	

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 1.88 m (74 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B			50		51	52	53	54	55	56	57	58	59		60					61	62
41401B			50		51	52	53	54	55	56	57	58	59		60					61	62
41709B			50		51	52	53	54	55	56	57	58	59		60					61	62
41808B			50		51	52	53	54	55	56	57	58	59		60					61	62
41907B			50		51	52	53	54	55	56	57	58	59		60					61	62
42014B			50		51	52	53	54	55	56	57	58	59		60					61	62
42105B			50		51	52	53	54	55	56	57	58	59		60					61	62
42204B			50		51	52	53	54	55	56	57	58	59		60					61	62
42306B			50		51	52	53	54	55	56	57	58	59		60					61	62
42415B			50		51	52	53	54	55	56	57	58	59		60					61	62
42711B			50		51	52	53	54	55	56	57	58	59		60					61	62
42810B			50		51	52	53	54	55	56	57	58	59		60					61	62
42915B			50		51	52	53	54	55	56	57	58	59		60					61	62
43129B			50		51	52	53	54	55	56	57	58	59		60					61	62
43202B			50		51	52	53	54	55	56	57	58	59		60					61	62
43412B			50		51	52	53	54	55	56	57	58	59		60					61	62
43513B			50		51	52	53	54	55	56	57	58	59		60					61	62
43717B			50		51	52	53	54	55	56	57	58	59		60					61	62
43816B			50		51	52	53	54	55	56	57	58	59		60					61	62

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 1.90 m (75 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B			63			64	65				66		67		68						69
41401B			63			64	65				66		67		68						69
41709B			63			64	65				66		67		68						69
41808B			63			64	65				66		67		68						69
41907B			63			64	65				66		67		68						69
42014B			63			64	65				66		67		68						69
42105B			63			64	65				66		67		68						69
42204B			63			64	65				66		67		68						69
42306B			63			64	65				66		67		68						69
42415B			63			64	65				66		67		68						69
42711B			63			64	65				66		67		68						69
42810B			63			64	65				66		67		68						69
42915B			63			64	65				66		67		68						69
43129B			63			64	65				66		67		68						69
43202B			63			64	65				66		67		68						69
43412B			63			64	65				66		67		68						69
43513B			63			64	65				66		67		68						69
43717B			63			64	65				66		67		68						69
43816B			63			64	65				66		67		68						69

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 1.93 m (76 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B				70	71		72	73	74	75	76	77		78		79		80		81	
41401B				70	71		72	73	74	75	76	77		78		79		80		81	
41709B				70	71			73	74	75	76	77		78		79		80		81	
41808B				70	71		72	73	74	75	76	77		78		79		80		81	
41907B				70	71		72	73	74	75	76	77		78		79		80		81	
42014B				70	71		72	73	74	75	76	77		78		79		80		81	
42105B				70	71		72	73	74	75	76	77		78		79		80		81	
42204B				70	71		72	73	74	75	76	77		78		79		80		81	
42306B				70	71		72	73	74	75	76	77		78		79		80		81	
42415B				70	71		72	73	74	75	76	77		78		79		80		81	
42711B				70	71		72	73	74	75	76	77		78		79		80		81	
42810B				70	71		72	73	74	75	76	77		78		79		80		81	
42915B				70	71		72	73	74	75	76	77		78		79		80		81	
43129B				70	71		72	73	74	75	76	77		78		79		80		81	
43202B				70	71		72	73	74	75	76	77		78		79		80		81	
43412B				70	71		72	73	74	75	76	77		78		79		80		81	
43513B				70	71		72	73	74	75	76	77		78		79		80		81	
43717B				70	71		72	73	74	75	76	77		78		79		80		81	
43816B				70	71		72	73	74	75	76	77		78		79		80		81	

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 1.96 m (77 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B			82			83	84				85		86		87						88
41401B			82			83	84				85		86		87						88
41709B			82			83	84				85		86		87						88
41808B			82			83	84				85		86		87						88
41907B			82			83	84				85		86		87						88
42014B			82			83	84				85		86		87						88
42105B			82			83	84				85		86		87						88
42204B			82			83	84				85		86		87						88
42306B			82			83	84				85		86		87						88
42415B			82			83	84				85		86		87						88
42711B			82			83	84				85		86		87						88
42810B			82			83	84				85		86		87						88
42915B			82			83	84				85		86		87						88
43129B			82			83	84				85		86		87						88
43202B			82			83	84				85		86		87						88
43412B			82			83	84				85		86		87						88
43513B			82			83	84				85		86		87						88
43717B			82			83	84				85		86		87						88
43816B			82			83	84				85		86		87						88

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 1.98 m (78 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B				89	90		91	92	93	94	95	96		97		98		100		101	
41401B				89	90		91	92	93	94	95	96		97		98		100		101	
41709B				89	90		91	92	93	94	95	96		97		98		100		101	
41808B				89	90		91	92	93	94	95	96		97		98		100		101	
41907B				89	90		91	92	93	94	95	96		97		98		100		101	
42014B				89	90		91	92	93	94	95	96		97		98		100		101	
42105B				89	90		91	92	93	94	95	96		97		98		100		101	
42204B				89	90		91	92	93	94	95	96		97		98		100		101	
42306B				89	90		91	92	93	94	95	96		97		98		100		101	
42415B				89	90		91	92	93	94	95	96		97		98		100		101	
42711B				89	90		91	92	93	94	95	96		97		98		100		101	
42810B				89	90		91	92	93	94	95	96		97		98		100		101	
42915B				89	90		91	92	93	94	95	96		97		98		100		101	
43129B				89	90		91	92	93	94	95	96		97		98		100		101	
43202B				89	90		91	92	93	94	95	96		97		98		100		101	
43412B				89	90		91	92	93	94	95	96		97		98		100		101	
43513B				89	90		91	92	93	94	95	96		97		98		100		101	
43717B				89	90		91	92	93	94	95	96		97		98		100		101	
43816B				89	90		91	92	93	94	95	96		97		98		100		101	

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 2.13 m (84 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B	109	110			111			112	113	114		115					116		117	118	
41401B	109	110			111			112	113	114		115					116		117	118	
41709B	109	110			111			112	113	114		115					116		117	118	
41808B	109	110			111			112	113	114		115					116		117	118	
41907B	109	110			111			112	113	114		115					116		117	118	
42014B	109	110			111			112	113	114		115					116		117	118	
42105B	109	110			111			112	113	114		115					116		117	118	
42204B	109	110			111			112	113	114		115					116		117	118	
42306B	109	110			111			112	113	114		115					116		117	118	
42415B	109	110			111			112	113	114		115					116		117	118	
42711B	109	110			111			112	113	114		115					116		117	118	
42810B	109	110			111			112	113	114		115					116		117	118	
42915B	109	110			111			112	113	114		115					116		117	118	
43129B	109	110			111			112	113	114		115					116		117	118	
43202B	109	110			111			112	113	114		115					116		117	118	
43412B	109	110			111			112	113	114		115					116		117	118	
43513B	109	110			111			112	113	114		115					116		117	118	
43717B	109	110			111			112	113	114		115					116		117	118	
43816B	109	110			111			112	113	114		115					116		117	118	

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 2.29 m (90 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B			119		120	121		122	123	124		125	126		127					128	129
41401B			119		120	121		122	123	124		125	126		127					128	129
41709B			119		120	121		122	123	124		125	126		127					128	129
41808B			119		120	121		122	123	124		125	126		127					128	129
41907B			119		120	121		122	123	124		125	126		127					128	129
42014B			119		120	121		122	123	124		125	126		127					128	129
42105B			119		120	121		122	123	124		125	126		127					128	129
42204B			119		120	121		122	123	124		125	126		127					128	129
42306B			119		120	121		122	123	124		125	126		127					128	129
42415B			119		120	121		122	123	124		125	126		127					128	129
42711B			119		120	121		122	123	124		125	126		127					128	129
42810B			119		120	121		122	123	124		125	126		127					128	129
42915B			119		120	121		122	123	124		125	126		127					128	129
43129B			119		120	121		122	123	124		125	126		127					128	129
43202B			119		120	121		122	123	124		125	126		127					128	129
43412B			119		120	121		122	123	124		125	126		127					128	129
43513B			119		120	121		122	123	124		125	126		127					128	129
43717B			119		120	121		122	123	124		125	126		127					128	129
43816B			119		120	121		122	123	124		125	126		127					128	129

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 2.44 m (96 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B	130	131			132			133	134	135		136					137		138	139	
41401B	130	131			132			133	134	135		136					137		138	139	
41709B	130	131			132			133	134	135		136					137		138	139	
41808B	130	131			132			133	134	135		136					137		138	139	
41907B	130	131			132			133	134	135		136					137		138	139	
42014B	130	131			132			133	134	135		136					137		138	139	
42105B	130	131			132			133	134	135		136					137		138	139	
42204B	130	131			132			133	134	135		136					137		138	139	
42306B	130	131			132			133	134	135		136					137		138	139	
42415B	130	131			132			133	134	135		136					137		138	139	
42711B	130	131			132			133	134	135		136					137		138	139	
42810B	130	131			132			133	134	135		136					137		138	139	
42915B	130	131			132			133	134	135		136					137		138	139	
43129B	130	131			132			133	134	135		136					137		138	139	
43202B	130	131			132			133	134	135		136					137		138	139	
43412B	130	131			132			133	134	135		136					137		138	139	
43513B	130	131			132			133	134	135		136					137		138	139	
43717B	130	131			132			133	134	135		136					137		138	139	
43816B	130	131			132			133	134	135		136					137		138	139	

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 2.59 m (102 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B	140	141	142			143							144		145		146		147		148
41401B	140	141	142			143							144		145		146		147		148
41709B	140	141	142			143							144		145		146		147		148
41808B	140	141	142			143							144		145		146		147		148
41907B	140	141	142			143							144		145		146		147		148
42014B	140	141	142			143							144		145		146		147		148
42105B	140	141	142			143							144		145		146		147		148
42204B	140	141	142			143							144		145		146		147		148
42306B	140	141	142			143							144		145		146		147		148
42415B	140	141	142			143							144		145		146		147		148
42711B	140	141	142			143							144		145		146		147		148
42910B	140	141	142			143							144		145		146		147		148
42915B	140	141	142			143							144		145		146		147		148
43129B	140	141	142			143							144		145		146		147		148
43202B	140	141	142			143							144		145		146		147		148
43412B	140	141	142			143							144		145		146		147		148
43513B	140	141	142			143							144		145		146		147		148
43717B	140	141	142			143							144		145		146		147		148
43816B	140	141	142			143							144		145		146		147		148

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 2.82 m (111 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B				149	150			151	152	153		154		155		156		157		158	
41401B				149	150			151	152	153		154		155		156		157		158	
41709B				149	150			151	152	153		154		155		156		157		158	
41808B				149	150			151	152	153		154		155		156		157		158	
41907B				149	150			151	152	153		154		155		156		157		158	
42014B				149	150			151	152	153		154		155		156		157		158	
42105B				149	150			151	152	153		154		155		156		157		158	
42204B				149	150			151	152	153		154		155		156		157		158	
42306B				149	150			151	152	153		154		155		156		157		158	
42415B				149	150			151	152	153		154		155		156		157		158	
42711B				149	150			151	152	153		154		155		156		157		158	
42810B				149	150			151	152	153		154		155		156		157		158	
42915B				149	150			151	152	153		154		155		156		157		158	
43129B				149	150			151	152	153		154		155		156		157		158	
43202B				149	150			151	152	153		154		155		156		157		158	
43412B				149	150			151	152	153		154		155		156		157		158	
43513B				149	150			151	152	153		154		155		156		157		158	
43717B				149	150			151	152	153		154		155		156		157		158	
43816B				149	150			151	152	153		154		155		156		157		158	

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 3.05 m (120 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B	159	160	161			162							163		164		165		166		167
41401B	159	160	161			162							163		164		165		166		167
41709B	159	160	161			162							163		164		165		166		167
41808B	159	160	161			162							163		164		165		166		167
41907B	159	160	161			162							163		164		165		166		167
42014B	159	160	161			162							163		164		165		166		167
42105B	159	160	161			162							163		164		165		166		167
42204B	159	160	161			162							163		164		165		166		167
42306B	159	160	161			162							163		164		165		166		167
42415B	159	160	161			162							163		164		165		166		167
42711B	159	160	161			162							163		164		165		166		167
42810B	159	160	161			162							163		164		165		166		167
42915B	159	160	161			162							163		164		165		166		167
43129B	159	160	161			162							163		164		165		166		167
43202B	159	160	161			162							163		164		165		166		167
43412B	159	160	161			162							163		164		165		166		167
43513B	159	160	161			162							163		164		165		166		167
43717B	159	160	161			162							163		164		165		166		167
43816B	159	160	161			162							163		164		165		166		167

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 3.35 m (132 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B				168										169		170		171			
41401B				168										169		170		171			
41709B				168										169		170		171			
41808B				168										169		170		171			
41907B				168										169		170		171			
42014B				168										169		170		171			
42105B				168										169		170		171			
42204B				168										169		170		171			
42306B				168										169		170		171			
42415B				168										169				171			
42711B				168										169				171			
42810B				168										169				171			
42915B				168										169				171			
43129B				168										169				171			
43202B				168										169				171			
43412B				168										169				171			
43513B				168										169				171			
43717B				168										169				171			
43816B				168										169				171			

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION B, 3.51 m (138 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103B			172			173							174		175						176
41401B			172			173							174		175						176
41709B			172			173							174		175						176
41808B			172			173							174		175						176
41907B			172			173							174		175						176
42014B			172			173							174		175						176
42105B			172			173							174		175						176
42204B			172			173							174		175						176
42306B			172			173							174		175						176
42415B			172			173							174		175						176
42711B			172			173							174		175						176
42810B			172			173							174		175						176
42915B			172			173							174		175						176
43129B						173							174		175						176
43202B						173							174		175						176
43412B						173							174		175						176
43513B						173							174		175						176
43717B						173							174		175						176
43816B						173							174		175						176

TABLE K-2 (cont)

VALID STEAM TEMPERATURE CHANNELS

CONFIGURATION B

Subchannel Number Elevation [m (in.)]	9 0.89 (35)	10 1.19 (47)	15 1.47 (58)	10 1.47 (58)	8 1.70 (67)	Special 1.70 (67)	9 1.70 (67)	11 1.70 (67)	6 1.96 (77)	8 1.96 (77)	9 1.96 (77)	11 1.96 (77)	6 2.26 (89)	7 2.26 (89)	10 2.26 (89)	5 2.26 (89)	8 2.46 (97)	9 2.46 (97)	10 2.46 (97)	5 2.77 (109)	10 2.77 (109)	14 3.05 (120)	6 3.05 (120)	15 3.05 (120)	11 3.30 (130)	6 3.51 (138)
Run																										
41103B	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202
41401B																										
41709B																										
41808B					↓		↓																			
41907B																										
42014B																										
42105B																										
42204B																										
42306B																										
42415B			↓					↓																		
42711B																										
42810B													↓													
42915B																										
43129B																										
43202B																										
43412B																										
43513B																										
43717B																										
43816B	↓	↓		↓		↓			↓	↓	↓	↓		↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓

TABLE K-3

VALID THERMOCOUPLE CHANNELS
CONFIGURATION C, 0.30 m (12 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C				1										2		3		4			
41201C				1										2		3		4			
41329C				1										2		3		4			
41731C				1										2		3		4			
41831C				1										2		3		4			
41909C				1										2		3		4			
42008C				1										2		3		4			
42107C				1										2		3		4			
42314C				1										2		3		4			
42413C				1										2		3		4			
42506C				1										2		3		4			
42605C				1										2		3		4			
42715C				1										2		3		4			
42804C				1										2		3		4			
42912C				1										2		3		4			
43110C				1										2		3		4			
43211C				1										2		3		4			
43315C				1										2		3		4			
43431C				1										2		3		4			
43531C				1										2		3		4			
43716C				1										2		3		4			
43817C				1										2		3		4			
43902C				1										2		3		4			

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION C, 0.61 m (24 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C	5	6															7		8		
41201C	5	6															7				
41329C	5	6															7				
41731C	5	6															7				
41831C	5	6															7				
41909C	5	6															7				
42008C	5	6															7				
42107C	5	6															7				
42314C	5	6															7				
42413C	5	6															7				
42506C	5	6															7				
42605C	5	6															7				
42715C	5	6															7				
42804C	5	6															7				
42912C	5	6															7				
43110C	5	6															7				
43211C	5	6															7				
43315C	5	6															7				
43431C	5	6															7				
43531C	5	6															7				
43716C	5	6															7				
43817C	5	6															7				
43902C	5	6															7				

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 0.99 m (39 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C				9										10		11		12			
41201C				9										10		11		12			
41329C				9										10		11		12			
41731C				9										10		11		12			
41831C				9										10		11		12			
41909C				9										10		11		12			
42008C				9										10		11		12			
42107C				9										10		11		12			
42314C				9										10		11		12			
42413C				9										10		11		12			
42506C				9										10		11		12			
42605C				9										10		11		12			
42715C				9										10		11		12			
42804C				9										10		11		12			
42912C				9										10		11		12			
43110C				9										10		11		12			
43211C				9										10		11		12			
43315C				9										10		11		12			
43431C				9										10		11		12			
43531C				9										10		11		12			
43716C				9										10		11		12			
43817C				9										10		11		12			
43902C				9										10		11		12			

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 1.22 m (48 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C	13	14															15		16		
41201C	13	14															15		16		
41329C	13	14															15		16		
41731C	13	14															15		16		
41831C	13	14															15		16		
41909C	13	14															15		16		
42008C	13	14															15		16		
42107C	13	14															15		16		
42314C	13	14															15		16		
42413C	13	14															15		16		
42506C	13	14															15		16		
42605C	13	14															15		16		
42715C	13	14															15		16		
42804C	13	14															15		16		
42912C	13	14															15		16		
43110C	13	14															15		16		
43211C	13	14															15		16		
43315C	13	14															15		16		
43431C	13	14															15		16		
43531C	13	14															15		16		
43716C	13	14															15		16		
43817C	13	14															15		16		
43902C	13	14															15		16		

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION C, 1.52 m (60 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C				17										18				20			
41201C				17										18				20			
41329C				17										18				20			
41731C				17										18				20			
41831C				17										18				20			
41909C				17										18				20			
42008C				17										18				20			
42107C				17										18				20			
42314C				17										18				20			
42413C				17										18				20			
42506C				17										18				20			
42605C				17										18				20			
42715C				17										18				20			
42804C				17										18				20			
42912C				17										18				20			
43110C				17										18				20			
43211C				17										18				20			
43315C				17										18				20			
43431C				17										18				20			
43531C				17										18				20			
43716C				17										18				20			
43817C				17										18				20			
43902C				17										18				20			

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION C, 1.70 m (67 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C				21										22		23		24			
41201C				21										22		23		24			
41329C				21										22		23		24			
41731C				21										22		23		24			
41831C				21										22		23		24			
41909C				21										22		23		24			
42008C				21										22		23		24			
42107C				21										22		23		24			
42314C				21										22		23		24			
42413C				21										22		23		24			
42506C				21										22		23		24			
42605C				21										22		23		24			
42715C				21										22		23		24			
42804C				21										22		23		24			
42912C				21										22		23		24			
43110C				21										22		23		24			
43211C				21										22		23		24			
43315C				21										22		23		24			
43431C				21										22		23		24			
43531C				21										22		23		24			
43716C				21										22		23		24			
43817C				21										22		23		24			
43902C				21										22		23		24			

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 1.78 m (70 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C	25	26					27				28						29		30		
41201C	25	26					27				28						29		30		
41329C	25	26					27				28						29		30		
41731C	25	26					27				28						29		30		
41831C	25	26					27				28						29		30		
41909C	25	26					27				28						29		30		
42008C	25	26					27				28						29		30		
42107C	25	26					27				28						29		30		
42314C	25	26					27				28						29		30		
42413C	25	26					27				28						29		30		
42506C	25	26					27				28						29		30		
42605C	25	26					27				26						29		30		
42715C	25	26					27				28						29		30		
42804C		26					27				28						29		30		
42912C		26					27				28						29		30		
43110C		26					27				28						29		30		
43211C		26					27				28						29		30		
43315C		26					27				28						29		30		
43431C		26					27				28						29		30		
43531C		26					27				28						29		30		
43716C		26					27				28						29		30		
43817C		26					27				28						29		30		
43902C		26					27				28						29		30		

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 1.80 m (71 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C						32	33				34		35		36						37
41201C						32	33				34		35		36						37
41329C						32	33				34		35		36						37
41731C						32	33				34		35		36						37
41831C						32	33				34		35		36						37
41909C						32	33				34		35		36						37
42008C						32	33				34		35		36						37
42107C						32	33				34		35		36						37
42314C						32	33				34		35		36						37
42413C						32	33				34		35		36						37
42506C						32	33				34		35		36						37
42605C						32	33				34		35		36						37
42715C						32	33				34		35		36						37
42804C						32	33				34		35		36						37
42912C						32	33				34		35		36						37
43110C						32	33				34		35		36						37
43211C						32	33				34		35		36						37
43315C						32	33				34		35		36						37
43431C						32	33				34		35		36						37
43531C						32	33				34		35		36						37
43716C						32	33				34		35		36						37
43817C						32	33				34		35		36						37
43902C						32	33				34		35		36						37

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION C, 1.83 m (72 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C	38	39			40		41	42	43	44	45	46					47		48	49	
41201C	38	39			40		41	42	43	44	45	46					47		48	49	
41329C	38	39			40		41	42	43	44	45	46					47		48	49	
41731C	38	39			40		41	42	43	44	45	46					47		48	49	
41831C	38	39			40		41	42	43	44	45	46					47		48	49	
41909C	38	39			40		41	42	43	44	45	46					47		48	49	
42008C	38	39			40		41	42	43	44	45	46					47		48	49	
42107C	38	39			40		41	42	43	44	45	46					47		48	49	
42314C	38	39			40		41	42	43	44	45	46					47		48	49	
42413C	38	39			40		41	42	43	44	45	46					47		48	49	
42506C	38	39			40		41	42	43	44	45	46					47		48	49	
42605C	38	39			40		41	42	43	44	45	46					47		48	49	
42715C	38	39			40		41	42	43	44	45	46					47		48	49	
42804C	38	39			40		41	42	43	44	45	46					47		48	49	
42912C	38	39			40		41	42	43	44	45	46					47		48	49	
43110C	38	39			40		41	42	43	44	45	46					47		48	49	
43211C	38	39			40		41	42	43	44	45	46					47		48	49	
43315C	38	39			40		41	42	43	44	45	46					47		48	49	
43431C	38	39			40		41	42	43	44	45	46					47		48	49	
43531C	38	39			40		41	42	43	44	45	46					47		48	49	
43716C	38	39			40		41	42	43	44	45	46					47		48	49	
43817C	38	39			40		41	42	43	44	45	46					47		48	49	
43902C	38	39			40		41	42	43	44	45	46					47		48	49	

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION C, 1.88 m (74 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C			50		51	52	53	54	55	56	57	58	59		60					61	62
41201C			50		51	52	53	54	55	56	57	58	59		60					61	62
41329C			50		51	52	53	54	55	56	57	58	59		60					61	62
41731C			50		51	52	53	54	55	56	57	58	59		60					61	62
41831C			50		51	52	53	54	55	56	57	58	59		60					61	62
41909C			50		51	52	53	54	55	56	57	58	59		60					61	62
42008C			50		51	52	53	54	55		57	58	59		60					61	62
42107C			50		51	52	53	54	55		57	58	59		60					61	62
42314C			50		51	52	53	54	55		57	58	59		60					61	62
42413C			50		51	52	53	54	55		57	58	59		60					61	62
42506C			50		51	52	53	54	55		57	58	59		60					61	62
42605C			50		51	52	53	54	55		57	58	59		60					61	62
42715C			50		51	52	53	54	55		57	58	59		60					61	62
42804C			50		51	52	53	54	55		57	58	59		60					61	62
42912C			50		51	52	53	54	55		57	58	59		60					61	62
43110C			50		51	52	53	54	55		57	58	59		60					61	62
43211C			50		51	52	53	54	55		57	58	59		60					61	62
43315C			50		51	52	53	54	55		57	58	59		60					61	62
43431C			50		51	52	53	54	55		57	58	59		60					61	62
43531C			50		51	52	53	54	55		57	58	59		60					61	62
43716C			50		51	52	53	54	55		57	58	59		60					61	62
43817C			50		51	52	53	54	55		57	58	59		60					61	62
43902C			50		51	52	53	54	55		57	58	59		60					61	62

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 1.90 m (75 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C			63			64	65				66		67		68						69
41201C			63			64	65				66		67		68						69
41329C			63			64	65				66		67		68						69
41731C			63			64	65				66		67		68						69
41831C			63			64	65				66		67		68						69
41909C			63			64	65				66		67		68						69
42008C			63			64	65				66		67		68						69
42107C			63			64	65				66		67		68						69
42314C			63			64	65				66		67		68						69
42413C			63			64	65				66		67		68						69
42506C			63			64	65				66		67		68						69
42605C			63			64	65				66		67		68						69
42715C			63			64	65				66		67		68						69
42804C			63			64	65				66		67		68						69
42912C			63			64	65				66		67		68						69
43110C			63			64	65				66		67		68						69
43211C			63			64	65				66		67		68						69
43315C			63			64	65				66		67		68						69
43431C			63			64	65				66		67		68						69
43531C			63			64	65				66		67		68						69
43716C			63			64	65				66		67		68						69
43817C			63			64	65				66		67		68						69
43902C			63			64	65				66		67		68						69

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 1.93 m (76 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C				70	71		72	73	74	75	76	77		78		79		80			
41201C				70	71		72	73	74	75	76	77		78		79		80			
41329C				70	71		72	73	74	75	76	77		78		79		80			
41731C				70	71		72	73	74	75	76	77		78		79		80			
41831C				70	71		72	73	74	75	76	77		78		79		80			
41909C				70	71		72	73	74	75	76	77		78		79		80			
42008C				70	71		72	73	74	75	76	77		78		79		80			
42107C				70	71		72	73	74	75	76	77		78		79		80			
42314C				70	71		72	73	74	75	76	77		78		79		80			
42413C				70	71		72	73	74	75	76	77		78		79		80			
42506C				70	71		72	73	74	75	76	77		78		79		80			
42605C				70	71		72	73	74	75	76	77		78		79		80			
42715C				70	71		72	73	74	75	76	77		78		79		80			
42804C				70	71		72	73	74	75	76	77		78		79		80			
42912C				70	71		72	73	74	75	76	77		78		79		80			
43110C				70	71		72	73	74	75	76	77		78		79		80			
43211C				70	71		72	73	74	75	76	77		78		79		80			
43315C				70	71		72	73	74	75	76	77		78		79		80			
43431C				70	71		72	73	74	75	76	77		78		79		80			
43531C				70	71		72	73	74	75	76	77		78		79		80			
43716C				70	71		72	73	74	75	76	77		78		79		80			
43817C				70	71		72	73	74	75	76	77		78		79		80			
43902C				70	71		72	73	74	75	76	77		78		79		80			

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 1.96 m (77 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
410030			82			83	84				85		86		87						88
412010			82			83	84				85		86		87						88
413290			82			83	84				85		86		87						88
417310			82			83	84				85		86		87						88
418310			82			83	84				85		86		87						88
419090			82			83	84				85		86		87						88
420080			82			83	84				85		86		87						88
421070			82			83	84				85		86		87						88
423140			82			83	84				85		86		87						88
424130			82			83	84				85		86		87						88
425060			82			83	84				85		86		87						88
426050			82			83	84				85		86		87						88
427150			82			83	84				85		86		87						88
428040			82			83	84				85		86		87						88
429120			82			83	84				85		86		87						88
431100			82			83	84				85		86		87						88
432110			82			83	84				85		86		87						88
433150			82			83	84				85		86		87						88
434310			82			83	84				85		86		87						88
435310			82			83	84				85		86		87						88
437160			82			83	84				85		86		87						88
438170			82			83	84				85		86		87						88
439020			82			83	84				85		86		87						88

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 1.98 m (78 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
410030				89	90		91	92	93	94	95	96		97		98		100		101	
412010				89	90		91	92	93	94	95	96		97		98		100		101	
413290				89	90		91	92	93	94	95	96		97		98		100		101	
417310				89	90		91	92	93	94	95	96		97		98		100		101	
418310				89	90		91	92	93	94	95	96		97		98		100		101	
419090				89	90		91	92	93	94	95	96		97		98		100		101	
420080				89	90		91	92	93	94	95	96		97		98		100		101	
421070				89	90		91	92	93	94	95	96		97		98		100		101	
423140				89	90		91	92	93	94	95	96		97		98		100		101	
424130				89	90		91	92	93	94	95	96		97		98		100		101	
425060				89	90		91	92	93	94	95	96		97		98		100		101	
426050				89	90		91	92	93	94	95	96		97		98		100		101	
427150				89	90		91	92	93	94	95	96		97		98		100		101	
428040				89	90		91	92	93	94	95	96		97		98		100		101	
429120				89	90		91	92	93	94	95	96		97		98		100		101	
431100				89	90		91	92	93	94	95	96		97		98		100		101	
432110				89	90		91	92	93	94	95	96		97		98		100		101	
433150				89	90		91	92	93	94	95	96		97		98		100		101	
434310				89	90		91	92	93	94	95	96		97		98		100		101	
435310				89	90		91	92	93	94	95	96		97		98		100		101	
437160				89	90		91	92	93	94	95	96		97		98		100		101	
438170				89	90		91	92	93	94	95	96		97		98		100		101	
439020				89	90		91	92	93	94	95	96		97		98		100		101	

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION C, 2.13 m (84 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C					120	121		122	123	124		125	126		127					128	129
41201C					120	121		122	123	124		125	126		127					128	129
41329C					120	121		122	123	124		125	126		127					128	129
41731C					120	121		122	123	124		125	126		127					128	129
41831C					120	121		122	123	124		125	126		127					128	129
41909C					120	121		122	123	124		125	126		127					128	129
42008C					120	121		122	123	124		125	126		127					128	129
42107C					120	121		122	123	124		125	126		127					128	129
42314C					120	121		122	123	124		125	126		127					128	129
42413C					120	121		122	123	124		125	126		127					128	129
42506C					120	121		122	123	124		125			127					128	129
42605C					120	121		122	123	124		125			127					128	129
42715C					120	121		122	123	124		125			127					128	129
42804C					120	121		122	123	124		125			127					128	129
42912C					120	121		122	123	124		125			127					128	129
43110C					120	121		122	123	124		125			127					128	129
43211C					120	121		122	123	124		125			127					128	129
43315C					120	121		122	123	124		125			127					128	129
43431C					120	121		122	123	124		125			127					128	129
43531C					120	121		122	123	124		125			127					128	129
43716C					120	121		122	123	124		125			127					128	129
43817C					120	121		122	123	124		125			127					128	129
43902C					120	121		122	123	124		125			127					128	129

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION C, 2.29 m (90 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C	109	110			111			112	113	114		115					116		117	118	
41201C	109	110			111			112	113	114		115					116		117	118	
41329C	109	110			111			112	113	114		115					116		117	118	
41731C	109	110			111			112	113	114		115					116		117	118	
41831C	109	110			111			112	113	114		115					116		117	118	
41909C	109	110			111			112	113	114		115					116		117	118	
42008C	109	110			111			112	113	114		115					116		117	118	
42107C	109	110			111			112	113	114		115					116		117	118	
42314C	109	110			111			112	113	114		115					116		117	118	
42413C	109	110			111			112	113	114		115					116		117	118	
42506C	109	110			111			112	113	114		115					116		117	118	
42605C	109	110			111			112	113	114		115					116		117	118	
42715C	109	110			111			112	113	114		115					116		117	118	
42804C	109	110			111			112	113	114		115					116		117	118	
42912C	109	110			111			112	113	114		115					116		117	118	
43110C	109	110			111			112	113	114		115					116		117	118	
43211C	109	110			111			112	113	114		115					116		117	118	
43315C	109	110			111			112	113	114		115					116		117	118	
43431C	109	110			111			112	113	114		115					116		117	118	
43531C	109	110			111			112	113	114		115					116		117	118	
43716C	109	110			111			112	113	114		115					116		117	118	
43817C	109	110			111			112	113	114		115					116		117	118	
43902C	109	110			111			112	113	114		115					116		117	118	

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 2.44 m (96 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C	130	131			132			133	134	135		136					137		138	139	
41201C	130	131			132			133	134	135		136					137		138	139	
41329C	130	131			132			133	134	135		136					137		138	139	
41731C	130	131			132			133	134	135		136					137		138	139	
41831C	130	131			132			133	134	135		136					137		138	139	
41909C	130	131			132			133	134	135		136					137		138	139	
42008C	130	131			132			133	134	135		136					137		138	139	
42107C	130	131			132			133	134	135		136					137		138	139	
42314C	130	131			132			133	134	135		136					137		138	139	
42413C	130	131			132			133	134	135		136					137		138	139	
42506C	130	131			132			133	134	135		136					137		138	139	
42605C	130	131			132			133	134	135		136					137		138	139	
42715C	130	131			132			133	134	135		136					137		138	139	
42804C	130	131			132			133	134	135		136					137		138	139	
42912C	130	131			132			133	134	135		136					137		138	139	
43110C	130	131			132			133	134	135		136					137		138	139	
43211C	130	131			132			133	134	135		136					137		138	139	
43315C	130	131			132			133	134	135		136					137		138	139	
43431C	130	131			132			133	134	135		136					137		138	139	
43531C	130	131			132			133	134	135		136					137		138	139	
43716C	130	131			132			133	134	135		136					137		138	139	
43817C	130	131			132			133	134	135		136					137		138	139	
43902C	130	131			132			133	134	135		136					137		138	139	

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 2.59 m (102 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C		141	142			143							144		145		146				148
41201C		141	142			143							144		145		146				148
41329C		141	142			143							144		145		146				148
41731C		141	142			143							144		145		146				148
41831C		141	142			143							144		145		146				148
41909C		141	142			143							144		145		146				148
42008C		141	142			143							144		145		146				148
42107C		141	142										144		145		146				148
42314C		141	142										144		145		146				148
42413C		141	142										144		145		146				148
42506C		141	142										144		145		146				148
42605C		141	142										144		145		146				148
42715C		141	142										144		145		146				148
42804C		141	142										144		145		146				148
42912C		141	142										144		145		146				148
43110C		141	142										144		145		146				148
43211C		141	142										144		145		146				148
43315C		141	142										144		145		146				148
43431C		141	142										144		145		146				148
43531C		141	142										144		145		146				148
43716C		141	142										144		145		146				148
43817C		141	142										144		145		146				148
43902C		141	142										144		145		146				148

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 2.82 m (111 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C					150			151	152	153		154		155		156		157		158	
41201C					150			151	152	153		154		155		156		157		158	
41329C					150			151	152	153		154		155		156		157		158	
41731C					150			151	152	153		154		155		156		157		158	
41831C					150			151	152	153		154		155		156		157		158	
41909C					150			151	152	153		154		155		156		157		158	
42008C					150			151	152	153		154		155		156		157		158	
42107C					150			151	152	153		154		155		156		157		158	
42314C					150			151	152	153		154		155		156		157		158	
42413C					150				152	153		154		155		156		157		158	
42506C					150				152	153		154		155		156		157		158	
42605C					150				152	153		154		155		156		157		158	
42715C					150				152	153		154		155		156		157		158	
42804C					150				152	153		154		155		156		157		158	
42912C					150				152	153		154		155		156		157		158	
43110C					150				152	153		154		155		156		157		158	
43211C					150				152	153		154		155		156		157		158	
43315C					150				152	153		154		155		156		157		158	
43431C					150				152	153		154		155		156		157		158	
43531C					150				152	153		154		155		156		157		158	
43716C					150				152	153		154		155		156		157		158	
43817C					150				152	153		154		155		156		157		158	
43902C					150				152	153		154		155		156		157		158	

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 3.05 m (120 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C	159	160	161			162							163		164		165		166		167
41201C	159	160	161			162							163		164		165		166		167
41329C	159	160	161			162							163		164		165		166		167
41731C	159	160	161			162							163		164		165		166		167
41831C	159	160	161			162							163		164		165		166		167
41909C	159	160	161			162							163		164		165		166		167
42008C	159	160	161			162							163		164		165		166		167
42107C	159	160	161			162							163		164		165		166		167
42314C	159	160	161			162							163		164		165		166		167
42413C	159	160	161			162							163		164		165		166		167
42506C	159	160	161			162							163		164		165		166		167
42605C	159	160	161			162							163		164		165		166		167
42715C	159	160	161			162							163		164		165		166		167
42804C	159	160	161			162							163		164		165		166		167
42912C	159	160	161			162							163		164		165		166		167
43110C	159	160	161			162							163		164		165		166		167
43211C	159	160	161			162							163		164		165		166		167
43315C	159	160	161			162							163		164		165		166		167
43431C	159	160	161			162							163		164		165		166		167
43531C	159	160	161			162							163		164		165		166		167
43716C	159	160	161			162							163		164		165		166		167
43817C	159	160	161			162							163		164		165		166		167
43902C	159	160	161			162							163		164		165		166		167

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 3.35 m (132 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C				168										169		170		171			
41201C				168										169		170		171			
41329C				168										169		170		171			
41731C				168										169		170		171			
41831C				168										169		170		171			
41909C				168										169		170		171			
42008C				168										169		170		171			
42107C				168										169		170		171			
42314C				168										169		170		171			
42413C				168										169		170		171			
42506C				168										169		170		171			
42605C				168										169		170		171			
42715C				168										169		170		171			
42804C				168										169		170		171			
42912C				168										169		170		171			
43110C				168										169		170		171			
43211C				168										169		170		171			
43315C				168										169		170		171			
43431C				168										169		170		171			
43531C				168										169		170		171			
43716C				168										169		170		171			
43817C				168										169		170		171			
43902C				168										169		170		171			

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION C, 3.51 m (138 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41003C			172			173							174		175						176
41201C			172			173							174		175						176
41329C			172			173							174		175						176
41731C			172			173							174		175						176
41831C			172			173							174		175						176
41909C			172			173							174		175						176
42008C			172			173							174		175						176
42107C			172			173							174		175						176
42314C			172			173							174		175						176
42413C			172			173							174		175						176
42506C			172			173							174		175						176
42605C			172			173							174		175						176
42715C			172			173							174		175						176
42804C			172			173							174		175						176
42912C			172			173							174		175						176
43110C			172			173							174		175						176
43211C			172			173							174		175						176
43315C			172			173							174		175						176
43431C			172			173							174		175						176
43531C			172			173							174		175						176
43716C			172			173							174		175						176
43817C			172			173							174		175						176
43902C			172			173							174		175						176

TABLE K-3 (cont)

VALID STEAM TEMPERATURE CHANNELS

CONFIGURATION C

Subchannel Number Elevation [m (in.)]	9 0.89 (35)	10 1.19 (47)	15 1.47 (58)	10 1.47 (58)	8 1.70 (67)	Special 1.70 (67)	9 1.70 (67)	11 1.70 (67)	6 1.96 (77)	8 1.96 (77)	9 1.96 (77)	11 1.96 (77)	6 2.26 (89)	7 2.26 (89)	10 2.26 (89)	5 2.26 (89)	8 2.46 (97)	9 2.46 (97)	10 2.46 (97)	5 2.77 (109)	10 2.77 (109)	14 3.05 (120)	6 3.05 (120)	15 3.05 (120)	11 3.30 (130)	6 3.51 (138)
Run																										
41003C	177	178	179	180	181		183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202
41201C																										
41329C																										
41731C																										
41831C																										
41909C																										
42008C																										
42107C																										
42314C																										
42413C																										
42506C																										
42605C																										
42715C																										
42804C																										
42912C																										
43110C																										
43211C																										
43315C																										
43431C																										
43531C																										
43716C																										
43817C																										
43902C																										

Not installed in bundle

TABLE K-4

VALID THERMOCOUPLE CHANNELS
CONFIGURATION D, 0.30 m (12 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D				1										2		3					
41202D				1										2		3					
41529D				1										2		3					
41808D				1										2		3					
42014D				1										2		3					
42206D				1										2		3					
42305D				1										2		3					
42404D				1										2		3					
42512D				1										2		3					
42615D				1										2		3					
42711D				1										2		3					
42910D				1										2		3					
43009D				1										2		3					
43115D				1										2		3					
43215D				1										2		3					
43401D				1										2		3					
43813D				1										2							
44116D				1										2							
44317D				1										2							

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION D, 0.61 m (24 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D		4																5	6		
41202D		4																5	6		
41529D		4																5	6		
41808D		4																5	6		
42014D		4																5	6		
42206D		4																5	6		
42305D		4																5	6		
42404D		4																5	6		
42512D		4																5	6		
42615D		4																5	6		
42711D		4																5	6		
42910D		4																5	6		
43009D		4																5	6		
43115D		4																5	6		
43215D		4																5	6		
43401D		4																5	6		
43813D		4																5	6		
44116D		4																5	6		
44317D		4																5	6		

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION D, 0.99 m (39 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D				7										8		9					
41202D				7										8		9					
41529D				7										8		9					
41808D				7										8		9					
42014D				7										8		9					
42206D				7										8		9					
42305D				7										8		9					
42404D				7										8		9					
42512D				7										8		9					
42615D				7										8		9					
42711D				7										8		9					
42910D				7										8		9					
43009D				7										8		9					
43115D				7										8		9					
43215D				7										8		9					
43401D				7										8		9					
43813D				7										8		9					
44116D				7										8		9					
44317D				7										8		9					

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION D, 1.22 m (48 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D		10																11			
41202D		10																11			
41529D		10																11			
41808D		10																11			
42014D		10																11			
42206D		10																11			
42305D		10																11			
42404D		10																11			
42512D		10																11			
42615D		10																11			
42711D		10																11			
42910D		10																11			
43009D		10																11			
43115D		10																11			
43215D		10																11			
43401D		10																11			
43813D		10																11			
44116D		10																11			
44317D		10																11			

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION D, 1.52 m (60 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D				13										14		15					
41202D				13										14		15					
41529D				13										14		15					
41808D				13										14		15					
42014D				13										14		15					
42206D				13										14		15					
42305D				13										14		15					
42404D				13										14		15					
42512D				13										14		15					
42615D				13										14		15					
42711D				13										14		15					
42910D				13										14		15					
43009D				13										14		15					
43115D				13										14		15					
43215D				13										14		15					
43401D				13										14		15					
43813D				13										14		15					
44116D				13										14		15					
44317D				13										14		15					

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION D, 1.70 m (67 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D				16										17		18					
41202D				16										17		18					
41529D				16										17		18					
41808D				16										17		18					
42014D				16										17		18					
42206D				16										17		18					
42305D				16										17		18					
42404D				16										17		18					
42512D				16										17		18					
42615D				16										17		18					
42711D				16										17		18					
42910D				16										17		18					
43009D				16										17		18					
43115D				16										17		18					
43215D				16										17		18					
43401D				16										17		18					
43813D				16										17		18					
44116D				16										17		18					
44317D				16										17		18					

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 1.78 m (70 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D		19					20				21						22	23			
41202D		19					20				21						22	23			
41529D		19					20				21						22	23			
41808D		19					20				21						22	23			
42014D		19					20				21						22	23			
42206D																					
42305D		19					20				21						22				
42404D		19					20				21						22				
42512D		19					20				21										
42615D		19					20				21										
42711D		19					20				21										
42910D		19					20				21										
43009D		19					20				21										
43115D		19					20				21										
43215D		19					20				21										
43401D		19					20				21										
43813D		19					20				21										
44116D		19					20				21										
44317D		19					20				21										

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 1.80 m (71 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D			25			26	27				28		29		30		31				
41202D			25			26	27				28		29		30		31				
41529D			25			26	27				28		29		30		31				
41808D			25			26	27				28		29		30						
42014D			25			26	27				28				30						
42206D															30						
42305D			25			26									30						
42404D			25			26									30						
42512D			25			26									30						
42615D			25			26									30						
42711D			25			26									30						
42910D			25			26									30						
43009D			25			26									30						
43115D			25			26									30						
43215D			25			26									30						
43401D			25			26									30						
43813D			25			26									30						
44116D			25			26									30						
44317D			25			26									30						

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 1.83 m (72 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D	33						36		38	39	40	41					42	43	44	45	
41202D	33						36		38	39	40	41					42	43	44	45	
41529D	33						36		38	39	40	41					42	43	44	45	
41808D	33						36		38	39	40	41					42	43	44	45	
42014D	33						36		38	39	40	41					42	43	44	45	
42206D	33						36				40	41					42	43	44	45	
42305D	33						36		38	39	40	41					42	43	44	45	
42404D	33						36		38	39	40	41					42	43	44	45	
42512D	33						36		38	39	40	41					42	43	44	45	
42615D	33						36		38	39	40	41					42	43	44	45	
42711D	33						36		38	39	40	41					42	43	44	45	
42910D	33						36		38	39	40	41					42	43	44	45	
43009D	33						36		38	39	40	41					42	43	44	45	
43115D	33						36		38	39	40	41					42	43	44	45	
43215D	33						36		38	39	40	41					42	43	44	45	
43401D	33						36		38	39	40	41					42	43	44	45	
43813D	33						36		38	39	40	41					42	43	44	45	
44116D	33						36		38	39	40	41					42	43	44	45	
44317D	33						36		38	39	40	41					42	43	44	45	

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 1.88 m (74 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D	46		47		48	49	50	51	52	53	54	55	56		57		58			59	60
41202D	46		47		48	49	50	51	52	53	54	55	56		57		58			59	60
41529D	46		47		48	49	50	51	52	53	54	55	56		57		58			59	60
41808D	46		47		48	49	50	51	52	53	54	55	56		57		58			59	60
42014D	46		47		48	49	50	51	52	53	54	55	56		57		58			59	60
42206D	46		47		48	49	50	51	52	53	54	55			57					59	60
42305D	46		47		48	49	50	51	52	53	54	55	56		57					59	60
42404D	46		47		48	49	50	51	52	53	54	55	56		57					59	60
42512D	46		47		48	49	50	51	52	53	54	55	56		57					59	60
42615D	46		47		48	49	50	51	52	53	54	55	56		57					59	60
42711D	46		47		48	49	50	51	52	53	54	55	56		57					59	60
42910D	46		47		48	49	50	51	52	53	54	55	56		57					59	60
43009D	46		47		48	49	50	51	52	53	54	55	56		57					59	60
43115D	46		47		48	49	50	51	52	53	54	55	56		57					59	60
43215D	46		47		48	49	50	51	52	53	54	55	56		57					59	60
43401D	46		47		48	49	50	51	52	53	54	55	56		57					59	60
43813D	46		47		48	49	50	51	52	53	54	55	56		57					59	60
44116D	46		47		48	49	50	51	52	53	54	55	56		57					59	60
44317D	46		47		48	49	50	51	52	53	54	55	56		57					59	60

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 1.90 m (75 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D			61			62	63				64		65		66		67				68
41202D			61			62	63				64		65		66		67				68
41529D			61			62	63				64		65		66		67				68
41808D			61			62	63				64		65		66		67				68
42014D			61			62	63				64		65		66		67				68
42206D			61										65		66		67				68
42305D			61								64		65		66		67				68
42404D			61								64		65		66		67				68
42512D			61								64		65		66		67				68
42615D			61								64		65		66		67				68
42711D			61								64		65		66		67				68
42910D			61								64		65		66		67				68
43009D			61								64		65		66		67				68
43115D			61								64		65		66		67				68
43215D			61								64		65		66		67				68
43401D			61								64		65		66		67				68
43813D			61								64		65		66		67				68
44116D			61								64		65		66		67				68
44317D			61								64		65		66		67				68

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 1.93 m (76 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D	69			70	71				74	75	76	77		78		79	80				
41202D	69			70	71				74	75	76	77		78		79	80				
41529D	69			70	71				74	75	76	77		78		79	80				
41808D	69			70	71				74	75	76	77		78		79	80				
42014D	69			70	71				74	75	76	77		78		79	80				
42206D	69			70	71				74		76	77		78		79	80				
42305D	69			70	71				74		76	77		78		79	80				
42404D	69			70	71				74		76	77		78		79	80				
42512D	69			70	71				74		76	77		78		79	80				
42615D	69			70	71				74		76	77		78		79	80				
42711D	69			70	71				74		76	77		78		79	80				
42910D	69			70	71				74		76	77		78		79	80				
43009D	69			70	71				74		76	77		78		79	80				
43115D	69			70	71				74		76	77		78		79	80				
43215D	69			70	71				74		76	77		78		79	80				
43401D	69			70	71				74		76	77		78		79	80				
43813D	69			70	71				74		76	77		78		79	80				
44116D	69			70	71				74		76	77		78		79	80				
44317D	69			70	71				74		76	77		78		79	80				

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 1.96 m (77 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D			82			83	84				85		86		87						89
41202D			82			83	84				85		86		87						89
41529D			82			83	84				85		86		87						89
41808D			82			83	84				85		86		87						89
42014D			82			83	84				85		86		87						89
42206D			82			83	84				85		86		87						89
42305D			82			83	84				85		86		87						89
42404D			82			83	84				85		86		87						89
42512D			82			83					85		86		87						89
42615D			82			83					85		86		87						89
42711D			82			83					85		86		87						89
42910D			82			83					85		86		87						89
43009D			82			83					85		86		87						89
43115D			82			83					85		86		87						89
43215D			82			83					85		86		87						89
43401D			82			83					85		86		87						89
43813D			82			83					85		86		87						89
44116D											85		86		87						89
44317D											85		86		87						89

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 1.98 m (78 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D	90			91	92		93		95	96	97	98		100		101	102			103	
41202D	90			91	92		93		95	96	97	98		100		101	102			103	
41529D	90			91	92		93		95	96	97	98		100		101	102			103	
41808D	90			91			93		95	96	97	98		100		101	102			103	
42014D	90			91					95	96	97	98		100		101	102			103	
42206D	90			91					95	96	97	98		100		101	102			103	
42305D	90			91					95	96	97	98		100		101	102			103	
42404D	90			91					95	96	97	98		100		101	102			103	
42512D	90			91					95	96	97	98		100		101	102			103	
42615D	90			91					95	96	97	98		100		101	102			103	
42711D	90			91					95	96	97	98		100		101	102			103	
42910D	90			91					95	96	97	98		100		101	102			103	
43009D	90			91					95	96	97	98		100		101	102			103	
43115D	90			91					95	96	97	98		100		101	102			103	
43215D	90			91					95	96	97	98		100		101	102			103	
43401D	90			91					95	96	97	98		100		101	102			103	
43813D	90			91					95	96	97	98		100		101	102			103	
44116D	90			91					95	96	97	98		100		101	102			103	
44317D	90			91					95	96	97	98		100		101	102			103	

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 2.13 m (84 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D	109	110			111			112	113	114		115						116	117	118	
41202D	109	110			111			112	113	114		115						116	117	118	
41529D	109	110			111			112	113	114		115						116	117	118	
41808D	109	110			111			112	113	114		115						116	117	118	
42014D	109	110			111			112	113	114		115						116	117	118	
42206D	109				111			112	113	114		115						116	117	118	
42305D	109				111			112	113	114		115						116	117	118	
42404D	109				111			112	113	114		115						116	117	118	
42512D	109				111			112	113	114		115						116	117	118	
42615D	109				111			112	113	114		115						116	117	118	
42711D	109				111			112	113	114		115						116	117	118	
42910D	109				111			112	113	114		115						116	117	118	
43009D	109				111			112	113	114		115						116	117	118	
43115D	109				111			112	113	114		115						116	117	118	
43215D	109				111			112	113	114		115						116	117	118	
43401D	109				111			112	113	114		115						116	117	118	
43813D	109				111			112	113	114		115						116	117	118	
44116D	109				111			112	113	114		115						116	117	118	
44317D	109				111			112	113	114		115						116	117	118	

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 2.29 m (90 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D	119		120		121	122		123	124	125			127		128					129	130
41202D	119		120		121	122		123	124	125			127		128					129	130
41529D	119		120		121	122		123	124	125			127		128					129	130
41808D	119		120		121	122		123	124	125			127		128					129	130
42014D	119		120		121	122		123	124	125			127		128					129	130
42206D	119		120		121	122		123	124	125			127		128					129	130
42305D	119		120		121	122		123	124	125			127		128					129	130
42404D	119		120		121	122		123	124	125			127		128					129	130
42512D	119		120		121	122		123	124	125			127		128					129	130
42615D	119		120		121	122		123	124	125			127		128					129	130
42711D	119		120		121	122		123	124	125			127		128					129	130
42910D	119		120		121	122		123	124	125			127		128					129	130
43009D	119		120		121	122		123	124	125			127		128					129	130
43115D	119		120		121	122		123	124	125			127		128					129	130
43215D	119		120		121	122		123	124	125			127		128					129	130
43401D	119		120		121	122		123	124	125			127		128					129	130
43813D	119		120		121	122		123	124	125			127		128					129	130
44116D	119		120		121	122		123		125			127		128					129	130
44317D	119		120		121	122		123		125			127		128					129	130

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 2.44 m (96 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D	131	132			133			134	135	136		137						138	139	140	
41202D	131	132			133			134	135	136		137						138	139	140	
41529D	131	132			133			134	135	136		137						138	139	140	
41808D	131	132			133			134	135	136		137						138	139	140	
42014D	131	132			133			134	135	136		137						138	139	140	
42206D	131	132			133			134	135	136		137						138	139	140	
42305D	131	132			133			134	135	136		137						138	139	140	
42404D	131	132			133			134	135	136		137						138	139	140	
42512D	131	132			133			134	135	136		137						138	139	140	
42615D	131	132			133			134	135	136		137						138	139	140	
42711D	131	132			133			134	135	136		137						138	139	140	
42910D	131	132			133			134	135	136		137						138	139	140	
43009D	131	132			133			134	135	136		137						138	139	140	
43115D	131	132			133			134	135	136		137						138	139	140	
43215D	131	132			133			134	135	136		137						138	139	140	
43401D	131	132			133			134	135	136		137						138	139	140	
43813D	131	132			133			134	135	136		137						138	139	140	
44116D	131	132			133			134	135	136		137						138	139	140	
44317D	131	132			133			134	135	136		137						138	139	140	

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 2.59 m (102 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D		141	142			143							144		145			146	147		148
41202D		141	142			143							144		145			146	147		148
41529D		141	142			143							144		145			146	147		148
41808D		141	142			143							144		145			146	147		148
42014D		141	142			143							144		145			146	147		148
42206D		141	142			143							144		145			146	147		148
42305D		141	142			143							144		145			146	147		148
42404D		141	142			143							144		145			146	147		148
42512D		141	142			143							144		145			146	147		148
42615D		141	142			143							144		145			146	147		148
42711D		141	142			143							144		145			146	147		148
42910D		141	142			143							144		145			146	147		148
43009D		141	142			143							144		145			146	147		148
43115D		141	142			143							144		145			146	147		148
43215D		141	142			143							144		145			146	147		148
43401D		141	142			143							144		145			146	147		148
43813D		141	142			143							144		145			146	147		148
44116D		141	142			143							144		145			146	147		148
44317D		141	142			143							144		145			146	147		148

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 2.82 m (111 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D	149			150	151				153			155		156		157				158	
41202D	149			150	151				153			155		156		157				158	
41529D	149			150	151				153			155		156		157				158	
41808D	149			150	151				153			155		156		157				158	
42014D	149			150	151				153			155		156		157				158	
42206D	149			150	151				153			155		156		157				158	
42305D	149			150	151				153			155		156		157				158	
42404D	149			150	151				153			155		156		157				158	
42512D	149			150	151				153			155		156		157				158	
42615D	149			150	151				153			155		156		157				158	
42711D	149			150	151				153			155		156		157				158	
42910D	149			150	151				153			155		156		157				158	
43009D	149			150	151				153			155		156		157				158	
43115D	149			150	151				153			155		156		157				158	
43215D	149			150	151				153			155		156		157				158	
43401D	149			150	151				153			155		156		157				158	
43813D	149			150	151				153			155		156		157				158	
44116D	149			150	151				153			155		156		157				158	
44317D	149			150	151				153			155		156		157				158	

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION D, 3.05 m (120 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D		159	160			161							162		163			164	165		166
41202D		159	160			161							162		163			164	165		166
41529D		159	160			161							162		163			164	165		166
41808D		159	160			161							162		163			164	165		166
42014D		159	160			161							162		163			164	165		166
42206D		159	160			161							162		163			164	165		166
42305D		159	160			161							162		163			164	165		166
42404D		159	160			161							162		163			164	165		166
42512D		159	160			161							162		163			164	165		166
42615D		159	160			161							162		163			164	165		166
42711D		159	160			161							162		163			164	165		166
42910D		159	160			161							162		163			164	165		166
43009D		159	160			161							162		163			164	165		166
43115D		159	160			161							162		163			164	165		166
43215D		159	160			161							162		163			164	165		166
43401D		159	160			161							162		163			164	165		166
43813D		159	160			161							162		163			164	165		166
44116D		159	160			161							162		163			164	165		166
44317D		159	160			161							162		163			164	165		166

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION D, 3.35 m (132 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D				167										168		169					
41202D				167										168		169					
41529D				167										168		169					
41808D				167										168		169					
42014D				167										168		169					
42206D				167										168		169					
42305D				167										168		169					
42404D				167										168		169					
42512D				167										168		169					
42615D				167										168		169					
42711D				167										168		169					
42910D				167										168		169					
43009D				167										168		169					
43115D				167										168		169					
43215D				167										168		169					
43401D				167										168		169					
43813D				167										168		169					
44116D				167										168		169					
44317D				167										168		169					

TABLE K-4 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION D, 3.51 m (138 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
41103D			170										172		173						174
41202D			170										172		173						174
41529D			170										172		173						174
41808D			170										172		173						174
42014D			170										172		173						174
42206D			170										172		173						174
42305D			170										172		173						174
42404D			170										172		173						174
42512D			170										172		173						174
42615D			170										172		173						174
42711D			170										172		173						174
42910D			170										172		173						174
43009D			170										172		173						174
43115D			170										172		173						174
43215D			170										172		173						174
43401D			170										172		173						174
43813D			170										172		173						174
44116D			170										172		173						174
44317D			170										172		173						174

TABLE K-4 (cont)

VALID STEAM TEMPERATURE CHANNELS

CONFIGURATION D

Subchannel Number Elevation [m (in.)]	9 0.89 (35)	10 1.19 (47)	15 1.47 (58)	10 1.47 (58)	8 1.70 (67)	Special 1.70 (67)	9 1.70 (67)	11 1.70 (67)	6 1.96 (77)	8 1.96 (77)	9 1.96 (77)	11 1.96 (77)	6 2.26 (89)	7 2.26 (89)	10 2.26 (89)	5 2.26 (89)	8 2.46 (97)	9 2.46 (97)	10 2.46 (97)	5 2.77 (109)	10 2.77 (109)	14 3.05 (120)	6 3.05 (120)	15 3.05 (120)	11 3.30 (130)	6 3.51 (138)
Run																										
41103D	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202
41202D																										
41529D																										
41808D		↓																								
42014D				↓		↓								↓												
42206D																										
42305D																										
42404D																										
42512D																										
42615D									↓							↓										
42711D																										
42910D																										
43009D																										
43115D																										
43215D																										
43401D							↓				↓				↓											
43813D								↓																		
44116D																										
44317D	↓		↓		↓					↓		↓	↓				↓	↓	↓	↓	↓	↓	↓	↓	↓	↓

TABLE K-5

VALID THERMOCOUPLE CHANNELS
CONFIGURATION E, 0.30 m (12 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E	1			2														4			
40503E	1			2																	
40601E	1			2														4			
41008E	1			2														4			
41206E	1			2														4			
41305E	1			2														4			
41515E	1			2														4			
41612E	1			2														4			
41711E	1			2														4			
41810E	1			2														4			
41913E	1			2														4			
42014E	1			2														4			
42215E	1			2														4			
42315E	1			2														4			
42415E	1			2														4			
42509E	1			2														4			
42704E	1			2														4			
43616E	1			2														4			
43817E	1			2														4			
43929E	1			2														4			
44029E	1			2														4			

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION E, 0.61 m (24 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E		5								6									7		
40503E		5								6									7		
40601E		5								6									7		
41008E		5								6									7		
41206E		5								6									7		
41305E		5								6									7		
41515E		5								6									7		
41612E		5								6									7		
41711E		5								6									7		
41810E		5								6									7		
41913E		5								6									7		
42014E		5								6									7		
42215E		5								6									7		
42315E		5								6									7		
42415E		5								6									7		
42509E		5								6									7		
42704E		5								6									7		
43616E		5								6									7		
43817E		5								6									7		
43929E		5								6									7		
44029E		5								6									7		

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION E, 0.99 m (39 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E	8			9												10		11			
40503E	8			9												10		11			
40601E	8			9												10		11			
41008E	8			9												10		11			
41206E	8			9												10		11			
41305E	8			9												10		11			
41515E	8			9												10		11			
41612E	8			9												10		11			
41711E	8			9												10		11			
41810E	8			9												10		11			
41913E	8			9												10		11			
42014E	8			9												10		11			
42215E	8			9												10		11			
42315E	8			9												10		11			
42415E	8			9												10		11			
42509E	8			9												10		11			
42704E	8			9												10		11			
43616E	8			9												10		11			
43817E	8			9												10		11			
43929E	8			9												10		11			
44029E	8			9												10		11			

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION E, 1.22 m (48 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E		12								13									14		
40503E		12								13									14		
40601E		12								13									14		
41008E		12								13									14		
41206E		12								13									14		
41305E		12								13									14		
41515E		12								13									14		
41612E		12								13									14		
41711E		12								13									14		
41810E		12								13									14		
41913E		12								13									14		
42014E		12								13									14		
42215E		12								13									14		
42315E		12								13									14		
42415E		12								13									14		
42509E		12								13									14		
42704E		12								13									14		
43616E		12								13									14		
43817E		12								13									14		
43929E		12								13									14		
44029E		12								13									14		

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION E, 1.52 m (60 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E	15			16												17					
40503E	15			16												17					
40601E	15			16												17					
41008E	15			16												17					
41206E	15			16												17					
41305E	15			16												17					
41515E	15			16												17					
41612E	15			16												17					
41711E	15			16												17					
41810E	15			16												17					
41913E	15			16												17					
42014E	15			16												17					
42215E	15			16												17					
42315E	15			16												17					
42415E	15			16												17					
42509E	15			16												17					
42704E	15			16												17					
43616E	15			16												17					
43817E	15			16												17					
43929E	15			16												17					
44029E	15			16												17					

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION E, 1.70 m (67 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E				19	20	21		22						23	24	25		26			
40503E				19	20	21		22						23	24	25		26			
40601E				19	20	21		22						23	24	25		26			
41008E				19	20	21		22						23	24	25		26			
41206E				19	20	21		22						23	24	25		26			
41305E				19	20	21		22						23	24	25		26			
41515E				19	20	21		22						23	24	25		26			
41612E				19	20	21		22						23	24	25		26			
41711E				19	20	21		22						23	24	25		26			
41810E				19	20	21		22						23	24	25		26			
41913E				19	20	21		22						23	24	25		26			
42014E				19	20	21		22						23	24	25		26			
42215E				19	20	21		22						23	24	25		26			
42315E				19	20	21		22						23	24	25		26			
42415E				19	20	21		22						23	24	25		26			
42509E				19	20	21		22						23	24	25		26			
42704E				19	20	21		22						23	24	25		26			
43616E				19	20	21		22						23	24	25		26			
43817E				19	20	21		22						23	24	25		26			
43929E				19	20	21		22						23	24	25		26			
44029E				19	20	21		22						23	24	25		26			

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 1.78 m (70 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E						27	28				29	30					31				
40503E						27	28				29	30					31				
40601E						27	28				29	30					31				
41008E						27	28				29	30					31				
41206E						27	28				29	30					31				
41305E						27	28				29	30					31				
41515E						27	28				29	30					31				
41612E						27	28				29	30					31				
41711E						27	28				29	30					31				
41810E						27	28				29	30					31				
41913E						27	28				29	30					31				
42014E						27	28				29	30					31				
42215E						27	28				29	30					31				
42315E						27	28				29	30					31				
42415E						27	28				29	30					31				
42509E						27	28				29	30					31				
42704E						27	28				29	30					31				
43616E						27	28				29	30					31				
43817E						27	28				29	30					31				
43929E						27	28				29	30					31				
44029E						27	28				29	30					31				

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 1.80 m (71 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E			32																		
40503E			32																		
40601E			32																		
41008E			32																		
41206E			32																		
41305E			32																		
41515E			32																		
41612E			32																		
41711E			32																		
41810E			32																		
41913E			32																		
42014E			32																		
42215E			32																		
42315E			32																		
42415E			32																		
42509E			32																		
42704E			32																		
43616E			32																		
43817E			32																		
43929E			32																		
44029E			32																		

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 1.83 m (72 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E								33					34		35					36	
40503E								33					34		35					36	
40601E								33					34		35					36	
41008E								33					34		35					36	
41206E								33					34		35					36	
41305E								33					34		35					36	
41515E								33					34		35					36	
41612E								33					34		35					36	
41711E								33					34		35					36	
41810E								33					34		35					36	
41913E								33					34		35					36	
42014E								33					34		35					36	
42215E								33					34		35					36	
42315E								33					34		35					36	
42415E								33					34		35					36	
42509E								33					34		35					36	
42704E								33					34		35					36	
43616E								33					34		35					36	
43817E								33					34		35					36	
43929E								33					34		35					36	
44029E								33					34		35					36	

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 1.85 m (73 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E	37			38																	
40503E	37			38																	
40601E	37			38																	
41008E	37			38																	
41206E	37			38																	
41305E	37			38																	
41515E	37			38																	
41612E	37			38																	
41711E	37			38																	
41810E	37			38																	
41913E	37			38																	
42014E	37			38																	
42215E	37			38																	
42315E	37			38																	
42415E	37			38																	
42509E	37			38																	
42704E	37			38																	
43616E	37			38																	
43817E	37			38																	
43929E	37			38																	
44029E	37			38																	

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 1.88 m (74 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E							39				40					41	42				
40503E							39				40					41	42				
40601E							39				40					41	42				
41008E							39				40					41	42				
41206E							39				40					41	42				
41305E							39				40					41	42				
41515E							39				40					41	42				
41612E							39				40					41	42				
41711E							39				40					41	42				
41810E							39				40					41	42				
41913E							39				40					41	42				
42014E							39				40					41	42				
42215E							39				40					41	42				
42315E							39				40					41	42				
42415E							39				40					41	42				
42509E							39				40					41	42				
42704E							39				40					41	42				
43616E							39				40					41	42				
43817E							39				40					41	42				
43929E							39				40					41	42				
44029E							39				40					41	42				

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 1.90 m (75 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E	43		44					45													46
40503E	43		44					45													46
40601E	43		44					45													46
41008E	43		44					45													46
41206E	43		44					45													46
41305E	43		44					45													46
41515E	43		44					45													46
41612E	43		44					45													46
41711E	43		44					45													46
41810E	43		44					45													46
41913E	43		44					45													46
42014E	43		44					45													46
42215E	43		44					45													46
42315E	43		44					45													46
42415E	43		44					45													46
42509E	43		44					45													46
42704E	43		44					45													46
43616E	43		44					45													46
43817E	43		44					45													46
43929E	43		44					45													46
44029E	43		44					45													46

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 1.93 m (76 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E			47		48				49			50		51	52		53			54	55
40503E			47		48				49			50		51	52		53			54	55
40601E			47		48				49			50		51	52		53			54	55
41008E			47		48				49			50		51	52		53			54	55
41206E			47		48				49			50		51	52		53			54	55
41305E			47		48				49			50		51	52		53			54	55
41515E			47		48				49			50		51	52		53			54	55
41612E			47		48				49			50		51	52		53			54	55
41711E			47		48				49			50		51	52		53			54	55
41810E			47		48				49			50		51	52		53			54	55
41913E			47		48				49			50		51	52		53			54	55
42014E			47		48				49			50		51	52		53			54	55
42215E			47		48				49			50		51	52		53			54	55
42315E			47		48				49			50		51	52		53			54	55
42415E			47		48				49			50		51	52		53			54	55
42509E			47		48				49			50		51	52		53			54	55
42704E			47		48				49			50		51	52		53			54	55
43616E			47		48				49			50		51	52		53			54	55
43817E			47		46				49			50		51	52		53			54	55
43929E			47		48				49			50		51	52		53			54	55
44029E			47		48				49			50		51	52		53			54	55

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 1.96 m (77 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E	56	57	58	59		60	61		62	63			64						65		66
40503E	56	57	58	59		60	61		62	63			64						65		66
40601E	56	57	58	59		60	61		62	63			64						65		66
41008E	56	57	58	59		60	61		62	63			64						65		66
41206E	56	57	58	59		60	61		62	63			64						65		66
41305E	56	57	58	59		60	61		62	63			64						65		66
41515E	56	57	58	59		60	61		62	63			64						65		66
41612E	56	57	58	59		60	61		62	63			64						65		66
41711E	56	57	58	59			61		62	63			64						65		66
41810E	56	57	58	59			61		62	63			64						65		66
41913E	56	57	58	59			61		62	63			64						65		66
42014E	56	57	58	59			61		62	63			64						65		66
42215E	56	57	58	59			61		62	63			64						65		66
42315E	56	57	58	59			61		62	63			64						65		66
42415E	56	57	58	59			61		62	63			64						65		66
42509E	56	57	58	59			61		62	63			64						65		66
42704E	56	57	58	59			61		62	63			64						65		66
43616E	56	57	58	59			61		62	63			64						65		66
43817E	56	57	58	59			61		62	63			64						65		66
43929E	56	57	58	59			61		62	63			64						65		66
44029E	56	57	58	59			61		62	63			64						65		66

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 1.98 m (78 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E		67			68			69	70	71	72			73	74	75	76	77			78
40503E		67			68			69	70	71	72			73	74	75	76	77			78
40601E		67			68			69	70	71	72			73	74	75	76	77			78
41038E		67			68			69	70	71	72			73	74	75	76	77			78
41206E		67			68			69	70	71	72			73	74	75	76	77			78
41305E		67			68			69	70	71	72			73	74	75	76	77			78
41515E		67			68			69	70	71	72			73	74	75	76	77			78
41612E		67			68			69	70	71	72			73	74	75	76	77			78
41711E		67			68			69	70	71	72			73	74	75	76	77			78
41810E		67			68			69	70	71	72			73	74	75	76	77			78
41913E		67			68			69	70	71	72			73	74	75	76	77			78
42014E		67			68			69	70	71	72			73	74	75	76	77			78
42215E		67			68			69	70	71	72			73	74	75	76	77			78
42315E		67			68			69	70	71	72			73	74	75	76	77			78
42415E		67			68			69	70	71	72			73	74	75	76	77			78
42509E		67			68			69	70	71	72			73	74	75	76	77			78
42704E		67			68			69	70	71	72			73	74	75	76	77			78
43616E		67			68			69	70	71	72			73	74	75	76	77			78
43817E		67			68			69	70	71	72			73	74	75	76	77			78
43929E		67			68			69	70	71	72			73	74	75	76	77			78
44029E		67			68			69	70	71	72			73	74	75	76	77			78

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 2.01 m (79 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E						79	80		81		82		83							84	
40503E						79	80		81		82		83							84	
40601E						79	80		81		82		83							84	
41038E						79	80		81				83							84	
41206E						79	80		81				83							84	
41305E						79	80		81				83							84	
41515E						79	80		81				83							84	
41612E						79	80		81				83							84	
41711E						79	80		81				83							84	
41810E						79	80		81				83							84	
41913E						79	80		81				83							84	
42014E						79	80		81				83							84	
42215E							80		81				83							84	
42315E							80		81				83							84	
42415E							80		81				83							84	
42509E							80		81				83							84	
42704E							80		81				83							84	
43616E							80		81				83							84	
43817E							80		81				83							84	
43929E							80		81				83							84	
44029E							80		81				83							84	

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 2.03 m (80 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E					85							86		87				88	89	90	
40503E					85							86		87				88	89	90	
40601E					85							86		87				88	89	90	
41008E					85							86		87				88	89	90	
41206E					85							86		87				88	89	90	
41305E					85							86		87				88	89	90	
41515E					85							86		87				88	89	90	
41612E					85							86		87				88	89	90	
41711E					85							86		87				88	89	90	
41810E					85							86		87				88	89	90	
41913E					85							86		87				88	89	90	
42014E					85							86		87				88	89	90	
42215E					85							86		87				88	89	90	
42315E					85							86		87				88	89	90	
42415E					85							86		87				88	89	90	
42509E					85							86		87				88	89	90	
42704E					85							86		87				88	89	90	
43616E					85							86		87				88	89	90	
43817E					85							86		87				88	89	90	
43929E					85							86		87				88	89	90	
44029E					85							86		87				88	89	90	

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 2.06 m (81 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E												91									
40503E												91									
40601E												91									
41008E												91									
41206E												91									
41305E												91									
41515E												91									
41612E												91									
41711E												91									
41810E												91									
41913E												91									
42014E												91									
42215E												91									
42315E												91									
42415E												91									
42509E												91									
42704E												91									
43616E												91									
43817E												91									
43929E												91									
44029E												91									

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 2.08 m (82 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E													92								
40503E													92								
40601E													92								
41008E													92								
41206E													92								
41305E													92								
41515E													92								
41612E													92								
41711E													92								
41810E													92								
41913E													92								
42014E													92								
42215E													92								
42315E													92								
42415E													92								
42509E													92								
42704E													92								
43616E													92								
43817E													92								
43929E													92								
44029E													92								

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 2.13 m (84 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E		93			94	95	96				97	98	100	101			102		103	104	
40503E		93			94	95	96				97	98	100	101			102		103	104	
40601E		93			94	95	96				97	98	100	101			102		103	104	
41008E		93			94	95	96				97	98	100	101			102		103	104	
41206E		93			94	95	96				97	98	100	101			102		103	104	
41305E		93			94	95	96				97	98	100	101			102		103	104	
41515E		93			94	95	96				97	98	100	101			102		103	104	
41612E		93			94	95	96				97	98	100	101			102		103	104	
41711E		93			94	95	96				97	98	100	101			102		103	104	
41810E		93			94	95	96				97	98	100	101			102		103	104	
41913E		93			94	95	96				97	98	100	101			102		103	104	
42014E		93			94	95	96				97	98	100	101			102		103	104	
42215E		93			94	95	96				97	98	100	101			102		103	104	
42315E		93			94	95	96				97	98	100	101			102		103	104	
42415E		93			94	95	96				97	98	100	101			102		103	104	
42509E		93			94	95	96				97	98	100	101			102		103	104	
42704E		93			94	95	96				97	98	100	101			102		103	104	
43616E		93			94	95	96				97	98	100	101			102		103	104	
43817E		93			94	95	96				97	98	100	101			102		103	104	
43929E		93			94	95	96				97	98	100	101			102		103	104	
44029E		93			94	95	96				97	98	100	101			102		103	104	

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 2.29 m (90 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E			109		110	111	112	113	114	115	116	117	118	119	120		121			122	123
40503E			109		110	111	112	113	114	115	116	117	118	119	120		121			122	123
40601E			109		110	111	112	113	114	115	116	117	118	119	120		121			122	123
41008E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
41206E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
41305E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
41515E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
41612E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
41711E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
41810E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
41913E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
42014E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
42215E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
42315E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
42415E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
42509E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
42704E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
43616E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
43817E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
43929E			109		110	111	112	113		115	116	117	118	119	120		121			122	123
44029E			109		110	111	112	113		115	116	117	118	119	120		121			122	123

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 2.44 m (96 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E		124					125	126		127	128	129	130		131		132		133	134	
40503E		124					125	126		127	128	129	130		131		132		133	134	
40601E		124					125	126		127	128	129	130		131		132		133	134	
41008E		124					125	126		127	128	129	130		131		132		133	134	
41206E		124					125	126		127	128	129	130		131		132		133	134	
41305E		124					125	126		127	128	129	130		131		132		133	134	
41515E		124					125	126		127	128	129	130		131		132		133	134	
41612E		124					125	126		127	128	129	130		131		132		133	134	
41711E		124					125	126		127	128	129	130		131		132		133	134	
41810E		124					125	126		127	128	129	130		131		132		133	134	
41913E		124					125	126		127	128	129	130		131		132		133	134	
42014E		124					125	126		127	128	129	130		131		132		133	134	
42215E		124					125	126		127	128	129	130		131		132		133	134	
42315E		124					125	126		127	128	129	130		131		132		133	134	
42415E		124					125	126		127	128	129	130		131		132		133	134	
42509E		124					125	126		127	128	129	130		131		132		133	134	
42704E		124					125	126		127	128	129	130		131		132		133	134	
43616E		124					125	126		127	128	129	130		131		132		133	134	
43817E		124					125	126		127	128	129	130		131		132		133	134	
43929E		124					125	126		127	128	129	130		131		132		133	134	
44029E		124					125	126		127	128	129	130		131		132		133	134	

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 2.59 m (102 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E		135	136		137	138		139	140	141				142	143				144		145
40503E		135	136		137	138		139	140	141				142	143				144		145
40601E		135	136		137	138		139	140	141				142	143				144		145
41008E		135	136		137	138		139	140	141				142	143				144		145
41206E		135	136		137	138		139	140	141				142	143				144		145
41305E		135	136		137	138		139	140	141				142	143				144		145
41515E		135	136		137	138		139	140	141				142	143				144		145
41612E		135	136		137	138		139	140	141				142	143				144		145
41711E		135	136		137	138		139	140	141				142	143				144		145
41810E		135	136		137	138		139	140	141				142	143				144		145
41913E		135	136		137	138		139	140	141				142	143				144		145
42014E		135	136			138		139	140	141				142	143				144		145
42215E		135	136			138		139	140	141				142	143				144		145
42315E		135	136			138		139	140	141				142	143				144		145
42415E		135	136			138		139	140	141				142	143				144		145
42509E		135	136			138		139	140	141				142	143				144		145
42704E		135	136			138		139	140	141				142	143				144		145
43616E		135	136			138		139	140	141				142	143				144		145
43817E		135	136			138		139	140	141				142	143				144		145
43929E		135	136			138		139	140	141				142	143				144		145
44029E		135	136			138		139	140	141				142	143				144		145

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 2.82 m (111 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E	146			147			148				149	150	151			152	153	154			
40503E	146			147			148				149	150	151			152	153	154			
40601E	146			147			148				149	150	151			152	153	154			
41008E	146			147			148				149	150	151			152	153	154			
41206E	146			147			148				149	150	151			152	153	154			
41305E	146			147			148				149	150	151			152	153	154			
41515E	146			147			148				149	150	151			152	153	154			
41612E	146			147			148				149	150	151			152	153	154			
41711E	146			147			148				149	150	151			152	153	154			
41810E	146			147			148				149	150	151			152	153	154			
41913E	146			147			148				149	150	151			152	153	154			
42014E	146			147			148				149	150	151			152	153	154			
42215E	146			147			148				149	150	151			152	153	154			
42315E	146			147			148				149	150	151			152	153	154			
42415E	146			147			148				149	150	151			152	153	154			
42509E	146			147			148				149	150	151			152	153	154			
42704E	146			147			148				149	150	151			152	153	154			
43616E	146			147			148				149	150	151			152	153	154			
43817E	146			147			148				149	150	151			152	153	154			
43929E	146			147			148				149	150	151			152	153	154			
44029E	146			147			148				149	150	151			152	153	154			

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 3.05 m (120 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E		156	157		158	159		160	161	162				163	164				165		166
40503E		156	157		158	159		160	161	162				163	164				165		166
40601E		156	157		158	159		160	161	162				163	164				165		166
41008E		156	157		158	159		160	161	162				163	164				165		166
41206E		156	157		158	159		160	161	162				163	164				165		166
41305E		156	157		158	159		160	161	162				163	164				165		166
41515E		156	157		158	159		160	161	162				163	164				165		166
41612E		156	157		158	159		160	161	162				163	164				165		166
41711E		156	157		158	159		160	161	162				163	164				165		166
41810E		156	157		158	159		160	161	162				163	164				165		166
41913E		156	157		158	159		160	161	162				163	164				165		166
42014E		156	157		158	159		160	161	162				163	164				165		166
42215E		156	157		158	159		160	161	162				163	164				165		166
42315E		156	157		158	159		160	161	162				163	164				165		166
42415E		156	157		158	159		160	161	162				163	164				165		166
42509E		156	157		158	159		160	161	162				163	164				165		166
42704E		156	157		158	159		160	161	162				163	164				165		166
43616E		156	157		158	159		160	161	162				163	164				165		166
43817E		156	157		158	159		160	161	162				163	164				165		166
43929E		156	157		158	159		160	161	162				163	164				165		166
44029E		156	157		158	159		160	161	162				163	164				165		166

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 3.35 m (132 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E	167			168												169		170			
40503E	167			168												169		170			
40601E	167			168												169		170			
41008E	167			168												169		170			
41206E	167			168												169		170			
41305E	167			168												169		170			
41515E	167			168												169		170			
41612E	167			168												169		170			
41711E	167			168												169		170			
41810E	167			168												169		170			
41913E	167			168												169		170			
42014E	167			168												169		170			
42215E	167			168												169		170			
42315E	167			168												169		170			
42415E	167			168												169		170			
42509E	167			168												169		170			
42704E	167			168												169		170			
43616E	167			168												169		170			
43817E	167			168												169		170			
43929E	167			168												169		170			
44029E	167			168												169		170			

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION E, 3.51 m (138 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40102E			171						172												
40503E			171						172												
40601E			171						172												
41008E			171						172												
41206E			171						172												
41305E			171						172												
41515E			171						172												
41612E			171						172												
41711E			171						172												
41810E			171						172												
41913E			171						172												
42014E			171						172												
42215E			171						172												
42315E			171						172												
42415E			171						172												
42509E			171						172												
42704E			171						172												
43616E			171						172												
43817E			171						172												
43929E			171						172												
44229E			171						172												

TABLE K-5 (cont)

VALID STEAM TEMPERATURE CHANNELS

CONFIGURATION E

Subchannel Number Elevation [m (in.)]	9 0.89 (35)	10 1.19 (47)	15 1.47 (58)	10 1.47 (58)	8 1.70 (67)	Special 1.70 (67)	9 1.70 (67)	11 1.70 (67)	6 1.96 (77)	8 1.96 (77)	9 1.96 (77)	11 1.96 (77)	6 2.26 (89)	7 2.26 (89)	10 2.26 (89)	5 2.26 (89)	8 2.46 (97)	9 2.46 (97)	10 2.46 (97)	5 2.77 (109)	10 2.77 (109)	14 3.05 (120)	6 3.05 (120)	15 3.05 (120)	11 3.30 (130)	6 3.51 (138)
Run																										
40102E	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202
40503E																										
40601E																										
41008E																										
41206E																										
41305E																										
41515E																										
41612E																										
41711E																										
41810E																										
41913E																										
42014E																										
42215E																										
42315E																										
42415E																										
42509E																										
42704E																										
43616E																										
43817E																										
43929E																										
44029E	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓

TABLE K-6

VALID THERMOCOUPLE CHANNELS
CONFIGURATION F, 0.30 m (12 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F																1		2			
41002F																1		2			
41103F																1		2			
41229F																1		2			
41509F																1		2			
41608F																1		2			
41807F																1		2			
41914F																1		2			
42006F																1		2			
42105F																1		2			
42215F																1		2			
42612F																1		2			
42711F																1		2			
42810F																1		2			
42915F																1		2			
43104F																1		2			
43333F																1		2			
43432F																1		2			
43534F																1		2			
43631F																1		2			
43813F																1		2			
43915F																1		2			
44015F																1		2			

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION F, 0.61 m (24 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F													3								
41002F													3								
41103F													3								
41229F													3								
41509F													3								
41608F													3								
41807F													3								
41914F													3								
42006F													3								
42105F													3								
42215F													3								
42612F													3								
42711F													3								
42810F													3								
42915F													3								
43104F													3								
43333F													3								
43432F													3								
43534F													3								
43631F													3								
43813F													3								
43915F													3								
44015F													3								

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION F, 0.99 m (39 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F	4			5												6					
41002F	4			5												6					
41103F	4			5												6					
41229F	4			5												6					
41509F	4			5												6					
41608F	4			5												6					
41807F	4			5												6					
41914F	4			5												6					
42006F	4			5												6					
42105F	4			5												6					
42215F	4			5												6					
42612F	4			5												6					
42711F	4			5												6					
42810F	4			5												6					
42915F	4			5												6					
43104F	4			5												6					
43333F	4			5												6					
43432F	4			5												6					
43534F	4			5												6					
43631F	4			5												6					
43813F	4			5												6					
43915F	4			5												6					
44015F	4			5												6					

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION F, 1.22 m (48 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F		7				8		9					10								
41002F		7				8		9					10								
41103F		7				8		9					10								
41229F		7				8		9					10								
41509F		7				8		9					10								
41608F		7				8		9					10								
41807F		7				8		9					10								
41914F		7				8		9					10								
42006F		7				8		9					10								
42105F		7				8		9					10								
42215F		7				8		9					10								
42612F		7				8		9					10								
42711F		7				8		9					10								
42810F		7				8		9					10								
42915F		7				8		9					10								
43104F		7				8		9					10								
43333F		7				8		9					10								
43432F		7				8		9					10								
43534F		7				8		9					10								
43631F		7				8		9					10								
43913F		7				8		9					10								
43915F		7				8		9					10								
44015F		7				8		9					10								

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 1.52 m (60 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F	11			12														13			
41002F	11			12														13			
41103F	11			12														13			
41229F	11			12														13			
41509F	11			12														13			
41608F	11			12														13			
41807F	11			12														13			
41914F	11			12														13			
42006F	11			12														13			
42105F	11			12														13			
42215F	11			12														13			
42612F	11			12														13			
42711F	11			12														13			
42810F	11			12														13			
42915F	11			12														13			
43104F	11			12														13			
43333F	11			12														13			
43432F	11			12														13			
43534F	11			12														13			
43631F	11			12														13			
43813F	11			12														13			
43915F	11			12														13			
44015F	11			12														13			

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 1.70 m (67 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F				14	15										16					17	18
41002F				14	15										16					17	18
41103F				14	15										16					17	18
41229F				14	15										16					17	18
41509F				14	15										16					17	18
41608F				14	15										16					17	18
41807F				14	15										16					17	18
41914F				14	15										16					17	18
42006F				14	15										16					17	18
42105F				14	15										16					17	18
42215F				14	15										16					17	18
42612F				14	15										16					17	18
42711F				14	15										16					17	18
42810F				14	15										16					17	18
42915F				14	15										16					17	18
43104F				14	15										16					17	18
43333F				14	15										16					17	18
43432F				14	15										16					17	18
43534F				14	15										16					17	18
43631F				14	15										16					17	18
43813F				14	15										16					17	18
43915F				14	15										16					17	18
44015F				14	15										16					17	18

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 1.78 m (70 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F											19			20				21	22		
41002F											19			20				21	22		
41103F											19			20				21	22		
41229F											19			20				21	22		
41509F											19			20				21	22		
41608F											19			20				21	22		
41807F											19			20				21	22		
41914F											19			20				21	22		
42006F											19			20				21	22		
42105F											19			20				21	22		
42215F											19			20				21	22		
42612F											19			20				21	22		
42711F											19			20				21	22		
42810F											19			20				21	22		
42915F											19			20				21	22		
43104F											19			20				21	22		
43333F											19			20				21	22		
43432F											19			20				21	22		
43534F											19			20				21	22		
43631F											19			20				21	22		
43813F											19			20				21	22		
43915F											19			20				21	22		
44015F											19			20				21	22		

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 1.80 m (71 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F												23				24					
41002F												23				24					
41103F												23				24					
41229F												23				24					
41509F												23				24					
41608F												23				24					
41807F												23				24					
41914F												23				24					
42006F												23				24					
42105F												23				24					
42215F												23				24					
42612F												23				24					
42711F												23				24					
42810F												23				24					
42915F												23				24					
43104F												23				24					
43333F												23				24					
43432F												23				24					
43534F												23				24					
43631F												23				24					
43813F												23				24					
43915F												23				24					
44015F												23				24					

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 1.83 m (72 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F																	25		26		
41002F																	25		26		
41103F																	25		26		
41229F																	25		26		
41509F																	25		26		
41608F																	25		26		
41807F																	25		26		
41914F																	25		26		
42006F																	25		26		
42105F																	25		26		
42215F																	25		26		
42612F																	25		26		
42711F																	25		26		
42810F																	25		26		
42915F																	25		26		
43104F																	25		26		
43333F																	25		26		
43432F																	25		26		
43534F																	25		26		
43631F																	25		26		
43813F																	25		26		
43915F																	25		26		
44015F																	25		26		

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 1.85 m (73 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F			27				28														
41002F			27				28														
41103F			27				28														
41229F			27				28														
41509F			27				28														
41608F			27				28														
41807F			27				28														
41914F			27				28														
42006F			27				28														
42105F			27				28														
42215F			27				28														
42612F			27				28														
42711F			27				28														
42810F			27				28														
42915F			27				28														
43104F			27				28														
43333F			27				28														
43432F			27				28														
43534F			27				28														
43631F			27				28														
43813F			27				28														
43915F			27				28														
44015F			27				28														

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 1.88 m (74 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F								29			30				31		32			33	
41002F								29			30				31		32			33	
41103F								29			30				31		32			33	
41229F								29			30				31		32			33	
41509F								29			30				31		32			33	
41608F								29			30				31		32			33	
41807F								29			30				31		32			33	
41914F								29			30				31		32			33	
42006F								29			30				31		32			33	
42105F								29			30				31		32			33	
42215F								29			30				31		32			33	
42612F								29			30				31		32			33	
42711F								29			30				31		32			33	
42810F								29			30				31		32			33	
42915F								29			30				31		32			33	
43104F								29			30				31		32			33	
43333F								29			30				31		32			33	
43432F								29			30				31		32			33	
43534F								29			30				31		32			33	
43631F								29			30				31		32			33	
43813F								29			30				31		32			33	
43915F								29			30				31		32			33	
44015F								29			30				31		32			33	

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 1.90 m (75 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F	34		35	36	37	38	39		40	41				42			43		44		
41002F	34		35	36	37	38	39		40	41				42			43		44		
41103F	34		35	36	37	38	39		40	41				42			43		44		
41229F	34		35	36	37	38	39		40	41				42			43		44		
41509F	34		35	36	37	38	39		40	41				42			43		44		
41608F	34		35	36	37	38	39		40	41				42			43		44		
41807F	34		35	36	37	38	39		40	41				42			43		44		
41914F	34		35	36	37	38	39		40	41				42			43		44		
42006F	34		35	36	37	38	39		40	41				42			43		44		
42105F	34		35	36	37	38	39		40	41				42			43		44		
42215F	34		35	36	37	38	39		40	41				42			43		44		
42612F	34		35	36	37	38	39		40	41				42			43		44		
42711F	34		35	36	37	38	39		40	41				42			43		44		
42810F	34		35	36	37	38	39		40	41				42			43		44		
42915F	34		35	36	37	38	39		40	41				42			43		44		
43104F	34		35	36	37	38	39		40	41				42			43		44		
43333F	34		35	36	37	38	39		40	41				42			43		44		
43432F	34		35	36	37	38	39		40	41				42			43		44		
43534F	34		35	36	37	38	39		40	41				42			43		44		
43631F	34		35	36	37	38	39		40	41				42			43		44		
43813F	34		35	36	37	38	39		40	41				42			43		44		
43915F	34		35	36	37	38	39		40	41				42			43		44		
44015F	34		35	36	37	38	39		40	41				42			43		44		

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 1.93 m (76 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F		45	46					47	48		49	50			51	52	53	54		55	56
41002F		45	46					47	48		49	50			51	52	53	54		55	56
41103F		45	46					47	48		49	50			51	52	53	54		55	56
41229F		45	46					47	48		49	50			51	52	53	54		55	56
41509F		45	46					47	48		49	50			51	52	53	54		55	56
41608F		45	46					47	48		49	50			51	52	53	54		55	56
41807F		45	46					47	48		49	50			51	52	53	54		55	56
41914F		45	46					47	48		49	50			51	52	53	54		55	56
42006F		45	46					47	48		49	50			51	52	53	54		55	56
42105F		45	46					47	48		49	50			51	52	53	54		55	56
42215F		45	46					47	48		49	50			51	52	53	54		55	56
42612F		45	46					47	48		49	50			51	52	53	54		55	56
42711F		45	46					47	48		49	50			51	52	53	54		55	56
42810F		45	46					47	48		49	50			51	52	53	54		55	56
42915F		45	46					47	48		49	50			51	52	53	54		55	56
43104F		45	46					47	48		49	50			51	52	53	54		55	56
43333F		45	46					47	48		49	50			51	52	53	54		55	56
43432F		45	46					47	48		49	50			51	52	53	54		55	56
43534F		45	46					47	48		49	50			51	52	53	54		55	56
43631F		45	46					47	48		49	50			51	52	53	54		55	56
43813F		45	46					47	48		49	50			51	52	53	54		55	56
43915F		45	46					47	48		49	50			51	52	53	54		55	56
44015F		45	46					47	48		49	50			51	52	53	54		55	56

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 1.96 m (77 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F	57		58	59	60	61	62			63									64		
41002F	57		58	59	60	61	62			63									64		
41103F	57		58	59	60	61	62			63									64		
41229F	57		58	59	60	61	62			63									64		
41509F	57		58	59	60	61	62			63									64		
41608F	57		58	59	60	61	62			63									64		
41807F	57		58	59	60	61	62			63									64		
41914F	57		58	59	60	61	62			63									64		
42006F	57		58	59	60	61	62			63									64		
42105F	57		58	59	60	61	62			63									64		
42215F	57		58	59	60	61	62			63									64		
42612F	57		58	59	60	61	62			63									64		
42711F	57		58	59	60	61	62			63									64		
42810F	57		58	59	60	61	62			63									64		
42915F	57		58	59	60	61	62			63									64		
43104F	57		58	59	60	61	62			63									64		
43333F	57		58	59	60	61	62			63									64		
43432F	57		58	59	60	61	62			63									64		
43534F	57		58	59	60	61	62			63									64		
43631F	57		58	59	60	61	62			63									64		
43813F	57		58	59	60	61	62			63									64		
43915F	57		58	59	60	61	62			63									64		
44015F	57		58	59	60	61	62			63									64		

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 1.98 m (78 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F		65		66	67				68		69		70	71	72	73	74	75		76	77
41002F		65		66	67				68		69		70	71	72	73	74	75		76	77
41103F		65		66	67				68		69		70	71	72	73	74	75		76	77
41229F		65		66	67				68		69		70	71	72	73	74	75		76	77
41509F		65		66	67				68		69		70	71	72	73	74	75		76	77
41608F		65		66	67				68		69		70	71	72	73	74	75		76	77
41807F		65		66	67				68		69		70	71	72	73	74	75		76	77
41914F		65		66	67				68		69		70	71	72	73	74	75		76	77
42006F		65		66	67				68		69		70	71	72	73	74	75		76	77
42105F		65		66	67				68		69		70	71	72	73	74	75		76	77
42215F		65		66	67				68		69		70	71	72	73	74	75		76	77
42612F		65		66	67				68		69		70	71	72	73	74	75		76	77
42711F		65		66	67				68		69		70	71	72	73	74	75		76	77
42810F		65		66	67				68		69		70	71	72	73	74	75		76	77
42915F		65		66	67				68		69		70	71	72	73	74	75		76	77
43104F		65		66	67				68		69		70	71	72	73	74	75		76	77
43333F		65		66	67				68		69		70	71	72	73	74	75			77
43432F		65		66	67				68		69		70	71	72	73	74	75			77
43534F		65		66	67				68		69		70	71	72	73	74	75			77
43631F		65		66	67				68		69		70	71	72	73	74	75			77
43813F		65		66	67				68		69		70	71	72	73	74	75			77
43915F		65		66	67				68		69		70	71	72	73	74	75			77
44015F		65		66	67				68		69		70	71	72	73	74	75			77

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 2.01 m (79 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F	78	79				80	81	82	83	84		85			86				87	88	
41002F	78	79				80	81	82	83	84		85			86				87	88	
41103F	78	79				80	81	82	83	84		85			86				87	88	
41229F	78	79				80	81	82	83	84		85			86				87	88	
41509F	78	79				80	81	82	83	84		85			86				87	88	
41608F	78	79				80	81	82	83	84		85			86				87	88	
41807F	78	79				80	81	82	83	84		85			86				87	88	
41914F	78	79				80	81	82	83	84		85			86				87	88	
42006F	78	79				80	81	82	83	84		85			86				87	88	
42105F	78	79				80	81	82	83	84		85			86				87	88	
42215F	78	79				80	81	82	83	84		85			86				87	88	
42612F	78	79				80	81	82	83	84		85			86				87	88	
42711F	78	79				80	81	82	83	84		85			86				87	88	
42810F	78	79				80	81	82	83	84		85			86				87	88	
42915F	78	79				80	81	82	83	84		85			86				87	88	
43104F	78	79				80	81	82	83	84		85			86				87	88	
43333F	78	79				80	81	82	83	84		85			86				87	88	
43432F	78	79				80	81	82	83	84		85			86				87	88	
43534F	78	79				80	81	82	83	84		85			86				87	88	
43631F	78	79				80	81	82	83	84		85			86				87	88	
43813F	78	79				80	81	82	83	84		85			86				87	88	
43915F	78	79				80	81	82	83	84		85			86				87	88	
44015F	78	79				80	81	82	83	84		85			86				87	88	

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 2.03 m (80 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F	89	90			91		92				93	94		95				96			
41002F	89	90			91		92				93	94		95				96			
41103F	89	90			91		92				93	94		95				96			
41229F	89	90			91		92				93	94		95				96			
41509F	89	90			91		92				93	94		95				96			
41608F	89	90			91		92				93	94		95				96			
41807F	89	90			91		92				93	94		95				96			
41914F	89	90			91		92				93	94		95				96			
42006F	89	90			91		92				93	94		95				96			
42105F	89	90			91		92				93	94		95				96			
42215F	89	90			91		92				93	94		95				96			
42612F	89	90			91		92				93	94		95				96			
42711F	89	90			91		92				93	94		95				96			
42810F	89	90			91		92				93	94		95				96			
42915F	89	90			91		92				93	94		95				96			
43104F	89	90			91		92				93	94		95				96			
43333F	89	90			91		92				93	94		95				96			
43432F	89	90			91		92				93	94		95				96			
43534F	89	90			91		92				93	94		95				96			
43631F	89	90			91		92				93	94		95				96			
43813F	89	90					92				93	94		95				96			
43915F	89	90					92				93	94		95				96			
44015F	89	90					92				93	94		95				96			

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 2.06 m (81 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F													97								
41002F													97								
41103F													97								
41229F													97								
41509F													97								
41608F													97								
41807F													97								
41914F													97								
42006F													97								
42105F													97								
42215F													97								
42612F													97								
42711F													97								
42810F													97								
42915F													97								
43104F													97								
43333F													97								
43432F													97								
43534F													97								
43631F													97								
43813F													97								
43915F													97								
44015F													97								

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 2.13 m (84 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F		109			110		111				112	113	114	115			116		117		118
41002F		109			110		111				112	113	114	115			116		117		118
41103F		109			110		111				112	113	114	115			116		117		118
41229F		109			110		111				112	113	114	115			116		117		118
41509F		109			110		111				112	113	114	115			116		117		118
41608F		109			110		111				112	113	114	115			116		117		118
41807F		109			110		111				112	113	114	115			116		117		118
41914F		109			110		111				112	113	114	115			116		117		118
42006F		109			110		111				112	113	114	115			116		117		118
42105F		109			110		111				112	113	114	115			116		117		118
42215F		109			110		111				112	113	114	115			116		117		118
42612F		109			110		111				112	113	114	115			116		117		118
42711F		109			110		111				112	113	114	115			116		117		118
42810F		109			110		111				112	113	114	115			116		117		118
42915F		109			110		111				112	113	114	115			116		117		118
43104F		109			110		111				112	113	114	115			116		117		118
43333F		109			110		111				112	113	114	115			116		117		118
43432F		109			110		111				112	113	114	115			116		117		118
43534F		109			110		111				112	113	114	115			116		117		118
43631F		109			110		111				112	113	114	115			116		117		118
43813F		109			110		111				112	113	114	115			116		117		118
43915F		109			110		111				112	113	114	115			116		117		118
44015F		109			110		111				112	113	114	115			116		117		118

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 2.29 m (90 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
41002F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
41103F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
41229F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
41509F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
41608F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
41807F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
41914F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
42006F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
42105F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
42215F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
42612F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
42711F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
42810F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
42915F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
43104F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
43333F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
43432F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
43534F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
43631F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
43813F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
43915F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	
44015F			119		120	121	122	123	124	125	126	127		128	129		130		131	132	

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 2.44 m (96 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F		133				134	135	136			137	138	139	140	141		142		143	144	
41002F		133				134	135	136			137	138	139	140	141		142		143	144	
41103F		133				134	135	136			137	138	139	140	141		142		143	144	
41229F		133				134	135	136			137	138	139	140	141		142		143	144	
41509F		133				134	135	136			137	138	139	140	141		142		143	144	
41608F		133				134	135	136			137	138	139	140	141		142		143	144	
41807F		133				134	135	136			137	138	139	140	141		142		143	144	
41914F		133				134	135	136			137	138	139	140	141		142		143	144	
42006F		133				134	135	136			137	138	139	140	141		142		143	144	
42105F		133				134	135	136			137	138	139	140	141		142		143	144	
42215F		133				134	135	136			137	138	139	140	141		142		143	144	
42612F		133				134	135	136			137	138	139	140	141		142		143	144	
42711F		133				134	135	136			137	138	139	140	141		142		143	144	
42810F		133				134	135	136			137	138	139	140	141		142		143	144	
42915F		133				134	135	136			137	138	139	140	141		142		143	144	
43104F		133				134	135	136			137	138	139	140	141		142		143	144	
43333F		133				134	135	136			137	138	139	140	141		142		143	144	
43432F		133				134	135	136			137	138	139	140	141		142		143	144	
43534F		133				134	135	136			137	138	139	140	141		142		143	144	
43631F		133				134	135	136			137	138	139	140	141		142		143	144	
43813F		133				134	135	136			137	138	139	140	141		142		143	144	
43915F		133				134	135	136			137	138	139	140	141		142		143	144	
44015F		133				134	135	136			137	138	139	140	141		142		143	144	

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 2.59 m (102 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F		145	146		147	148		149	150	151			152		153					154	155
41002F		145	146		147	148		149	150	151			152		153					154	155
41103F		145	146		147	148		149	150	151			152		153					154	155
41229F		145	146		147	148		149	150	151			152		153					154	155
41509F		145	146		147	148		149	150	151			152		153					154	155
41608F		145	146		147	148		149	150	151			152		153					154	155
41807F		145	146		147	148		149	150	151			152		153					154	155
41914F		145	146		147	148		149	150	151			152		153					154	155
42006F		145	146		147	148		149	150	151			152		153					154	155
42105F		145	146		147	148		149	150	151			152		153					154	155
42215F		145	146		147	148		149	150	151			152		153					154	155
42612F		145	146		147	148		149	150	151			152		153					154	155
42711F		145	146		147	148		149	150	151			152		153					154	155
42810F		145	146		147	148		149	150	151			152		153					154	155
42915F		145	146		147	148		149	150	151			152		153					154	155
43104F		145	146		147	148		149	150	151			152		153					154	155
43333F		145	146		147	148		149	150	151			152		153					154	155
43432F		145	146		147	148		149	150	151			152		153					154	155
43534F		145	146		147	148		149	150	151			152		153					154	155
43631F		145	146		147	148		149	150	151			152		153					154	155
43813F		145	146		147	148		149	150	151			152		153					154	155
43915F		145	146		147	148		149	150	151			152		153					154	155
44015F		145	146		147	148		149	150	151			152		153					154	155

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 2.82 m (111 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F	156			157							158	159		160		161		162	163		
41002F	156			157							158	159		160		161		162	163		
41103F	156			157							158	159		160		161		162	163		
41229F	156			157							158	159		160		161		162	163		
41509F	156			157							158	159		160		161		162	163		
41608F	156			157							158	159		160		161		162	163		
41807F	156			157							158	159		160		161		162	163		
41914F	156			157							158	159		160		161		162	163		
42006F	156			157							158	159		160		161		162	163		
42105F	156			157							158	159		160		161		162	163		
42215F	156			157							158	159		160		161		162	163		
42612F	156			157							158	159		160		161		162	163		
42711F	156			157							158	159		160		161		162	163		
42810F	156			157							158	159		160		161		162	163		
42915F	156			157							158	159		160		161		162	163		
43104F	156			157							158	159		160		161		162	163		
43333F	156			157							158	159		160		161		162	163		
43432F	156			157							158	159		160		161		162	163		
43534F	156			157							158	159		160		161		162	163		
43631F	156			157							158	159		160		161		162	163		
43813F	156			157							158	159		160		161		162	163		
43915F	156			157							158	159		160		161		162	163		
44015F	156			157							158	159		160		161		162	163		

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 3.05 m (120 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F			164						165	166			167		168						169
41002F			164						165	166			167		168						169
41103F			164						165	166			167		168						169
41229F			164						165	166			167		168						169
41509F			164						165	166			167		168						169
41608F			164						165	166			157		168						169
41807F			164						165	166			157		168						169
41914F			164						165	166			157		168						169
42006F			164						165	166			167		168						169
42105F			164						165	166			167		168						169
42215F			164						165	166			167		168						169
42612F			164						165	166			157		168						169
42711F			164						165	166			167		168						169
42810F			164						165	166			157		168						169
42915F			164						165	166			167		168						169
43104F			164						165	166			167		168						169
43333F			164						165	166			167		168						169
43432F			164						165	166			167		168						169
43534F			164						165	166			157		168						169
43631F			164						165	166			167		168						169
43813F			164						165	166			167		168						169
43915F			164						165	166			167		168						169
44015F			164						165	166			167		168						169

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 3.35 m (132 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F	170			171												172		173			
41002F	170			171												172		173			
41103F	170			171												172		173			
41229F	170			171												172		173			
41509F	170			171												172		173			
41608F	170			171												172		173			
41807F	170			171												172		173			
41914F	170			171												172		173			
42006F	170			171												172		173			
42105F	170			171												172		173			
42215F	170			171												172		173			
42612F	170			171												172		173			
42711F	170			171												172		173			
42810F	170			171												172		173			
42915F	170			171												172		173			
43104F	170			171												172		173			
43333F	170			171												172		173			
43432F	170			171												172		173			
43534F	170			171												172		173			
43631F	170			171												172		173			
43813F	170			171												172		173			
43915F	170			171												172		173			
44015F	170			171												172		173			

TABLE K-6 (cont)

VALID THERMOCOUPLE CHANNELS

CONFIGURATION F, 3.51 m (138 in.) ELEVATION

RUN NUMBER	1B	1C	1D	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	4A	4B	4C	4D	4E	5B	5C	5D
40901F			174						175	176											
41002F			174						175	176											
41103F			174						175	176											
41229F			174						175	176											
41509F			174						175	176											
41608F			174						175	176											
41807F			174						175	176											
41914F			174						175	176											
42006F									175	176											
42105F									175	176											
42215F									175	176											
42612F									175	176											
42711F									175	176											
42810F									175	176											
42915F									175	176											
43104F									175	176											
43333F									175	176											
43432F									175	176											
43534F									175	176											
43631F									175	176											
43813F									175	176											
43915F									175	176											
44015F									175	176											

TABLE K-6 (cont)

VALID STEAM TEMPERATURE CHANNELS

CONFIGURATION F

Subchannel Number Elevation [m (in.)]	9 0.89 (35)	10 1.19 (47)	15 1.47 (58)	10 1.47 (58)	8 1.70 (67)	Special 1.70 (67)	9 1.70 (67)	11 1.70 (67)	6 1.96 (77)	8 1.96 (77)	9 1.96 (77)	11 1.96 (77)	6 2.26 (89)	7 2.26 (89)	10 2.26 (89)	5 2.26 (89)	8 2.46 (97)	9 2.46 (97)	10 2.46 (97)	5 2.77 (109)	10 2.77 (109)	14 3.05 (120)	6 3.05 (120)	15 3.05 (120)	11 3.30 (130)	6 3.51 (138)
Run																										
40901F	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202
41002F																										
41103F																										
41229F													↓													
41509F																										
41608F																										
41807F																										
41914F																										
42006F																										
42105F																										
42215F																										
42612F																										
42711F																										
42810F																										
42915F																										
43104F																										
43333F																										
43432F																										
43534F																										
43631F																										
43813F																										
43915F																										
44015F	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓

TABLE K-7

INVALID 21-ROD BUNDLE TESTS

Test	Type of Test	Reason Invalid
40928A	Axial thermocouple check	Unpowered bundle shakedown
41001A	Steam cooling	Condensation in bundle
41102A	Steam cooling	Condensation in bundle
41203A	Steam cooling	Condensation in bundle
41301A	Steam cooling	Condensation in bundle
41429A	Steam cooling	Condensation in bundle
41503A	Steam cooling	Condensation in bundle
41603A	Steam cooling	Condensation in bundle
41702A	Steam cooling	Condensation in bundle
41824A	Forced reflood	Facility shakedown with poor power decay
42008A	Forced reflood	Computer failure - data lost
43312A	Forced reflood	Pretest turbine meter failure (no test)
43411A	Forced reflood	Pretest turbine meter failure (no test)
44017A	Gravity reflood	Exhaust orifice undersized, providing poor mass balance
44202A	Steam cooling	Condensation in bundle
44602A	Steam cooling	Condensation in bundle
40228B	Axial thermocouple check	Unpowered bundle shakedown
41202B	Steam cooling	Condensation in bundle
41303B	Steam cooling	Condensation in bundle
41529B	Steam cooling	Boiler valved into upper plenum
42612B	Forced reflood	Poor mass balance
43312B	Forced reflood	Poor mass balance
40128C	Axial thermocouple check	Unpowered bundle shakedown
41102C	Steam cooling	Condensation in bundle
41402C	Steam cooling	Condensation in bundle
41502C	Steam cooling	Condensation in bundle
41624C	Forced reflood	Facility shakedown with poor mass balance

TABLE K-7 (cont)

INVALID 21-ROD BUNDLE TESTS

Test	Type of Test	Reason Invalid
43011C	Forced reflood	Poor mass balance
44002C	Steam cooling	Scrammed on seal plate overtemperature, therefore not steady state
40028D	Axial thermocouple check	Unpowered bundle shakedown
41003D	Steam cooling	Not steady state
41429D	Steam cooling	Not steady state
41709D	Forced reflood	Turbine meter overranged, therefore poor mass balance
42106D	Forced reflood	Scrammed on failed rod thermocouple over-temperature at approximately turnaround time
42810D	Forced reflood	Poor mass balance
43301D	Steam cooling	Computer software failure
43513D	Forced reflood	Computer hardware failure
43613D	Forced reflood	Poor mass balance
43713D	Forced reflood	Poor mass balance
40028E	Axial thermocouple check	Unpowered bundle shakedown
40303E	Steam cooling	Condensation in bundle
40403E	Steam cooling	Condensation in bundle
43717E	Gravity reflood	High [approximately 15 cm (6 in.)] initial bundle water level
40028F	Axial thermocouple check	Unpowered bundle shakedown
41324F	Forced reflood	Facility shakedown with poor mass balance
41707F	Forced reflood	Poor mass balance
42304F	Forced reflood	Poor mass balance
42413F	Forced reflood	Poor mass balance
42504F	Forced reflood	Low [approximately 5 cm (2 in.)] initial bundle water level

TABLE K-7 (cont)

INVALID 21-ROD BUNDLE TESTS

Test	Type of Test	Reason Invalid
43004F	Forced reflood	Poor mass balance
43231F	Forced reflood	Low [approximately 8.9 cm (3.5 in.)] initial bundle water level
43713F	Forced reflood	Bundle overpowered at 3.41 kw/m (1.04 kw/ft)

TABLE K-8

NONMATRIX VALID TESTS

Test	Type of Test	Reason Unsuitable for Analysis
40826A	Steam cooling	Isothermal facility shakedown
42327A	Forced reflood	Computer failure just past turnaround time
43825A	Gravity reflood	Facility shakedown
41026B	Steam cooling	Isothermal facility shakedown
41624B	Forced reflood	Facility shakedown
42513B	Forced reflood	Pressure oscillations
43013B	Forced reflood	Pressure oscillations
43625B	Gravity reflood	Facility shakedown
40926C	Steam cooling	Isothermal facility shakedown
41731C	Forced reflood	538°C (1000°F) initial clad temperature
41831C	Forced reflood	538°C (1000°F) initial clad temperature
42214C	Forced reflood	Pressure oscillations
43431C	Forced reflood	538°C (1000°F) initial clad temperature
43531C	Forced reflood	538°C (1000°F) initial clad temperature
43625C	Gravity reflood	Facility shakedown
41301D	Steam cooling	
41624D	Forced reflood	Facility shakedown
41907D	Forced reflood	Flooding rate 6.7 percent high for first 15 seconds
43925D	Gravity reflood	Facility shakedown
44017D	Gravity reflood	High initial water level in downcomer [0.38 m (15 in.)]
42217D	Gravity reflood	
40226E	Steam cooling	Isothermal facility shakedown
40729E	Steam cooling	Power at 1.32 kw

TABLE K-8 (cont)

NONMATRIX VALID TESTS

Test	Type of Test	Reason Unsuitable for Analysis
40824E	Forced reflood	Facility shakedown
40908E	Forced reflood	Flooding rate 5.5 percent low for approximately 10 seconds
41107E	Forced reflood	Flooding rate 5.1 percent high for approximately 20 seconds
41404E	Forced reflood	
42109E	Forced reflood	Oscillating flooding rate at test initiation
42629E	Steam cooling	Computer continually scrammed during test due to overranged test conditions in subroutine to calculate steam flow
43525E	Gravity reflood	Facility shakedown
40826F	Steam cooling	Isothermal facility shakedown
41424F	Forced reflood	Facility shakedown

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40618A
Test Date: 3/5/80
Test Type: Hydraulic Characteristics
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.13 MPa (19 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	6.3×10^{-4} m^3/sec (10 gal/min)
Coolant temperature	23°C (73°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	2645
Grid loss coefficients:	0.53 m (21 in.) - 1.133
	1.06 m (42 in.) - 1.546
	1.57 m (62 in.) - 2.175
	2.11 m (83 in.) - 2.306
	2.59 m (102 in.) - 1.792
	3.15 m (124 in.) - 1.901
Friction factors:	0.61-0.91 m (24-36 in.) - 0.0544
	2.74-3.05 m (108-120 in.) - 0.0564
	3.35-3.56 m (132-140 in.) - 0.0542
Measured overall bundle pressure drop:	1.3376 kPa (0.19400 psid)
Calculated overall bundle pressure drop:	1.3610 kPa (0.19739 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40818B
Test Date: 6/10/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.20 MPa (29 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	6.69×10^{-4} m^3/sec (10.6 gal/min)
Coolant temperature	26°C (78°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	3037
Grid loss coefficients:	0.53 m (21 in.) - 0.989
	1.07 m (42 in.) - [a]
	2.59 m (102 in.) - 1.159
	3.15 m (124 in.) - 1.227
Friction factors:	0.61-0.91 m (24-36 in.) - 0.043
	2.74-3.05 m (108-120 in.) - 0.056
	3.35-3.56 m (132-140 in.) - 0.068
Blockage loss coefficient:	-0.650
Measured overall bundle pressure drop:	1.534 kPa (0.2225 psid)
Calculated overall bundle pressure drop:	1.402 kPa (0.2033 psid)

C. Comments:

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a. Nonsteady linearly increasing from 0.105 to 0.155 kPa (0.0152 to 0.0225 psid) pressure drop at 0.91-1.22 m (36-48 in.) elevation

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40718C
Test Date: 8/12/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.12 MPa (18 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	6.36×10^{-4} m^3/sec (10.1 gal/min)
Coolant temperature	30°C (86°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	3205
Grid loss coefficients:	0.53 m (21 in.) - 0.846
	1.07 m (42 in.) - 1.062
	2.59 m (102 in.) - 1.676
	3.15 m (124 in.) - 1.345
Friction factors:	0.61-0.91 m (24-36 in.) - 0.049
	2.74-3.05 m (108-120 in.) - 0.053
	3.35-3.56 m (132-140 in.) - 0.078
Blockage loss coefficient:	2.42
Measured overall bundle pressure drop:	1.51 kPa (0.219 psid)
Calculated overall bundle pressure drop:	1.50 kPa (0.218 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40718D
Test Date: 10/6/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.14 MPa (20 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	6.37×10^{-4} m^3/sec (10.1 gal/min)
Coolant temperature	23°C (74°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	2685
Grid loss coefficients:	0.53 m (21 in.) - 1.379
	1.07 m (42 in.) - 1.752
	2.59 m (102 in.) - 1.933
	3.15 m (124 in.) - 1.555
Friction factors:	0.61-0.91 m (24-36 in.) - 0.036
	2.74-3.05 m (108-120 in.) - 0.048
	3.35-3.56 m (132-140 in.) - 0.046
Blockage loss coefficient:	1.238
Measured overall bundle pressure drop:	1.32 kPa (0.191 psid)
Calculated overall bundle pressure drop:	1.30 kPa (0.189 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42818E
Test Date: 12/13/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.15 MPa (22 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	6.75×10^{-4} m^3/sec (10.7 gal/min)
Coolant temperature	27°C (81°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	3126
Grid loss coefficients:	0.53 m (21 in.) - 1.233
	1.07 m (42 in.) - 1.302
	2.59 m (102 in.) - 1.943
	3.15 m (124 in.) - 1.567
Friction factors:	0.61-0.91 m (24-36 in.) - 0.045
	2.74-3.05 m (108-120 in.) - 0.049
	3.35-3.56 m (132-140 in.) - 0.052
Blockage loss coefficient:	4.023
Measured overall bundle pressure drop:	1.71 kPa (0.248 psid)
Calculated overall bundle pressure drop:	1.68 kPa (0.243 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40618F
Test Date: 6/17/81
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.12 MPa (17 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	0.590×10^{-4} m^3/sec (9.35 gal/min)
Coolant temperature	25.7°C (78.2°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	2617
Grid loss coefficients:	0.53 m (21 in.) - 1.529
	1.07 m (42 in.) - 1.479
	2.59 m (102 in.) - 2.266
	3.15 m (124 in.) - 2.005
Friction factors:	0.61-0.91 m (24-36 in.) - 0.052
	2.74-3.05 m (108-120 in.) - 0.051
	3.35-3.56 m (132-140 in.) - 0.047
Blockage loss coefficient:	5.406
Measured overall bundle pressure drop:	1.38 kPa (0.200 psid)
Calculated overall bundle pressure drop:	1.43 kPa (0.208 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40419A
Test Date: 3/5/80
Test Type: Hydraulic Characteristics
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.13 MPa (19 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.3×10^{-3} m^3/sec (20 gal/min)
Coolant temperature	23°C (74°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	5431
Grid loss coefficients:	0.53 m (21 in.) - 0.910
	1.06 m (42 in.) - 1.126
	1.57 m (62 in.) - 1.447
	2.11 m (83 in.) - 1.711
	2.59 m (102 in.) - 1.367
	3.15 m (124 in.) - 1.308
Friction factors:	0.61-0.91 m (24-36 in.) - 0.041
	2.74-3.05 m (108-120 in.) - 0.042
	3.35-3.56 m (132-140 in.) - 0.043
Measured overall bundle pressure drop:	4.166 kPa (0.6042 psid)
Calculated overall bundle pressure drop:	4.183 kPa (0.6067 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40619B
Test Date: 6/10/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.26 MPa (37 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.32×10^{-3} m^3/sec (20.9 gal/min)
Coolant temperature	25°C (77°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	5866
Grid loss coefficients:	0.53 m (21 in.) - 0.897
	1.07 m (42 in.) - 1.023
	2.59 m (102 in.) - 1.261
	3.15 m (124 in.) - 1.151
Friction factors:	0.61-0.91 m (24-36 in.) - 0.037
	2.74-3.05 m (108-120 in.) - 0.041
	3.35-3.56 m (132-140 in.) - 0.044
Blockage loss coefficient:	-0.052
Measured overall bundle pressure drop:	4.574 kPa (0.6634 psid)
Calculated overall bundle pressure drop:	4.445 kPa (0.6446 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40519C
Test Date: 8/12/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.15 MPa (22 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.25×10^{-3} m^3/sec (19.8 gal/min)
Coolant temperature	30°C (86°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	6251
Grid loss coefficients:	0.53 m (21 in.) - 0.773
	1.07 m (42 in.) - 0.870
	2.59 m (102 in.) - 1.358
	3.15 m (124 in.) - 1.157
Friction factors:	0.61-0.91 m (24-36 in.) - 0.039
	2.74-3.05 m (108-120 in.) - 0.042
	3.35-3.56 m (132-140 in.) - 0.049
Blockage loss coefficient:	1.975
Measured overall bundle pressure drop:	4.43 kPa (0.643 psid)
Calculated overall bundle pressure drop:	4.39 kPa (0.636 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40519D
Test Date: 10/6/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.14 MPa (21 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.27×10^{-3} m^3/sec (20.2 gal/min)
Coolant temperature	23°C (73°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	5300
Grid loss coefficients:	0.53 m (21 in.) - 0.920
	1.07 m (42 in.) - 1.041
	2.59 m (102 in.) - 1.468
	3.15 m (124 in.) - 1.159
Friction factors:	0.61-0.91 m (24-36 in.) - 0.035
	2.74-3.05 m (108-120 in.) - 0.038
	3.35-3.56 m (132-140 in.) - 0.039
Blockage loss coefficient:	0.373
Measured overall bundle pressure drop:	4.19 kPa (0.607 psid)
Calculated overall bundle pressure drop:	4.11 kPa (0.596 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43219E
Test Date: 12/13/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.11 MPa (16 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.29×10^{-3} m^3/sec (20.5 gal/min)
Coolant temperature	26°C (79°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	5793
Grid loss coefficients:	0.53 m (21 in.) - 0.917
	1.07 m (42 in.) - 0.956
	2.59 m (102 in.) - 1.462
	3.15 m (124 in.) - 1.177
Friction factors:	0.61-0.91 m (24-36 in.) - 0.035
	2.74-3.05 m (108-120 in.) - 0.038
	3.35-3.56 m (132-140 in.) - 0.040
Blockage loss coefficient:	2.812
Measured overall bundle pressure drop:	4.76 kPa (0.691 psid)
Calculated overall bundle pressure drop:	4.67 kPa (0.677 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40419F
Test Date: 6/17/81
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.097 MPa (14 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.2×10^{-3} m^3/sec (19 gal/min)
Coolant temperature	28.7°C (83.6°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	5682
Grid loss coefficients:	0.53 m (21 in.) - 1.066
	1.07 m (42 in.) - 0.896
	2.59 m (102 in.) - 1.579
	3.15 m (124 in.) - 1.413
Friction factors:	0.61-0.91 m (24-36 in.) - 0.038
	2.74-3.05 m (108-120 in.) - 0.037
	3.35-3.56 m (132-140 in.) - 0.039
Blockage loss coefficient:	3.277
Measured overall bundle pressure drop:	4.19 kPa (0.607 psid)
Calculated overall bundle pressure drop:	4.21 kPa (0.611 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40220A
Test Date: 3/5/80
Test Type: Hydraulic Characteristics
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.12 MPa (18 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.9×10^{-3} m^3/sec (30 gal/min)
Coolant temperature	25°C (77°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	8518
Grid loss coefficients:	0.53 m (21 in.) - 0.804
	1.06 m (42 in.) - 0.960
	1.57 m (62 in.) - 1.217
	2.11 m (83 in.) - 1.478
	2.59 m (102 in.) - 1.175
	3.15 m (124 in.) - 1.128
Friction factors:	0.61-0.91 m (24-36 in.) - 0.03691
	2.74-3.05 m (108-120 in.) - 0.03565
	3.35-3.56 m (132-140 in.) - 0.03947
Measured overall bundle pressure drop:	8.364 kPa (1.213 psid)
Calculated overall bundle pressure drop:	8.267 kPa (1.199 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40720A
Test Date: 3/5/80
Test Type: Hydraulic Characteristics
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.17 MPa (24 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.9×10^{-3} m^3/sec (30 gal/min)
Coolant temperature	22°C (71°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	7835
Grid loss coefficients:	0.53 m (21 in.) - 0.840
	1.07 m (42 in.) - 1.007
	1.57 m (62 in.) - 1.261
	2.11 m (83 in.) - 1.514
	2.59 m (102 in.) - 1.225
	3.15 m (124 in.) - 1.148
Friction factors:	0.61-0.91 m (24-36 in.) - 0.0370
	2.74-3.05 m (108-120 in.) - 0.0379
	3.35-3.56 m (132-140 in.) - 0.0391
Measured overall bundle pressure drop:	8.4209 kPa (1.2213 psid)
Calculated overall bundle pressure drop:	8.4478 kPa (1.2252 psid)

C. Comments:

This test was a repeat of run 40220A.

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40420B
Test Date: 6/9/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.20 MPa (29 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.87×10^{-3} m^3/sec (29.7 gal/min)
Coolant temperature	26°C (78°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	8452
Grid loss coefficients:	0.53 m (21 in.) - 0.906
	1.07 m (42 in.) - 1.098
	2.59 m (102 in.) - 1.314
	3.15 m (124 in.) - 1.155
Friction factors:	0.61-0.91 m (24-36 in.) - 0.033
	2.74-3.05 m (108-120 in.) - 0.034
	3.35-3.56 m (132-140 in.) - 0.032
Blockage loss coefficient:	0.408
Measured overall bundle pressure drop:	8.074 kPa (1.171 psid)
Calculated overall bundle pressure drop:	7.950 kPa (1.153 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40920B
Test Date: 6/10/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.19 MPa (27 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.96×10^{-3} m^3/sec (31.1 gal/min)
Coolant temperature	25°C (77°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	8759
Grid loss coefficients:	0.53 m (21 in.) - 0.817
	1.07 m (42 in.) - 0.950
	2.59 m (102 in.) - 1.193
	3.15 m (124 in.) - 1.060
Friction factors:	0.61-0.91 m (24-36 in.) - 0.034
	2.74-3.05 m (108-120 in.) - 0.035
	3.35-3.56 m (132-140 in.) - 0.037
Blockage loss coefficient:	0.211
Measured overall bundle pressure drop:	8.970 kPa (1.301 psid)
Calculated overall bundle pressure drop:	8.777 kPa (1.273 psid)

C. Comments:

This test was a repeat of run 40420B.

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40320C
Test Date: 8/12/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.12 MPa (18 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.91×10^{-3} m^3/sec (30.3 gal/min)
Coolant temperature	30°C (86°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	9525
Grid loss coefficients:	0.53 m (21 in.) - 0.711
	1.07 m (42 in.) - 0.770
	2.59 m (102 in.) - 1.194
	3.15 m (124 in.) - 1.033
Friction factors:	0.61-0.91 m (24-36 in.) - 0.035
	2.74-3.05 m (108-120 in.) - 0.037
	3.35-3.56 m (132-140 in.) - 0.041
Blockage loss coefficient:	1.783
Measured overall bundle pressure drop:	9.143 kPa (1.326 psid)
Calculated overall bundle pressure drop:	8.957 kPa (1.299 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40820C
Test Date: 8/12/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.12 MPa (18 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.92×10^{-3} m^3/sec (30.4 gal/min)
Coolant temperature	29°C (85°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	9571
Grid loss coefficients:	0.53 m (21 in.) - 0.707
	1.07 m (42 in.) - 0.761
	2.59 m (102 in.) - 1.187
	3.15 m (124 in.) - 1.026
Friction factors:	0.61-0.91 m (24-36 in.) - 0.035
	2.74-3.05 m (108-120 in.) - 0.037
	3.35-3.56 m (132-140 in.) - 0.040
Blockage loss coefficient:	1.733
Measured overall bundle pressure drop:	9.074 kPa (1.316 psid)
Calculated overall bundle pressure drop:	8.984 kPa (1.303 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40220D
Test Date: 10/6/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.12 MPa (17 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.96×10^{-3} m^3/sec (31.1 gal/min)
Coolant temperature	24°C (75°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	8430
Grid loss coefficients:	0.53 m (21 in.) - 0.752
	1.07 m (42 in.) - 0.800
	2.59 m (102 in.) - 1.256
	3.15 m (124 in.) - 0.992
Friction factors:	0.61-0.91 m (24-36 in.) - 0.033
	2.74-3.05 m (108-120 in.) - 0.033
	3.35-3.56 m (132-140 in.) - 0.034
Blockage loss coefficient:	0.326
Measured overall bundle pressure drop:	8.591 kPa (1.246 psid)
Calculated overall bundle pressure drop:	8.474 kPa (1.229 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40820D
Test Date: 10/6/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.12 MPa (18 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.97×10^{-3} m^3/sec (31.2 gal/min)
Coolant temperature	23°C (73°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	8246
Grid loss coefficients:	0.53 m (21 in.) - 0.779
	1.07 m (42 in.) - 0.839
	2.59 m (102 in.) - 1.287
	3.15 m (124 in.) - 1.007
Friction factors:	0.61-0.91 m (24-36 in.) - 0.032
	2.74-3.05 m (108-120 in.) - 0.034
	3.35-3.56 m (132-140 in.) - 0.034
Blockage loss coefficient:	0.371
Measured overall bundle pressure drop:	8.901 kPa (1.291 psid)
Calculated overall bundle pressure drop:	8.681 kPa (1.259 psid)

C. Comments:

This test was a repeat of run 40220D.

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42920E
Test Date: 12/13/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.28 MPa (40 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	2.00×10^{-3} m^3/sec (31.7 gal/min)
Coolant temperature	27°C (81°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	9260
Grid loss coefficients:	0.53 m (21 in.) - 0.837
	1.07 m (42 in.) - 0.820
	2.59 m (102 in.) - 1.286
	3.15 m (124 in.) - 1.025
Friction factors:	0.61-0.91 m (24-36 in.) - 0.030
	2.74-3.05 m (108-120 in.) - 0.034
	3.35-3.56 m (132-140 in.) - 0.035
Blockage loss coefficient:	2.732
Measured overall bundle pressure drop:	10.02 kPa (1.453 psid)
Calculated overall bundle pressure drop:	9.881 kPa (1.433 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43420E
Test Date: 12/13/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.12 MPa (18 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.93×10^{-3} m^3/sec (30.6 gal/min)
Coolant temperature	25°C (77°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	8458
Grid loss coefficients:	0.53 m (21 in.) - 0.851
	1.07 m (42 in.) - 0.815
	2.59 m (102 in.) - 1.272
	3.15 m (124 in.) - 1.034
Friction factors:	0.61-0.91 m (24-36 in.) - 0.031
	2.74-3.05 m (108-120 in.) - 0.035
	3.35-3.56 m (132-140 in.) - 0.037
Blockage loss coefficient:	2.641
Measured overall bundle pressure drop:	9.536 kPa (1.383 psid)
Calculated overall bundle pressure drop:	9.398 kPa (1.363 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40220F
Test Date: 6/17/81
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.17 MPa (25 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.84×10^{-3} m^3/sec (29.2 gal/min)
Coolant temperature	28.1°C (82.5°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	8389
Grid loss coefficients:	0.53 m (21 in.) - 0.988
	1.07 m (42 in.) - 0.717
	2.59 m (102 in.) - 1.360
	3.15 m (124 in.) - 1.168
Friction factors:	0.61-0.91 m (24-36 in.) - 0.032
	2.74-3.05 m (108-120 in.) - 0.031
	3.35-3.56 m (132-140 in.) - 0.036
Blockage loss coefficient:	2.897
Measured overall bundle pressure drop:	8.681 kPa (1.259 psid)
Calculated overall bundle pressure drop:	8.701 kPa (1.262 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40720F
Test Date: 6/17/81
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.121 MPa (17.5 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	1.88×10^{-3} m^3/sec (29.8 gal/min)
Coolant temperature	25.7°C (78.2°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	8650
Grid loss coefficients:	0.53 m (21 in.) - 1.015
	1.07 m (42 in.) - 0.770
	2.59 m (102 in.) - 1.404
	3.15 m (124 in.) - 1.210
Friction factors:	0.61-0.91 m (24-36 in.) - 0.032
	2.74-3.05 m (108-120 in.) - 0.031
	3.35-3.56 m (132-140 in.) - 0.035
Blockage loss coefficient:	3.026
Measured overall bundle pressure drop:	9.184 kPa (1.332 psid)
Calculated overall bundle pressure drop:	9.163 kPa (1.329 psid)

C. Comments:

This test was a repeat of run 40220F.

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40121A
Test Date: 3/5/80
Test Type: Hydraulic Characteristics
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.19 MPa (27 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	2.5×10^{-3} m^3/sec (40 gal/min)
Coolant temperature	26°C (78°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	11464
Grid loss coefficients:	0.53 m (21 in.) - 0.769
	1.07 m (42 in.) - 0.911
	1.57 m (62 in.) - 1.133
	2.11 m (83 in.) - 1.355
	2.59 m (102 in.) - 1.116
	3.15 m (124 in.) - 1.034
Friction factors:	0.61-0.91 m (24-36 in.) - 0.033
	2.74-3.05 m (108-120 in.) - 0.034
	3.35-3.56 m (132-140 in.) - 0.035
Measured overall bundle pressure drop:	13.32 kPa (1.932 psid)
Calculated overall bundle pressure drop:	13.38 kPa (1.940 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40321B
Test Date: 6/9/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.18 MPa (26 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	2.49×10^{-3} m^3/sec (39.4 gal/min)
Coolant temperature	24°C (76°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	10941
Grid loss coefficients:	0.53 m (21 in.) - 0.834
	1.07 m (42 in.) - 0.989
	2.59 m (102 in.) - 1.213
	3.15 m (124 in.) - 1.071
Friction factors:	0.61-0.91 m (24-36 in.) - 0.03166
	2.74-3.05 m (108-120 in.) - 0.03173
	3.35-3.56 m (132-140 in.) - 0.03134
Blockage loss coefficient:	0.419
Measured overall bundle pressure drop:	13.46 kPa (1.952 psid)
Calculated overall bundle pressure drop:	13.28 kPa (1.926 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40221C
Test Date: 8/11/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.22 MPa (32 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	2.48×10^{-3} m^3/sec (39.3 gal/min)
Coolant temperature	30°C (86°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	12436
Grid loss coefficients:	0.53 m (21 in.) - 0.678
	1.07 m (42 in.) - 0.728
	2.59 m (102 in.) - 1.117
	3.15 m (124 in.) - 0.973
Friction factors:	0.61-0.91 m (24-36 in.) - 0.032
	2.74-3.05 m (108-120 in.) - 0.035
	3.35-3.56 m (132-140 in.) - 0.037
Blockage loss coefficient:	1.579
Measured overall bundle pressure drop:	14.09 kPa (2.044 psid)
Calculated overall bundle pressure drop:	13.89 kPa (2.014 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40121D
Test Date: 10/3/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.28 MPa (40 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	2.49×10^{-3} m^3/sec (39.5 gal/min)
Coolant temperature	25°C (77°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	10993
Grid loss coefficients:	0.53 m (21 in.) - 0.720
	1.07 m (42 in.) - 0.750
	2.59 m (102 in.) - 1.193
	3.15 m (124 in.) - 0.966
Friction factors:	0.61-0.91 m (24-36 in.) - 0.031
	2.74-3.05 m (108-120 in.) - 0.031
	3.35-3.56 m (132-140 in.) - 0.031
Blockage loss coefficient:	0.386
Measured overall bundle pressure drop:	13.01 kPa (1.887 psid)
Calculated overall bundle pressure drop:	12.78 kPa (1.854 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43021E
Test Date: 12/13/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.19 MPa (28 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	2.57×10^{-3} m^3/sec (40.8 gal/min)
Coolant temperature	27°C (80°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	11762
Grid loss coefficients:	0.53 m (21 in.) - 0.831
	1.07 m (42 in.) - 0.742
	2.59 m (102 in.) - 1.165
	3.15 m (124 in.) - 0.937
Friction factors:	0.61-0.91 m (24-36 in.) - 0.028
	2.74-3.05 m (108-120 in.) - 0.032
	3.35-3.56 m (132-140 in.) - 0.034
Blockage loss coefficient:	2.580
Measured overall bundle pressure drop:	15.62 kPa (2.266 psid)
Calculated overall bundle pressure drop:	15.46 kPa (2.242 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40121F
Test Date: 6/17/81
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.176 MPa (25.5 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	2.48×10^{-3} m^3/sec (39.3 gal/min)
Coolant temperature	27.4°C (81.4°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	11403
Grid loss coefficients:	0.53 m (21 in.) - 0.987
	1.07 m (42 in.) - 0.684
	2.59 m (102 in.) - 1.301
	3.15 m (124 in.) - 1.099
Friction factors:	0.61-0.91 m (24-36 in.) - 0.029
	2.74-3.05 m (108-120 in.) - 0.029
	3.35-3.56 m (132-140 in.) - 0.032
Blockage loss coefficient:	2.867
Measured overall bundle pressure drop:	14.47 kPa (2.098 psid)
Calculated overall bundle pressure drop:	14.45 kPa (2.096 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40322A
Test Date: 3/5/80
Test Type: Hydraulic Characteristics
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.18 MPa (26 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	3.2×10^{-3} m^3/sec (50 gal/min)
Coolant temperature	24°C (75°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	13695
Grid loss coefficients:	0.53 m (21 in.) - 0.740
	1.07 m (42 in.) - 0.871
	1.57 m (62 in.) - 1.077
	2.11 m (83 in.) - 1.303
	2.59 m (102 in.) - 1.071
	3.15 m (124 in.) - 0.992
Friction factors:	0.61-0.91 m (24-36 in.) - 0.032
	2.74-3.05 m (108-120 in.) - 0.033
	3.35-3.56 m (132-140 in.) - 0.034
Measured overall bundle pressure drop:	20.23 kPa (2.934 psid)
Calculated overall bundle pressure drop:	20.23 kPa (2.934 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40522B
Test Date: 6/10/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.28 MPa (40 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	3.17×10^{-3} m^3/sec (50.3 gal/min)
Coolant temperature	24°C (75°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	13757
Grid loss coefficients:	0.53 m (21 in.) - 0.756
	1.07 m (42 in.) - 0.873
	2.59 m (102 in.) - 1.117
	3.15 m (124 in.) - 0.987
Friction factors:	0.61-0.91 m (24-36 in.) - 0.0304
	2.74-3.05 m (108-120 in.) - 0.0308
	3.35-3.56 m (132-140 in.) - 0.0320
Blockage loss coefficient:	0.341
Measured overall bundle pressure drop:	20.67 kPa (2.998 psid)
Calculated overall bundle pressure drop:	20.97 kPa (3.041 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40422C
Test Date: 8/12/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.23 MPa (33 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	3.24×10^{-3} m^3/sec (51.3 gal/min)
Coolant temperature	29°C (84°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	15918
Grid loss coefficients:	0.53 m (21 in.) - 0.668
	1.07 m (42 in.) - 0.724
	2.59 m (102 in.) - 1.107
	3.15 m (124 in.) - 0.958
Friction factors:	0.61-0.91 m (24-36 in.) - 0.032
	2.74-3.05 m (108-120 in.) - 0.033
	3.35-3.56 m (132-140 in.) - 0.035
Blockage loss coefficient:	0.829[a]
Measured overall bundle pressure drop:	23.54 kPa (3.414 psid)
Calculated overall bundle pressure drop:	22.28 kPa (3.232 psid)[a]

C. Comments:

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a. The differential pressure transmitter across the blockage zone was overranged; however, the measured overall bundle pressure drop was utilized to calculate the blockage loss coefficient as 1.82.

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40422D
Test Date: 10/6/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.17 MPa (25 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	3.17×10^{-3} m^3/sec (50.3 gal/min)
Coolant temperature	26°C (78°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	12996
Grid loss coefficients:	0.53 m (21 in.) - 0.674
	1.07 m (42 in.) - 0.729
	2.59 m (102 in.) - 1.143
	3.15 m (124 in.) - 0.891
Friction factors:	0.61-0.91 m (24-36 in.) - 0.030
	2.74-3.05 m (108-120 in.) - 0.030
	3.35-3.56 m (132-140 in.) - 0.031
Blockage loss coefficient:	0.345
Measured overall bundle pressure drop:	20.38 kPa (2.956 psid)
Calculated overall bundle pressure drop:	20.04 kPa (2.906 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43122E
Test Date: 12/13/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.27 MPa (39 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	3.2×10^{-3} m^3/sec (50 gal/min)
Coolant temperature	26°C (79°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	14158
Grid loss coefficients:	0.53 m (21 in.) - 0.732
	1.07 m (42 in.) - 0.711
	2.59 m (102 in.) - 1.099
	3.15 m (124 in.) - 0.881
Friction factors:	0.61-0.91 m (24-36 in.) - 0.027
	2.74-3.05 m (108-120 in.) - 0.031
	3.35-3.56 m (132-140 in.) - 0.032
Blockage loss coefficient:	2.480
Measured overall bundle pressure drop:	22.23 kPa (3.224 psid)
Calculated overall bundle pressure drop:	21.96 kPa (3.185 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK

SUMMARY AND COMMENT SHEET

Run: 40322F

Test Date: 6/17/81

Test Type: Hydraulic Characteristics

Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.21 MPa (30 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	3.11×10^{-3} m^3/sec (49.3 gal/min)
Coolant temperature	28.1°C (82.5°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	14598
Grid loss coefficients:	0.53 m (21 in.) - 0.976
	1.07 m (42 in.) - 0.639
	2.59 m (102 in.) - 1.240
	3.15 m (124 in.) - 1.021
Friction factors:	0.61-0.91 m (24-36 in.) - 0.026
	2.74-3.05 m (108-120 in.) - 0.027
	3.35-3.56 m (132-140 in.) - 0.031
Blockage loss coefficient:	1.329[a]
Measured overall bundle pressure drop:	21.73 kPa (3.152 psid)
Calculated overall bundle pressure drop:	20.04 kPa (2.907 psid)[a]

C. Comments:

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a. The differential pressure transmitter across the blockage zone was overranged; however, the measured overall bundle pressure drop was utilized to calculate the blockage loss coefficient as 2.946.

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40523A
Test Date: 3/5/80
Test Type: Hydraulic Characteristics
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.21 MPa (31 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	3.8×10^{-3} m^3/sec (60 gal/min)
Coolant temperature	23°C (74°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	16287
Grid loss coefficients:	0.53 m (21 in.) - 0.722
	1.07 m (42 in.) - 0.844
	1.57 m (62 in.) - 1.044
	2.11 m (83 in.) - 1.125
	2.59 m (102 in.) - 1.041
	3.15 m (124 in.) - 0.962
Friction factors:	0.61-0.91 m (24-36 in.) - 0.0310
	2.74-3.05 m (108-120 in.) - 0.0312
	3.35-3.56 m (132-140 in.) - 0.0324
Measured overall bundle pressure drop:	28.23 kPa (4.094 psid)
Calculated overall bundle pressure drop:	27.96 kPa (4.055 psid)

C. Comments:

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40723B
Test Date: 6/10/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.34 MPa (50 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	3.76×10^{-3} m^3/sec (59.6 gal/min)
Coolant temperature	25°C (77°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	16759
Grid loss coefficients:	0.53 m (21 in.) - 0.734
	1.07 m (42 in.) - 0.847
	2.59 m (102 in.) - 1.092
	3.15 m (124 in.) - 0.962
Friction factors:	0.61-0.91 m (24-36 in.) - 0.0292
	2.74-3.05 m (108-120 in.) - 0.0292
	3.35-3.56 m (132-140 in.) - 0.0303
Blockage loss coefficient:	0.213[a]
Measured overall bundle pressure drop:	28.26 kPa (4.099 psid)
Calculated overall bundle pressure drop:	27.55 kPa (3.995 psid)[a]

C. Comments:

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a. The differential pressure transmitter across the blockage zone was overranged; however, the measured overall bundle pressure drop was utilized to calculate the blockage loss coefficient as 0.618.

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40623C
Test Date: 8/12/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.28 MPa (40 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	3.72×10^{-3} m^3/sec (58.9 gal/min)
Coolant temperature	31°C (87°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	18870
Grid loss coefficients:	0.53 m (21 in.) - 0.646
	1.07 m (42 in.) - 0.695
	2.59 m (102 in.) - 1.062
	3.15 m (124 in.) - 0.924
Friction factors:	0.61-0.91 m (24-36 in.) - 0.031
	2.74-3.05 m (108-120 in.) - 0.032
	3.35-3.56 m (132-140 in.) - 0.033
Blockage loss coefficient:	0.075[a]
Measured overall bundle pressure drop:	29.68 kPa (4.304 psid)
Calculated overall bundle pressure drop:	26.99 kPa (3.914 psid)[a]

C. Comments:

---

a. The differential pressure transmitter across the blockage zone was overranged; however, the measured overall bundle pressure drop was utilized to calculate the blockage loss coefficient as 1.83.

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40623D
Test Date: 10/6/80
Test Type: Hydraulic Characteristics
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.22 MPa (32 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	3.8×10^{-3} m^3/sec (60 gal/min)
Coolant temperature	23°C (73°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	15774
Grid loss coefficients:	0.53 m (21 in.) - 0.669
	1.07 m (42 in.) - 0.709
	2.59 m (102 in.) - 1.121
	3.15 m (124 in.) - 0.868
Friction factors:	0.61-0.91 m (24-36 in.) - 0.029
	2.74-3.05 m (108-120 in.) - 0.029
	3.35-3.56 m (132-140 in.) - 0.030
Blockage loss coefficient:	-0.028[a]
Measured overall bundle pressure drop:	28.50 kPa (4.134 psid)
Calculated overall bundle pressure drop:	27.35 kPa (3.966 psid)[a]

C. Comments:

---

a. The differential pressure transmitter across the blockage zone was overranged; however, the measured overall bundle pressure drop was utilized to calculate the blockage loss coefficient as 0.712.

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40322D

Test Date: 10/6/80

Test Type: Hydraulic Characteristics

Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.28 MPa (40 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	3.8×10^{-3} m^3/sec (60 gal/min)
Coolant temperature	23°C (73°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	15749
Grid loss coefficients:	0.53 m (21 in.) - 0.680
	1.07 m (42 in.) - 0.722
	2.59 m (102 in.) - 1.126
	3.15 m (124 in.) - 0.887
Friction factors:	0.61-0.91 m (24-36 in.) - 0.030
	2.74-3.05 m (108-120 in.) - 0.030
	3.35-3.56 m (132-140 in.) - 0.031
Blockage loss coefficient:	-0.017[a]

Measured overall bundle pressure drop: 28.99 kPa (4.204 psid)

Calculated overall bundle pressure drop: 27.67 kPa (4.013 psid)[a]

C. Comments:

This test was misnumbered; it should be 40323D.

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a. The differential pressure transmitter across the blockage zone was overranged; however, the measured overall bundle pressure drop was utilized to calculate the blockage loss coefficient as 0.807.

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK

SUMMARY AND COMMENT SHEET

Run: 43323E

Test Date: 12/13/80

Test Type: Hydraulic Characteristics

Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.28 MPa (41 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	3.51×10^{-3} m^3/sec (55.6 gal/min)
Coolant temperature	25°C (77°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	15394
Grid loss coefficients:	0.53 m (21 in.) - 0.712
	1.07 m (42 in.) - 0.687
	2.59 m (102 in.) - 1.069
	3.15 m (124 in.) - 0.854
Friction factors:	0.61-0.91 m (24-36 in.) - 0.026
	2.74-3.05 m (108-120 in.) - 0.030
	3.35-3.56 m (132-140 in.) - 0.031
Blockage loss coefficient:	2.156[a]

Measured overall bundle pressure drop: 26.96 kPa (3.910 psid)

Calculated overall bundle pressure drop: 26.21 kPa (3.801 psid)[a]

C. Comments:

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a. The differential pressure transmitter across the blockage zone was overranged; however, the measured overall bundle pressure drop was utilized to calculate the blockage loss coefficient as 2.776.

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40523F

Test Date: 6/17/81

Test Type: Hydraulic Characteristics

Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.23 MPa (34 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	N/A
Flow rate	3.77×10^{-3} m^3/sec (59.8 gal/min)
Coolant temperature	28.1°C (82.5°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Reynolds number:	17682
Grid loss coefficients:	0.53 m (21 in.) - 0.961
	1.07 m (42 in.) - 0.624
	2.59 m (102 in.) - 1.207
	3.15 m (124 in.) - 0.997
Friction factors:	0.61-0.91 m (24-36 in.) - 0.025
	2.74-3.05 m (108-120 in.) - 0.026
	3.35-3.56 m (132-140 in.) - 0.029
Blockage loss coefficient:	0.239[a]
Measured overall bundle pressure drop:	30.73 kPa (4.457 psid)
Calculated overall bundle pressure drop:	26.55 kPa (3.850 psid)[a]

C. Comments:

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a. The differential pressure transmitter across the blockage zone was overranged; however, the measured overall bundle pressure drop was utilized to calculate the blockage loss coefficient as 2.895.

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 44401A
Test Date: 5/13/80
Test Type: Steam Cooling
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.145 MPa (21.1 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.53 kw/m (0.016 kw/ft)
Flow rate	0.014 kg/sec (0.031 lb/sec)
Coolant temperature	110°C (230°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 4790

(See following pages for additional results.)

C. Comments:

RUN 44401A

MASS FLOW = .0141 KG/SEC INLET VAPOR TEMP = 110.0 DEG C TOTAL POWER = 2.39 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	438.80	119.94	113.10	18.54	3427.5
.30	4A	442.31	119.97	113.11	18.62	3427.1
.30	4C	439.45	119.33	113.18	32.06	7127.5
.30	4E	441.30	119.33	113.11	20.52	3430.3
	AVE	440.46	119.64	113.13	22.44	4353.1
.61	1B	668.66	125.40	115.95	20.20	3459.8
.61	1C	664.50	125.33	115.18	25.82	5865.3
.61	4D	674.62	125.37	116.50	29.21	5317.7
.61	5B	674.28	124.72	115.97	22.03	3462.9
	AVE	670.52	125.21	115.90	24.32	4526.4
.99	2A	1154.95	137.88	121.37	19.48	3309.2
.99	4A	1127.02	136.65	121.41	20.63	3302.0
.99	4C	1100.68	135.15	121.50	35.05	6879.8
	AVE	1127.55	136.56	121.42	25.06	4497.0
1.22	1B	1369.06	146.82	129.36	21.35	3283.3
1.22	1C	1335.09	148.61	127.33	23.59	5651.1
1.22	4D	1347.19	149.22	130.99	26.94	5176.5
1.22	5B	1337.32	145.09	129.70	23.76	3237.5
	AVE	1347.17	147.43	129.35	23.90	4337.1
1.52	2A	1664.12	155.33	140.00	28.78	3472.3
1.52	4A	1662.56	155.75	141.09	30.01	2899.1
1.52	4C	1675.26	154.59	140.15	47.82	5490.7
1.52	4E	1655.91	154.12	140.46	32.18	3238.0
	AVE	1664.46	154.95	140.42	34.70	3775.0

RUN 44401A

MASS FLOW = 0.142 KG/SEC INLET VAPOR TEMP = 110.0 DEG C TOTAL POWER = 2.39 KW

Z (M)	ROD LOCATION	HEAT FLUX (KW/M**2)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	HT/PR**.33	REYNOLDS NO.
1.70(1.72)	2A	1743.81	153.41	146.88	27.40	3229.2
1.70(1.72)	4A	1746.24	168.78	148.62	22.18	2924.9
1.70(1.72)	4C	1727.87	172.41	147.94	28.11	5952.5
1.70(1.72)	4E	1729.84	164.01	147.29	26.68	3079.4
	AVE	1732.94	157.15	147.68	26.09	3771.5
1.78(1.80)	1A	1769.43	164.45	149.54	30.60	3141.7
1.78(1.81)	1C	1735.82	169.96	146.51	26.31	5440.1
1.78(1.78)	2D	1781.67	171.83	151.43	30.0[illegible]	4945.7
1.78(1.80)	3C	1745.91	174.28	150.65	29.24	6289.4
1.78(1.78)	4D	1766.73	173.06	152.19	29.30	4768.5
1.78(1.80)	1B	1715.23	168.07	150.86	23.50	3017.9
	AVE	1756.15	17[illegible].27	150.2[illegible]	28.5[illegible]	4600.5
1.80(1.85)	1D	1769.63	166.94	151.71	29.82	3692.6
1.80(1.83)	2C	1770.29	174.21	150.99	30.14	6365.9
1.80(1.80)	2D	1781.67	171.81	152.23	31.23	4944.6
1.80(1.83)	3C	1745.91	175.46	151.62	28.89	6293.4
1.80(1.82)	3E	1740.77	169.99	147.23	27.15	5267.3
1.80(1.82)	4A	1742.48	175.16	154.63	29.0[illegible]	4724.9
1.80(1.82)	4D	1746.84	169.14	151.32	25.1[illegible]	3[illegible]4.7
	AVE	1756.8[illegible]	171.8[illegible]	151.39	28.77	4813.3
1.83(1.85)	1B	1769.43	165.72	151.47	31.34	3269.6
1.83(1.86)	1C	1735.82	171.25	148.28	26.71	5385.0
1.83(1.83)	2D	1781.67	171.84	153.53	33.35	4941.4
1.83(1.80)	3B	1804.35	179.8[illegible]	153.46	26.79	6105.0
1.83(1.85)	3C	1745.91	175.68	152.58	29.44	6294.7
1.83(1.86)	3D	1805.41	177.33	152.72	28.82	6154.2
1.83(1.84)	1A	1715.23	173.38	152.73	24.79	2998.7
1.83(1.82)	5C	1758.47	17[illegible].02	147.65	27.9	5288.1
	AVE	1764.5[illegible]	172.88	151.55	28.6[illegible]	5028.3
1.88(1.93)	1D	1769.63	169.39	154.72	30.73	3030.7
1.88(1.91)	2C	1770.29	177.33	153.97	29.71	6309.1
1.88(1.89)	2D	1781.67	174.56	156.02	32.5[illegible]	4913.4

1.88(1.84)	2E	1694.16	167.69	151.67	27.13	3033.8
1.88(1.92)	3B	1864.35	182.22	155.49	26.24	6099.8
1.88(1.94)	3C	1745.91	179.51	154.51	27.27	6288.4
1.88(1.92)	3D	1865.41	179.45	154.85	28.66	6149.2
1.88(1.89)	3E	1740.77	173.03	150.55	26.69	5213.2
1.88(1.90)	4B	1742.48	177.94	157.71	29.1[illegible]	4745.2
1.88(1.87)	5C	1756.47	172.59	149.61	26.97	5199.7
1.88(1.90)	5D	1746.84	173.16	154.47	23.94	2974.9
	AVE	1760.0[illegible]	175.17	153.93	28.[illegible]	4967.1
1.91(1.96)	1D	1769.63	177.61	155.89	30.52	3634.7
1.91(1.94)	2C	1770.29	178.55	155.12	29.52	6287.5
1.91(1.91)	2D	1781.67	175.53	156.61	32.[illegible]	4965.3
1.91(1.93)	3C	1745.91	179.78	155.66	28.22	6293.6
1.91(1.93)	3E	1740.77	172.66	151.24	28.62	5213.5
1.91(1.93)	4B	1742.48	178.81	158.90	29.48	4749.2
1.91(1.93)	5D	1746.84	173.44	155.56	24.72	2968.8
	AVE	1756.83	175.62	155.57	29.[illegible]	4777.5
1.93(1.95)	2A	1743.81	179.69	155.96	29.65	2996.8
1.93(1.92)	2B	1686.80	176.27	157.06	29.75	4919.3
1.93(1.93)	2D	1781.67	176.11	157.31	32.1[illegible]	4897.9
1.93(1.89)	2E	1694.16	170.97	153.63	24.86	3[illegible]8.2
1.93(1.96)	3B	1864.35	182.12	157.23	28.11	6107.9
1.93(1.96)	3C	1745.91	187.39	156.52	28.46	6292.8
1.93(1.96)	3D	1865.41	181.[illegible]	156.60	28.70	6142.0
1.93(1.95)	4A	1746.24	173.69	157.44	27.[illegible]	2929.1
1.93(1.95)	4E	1719.84	171.88	156.12	27.60	2986.3
1.93(1.95)	5C	1727.67	179.78	156.71	29.17	6663.8
	AVE	1744.99	176.31	156.46	28.5[illegible]	4630.4
1.96(2.00)	1D	1769.63	172.47	157.64	30.16	3[illegible]1.7
1.96(1.99)	2C	1770.29	18[illegible].39	156.94	29.39	6254.3
1.95(1.95)	2D	1781.67	177.36	158.2[illegible]	31.45	4885.2
1.96(1.98)	3C	1745.91	181.62	157.38	27.94	6265.6
1.96(1.97)	3E	1740.77	174.24	152.93	28.61	5176.7
1.96(1.98)	4B	1742.48	180.38	160.67	29.60	4749.[illegible]
1.96(1.97)	5D	1746.84	174.69	157.42	25.2[illegible]	2935.5
	AVE	1756.8	177.33	157.31	28.92	4759.7
1.98(2.01)	3D	1865.41	182.85	158.61	28.85	6129.6
1.98(2.00)	2A	1743.81	174.22	157.94	27.3[illegible]	2969.6
1.98(1.98)	2D	1781.67	175.73	159.39	31.0[illegible]	4869.9

1.98(2.01)	3B	1864.35	182.63	159.23	29.54	6115.3
1.98(2.01)	3C	1745.91	182.83	158.33	27.57	6277.8
1.98(2.01)	4A	1740.24	175.79	159.48	26.79	2919.0
1.98(2.00)	4B	1719.64	174.89	158.18	25.91	2963.7
1.98(2.00)	4C	1727.87	183.59	158.74	30.67	6691.0
	AVE	1758.64	179.69	158.74	28.42	4795.7
2.13	1A	1866.62	173.71	162.71	36.60	3215.9
2.13	1C	1582.63	174.69	158.43	33.41	5625.0
2.13	2A	1562.79	174.95	164.70	52.26	4187.1
2.13	2B	1619.74	171.22	153.32	51.53	2999.2
2.13	3A	1573.35	175.30	162.17	35.38	5266.7
2.13	3B	1616.44	182.23	163.44	33.37	5614.3
2.13	3C	1627.49	182.22	162.85	32.36	5200.5
2.13	4B	1656.32	177.69	165.28	47.30	4629.6
2.13	5A	1582.52	172.44	164.05	47.21	3193.9
	AVE	1606.69	175.03	162.76	40.97	4354.1
2.29	1D	1563.19	189.39	167.28	28.31	3633.5
2.29	2C	1566.06	187.79	168.23	29.23	5628.3
2.29	2E	1603.43	174.99	167.78	56.75	2945.0
2.29	3A	1574.37	189.28	165.32	26.76	4970.2
2.29	3B	1566.08	190.83	169.53	28.11	5373.6
2.29	3D	1523.87	189.62	168.76	27.60	5562.1
2.29	3E	1527.63	177.54	164.20	39.15	5196.3
2.29	4B	1522.87	187.17	171.34	31.50	4474.3
2.29	5C	1556.62	178.59	164.45	37.81	5306.1
2.29	5D	1536.43	179.78	167.98	32.13	3604.4
	AVE	1544.72	183.23	167.49	33.50	4561.5
2.44	3C	1325.02	187.78	173.64	35.26	5797.7
2.44	1B	1271.78	183.91	171.64	25.29	2930.4
2.44	1C	1260.11	183.43	167.92	27.66	5159.7
2.44	2E	1275.24	185.28	172.35	23.92	2869.2
2.44	3B	1322.83	194.50	174.48	24.61	3641.4
2.44	4D	1287.64	189.61	175.36	29.35	4050.2
2.44	5B	1300.34	181.81	172.83	35.38	2919.0
2.44	5C	1297.99	183.00	169.25	31.40	5100.7
	AVE	1293.39	185.16	172.15	29.11	4394.4

RUN 44401A

MASS FLOW = .0310 LBM/SEC INLET VAPOR TEMP = 230.0 DEG F TOTAL POWER = 2.27 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	139.08	247.89	235.58	18.54	3427.5
12	4A	140.19	247.95	235.60	18.62	3427.1
12	4C	139.29	246.80	235.72	32.06	7127.5
12	4E	139.87	246.79	235.60	20.52	3430.3
	AVE	139.61	247.36	235.63	22.44	4353.1
24	1B	211.94	257.72	240.71	20.20	3459.8
24	1C	210.62	257.60	239.32	25.82	5865.3
24	4D	213.83	257.67	241.70	29.21	5317.7
24	5B	213.72	256.50	240.75	22.03	3462.9
	AVE	212.52	257.37	240.62	24.32	4526.4
39	2A	366.07	280.19	250.46	19.48	3309.2
39	4A	357.22	277.98	250.53	20.63	3302.0
39	4C	348.87	275.27	250.71	35.05	6879.8
	AVE	357.38	277.81	250.56	25.06	4497.0
48	1B	433.93	296.27	264.85	21.35	3283.3
48	1C	423.17	299.49	261.20	23.59	5651.1
48	4D	427.00	300.60	267.78	26.94	5176.5
48	5B	423.87	293.16	265.46	23.70	3237.5
	AVE	426.99	297.38	264.82	23.90	4337.1
60	2A	527.45	311.60	284.00	28.78	3472.3
60	4A	526.96	312.35	285.96	30.01	2899.1
60	4C	530.99	310.27	294.26	47.82	5490.7
60	4E	524.85	309.42	284.83	32.18	3238.0
	AVE	527.56	310.91	284.76	34.70	3775.0

ROD 44+013

MASS FLOW = .0316 LBM/SEC INLET VAPOR TEMP = 252.7 DEG F TOTAL POWER = 2.27 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.6)	2A	552.71	326.13	296.38	27.4[illegible]	3129.2
67 (67.9)	4A	551.58	335.81	299.48	22.1[illegible]	2924.9
67 (67.7)	4C	547.60	342.33	298.29	28.1[illegible]	2952.5
67 (67.6)	4E	545.12	327.22	297.13	26.6[illegible]	3079.4
	AVE	549.27	332.87	297.82	26.09	3771.5
70 (70.8)	2B	560.83	328.01	301.17	30.6[illegible]	3141.7
70 (71.3)	2C	556.18	337.93	295.71	26.31	5440.1
70 (70.[illegible])	2D	564.71	341.30	304.57	30.[illegible]	4945.7
70 (70.9)	3C	553.38	345.70	303.18	29.24	6289.4
70 (70.1)	4D	566.95	343.50	305.94	29.38	4708.5
70 (70.7)	5E	543.69	334.52	303.54	25.56	3017.9
	AVE	556.62	338.49	302.35	28.53	4600.5
71 (72.7)	2B	560.93	332.50	305.07	29.82	3092.6
71 (72.0)	2C	561.11	345.58	303.78	30.14	6365.9
71 (70.8)	2D	564.71	341.26	306.01	31.2[illegible]	4944.6
71 (71.9)	3C	553.38	347.82	304.92	28.89	6293.4
71 (71.5)	3E	551.73	337.99	297.[illegible]1	27.1[illegible]	5267.0
71 (71.7)	4B	552.29	347.11	310.33	29.[illegible]	4724.9
71 (71.9)	5D	553.67	336.46	304.27	25.1[illegible]	3[illegible]4.7
	AVE	556.83	341.25	304.50	28.71	4823.[illegible]
72 (72.0)	1B	560.83	33[illegible].[illegible]	304.64	31.94	2109.6
72 (73.3)	1C	556.18	340.25	298.91	26.7[illegible]	5385.[illegible]
72 (72.1)	2D	564.71	341.32	308.35	33.3[illegible]	4941.4
72 (73.3)	3D	571.93	355.54	308.27	26.79	6[illegible]5.6
72 (72.9)	3C	553.38	35[illegible].[illegible]3	306.65	28.44	6294.7
72 (73.2)	3E	572.24	351.25	304.9[illegible]	28.92	6154.2
72 (72.0)	5A	543.09	338.69	306.91	24.75	2998.7
72 (71.0)	5C	537.30	338.04	297.72	27.9[illegible]	5238.1
	AVE	559.29	343.18	304.8[illegible]	29.6[illegible]	5[illegible]26.3
74 (75.0)	1B	560.9[illegible]	336.91	312.5[illegible]	3[illegible].7[illegible]	3[illegible]5.7
74 (75.1)	2C	561.11	351.20	309.14	29.71	63[illegible]9.1
74 (74.0)	2[illegible]	564.71	345.99	312.83	32.5[illegible]	4913.4

74 (72.4)	2E	556.98	333.04	305.01	27.13	3033.8
74 (75.4)	3A	571.9[illegible]	359.99	311.89	26.24	6199.6
74 (74.9)	3C	553.28	355.13	310.11	27.27	6268.4
74 (75.4)	3D	572.24	355.32	310.74	28.66	6149.2
74 (74.6)	3E	551.75	343.46	302.11	26.69	5213.2
74 (74.8)	4B	552.29	352.3[illegible]	315.89	29.1[illegible]	4745.2
74 (73.7)	5C	557.35	342.66	301.27	26.97	5199.7
74 (74.7)	5D	553.67	343.50	310.05	23.84	2974.9
	AVE	557.84	347.31	309.05	28.28	4967.1
75 (77.4)	1D	560.93	339.10	312.62	30.53	3334.7
75 (76.3)	2C	561.11	353.46	311.22	29.53	6287.5
75 (75.2)	2D	564.71	347.98	313.9[illegible]	32.0[illegible]	4965.3
75 (76.1)	3C	553.38	355.66	312.18	28.22	6293.6
75 (75.9)	3E	551.73	342.78	304.27	28.62	5203.5
75 (76.0)	4B	552.29	353.86	318.02	29.48	4749.2
75 (75.8)	5D	553.67	344.19	312.0[illegible]	24.72	2968.8
	AVE	556.83	348.12	312.03	29.[illegible]2	4777.5
76 (76.8)	2A	552.71	339.56	312.73	29.65	2996.8
76 (75.7)	2B	534.58	349.29	314.70	29.75	4929.[illegible]
76 (75.9)	2D	564.71	349.[illegible]	315.16	32.11	4897.9
76 (74.4)	2E	556.98	339.75	308.53	24.88	3008.2
76 (77.2)	3B	571.93	359.82	315.01	28.11	6107.9
76 (77.0)	3C	553.38	356.70	313.73	28.46	6292.8
76 (77.2)	3D	572.24	357.80	313.87	28.76	6142.0
76 (76.9)	4A	551.58	344.64	315.39	27.0[illegible]	2929.1
76 (76.0)	4E	545.12	341.39	313.[illegible]1	27.60	2986.3
76 (76.7)	4C	547.65	353.[illegible]	314.[illegible]8	29.17	6083.8
	AVE	553.09	349.36	313.62	28.5[illegible]	4636.4
77 (78.8)	1D	560.9	342.44	315.75	33.1[illegible]	3011.7
77 (78.2)	2C	561.11	356.73	314.53	29.34	6254.3
77 (76.8)	2D	564.71	351.24	316.76	31.43	4885.2
77 (77.9)	3C	553.38	358.92	315.28	27.94	6285.6
77 (77.7)	3E	551.75	345.63	307.27	28.51	5176.7
77 (77.0)	4B	552.29	356.68	321.21	29.66	4749.[illegible]
77 (77.7)	5D	553.67	346.8[illegible]	315.36	25.2[illegible]	2955.5
	AVE	556.85	351.2[illegible]	315.17	28.91	4759.7
78 (79.3)	3D	572.24	361.[illegible]9	317.49	28.85	6129.[illegible]
78 (78.8)	2A	552.71	345.6[illegible]	316.3[illegible]	27.[illegible]	2959.6
78 (78.[illegible])	2D	564.71	353.72	318.91	31.[illegible]2	4869.9

78 (79.3)	3B	571.95	361.16	318.62	29.54	6105.3
78 (78.9)	3C	553.38	361.1[illegible]	317.[illegible]	27.57	6277.6
78 (79.0)	4A	551.58	348.42	319.07	26.79	2919.0
78 (78.7)	4E	542.12	346.83	316.72	25.91	2963.7
78 (78.8)	4C	547.66	357.06	317.73	30.67	6091.6
	AVE	557.41	354.36	317.73	28.42	4796.7
84	1B	569.23	344.67	324.88	36.6[illegible]	3210.9
84	1C	561.63	346.86	317.18	33.41	5625.0
84	2B	564.63	346.91	328.47	57.2[illegible]	4187.1
84	2E	513.39	343.19	325.97	51.53	2999.2
84	3A	498.68	347.9[illegible]	327.19	35.3[illegible]	5066.7
84	3B	512.34	360.91	326.18	33.07	5214.3
84	3D	515.84	363.[illegible]	325.13	32.33	5260.5
84	4D	525.62	359.77	329.51	47.[illegible]	4029.6
84	5B	561.59	342.40	327.28	47.2[illegible]	3193.9
	AVE	569.24	348.85	324.98	40.97	4334.1
9[illegible]	1D	476.45	356.79	333.11	28.30	3033.5
9[illegible]	2C	477.99	371.02	334.82	29.23	5628.3
9[illegible]	2E	508.22	346.80	334.00	56.[illegible]	2945.[illegible]
9[illegible]	3A	499.01	365.5[illegible]	329.58	26.76	4976.2
9[illegible]	3B	503.54	375.50	337.16	28.11	5373.0
9[illegible]	3D	463.6[illegible]	373.31	335.75	27.60	5562.1
9[illegible]	3E	464.1[illegible]	352.3[illegible]	327.56	38.1[illegible]	5196.3
9[illegible]	4B	462.60	368.90	340.41	31.5[illegible]	4474.3
9[illegible]	5C	494.01	353.45	328.01	37.8[illegible]	5308.1
9	5D	480.98	355.61	334.36	32.1[illegible]	3064.4
	AVE	489.61	361.81	333.48	33.[illegible]	4561.5
95	3D	419.97	370.00	344.56	35.28	5797.7
96	1B	463.1[illegible]	363.[illegible]4	340.95	25.29	2930.4
95	1C	461.3[illegible]	362.18	334.25	27.60	5159.7
95	2E	464.19	365.50	342.14	33.92	2869.2
96	3B	419.20	362.16	346.06	24.6[illegible]	3641.4
96	4D	408.13	373.30	347.65	29.3[illegible]	4630.2
95	5B	412.22	359.2[illegible]	343.09	35.3[illegible]	2939.0
96	5C	411.41	381.40	326.2[illegible]	31.4[illegible]	5160.7
	AVE	409.95	367.10	341.86	29.1[illegible]	4394.4

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41401B
Test Date: 6/13/80
Test Type: Steam Cooling
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.141 MPa (20.4 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.0522 kw/m (0.0159 kw/ft)
Flow rate	0.0141 kg/sec (0.0312 lb/sec)
Coolant temperature	111°C (231°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 4700

(See following pages for additional results.)

C. Comments:

RUN 41401B

MASS FLOW = .0141 KG/SEC INLET VAPOR TEMP = 110.6 DEG C TOTAL POWER = 2.41 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	446.62	119.93	113.13	19.00	3456.1
.30	4A	446.80	120.04	113.14	18.48	3455.3
.30	4C	437.85	119.33	113.20	32.12	7186.4
.30	4E	429.68	119.63	113.12	19.11	3457.6
	AVE	438.73	119.73	113.15	22.18	4388.9
.61	1B	709.93	125.77	116.05	20.87	3485.9
.61	1C	693.24	124.72	115.24	28.90	5917.8
.61	4D	717.98	125.33	116.55	31.45	5361.5
.61	5B	724.33	125.30	116.10	22.50	3487.5
	AVE	711.37	125.28	115.98	25.93	4563.2
.99	2A	1147.26	137.28	121.48	20.27	3339.2
.99	4A	1127.40	137.56	121.54	19.63	3324.0
.99	4C	1147.79	137.28	121.63	31.83	6913.2
.99	4E	1115.50	137.23	121.48	19.77	3336.6
	AVE	1134.49	137.34	121.53	22.87	4228.2
1.22	1B	1383.31	149.83	129.58	18.54	3292.3
1.22	1C	1397.95	147.79	127.48	25.93	5699.2
1.22	4D	1388.02	149.04	131.07	28.19	5220.5
1.22	5B	1415.79	147.36	130.02	22.22	3250.2
	AVE	1396.27	148.50	129.54	23.72	4365.6
1.52	2A	1682.36	159.03	140.17	23.54	3128.6
1.52	4A	1651.17	157.78	140.78	25.67	3096.5
1.52	4C	1627.35	158.39	140.26	36.86	6529.3
1.52	4E	1658.80	157.03	140.01	25.81	3156.7
	AVE	1654.92	158.06	140.31	27.97	3977.8

RUN 414018

MASS FLOW = .0141 KG/SEC INLET VAPOR TEMP = 110.6 DEG C TOTAL POWER = 2.41 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.72)	2A	1745.87	168.75	146.83	20.56	3193.4
1.70(1.72)	4A	1748.66	172.26	148.36	18.73	2918.6
1.70(1.70)	4C	1745.15	176.00	147.62	31.19	5792.2
1.70(1.71)	4E	1761.05	169.52	146.65	19.86	3111.8
	AVE	1750.18	170.14	147.37	22.58	3754.0
1.78(1.80)	1B	1798.83	172.35	149.39	20.04	3256.2
1.78(1.79)	1C	1738.84	166.33	146.20	30.89	5550.9
1.78(1.80)	2D	1741.81	173.05	151.83	28.16	4927.2
1.78(1.78)	3C	1787.16	173.06	149.99	30.74	6127.8
1.78(1.79)	4D	1765.24	173.84	152.43	28.24	4694.6
1.78(1.81)	5B	1709.55	165.11	150.93	31.09	3218.7
	AVE	1756.91	170.62	150.13	28.19	4629.2
1.80(1.83)	1D	1725.88	169.72	150.37	22.86	3812.9
1.80(1.82)	2D	1741.81	173.74	152.55	28.14	5085.1
1.80(1.81)	3C	1787.16	174.25	150.88	30.26	5861.4
1.80(1.83)	3E	1756.31	168.25	147.95	30.79	5933.8
1.80(1.81)	4B	1733.84	177.93	154.09	24.71	4730.5
1.80(1.82)	5D	1750.96	166.78	150.65	24.80	3530.4
	AVE	1749.33	172.11	151.08	26.93	4825.7
1.83(1.85)	1B	1798.83	173.06	150.97	20.77	4480.4
1.83(1.85)	1C	1738.84	170.00	148.17	28.27	7409.1
1.83(1.86)	2E	1775.65	167.51	151.55	28.56	4478.3
1.83(1.86)	3A	1692.79	174.33	149.73	24.22	7317.0
1.83(1.85)	5B	1709.55	162.67	152.35	42.76	4753.9
1.83(1.84)	5C	1834.51	169.99	148.92	30.86	6549.2
	AVE	1758.36	169.59	150.28	29.24	5831.3
1.88(1.91)	1D	1725.88	169.55	153.16	26.91	3059.2
1.88(1.91)	2B	1807.37	174.88	156.13	32.79	4968.6
1.88(1.91)	2C	1753.74	172.29	154.21	38.32	6456.6
1.88(1.90)	2D	1741.81	172.76	155.58	34.63	5066.2
1.88(1.91)	2E	1775.65	168.07	153.48	31.15	2992.0
1.88(1.92)	3A	1692.79	175.55	151.04	25.42	5246.8

1.88(1.91)	3B	1720.54	173.44	155.54	37.84	6245.4
1.88(1.88)	3C	1787.16	173.73	154.42	35.47	6608.6
1.88(1.91)	3D	1721.76	170.08	154.95	43.30	6295.3
1.88(1.91)	3E	1756.31	176.07	159.77	32.18	5316.2
1.88(1.89)	4B	1733.84	176.12	156.94	30.67	4981.8
1.88(1.89)	5C	1834.51	173.06	150.90	29.15	5344.1
1.88(1.90)	5D	1750.96	171.83	153.44	24.25	3028.6
	AVE	1754.03	172.42	153.94	32.54	5046.9
1.91(1.94)	1D	1725.88	168.13	154.38	32.07	3073.9
1.91(1.94)	2C	1753.74	173.07	155.41	37.80	6442.8
1.91(1.93)	2D	1741.81	172.39	156.67	38.54	4984.0
1.91(1.92)	3C	1787.16	172.43	155.55	41.74	6383.5
1.91(1.94)	3E	1756.31	169.99	151.72	33.95	5279.5
1.91(1.92)	4B	1733.84	174.09	157.90	34.64	4844.4
1.91(1.93)	5D	1750.96	173.67	154.89	23.64	2965.9
	AVE	1749.96	172.13	155.22	34.63	4853.4
1.93(1.95)	2A	1745.87	173.67	155.03	23.74	3063.0
1.93(1.96)	2B	1807.37	176.02	157.94	32.77	4942.4
1.93(1.96)	2E	1775.65	167.43	155.59	37.66	3018.5
1.93(1.96)	3A	1692.79	174.89	153.26	27.46	5183.2
1.93(1.96)	3B	1720.54	175.63	157.17	36.45	6235.4
1.93(1.94)	3C	1787.16	174.80	156.29	37.90	6399.4
1.93(1.96)	3D	1721.76	173.00	156.07	41.33	6286.2
1.93(1.96)	4A	1748.66	177.94	156.87	20.86	2965.3
1.93(1.94)	4C	1745.15	174.27	156.46	33.50	6174.7
1.93(1.94)	4E	1761.05	174.08	155.02	22.43	3031.0
1.93(1.94)	5C	1834.51	173.96	152.61	31.52	5103.0
	AVE	1758.23	174.20	155.70	31.87	4758.4
1.96(1.99)	1D	1725.88	176.46	156.46	31.31	3080.9
1.96(1.98)	2C	1753.74	176.71	156.99	34.78	6378.0
1.96(1.98)	2D	1741.81	174.89	158.04	35.35	4962.2
1.96(1.96)	3C	1787.16	176.40	157.30	33.14	6371.0
1.96(1.99)	3E	1756.31	169.34	153.42	38.92	5244.1
1.96(1.96)	4B	1733.84	176.55	159.25	30.19	4851.8
1.96(1.98)	5D	1750.96	171.22	157.32	31.27	2994.3
	AVE	1749.96	174.23	157.01	33.69	4840.3
1.98(2.00)	2A	1745.87	179.03	156.70	19.62	2968.3
1.98(2.01)	2B	1807.37	180.39	160.05	29.84	4892.4
1.98(2.00)	2D	1741.81	175.56	159.43	36.53	4952.6

1.98(2.01)	2E	1775.65	169.67	157.37	36.66	3026.6
1.98(2.01)	3A	1692.79	177.94	155.21	25.89	5124.4
1.98(2.01)	3B	1720.54	161.00	159.29	30.71	6156.2
1.98(1.99)	3C	1787.16	180.53	158.40	31.36	6343.3
1.98(2.01)	3D	1721.76	176.71	158.00	37.11	6231.1
1.98(2.01)	4A	1748.66	160.39	156.94	20.36	2976.5
1.98(1.99)	4C	1745.15	177.94	158.23	34.51	6135.6
1.98(1.99)	4E	1761.05	176.11	157.05	23.27	3053.1
1.98(2.00)	5C	1834.51	172.00	154.61	35.76	5051.4
	AVE	1756.86	177.32	157.82	30.14	4744.3
2.13	1B	1586.89	175.44	161.73	29.00	3217.3
2.13	1C	1639.80	172.17	158.54	41.95	5682.1
2.13	2B	1590.87	161.38	164.57	32.13	4233.0
2.13	3A	1602.90	179.68	159.96	28.01	5085.3
2.13	3B	1671.06	161.03	163.79	36.06	5085.8
2.13	3D	1596.60	177.86	163.15	42.04	5381.8
2.13	4D	1627.69	176.02	164.38	39.97	4741.7
2.13	5B	1616.23	174.26	163.76	38.51	3196.6
	AVE	1616.50	177.52	162.48	35.96	4577.9
2.29	1D	1517.91	181.02	166.53	25.87	3050.5
2.29	2B	1499.87	192.06	169.99	22.16	4467.9
2.29	2C	1516.15	187.70	168.24	29.44	5782.1
2.29	3A	1466.54	189.16	164.99	20.50	4983.5
2.29	3B	1560.76	192.06	169.40	25.24	5531.2
2.29	3D	1501.96	165.75	168.59	33.27	5744.3
2.29	4B	1629.24	189.24	170.79	28.87	4590.7
2.29	5D	1483.09	162.22	167.47	24.75	3039.0
	AVE	1521.94	187.49	168.25	26.26	4648.6
2.44	2B	1241.52	193.51	174.80	21.45	4591.4
2.44	3A	1287.77	190.83	169.62	20.33	4942.2
2.44	3B	1294.79	196.34	174.16	21.71	5753.2
2.44	3D	1299.46	187.16	173.32	35.39	5915.5
2.44	4D	1322.37	187.78	174.47	32.40	4742.3
2.44	5B	1343.67	185.09	173.03	25.41	2928.6
	AVE	1298.26	190.25	173.23	26.12	4812.2

RUN 41401B

MASS FLOW = .0310 LBM/SEC INLET VAPOR TEMP = 231.0 DEG F TOTAL POWER = 2.28 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	141.56	247.87	235.63	19.00	3456.1
12	4A	139.71	248.06	235.65	18.48	3455.3
12	4C	138.78	246.80	235.76	32.12	7186.4
12	4E	136.19	247.33	235.61	19.11	3457.6
	AVE	139.06	247.51	235.66	22.18	4388.9
24	1B	225.02	258.38	240.88	20.87	3485.9
24	1C	219.73	256.50	239.43	28.90	5917.8
24	4D	227.57	257.60	241.78	31.45	5361.5
24	5B	229.58	257.54	240.97	22.50	3487.5
	AVE	225.47	257.51	240.77	25.93	4563.2
39	2A	363.63	279.10	250.66	20.27	3339.2
39	4A	357.34	279.62	250.77	19.63	3324.0
39	4C	363.80	279.10	250.94	31.83	6913.2
39	4E	353.57	279.02	250.67	19.77	3336.6
	AVE	359.58	279.21	250.76	22.87	4228.2
48	1B	438.45	301.69	265.25	18.54	3292.3
48	1C	443.09	298.02	261.46	25.93	5699.2
48	4D	439.94	300.28	267.93	28.19	5220.5
48	5B	448.74	297.24	266.04	22.22	3250.2
	AVE	442.56	299.31	265.17	23.72	4365.6
60	2A	533.24	318.25	284.30	23.54	3128.6
60	4A	523.35	316.00	285.41	25.67	3096.5
60	4C	515.80	317.10	284.48	36.86	6529.3
60	4E	525.77	314.65	284.02	25.81	3156.7
	AVE	524.54	316.50	284.55	27.97	3977.8

RUN 414013

MASS FLOW = .0310 LBM/SEC INLET VAPOR TEMP = 231.0 DEG F TOTAL POWER = 2.28 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.7)	2A	553.37	335.74	296.29	29.56	3193.4
67 (67.9)	4A	554.25	342.10	299.55	18.73	2918.6
67 (67.1)	4C	553.14	356.00	297.72	31.19	5792.2
67 (67.3)	4E	558.18	337.14	295.98	19.86	3111.8
	AVE	554.73	358.25	297.26	22.56	3754.0
70 (70.7)	1B	570.15	342.23	300.90	20.04	3256.2
70 (70.6)	1C	551.14	331.40	295.15	37.89	5550.9
70 (70.7)	2D	552.08	343.49	305.29	28.16	4927.2
70 (70.2)	3C	566.45	343.51	301.98	30.74	6127.3
70 (70.5)	4D	559.51	344.91	306.37	28.24	4694.6
70 (71.1)	5B	541.85	329.20	303.68	31.09	3218.7
	AVE	556.86	339.12	302.23	28.19	4629.2
71 (72.1)	1D	547.03	337.50	302.66	22.86	3812.9
71 (71.6)	2D	552.08	344.74	306.58	28.14	5385.1
71 (71.1)	3C	566.45	345.50	303.59	30.26	5861.4
71 (72.1)	3E	556.67	334.35	298.32	30.79	5933.8
71 (71.3)	4B	549.55	352.27	309.37	24.71	4730.5
71 (71.7)	5D	554.98	335.60	303.18	24.86	3530.4
	AVE	554.46	341.80	303.45	26.93	4825.7
72 (72.7)	1B	570.15	343.50	303.74	20.77	4480.4
72 (72.7)	1C	551.14	336.00	298.71	28.27	7409.1
72 (73.2)	2E	562.81	333.52	304.78	28.56	4478.3
72 (73.2)	3A	536.54	345.80	301.51	24.22	7317.0
72 (73.0)	5B	541.85	324.81	306.22	42.76	4753.9
72 (72.4)	5C	581.46	337.99	308.06	30.86	6549.2
	AVE	557.33	337.27	302.50	29.24	5831.3
74 (75.2)	1D	547.03	337.20	307.70	26.91	3059.2
74 (75.3)	2B	572.86	346.79	313.03	32.79	4968.6
74 (75.0)	2C	555.86	342.12	309.58	38.32	6456.6
74 (74.7)	2D	552.08	342.96	312.04	34.63	5066.2
74 (75.3)	2E	562.81	334.52	308.26	31.15	2992.0
74 (75.4)	3A	536.54	347.00	304.95	25.42	5246.8

74 (75.2)	3B	545.34	344.19	311.97	37.84	6245.4
74 (74.2)	3C	566.45	344.72	309.95	36.47	6608.6
74 (75.2)	3D	545.72	339.22	310.91	43.30	6295.3
74 (75.2)	3E	556.67	336.12	303.38	32.18	5316.2
74 (74.4)	4B	549.55	349.51	314.49	30.67	4981.8
74 (74.6)	5C	581.46	343.50	303.62	29.15	5344.1
74 (74.8)	5D	554.98	341.30	306.20	24.25	3028.6
	AVE	555.95	342.36	309.08	32.54	5046.9
75 (75.4)	1D	547.03	334.03	309.88	32.07	3073.9
75 (76.3)	2C	555.66	344.61	311.74	37.80	6442.8
75 (75.8)	2D	552.08	341.77	314.01	38.54	4984.6
75 (75.4)	3C	566.45	342.38	311.99	41.74	6383.5
75 (76.3)	3E	556.67	337.99	305.10	33.95	5279.5
75 (75.6)	4B	549.55	346.80	316.22	34.64	4844.4
75 (76.1)	5D	554.98	344.61	310.81	23.64	2905.9
	AVE	554.66	341.83	311.39	34.63	4853.4
76 (76.9)	2A	553.37	344.00	311.05	23.74	3003.0
76 (77.1)	2B	572.86	349.91	316.30	32.77	4942.4
76 (77.2)	2E	562.81	333.38	311.70	37.66	3018.5
76 (77.2)	3A	536.54	346.80	307.87	27.40	5183.2
76 (77.0)	3B	545.34	346.17	314.90	36.45	6235.4
76 (76.2)	3C	566.45	346.54	313.32	37.9[illegible]	6399.4
76 (77.1)	3D	545.72	343.30	314.01	41.33	6286.2
76 (77.0)	4A	554.25	352.29	314.57	20.36	2965.3
76 (76.3)	4C	553.14	345.68	313.63	38.50	6174.7
76 (76.5)	4E	558.18	346.79	311.03	22.43	3031.0
76 (76.5)	5C	581.46	343.50	306.70	31.52	5103.6
	AVE	557.28	345.57	312.26	31.87	4756.4
77 (78.5)	1D	547.03	336.83	313.63	31.31	3080.9
77 (78.0)	2C	555.86	350.09	314.08	34.78	6378.0
77 (77.8)	2D	552.08	346.00	317.55	35.35	4962.2
77 (77.3)	3C	566.45	353.12	315.14	33.94	6371.0
77 (78.2)	3E	556.67	336.01	308.16	38.92	5244.1
77 (77.2)	4B	549.55	353.40	316.56	30.19	4651.8
77 (78.1)	5D	554.98	340.20	314.64	31.27	2994.3
	AVE	554.66	345.01	314.01	33.69	4840.3
78 (78.6)	2A	553.37	354.25	314.06	10.62	2988.3
78 (79.2)	2B	572.86	356.70	320.08	29.84	4892.4
78 (78.6)	2D	552.08	346.01	318.97	35.53	4952.6

78 (79.2)	2E	562.81	337.41	315.26	36.66	3026.6
78 (79.3)	3A	536.54	352.30	311.38	25.89	5124.4
78 (79.3)	3B	545.34	357.81	318.72	30.71	6156.2
78 (78.5)	3C	566.45	356.96	317.12	31.36	6343.3
78 (79.2)	3D	545.72	356.58	317.48	37.11	6231.1
78 (79.0)	4A	554.25	356.79	318.10	29.36	2976.5
78 (78.3)	4C	553.14	352.30	316.81	34.51	6135.6
78 (78.5)	4E	556.18	349.00	314.70	23.27	3053.1
78 (78.6)	5C	581.46	342.67	310.31	35.76	5051.4
	AVE	556.85	351.18	316.08	30.14	4744.3
84	1B	502.98	347.79	323.12	29.09	3217.3
84	1C	519.75	341.91	317.37	41.95	5682.1
84	2B	504.24	357.94	328.22	32.13	4233.0
84	3A	508.05	352.42	319.92	28.01	5085.3
84	3B	529.65	358.93	326.82	36.06	5085.8
84	3D	506.05	352.14	325.67	42.04	5381.8
84	4D	515.91	352.43	327.88	39.97	4741.7
84	5B	512.27	345.67	326.77	38.51	3196.6
	AVE	512.36	351.53	324.47	35.96	4577.9
90	1D	481.11	357.84	331.76	25.87	3050.5
90	2B	475.39	377.70	337.97	22.16	4467.9
90	2C	480.56	370.00	334.63	29.44	5782.1
90	3A	464.83	372.48	328.99	29.50	4983.5
90	3B	494.69	376.30	336.92	25.24	5531.2
90	3D	476.06	366.36	335.46	33.27	5744.3
90	4B	516.48	372.03	339.42	28.87	4590.7
90	5D	470.08	360.00	333.45	24.75	3039.0
	AVE	482.39	369.46	334.85	26.26	4648.6
96	2B	393.51	366.52	346.04	21.45	4591.4
96	3A	408.17	375.50	337.32	20.33	4942.2
96	3B	410.39	385.41	345.49	21.71	5753.2
96	3D	411.87	368.89	343.97	35.39	5915.5
96	4D	419.13	376.00	345.05	32.40	4742.3
96	5B	425.89	366.60	343.46	25.41	2928.6
	AVE	411.49	374.45	343.82	25.12	4812.2

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41201C
Test Date: 8/13/80
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.140 MPa (20.3 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.0531 kw/m (0.0162 kw/ft)
Flow rate	0.014 kg/sec (0.031 lb/sec)
Coolant temperature	111°C (232°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 4630

(See following pages for additional results.)

C. Comments:

RUN 41201C

MASS FLOW = .0141 KG/SEC INLET VAPOR TEMP = 111.1 DEG C TOTAL POWER = 2.46 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	461.08	121.72	114.05	17.32	3422.0
.30	4A	455.27	121.40	114.06	17.90	3423.4
.30	4C	434.56	121.11	114.13	27.93	7116.1
.30	4E	425.28	121.04	114.06	17.56	3425.2
	AVE	444.05	121.32	114.08	20.17	4346.7
.61	1B	708.84	128.33	117.32	17.82	3447.6
.61	1C	728.26	126.15	116.22	28.91	5862.9
.61	4D	736.56	127.23	117.57	29.23	5307.4
	AVE	724.53	127.24	116.94	25.32	4872.6
.99	2A	1118.23	142.59	122.54	15.44	3289.1
.99	4A	1158.38	141.44	122.59	17.03	3281.0
.99	4C	1222.33	139.89	122.69	30.68	6837.9
.99	4E	1173.48	141.44	122.58	17.25	3291.1
	AVE	1168.11	141.34	122.60	20.16	4174.8
1.22	1B	1319.57	152.52	130.76	16.37	3255.3
1.22	1C	1386.04	149.82	128.70	24.61	5639.7
1.22	4D	1458.00	154.22	132.39	24.16	5142.1
1.22	5B	1402.54	154.94	131.11	15.82	3193.3
	AVE	1391.54	152.87	130.74	20.24	4307.6
1.52	2A	1716.12	164.50	141.62	19.61	3103.3
1.52	4A	1659.39	165.72	142.19	18.39	3063.7
1.52	4E	1678.97	163.89	141.55	19.67	3121.2
	AVE	1684.83	164.70	141.79	19.22	3096.0

RUN 41201C

MASS FLOW = .0141 KG/SEC INLET VAPOR TEMP = 111.1 DEG C TOTAL POWER = 2.46 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.71)	2A	1860.48	171.87	147.41	19.53	3168.0
1.70(1.71)	4A	1731.72	174.27	148.63	17.25	2889.9
1.70(1.71)	4C	1838.85	174.77	149.47	28.80	5703.4
1.70(1.69)	4E	1807.71	172.19	147.07	18.48	3092.7
	AVE	1809.69	173.28	148.15	21.02	3713.5
1.78(1.80)	1B	1831.16	163.73	150.63	36.15	3289.3
1.78(1.80)	1C	1817.84	172.44	147.38	25.69	5416.5
1.78(1.79)	2D	1790.71	175.50	153.41	27.67	4844.9
1.78(1.80)	3C	1806.87	177.36	152.91	29.05	5890.7
1.78(1.80)	4D	1839.24	179.70	154.72	24.93	4573.3
1.78(1.80)	5B	1847.30	173.21	151.69	21.87	3134.0
	AVE	1822.19	173.66	151.79	27.56	4524.8
1.80(1.81)	2D	1790.71	176.27	154.24	27.68	4849.8
1.80(1.83)	3C	1806.87	177.82	153.89	29.62	5867.4
1.80(1.81)	3E	1852.61	173.05	148.41	26.57	5316.1
1.80(1.82)	5D	1802.61	171.75	151.93	23.21	3617.7
	AVE	1813.20	174.72	152.12	26.77	4912.8
1.83(1.83)	3A	1883.67	177.33	150.10	24.24	5519.0
1.83(1.83)	5C	1825.46	175.48	149.79	24.98	5569.3
	AVE	1854.57	176.41	149.95	24.61	5544.1
1.88(1.93)	1D	1748.28	167.43	155.44	37.26	3075.6
1.88(1.89)	2B	1787.63	173.07	156.73	37.29	5157.8
1.88(1.91)	2C	1706.78	171.83	155.89	42.24	6429.8
1.88(1.89)	2D	1790.71	171.22	156.79	42.42	5253.8
1.88(1.93)	2E	1727.03	163.91	155.70	54.04	3062.2
1.88(1.88)	3A	1883.67	172.65	152.10	32.24	5642.5
1.88(1.89)	3B	1821.70	171.83	156.55	46.97	6427.8
1.88(1.91)	3C	1806.87	171.04	157.19	51.41	6570.6
1.88(1.90)	3D	1780.46	170.00	156.34	51.52	6326.9
1.88(1.89)	3E	1852.61	168.90	151.58	37.86	5622.6
1.88(1.93)	4B	1793.19	174.27	159.38	40.82	4771.4
1.88(1.88)	5C	1825.46	173.46	151.84	29.67	5676.4

1.88(1.90)	5D	1802.61	169.37	155.02	32.04	3016.1
	AVE	1794.39	170.69	155.43	41.21	5156.4
1.91(1.95)	1D	1748.28	170.00	156.60	33.16	3094.6
1.91(1.94)	2C	1706.78	175.84	156.92	35.33	6390.2
1.91(1.91)	2D	1790.71	170.00	157.39	48.57	4975.7
1.91(1.93)	3C	1806.87	173.64	158.23	45.99	6566.0
1.91(1.92)	3E	1852.61	166.33	152.51	47.54	5190.7
1.91(1.96)	4B	1793.19	177.33	160.21	35.32	4796.6
1.91(1.94)	5D	1802.61	169.87	156.81	35.10	3011.2
	AVE	1785.87	171.86	156.96	40.15	4860.7
1.93(1.95)	2A	1860.48	172.24	156.53	30.03	3062.0
1.93(1.94)	2B	1787.63	176.11	157.92	33.30	5020.6
1.93(1.94)	2D	1790.71	172.43	158.05	42.41	5007.9
1.93(1.96)	2E	1727.03	166.97	157.05	44.41	3082.5
1.93(1.93)	3A	1883.67	168.39	153.64	45.09	5071.4
1.93(1.94)	3B	1821.70	174.72	158.02	42.74	6212.3
1.93(1.96)	3C	1806.87	176.11	159.08	41.41	6525.4
1.93(1.95)	3D	1780.46	173.83	157.87	43.75	6250.2
1.93(1.94)	4A	1731.72	171.22	157.83	32.76	2941.3
1.93(1.94)	4C	1838.85	176.11	158.46	40.71	6122.2
1.93(1.92)	4E	1807.71	170.61	155.81	31.06	2994.8
	AVE	1803.35	172.61	157.30	38.88	4753.7
1.96(2.00)	1D	1748.28	173.06	158.47	30.26	3103.4
1.96(1.94)	2C	1706.78	175.34	157.01	36.49	6392.4
1.96(1.96)	2D	1790.71	174.89	158.64	37.37	5009.5
1.96(1.98)	3C	1806.87	179.76	159.91	35.30	6472.5
1.96(1.96)	3E	1852.61	168.79	154.20	44.76	5082.7
1.96(2.00)	4B	1793.19	181.65	161.55	29.84	4795.5
1.96(1.97)	5D	1802.61	172.90	158.07	30.70	3024.2
	AVE	1785.87	175.20	158.26	34.96	4840.0
1.98(2.00)	2A	1860.48	177.94	158.55	24.06	3056.5
1.98(2.02)	2B	1787.63	182.22	160.32	27.34	4978.9
1.98(1.99)	2D	1790.71	177.33	159.59	34.06	5002.4
1.98(2.03)	2E	1727.03	172.36	159.53	33.95	3080.0
1.98(1.98)	3A	1883.67	172.44	155.66	39.29	4962.1
1.98(1.99)	3B	1821.70	181.02	159.85	33.33	6132.8
1.98(2.00)	3C	1806.87	182.15	160.82	32.71	6425.3
1.98(2.00)	3D	1780.46	179.78	159.80	34.58	6176.5
1.98(2.00)	4A	1731.72	175.50	159.95	27.97	2965.7

1.98(2.00)	4C	1838.85	181.36	160.31	33.80	6067.3
1.98(1.98)	4E	1807.71	175.23	158.04	26.49	3025.2
1.98(1.98)	5C	1825.46	171.83	155.45	39.06	5004.1
	AVE	1805.19	177.43	158.99	32.22	4739.7
2.13	1B	1618.09	179.06	163.24	25.45	3174.0
2.13	1C	1672.84	174.89	160.33	39.82	5544.5
2.13	2B	1658.60	182.59	164.70	30.84	4270.5
2.13	2E	1642.30	174.89	163.61	36.42	3008.7
2.13	3A	1634.63	176.88	161.69	37.13	5008.8
2.13	3B	1647.00	181.68	164.84	37.60	5091.3
2.13	3D	1658.61	181.00	164.40	38.47	5352.6
2.13	4D	1711.80	184.05	165.28	30.25	4714.5
2.13	5B	1631.85	179.42	164.65	27.41	3168.2
2.13	5C	1651.41	177.49	161.42	35.44	5491.0
	AVE	1652.71	179.20	163.42	33.88	4482.4
2.29	2B	1534.78	193.26	170.35	21.80	4533.0
2.29	2C	1690.50	192.78	169.15	26.93	5732.4
2.29	2E	1530.38	183.68	169.11	25.76	2926.2
2.29	3A	1555.48	183.96	166.93	30.99	4908.8
2.29	3B	1557.55	193.42	170.13	25.11	5561.8
2.29	3D	1563.02	191.44	169.51	26.85	5715.0
2.29	3E	1340.07	182.07	165.99	28.38	5064.3
2.29	4B	1621.23	195.43	171.33	21.79	4584.5
2.29	5C	1567.52	183.42	166.35	31.20	5182.9
2.29	5D	1690.81	179.78	169.04	38.83	3064.4
	AVE	1565.13	187.92	168.79	27.76	4727.3
2.44	1B	1337.51	185.80	174.03	27.59	2913.0
2.44	2B	1403.67	195.77	175.62	22.43	4612.0
2.44	2E	1303.38	188.41	174.31	22.35	2868.4
2.44	3A	1427.79	187.78	171.83	30.01	4839.2
2.44	3B	1381.80	198.68	175.14	21.74	5740.3
2.44	3D	1369.75	195.34	174.48	24.45	5852.0
2.44	4D	1321.92	195.11	175.22	21.43	4744.7
2.44	5B	1358.81	189.61	174.97	22.39	2906.1
2.44	5C	1405.01	187.18	171.17	29.48	5019.2
	AVE	1367.74	191.52	174.09	24.65	4388.3

RUN 41201C

MASS FLOW = .0310 LBM/SEC INLET VAPOR TEMP = 232.0 DEG F TOTAL POWER = 2.34 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	146.14	251.10	237.29	17.32	3422.0
12	4A	144.30	250.52	237.32	17.96	3423.4
12	4C	137.74	250.00	237.43	27.96	7116.1
12	4E	134.86	249.88	237.31	17.56	3425.2
	AVE	140.74	250.37	237.34	20.17	4346.7
24	1B	224.67	263.00	242.63	17.82	3447.6
24	1C	230.81	259.07	241.20	28.91	5862.9
24	4D	233.46	261.02	243.63	29.23	5307.4
	AVE	229.65	261.03	242.49	25.32	4872.6
39	2A	354.43	288.67	252.58	15.44	3289.1
39	4A	367.16	286.60	252.66	17.03	3281.0
39	4C	387.43	283.81	252.85	30.66	6837.9
39	4E	371.94	286.60	252.65	17.25	3291.1
	AVE	370.24	286.42	252.69	20.10	4174.8
48	1B	418.25	306.54	267.38	16.37	3255.3
48	1C	439.31	301.68	263.67	24.61	5639.7
48	4D	462.12	309.60	270.30	24.16	5142.1
48	5B	444.55	310.88	267.99	15.82	3193.3
	AVE	441.06	307.17	257.33	20.24	4307.6
60	2A	543.94	328.10	286.91	19.61	3103.3
60	4A	525.95	330.30	287.93	18.39	3063.7
60	4E	532.16	327.01	286.80	19.67	3121.2
	AVE	534.02	328.47	287.21	19.22	3096.0

RUN 41201C

MASS FLOW = .0310 LBM/SEC INLET VAPOR TEMP = 232.0 DEG F TOTAL POWER = 2.34 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.5)	2A	589.69	341.37	297.34	19.53	3168.0
67 (67.4)	4A	548.88	345.69	299.53	17.25	2889.9
67 (67.3)	4C	582.84	346.59	301.05	28.80	5703.4
67 (66.7)	4E	572.97	341.94	296.73	18.48	3092.7
	AVE	573.59	343.90	298.66	21.02	3713.5
70 (71.0)	1B	580.40	326.71	303.14	36.15	3289.3
70 (70.8)	1C	576.18	342.40	297.28	25.69	5416.5
70 (70.3)	2D	567.58	347.90	308.14	27.67	4844.9
70 (71.0)	3C	572.70	351.24	307.24	29.05	5890.7
70 (70.8)	4D	582.96	355.47	310.50	24.93	4573.3
70 (70.9)	5B	585.52	343.79	305.05	21.87	3134.0
	AVE	577.56	344.58	305.23	27.56	4524.8
71 (71.2)	2D	567.58	349.29	309.64	27.68	4849.8
71 (71.9)	3C	572.70	352.08	309.00	29.62	5867.4
71 (71.2)	3E	587.20	343.49	299.14	26.57	5316.1
71 (71.6)	5D	571.35	341.15	305.47	23.21	3617.7
	AVE	574.71	346.50	305.81	26.77	4912.8
72 (71.9)	3A	597.04	351.20	302.16	24.24	5519.0
72 (71.9)	5C	578.59	347.87	301.63	24.98	5569.3
	AVE	587.82	349.53	301.90	24.61	5544.1
74 (75.8)	1D	554.13	333.38	311.80	37.26	3075.6
74 (74.6)	2B	566.60	343.52	314.11	37.29	5157.8
74 (75.2)	2C	540.98	341.30	312.61	42.24	6429.8
74 (74.3)	2D	567.58	340.19	314.23	42.42	5253.8
74 (75.9)	2E	547.40	327.03	312.27	54.04	3062.2
74 (74.1)	3A	597.04	342.76	305.77	32.24	5642.5
74 (74.6)	3B	577.40	341.30	313.78	46.97	6427.8
74 (75.0)	3C	572.70	339.88	314.95	51.41	6570.6
74 (74.9)	3D	564.33	338.00	313.42	51.52	6326.9
74 (74.3)	3E	587.20	336.02	304.85	37.86	5622.6
74 (75.8)	4B	568.37	345.69	318.88	40.82	4771.4
74 (74.1)	5C	578.59	344.24	305.31	29.67	5676.4

74 (74.9)	5D	571.35	336.87	311.04	32.04	3016.1
	AVE	568.74	339.24	311.77	41.21	5156.4
75 (76.9)	1D	554.13	338.00	313.88	33.16	3094.6
75 (76.4)	2C	540.98	348.52	314.46	35.33	6390.2
75 (75.3)	2D	567.58	338.00	315.30	48.57	4975.7
75 (76.1)	3C	572.70	344.55	316.82	45.99	6566.0
75 (75.4)	3E	587.20	331.40	306.53	47.54	5190.7
75 (77.0)	4B	568.37	351.20	320.38	35.32	4796.6
75 (76.5)	5D	571.35	337.76	314.26	35.10	3011.2
	AVE	566.04	341.35	314.52	40.15	4860.7
76 (76.7)	2A	589.69	342.02	313.76	30.03	3062.0
76 (76.4)	2B	566.60	349.00	316.26	33.30	5020.6
76 (76.3)	2D	567.58	342.38	316.49	42.41	5007.9
76 (77.2)	2E	547.40	332.54	314.69	44.41	3082.5
76 (75.9)	3A	597.04	335.11	308.55	45.09	5071.4
76 (76.4)	3B	577.40	346.49	316.44	42.74	6212.3
76 (77.0)	3C	572.70	349.00	318.34	41.41	6525.4
76 (76.7)	3D	564.33	344.90	316.16	43.75	6250.2
76 (76.5)	4A	548.88	340.20	316.09	32.76	2941.3
76 (76.5)	4C	582.84	349.00	317.24	40.71	6122.2
76 (75.7)	4E	572.97	339.10	312.46	31.06	2994.8
	AVE	571.58	342.70	315.13	38.88	4753.7
77 (78.8)	1D	554.13	343.50	317.25	30.26	3103.4
77 (76.5)	2C	540.98	347.61	314.62	36.49	6392.4
77 (77.1)	2D	567.58	346.80	317.55	37.37	5009.5
77 (77.9)	3C	572.70	355.58	319.83	35.30	6472.5
77 (77.2)	3E	587.20	335.83	309.56	44.76	5082.7
77 (78.7)	4B	568.37	358.98	322.79	29.84	4795.5
77 (77.7)	5D	571.35	343.22	316.52	30.70	3024.2
	AVE	566.04	347.36	316.87	34.96	4840.0
78 (78.7)	2A	589.69	352.29	317.39	24.06	3056.5
78 (79.4)	2B	566.60	360.00	320.58	27.34	4978.9
78 (78.3)	2D	567.58	351.20	319.26	34.06	5002.4
78 (79.8)	2E	547.40	342.26	319.15	33.95	3080.0
78 (78.0)	3A	597.04	342.40	312.18	39.29	4962.1
78 (78.5)	3B	577.40	357.83	319.72	33.33	6132.8
78 (78.9)	3C	572.70	359.88	321.47	32.71	6425.3
78 (78.9)	3D	564.33	355.60	319.64	34.58	6176.5
78 (78.6)	4A	548.88	347.90	319.91	27.97	2965.7

78 (78.6)	4C	582.84	358.45	320.56	33.80	6067.3
78 (77.8)	4E	572.97	347.41	316.48	26.49	3025.2
78 (78.0)	5C	578.59	341.30	311.81	39.06	5004.1
	AVE	572.17	351.38	318.18	32.22	4739.7
84	1B	512.86	354.30	325.83	25.45	3174.0
84	1C	530.22	346.81	320.59	39.82	5544.5
84	2B	525.71	360.67	328.46	30.84	4270.5
84	2E	520.54	346.80	326.50	36.42	3008.7
84	3A	518.11	350.38	323.04	37.13	5008.8
84	3B	522.03	359.02	328.72	37.60	5091.3
84	3D	525.71	357.80	327.92	38.47	5352.6
84	4D	542.57	363.30	329.50	30.25	4714.5
84	5B	517.23	354.96	328.37	27.41	3168.2
84	5C	523.42	351.48	322.55	35.44	5491.0
	AVE	523.84	354.55	326.15	33.88	4482.4
90	2B	486.46	379.88	338.64	21.80	4533.0
90	2C	535.82	379.00	336.47	26.93	5732.4
90	2E	485.06	362.62	336.40	25.76	2926.2
90	3A	493.02	363.13	332.47	30.99	4908.8
90	3B	493.68	380.15	338.23	25.11	5561.8
90	3D	495.41	376.60	337.11	26.85	5715.0
90	3E	424.74	359.72	330.77	28.38	5064.3
90	4B	513.86	383.78	340.39	21.79	4584.5
90	5C	496.84	362.16	331.43	31.20	5182.9
90	5D	535.91	355.60	336.28	38.83	3064.4
	AVE	496.08	370.26	335.82	27.76	4727.3
96	1B	423.93	366.43	345.25	27.59	2913.0
96	2B	444.90	384.39	348.12	22.43	4612.0
96	2E	413.12	371.14	345.76	22.35	2868.4
96	3A	452.55	370.01	341.30	30.01	4839.2
96	3B	437.97	389.62	347.26	21.74	5740.3
96	3D	434.15	383.61	346.07	24.45	5852.0
96	4D	418.99	383.20	347.40	21.43	4744.7
96	5B	430.69	373.30	346.94	22.39	2906.1
96	5C	445.33	368.92	340.11	29.48	5019.2
	AVE	433.51	376.73	345.36	24.65	4388.3

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43401D
Test Date: 10/23/80
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.141 MPa (20.4 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.0531 kw/m (0.0162 kw/ft)
Flow rate	0.0143 kg/sec (0.0316 lb/sec)
Coolant temperature	110°C (230°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 4645

(See following pages for additional results.)

C. Comments:

RUN 434010

MASS FLOW = .0143 KG/SEC INLET VAPOR TEMP = 110.0 DEG C TOTAL POWER = 2.45 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	443.57	120.56	113.14	17.28	3494.0
.30	4A	446.20	119.97	113.12	18.83	3497.3
.30	4C	421.67	120.55	113.18	25.70	7260.6
	AVE	437.15	120.36	113.15	20.66	4756.6
.61	1C	737.42	124.86	115.27	30.41	5985.7
.61	4E	728.80	127.73	116.02	17.74	3518.2
.61	5B	689.83	126.50	116.03	18.81	3524.3
	AVE	718.68	126.36	115.77	22.32	4342.7
.99	2A	1179.31	139.02	121.54	18.78	3370.3
.99	4A	1169.43	138.18	121.49	19.54	3362.3
.99	4C	1155.11	137.93	121.59	30.63	6989.3
	AVE	1167.95	138.38	121.54	22.99	4574.0
1.22	1C	1362.14	146.92	127.64	26.63	5770.9
1.22	4E	1391.05	146.84	129.59	21.96	3349.4
	AVE	1376.59	146.88	128.62	24.30	4560.2
1.52	2A	1703.92	159.64	140.43	23.38	3185.3
1.52	4A	1599.77	159.00	140.76	23.13	3155.7
1.52	4C	1594.75	157.89	140.29	37.21	6607.2
	AVE	1632.81	158.84	140.49	27.91	4316.1

RUN 43401D

MASS FLOW = .0143 KG/SEC INLET VAPOR TEMP = 119.0 DEG C TOTAL POWER = 2.45 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.72)	2A	1760.43	165.12	147.83	26.38	3206.0
1.70(1.72)	4A	1809.12	171.33	147.82	19.76	3156.1
1.70(1.72)	4C	1851.56	170.01	147.74	33.24	6392.1
	AVE	1807.04	168.82	147.80	26.46	4251.4
1.78(1.80)	1C	1758.22	169.41	147.20	28.17	5871.1
1.78(1.79)	3C	1863.63	171.31	150.21	35.14	7143.0
	AVE	1810.93	170.36	148.71	31.65	6507.0
1.80(1.87)	2C	1771.51	174.88	153.34	32.41	7393.3
	AVE	1771.51	174.88	153.34	32.41	7393.3
1.83(1.83)	1B	1862.81	164.41	150.96	35.75	3603.4
1.83(1.84)	2D	1840.28	175.49	154.25	29.53	5626.7
1.83(1.84)	3C	1863.63	173.28	152.16	34.92	7490.9
1.83(1.84)	3D	1842.76	175.24	151.96	31.24	7044.2
1.83(1.83)	4D	1848.54	173.06	153.72	32.72	5529.5
	AVE	1851.61	172.29	152.61	32.83	5899.0
1.88(1.88)	1B	1862.81	166.31	153.14	36.31	3622.7
1.88(1.89)	1D	1789.92	170.80	153.80	26.83	3624.4
1.88(1.89)	2B	1903.21	173.29	156.49	38.59	5763.5
1.88(1.95)	2C	1771.51	172.11	156.25	44.01	6516.4
1.88(1.89)	2D	1840.28	173.99	155.77	34.42	5965.9
1.88(1.88)	2E	1810.64	170.00	153.11	27.37	3910.0
1.88(1.91)	3A	1841.65	171.87	151.71	32.19	5497.5
1.88(1.89)	3B	1860.82	172.44	154.90	41.87	7267.8
1.88(1.90)	4B	1716.97	174.22	156.82	33.57	5515.6
1.88(1.88)	5C	1804.31	171.46	151.22	31.44	6137.7
1.88(1.87)	5D	1730.61	164.80	152.89	37.38	3830.8
	AVE	1812.07	171.03	154.19	34.91	5241.1
1.91(1.92)	1D	1789.92	172.36	154.59	25.59	3408.6
1.91(1.93)	3E	1731.42	165.10	152.11	47.36	5391.3
1.91(1.93)	4B	1716.97	174.89	157.91	34.33	5095.1

1.91(1.91)	4D	1848.54	172.44	156.55	39.68	5932.5
1.91(1.93)	5D	1730.61	168.22	154.72	32.76	3151.2
	AVE	1763.49	170.60	155.18	35.94	4595.7
1.93(1.93)	1B	1862.81	166.92	154.67	38.93	3133.7
1.93(1.95)	2A	1760.43	169.39	155.83	33.07	3074.1
1.93(1.94)	2B	1903.21	172.44	158.27	45.70	5644.0
1.93(1.95)	3A	1841.65	172.44	153.51	34.15	5171.4
1.93(1.95)	3C	1863.63	172.44	156.56	46.21	6633.0
1.93(1.94)	3D	1842.76	174.25	156.01	39.76	6585.2
1.93(1.95)	4A	1809.12	173.06	155.74	26.47	3034.2
1.93(1.95)	4C	1851.56	173.13	156.95	44.97	6449.7
1.93(1.93)	4D	1848.54	172.84	157.41	40.83	5148.8
	AVE	1842.63	171.88	156.11	38.89	4919.4
1.96(1.96)	1D	1789.92	173.00	155.99	26.66	3101.5
1.96(2.02)	2C	1771.51	175.41	158.86	41.85	6353.6
1.96(1.97)	3C	1863.63	172.95	157.43	47.20	6599.7
1.96(1.97)	3E	1731.42	167.08	153.51	45.14	5260.7
1.96(1.97)	4B	1716.97	178.00	159.46	31.22	4974.8
1.96(1.96)	5D	1730.61	170.59	155.93	29.99	3042.4
	AVE	1767.34	172.84	156.86	37.01	4888.8
1.98(1.98)	1B	1862.81	168.76	156.65	39.16	3050.8
1.98(2.00)	2A	1760.43	174.08	158.10	27.79	3090.0
1.98(2.00)	3A	1841.65	175.84	155.49	31.55	5095.3
1.98(1.99)	3B	1860.82	176.21	158.59	41.25	6327.8
1.98(2.00)	3C	1863.63	174.26	158.48	46.26	6582.6
1.98(1.99)	3D	1842.76	173.65	157.98	46.12	6458.6
1.98(2.00)	4A	1809.12	176.71	157.70	23.93	3001.3
1.98(2.00)	4C	1851.56	177.33	158.85	39.06	6384.8
1.98(1.98)	4D	1848.54	172.45	159.41	48.17	5055.0
1.98(1.98)	5C	1804.31	172.46	154.55	35.33	5292.4
	AVE	1834.56	174.17	157.58	37.86	5033.9
2.13	1B	1667.28	170.80	152.79	52.38	3244.7
2.13	2B	1697.80	173.38	165.32	70.91	4324.6
2.13	2E	1643.62	174.56	163.21	36.24	3047.0
2.13	3A	1698.46	175.60	160.79	39.69	5108.8
2.13	3B	1641.84	175.50	163.88	54.83	5204.6
2.13	3D	1600.26	175.50	163.25	50.74	5486.3
2.13	4E	1666.89	174.88	162.26	33.08	3333.6
2.13	5B	1710.08	171.11	162.90	52.42	3332.8

2.13	5C	1646.54	172.43	159.12	46.52	5711.3
	AVE	1663.64	173.75	152.72	48.53	4310.4
2.29	1B	1665.16	182.23	167.52	27.86	3050.1
2.29	2B	1601.52	184.03	170.92	40.22	4576.8
2.29	2C	1583.42	187.16	168.69	32.54	5851.4
2.29	2E	1552.13	177.36	167.96	40.86	2989.8
2.29	3A	1599.90	182.22	166.05	33.70	5008.8
2.29	3B	1570.96	185.16	159.67	38.54	5662.4
2.29	3E	1580.63	181.73	164.78	31.83	5212.0
2.29	4B	1562.87	188.64	170.47	28.14	4678.7
2.29	5C	1578.76	178.78	154.93	39.07	5396.7
	AVE	1568.37	183.03	167.89	34.75	4714.1
2.44	2B	1423.93	187.17	175.99	41.48	4680.7
2.44	2E	1407.45	183.45	172.60	31.65	2939.4
2.44	3A	1365.13	183.58	170.98	37.10	4971.0
2.44	3B	1421.80	189.93	174.65	34.88	5871.9
2.44	3D	1388.08	189.54	173.80	33.11	5988.3
2.44	4E	1387.83	186.50	171.77	22.93	3011.7
2.44	5B	1378.58	184.37	171.82	25.82	3067.8
2.44	5C	1442.18	184.61	169.66	32.58	5194.7
	AVE	1404.37	186.14	172.66	32.57	4465.7

RUN 43401D

MASS FLOW = .0316 LBM/SEC INLET VAPOR TEMP = 230.0 DEG F TOTAL POWER = 2.33 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	140.59	249.00	235.65	17.28	3494.0
12	4A	141.43	247.95	235.62	18.83	3497.3
12	4C	133.65	248.99	235.73	25.70	7260.6
	AVE	138.56	248.65	235.66	20.60	4750.0
24	1C	233.73	256.74	239.48	30.41	5985.7
24	4E	231.00	261.91	240.83	17.74	3518.2
24	5B	218.65	259.70	240.86	18.81	3524.3
	AVE	227.79	259.45	240.39	22.32	4342.7
39	2A	373.79	282.24	250.77	18.78	3370.3
39	4A	370.66	280.72	250.68	19.54	3362.3
39	4C	366.12	280.28	250.86	30.63	6989.3
	AVE	370.19	281.08	250.77	22.99	4574.0
48	1C	431.74	296.46	261.75	26.63	5770.9
48	4E	440.90	296.32	265.26	21.96	3349.4
	AVE	436.32	295.39	263.51	24.30	4560.2
60	2A	540.07	319.35	284.77	23.38	3185.3
60	4A	507.06	318.20	285.37	23.13	3155.7
60	4C	505.47	316.21	284.51	37.21	6607.2
	AVE	517.53	317.92	284.88	27.91	4316.1

RUN 43401D

MASS FLOW = .0316 LBM/SEC INLET VAPOR TEMP = 230.0 DEG F TOTAL POWER = 2.33 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.8)	2A	557.98	329.21	298.10	26.38	3206.0
67 (67.6)	4A	573.41	340.40	298.07	19.76	3156.1
67 (67.8)	4C	586.87	338.02	297.94	33.24	6392.1
	AVE	572.75	335.88	298.04	26.46	4251.4
70 (70.9)	1C	557.28	336.93	296.97	28.17	5871.1
70 (70.6)	3C	590.69	340.35	302.38	35.14	7143.0
	AVE	573.99	338.64	299.67	31.65	6507.0
71 (73.5)	2C	561.49	346.79	308.01	32.41	7393.3
	AVE	561.49	346.79	308.01	32.41	7393.3
72 (71.9)	1B	590.43	327.93	303.72	35.75	3603.4
72 (72.4)	2D	583.29	347.89	309.66	29.53	5826.7
72 (72.6)	3C	590.69	343.90	305.90	34.92	7490.9
72 (72.4)	3D	584.08	347.42	305.52	31.24	7044.2
72 (72.0)	4D	585.91	343.50	308.70	32.72	5529.5
	AVE	586.88	342.13	305.70	32.83	5899.0
74 (74.1)	1B	590.43	331.35	307.65	36.31	3622.7
74 (74.5)	1D	567.33	339.44	308.83	26.83	3624.4
74 (74.4)	2B	603.24	343.93	313.68	38.59	5763.5
74 (76.6)	2C	561.49	341.79	313.24	44.01	6516.4
74 (74.4)	2D	583.29	345.18	312.38	34.42	5965.9
74 (74.0)	2E	573.90	338.00	307.59	27.37	3910.0
74 (75.0)	3A	583.72	341.36	305.09	32.19	5497.5
74 (74.6)	3B	589.80	342.39	310.82	41.87	7267.8
74 (74.7)	4B	544.20	345.60	314.27	33.57	5515.6
74 (74.2)	5C	571.89	340.63	304.19	31.44	6137.7
74 (73.8)	5D	548.53	328.65	307.20	37.36	3830.8
	AVE	574.35	339.85	309.54	34.91	5241.1
75 (75.4)	1D	567.33	342.24	310.26	25.59	3408.6
75 (76.1)	3E	548.79	329.19	305.80	47.30	5391.3
75 (75.9)	4B	544.20	346.80	316.24	34.33	5095.1

75 (75.1)	4D	585.91	342.40	313.79	39.68	5932.5
75 (75.8)	5D	548.53	334.79	310.50	32.76	3151.2
	AVE	558.95	339.08	311.32	35.94	4595.7
76 (75.9)	1B	590.43	332.46	310.41	38.93	3133.7
76 (76.7)	2A	557.98	336.90	312.50	33.07	3074.1
76 (76.3)	2B	603.24	342.40	316.88	45.70	5044.0
75 (76.9)	3A	583.72	342.40	308.31	34.15	5171.4
75 (76.8)	3C	590.69	342.39	313.81	46.21	6633.0
76 (76.4)	3D	584.08	345.64	312.81	39.70	6585.2
75 (76.7)	4A	573.41	343.51	312.33	26.47	3034.2
76 (76.9)	4C	586.87	343.64	314.51	44.97	6449.7
76 (76.0)	4D	585.91	343.10	315.35	40.83	5148.8
	AVE	584.04	341.38	312.99	38.89	4919.4
77 (77.0)	1D	567.33	343.40	312.79	26.66	3101.5
77 (79.5)	2C	561.49	347.73	317.96	41.85	6353.6
77 (77.7)	3C	590.69	343.30	315.38	47.20	6599.7
77 (77.6)	3E	548.79	332.74	308.32	45.14	5260.7
77 (77.6)	4B	544.20	352.41	319.03	31.22	4974.8
77 (77.0)	5D	548.53	339.06	312.67	29.99	3042.4
	AVE	560.17	343.11	314.36	37.01	4888.8
78 (77.9)	1B	590.43	335.77	313.98	39.16	3050.8
78 (78.9)	2A	557.98	345.34	316.58	27.79	3090.0
78 (78.9)	3A	583.72	348.50	311.89	31.55	5095.3
78 (78.5)	3B	589.80	349.18	317.46	41.25	6327.8
78 (78.8)	3C	590.69	345.67	317.27	46.26	6582.6
78 (78.5)	3D	584.08	344.58	316.36	46.12	6458.6
78 (78.6)	4A	573.41	350.08	315.86	23.93	3001.3
78 (78.9)	4C	586.87	351.19	317.92	39.06	6384.8
78 (78.0)	4D	585.91	342.41	318.93	48.17	5055.0
78 (78.1)	5C	571.89	342.42	310.19	35.33	5292.4
	AVE	581.48	345.51	315.64	37.86	5033.9
84	1B	528.46	339.44	325.02	52.38	3244.7
84	2B	538.13	344.08	329.57	70.91	4324.6
84	2E	520.96	346.22	325.79	36.24	3047.0
84	3A	538.34	348.09	321.43	39.69	5108.8
84	3B	520.39	347.90	326.98	54.83	5204.6
84	3D	507.21	347.90	325.85	50.74	5486.3
84	4E	528.33	346.79	324.07	33.06	3333.6
84	5B	542.02	340.00	325.23	52.42	3332.8

84	5C	521.88	342.38	320.21	46.52	5711.3
	AVE	527.30	344.75	324.90	48.53	4310.4
90	1B	527.78	360.02	333.54	27.86	3050.1
90	2B	507.61	363.25	339.66	40.22	4576.8
90	2C	501.88	368.89	335.65	32.54	5851.4
90	2E	491.96	351.25	334.32	40.88	2989.8
90	3A	507.10	359.99	330.89	33.70	5008.8
90	3B	497.93	365.28	337.41	38.54	5662.4
90	3E	500.99	359.12	328.61	31.83	5212.0
90	4B	495.36	371.56	338.84	28.14	4678.7
90	5C	500.40	353.80	328.87	39.07	5396.7
	AVE	503.45	361.46	334.20	34.75	4714.1
96	2B	451.32	368.90	348.78	41.48	4680.7
96	2E	446.10	362.21	342.67	31.65	2939.4
96	3A	439.03	362.44	339.76	37.10	4971.0
96	3B	450.65	373.88	346.37	34.88	5871.9
96	3D	439.96	373.18	344.83	33.11	5988.3
96	4E	439.88	367.70	341.19	22.93	3011.7
96	5B	436.95	363.86	341.28	26.82	3067.8
96	5C	457.11	364.30	337.39	32.58	5194.7
	AVE	445.13	367.06	342.78	32.57	4405.7

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40601E
Test Date: 11/26/80
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.141 MPa (20.5 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.43 kw/m (0.013 kw/ft)
Flow rate	0.12 kg/sec (0.026 lb/sec)
Coolant temperature	110°C (230°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 3796

(See following pages for additional results.)

C. Comments:

The power and flow were reduced approximately 23 percent to provide data at a lower Reynolds number.

RUN 40501E

MASS FLOW = .0118 KG/SEC INLET VAPOR TEMP = 110.0 DEG C TOTAL POWER = 1.96 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	1B	371.47	120.56	113.08	14.35	2866.7
.30	2A	360.28	119.93	113.07	15.19	2869.4
.30	4E	376.77	120.15	113.07	15.39	2868.5
	AVE	369.51	120.21	113.07	14.98	2868.2
.61	1C	567.01	123.98	115.12	25.32	4934.3
.61	3B	570.24	124.41	115.95	30.06	5692.2
.61	5B	540.62	125.90	115.92	15.47	2893.8
	AVE	559.29	124.76	115.66	23.60	4506.7
.99	1B	933.44	139.65	121.25	14.12	2759.4
.99	2A	929.59	139.67	121.23	14.03	2761.2
.99	4C	941.98	136.78	121.43	26.65	5773.8
.99	4E	921.09	137.89	121.24	15.44	2765.9
	AVE	931.53	138.49	121.29	17.56	3515.1
1.22	1C	1093.51	146.55	126.88	20.99	4759.0
1.22	3B	1083.62	149.22	129.55	23.25	5313.3
1.22	5B	1082.09	146.17	129.19	17.36	2705.8
	AVE	1086.41	147.31	128.54	20.54	4259.3
1.52	1B	1437.39	162.58	139.13	16.12	2617.6
1.52	2A	1385.03	163.28	139.23	15.13	2602.4
1.52	4C	1419.44	158.36	139.45	30.84	5447.5
	AVE	1413.95	161.41	139.27	20.70	3555.8

RUN 40601E

MASS FLOW = .0118 KG/SEC INLET VAPOR TEMP = 110.0 DEG C TOTAL POWER = 1.96 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.68)	2A	1407.97	167.07	145.05	16.58	2658.9
1.70(1.69)	2B	1374.76	170.00	147.48	21.16	4296.5
1.70(1.68)	2C	1399.59	165.71	144.62	26.80	5384.8
1.70(1.69)	2E	1405.55	168.81	145.28	15.45	2639.5
1.70(1.69)	4A	1402.40	162.10	145.39	21.90	2677.7
1.70(1.70)	4B	1398.80	169.38	148.12	22.81	4247.3
1.70(1.71)	4C	1431.50	170.61	146.46	23.72	5375.8
1.70(1.70)	4E	1406.73	166.93	145.71	17.16	2674.8
	AVE	1403.41	167.58	146.01	20.70	3744.4
1.78(1.79)	2C	1399.59	171.23	148.42	24.46	6677.9
1.78(1.76)	3C	1375.04	168.75	147.67	26.12	6100.9
1.78(1.78)	3D	1412.45	170.00	149.00	26.84	6627.4
	AVE	1395.69	170.00	148.36	25.81	6468.7
1.83(1.81)	3E	1404.12	170.63	146.63	20.79	6135.5
1.83(1.88)	5C	1403.83	167.52	149.30	27.40	5735.6
	AVE	1403.98	169.07	147.97	24.10	5935.6
1.85(1.85)	1B	1432.20	174.89	149.22	14.23	4363.7
1.85(1.86)	2A	1407.97	169.99	149.31	17.47	4518.6
	AVE	1420.09	172.44	149.26	15.85	4441.2
1.88(1.89)	2D	1410.83	173.66	153.52	23.96	6515.1
1.88(1.88)	4D	1386.42	171.83	152.98	25.24	6583.4
	AVE	1398.63	172.74	153.25	24.60	6549.2
1.91(1.91)	1B	1432.20	174.89	150.87	15.17	4019.0
1.91(1.90)	1D	1394.80	171.83	150.22	16.50	3756.0
1.91(1.92)	2E	1405.55	170.61	151.10	18.44	3571.1
1.91(1.90)	5D	1414.44	162.74	150.48	29.87	3932.4
	AVE	1411.75	170.02	150.67	19.99	3819.6
1.93(1.92)	1D	1394.80	170.02	150.92	18.71	3513.3

1.93(1.92)	3A	1412.21	165.15	150.77	34.96	4655.4
1.93(1.92)	3D	1412.45	174.27	153.61	26.96	7005.5
1.93(1.93)	4A	1402.40	163.89	152.45	31.59	2904.6
1.93(1.93)	4B	1398.80	171.28	156.34	31.99	4495.5
1.93(1.93)	4D	1386.42	170.45	154.64	30.07	5794.9
1.93(1.97)	5C	1403.83	168.18	152.11	30.91	4576.6
1.93(1.93)	5D	1414.44	163.89	151.18	28.74	3671.8
	AVE	1403.17	168.39	152.75	29.24	4577.2
1.96(1.96)	1B	1432.20	176.11	152.23	15.20	3306.5
1.96(1.96)	1C	1367.10	170.26	151.00	25.09	5033.8
1.96(1.95)	1D	1394.80	170.04	151.93	19.70	3261.7
1.96(1.96)	2A	1407.97	173.67	152.86	17.20	3036.9
1.96(1.96)	2C	1399.59	174.25	154.73	28.23	5873.9
1.96(1.95)	2D	1410.83	171.23	155.52	30.74	5386.8
1.96(1.96)	3B	1402.68	171.83	156.57	36.21	4829.4
1.96(1.97)	5B	1408.64	165.73	153.52	29.62	2821.7
1.96(1.94)	5D	1414.44	165.07	151.68	27.22	3500.1
	AVE	1404.25	170.91	153.34	25.47	4116.7
1.98(1.99)	1C	1367.10	170.61	152.03	25.95	4847.2
1.98(1.98)	2B	1374.76	174.89	156.09	24.89	5009.2
1.98(1.97)	2E	1405.55	169.39	152.86	21.74	3007.7
1.98(1.98)	3A	1412.21	164.50	153.73	46.52	4138.4
1.98(1.98)	3B	1402.68	171.95	157.55	38.31	4721.3
1.98(1.99)	3C	1375.04	174.15	158.47	34.33	3459.5
1.98(1.98)	4A	1402.40	164.50	154.49	35.98	2671.4
1.98(1.98)	4B	1398.80	173.60	158.37	31.19	4064.2
1.98(1.99)	4C	1431.50	175.41	157.63	31.53	4684.9
1.98(1.98)	4D	1386.42	172.44	156.33	29.37	4905.5
1.98(2.00)	4E	1406.73	171.23	153.52	20.23	2898.4
1.98(1.99)	5D	1414.44	167.74	153.16	24.85	3103.7
	AVE	1398.14	170.87	155.35	30.41	3959.3
2.01(2.01)	2C	1359.01	173.06	156.51	32.31	5413.6
2.01(2.00)	2D	1410.83	173.05	157.23	30.37	4835.2
2.01(2.01)	3A	1412.21	167.55	154.94	39.49	4188.3
2.01(2.02)	3C	1300.53	175.09	159.67	34.45	3467.8
2.01(2.00)	3E	1404.12	170.61	152.58	27.44	4344.2
2.01(2.05)	5C	1403.83	165.68	154.92	46.13	4573.6
	AVE	1391.75	170.84	155.97	35.03	4470.5
2.03(2.02)	2B	1346.47	177.94	157.59	22.37	4715.4

2.03(2.02)	3D	1412.45	173.12	157.27	35.03	5192.2
2.03(2.03)	4A	1361.05	166.33	156.82	36.55	2639.6
2.03(2.04)	4E	1365.05	172.83	155.48	19.95	2833.2
2.03(2.05)	5B	1312.10	168.17	157.07	30.11	2703.7
2.03(2.10)	5C	1352.12	167.53	157.00	45.16	4689.2
	AVE	1358.21	170.99	156.87	31.53	3795.5
2.06(2.04)	3D	1412.45	173.58	158.01	35.57	5071.3
	AVE	1412.45	173.58	158.01	35.57	5071.3
2.08(2.07)	3E	1304.62	172.44	155.61	27.13	4514.2
	AVE	1304.62	172.44	155.61	27.13	4514.2
2.13	1C	1299.32	171.51	157.09	31.51	4711.9
2.13	2B	1346.47	179.27	161.64	25.63	3572.1
2.13	2C	1359.01	176.08	161.07	35.23	4465.3
2.13	2D	1353.34	177.94	162.36	29.17	3569.4
2.13	3C	1360.53	176.73	163.71	40.49	3932.6
2.13	3D	1337.71	178.18	161.50	31.12	4548.4
2.13	3E	1304.62	173.57	157.96	29.12	4575.1
2.13	4A	1361.05	168.20	161.47	51.12	2608.9
2.13	4D	1341.13	176.72	161.53	29.73	4047.0
2.13	5B	1312.10	168.15	160.64	44.29	2696.2
2.13	5C	1352.12	171.83	157.94	34.00	4638.2
	AVE	1338.85	174.38	160.63	34.67	3942.3
2.29	1D	1283.42	178.66	164.10	21.91	2563.8
2.29	2B	1274.07	189.04	157.37	19.32	3785.2
2.29	2C	1268.35	181.61	166.42	32.01	4838.9
2.29	2D	1255.50	183.44	168.09	27.05	3805.8
2.29	2E	1257.82	179.18	164.56	21.35	2485.9
2.29	3A	1299.13	173.81	154.94	50.49	4231.1
2.29	3B	1302.55	186.30	168.30	27.49	4634.0
2.29	3C	1311.84	184.64	168.52	30.99	4690.1
2.29	3D	1278.25	185.34	166.77	26.25	4873.9
2.29	3E	1254.02	179.78	162.69	25.19	4369.4
2.29	4A	1279.20	174.89	166.70	38.90	2474.7
2.29	4B	1296.26	185.87	168.82	25.03	3808.4
2.29	4D	1268.16	185.28	166.93	22.84	4011.3
2.29	5C	1286.63	177.08	162.55	30.51	4407.0
2.29	5D	1252.72	176.15	164.07	25.86	2578.8
	AVE	1277.86	181.41	166.06	28.35	3837.2

2.44	1C	1095.99	182.22	166.53	23.77	4223.4
2.44	2D	1088.16	187.98	173.29	24.18	3878.6
2.44	2E	1067.88	180.98	169.19	22.28	2438.6
2.44	3B	1107.38	189.51	173.05	25.29	4844.5
2.44	3C	1094.06	189.61	172.84	24.53	4971.5
2.44	3D	1101.59	188.41	171.48	24.55	4987.8
2.44	3E	1099.62	182.25	167.15	24.75	4253.7
2.44	4B	1118.53	187.68	173.67	26.06	3893.3
2.44	4D	1097.90	186.49	171.99	24.80	3989.7
2.44	5B	1083.76	179.31	170.26	29.46	2469.1
	AVE	1095.49	185.44	170.95	24.97	3995.0

RUN 40601E

MASS FLOW = .0260 LBM/SEC INLET VAPOR TEMP = 230.0 DEG F TOTAL POWER = 1.86 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	1B	117.74	249.00	235.54	14.35	2866.7
12	2A	114.19	247.88	235.53	15.19	2869.4
12	4E	119.42	248.26	235.53	15.39	2868.5
	AVE	117.12	248.38	235.53	14.98	2868.2
24	1C	179.72	255.17	239.22	25.32	4934.3
24	3B	180.74	255.94	240.72	30.05	5692.2
24	5B	171.35	258.62	240.66	15.47	2893.8
	AVE	177.27	256.58	240.20	23.65	4506.7
39	1B	295.86	283.37	250.26	14.12	2759.4
39	2A	294.64	283.40	250.22	14.03	2761.2
39	4C	298.57	278.20	250.58	26.65	5773.8
39	4E	291.95	280.20	250.24	15.44	2765.9
	AVE	295.25	281.29	250.32	17.56	3515.1
48	1C	346.60	295.79	260.39	20.99	4759.0
48	3B	343.46	300.60	265.20	23.25	5313.3
48	5B	342.97	295.11	264.54	17.38	2765.8
	AVE	344.34	297.17	263.37	20.54	4259.3
60	1B	455.59	324.64	282.43	16.12	2617.6
60	2A	439.00	325.90	282.61	15.13	2602.4
60	4C	449.90	317.05	283.01	30.84	5447.5
	AVE	448.16	322.53	282.68	20.70	3555.8

RUN 40601E

MASS FLOW = .0260 LBM/SEC INLET VAPOR TEMP = 230.0 DEG F TOTAL POWER = 1.86 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (66.3)	2A	446.27	332.72	293.09	16.58	2658.9
67 (66.7)	2B	435.74	338.00	297.46	21.16	4296.5
67 (66.0)	2C	443.61	330.29	292.32	26.80	5384.8
67 (66.7)	2E	445.50	335.85	293.51	15.45	2639.5
67 (66.5)	4A	444.50	323.78	293.69	21.90	2677.7
67 (66.8)	4B	443.36	336.89	298.62	22.81	4247.3
67 (67.5)	4C	453.73	339.10	295.63	23.72	5375.8
67 (67.0)	4E	445.87	332.47	294.27	17.18	2674.8
	AVE	444.82	333.64	294.83	20.70	3744.4
70 (70.4)	2C	443.61	340.22	299.15	24.46	6677.9
70 (69.2)	3C	435.83	335.75	297.80	26.12	6100.9
70 (70.1)	3D	447.69	338.00	300.19	26.84	6627.4
	AVE	442.37	337.99	299.05	25.81	6468.7
72 (71.4)	3E	445.05	339.13	295.94	20.79	6135.5
72 (74.0)	5C	444.95	333.53	300.75	27.40	5735.6
	AVE	445.00	336.33	298.34	24.10	5935.6
73 (73.0)	1B	453.95	346.80	300.59	14.23	4363.7
73 (73.3)	2A	446.27	337.99	300.76	17.47	4518.6
	AVE	450.11	342.39	300.67	15.85	4441.2
74 (74.5)	2D	447.17	344.59	308.34	23.96	6515.1
74 (73.9)	4D	439.44	341.29	307.36	25.24	6583.4
	AVE	443.31	342.94	307.85	24.60	6549.2
75 (75.3)	1B	453.95	346.80	303.56	15.17	4019.0
75 (74.7)	1D	442.09	341.30	302.39	16.50	3756.0
75 (75.6)	2E	445.50	339.10	303.99	18.44	3571.1
75 (74.8)	5D	448.32	324.94	302.87	29.87	3932.4
	AVE	447.46	338.03	303.20	19.99	3819.6
76 (75.6)	1D	442.09	338.03	303.66	18.71	3513.3

76 (75.6)	3A	447.61	329.27	303.38	34.96	4655.4
76 (75.6)	3D	447.69	345.68	308.51	26.96	7005.5
76 (76.0)	4A	444.50	327.01	306.41	31.59	2904.6
76 (75.9)	4B	443.36	340.31	313.40	31.99	4495.5
76 (76.0)	4D	439.44	338.81	310.35	30.07	5794.9
76 (77.6)	5C	444.95	334.72	305.79	30.91	4576.6
76 (75.8)	5D	448.32	327.00	304.12	28.74	3671.8
	AVE	444.74	335.10	306.95	29.24	4577.2
77 (77.3)	1B	453.95	349.00	306.01	15.20	3306.5
77 (77.1)	1C	433.31	338.46	303.80	25.09	5033.8
77 (76.8)	1D	442.09	338.08	305.48	19.70	3261.7
77 (77.3)	2A	446.27	344.60	307.15	17.20	3036.9
77 (77.1)	2C	443.61	345.66	310.52	28.23	5873.9
77 (76.8)	2D	447.17	340.21	311.94	30.74	5386.8
77 (77.1)	3B	444.59	341.30	313.83	36.21	4829.4
77 (77.4)	5B	446.48	330.31	308.33	29.62	2821.7
77 (76.5)	5D	448.32	329.12	305.02	27.22	3500.1
	AVE	445.09	339.64	308.01	25.47	4116.7
78 (78.4)	1C	433.31	339.10	305.65	25.95	4847.2
78 (77.8)	2B	435.74	346.80	312.97	24.89	5009.2
78 (77.7)	2E	445.50	336.90	307.15	21.74	3007.7
78 (78.1)	3A	447.61	328.11	308.72	46.52	4138.4
78 (78.1)	3B	444.59	341.52	315.59	38.31	4721.3
78 (78.2)	3C	435.83	345.48	317.24	34.33	3459.5
78 (77.8)	4A	444.50	328.10	310.08	35.98	2671.4
78 (78.1)	4B	443.36	344.49	317.07	31.19	4064.2
78 (78.4)	4C	453.73	347.73	315.74	31.53	4684.9
78 (78.1)	4D	439.44	342.40	313.40	29.37	4905.5
78 (78.6)	4E	445.87	340.22	308.33	20.23	2898.4
78 (78.3)	5D	448.32	333.93	307.69	24.85	3103.7
	AVE	443.15	339.56	311.64	30.41	3959.3
79 (79.1)	2C	430.75	343.50	313.72	32.31	5413.6
79 (78.7)	2D	447.17	343.49	315.01	30.37	4835.2
79 (79.2)	3A	447.61	333.60	310.89	39.49	4188.3
79 (79.4)	3C	431.23	347.16	319.40	34.45	3467.8
79 (78.6)	3E	445.05	339.10	306.64	27.44	4344.2
79 (80.8)	5C	444.95	330.23	310.86	46.13	4573.6
	AVE	441.13	339.51	312.75	35.03	4470.5
80 (79.7)	2B	426.77	352.30	315.67	22.37	4715.4

80 (79.6)	3D	447.69	343.61	315.09	35.03	5192.2
80 (79.8)	4A	431.40	331.40	314.28	36.55	2639.6
80 (80.4)	4E	432.66	343.09	311.86	19.95	2833.2
80 (80.7)	5B	415.88	334.70	314.73	30.11	2703.7
80 (82.8)	5C	428.56	333.55	314.60	45.16	4689.2
	AVE	430.49	339.78	314.37	31.53	3795.5
81 (80.4)	3D	447.69	344.44	316.41	35.57	5071.3
	AVE	447.69	344.44	316.41	35.57	5071.3
82 (81.5)	3E	413.51	342.40	312.09	27.13	4514.2
	AVE	413.51	342.40	312.09	27.13	4514.2
84	1C	411.83	340.72	314.75	31.51	4711.9
84	2B	426.77	354.69	322.95	25.63	3572.1
84	2C	430.75	348.94	321.92	35.23	4465.3
84	2D	428.95	352.30	324.25	29.17	3569.4
84	3C	431.23	350.11	326.67	40.49	3932.6
84	3D	424.00	352.72	322.70	31.12	4548.4
84	3E	413.51	344.43	316.34	29.12	4575.1
84	4A	431.40	334.77	322.64	51.12	2608.9
84	4D	425.08	350.10	322.75	29.73	4047.0
84	5B	415.88	334.67	321.16	44.29	2696.2
84	5C	428.56	341.30	316.30	34.00	4638.2
	AVE	424.36	345.88	321.13	34.67	3942.3
90	1D	406.79	353.59	327.37	21.91	2563.8
90	2B	403.83	372.27	333.27	19.32	3785.2
90	2C	402.01	358.90	331.55	32.01	4838.9
90	2D	397.94	362.20	334.57	27.05	3805.8
90	2E	398.67	354.53	328.21	21.35	2485.9
90	3A	411.77	344.86	328.89	50.49	4231.1
90	3B	412.85	367.35	334.93	27.49	4634.0
90	3C	415.80	364.35	335.34	30.99	4690.1
90	3D	405.15	365.61	332.18	26.25	4873.9
90	3E	397.47	355.60	324.85	25.19	4369.4
90	4A	405.45	346.80	332.06	38.90	2474.7
90	4B	410.86	366.56	335.87	25.03	3808.4
90	4D	401.95	365.50	332.48	22.84	4011.3
90	5C	407.81	350.75	324.59	30.51	4407.0
90	5D	397.06	349.08	327.33	25.86	2578.8
	AVE	405.03	358.53	330.90	28.35	3837.2

96	1C	347.38	360.00	331.76	23.77	4223.4
96	2D	344.90	370.36	343.93	24.18	3878.6
96	2E	338.47	357.76	336.54	22.28	2438.6
96	3B	350.99	373.12	343.49	25.29	4844.5
96	3C	346.77	373.30	343.11	24.53	4971.5
96	3D	349.16	371.13	340.66	24.55	4987.8
96	3E	348.53	360.05	332.87	24.75	4253.7
96	4B	354.52	369.82	344.61	26.06	3893.3
96	4D	347.99	367.69	341.58	24.80	3989.7
96	5B	343.51	354.76	338.46	29.46	2469.1
	AVE	347.22	365.80	339.70	24.97	3995.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK

SUMMARY AND COMMENT SHEET

Run: 40901F

Test Date: 6/18/81

Test Type: Steam Cooling

Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.142 MPa (20.6 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.413 kw/m (0.0126 kw/ft)
Flow rate	0.0119 kg/sec (0.0263 lb/sec)
Coolant temperature	113°C (236°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 3811

(See following pages for additional results.)

C. Comments:

The power and flow were reduced approximately 23 percent to provide data at a lower Reynolds number.

RUN 40901F

MASS FLOW = .0119 KG/SEC INLET VAPOR TEMP = 113.3 DEG C TOTAL POWER = 1.90 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	4C	371.17	122.42	116.29	26.98	6024.2
.30	4E	348.85	122.33	116.27	16.51	2893.4
	AVE	360.01	122.38	116.28	21.74	4458.8
.61	3E	521.49	126.49	118.26	24.88	4974.8
	AVE	521.49	126.49	118.26	24.88	4974.8
.99	1B	903.97	140.92	124.11	14.88	2788.8
.99	2A	858.13	142.12	124.09	13.15	2786.0
.99	4C	919.09	139.67	124.16	25.53	5825.4
	AVE	893.73	140.90	124.12	17.85	3800.1
1.22	1C	1035.10	149.23	129.50	19.56	4800.8
1.22	2C	1038.57	149.57	131.39	24.03	5636.7
1.22	2E	1031.90	147.45	131.44	17.49	2778.4
1.22	3E	1020.26	144.90	129.52	25.00	4831.8
	AVE	1031.46	147.79	130.46	21.55	4511.9
1.52	1B	1273.13	163.32	141.19	15.07	2651.1
1.52	2A	1306.53	165.89	141.28	13.79	2629.0
1.52	4E	1360.03	154.72	141.33	26.92	2681.9
	AVE	1311.23	161.31	141.27	18.60	2654.0

RUN 4[illegible]

MASS FLOW = .0119 KG/SEC INLET VAPOR TEMP = 113.[illegible] DEG C TOTAL POWER = [illegible] KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.67)	2A	1346.63	168.22	146.33	15.89	2658.4
1.70(1.70)	2B	1358.22	171.90	148.92	20.39	4366.7
1.70(1.70)	4B	1355.46	176.32	149.87	17.55	4361.1
1.70(1.70)	3C	1362.19	163.28	144.66	26.33	4429.6
1.70(1.70)	3D	1352.35	162.70	147.75	23.51	2614.5
	AVE	1354.97	168.48	147.59	20.75	3673.9
1.78(1.77)	3C	1376.92	171.23	149.35	24.95	6552.6
1.78(1.78)	4B	1362.54	168.04	150.06	19.48	3861.3
	AVE	1366.71	169.64	149.70	22.21	5177.0
1.88(1.8[illegible])	3D	1392.74	171.79	150.94	26.52	7291.1
	AVE	1392.74	171.79	150.94	26.52	7291.1
1.88(1.87)	4D	1352.43	171.22	154.20	27.24	7645.9
	AVE	1352.43	171.22	154.20	27.24	7645.9
1.91(1.90)	2A	1369.54	170.65	152.17	19.57	4851.7
1.91(1.89)	1D	1366.27	169.32	151.97	20.[illegible]7	4359.3
1.91(1.90)	2D	1347.93	173.61	154.28	28.32	7490.8
1.91(1.89)	4D	1352.43	173.61	154.69	27.15	7588.8
	AVE	1357.54	172.15	153.28	24.[illegible]	6072.7
1.93(1.93)	1D	1366.27	167.53	152.91	23.85	3846.2
1.93(1.94)	2B	1371.85	162.46	152.98	35.82	3556.1
1.93(1.94)	4A	1355.46	173.67	158.51	30.37	4466.5
1.93(1.92)	4D	1352.43	170.65	155.56	30.66	6851.8
1.93(1.94)	3C	1362.19	164.50	153.38	43.46	5166.0
1.93(1.93)	3D	1352.35	165.28	153.35	26.82	4124.9
	AVE	1359.[illegible]9	167.58	154.45	31.84	4657.5
1.96(1.95)	1A	1369.54	171.78	153.40	18.07	3818.2
1.96(1.95)	1D	1366.27	167.55	153.75	25.23	3537.5
1.96(1.95)	2A	1346.63	173.73	153.95	17.26	3174.7

1.96(1.96)	2B	1356.22	175.50	156.72	24.57	5336.7
1.96(1.95)	2C	1347.93	169.42	155.95	34.3[illegible]	5629.2
1.96(1.95)	3B	1364.81	175.79	157.43	29.76	4644.7
1.96(1.96)	3C	1373.12	167.55	155.11	28.19	2995.9
	AVE	1360.[illegible]7	171.62	155.19	25.37	4105.8
1.98(1.97)	1C	1350.27	168.78	153.46	31.10	5340.2
1.98(1.98)	2A	1346.63	175.50	155.08	16.67	2968.6
1.98(1.98)	2B	1356.22	175.11	157.32	24.51	5113.2
1.98(1.98)	3A	1352.34	173.14	155.33	26.55	3983.5
1.98(1.97)	4A	1367.45	175.51	155.98	17.67	27[illegible]0.9
1.98(1.99)	4B	1355.46	175.11	159.81	28.1[illegible]	4084.7
1.98(1.99)	4C	1412.25	173.68	159.16	38.1[illegible]	4610.6
1.98(1.97)	4D	1352.43	171.18	157.36	36.[illegible]	5415.0
1.98(1.99)	4E	1362.5[illegible]	173.61	154.99	22.07	3131.6
1.98(1.99)	5C	1362.19	167.55	154.95	38.13	4662.1
1.98(1.99)	5D	1352.35	170.20	155.08	22.76	3352.8
	AVE	1361.11	172.49	156.22	27.4[illegible]	4124.9
2.01(2.00)	1B	1369.54	173.67	154.96	18.55	3376.1
2.01(2.[illegible])	1C	1356.27	169.38	154.27	31.49	5185.5
2.01(2.[illegible])	2C	1343.65	176.12	157.43	28.1[illegible]	5536.2
2.01(2.[illegible])	2D	1347.93	172.45	157.58	30.87	4858.[illegible]
2.01(1.99)	2E	1371.65	163.89	154.97	39.[illegible]4	2961.7
2.01(2.00)	3A	1334.52	175.52	156.31	24.21	4648.[illegible]
2.01(2.00)	3B	1364.81	179.14	159.23	26.65	4567.4
2.01(2.02)	3D	1392.74	175.35	158.44	32.2[illegible]	4890.2
2.01(2.01)	4B	1355.48	177.33	160.32	26.7[illegible]	4036.3
2.01(2.01)	1B	1373.11	168.19	157.05	31.37	2864.5
2.01(2.01)	5C	1362.19	169.27	155.8[illegible]	35.55	4651.8
	AVE	1360.55	172.75	156.92	29.52	4265.4
2.03(2.03)	1B	1369.54	174.37	155.92	18.77	3250.5
2.03(2.03)	1C	1364.65	169.88	155.16	31.10	5108.6
2.03(2.03)	2B	1359.35	179.14	158.79	21.60	4856.8
2.03(2.03)	2D	1340.57	173.65	158.38	29.85	4686.1
2.03(2.02)	3C	1345.53	178.35	161.41	30.79	3[illegible]1.1
2.03(2.04)	3D	1353.49	175.[illegible]1	159.39	31.[illegible]	4763.6
2.03(2.02)	4A	1286.6[illegible]	177.33	158.21	16.8[illegible]	2649.3
2.03(2.05)	4E	1366.2[illegible]	171.81	156.73	21.05	3034.0
	AVE	1323.99	175.07	158.[illegible]	25.29	3919.9
2.05(2.05)	3E	1289.52	168.17	156.33	38.31	4426.5

	AVE	1289.52	168.17	156.33	38.31	4416.3
2.13	1C	1364.66	172.20	158.42	33.04	4824.7
2.13	2B	1309.33	180.39	152.03	23.89	3765.2
2.13	2D	1340.57	178.11	162.31	28.40	3605.6
2.13	3C	1345.53	179.69	164.77	34.76	3956.9
2.13	3D	1333.49	178.14	162.62	33.27	4566.9
2.13	3E	1289.52	179.61	159.09	39.09	4616.7
2.13	4A	1280.60	177.11	162.62	22.07	2619.6
2.13	4D	1344.95	175.20	162.94	34.37	4091.3
2.13	5B	1304.94	179.00	161.81	40.16	2749.6
2.13	5D	1299.72	173.11	160.74	26.43	2886.1
	AVE	1315.23	175.55	161.73	31.59	3753.6
2.29	1D	1219.41	174.75	165.19	31.82	2635.6
2.29	2B	1179.78	169.07	167.41	17.89	3916.3
2.29	2C	1221.13	185.24	166.84	25.30	4917.4
2.29	2D	1214.69	184.67	167.81	23.86	3866.8
2.29	2E	1221.92	174.87	169.51	32.53	2556.2
2.29	3A	1195.15	185.28	166.27	21.31	4196.2
2.29	3B	1238.58	192.16	168.51	19.85	4691.1
2.29	3C	1262.82	189.43	169.22	24.87	4732.5
2.29	3D	1230.01	187.18	167.63	23.91	4876.3
2.29	4A	1255.21	182.77	167.67	20.42	2513.5
2.29	4B	1224.78	188.39	168.84	20.50	3913.3
2.29	4D	1279.10	186.05	168.26	23.69	4038.7
2.29	5B	1230.21	177.33	166.52	28.26	2597.3
2.29	5C	1193.99	179.26	164.46	27.64	4388.1
	AVE	1226.2[illegible]	183.95	167.15	24.41	3843.7
2.44	2C	1066.15	187.75	171.48	24.72	5056.5
2.44	2D	1050.39	186.29	172.72	25.33	3974.8
2.44	3C	1065.45	191.44	173.33	22.04	5038.9
2.44	3D	1117.36	189.03	172.04	24.71	5047.2
2.44	4A	1055.29	182.99	172.27	24.01	2408.0
2.44	4B	1093.26	189.63	173.67	22.2	3978.1
2.44	4D	1093.27	187.99	173.05	23.98	4119.8
2.44	5C	1070.53	183.99	168.62	29.41	4247.5
	AVE	1076.45	187.[illegible]1	172.14	24.50	4229.2

RUN 40901F

MASS FLOW = .0263 LBM/SEC INLET VAPOR TEMP = 236.0 DEG F TOTAL POWER = 1.80 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	4C	117.65	252.36	241.32	26.98	6024.2
12	4E	110.57	252.20	241.29	16.51	2893.4
	AVE	114.11	252.28	241.31	21.74	4458.8
24	3E	165.29	259.69	244.88	24.88	4974.8
	AVE	165.29	259.69	244.88	24.88	4974.8
39	1B	286.52	285.66	255.41	14.88	2788.8
39	2A	271.99	287.81	255.37	13.15	2786.0
39	4C	291.31	283.40	255.49	25.53	5825.4
	AVE	283.27	285.62	255.42	17.85	3800.1
48	1C	328.08	300.61	265.10	19.66	4800.8
48	2C	329.18	301.23	268.51	24.03	5636.7
48	2E	327.07	297.41	268.59	17.49	2778.4
48	3E	323.38	292.82	265.14	25.00	4831.8
	AVE	326.93	298.02	266.83	21.55	4511.9
60	1B	403.53	325.98	286.14	15.07	2651.1
60	2A	412.21	330.61	286.31	13.79	2629.0
60	4E	431.07	310.50	286.49	26.92	2681.9
	AVE	415.60	322.36	286.28	18.60	2654.0

RUN 4[illegible]

MASS FLOW = .0263 LBM/SEC INLET VAPOR TEMP = 236.0 DEG F TOTAL POWER = 1.3[illegible] BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (65.7)	2A	426.6[illegible]	334.79	295.39	15.89	2658.4
67 (66.8)	2B	43[illegible].5[illegible]	341.42	300.05	20.39	4366.7
67 (67.1)	4B	429.63	349.37	301.76	17.55	43[illegible].1
67 (67.1)	5C	431.76	325.9[illegible]	292.39	26.3[illegible]	4429.8
67 (66.9)	5D	426.64	324.85	297.95	23.51	2614.5
	AVE	429.47	333.27	297.51	20.73	3673.9
7[illegible] (69.5)	5C	434.52	34[illegible].21	300.83	24.9[illegible]	6552.6
7[illegible] (70.[illegible])	4E	431.85	334.48	302.11	19.46	38[illegible]1.3
	AVE	433.19	337.34	301.47	22.2[illegible]	5177.[illegible]
71 (70.7)	3D	441.44	341.22	303.70	26.5[illegible]	7291.1
	AVE	441.44	341.22	303.70	26.5[illegible]	7291.1
74 (73.6)	4D	428.6[illegible]	343.2[illegible]	309.56	27.24	7645.9
	AVE	428.6[illegible]	343.2[illegible]	309.56	27.24	7645.9
75 (74.7)	1B	434.[illegible]9	338.1[illegible]	305.90	19.57	4851.7
75 (74.5)	1D	431.1[illegible]	336.78	3[illegible]5.54	2[illegible].[illegible]	43[illegible]9.3
75 (74.7)	2D	427.24	339.10	309.71	29.32	749[illegible].8
75 (74.4)	4D	428.6[illegible]	339.10	310.44	29.1[illegible]	7588.8
	AVE	43[illegible].28	338.27	307.9[illegible]	24.2[illegible]	6072.7
76 (75.8)	1D	431.1[illegible]	333.55	307.24	23.85	384[illegible].2
76 (75.4)	2E	434.82	325.1[illegible]	307.37	35.8[illegible]	25[illegible]6.1
76 (76.2)	4A	429.63	344.50	317.32	3[illegible].37	4486.5
76 (75.5)	4D	428.6[illegible]	339.17	312.01	30.66	68[illegible]0.6
76 (76.2)	5C	431.76	328.1[illegible]	308.0[illegible]	43.48	5186.6
76 (75.9)	5D	428.64	331.31	308.03	26.82	4024.9
	AVE	43[illegible].77	333.65	310.[illegible]1	31.8[illegible]	4657.5
77 (76.9)	1B	434.[illegible]9	341.21	308.11	18.97	36[illegible]6.2
77 (76.8)	1D	431.1[illegible]	333.60	308.75	25.2[illegible]	35[illegible]7.5
77 (76.9)	2A	426.85	344.71	309.11	17.2[illegible]	3174.7

77 (77.2)	2B	436.53	347.96	314.10	24.57	5330.7
77 (76.9)	2D	427.24	336.96	312.71	34.31	5629.2
77 (76.7)	3B	432.59	348.43	315.37	29.06	4844.7
77 (77.0)	5B	435.22	333.60	311.20	28.19	2995.9
	AVE	431.08	34[illegible].91	311.34	25.37	4[illegible]85.8
78 (77.7)	1C	427.98	335.80	308.22	31.16	5345.2
78 (78.0)	2A	426.83	347.98	311.14	16.57	2968.6
78 (78.0)	2B	430.51	349.68	315.18	24.51	5113.2
78 (78.0)	3A	428.64	343.05	311.59	26.55	3983.5
78 (77.7)	4A	433.42	347.91	312.76	17.67	2710.9
78 (78.4)	4B	429.65	349.00	319.66	28.10	4684.7
78 (78.2)	4C	447.64	344.62	318.50	38.1[illegible]	4616.6
78 (77.5)	4D	426.66	338.32	315.24	36.70	5415.6
78 (78.3)	4E	431.85	339.19	316.82	22.07	3131.6
78 (78.3)	5C	431.76	333.60	310.92	38.15	4662.1
78 (78.2)	5D	426.64	338.35	311.15	22.76	3552.8
	AVE	431.41	342.48	313.2[illegible]	27.4[illegible]	4124.9
79 (78.9)	1B	434.09	344.50	310.92	18.55	3376.1
79 (78.8)	1C	427.98	336.88	309.69	31.49	5185.5
79 (78.6)	2C	425.65	349.32	315.37	28.11	5536.2
79 (78.9)	2D	427.24	342.41	315.64	30.87	4638.0
79 (78.5)	2E	434.82	327.[illegible]1	310.76	39.04	2981.7
79 (78.9)	3A	422.99	347.90	313.35	24.21	4048.0
79 (78.9)	3B	432.59	354.46	318.61	26.65	4567.4
79 (79.5)	3D	441.44	347.62	317.20	32.21	4896.2
79 (79.0)	4B	429.63	351.24	320.39	26.71	4036.3
79 (79.1)	5B	435.22	334.74	314.69	31.37	2854.5
79 (79.3)	5C	431.76	336.69	312.45	35.51	4635.8
	AVE	431.24	342.96	314.44	29.52	4265.4
8[illegible] (8[illegible].[illegible])	1B	434.09	345.86	312.66	18.74	3250.5
80 (8[illegible].[illegible])	1C	412.32	337.78	311.29	31.16	5168.8
80 (8[illegible].1)	2B	415.03	354.44	317.82	21.60	4836.0
8[illegible] (79.9)	2D	424.9[illegible]	344.56	317.09	29.8[illegible]	4666.1
8[illegible] (79.6)	3C	426.48	333.[illegible]3	322.53	37.79	3031.1
8[illegible] (8[illegible].5)	3D	422.66	348.82	318.91	31.3[illegible]	4763.0
80 (79.7)	4[illegible]	405.9[illegible]	351.19	316.77	16.9[illegible]	2649.3
8[illegible] (8[illegible].1)	4E	414.64	341.25	314.11	21.99	3[illegible]54.0
	AVE	419.65	347.12	316.46	25.29	3919.9
81 (8[illegible].9)	5E	408.72	334.70	313.39	38.3[illegible]	44[illegible]6.3

	AVE	406.72	334.70	313.39	38.31	4416.3
84	1C	413.52	341.96	317.16	33.04	4824.7
84	2B	415.06	356.72	323.66	23.89	3705.2
84	2D	424.90	352.61	324.13	28.48	3625.0
84	3C	426.48	352.43	328.59	34.76	3936.9
84	3D	422.66	352.66	324.72	32.27	4506.9
84	3E	408.72	339.10	318.36	39.19	4626.7
84	4A	405.9[illegible]	35[illegible].79	324.72	22.07	2619.0
84	4D	426.28	348.99	325.29	34.37	4091.3
84	5B	413.61	338.00	323.25	40.16	2749.6
84	5D	411.93	343.6[illegible]	321.33	26.43	2860.1
	AVE	416.9[illegible]	347.98	323.12	31.55	3795.6
90	1D	366.59	346.54	329.34	31.82	2635.6
90	2A	373.94	372.32	333.33	17.89	3910.3
90	2C	387.0[illegible]	355.43	332.31	25.30	4917.4
90	2D	385.00	354.40	334.05	23.8[illegible]	3866.8
90	2E	387.30	345.77	329.92	32.53	2538.2
90	3A	376.81	365.50	331.28	21.31	4190.2
90	3B	392.56	377.70	335.32	19.83	4091.1
90	3C	406.26	371.17	336.59	24.87	4732.5
90	3D	389.86	368.92	333.74	23.91	4878.3
90	4A	397.85	36[illegible].99	333.81	20.45	2513.5
90	4B	386.20	371.10	335.91	20.50	3915.3
90	4D	405.42	366.88	334.87	23.69	4038.7
90	5A	389.92	351.19	331.70	28.20	2597.3
90	5C	378.44	354.66	328.03	27.64	4366.1
	AVE	388.69	353.11	332.87	24.41	3843.7
96	2C	337.93	359.94	340.66	24.71	5058.5
96	2D	332.93	367.32	342.89	25.33	3974.8
96	3C	337.70	375.6[illegible]	343.99	22.[illegible]4	5038.9
96	3D	334.15	372.25	341.67	24.77	5047.2
96	4A	334.48	361.37	342.[illegible]8	24.[illegible]	2408.6
96	4B	346.92	373.33	344.49	22.21	3978.1
96	4D	346.32	37[illegible].37	343.50	23.90	4019.8
96	5C	339.31	357.77	335.51	29.4[illegible]	4247.5
	AVE	341.19	368.62	341.85	24.50	4229.2

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43202B
Test Date: 6/25/80
Test Type: Steam Cooling
Blockage Configuration: 9 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.143 MPa (20.7 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.103 kw/m (0.0313 kw/ft)
Flow rate	0.0280 kg/sec (0.0618 lb/sec)
Coolant temperature	112°C (233°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 9180

(See following pages for additional results.)

C. Comments:

RUN 432028

MASS FLOW = .0281 KG/SEC INLET VAPOR TEMP = 111.7 DEG C TOTAL POWER = 4.75 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	879.79	124.71	114.39	24.45	6910.7
.30	4A	868.32	124.82	114.41	23.90	6909.1
.30	4C	862.52	121.72	114.37	52.52	13902.7
.30	4E	846.41	122.49	114.39	30.06	6933.0
	AVE	864.26	123.43	114.39	32.73	8663.9
.61	1B	1398.48	131.75	117.38	27.51	6921.7
.61	1C	1365.61	128.35	116.60	45.62	11624.5
.61	4D	1414.34	127.52	117.73	55.33	10472.4
.61	5B	1426.86	130.69	117.43	30.47	6930.8
	AVE	1401.32	129.58	117.29	39.73	8987.4
.99	2A	2259.97	145.67	122.90	27.32	6647.7
.99	4A	2220.85	145.01	122.95	27.74	6635.5
.99	4C	2261.03	139.94	122.95	57.38	13288.6
.99	4E	2197.42	141.80	122.89	32.17	6680.4
	AVE	2234.82	143.10	122.92	36.15	8313.1
1.22	1B	2724.98	158.13	131.04	26.91	6554.2
1.22	1C	2753.81	150.68	129.02	47.57	11213.2
1.22	4D	2734.25	154.21	132.42	45.37	10126.5
1.22	5B	2788.95	155.23	131.47	31.51	6455.7
	AVE	2750.50	154.56	130.99	37.84	8587.4
1.52	2A	3314.07	165.68	141.46	35.71	6918.5
1.52	4A	3252.62	164.49	142.58	38.76	5762.8
1.52	4C	3205.70	160.33	141.90	71.02	10652.8
1.52	4E	3267.65	162.90	141.81	40.59	6445.4
	AVE	3260.01	163.35	141.94	46.52	7444.9

RUN 432028

MASS FLOW = .0281 KG/SEC INLET VAPOR TEMP = 111.7 DEG C TOTAL POWER = 4.75 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SCM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.72)	2A	3439.17	176.13	148.13	31.31	6417.0
1.70(1.72)	4A	3444.67	183.44	150.19	26.07	5671.0
1.70(1.70)	4C	3437.75	177.03	149.57	49.44	10806.8
1.70(1.71)	4E	3469.08	178.07	148.31	29.63	6177.5
	AVE	3447.67	178.67	149.05	34.11	7268.1
1.78(1.80)	1B	3543.50	176.01	150.61	35.44	6579.8
1.78(1.79)	1C	3425.32	175.35	147.56	43.45	10983.8
1.78(1.80)	2D	3431.19	178.47	153.32	46.35	9529.2
1.78(1.78)	3C	3520.51	178.41	151.98	52.32	11555.6
1.78(1.79)	4D	3477.34	182.14	154.28	42.13	8947.9
	AVE	3479.57	178.08	151.55	43.94	9519.3
1.80(1.83)	1D	3399.80	181.16	151.69	29.05	7535.2
1.80(1.82)	2D	3431.19	180.25	154.07	44.38	9843.0
1.80(1.81)	3C	3520.51	180.02	152.89	50.80	11101.0
1.80(1.83)	3E	3459.73	179.79	149.54	39.96	11522.3
1.80(1.81)	4B	3415.49	181.95	156.10	44.50	9081.1
1.80(1.82)	5D	3449.20	179.83	152.35	31.64	6955.3
	AVE	3445.99	180.50	152.77	40.76	9339.7
1.83(1.85)	1C	3425.32	176.03	149.50	45.34	14570.5
1.83(1.86)	2E	3497.84	176.51	153.00	37.66	8860.0
1.83(1.86)	3A	3334.61	181.02	151.42	39.18	14165.9
1.83(1.85)	5B	3367.63	174.89	154.12	41.07	9317.3
1.83(1.84)	5C	3613.79	179.56	150.58	43.51	12741.1
	AVE	3447.84	177.60	151.72	41.35	11931.0
1.88(1.91)	1D	3399.80	178.13	154.49	36.23	6115.2
1.88(1.91)	2B	3560.33	178.70	157.60	57.00	9691.4
1.88(1.91)	2C	3454.67	176.44	155.76	65.44	12469.7
1.88(1.90)	2D	3431.19	177.24	157.11	57.72	9835.8
1.88(1.91)	2E	3497.84	176.33	154.94	41.28	5954.6
1.88(1.92)	3A	3334.61	179.15	153.37	44.98	10191.4
1.88(1.91)	3B	3389.28	178.90	157.41	61.46	11930.6
1.88(1.88)	3C	3520.51	179.17	156.37	60.24	12715.8

1.88(1.91)	3D	3391.68	176.34	156.77	67.81	12020.6
1.88(1.91)	3E	3459.73	180.36	152.39	43.50	10335.0
1.88(1.89)	4B	3415.49	179.50	158.95	55.97	9587.3
1.88(1.89)	5C	3613.79	179.89	152.01	46.08	10442.6
1.88(1.90)	5D	3449.20	182.85	155.14	31.13	6007.5
	AVE	3455.24	178.67	155.61	51.45	9792.1
1.91(1.94)	1D	3399.80	175.44	155.69	43.46	6143.7
1.91(1.94)	2C	3454.67	180.17	156.97	57.95	12404.3
1.91(1.93)	2D	3431.19	179.14	158.20	55.25	9644.7
1.91(1.92)	3C	3520.51	176.78	157.50	71.35	12275.3
1.91(1.94)	3E	3459.73	182.31	153.36	41.38	10244.4
1.91(1.92)	4B	3415.49	179.93	159.91	57.34	9304.0
1.91(1.93)	5D	3449.20	189.59	156.57	25.83	5838.3
	AVE	3447.23	180.48	156.88	50.36	9407.8
1.93(1.95)	2A	3439.17	177.33	156.40	41.34	6008.4
1.93(1.96)	2B	3560.33	182.25	159.41	52.26	9612.9
1.93(1.95)	2D	3431.19	181.99	159.19	50.47	9610.4
1.93(1.96)	2E	3497.84	180.09	156.84	37.68	5960.5
1.93(1.96)	3A	3334.61	186.38	155.03	45.56	10069.1
1.93(1.96)	3B	3389.28	183.10	159.06	54.49	11890.7
1.93(1.94)	3C	3520.51	180.11	158.24	62.54	12284.3
1.93(1.96)	3D	3391.68	181.78	158.50	56.47	11971.9
1.93(1.96)	4A	3444.67	179.78	158.70	40.86	5881.1
1.93(1.94)	4C	3437.75	181.86	158.47	56.94	11747.8
1.93(1.94)	4E	3469.08	186.18	156.66	29.20	5997.7
1.93(1.94)	5C	3613.79	181.02	154.33	46.92	9976.5
	AVE	3460.83	181.32	157.57	47.89	9250.9
1.96(1.99)	1D	3399.80	182.94	157.77	33.66	6108.2
1.96(1.98)	2C	3454.67	185.44	158.57	49.56	12241.1
1.96(1.98)	2D	3431.19	185.32	160.17	45.49	9564.3
1.96(1.96)	3C	3520.51	184.28	159.25	54.26	12215.7
1.96(1.99)	3E	3459.73	184.73	155.07	40.17	10140.7
1.96(1.96)	4B	3415.49	184.32	161.20	49.24	9330.9
1.96(1.98)	5D	3449.20	184.78	158.69	32.81	5909.3
	AVE	3447.23	184.55	158.67	43.60	9358.6
1.98(2.00)	2A	3439.17	181.64	158.08	36.42	5981.5
1.98(2.01)	2B	3560.33	186.79	161.51	46.79	9501.1
1.98(2.00)	2D	3431.19	186.86	160.96	44.03	9537.2
1.98(2.01)	2E	3497.84	183.80	158.82	34.81	5965.0

1.98(2.01)	3A	3334.61	182.22	157.01	45.59	9977.8
1.98(2.01)	3B	3389.28	189.43	161.19	45.84	11735.1
1.98(1.99)	3C	3520.51	186.99	160.36	50.72	12149.0
1.98(2.01)	3D	3391.68	187.39	160.44	48.25	11849.3
1.98(2.01)	4A	3444.67	182.89	160.77	38.83	5914.4
1.98(1.99)	4C	3437.75	186.84	160.23	49.59	11675.5
1.98(1.99)	4E	3469.06	189.88	158.70	27.42	6023.1
1.98(2.00)	5C	3613.79	182.72	156.34	47.22	9841.5
	AVE	3460.83	185.61	159.53	42.96	9179.2
2.13	1B	3126.01	176.49	163.04	58.02	6439.1
2.13	1C	3230.23	179.35	159.93	57.33	11139.4
2.13	2B	3133.83	184.65	166.15	56.08	8226.4
2.13	2E	3237.14	185.08	163.82	37.51	5962.0
2.13	3A	3157.53	180.38	161.80	58.33	9998.1
2.13	3B	3291.81	187.29	165.70	58.04	9778.6
2.13	3D	3145.12	186.86	164.99	54.85	10317.3
2.13	4D	3206.38	186.10	166.19	53.20	9193.6
2.13	5B	3183.79	177.33	165.57	67.23	6360.3
2.13	5C	3174.41	179.10	161.85	63.29	10870.6
	AVE	3188.63	182.26	163.90	56.39	8828.5
2.29	1D	2990.11	192.50	167.92	29.50	6058.0
2.29	2B	2954.58	195.12	171.61	40.71	8654.2
2.29	2C	2986.66	196.58	169.99	41.98	11025.2
2.29	2E	3023.66	190.82	168.54	32.96	5848.6
2.29	3A	2888.93	185.33	166.95	53.23	9849.9
2.29	3B	3074.52	197.88	171.39	43.21	10569.2
2.29	3D	2958.70	197.24	170.47	41.25	10915.4
2.29	3E	2923.69	189.61	165.68	41.19	10147.1
2.29	4B	3209.43	194.50	172.71	47.68	8906.8
2.29	5C	3109.24	185.04	166.68	57.36	10308.0
2.29	5D	2921.53	194.79	169.34	27.70	6018.6
	AVE	3003.73	192.67	169.21	41.52	8936.4
2.44	1B	2576.90	167.64	172.17	40.42	5938.9
2.44	1C	2573.10	188.25	169.35	45.75	10199.1
2.44	2B	2445.67	194.85	176.47	42.82	8917.6
2.44	2E	2563.85	194.79	173.07	28.35	5766.8
2.44	3A	2536.77	188.64	171.72	50.21	9744.5
2.44	3B	2550.59	199.28	176.24	40.89	11038.1
2.44	3D	2559.80	198.47	175.26	40.82	11256.4
2.44	4D	2604.93	198.69	176.23	37.14	9177.2
2.44	5B	2646.89	188.79	175.09	45.66	5863.9
2.44	5C	2844.36	189.76	171.36	51.70	9920.7
	AVE	2590.29	192.92	173.70	42.48	8782.3

RUN 43202B

MASS FLOW = .0620 LBM/SEC INLET VAPOR TEMP = 233.0 DEG F TOTAL POWER = 4.50 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	278.86	256.48	237.91	24.45	6910.7
12	4A	275.22	256.68	237.93	23.90	6909.1
12	4C	273.38	251.09	237.86	52.52	13902.7
12	4E	268.28	252.47	237.90	30.06	6933.0
	AVE	273.93	254.18	237.90	32.73	8663.9
24	1B	443.26	269.16	243.28	27.51	6921.7
24	1C	432.84	263.03	241.88	45.62	11624.5
24	4D	448.28	261.53	243.92	55.33	10472.4
24	5B	452.25	267.24	243.38	30.47	6930.8
	AVE	444.16	265.24	243.11	39.73	8987.4
39	2A	716.31	294.20	253.21	27.32	6647.7
39	4A	703.92	293.01	253.31	27.74	6635.5
39	4C	716.65	283.89	253.31	57.38	13288.6
39	4E	696.49	287.24	253.20	32.17	6680.4
	AVE	708.34	289.58	253.26	36.15	8313.1
48	1B	863.70	316.63	267.86	26.91	6554.2
48	1C	872.84	303.23	264.24	47.57	11213.2
48	4D	866.64	309.59	270.36	45.37	10126.5
48	5B	883.98	311.41	268.65	31.51	6455.7
	AVE	871.79	310.21	267.78	37.84	8587.4
60	2A	1050.42	330.23	286.64	35.71	6918.5
60	4A	1030.94	328.08	288.65	38.76	5762.8
60	4C	1016.07	320.60	287.42	71.02	10652.8
60	4E	1035.70	325.22	287.27	40.59	6445.4
	AVE	1033.28	326.03	287.49	46.52	7444.9

RUN 43202B

MASS FLOW = .0620 LBM/SEC INLET VAPOR TEMP = 233.0 DEG F TOTAL POWER = 4.50 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.7)	2A	1090.07	349.03	298.63	31.31	6417.0
67 (67.9)	4A	1091.61	362.20	302.35	26.07	5671.0
67 (67.1)	4C	1089.62	350.65	301.23	49.44	10806.8
67 (67.3)	4E	1099.55	352.52	298.96	29.63	6177.5
	AVE	1092.76	353.60	300.29	34.11	7268.1
70 (70.7)	1B	1123.14	348.82	303.10	35.44	6579.8
70 (70.6)	1C	1085.68	347.62	297.60	43.45	10983.8
70 (70.7)	2D	1087.54	353.24	307.98	46.35	9529.2
70 (70.2)	3C	1115.85	353.15	305.57	52.32	11555.6
70 (70.5)	4D	1102.17	359.86	309.70	42.13	8947.9
	AVE	1102.88	352.54	304.79	43.94	9519.3
71 (72.1)	1D	1077.59	358.09	305.03	29.05	7535.2
71 (71.6)	2D	1087.54	356.45	309.33	44.38	9843.0
71 (71.1)	3C	1115.85	356.03	307.20	50.80	11101.0
71 (72.1)	3E	1096.59	355.62	301.17	39.96	11522.3
71 (71.3)	4B	1082.56	359.52	312.98	44.50	9081.1
71 (71.7)	5D	1093.25	355.70	306.23	31.64	6955.3
	AVE	1092.23	356.90	306.99	40.06	9339.7
72 (72.7)	1C	1085.68	348.86	301.10	45.34	14570.5
72 (73.2)	2E	1108.67	349.71	307.40	37.66	8860.0
72 (73.2)	3A	1056.93	357.84	304.55	39.18	14165.9
72 (73.0)	5B	1067.39	346.80	309.42	41.07	9317.3
72 (72.4)	5C	1145.42	355.21	303.04	43.51	12741.1
	AVE	1092.82	351.68	305.10	41.35	11931.0
74 (75.2)	1D	1077.59	352.64	310.08	36.23	6115.2
74 (75.3)	2B	1128.47	353.65	315.69	57.00	9691.4
74 (75.0)	2C	1094.98	349.59	312.36	65.44	12469.7
74 (74.7)	2D	1087.54	351.03	314.80	57.72	9835.8
74 (75.3)	2E	1108.67	349.40	310.89	41.28	5954.6
74 (75.4)	3A	1056.93	354.48	308.06	44.98	10191.4
74 (75.2)	3B	1074.26	354.02	315.34	61.46	11930.6
74 (74.2)	3C	1115.85	354.50	313.47	60.24	12715.8

74 (75.2)	3D	1075.02	349.42	314.19	67.81	12020.6
74 (75.2)	3E	1096.59	356.10	306.30	43.50	10335.0
74 (74.4)	4B	1082.56	355.09	318.11	55.97	9587.3
74 (74.6)	5C	1145.42	355.80	306.69	46.08	10442.6
74 (74.8)	5D	1093.25	361.13	311.25	31.13	6007.5
	AVE	1095.16	353.60	312.09	51.45	9792.1
75 (76.4)	1D	1077.59	347.80	312.24	43.46	6143.7
75 (76.3)	2C	1094.98	356.30	314.54	57.95	12404.3
75 (75.8)	2D	1087.54	354.45	316.76	55.25	9644.7
75 (75.4)	3C	1115.85	350.20	315.50	71.35	12275.3
75 (76.3)	3E	1096.59	360.16	308.05	41.38	10244.4
75 (75.6)	4B	1082.56	355.87	319.84	57.34	9304.0
75 (76.1)	5D	1093.25	373.26	313.82	25.83	5838.3
	AVE	1092.62	356.67	314.39	50.36	9407.8
76 (76.9)	2A	1090.07	351.20	313.52	41.34	6008.4
76 (77.1)	2B	1128.47	360.04	318.94	52.26	9612.9
76 (76.8)	2D	1087.54	359.58	318.54	50.47	9610.4
76 (77.2)	2E	1108.67	356.17	314.32	37.68	5960.5
76 (77.2)	3A	1056.93	356.69	311.05	45.56	10069.1
76 (77.0)	3B	1074.26	361.57	318.30	54.49	11890.7
76 (76.2)	3C	1115.85	356.19	316.83	62.54	12284.3
76 (77.1)	3D	1075.02	359.20	317.30	56.47	11971.9
76 (77.0)	4A	1091.81	355.60	317.67	40.86	5881.1
76 (76.3)	4C	1089.62	359.35	317.24	56.94	11747.8
76 (76.5)	4E	1099.55	367.12	313.99	29.20	5997.7
76 (76.5)	5C	1145.42	357.83	309.80	46.92	9976.5
	AVE	1096.93	358.38	315.62	47.89	9250.9
77 (78.5)	1D	1077.59	361.30	315.99	33.66	6108.2
77 (78.0)	2C	1094.98	365.79	317.42	49.56	12241.1
77 (77.8)	2D	1087.54	365.58	320.30	45.49	9564.3
77 (77.3)	3C	1115.85	363.70	318.65	54.26	12215.7
77 (78.2)	3E	1096.59	364.52	311.13	40.17	10140.7
77 (77.2)	4B	1082.56	363.78	322.15	49.24	9330.9
77 (78.1)	5D	1093.25	364.61	317.64	32.81	5909.3
	AVE	1092.62	364.18	317.61	43.60	9358.6
78 (78.6)	2A	1090.07	358.95	316.54	36.42	5981.5
78 (79.2)	2B	1128.47	368.21	322.72	46.79	9501.1
78 (78.6)	2D	1087.54	368.34	321.72	44.03	9537.2
78 (79.2)	2E	1108.67	362.84	317.88	34.81	5965.0

78 (79.3)	3A	1056.93	360.00	314.62	45.59	9977.8
78 (79.3)	3B	1074.26	372.98	322.14	45.84	11735.1
78 (78.5)	3C	1115.85	368.58	320.64	50.72	12149.0
78 (79.2)	3D	1075.02	369.31	320.79	48.25	11849.3
78 (79.0)	4A	1091.81	361.03	321.39	38.83	5914.4
78 (78.3)	4C	1089.62	368.31	320.41	49.59	11675.5
78 (78.5)	4E	1099.55	373.79	317.65	27.42	6023.1
78 (78.6)	5C	1145.42	360.90	313.41	47.22	9841.5
	AVE	1096.93	366.10	319.16	42.96	9179.2
84	1B	990.81	349.68	325.47	58.02	6439.1
84	1C	1023.85	354.83	319.88	57.33	11139.4
84	2B	993.29	364.37	331.07	56.08	8226.4
84	2E	1026.04	365.15	326.87	37.51	5962.0
84	3A	1000.80	356.68	323.23	58.33	9998.1
84	3B	1043.36	369.13	330.26	58.04	9778.6
84	3D	996.87	368.35	328.98	54.85	10317.3
84	4D	1016.29	366.97	331.14	53.20	9193.6
84	5B	1009.13	351.20	330.02	67.23	6360.3
84	5C	1006.15	354.38	323.34	63.29	10870.6
	AVE	1010.66	360.07	327.03	56.39	8828.5
90	1D	947.74	378.50	334.25	29.50	6058.0
90	2B	936.48	383.21	340.90	40.71	8654.2
90	2C	946.64	365.84	337.97	41.98	11025.2
90	2E	958.37	375.48	335.36	32.96	5848.6
90	3A	915.67	365.59	332.51	53.23	9849.9
90	3B	974.49	368.19	340.50	43.21	10569.2
90	3D	937.78	367.03	338.84	41.25	10915.4
90	3E	926.68	373.30	330.23	41.19	10147.1
90	4B	1017.25	382.10	342.88	47.68	8906.8
90	5C	985.50	365.07	332.02	57.36	10308.0
90	5D	926.00	362.63	336.81	27.70	6018.6
	AVE	952.05	378.81	336.57	41.52	8936.4
96	1B	816.77	369.76	341.90	40.42	5938.9
96	1C	815.56	370.86	336.83	45.75	10199.1
96	2B	775.17	382.73	349.64	42.82	8917.6
96	2E	812.63	382.62	343.53	28.35	5766.8
96	3A	804.05	371.55	341.10	50.21	9744.5
96	3B	808.43	390.70	349.24	40.89	11038.1
96	3D	811.35	389.25	347.46	40.82	11256.4
96	4D	825.65	369.64	349.21	37.14	9177.2
96	5B	838.95	371.81	347.16	46.66	5863.9
96	5C	901.54	373.57	340.45	51.70	9920.7
	AVE	821.01	379.25	344.65	42.48	8782.3

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43902C
Test Date: 9/8/80
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.140 MPa (20.3 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.10 kw/m (0.032 kw/ft)
Flow rate	0.028 kg/sec (0.062 lb/sec)
Coolant temperature	112°C (233°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 9260

(See following pages for additional results.)

C. Comments:

RUN 43902C

MASS FLOW = .0281 KG/SEC INLET VAPOR TEMP = 111.7 DEG C TOTAL POWER = 4.86 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	909.53	129.55	114.43	17.14	6892.2
.30	4A	896.06	129.72	114.44	16.75	6890.0
.30	4C	857.22	125.78	114.40	33.54	13877.4
.30	4E	838.91	127.73	114.44	18.02	6909.9
	AVE	875.93	128.20	114.43	21.37	8642.4
.61	1B	1398.25	137.50	117.45	19.57	6893.9
.61	1C	1436.46	134.30	116.69	31.77	11571.8
.61	4D	1452.94	133.71	117.85	34.79	10420.5
	AVE	1429.22	135.17	117.33	28.71	9628.7
.99	2A	2205.82	152.09	123.03	20.72	6614.5
.99	4A	2285.03	153.63	123.08	20.37	6582.3
.99	4C	2411.18	147.43	123.08	42.29	13199.4
.99	4E	2314.82	149.12	123.07	24.35	6637.4
	AVE	2304.21	150.57	123.06	26.93	8258.4
1.22	1B	2603.00	165.48	131.25	20.15	6514.0
1.22	1C	2734.11	160.04	129.29	32.84	11107.3
1.22	4D	2876.06	160.52	132.76	37.14	10072.3
1.22	5B	2766.66	163.27	131.58	23.19	6412.8
	AVE	2744.96	162.33	131.22	28.33	8526.6
1.52	2A	3385.24	176.77	141.90	24.95	6219.6
1.52	4A	3273.32	179.34	142.45	22.71	6123.3
1.52	4E	3311.94	172.28	141.80	28.10	6292.8
	AVE	3323.50	176.13	142.05	25.25	6211.9

RUN 43902C

MASS FLOW = .0281 KG/SEC INLET VAPOR TEMP = 111.7 DEG C TOTAL POWER = 4.86 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.71)	2A	3669.99	183.86	148.60	26.24	6356.4
1.70(1.71)	4A	3416.00	190.25	149.81	21.08	5714.7
1.70(1.71)	4C	3627.33	183.34	150.16	42.77	10971.9
1.70(1.69)	4E	3565.90	183.83	148.14	25.20	6189.7
	AVE	3569.81	185.32	149.17	28.82	7308.2
1.78(1.80)	1C	3585.89	181.67	148.69	37.95	10670.2
1.78(1.79)	2D	3532.37	186.50	153.93	36.43	9429.2
1.78(1.80)	3C	3564.25	186.70	153.40	41.50	11350.7
1.78(1.80)	4D	3628.10	191.12	155.19	33.64	8886.9
1.78(1.80)	5B	3644.00	185.53	152.69	27.76	6250.1
	AVE	3590.92	186.30	152.78	35.45	9317.4
1.80(1.81)	2D	3532.37	188.56	154.75	34.96	9435.7
1.80(1.83)	3C	3564.25	188.37	154.35	40.48	11353.6
1.80(1.81)	3E	3654.46	186.97	149.64	33.87	10396.2
1.80(1.82)	5D	3555.83	182.23	152.87	30.42	7217.3
	AVE	3576.73	186.53	152.90	34.93	9600.7
1.83(1.83)	3A	3715.75	192.61	151.25	30.78	10736.7
1.83(1.83)	5C	3600.91	187.05	150.93	34.43	10910.3
	AVE	3658.33	189.83	151.09	32.61	10823.5
1.88(1.93)	1D	3448.66	176.50	156.28	43.00	6172.9
1.88(1.89)	2B	3526.28	182.61	157.31	46.83	10151.7
1.88(1.91)	2C	3366.81	180.75	156.48	54.00	12519.7
1.88(1.89)	2D	3532.37	181.04	157.27	50.06	10341.2
1.88(1.93)	2E	3406.76	177.38	156.53	41.12	6104.0
1.88(1.88)	3A	3715.75	181.62	153.16	45.29	11035.6
1.88(1.91)	3C	3564.25	178.90	157.58	65.14	12781.1
1.88(1.90)	3D	3512.15	179.44	156.84	60.57	12310.2
1.88(1.89)	3E	3654.46	179.51	152.63	47.34	11003.4
1.88(1.93)	4B	3537.27	183.71	159.65	49.18	9418.0
1.88(1.88)	5C	3600.91	183.82	152.87	40.27	11115.4
1.88(1.90)	5D	3555.83	177.89	155.82	40.56	6071.9

	AVE	3535.13	180.26	156.04	48.61	9918.8
1.91(1.95)	1D	3448.66	180.77	157.43	36.96	6187.2
1.91(1.94)	2C	3366.81	186.44	157.49	44.86	12412.9
1.91(1.91)	2D	3532.37	180.33	157.89	53.02	9770.3
1.91(1.93)	3C	3564.25	182.51	158.58	57.67	12767.3
1.91(1.92)	3E	3654.46	177.24	153.55	53.80	10165.8
1.91(1.96)	4B	3537.27	187.44	160.50	43.66	9464.6
1.91(1.94)	5D	3555.83	180.46	157.57	38.86	6035.8
	AVE	3522.81	182.17	157.57	46.98	9543.4
1.93(1.95)	2A	3669.99	186.59	157.44	31.24	6086.8
1.93(1.94)	2B	3526.28	186.56	158.52	41.97	9846.4
1.93(1.94)	2D	3532.37	183.85	158.56	46.79	9811.1
1.93(1.96)	2E	3406.76	180.31	157.89	38.00	6140.8
1.93(1.93)	3A	3715.75	179.30	154.71	52.47	9918.0
1.93(1.94)	3B	3593.49	183.77	158.50	54.97	12111.6
1.93(1.96)	3C	3564.25	185.64	159.39	52.28	12682.3
1.93(1.95)	3D	3512.15	185.23	158.33	50.37	12141.8
1.93(1.94)	4A	3416.00	182.22	158.49	35.89	5897.7
1.93(1.94)	4C	3627.33	183.65	158.83	56.49	11984.8
1.93(1.92)	4E	3565.90	184.40	156.57	31.92	5984.6
	AVE	3557.30	183.78	157.93	44.76	9327.8
1.96(2.00)	1D	3448.66	184.90	159.36	33.50	6191.5
1.96(1.94)	2C	3366.81	185.83	157.58	46.00	12418.0
1.96(1.96)	2D	3532.37	187.21	159.17	41.96	9798.0
1.96(1.98)	3C	3564.25	189.32	160.20	46.85	12578.8
1.96(1.96)	3E	3654.46	181.52	155.25	48.12	9942.5
1.96(2.00)	4B	3537.27	192.09	161.88	38.61	9465.6
1.96(1.97)	5D	3555.83	183.93	158.83	35.22	6059.3
	AVE	3522.81	186.40	158.90	41.46	9493.4
1.98(2.00)	2A	3669.99	193.97	159.48	26.07	6068.7
1.98(2.02)	2B	3526.28	192.88	160.99	36.46	9744.9
1.98(1.99)	2D	3532.37	190.65	160.15	38.35	9764.7
1.98(2.03)	2E	3406.76	184.65	160.45	34.87	6151.8
1.98(1.98)	3A	3715.75	184.19	156.76	46.60	9719.4
1.98(1.99)	3B	3593.49	191.64	160.34	43.79	11936.8
1.98(2.00)	3C	3564.25	192.07	161.11	43.84	12478.7
1.98(2.00)	3D	3512.15	191.69	160.27	42.64	11986.6
1.98(2.00)	4A	3416.00	185.95	160.65	33.39	5964.1
1.98(2.00)	4C	3627.33	189.55	160.66	48.00	11876.6
1.98(1.98)	4E	3565.90	192.15	158.80	26.28	6015.3

1.98(1.98)	5C	3600.91	179.61	156.47	53.88	9869.5
	AVE	3560.93	189.08	159.68	39.51	9298.1
2.13	1B	3191.85	187.44	164.34	33.94	6342.3
2.13	1C	3299.86	181.23	161.58	57.62	10947.6
2.13	2B	3271.76	190.29	165.56	43.50	8364.2
2.13	2E	3239.62	187.15	164.70	35.44	5989.9
2.13	3A	3224.48	188.40	162.79	42.70	9855.9
2.13	3B	3248.88	190.04	165.52	50.26	9920.1
2.13	3D	3271.79	190.27	165.08	49.31	10419.9
2.13	4D	3376.71	193.66	165.97	39.88	9266.5
2.13	5B	3219.01	187.77	165.64	35.63	6346.1
2.13	5C	3257.57	184.60	162.56	50.39	10862.1
	AVE	3260.15	188.09	164.37	43.87	8831.5
2.29	2B	3027.51	202.56	171.41	31.18	8828.5
2.29	2C	3334.69	201.83	170.21	39.14	11051.9
2.29	2E	3018.83	193.74	170.12	30.86	5879.3
2.29	3A	3068.35	196.46	167.96	35.85	9680.5
2.29	3B	3072.43	204.07	171.11	34.45	10699.9
2.29	3D	3083.23	203.07	170.52	35.09	10993.6
2.29	4B	3198.65	202.46	172.34	34.02	8980.5
2.29	5C	3092.11	191.67	167.46	42.85	10289.7
2.29	5D	3335.30	188.94	170.16	43.18	6176.6
	AVE	3136.72	198.31	170.14	36.29	9175.6
2.44	1B	2638.37	198.22	174.84	26.91	5863.8
2.44	1C	2671.01	191.88	171.48	43.68	9970.6
2.44	2B	2768.89	204.78	176.53	31.12	9036.1
2.44	2E	2571.06	198.03	175.19	26.85	5792.8
2.44	3A	2816.47	199.40	172.92	35.04	9570.0
2.44	3B	2725.74	206.67	176.07	32.57	11125.2
2.44	3D	2701.97	204.25	175.45	34.46	11309.5
2.44	4D	2607.63	204.96	176.34	28.93	9248.3
2.44	5B	2680.40	195.18	175.91	33.25	5891.4
2.44	5C	2771.52	196.33	172.29	38.18	9925.5
	AVE	2695.31	199.97	174.70	33.10	8773.3

RUN 43902C

MASS FLOW = .0620 LBM/SEC INLET VAPOR TEMP = 233.0 DEG F TOTAL POWER = 4.51 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	288.28	265.19	237.98	17.14	6892.2
12	4A	284.65	265.49	238.00	16.75	6890.0
12	4C	271.70	258.41	237.93	33.54	13877.4
12	4E	265.90	261.92	237.99	18.02	6909.9
	AVE	277.63	262.75	237.97	21.37	8642.4
24	1B	443.19	279.51	243.41	19.57	6893.9
24	1C	455.30	273.73	242.03	31.77	11571.8
24	4D	460.52	272.68	244.13	34.79	10420.5
	AVE	453.00	275.31	243.19	28.71	9628.7
39	2A	699.15	305.77	253.46	20.72	6614.5
39	4A	724.26	308.53	253.54	20.37	6582.3
39	4C	764.24	297.37	253.55	42.29	13199.4
39	4E	733.70	300.41	253.52	24.35	6637.4
	AVE	730.34	303.02	253.51	26.93	8258.4
48	1B	825.04	329.86	268.25	20.15	6514.0
48	1C	866.60	320.08	264.72	32.84	11107.3
48	4D	911.59	320.94	270.96	37.14	10072.3
48	5B	876.91	325.89	268.84	23.19	6412.8
	AVE	870.03	324.19	268.19	28.33	8526.6
60	2A	1072.97	350.19	287.42	24.95	6219.6
60	4A	1037.50	354.81	288.42	22.71	6123.3
60	4E	1049.74	342.11	287.24	28.10	6292.8
	AVE	1053.41	349.04	287.69	25.25	6211.9

RUN 43902C

MASS FLOW = .0620 LBM/SEC INLET VAPOR TEMP = 233.0 DEG F TOTAL POWER = 4.61 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.5)	2A	1163.23	362.95	299.47	26.24	6356.4
67 (67.4)	4A	1082.73	374.44	301.66	21.08	5714.7
67 (67.3)	4C	1149.71	362.01	302.28	42.77	10971.9
67 (66.7)	4E	1136.24	362.90	298.64	25.20	6189.7
	AVE	1131.48	365.58	300.51	28.82	7308.2
70 (70.8)	1C	1136.57	359.01	299.64	37.95	10670.2
70 (70.3)	2D	1119.61	367.71	309.08	36.43	9429.2
70 (71.0)	3C	1129.71	368.06	308.12	41.50	11350.7
70 (70.8)	4D	1149.95	376.02	311.33	33.64	8886.9
70 (70.9)	5B	1154.99	365.95	306.84	27.76	6250.1
	AVE	1138.17	367.35	307.00	35.45	9317.4
71 (71.2)	2D	1119.61	371.41	310.56	34.96	9435.7
71 (71.9)	3C	1129.71	371.07	309.83	40.48	11353.6
71 (71.2)	3E	1158.31	368.55	301.34	33.87	10396.2
71 (71.6)	5D	1127.05	360.02	307.16	30.42	7217.3
	AVE	1133.67	367.76	307.22	34.93	9600.7
72 (71.9)	3A	1177.73	378.70	304.25	30.78	10736.7
72 (71.9)	5C	1141.33	368.69	303.68	34.43	10910.3
	AVE	1159.53	373.70	303.97	32.61	10823.5
74 (75.8)	1D	1093.08	349.69	313.31	43.00	6172.9
74 (74.6)	2B	1117.68	360.70	315.15	46.83	10151.7
74 (75.2)	2C	1067.14	357.36	313.67	54.00	12519.7
74 (74.3)	2D	1119.61	357.87	315.09	50.06	10341.2
74 (75.9)	2E	1079.80	351.29	313.76	41.12	6104.0
74 (74.1)	3A	1177.73	358.92	307.69	45.29	11035.6
74 (75.0)	3C	1129.71	354.03	315.64	65.14	12781.1
74 (74.9)	3D	1113.20	354.99	314.31	60.57	12310.2
74 (74.3)	3E	1158.31	355.11	306.73	47.34	11003.4
74 (75.8)	4B	1121.16	362.68	319.37	49.18	9418.0
74 (74.1)	5C	1141.33	362.87	307.17	40.27	11115.4
74 (74.9)	5D	1127.05	352.20	312.48	40.56	6071.9

	AVE	1120.48	356.48	312.87	48.61	9918.8
75 (76.9)	1D	1093.08	357.39	315.38	36.96	6187.2
75 (76.4)	2C	1067.14	367.59	315.49	44.86	12412.9
75 (75.3)	2D	1119.61	356.60	316.20	53.02	9770.3
75 (76.1)	3C	1129.71	360.52	317.44	57.67	12767.3
75 (75.4)	3E	1158.31	351.03	308.39	53.80	10165.8
75 (77.0)	4B	1121.16	369.38	320.90	43.66	9464.6
75 (76.5)	5D	1127.05	356.83	315.62	38.86	6035.8
	AVE	1116.58	359.91	315.63	46.98	9543.4
76 (76.7)	2A	1163.23	367.86	315.39	31.24	6086.8
76 (76.4)	2B	1117.68	367.81	317.34	41.97	9846.4
76 (76.3)	2D	1119.61	362.93	317.42	46.79	9811.1
76 (77.2)	2E	1079.80	356.56	316.19	38.00	6140.8
76 (75.9)	3A	1177.73	354.74	310.47	52.47	9918.0
76 (76.4)	3B	1138.98	362.79	317.30	54.97	12111.6
76 (77.0)	3C	1129.71	366.16	318.90	52.28	12682.3
76 (76.7)	3D	1113.20	365.42	316.99	50.37	12141.8
76 (76.5)	4A	1082.73	359.99	317.27	35.89	5897.7
76 (76.5)	4C	1149.71	362.56	317.89	56.49	11984.8
76 (75.7)	4E	1130.24	363.92	313.82	31.92	5984.6
	AVE	1127.51	362.80	316.27	44.76	9327.8
77 (78.8)	1D	1093.08	364.82	318.84	33.50	6191.5
77 (76.5)	2C	1067.14	366.50	315.65	46.00	12418.0
77 (77.1)	2D	1119.61	368.97	318.50	41.96	9798.0
77 (77.9)	3C	1129.71	372.78	320.36	46.85	12578.8
77 (77.2)	3E	1158.31	358.73	311.44	48.12	9942.5
77 (78.7)	4B	1121.16	377.77	323.39	38.61	9465.6
77 (77.7)	5D	1127.05	363.07	317.89	35.22	6059.3
	AVE	1116.58	367.52	318.01	41.46	9493.4
78 (78.7)	2A	1163.23	381.14	319.07	26.07	6068.7
78 (79.4)	2B	1117.68	379.18	321.77	36.46	9744.9
78 (78.3)	2D	1119.61	375.17	320.27	38.35	9764.7
78 (79.8)	2E	1079.80	364.38	320.80	34.87	6151.8
78 (78.0)	3A	1177.73	363.54	314.17	46.60	9719.4
78 (78.5)	3B	1138.98	376.95	320.61	43.79	11936.8
78 (78.9)	3C	1129.71	377.72	321.99	43.84	12478.7
78 (78.9)	3D	1113.20	377.05	320.49	42.64	11986.6
78 (78.6)	4A	1082.73	366.71	321.17	33.39	5964.1
78 (78.6)	4C	1149.71	373.20	321.19	48.00	11876.6
78 (77.8)	4E	1130.24	377.86	317.83	26.28	6015.3

78 (78.0)	5C	1141.33	355.30	313.64	53.88	9869.5
	AVE	1128.66	372.35	319.42	39.51	9298.1
84	1B	1011.68	369.38	327.82	33.94	6342.3
84	1C	1045.91	358.22	322.85	57.62	10947.6
84	2B	1037.01	374.52	330.00	43.50	8364.2
84	2E	1026.82	368.86	328.46	35.44	5989.9
84	3A	1022.02	371.12	325.02	42.70	9855.9
84	3B	1029.76	374.08	329.93	50.28	9920.1
84	3D	1037.02	374.49	329.14	49.31	10419.9
84	4D	1070.27	380.59	330.74	39.88	9266.5
84	5B	1020.29	369.99	330.15	35.63	6346.1
84	5C	1032.51	364.29	324.60	50.39	10862.1
	AVE	1033.33	370.55	327.87	43.87	8831.5
90	2B	959.59	396.61	340.53	31.18	8828.5
90	2C	1056.95	395.30	338.38	39.14	11051.9
90	2E	956.84	380.74	338.21	30.86	5879.3
90	3A	972.54	385.63	334.32	35.85	9680.5
90	3B	973.83	399.32	339.99	34.45	10699.9
90	3D	977.25	397.52	338.94	35.09	10993.6
90	4B	1013.64	396.42	342.21	34.02	8980.5
90	5C	980.07	377.01	333.43	42.85	10289.7
90	5D	1057.15	372.09	338.29	43.18	6176.6
	AVE	994.21	388.96	338.26	36.29	9175.6
96	1B	836.25	388.80	346.72	26.91	5863.8
96	1C	846.60	377.38	340.66	43.68	9970.6
96	2B	877.62	400.61	349.75	31.12	9036.1
96	2E	814.92	388.45	347.34	26.85	5792.8
96	3A	892.70	390.92	343.25	35.04	9570.0
96	3B	863.94	404.01	348.92	32.57	11125.2
96	3D	856.41	399.64	347.80	34.46	11309.5
96	4D	826.51	400.93	349.41	28.93	9248.3
96	5B	849.57	383.33	348.64	33.25	5891.4
96	5C	878.45	385.40	342.12	38.18	9925.5
	AVE	854.30	391.95	346.46	33.10	8773.3

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41202D
Test Date: 10/7/80
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.148 MPa (21.4 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.104 kw/m (0.0318 kw/ft)
Flow rate	0.028 kg/sec (0.062 lb/sec)
Coolant temperature	112°C (234°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 9054

(See following pages for additional results.)

C. Comments:

RUN 41202D

MASS FLOW = .0281 KG/SEC INLET VAPOR TEMP = 112.2 DEG C TOTAL POWER = 4.83 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	873.55	131.28	115.63	15.82	6844.8
.30	4A	878.73	130.76	115.62	16.45	6850.5
.30	4C	830.42	127.77	115.58	30.12	13784.6
	AVE	860.90	129.94	115.61	20.8[illegible]	9160.0
.61	1C	1452.25	134.84	117.87	33.18	11516.2
.61	4E	1435.26	136.32	118.59	22.67	6877.4
.61	5B	1358.51	136.68	118.60	21.05	6873.6
	AVE	1415.34	135.95	118.35	25.63	8422.4
.99	2A	2322.47	153.50	124.22	21.54	6573.7
.99	4A	2303.01	151.21	124.16	23.20	6579.9
.99	4C	2274.82	147.57	124.16	41.36	13151.4
	AVE	2300.10	150.76	124.18	28.70	8768.3
1.22	1C	2682.53	159.58	130.47	33.96	11071.5
1.22	4E	2739.46	157.78	132.32	28.71	6560.8
	AVE	2711.00	158.68	131.39	31.34	8816.1
1.52	2A	3355.62	183.99	143.07	20.81	6134.0
1.52	4A	3150.51	174.89	143.40	25.69	6141.1
1.52	4C	3140.63	174.17	143.21	40.53	12333.0
	AVE	3215.58	177.68	143.23	29.01	8202.7

RUN 41202D

MASS FLOW = .0281 KG/SEC INLET VAPOR TEMP = 112.2 DEG C TOTAL POWER = 4.83 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SCM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.72)	2A	3466.91	192.66	150.58	20.44	6142.9
1.70(1.72)	4A	3562.80	192.66	150.54	20.99	6094.3
1.70(1.72)	4C	3646.38	184.68	150.75	41.89	11974.6
	AVE	3558.70	190.00	150.62	27.78	8070.6
1.78(1.80)	1C	3462.56	185.27	150.21	34.19	11243.2
1.78(1.79)	3C	3670.15	187.70	153.33	41.31	13311.0
1.78(1.82)	4E	3504.65	182.39	153.58	30.49	7092.6
	AVE	3545.79	185.12	152.37	35.33	10548.9
1.80(1.87)	2C	3488.74	192.58	156.42	36.92	13786.2
1.80(1.81)	2D	3624.17	196.96	156.44	29.48	10781.6
1.80(1.82)	3C	3670.15	188.06	154.33	42.01	13399.5
1.80(1.82)	3E	3409.77	176.73	150.70	45.86	11576.6
1.80(1.80)	4D	3640.43	202.44	155.76	25.54	11290.0
	AVE	3566.65	191.36	154.73	35.96	12166.8
1.83(1.83)	1B	3668.52	190.22	153.66	25.01	6895.5
1.83(1.84)	2D	3624.17	195.14	157.13	31.48	11009.2
1.83(1.84)	3C	3670.15	196.10	155.31	40.57	13923.2
1.83(1.84)	3D	3629.04	193.03	154.99	36.55	13127.2
1.83(1.83)	4D	3640.43	191.44	156.58	34.68	10455.6
	AVE	3646.46	191.99	155.57	33.66	11082.1
1.88(1.88)	1B	3668.52	191.46	156.04	25.55	6992.1
1.88(1.89)	1D	3524.98	189.61	156.68	26.46	6982.2
1.88(1.89)	2B	3748.09	195.10	159.43	34.59	10884.9
1.88(1.95)	2C	3488.74	189.61	159.38	44.16	12184.1
1.88(1.89)	2D	3624.17	193.04	158.72	34.89	11204.0
1.88(1.88)	2E	3565.79	185.89	155.96	29.62	7566.7
1.88(1.91)	3A	3626.85	188.90	154.75	36.36	10518.7
1.88(1.89)	3B	3664.61	189.61	158.00	44.45	13606.8
1.88(1.90)	4B	3381.31	188.37	159.78	39.26	10478.0
1.88(1.88)	4D	3640.43	187.78	158.31	41.13	12624.0
1.88(1.88)	5C	3553.33	181.61	154.21	44.87	11767.6
1.88(1.87)	5D	3408.19	176.72	155.75	40.93	7484.0

	AVE	3574.58	188.14	157.25	36.86	10141.1
1.91(1.92)	1D	3524.98	190.21	157.49	26.57	6574.2
1.91(1.98)	2C	3488.74	189.62	160.48	45.75	12022.4
1.91(1.92)	2D	3624.17	194.07	159.94	34.97	10711.1
1.91(1.93)	3E	3409.77	175.79	155.15	57.57	10358.5
1.91(1.93)	4B	3381.31	189.50	160.91	39.14	9659.9
1.91(1.91)	4D	3640.43	188.41	159.47	41.79	11215.3
1.91(1.93)	5D	3408.19	179.17	157.56	39.49	6173.9
	AVE	3496.80	186.68	158.72	40.76	9530.8
1.93(1.93)	1B	3668.52	192.54	157.59	25.81	6046.0
1.93(1.95)	2A	3466.91	192.35	158.74	25.32	5945.5
1.93(1.94)	2B	3748.09	194.25	161.24	37.32	9525.5
1.93(1.95)	3A	3626.85	189.60	156.53	37.41	9896.2
1.93(1.94)	3B	3664.61	189.61	159.66	46.81	12102.6
1.93(1.95)	3C	3670.15	189.46	159.76	47.27	12363.3
1.93(1.94)	3D	3629.04	192.35	159.11	42.03	12296.1
1.93(1.95)	4A	3562.80	188.39	158.62	29.55	5920.4
1.93(1.95)	4C	3646.38	188.42	160.05	49.21	12058.3
1.93(1.93)	4D	3640.43	188.00	160.34	43.69	9755.3
	AVE	3632.38	190.47	159.17	33.44	9590.9
1.96(1.96)	1D	3524.98	189.63	158.94	28.30	6010.8
1.96(2.02)	2C	3488.74	192.66	162.04	43.25	11899.7
1.96(1.97)	2D	3624.17	193.30	161.71	37.74	9549.1
1.96(1.97)	3C	3670.15	189.03	160.65	48.36	12309.7
1.96(1.97)	3E	3409.77	177.94	156.56	55.30	10122.6
1.96(1.97)	4B	3381.31	192.56	162.51	36.87	9427.4
1.96(1.96)	5D	3408.19	181.08	158.78	38.16	5954.2
	AVE	3501.04	188.13	160.17	41.13	9324.8
1.98(1.98)	1B	3668.52	196.96	159.61	23.94	5862.9
1.98(2.00)	2A	3466.91	198.25	161.63	22.62	5949.4
1.98(1.98)	2B	3748.09	197.24	162.91	35.66	9371.0
1.98(1.99)	2D	3624.17	194.21	162.77	37.81	9539.2
1.98(2.00)	3A	3626.85	193.80	158.56	34.76	9732.0
1.98(1.99)	3B	3664.61	194.13	161.72	42.87	11845.5
1.98(2.00)	3C	3670.15	190.63	161.71	47.99	12282.4
1.98(1.99)	3D	3629.04	190.87	161.10	46.46	12078.5
1.98(2.00)	4A	3562.80	192.68	160.61	27.74	5849.2
1.98(2.00)	4C	3646.38	192.66	161.99	45.14	11948.1
1.98(1.98)	4D	3640.43	187.69	162.37	47.62	9577.3

1.98(1.98)	5C	3553.33	182.53	157.60	49.04	10164.4
	AVE	3625.11	192.66	160.99	38.47	9516.7
2.13	1B	3283.47	190.85	165.86	32.01	6248.6
2.13	1C	3268.08	188.38	162.86	43.40	10749.1
2.13	2B	3343.57	193.89	168.44	42.79	8135.8
2.13	2E	3236.86	189.60	166.24	33.81	5904.1
2.13	3A	3344.87	190.83	163.80	41.72	9776.7
2.13	3B	3233.36	190.22	167.04	52.79	9799.6
2.13	3D	3151.48	190.85	166.42	48.81	10326.3
2.13	4E	3282.70	184.67	165.32	41.72	6505.2
2.13	5B	3367.75	179.07	166.05	64.00	6502.8
2.13	5C	3242.62	181.84	163.26	59.63	11004.6
	AVE	3275.48	188.02	165.53	46.07	8495.3
2.29	1B	3279.28	198.58	170.63	28.11	5948.8
2.29	1D	3241.82	192.01	170.58	36.56	6055.3
2.29	2B	3153.96	204.96	174.09	32.53	8581.9
2.29	2C	3118.31	205.42	172.02	34.36	10896.8
2.29	2E	3056.69	195.39	171.09	33.24	5802.9
2.29	3A	3150.76	198.11	169.13	36.04	9561.2
2.29	3B	3093.77	202.64	172.90	38.39	10550.5
2.29	3E	3112.82	192.66	167.97	42.16	10026.2
2.29	4B	3077.83	202.44	173.76	34.29	8856.7
2.29	5C	3109.16	190.21	168.17	47.34	10386.6
2.29	5D	3247.25	183.86	170.58	59.76	6149.1
	AVE	3149.24	196.94	170.99	38.16	8437.8
2.44	1B	2597.06	200.67	175.49	24.47	5778.4
2.44	1C	2784.60	197.69	172.62	36.66	9760.5
2.44	2B	2804.22	207.81	179.17	33.83	8798.8
2.44	2E	2771.76	201.95	175.82	25.11	5707.3
2.44	3A	2727.80	196.27	174.14	40.69	9510.8
2.44	3B	2800.02	205.50	177.95	37.10	10980.4
2.44	3D	2733.62	203.63	177.15	37.82	11219.0
2.44	4E	2733.12	197.34	174.95	28.86	5909.0
2.44	5B	2714.90	193.28	175.08	35.78	6053.4
2.44	5C	2840.16	190.86	173.00	52.93	10068.0
	AVE	2750.67	199.32	175.54	35.03	8376.6

RUN 41202D

MASS FLOW = .0620 LBM/SEC INLET VAPOR TEMP = 234.0 DEG F TOTAL POWER = 4.58 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	276.88	268.30	240.14	15.82	6844.8
12	4A	278.52	267.37	240.11	16.45	6850.5
12	4C	263.21	261.99	240.04	30.12	13784.6
	AVE	272.87	265.88	240.10	20.80	9160.0
24	1C	460.30	274.72	244.16	33.18	11516.2
24	4E	454.92	277.38	245.46	22.67	6877.4
24	5B	430.59	278.02	245.48	21.05	6873.6
	AVE	448.60	276.71	245.03	25.63	8422.4
39	2A	736.12	308.30	255.59	21.54	6573.7
39	4A	729.96	304.17	255.50	23.20	6579.9
39	4C	721.02	297.62	255.49	41.36	13151.4
	AVE	729.03	303.36	255.53	28.70	8768.3
48	1C	850.25	319.24	266.84	33.96	11071.5
48	4E	868.29	316.01	270.17	28.71	6560.8
	AVE	859.27	317.63	268.50	31.34	8816.1
60	2A	1063.59	363.19	289.53	20.81	6134.0
60	4A	998.58	346.80	290.11	25.69	6141.1
60	4C	995.45	345.51	289.78	40.53	12333.0
	AVE	1019.20	351.83	289.81	29.01	8202.7

	AVE	1132.99	370.65	315.05	36.86	10141.1
75 (75.4)	1D	1117.27	374.38	315.48	26.57	6574.2
75 (77.8)	2C	1105.78	373.31	320.86	45.75	12022.4
75 (75.6)	2D	1148.71	381.33	319.90	34.97	10711.1
75 (76.1)	3E	1080.75	348.42	311.28	57.57	10358.5
75 (75.9)	4B	1071.73	373.10	321.64	39.14	9659.9
75 (75.1)	4D	1153.86	371.13	319.05	41.79	11215.3
75 (75.8)	5D	1080.25	354.50	315.60	39.49	6173.9
	AVE	1108.34	368.02	317.69	40.76	9530.8
76 (75.9)	1B	1162.77	378.58	315.67	25.81	6046.0
76 (76.7)	2A	1098.86	378.24	317.74	25.32	5945.5
76 (76.3)	2B	1187.98	381.65	322.23	37.32	9525.5
76 (76.9)	3A	1149.56	373.29	313.75	37.41	9896.2
76 (76.3)	3B	1161.52	373.30	319.40	46.81	12102.6
76 (76.8)	3C	1163.28	373.03	319.57	47.27	12363.3
76 (76.4)	3D	1150.25	377.69	318.39	42.03	12296.1
76 (76.7)	4A	1129.25	371.11	317.52	29.55	5920.4
76 (76.9)	4C	1155.75	371.16	320.10	49.21	12058.3
76 (76.0)	4D	1153.86	370.40	320.61	43.69	9755.3
	AVE	1151.31	374.84	318.50	38.44	9590.9
77 (77.0)	1D	1117.27	373.33	318.09	28.30	6010.8
77 (79.5)	2C	1105.78	378.79	323.66	43.25	11899.7
77 (77.4)	2D	1148.71	379.93	323.08	37.74	9549.1
77 (77.7)	3C	1163.28	373.34	321.16	48.36	12309.7
77 (77.6)	3E	1080.75	352.29	313.81	55.30	10122.6
77 (77.6)	4B	1071.73	378.80	324.52	36.87	9427.4
77 (77.0)	5D	1080.25	357.94	317.80	38.16	5954.2
	AVE	1109.68	370.63	320.30	41.13	9324.8
78 (77.9)	1B	1162.77	386.52	319.29	23.94	5862.9
78 (78.9)	2A	1098.86	388.85	321.86	22.62	5949.4
78 (78.1)	2B	1187.98	387.03	325.24	35.66	9371.0
78 (78.5)	2D	1148.71	361.56	324.98	37.81	9539.2
78 (78.9)	3A	1149.56	380.35	317.30	34.76	9732.0
78 (78.5)	3B	1161.52	361.43	323.09	42.87	11845.5
78 (78.8)	3C	1163.28	375.50	323.08	47.99	12282.4
78 (78.5)	3D	1150.25	375.57	321.99	46.46	12078.5
78 (78.6)	4A	1129.25	377.74	321.10	27.74	5849.2
78 (78.9)	4C	1155.75	378.80	323.59	45.14	11948.1
78 (78.0)	4D	1153.86	369.83	324.27	47.62	9577.3

RUN +1202D

MASS FLOW = .0620 LBM/SEC INLET VAPOR TEMP = 234.0 DEG F TOTAL POWER = 4.58 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.8)	2A	1098.86	378.80	303.04	20.44	6142.9
67 (67.6)	4A	1129.25	378.80	302.97	20.99	6094.3
67 (67.8)	4C	1155.75	364.43	303.36	41.89	11974.6
	AVE	1127.95	374.01	303.12	27.78	8070.6
70 (70.9)	1C	1097.48	365.46	302.38	34.19	11243.2
70 (70.6)	3C	1163.28	369.87	308.00	41.31	13311.0
70 (71.5)	4E	1110.82	360.31	308.44	30.49	7092.6
	AVE	1123.86	365.22	306.27	35.33	10548.9
71 (73.5)	2C	1105.78	378.64	313.55	36.92	13786.2
71 (71.4)	2D	1148.71	386.53	313.60	29.46	10781.6
71 (71.6)	3C	1163.28	370.52	309.80	42.01	13399.5
71 (71.6)	3E	1080.75	350.11	303.26	45.86	11576.6
71 (71.0)	4D	1153.86	396.40	312.36	25.54	11290.0
	AVE	1130.48	376.44	310.51	35.96	12166.8
72 (71.9)	1B	1162.77	374.39	308.95	25.01	6895.5
72 (72.4)	2D	1148.71	383.25	314.83	31.48	11009.2
72 (72.6)	3C	1163.28	374.18	311.56	40.57	13923.2
72 (72.4)	3D	1150.25	379.46	310.97	35.55	13127.2
72 (72.0)	4D	1153.86	376.60	313.85	34.68	10455.6
	AVE	1155.77	377.58	312.03	33.66	11082.1
74 (74.1)	1B	1162.77	376.63	312.88	25.55	6992.1
74 (74.5)	1D	1117.27	373.30	314.03	26.46	6982.2
74 (74.4)	2B	1187.98	383.18	318.98	34.59	10884.9
74 (76.6)	2C	1105.78	373.30	318.89	44.16	12184.1
74 (74.4)	2D	1148.71	379.47	317.70	34.89	11204.0
74 (74.0)	2E	1130.20	366.60	312.73	29.62	7566.7
74 (75.0)	3A	1149.56	372.02	310.55	36.36	10518.7
74 (74.6)	3B	1161.52	373.30	316.41	44.45	13606.8
74 (74.7)	4B	1071.73	371.06	319.60	39.26	10478.0
74 (74.0)	4D	1153.86	370.00	316.96	41.13	12024.0
74 (74.2)	5C	1126.25	358.90	309.57	44.87	11767.6
74 (73.8)	5D	1080.25	350.10	312.35	40.93	7484.0

78 (78.1)	5C	1126.25	360.55	315.69	49.04	10164.4
	AVE	1149.00	378.69	321.79	38.47	9516.7
84	1B	1040.72	375.52	330.54	32.01	6248.6
84	1C	1035.84	371.08	325.15	43.40	10749.1
84	2B	1059.77	381.00	335.20	42.79	8135.8
84	2E	1025.95	373.27	331.23	33.81	5904.1
84	3A	1060.18	375.50	326.84	41.72	9776.7
84	3B	1024.84	374.39	332.67	52.79	9799.6
84	3D	998.88	375.53	331.56	48.81	10326.3
84	4E	1040.48	364.40	329.58	41.72	6505.2
84	5B	1067.43	354.33	330.89	64.00	6502.8
84	5C	1027.77	359.31	325.86	59.63	11004.6
	AVE	1038.19	370.43	329.95	46.07	8495.3
90	1B	1039.39	389.45	339.14	28.11	5948.8
90	1D	1027.52	377.61	339.04	36.56	6055.3
90	2B	999.67	400.93	345.37	32.53	8581.9
90	2C	988.37	401.76	341.63	34.36	10896.8
90	2E	968.84	383.69	339.95	30.24	5802.9
90	3A	998.66	388.60	336.44	35.04	9561.2
90	3B	980.59	396.75	343.22	39.39	10550.5
90	3E	986.63	378.80	334.35	42.16	10026.2
90	4B	975.54	396.40	344.76	34.29	8856.7
90	5C	985.47	374.38	334.71	47.34	10386.6
90	5D	1029.24	362.96	339.05	59.76	6149.1
	AVE	998.17	386.48	339.79	38.16	8437.8
96	1B	823.16	393.21	347.88	24.47	5778.4
96	1C	882.41	387.64	342.71	36.66	9760.5
96	2B	888.82	406.06	354.50	30.83	8798.8
96	2E	878.53	395.52	348.48	25.11	5707.3
96	3A	864.64	385.28	345.45	40.69	9510.8
96	3B	887.49	401.91	352.31	37.10	10980.4
96	3D	866.44	398.54	350.87	37.82	11219.0
96	4E	866.28	387.56	346.92	28.86	5909.0
96	5B	860.51	379.90	347.15	35.78	6053.4
96	5C	900.21	375.55	343.39	52.93	10068.0
	AVE	871.84	391.14	347.97	35.03	8378.6

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40102E
Test Date: 11/25/80
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.144 MPa (20.9 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.075 kw/m (0.023 kw/ft)
Flow rate	0.021 kg/sec (0.046 lb/sec)
Coolant temperature	112°C (233°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 6695

(See following pages for additional results.)

C. Comments:

The power and flow were reduced approximately 39 percent to provide data at a lower Reynolds number.

RUN 40102E

MASS FLOW = .0209 KG/SEC INLET VAPOR TEMP = 111.7 DEG C TOTAL POWER = 3.50 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	1B	662.95	121.49	114.35	26.73	5141.3
.30	2A	642.97	120.76	114.35	28.90	5146.9
.30	4E	672.41	119.98	114.34	34.40	5152.6
	AVE	659.44	120.74	114.35	30.01	5146.9
.61	1C	1011.91	125.94	116.47	42.07	8739.5
.61	3B	1017.68	125.25	117.10	55.36	10049.8
.61	5B	964.83	127.71	117.26	26.25	5178.4
	AVE	998.14	126.30	116.94	41.23	7989.2
.99	1B	1665.87	143.88	122.69	21.69	4937.1
.99	2A	1658.99	143.72	122.67	21.75	4941.1
.99	4C	1681.12	139.03	122.63	44.27	10131.9
.99	4E	1643.84	142.67	122.68	22.73	4944.8
	AVE	1662.46	142.32	122.67	27.61	6238.7
1.22	1C	1951.55	151.67	128.42	31.39	8402.2
1.22	3B	1933.90	152.28	130.82	37.79	9286.5
1.22	5B	1931.15	151.68	130.69	24.84	4822.5
	AVE	1938.87	151.87	129.98	31.34	7503.7
1.52	1B	2565.26	169.46	140.57	23.08	4667.4
1.52	2A	2471.81	170.61	140.68	21.43	4634.0
1.52	4C	2533.21	162.54	140.79	47.46	9544.8
	AVE	2523.43	167.54	140.68	30.66	6282.1

RUN 40102E

MASS FLOW = .0209 KG/SEC INLET VAPOR TEMP = 111.7 DEG C TOTAL POWER = 3.50 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.68)	2A	2512.75	174.79	146.59	22.80	4729.7
1.70(1.69)	2B	2453.49	175.49	148.77	31.52	7591.2
1.70(1.68)	2C	2497.78	170.63	145.93	40.49	9465.4
1.70(1.69)	2E	2508.43	177.43	146.64	20.89	4693.1
1.70(1.69)	4A	2502.80	169.39	146.98	28.77	4752.9
1.70(1.70)	4B	2496.38	176.70	149.47	31.38	7459.3
1.70(1.71)	4C	2554.75	177.14	147.85	34.51	9396.6
1.70(1.70)	4E	2510.53	176.21	147.22	22.10	4745.0
	AVE	2504.61	174.72	147.46	29.06	6604.0
1.78(1.79)	2C	2497.78	177.09	149.79	36.10	11711.6
1.78(1.76)	3C	2453.98	174.25	149.01	38.55	10695.6
1.78(1.78)	3D	2520.74	176.12	150.23	38.46	11676.3
	AVE	2490.84	175.82	149.68	37.70	11361.2
1.83(1.81)	3E	2505.88	177.40	148.22	30.15	10716.8
1.83(1.88)	5C	2505.36	175.51	151.10	35.99	10054.8
	AVE	2505.62	176.45	149.66	33.07	10385.8
1.85(1.85)	1B	2555.99	179.78	150.97	22.41	7722.2
1.85(1.86)	2A	2512.75	178.55	151.10	23.15	7971.4
	AVE	2534.37	179.17	151.03	22.78	7846.8
1.88(1.89)	2D	2517.86	176.72	154.48	38.49	11440.7
1.88(1.88)	4D	2474.30	175.33	154.45	40.36	11511.9
	AVE	2496.08	176.03	154.47	39.42	11476.3
1.91(1.91)	1B	2555.99	179.78	152.64	23.73	7100.2
1.91(1.90)	1D	2489.25	179.15	152.16	23.27	6621.7
1.91(1.92)	2E	2508.43	175.50	153.05	28.31	6350.2
1.91(1.90)	5D	2524.29	167.55	152.29	42.41	6940.9
	AVE	2519.49	175.49	152.53	29.43	6753.2
1.93(1.92)	1D	2489.25	176.72	152.90	26.43	6173.4

1.93(1.92)	3A	2520.31	171.56	152.60	46.76	8175.7
1.93(1.92)	3D	2520.74	179.97	154.99	39.38	12364.4
1.93(1.93)	4A	2502.80	170.04	154.29	40.51	5165.0
1.93(1.93)	4B	2496.38	176.14	157.87	46.26	7891.8
1.93(1.93)	4D	2474.30	174.27	156.14	46.47	10196.7
1.93(1.97)	5C	2505.36	173.67	153.99	44.56	7914.8
1.93(1.93)	5D	2524.29	168.20	152.99	42.48	6489.1
	AVE	2504.18	173.82	154.47	41.61	8046.4
1.96(1.96)	1B	2555.99	181.68	154.04	23.20	5894.6
1.96(1.96)	1C	2439.80	174.92	152.85	38.68	8707.7
1.96(1.95)	1D	2489.25	177.30	153.92	26.87	5715.9
1.96(1.96)	2A	2512.75	179.26	154.63	25.66	5433.2
1.96(1.96)	2C	2497.78	181.61	156.09	38.05	10303.0
1.96(1.95)	2D	2517.86	176.09	156.42	43.43	9496.3
1.96(1.96)	3B	2503.31	176.18	158.06	53.99	8502.0
1.96(1.97)	5B	2513.95	171.83	155.38	38.79	5011.9
1.96(1.94)	5D	2524.29	169.63	153.49	39.92	6197.7
	AVE	2506.11	176.50	154.99	36.51	7251.4
1.98(1.99)	1C	2439.80	175.50	153.89	39.44	8393.6
1.98(1.98)	2B	2453.49	180.36	157.59	36.30	8837.4
1.98(1.97)	2E	2508.43	175.50	154.89	30.76	5364.6
1.98(1.98)	3A	2520.31	168.43	155.50	68.60	7192.7
1.98(1.98)	3B	2503.31	176.15	159.03	57.05	8315.2
1.98(1.99)	3C	2453.98	179.15	159.81	49.23	6309.9
1.98(1.98)	4A	2502.80	171.14	156.30	42.81	4739.5
1.98(1.98)	4B	2496.38	179.15	159.92	43.66	7122.6
1.98(1.99)	4C	2554.75	180.39	159.16	46.68	8179.4
1.98(1.98)	4D	2474.30	177.33	157.84	42.93	8641.0
1.98(2.00)	4E	2510.53	177.36	155.31	28.67	5225.3
1.98(1.99)	5D	2524.29	173.06	154.97	35.39	5522.6
	AVE	2495.20	176.13	157.02	43.46	6987.0
2.01(2.01)	2C	2425.36	177.95	157.86	47.05	9497.4
2.01(2.00)	2D	2517.86	179.17	158.05	40.20	8533.9
2.01(2.01)	3A	2520.31	171.83	156.69	58.25	7281.1
2.01(2.02)	3C	2428.07	179.78	161.00	50.07	6281.4
2.01(2.00)	3E	2505.88	175.50	154.55	41.74	7653.8
2.01(2.05)	5C	2505.36	170.00	156.84	66.73	7922.8
	AVE	2483.81	175.70	157.50	50.67	7861.7
2.03(2.02)	2B	2402.99	183.87	159.09	32.44	8328.7

2.03(2.02)	3D	2520.74	177.94	158.66	53.91	9183.7
2.03(2.03)	4A	2429.01	173.06	158.60	42.38	4698.5
2.03(2.04)	4E	2436.16	178.57	157.23	28.64	5100.9
2.03(2.05)	5B	2341.66	174.73	158.90	37.21	4808.4
2.03(2.10)	5C	2413.08	172.14	158.88	63.43	8187.6
	AVE	2423.94	176.72	158.56	42.50	6718.0
2.06(2.04)	3D	2520.74	177.95	159.39	52.83	8980.1
	AVE	2520.74	177.95	159.39	52.83	8980.1
2.08(2.07)	3E	2328.31	177.94	157.55	39.55	7920.2
	AVE	2328.31	177.94	157.55	39.55	7920.2
2.13	1C	2318.84	176.11	158.84	46.54	8292.6
2.13	2B	2402.99	183.69	163.18	38.60	6403.7
2.13	2C	2425.36	180.03	162.43	53.21	7931.9
2.13	2D	2415.24	184.06	163.09	38.31	6386.2
2.13	3C	2428.07	179.81	165.10	63.54	6933.2
2.13	3D	2387.35	184.10	162.87	43.17	8044.8
2.13	3E	2328.31	179.16	159.85	41.56	8036.4
2.13	4A	2429.01	173.76	163.19	57.52	4637.6
2.13	4D	2393.47	180.39	163.08	45.23	7209.9
2.13	5B	2341.66	173.06	162.47	55.50	4779.6
2.13	5C	2413.08	176.12	159.85	51.33	8113.2
	AVE	2389.40	179.14	162.18	48.68	6979.0
2.29	1D	2290.47	185.88	165.91	28.16	4571.8
2.29	2B	2273.78	194.50	168.95	28.95	6684.5
2.29	2C	2263.57	187.17	167.81	44.41	8470.7
2.29	2D	2240.65	189.61	168.81	35.29	6723.4
2.29	2E	2244.78	188.28	166.57	25.27	4417.2
2.29	3A	2318.50	178.03	166.68	66.32	7452.9
2.29	3B	2324.61	189.64	169.83	44.29	8113.7
2.29	3C	2341.19	189.61	170.04	45.13	8143.6
2.29	3D	2281.24	191.87	168.24	36.40	8514.8
2.29	3E	2237.99	186.80	164.74	34.37	7690.0
2.29	4A	2282.94	182.22	168.55	41.05	4397.4
2.29	4B	2313.38	192.66	170.51	33.98	6686.2
2.29	4D	2263.24	191.18	168.55	32.69	7104.4
2.29	5C	2296.19	182.17	164.57	44.48	7735.7
2.29	5D	2235.67	182.22	165.97	33.93	4621.8
	AVE	2280.55	187.50	167.72	38.31	6755.2

2.44	1C	1955.97	188.76	168.38	32.27	7445.5
2.44	2D	1942.00	194.50	173.87	30.42	6834.2
2.44	2E	1905.80	188.99	171.32	26.16	4344.4
2.44	3B	1976.30	193.31	174.67	39.54	8459.0
2.44	3C	1952.52	193.44	174.41	38.30	8663.9
2.44	3D	1965.96	194.19	173.04	34.72	8708.7
2.44	3E	1962.45	189.61	169.38	32.53	7485.4
2.44	4B	1996.19	192.83	175.41	37.02	6841.6
2.44	4D	1959.38	191.85	173.61	34.85	7054.7
2.44	5B	1934.15	185.86	172.34	34.78	4388.3
2.44	5C	2022.43	184.67	169.12	43.95	7495.3
	AVE	1961.20	190.73	172.32	34.96	7065.5

RUN 40102E

MASS FLOW = .0460 LBM/SEC INLET VAPOR TEMP = 233.0 DEG F TOTAL POWER = 3.32 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	1B	210.13	250.68	237.83	26.73	5141.3
12	2A	203.80	249.36	237.82	28.90	5146.9
12	4E	213.12	247.96	237.82	34.40	5152.6
	AVE	209.02	249.34	237.82	30.01	5146.9
24	1C	320.73	258.69	241.64	42.07	8739.5
24	3B	322.56	257.44	242.77	55.36	10049.8
24	5B	305.81	261.88	243.07	26.25	5178.4
	AVE	316.37	259.34	242.49	41.23	7989.2
39	1B	528.01	290.99	252.84	21.69	4937.1
39	2A	525.83	290.70	252.80	21.75	4941.1
39	4C	532.84	282.25	252.73	44.27	10131.9
39	4E	521.03	288.81	252.82	22.73	4944.8
	AVE	526.93	288.18	252.80	27.61	6238.7
48	1C	618.56	305.00	263.16	31.39	8402.2
48	3B	612.96	306.10	267.48	37.79	9286.5
48	5B	612.09	305.02	267.24	24.84	4822.5
	AVE	614.54	305.37	265.96	31.34	7503.7
60	1B	813.08	337.02	285.03	23.08	4667.4
60	2A	783.46	339.10	285.22	21.43	4634.0
60	4C	802.92	324.58	285.41	47.46	9544.8
	AVE	799.82	333.56	285.22	30.66	6282.1

RUN 40102E

MASS FLOW = .0460 LBM/SEC INLET VAPOR TEMP = 233.0 DEG F TOTAL POWER = 3.32 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (66.3)	2A	796.44	346.62	295.87	22.80	4729.7
67 (66.7)	2B	777.65	347.88	299.79	31.52	7591.2
67 (66.0)	2C	791.69	339.13	294.68	40.49	9465.4
67 (66.7)	2E	795.06	351.37	296.30	20.89	4693.1
67 (66.5)	4A	793.28	336.90	296.56	28.77	4752.0
67 (66.8)	4B	791.24	350.06	301.05	31.38	7459.3
67 (67.5)	4C	809.74	350.86	298.13	34.51	9396.6
67 (67.0)	4E	795.73	349.18	297.00	22.10	4745.0
	AVE	793.86	346.50	297.42	29.06	6604.0
70 (70.4)	2C	791.69	350.76	301.62	36.10	11711.6
70 (69.2)	3C	777.81	345.66	300.21	38.55	10695.6
70 (70.1)	3D	798.97	349.31	302.42	38.46	11676.3
	AVE	789.49	348.47	301.42	37.70	11361.2
72 (71.4)	3E	794.26	351.32	298.79	30.15	10716.8
72 (74.0)	5C	794.09	347.91	303.98	35.99	10054.8
	AVE	794.17	349.61	301.38	33.07	10385.8
73 (73.0)	1B	810.14	355.60	303.74	22.41	7722.2
73 (73.3)	2A	796.44	353.40	303.98	23.15	7971.4
	AVE	803.29	354.50	303.86	22.78	7846.8
74 (74.5)	2D	798.05	350.10	310.06	38.49	11440.7
74 (73.9)	4D	784.25	347.60	310.01	40.36	11511.9
	AVE	791.15	348.85	310.04	39.42	11476.3
75 (75.3)	1B	810.14	355.60	306.75	23.73	7100.2
75 (74.7)	1D	788.99	354.48	305.89	23.27	6621.7
75 (75.6)	2E	795.06	347.90	307.49	28.31	6350.2
75 (74.8)	5D	800.09	333.59	306.11	42.41	6940.9
	AVE	798.57	347.89	306.56	29.43	6753.2
76 (75.6)	1D	788.99	350.10	307.22	26.43	6173.4

76 (75.6)	3A	798.83	340.81	306.69	46.76	8175.7
76 (75.6)	3D	798.97	355.94	310.97	39.36	12364.4
76 (76.0)	4A	793.28	338.07	309.73	40.51	5165.0
76 (75.9)	4B	791.24	349.05	316.16	46.26	7891.8
76 (76.0)	4D	784.25	345.68	313.06	46.47	10196.7
76 (77.6)	5C	794.09	344.61	309.18	44.56	7914.8
76 (75.8)	5D	800.09	334.75	307.38	42.48	6489.1
	AVE	793.72	344.88	310.05	41.61	8046.4
77 (77.3)	1B	810.14	359.02	309.27	23.20	5894.6
77 (77.1)	1C	773.31	346.86	307.12	38.68	8707.7
77 (76.8)	1D	788.99	351.14	309.06	26.87	5715.9
77 (77.3)	2A	796.44	354.66	310.33	25.66	5433.2
77 (77.1)	2C	791.69	358.90	312.96	38.05	10303.0
77 (76.8)	2D	798.05	348.97	313.55	43.43	9496.3
77 (77.1)	3B	793.44	349.12	316.52	53.99	8502.0
77 (77.4)	5B	796.81	341.29	311.68	38.79	5011.9
77 (76.5)	5D	800.09	337.34	308.29	39.92	6197.7
	AVE	794.33	349.70	310.98	36.51	7251.4
78 (78.4)	1C	773.31	347.90	309.00	39.44	8393.6
78 (77.8)	2B	777.65	356.64	315.66	36.30	8837.4
78 (77.7)	2E	795.06	347.90	310.81	30.76	5364.6
78 (78.1)	3A	798.83	335.17	311.90	68.60	7192.7
78 (78.1)	3B	793.44	349.38	318.26	57.05	8315.2
78 (78.2)	3C	777.81	354.48	319.65	49.23	6309.9
78 (77.8)	4A	793.28	340.05	313.34	42.81	4739.5
78 (78.1)	4B	791.24	354.48	319.86	43.66	7122.6
78 (78.4)	4C	809.74	356.70	318.50	46.68	8179.4
78 (78.1)	4D	784.25	351.20	316.12	42.93	8641.0
78 (78.6)	4E	795.73	351.25	311.55	28.67	5225.3
76 (78.3)	5D	800.09	343.50	310.95	35.39	5522.6
	AVE	790.87	349.03	314.63	43.46	6987.0
79 (79.1)	2C	768.74	352.32	316.15	47.05	9497.4
79 (78.7)	2D	798.05	354.50	316.49	40.20	8533.9
79 (79.2)	3A	798.83	341.29	314.05	58.25	7281.1
79 (79.4)	3C	769.60	355.60	321.81	50.07	6281.4
79 (78.6)	3E	794.26	347.90	310.19	41.74	7653.8
79 (80.8)	5C	794.09	338.00	314.31	66.73	7922.8
	AVE	787.26	348.27	315.50	50.67	7861.7
80 (79.7)	2B	761.65	362.97	318.37	32.44	8328.7

80 (79.6)	3D	798.97	352.30	317.60	50.91	9183.7
80 (79.8)	4A	769.89	343.50	317.48	42.38	4698.5
80 (80.4)	4E	772.16	353.42	315.02	28.64	5100.9
80 (80.7)	5B	742.20	346.51	318.01	37.21	4808.4
80 (82.8)	5C	764.84	341.85	317.99	63.43	8187.6
	AVE	768.28	350.09	317.41	42.50	6718.0
81 (80.4)	3D	798.97	352.32	318.91	52.83	8980.1
	AVE	798.97	352.32	318.91	52.83	8980.1
82 (81.5)	3E	737.97	352.30	315.60	39.55	7920.2
	AVE	737.97	352.30	315.60	39.55	7920.2
84	1C	734.97	349.00	317.91	46.54	8292.6
84	2B	761.65	363.00	325.72	38.60	6403.7
84	2C	768.74	356.06	324.37	53.21	7931.9
84	2D	765.53	363.31	325.56	38.31	6386.2
84	3C	769.68	355.66	329.18	63.54	6933.2
84	3D	756.69	363.39	325.17	43.17	8044.8
84	3E	737.97	354.49	319.73	41.56	8036.4
84	4A	769.89	344.77	325.74	57.52	4637.6
84	4D	758.63	356.70	325.55	46.23	7209.9
84	5B	742.28	343.50	324.44	55.50	4779.6
84	5C	764.84	349.01	319.72	51.33	8113.2
	AVE	757.34	354.44	323.92	48.68	6979.0
90	1D	725.98	366.58	330.64	28.16	4571.8
90	2B	720.69	382.10	336.11	28.95	6684.5
90	2C	717.45	368.90	334.06	44.41	8470.7
90	2D	710.19	373.30	335.86	35.29	6723.4
90	2E	711.50	370.90	331.63	25.27	4417.2
90	3A	734.87	353.53	332.03	66.32	7452.9
90	3B	736.88	373.35	337.70	44.29	8113.7
90	3C	742.06	373.30	338.07	45.13	8143.6
90	3D	723.06	377.37	334.84	36.40	8514.8
90	3E	709.35	368.24	328.53	34.37	7690.0
90	4A	723.59	359.99	335.39	41.05	4397.4
90	4B	733.24	378.60	338.92	33.98	6686.2
90	4D	717.35	376.13	335.39	32.69	7104.4
90	5C	727.79	359.91	328.22	44.48	7735.7
90	5D	708.61	360.00	330.75	33.93	4621.8
	AVE	722.84	369.49	333.89	38.31	6755.2

96	1C	619.96	371.77	335.08	32.27	7445.5
96	2D	615.53	362.10	344.97	30.42	6834.2
96	2E	604.06	372.18	340.37	26.16	4344.4
96	3B	626.40	379.96	346.40	39.54	8459.0
96	3C	618.86	360.18	345.95	38.30	8663.9
96	3D	623.13	381.54	343.48	34.72	8708.7
96	3E	622.01	373.30	336.88	32.53	7485.4
96	4B	632.71	379.09	347.73	37.02	6841.6
96	4D	621.04	377.32	344.50	34.85	7054.7
96	5B	613.04	366.55	342.20	34.78	4388.3
96	5C	641.02	364.40	336.42	43.95	7495.3
	AVE	621.62	375.31	342.16	34.96	7065.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41002F
Test Date: 6/19/81
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.1410 MPa (20.45 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.0741 kw/m (0.0226 kw/ft)
Flow rate	0.0207 kg/sec (0.0456 lb/sec)
Coolant temperature	112.0°C (233.6°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 6629

(See following pages for additional results.)

C. Comments:

The power and flow were reduced approximately 39 percent to provide data at a lower Reynolds number.

RUN 41002F

MASS FLOW = .0207 KG/SEC INLET VAPOR TEMP = 112.2 DEG C TOTAL POWER = 3.42 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	4C	669.10	122.94	114.91	37.20	10406.2
.30	4E	628.87	123.95	114.99	20.13	5033.5
	AVE	648.99	123.45	114.95	28.67	7719.9
.61	3E	940.08	127.94	117.13	34.14	8567.5
	AVE	940.08	127.94	117.13	34.14	8567.5
.99	1B	1629.57	144.52	123.27	21.14	4847.2
.99	2A	1546.93	146.81	123.24	18.04	4834.4
.99	4C	1656.83	141.47	123.22	39.06	9939.2
	AVE	1611.11	144.27	123.24	26.08	6540.3
1.22	1C	1865.96	152.28	128.99	29.93	8253.6
1.22	2C	1872.21	152.56	130.85	36.15	9597.9
1.22	2E	1860.18	152.26	130.95	23.55	4822.9
1.22	3E	1839.21	148.01	129.01	36.37	8306.4
	AVE	1859.39	151.28	129.95	31.50	7745.2
1.52	1B	2295.06	169.93	141.09	20.66	4584.6
1.52	2A	2344.45	173.06	141.19	19.02	4539.8
1.52	4E	2451.71	161.44	141.23	31.87	4638.2
	AVE	2363.74	168.15	141.17	23.85	4587.5

RUN 41002F

MASS FLOW = .0207 KG/SEC INLET VAPOR TEMP = 112.2 DEG C TOTAL POWER = 3.42 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.67)	2A	2427.56	176.67	146.50	20.55	4583.1
1.70(1.70)	2B	2448.44	178.01	149.18	29.04	7478.6
1.70(1.70)	4B	2443.51	185.20	150.22	23.62	7309.4
1.70(1.70)	5C	2455.60	169.94	144.90	34.97	7551.8
1.70(1.70)	5D	2437.87	171.84	147.99	26.23	4494.7
	AVE	2442.60	176.33	147.76	26.88	6283.5
1.78(1.77)	3C	2471.34	177.33	149.72	35.33	11166.8
1.78(1.78)	4E	2456.16	176.11	150.45	24.33	6516.5
	AVE	2463.75	176.72	150.09	29.83	8841.6
1.80(1.80)	3D	2510.67	179.14	151.34	35.47	12434.0
	AVE	2510.67	179.14	151.34	35.47	12434.0
1.88(1.87)	4D	2438.00	177.85	154.85	35.98	12875.4
	AVE	2438.00	177.85	154.85	35.98	12875.4
1.91(1.90)	1B	2468.86	175.86	152.80	27.13	8299.5
1.91(1.89)	1D	2452.13	175.53	152.58	27.09	7468.5
1.91(1.90)	2D	2429.90	173.79	154.96	44.05	12738.5
1.91(1.89)	4D	2438.00	175.17	155.39	41.96	12834.9
	AVE	2447.22	175.09	153.93	35.06	10335.3
1.93(1.93)	1D	2452.13	173.06	153.56	31.97	6548.8
1.93(1.94)	2E	2473.02	168.78	153.67	41.83	6164.8
1.93(1.94)	4B	2443.51	180.33	159.44	39.31	7625.4
1.93(1.92)	4D	2438.00	174.89	156.30	44.60	11661.1
1.93(1.94)	5C	2455.60	169.39	154.07	56.46	8703.7
1.93(1.93)	5D	2437.87	171.22	154.03	36.10	6876.7
	AVE	2450.02	172.94	155.18	41.71	7930.1
1.96(1.95)	1B	2468.86	178.56	154.13	25.46	6586.2
1.96(1.95)	1D	2452.13	173.16	154.43	33.23	5994.5
1.96(1.95)	2A	2427.56	180.98	154.62	23.12	5499.1

1.96(1.96)	2B	2448.44	181.59	157.50	34.20	9099.4
1.96(1.95)	2D	2429.90	173.67	156.71	48.81	9654.0
1.96(1.95)	3B	2460.33	181.60	158.27	40.90	8249.2
1.96(1.96)	5B	2475.28	175.50	155.90	31.89	5152.1
	AVE	2451.79	177.86	155.94	33.94	7176.4
1.98(1.97)	1C	2434.11	173.69	154.20	43.73	8963.9
1.98(1.98)	2A	2427.56	182.26	155.79	22.94	5138.6
1.98(1.98)	2B	2448.44	182.22	158.14	34.15	8716.0
1.98(1.98)	3A	2437.86	180.39	156.04	34.65	6653.7
1.98(1.97)	4A	2465.09	185.89	156.76	21.04	4646.2
1.98(1.99)	4B	2443.51	182.83	160.85	37.17	6939.8
1.98(1.99)	4C	2545.93	179.17	160.09	51.80	7848.6
1.98(1.97)	4D	2438.00	174.88	158.14	49.40	9258.5
1.98(1.99)	4E	2456.16	176.11	155.63	30.26	5441.8
1.98(1.99)	5C	2455.60	172.46	155.77	51.50	7824.7
1.98(1.99)	5D	2437.87	175.50	155.84	31.30	5778.5
	AVE	2453.65	178.67	157.02	37.09	7019.1
2.01(2.00)	1B	2468.86	181.00	155.74	24.50	5855.9
2.01(2.00)	1C	2434.11	174.30	155.08	44.25	8727.4
2.01(2.00)	2C	2422.17	181.62	158.23	40.16	9396.9
2.01(2.00)	2D	2429.90	177.40	158.40	43.23	8354.6
2.01(1.99)	2E	2473.02	170.01	155.59	43.67	5223.3
2.01(2.00)	3A	2405.72	182.83	157.05	32.14	6774.1
2.01(2.00)	3B	2460.33	184.69	160.21	38.70	7739.7
2.01(2.02)	3D	2510.67	179.35	159.21	48.44	8449.8
2.01(2.01)	4B	2443.51	184.05	161.30	35.82	6863.7
2.01(2.01)	5B	2475.28	175.08	157.98	36.45	4841.4
2.01(2.01)	5C	2455.60	174.29	156.67	48.60	7787.4
	AVE	2452.65	178.60	157.77	39.63	7274.0
2.03(2.03)	1B	2468.86	181.75	156.73	24.67	5647.8
2.03(2.03)	1C	2351.90	174.89	156.03	43.49	8625.7
2.03(2.03)	2B	2360.32	185.28	159.73	30.83	8245.3
2.03(2.03)	2D	2416.63	178.57	159.24	42.14	8070.7
2.03(2.02)	3C	2425.58	182.66	162.39	46.08	5307.9
2.03(2.04)	3D	2403.86	180.39	160.20	46.13	8217.0
2.03(2.02)	4A	2308.53	187.78	159.06	19.87	4550.8
2.03(2.03)	4E	2358.27	176.53	157.53	31.23	5275.3
	AVE	2386.74	180.98	158.86	35.55	6742.6
2.06(2.05)	3E	2324.60	173.13	157.13	50.72	7520.6

	AVE	2324.60	173.13	157.13	50.72	7520.6
2.13	1C	2351.90	177.95	159.43	43.90	8267.9
2.13	2B	2360.32	186.08	163.20	34.23	6412.3
2.13	2D	2416.63	184.67	163.34	37.66	6232.7
2.13	3C	2425.58	182.84	166.01	55.20	6691.6
2.13	3D	2403.86	183.57	163.62	46.26	7708.6
2.13	3E	2324.60	176.11	160.03	50.04	7852.0
2.13	4A	2308.53	185.89	163.69	25.60	4480.2
2.13	4D	2424.49	179.78	164.02	51.43	7068.0
2.13	5B	2352.41	175.71	163.04	46.40	4718.3
2.13	5D	2342.98	178.62	161.74	34.60	4983.9
	AVE	2371.13	181.12	162.81	42.53	6441.5
2.29	1D	2198.21	184.65	166.31	29.47	4588.6
2.29	2B	2126.78	197.55	168.83	24.00	6673.9
2.29	2C	2201.31	191.04	168.31	36.56	8309.4
2.29	2D	2189.71	191.45	168.96	31.82	6575.9
2.29	2E	2202.74	183.44	166.25	31.53	4415.7
2.29	3A	2154.49	193.28	167.33	27.80	7108.2
2.29	3B	2232.77	198.78	169.87	28.80	7947.5
2.29	3C	2276.47	194.50	170.76	35.92	7925.7
2.29	3D	2217.33	194.50	168.90	32.52	8192.2
2.29	4A	2262.74	193.28	168.93	22.49	4274.9
2.29	4B	2207.90	196.94	170.47	27.00	6643.6
2.29	4D	2305.81	192.68	169.55	32.49	6924.8
2.29	5B	2217.69	185.58	167.91	30.75	4473.4
2.29	5C	2152.38	185.61	165.94	37.09	7534.4
	AVE	2210.45	191.66	168.45	30.59	6542.0
2.44	1C	1912.94	187.20	169.30	35.98	7299.4
2.44	2C	1921.94	193.48	173.10	35.25	8503.6
2.44	2D	1893.52	193.28	173.83	31.52	6719.1
2.44	2E	1893.43	187.73	170.78	27.16	4323.4
2.44	3C	1920.68	196.93	174.98	32.46	8473.5
2.44	3D	2014.25	195.15	173.48	34.64	8461.5
2.44	3E	1931.32	186.19	169.55	39.13	7324.5
2.44	4A	1902.36	193.91	173.84	22.77	4229.4
2.44	4B	1970.81	197.54	175.22	28.37	6764.5
2.44	4D	1970.83	193.93	174.57	32.90	6907.1
2.44	5B	1988.22	187.45	172.65	32.61	4369.1
2.44	5C	1929.83	187.34	170.69	38.93	7309.5
	AVE	1937.51	191.68	172.67	32.64	6723.7

RUN 41002F

MASS FLOW = .0456 LBM/SEC INLET VAPOR TEMP = 234.0 DEG F TOTAL POWER = 3.24 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	4C	212.08	253.30	238.84	37.26	10406.2
12	4E	199.33	255.11	238.98	20.13	5033.5
	AVE	205.70	254.20	238.91	28.67	7719.9
24	3E	297.96	262.30	242.83	34.14	8567.5
	AVE	297.96	262.30	242.83	34.14	8567.5
39	1B	516.50	292.14	253.88	21.14	4847.2
39	2A	490.31	296.26	253.84	18.04	4834.4
39	4C	525.14	286.65	253.80	39.06	9939.2
	AVE	510.65	291.69	253.84	26.08	6540.3
48	1C	591.43	306.10	264.18	29.93	8253.6
48	2C	593.41	306.62	267.53	36.15	9597.9
48	2E	589.60	306.08	267.71	23.55	4822.9
48	3E	582.95	298.42	264.22	36.37	8306.4
	AVE	589.35	304.30	265.91	31.50	7745.2
60	1B	727.44	337.88	285.96	20.66	4584.6
60	2A	743.09	343.51	286.15	19.02	4539.8
60	4E	777.09	322.60	286.22	31.87	4638.2
	AVE	749.21	334.66	286.11	23.85	4587.5

RUN 41002F

MASS FLOW = .0456 LBM/SEC INLET VAPOR TEMP = 234.0 DEG F TOTAL POWER = 3.24 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (65.7)	2A	769.43	350.00	295.70	20.55	4583.1
67 (66.8)	2B	776.05	352.42	300.52	29.04	7478.6
67 (67.1)	4B	774.49	365.37	302.40	23.62	7309.4
67 (67.1)	5C	778.32	337.89	292.83	34.97	7551.8
67 (66.9)	5D	772.70	341.31	298.39	26.23	4494.7
	AVE	774.20	349.40	297.97	26.88	6283.5
70 (69.5)	3C	783.31	351.20	301.50	35.33	11166.8
70 (70.0)	4E	778.50	349.00	302.82	24.33	6516.5
	AVE	780.90	350.10	302.16	29.83	8841.6
71 (70.7)	3D	795.77	354.46	304.41	35.47	12434.0
	AVE	795.77	354.46	304.41	35.47	12434.0
74 (73.6)	4D	772.74	352.13	310.74	35.98	12875.4
	AVE	772.74	352.13	310.74	35.98	12875.4
75 (74.7)	1B	782.52	348.55	307.03	27.13	8299.5
75 (74.5)	1D	777.22	347.95	306.64	27.09	7468.5
75 (74.7)	2D	770.17	344.82	310.93	44.05	12738.5
75 (74.4)	4D	772.74	347.30	311.70	41.96	12834.9
	AVE	775.67	347.16	309.08	35.06	10335.3
76 (75.8)	1D	777.22	343.50	308.42	31.97	6548.8
76 (76.4)	2E	783.84	335.80	308.60	41.83	6164.8
76 (76.2)	4B	774.49	356.60	318.99	39.31	7625.4
76 (75.5)	4D	772.74	346.81	313.34	44.60	11661.1
76 (76.2)	5C	778.32	336.90	309.32	56.46	8703.7
76 (75.9)	5D	772.70	340.20	309.25	36.10	6876.7
	AVE	776.55	343.30	311.32	41.71	7930.1
77 (76.9)	1B	782.52	353.41	309.43	25.46	6586.2
77 (76.8)	1D	777.22	343.69	309.98	33.23	5994.5
77 (76.9)	2A	769.43	357.76	310.32	23.12	5499.1

77 (77.2)	2B	776.05	358.85	315.51	34.20	9099.4
77 (76.9)	2D	770.17	344.60	314.09	48.81	9654.0
77 (76.7)	3B	779.82	358.88	316.89	40.90	8249.2
77 (77.0)	5B	784.56	347.90	312.63	31.89	5152.1
	AVE	777.11	352.16	312.69	33.94	7176.4
78 (77.7)	1C	771.51	344.64	309.56	43.73	8963.9
78 (78.0)	2A	769.43	360.08	312.42	22.94	5138.6
78 (78.0)	2B	776.05	360.00	316.66	34.15	8716.0
78 (78.0)	3A	772.70	356.70	312.88	34.65	6653.7
78 (77.7)	4A	781.33	366.60	314.18	21.04	4646.2
78 (78.4)	4B	774.49	361.09	321.53	37.17	6939.8
78 (78.2)	4C	806.95	354.50	320.16	51.80	7848.6
78 (77.5)	4D	772.74	346.79	316.65	49.40	9258.5
78 (78.3)	4E	778.50	349.00	312.13	30.26	5441.8
78 (78.3)	5C	778.32	342.42	312.38	51.50	7824.7
78 (78.2)	5D	772.70	347.90	312.50	31.30	5778.5
	AVE	777.70	353.61	314.64	37.09	7019.1
79 (78.9)	1B	782.52	357.80	312.33	24.50	5855.9
79 (78.8)	1C	771.51	345.74	311.15	44.25	8727.4
79 (78.6)	2C	767.73	358.91	316.81	40.16	9396.9
79 (78.9)	2D	770.17	351.32	317.12	43.23	8354.6
79 (78.5)	2E	783.84	338.01	312.07	43.67	5223.3
79 (78.9)	3A	762.51	361.10	314.70	32.14	6774.1
79 (78.9)	3B	779.82	364.44	320.38	38.70	7739.7
79 (79.5)	3D	795.77	354.83	318.58	48.44	8449.8
79 (79.0)	4B	774.49	363.30	322.34	35.82	6863.7
79 (79.1)	5B	784.56	347.15	316.36	36.45	4841.4
79 (79.3)	5C	778.32	345.72	314.01	48.60	7787.4
	AVE	777.39	353.48	315.99	39.63	7274.0
80 (80.0)	1B	782.52	359.15	314.12	24.67	5647.8
80 (80.0)	1C	745.45	346.80	312.85	43.49	8625.7
80 (80.1)	2B	748.12	365.50	319.51	30.83	8245.3
80 (79.9)	2D	765.97	353.42	318.63	42.14	8070.7
80 (79.6)	3C	768.80	360.79	324.31	46.08	5307.9
80 (80.5)	3D	761.92	356.70	320.36	46.13	8217.0
80 (79.7)	4A	731.71	370.00	318.31	19.87	4550.8
80 (80.1)	4E	747.47	349.75	315.55	31.23	5275.3
	AVE	756.50	357.76	317.95	35.55	6742.6
81 (80.9)	3E	736.80	343.63	314.84	50.72	7520.6

	AVE	736.80	343.63	314.84	50.72	7520.6
84	1C	745.45	352.31	318.98	43.90	8267.9
84	2B	748.12	366.94	325.76	34.23	6412.3
84	2D	765.97	364.40	326.01	37.66	6232.7
84	3C	768.80	361.11	330.81	55.20	6691.6
84	3D	761.92	362.43	326.52	46.26	7708.6
84	3E	736.80	349.00	320.06	50.04	7852.0
84	4A	731.71	366.60	326.64	25.60	4480.2
84	4D	768.46	355.60	327.23	51.43	7068.0
84	5B	745.61	348.27	325.47	46.40	4718.3
84	5D	742.62	353.52	323.13	34.60	4983.9
	AVE	751.55	358.02	325.06	42.53	6441.5
90	1D	696.74	364.37	331.37	29.47	4588.6
90	2B	674.10	387.60	335.90	24.00	6673.9
90	2C	697.72	375.87	334.95	36.56	8309.4
90	2D	694.04	376.61	336.13	31.82	6575.9
90	2E	698.17	362.20	331.24	31.53	4415.7
90	3A	682.88	379.90	333.20	27.80	7108.2
90	3B	707.69	389.80	337.77	28.80	7947.5
90	3C	721.54	382.10	339.37	35.92	7925.7
90	3D	702.80	382.10	336.02	32.52	8192.2
90	4A	717.19	379.90	336.07	22.49	4274.9
90	4B	699.81	386.49	338.85	27.00	6643.6
90	4D	730.84	378.83	337.19	32.49	6924.8
90	5B	702.91	366.04	334.24	30.75	4473.4
90	5C	682.21	366.10	330.70	37.09	7534.4
	AVE	700.62	376.99	335.21	30.59	6542.0
96	1C	606.32	368.96	336.75	35.98	7299.4
96	2C	609.17	380.26	343.57	35.25	8503.6
96	2D	600.17	379.90	344.89	31.52	6719.1
96	2E	600.14	369.92	339.40	27.16	4323.4
96	3C	608.77	386.48	346.96	32.46	8473.5
96	3D	638.43	383.28	344.26	34.64	8461.5
96	3E	612.15	367.14	337.20	39.13	7324.5
96	4A	602.97	381.03	344.92	22.77	4229.4
96	4B	624.66	387.56	347.40	28.37	6764.5
96	4D	624.67	381.07	346.22	32.90	6907.1
96	5B	630.18	369.41	342.77	32.61	4369.1
96	5C	611.67	369.21	339.23	38.93	7309.5
	AVE	614.11	377.02	342.80	32.64	6723.7

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 44303A
Test Date: 5/13/80
Test Type: Steam Cooling
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.143 MPa (20.8 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.131 kw/m (0.040 kw/ft)
Flow rate	0.034 kg/sec (0.076 lb/sec)
Coolant temperature	114°C (238°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 11590

(See following pages for additional results.)

C. Comments:

RUN 44303A

MASS FLOW = .0345 KG/SEC INLET VAPOR TEMP = 114.4 DEG C TOTAL POWER = 6.09 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	1116.52	126.49	117.44	35.12	8503.3
.30	4A	1125.46	125.45	117.45	40.14	8515.5
.30	4C	1118.17	124.11	117.40	74.01	16902.2
.30	4E	1122.89	124.85	117.45	43.31	8522.9
	AVE	1120.76	125.23	117.44	48.15	10610.9
.61	1B	1701.40	133.67	120.50	36.27	8490.1
.61	1C	1690.83	131.89	119.75	54.14	14125.0
.61	4D	1716.58	131.83	120.89	59.41	12741.2
.61	5B	1715.71	129.63	120.52	53.17	8538.2
	AVE	1706.13	131.76	120.41	50.75	10973.6
.99	2A	2938.77	146.88	126.27	38.99	8182.6
.99	4A	2867.69	146.19	126.31	39.48	8168.7
.99	4C	2800.68	142.22	126.28	75.18	16137.9
	AVE	2869.05	145.10	126.29	51.22	10829.7
1.22	1B	3483.57	158.41	134.68	39.06	8074.4
1.22	1C	3397.14	160.28	132.72	45.27	13495.0
1.22	4D	3427.94	159.81	136.21	51.84	12269.1
1.22	5B	3402.82	156.12	135.03	43.04	7945.4
	AVE	3427.87	158.66	134.66	44.80	10450.9
1.52	2A	4234.35	167.55	145.71	50.16	8477.2
1.52	4A	4230.37	168.26	146.81	50.89	7044.2
1.52	4C	4262.71	164.54	146.09	93.25	12903.1
1.52	4E	4213.47	166.96	146.13	52.35	7862.7
	AVE	4235.23	166.83	146.18	61.66	9071.8

RUN 44303A

MASS FLOW = .0345 KG/SEC INLET VAPOR TEMP = 114.4 DEG C TOTAL POWER = 6.09 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SCM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.72)	2A	4437.12	179.81	152.85	41.46	7685.4
1.70(1.72)	4A	4428.05	185.27	154.68	36.11	7114.1
1.70(1.72)	4C	4396.58	184.62	154.38	56.43	13786.7
1.70(1.72)	4E	4376.13	179.19	153.28	42.56	7526.8
	AVE	4409.47	182.22	153.80	44.14	9028.2
1.78(1.80)	1B	4502.33	182.33	155.61	42.14	7690.1
1.78(1.81)	1C	4416.80	186.18	152.91	45.76	12929.6
1.78(1.78)	2D	4533.45	187.25	157.72	51.23	11641.9
1.78(1.80)	3C	4442.47	187.77	157.30	56.12	14501.8
1.78(1.78)	4D	4551.42	187.82	158.57	51.81	11186.0
1.78(1.80)	5B	4364.65	181.98	157.04	43.70	7378.7
	AVE	4468.52	185.55	156.52	48.46	10888.4
1.80(1.85)	1D	4502.83	182.24	157.85	46.04	7582.3
1.80(1.83)	2C	4504.50	189.73	157.55	53.72	14747.4
1.80(1.80)	2D	4533.45	187.77	158.56	51.70	11631.8
1.80(1.83)	3C	4442.47	189.51	158.33	54.46	14497.0
1.80(1.82)	3E	4429.39	187.19	153.67	45.44	12489.5
1.80(1.82)	4B	4433.75	188.97	161.21	52.92	11081.2
1.80(1.82)	5D	4444.83	181.57	157.42	45.96	7385.6
	AVE	4470.17	186.73	157.80	50.03	11345.0
1.83(1.85)	1B	4502.33	182.83	157.61	44.51	7616.9
1.83(1.86)	1C	4416.80	188.16	154.78	45.37	12790.9
1.83(1.83)	2D	4533.45	187.42	159.93	54.85	11631.5
1.83(1.86)	3B	4591.17	196.34	160.22	48.16	14079.4
1.83(1.85)	3C	4442.47	190.83	159.36	53.96	14499.3
1.83(1.86)	3D	4593.87	194.07	159.44	50.48	14197.5
1.83(1.84)	5B	4364.65	185.19	158.99	41.32	7324.9
1.83(1.82)	5C	4474.42	181.22	154.12	57.21	12518.1
	AVE	4489.90	188.26	158.06	49.48	11832.3
1.88(1.93)	1D	4502.83	186.63	160.98	43.34	7459.3
1.88(1.91)	2C	4504.50	193.86	160.71	51.62	14591.7
1.88(1.89)	2D	4533.45	191.69	162.56	51.27	11548.0

1.88(1.84)	2E	4310.78	185.28	157.81	38.98	7419.0
1.88(1.92)	3B	4591.17	196.88	162.37	50.23	14104.0
1.88(1.90)	3C	4442.47	193.30	161.41	52.91	14490.7
1.88(1.92)	3D	4593.87	195.26	161.69	51.84	14203.9
1.88(1.89)	3E	4429.39	188.39	156.66	47.73	12396.1
1.88(1.90)	4B	4433.75	191.88	164.48	53.15	11145.1
1.88(1.87)	5C	4474.42	182.47	156.17	58.69	12451.1
1.88(1.90)	5D	4444.83	184.88	160.70	45.51	7314.4
	AVE	4478.31	190.05	160.50	49.57	11556.7
1.91(1.96)	1D	4502.83	187.79	162.20	43.29	7420.6
1.91(1.94)	2C	4504.50	195.11	161.94	51.42	14539.8
1.91(1.91)	2D	4533.45	192.61	163.19	50.66	11528.6
1.91(1.93)	3C	4442.47	194.52	162.63	52.75	14484.1
1.91(1.93)	3E	4429.39	187.21	157.92	51.69	12386.6
1.91(1.93)	4B	4433.75	192.71	165.74	53.83	11161.0
1.91(1.93)	5D	4444.83	186.01	161.64	45.37	7291.0
	AVE	4470.17	190.85	162.21	49.86	11258.8
1.93(1.95)	2A	4437.12	187.14	162.26	43.94	7341.1
1.93(1.92)	2B	4291.55	190.85	163.03	51.93	11614.7
1.93(1.93)	2D	4533.45	193.28	163.93	50.68	11511.5
1.93(1.89)	2E	4310.78	189.01	159.84	36.41	7348.9
1.93(1.96)	3B	4591.17	197.57	164.21	51.77	14109.2
1.93(1.96)	3C	4442.47	195.71	163.55	52.14	14471.0
1.93(1.96)	3D	4593.87	197.37	163.54	51.15	14177.6
1.93(1.95)	4A	4428.05	190.75	163.90	40.32	7128.1
1.93(1.95)	4E	4376.13	189.27	162.44	40.04	7285.8
1.93(1.95)	4C	4396.58	193.16	163.70	56.53	14077.7
	AVE	4440.12	192.41	163.10	47.49	10906.5
1.96(2.00)	1D	4502.83	189.61	164.03	43.09	7364.8
1.96(1.99)	2C	4504.50	197.55	163.88	50.35	14449.6
1.96(1.95)	2D	4533.45	194.54	164.87	49.96	11482.7
1.96(1.98)	3C	4442.47	196.94	164.47	51.48	14454.8
1.96(1.97)	3E	4429.39	187.97	159.67	53.31	12335.9
1.96(1.98)	4B	4433.75	195.59	167.61	51.37	11147.8
1.96(1.97)	5D	4444.83	186.29	163.79	44.51	7249.1
	AVE	4470.17	192.94	164.04	49.16	11212.1
1.98(2.01)	3D	4593.87	199.39	165.67	51.02	14145.3
1.98(2.00)	2A	4437.12	190.78	164.35	41.01	7268.5
1.98(1.98)	2D	4533.45	195.72	166.12	49.93	11450.8

1.98(2.01)	3B	4591.17	199.94	166.33	51.37	14074.2
1.98(2.00)	3C	4442.47	198.77	165.48	50.04	14425.6
1.98(2.01)	4A	4428.05	192.34	166.05	40.96	7111.9
1.98(2.00)	4E	4376.13	192.07	164.60	38.84	7234.1
1.98(2.00)	4C	4396.58	194.56	165.85	57.72	14088.5
	AVE	4474.66	195.44	165.55	47.57	11224.9
2.13	1B	4088.05	189.37	169.44	49.85	7724.1
2.13	1C	4027.01	188.62	165.42	58.62	13432.9
2.13	2B	4052.85	187.78	171.82	83.01	9915.7
2.13	2E	4121.44	184.66	170.07	68.94	7245.0
2.13	3A	4003.38	188.07	167.15	64.53	12115.9
2.13	3B	4113.03	197.07	170.77	58.34	11746.8
2.13	3D	4141.14	196.97	170.16	57.67	12334.0
2.13	4D	4219.60	189.97	172.55	78.88	10958.0
2.13	5B	4026.71	187.17	170.94	60.40	7688.9
	AVE	4088.14	189.97	169.81	64.47	10351.2
2.29	1D	3824.87	198.18	174.26	38.15	7393.6
2.29	2C	3837.27	203.06	175.82	51.77	13001.1
2.29	2E	4079.94	191.19	174.78	59.86	7186.8
2.29	3A	4005.99	198.75	172.68	50.69	11811.3
2.29	3B	4042.40	206.89	177.20	49.69	12370.8
2.29	3D	3877.49	204.83	176.37	49.92	12850.4
2.29	3E	3887.07	190.83	171.49	67.10	12378.0
2.29	4B	3874.94	201.26	178.92	55.17	10505.4
2.29	5C	3965.90	189.55	171.78	74.60	12825.8
2.29	5D	3909.44	195.72	175.03	45.18	7494.7
	AVE	3930.53	198.03	174.83	54.21	10781.8
2.44	3D	3371.50	201.83	181.61	60.91	13381.1
2.44	1B	3236.05	198.95	178.72	37.88	7187.7
2.44	1C	3221.61	196.08	175.52	51.67	12293.9
2.44	2E	3244.76	197.98	179.37	41.32	7058.8
2.44	3B	3365.95	206.43	182.52	46.98	12996.5
2.44	4D	3276.40	203.48	183.06	50.57	10948.3
2.44	5B	3309.23	196.06	180.05	49.09	7206.9
2.44	5C	3302.73	192.90	176.63	67.08	12368.6
	AVE	3291.03	199.46	179.68	50.69	10430.2

RUN 44303A

MASS FLOW = .0760 LBM/SEC INLET VAPOR TEMP = 238.0 DEG F TOTAL POWER = 5.77 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	353.89	259.69	243.40	35.12	8503.3
12	4A	356.72	257.81	243.42	40.14	8515.5
12	4C	354.41	255.40	243.33	74.01	16902.2
12	4E	355.91	255.73	243.42	43.31	8522.9
	AVE	355.23	257.41	243.39	48.15	10610.9
24	1B	539.27	272.60	248.90	36.27	8490.1
24	1C	535.92	269.41	247.55	54.14	14125.0
24	4D	544.08	269.30	249.59	59.41	12741.2
24	5B	543.81	265.34	248.94	53.17	8538.2
	AVE	540.77	269.16	248.75	50.75	10973.6
39	2A	931.46	296.39	259.28	38.99	8182.6
39	4A	908.94	295.14	259.35	39.48	8168.7
39	4C	887.70	288.00	259.31	75.18	16137.9
	AVE	909.37	293.17	259.31	51.22	10829.7
48	1B	1104.14	317.13	274.42	39.06	8074.4
48	1C	1076.75	320.51	270.89	45.27	13495.0
48	4D	1086.51	319.66	277.18	51.84	12289.1
48	5B	1078.55	313.02	275.05	43.04	7945.4
	AVE	1086.49	317.58	274.39	44.80	10450.9
60	2A	1342.11	333.60	294.28	50.16	8477.2
60	4A	1340.85	334.87	296.25	50.89	7044.2
60	4C	1351.10	328.18	294.97	93.25	12903.1
60	4E	1335.49	332.53	295.03	52.35	7862.7
	AVE	1342.39	332.30	295.13	61.66	9071.8

RUN 44303A

MASS FLOW = .0760 LBM/SEC INLET VAPOR TEMP = 238.0 DEG F TOTAL POWER = 5.77 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.6)	2A	1406.38	355.66	307.13	41.46	7685.4
67 (67.9)	4A	1403.50	365.49	310.43	36.11	7114.1
67 (67.7)	4C	1393.53	364.32	309.89	56.43	13786.7
67 (67.6)	4E	1387.05	354.54	307.90	42.56	7526.8
	AVE	1397.61	360.00	308.84	44.14	9028.2
70 (70.8)	1B	1427.05	360.20	312.10	42.14	7690.1
70 (71.3)	1C	1399.94	367.12	307.23	45.76	12929.6
70 (70.0)	2D	1436.91	369.04	315.90	51.23	11641.9
70 (70.9)	3C	1408.07	369.99	315.15	56.12	14501.8
70 (70.1)	4D	1442.61	370.08	317.42	51.81	11188.0
70 (70.7)	5B	1383.41	359.57	314.67	43.70	7378.7
	AVE	1416.33	366.00	313.74	48.46	10888.4
71 (72.7)	1D	1427.20	366.03	316.13	46.04	7582.3
71 (72.0)	2C	1427.73	373.52	315.60	53.72	14747.4
71 (70.8)	2D	1436.91	369.98	317.42	51.70	11631.8
71 (71.9)	3C	1408.07	373.30	317.00	54.46	14497.0
71 (71.5)	3E	1403.93	368.94	308.61	45.44	12489.5
71 (71.7)	4B	1405.31	372.14	322.19	52.92	11081.2
71 (71.5)	5D	1408.82	358.83	315.36	45.96	7385.6
	AVE	1416.85	368.11	316.04	50.03	11345.0
72 (72.8)	1B	1427.05	361.09	315.70	44.51	7616.9
72 (73.3)	1C	1399.94	370.68	310.60	45.37	12790.9
72 (72.1)	2D	1436.91	369.35	319.88	54.85	11631.5
72 (73.3)	3B	1455.20	365.42	320.40	48.16	14079.4
72 (72.9)	3C	1408.07	375.49	318.85	53.96	14499.3
72 (73.2)	3D	1456.06	361.32	318.99	50.48	14197.5
72 (72.6)	5B	1383.41	365.33	318.18	41.32	7324.9
72 (71.6)	5C	1418.20	358.19	309.42	57.21	12518.1
	AVE	1423.10	370.86	316.50	49.48	11832.3
74 (75.8)	1D	1427.20	367.93	321.76	43.34	7459.3
74 (75.1)	2C	1427.73	386.96	321.28	51.62	14591.7
74 (74.6)	2D	1436.91	377.04	324.61	51.27	11548.0

74 (72.4)	2E	1366.33	365.50	316.06	38.98	7419.0
74 (75.4)	3B	1455.20	386.38	324.27	50.23	14104.0
74 (74.9)	3C	1408.07	379.94	322.53	52.91	14490.7
74 (75.4)	3D	1456.06	383.46	323.05	51.84	14203.9
74 (74.6)	3E	1403.93	371.10	313.98	47.73	12396.1
74 (74.8)	4B	1405.31	377.39	328.07	53.15	11145.1
74 (73.7)	5C	1418.20	360.44	313.11	58.69	12451.1
74 (74.7)	5D	1408.82	364.78	321.27	45.51	7314.4
	AVE	1419.43	374.08	320.91	49.57	11556.7
75 (77.0)	1D	1427.20	370.02	323.96	43.29	7420.6
75 (76.3)	2C	1427.73	383.20	323.49	51.42	14539.8
75 (75.2)	2D	1436.91	378.70	325.75	50.66	11528.6
75 (76.1)	3C	1408.07	382.13	324.74	52.75	14484.1
75 (75.9)	3E	1403.93	368.98	316.25	51.69	12386.6
75 (76.0)	4B	1405.31	378.89	330.33	53.83	11161.0
75 (75.8)	5D	1408.82	366.82	323.30	45.37	7291.0
	AVE	1416.85	375.53	323.97	49.86	11258.8
76 (76.8)	2A	1406.38	368.85	324.10	43.94	7341.1
76 (75.7)	2B	1360.24	375.53	326.54	51.93	11614.7
76 (75.9)	2D	1436.91	379.90	327.07	50.68	11511.5
76 (74.4)	2E	1366.33	372.22	319.71	36.41	7348.9
76 (77.2)	3B	1455.20	387.63	327.57	51.77	14109.2
76 (77.0)	3C	1408.07	384.29	326.39	52.14	14471.0
76 (77.2)	3D	1456.06	387.26	326.37	51.15	14177.6
76 (76.9)	4A	1403.50	375.36	327.03	40.32	7128.1
76 (76.6)	4E	1387.05	372.68	324.40	40.04	7285.8
76 (76.7)	4C	1393.53	379.69	326.67	56.53	14077.7
	AVE	1407.33	378.34	325.59	47.49	10906.5
77 (78.8)	1D	1427.20	373.30	327.25	43.09	7364.8
77 (78.2)	2C	1427.73	387.60	326.98	50.35	14449.6
77 (76.8)	2D	1436.91	382.16	328.76	49.98	11482.7
77 (77.9)	3C	1408.07	386.50	328.04	51.48	14454.8
77 (77.7)	3E	1403.93	370.35	319.41	53.31	12335.9
77 (77.8)	4B	1405.31	384.24	333.09	51.37	11147.8
77 (77.7)	5D	1408.82	370.92	326.82	44.51	7249.1
	AVE	1416.85	379.30	327.28	49.16	11212.1
78 (79.3)	3D	1456.06	390.90	330.20	51.02	14145.3
78 (78.8)	2A	1406.38	375.40	327.62	41.91	7268.5
78 (78.0)	2D	1436.91	384.30	331.02	49.93	11450.8

78 (79.3)	3B	1455.20	391.89	331.39	51.07	14074.2
78 (78.9)	3C	1408.07	369.79	329.87	50.04	14425.6
78 (79.0)	4A	1403.50	378.20	330.88	40.96	7111.9
78 (78.7)	4E	1387.05	377.72	328.28	38.84	7234.1
78 (78.8)	4C	1393.53	382.21	330.53	57.72	14088.5
	AVE	1418.34	383.80	330.00	47.57	11224.9
84	1B	1295.74	372.87	336.99	49.85	7724.1
84	1C	1276.39	371.52	329.76	58.62	13432.9
84	2B	1284.58	370.01	341.27	83.01	9915.7
84	2E	1306.32	364.42	338.12	68.94	7245.0
84	3A	1268.90	370.53	332.88	64.53	12115.9
84	3B	1303.66	386.73	339.38	58.34	11746.8
84	3D	1312.57	386.55	338.28	57.67	12334.0
84	4D	1337.43	373.95	342.58	78.88	10958.0
84	5B	1276.30	368.90	339.70	60.40	7688.9
	AVE	1295.76	373.94	337.66	64.47	10351.2
90	1D	1212.32	388.73	345.67	38.15	7393.6
90	2C	1216.25	397.51	348.47	51.77	13001.1
90	2E	1293.17	376.14	346.61	59.86	7186.8
90	3A	1269.73	369.74	342.83	50.69	11811.3
90	3B	1281.27	404.41	350.97	49.69	12370.8
90	3D	1229.00	400.70	349.47	49.92	12850.4
90	3E	1232.03	375.50	340.68	67.10	12378.0
90	4B	1228.19	394.27	354.06	55.17	10505.4
90	5C	1257.02	373.20	341.21	74.50	12825.8
90	5D	1239.12	384.30	347.05	45.18	7494.7
	AVE	1245.81	388.45	346.70	54.21	10781.8
96	3D	1068.62	395.30	358.90	60.91	13381.1
96	1B	1025.69	390.12	353.69	37.88	7187.7
96	1C	1021.11	384.94	347.93	51.67	12293.9
96	2E	1028.45	368.37	354.87	41.32	7058.8
96	3B	1066.86	407.17	360.53	45.98	12996.5
96	4D	1038.48	398.27	361.50	50.57	10948.3
96	5B	1048.69	384.90	356.10	49.09	7206.9
96	5C	1046.83	379.23	349.93	67.06	12368.6
	AVE	1043.12	391.04	355.43	50.69	10430.2

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41103B
Test Date: 6/11/80
Test Type: Steam Cooling
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.141 MPa (20.4 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.131 kw/m (0.0399 kw/ft)
Flow rate	0.035 kg/sec (0.077 lb/sec)
Coolant temperature	114°C (237°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 11330

(See following pages for additional results.)

C. Comments:

RUN 411038

MASS FLOW = .0349 KG/SEC INLET VAPOR TEMP = 113.9 DEG C TOTAL POWER = 6.05 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	1120.74	126.34	116.83	33.59	8643.9
.30	4A	1106.13	126.60	116.84	32.32	8640.1
.30	4C	1098.74	124.70	116.79	61.75	17146.3
.30	4E	1078.23	125.94	116.82	33.75	8649.1
	AVE	1100.96	125.89	116.82	40.35	10769.8
.61	1B	1781.49	135.13	119.91	32.85	8606.8
.61	1C	1739.62	131.89	119.14	53.14	14342.5
.61	4D	1801.69	133.11	120.24	53.03	12917.9
.61	5B	1817.63	133.14	119.96	38.82	8629.4
	AVE	1785.11	133.32	119.81	44.46	11124.2
.99	2A	2878.92	148.06	125.60	35.05	8302.0
.99	4A	2829.09	148.59	125.65	33.70	8273.2
.99	4C	2880.27	146.22	125.64	59.61	16290.7
.99	4E	2799.24	148.59	125.59	33.25	8292.2
	AVE	2846.88	147.87	125.62	40.40	10289.5
1.22	1B	3471.28	164.50	133.98	30.06	8133.4
1.22	1C	3508.01	158.77	131.98	48.28	13729.9
1.22	4D	3483.09	160.06	135.35	50.38	12482.0
1.22	5B	3552.77	160.86	134.43	35.68	8015.4
	AVE	3503.79	161.04	133.94	41.10	10590.2
1.52	2A	4221.71	174.89	144.67	35.86	7736.9
1.52	4A	4143.43	173.66	145.31	37.54	7642.9
1.52	4C	4083.65	170.10	145.13	65.61	15288.5
1.52	4E	4162.57	171.48	144.50	39.79	7617.5
	AVE	4152.84	172.53	144.90	44.70	9621.5

RUN 41103B

MASS FLOW = .0349 KG/SEC INLET VAPOR TEMP = 113.9 DEG C TOTAL POWER = 6.05 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.72)	2A	4381.07	186.43	151.62	31.49	7894.9
1.70(1.72)	4A	4388.08	190.50	153.21	29.21	7145.1
1.70(1.70)	4C	4379.27	183.34	152.81	55.92	13500.0
1.70(1.71)	4E	4419.17	185.89	151.41	32.09	7678.1
	AVE	4391.90	186.54	152.26	37.18	9054.5
1.78(1.80)	1B	4513.97	190.21	154.26	31.14	8007.9
1.78(1.79)	1C	4363.43	179.76	151.35	53.53	13334.3
1.78(1.80)	2D	4370.90	188.34	156.89	46.36	11689.8
1.78(1.78)	3C	4484.69	187.17	155.31	54.40	14263.9
1.78(1.79)	4D	4429.69	188.42	157.54	47.81	11099.2
1.78(1.81)	5B	4289.94	182.31	155.88	40.60	7876.7
	AVE	4408.77	186.03	155.20	45.64	11045.3
1.80(1.83)	1D	4330.92	185.92	155.26	35.19	9300.1
1.80(1.82)	2D	4370.90	190.86	157.69	43.76	12053.3
1.80(1.81)	3C	4484.69	188.96	156.24	52.78	13682.4
1.80(1.83)	3E	4407.26	183.60	153.21	50.17	14170.6
1.80(1.81)	4B	4350.90	194.56	159.38	40.78	11158.0
1.80(1.82)	5D	4393.85	185.29	155.55	36.82	8639.2
	AVE	4389.75	188.20	156.22	43.25	11500.6
1.83(1.85)	1B	4513.97	190.86	155.94	31.96	10934.0
1.83(1.85)	1C	4363.43	184.67	153.37	48.15	17678.1
1.83(1.86)	2E	4455.81	183.15	156.49	41.72	10970.0
1.83(1.86)	3A	4247.87	191.44	155.02	39.82	17329.4
1.83(1.85)	5B	4289.94	179.65	157.41	48.36	11564.2
1.83(1.84)	5C	4603.51	183.08	154.24	55.18	15678.6
	AVE	4412.42	185.47	155.41	44.19	14025.7
1.88(1.91)	1D	4330.92	184.67	158.14	40.58	7552.9
1.88(1.91)	2B	4535.42	196.22	161.39	52.03	11833.8
1.88(1.91)	2C	4460.82	186.33	159.58	63.27	15162.9
1.88(1.90)	2D	4370.90	187.78	160.82	53.85	12037.4
1.88(1.91)	2E	4455.81	181.03	158.47	49.36	7414.8
1.88(1.92)	3A	4247.87	190.03	156.99	43.86	12456.4

1.88(1.91)	3B	4317.52	187.72	161.02	61.97	14611.7
1.88(1.88)	3C	4484.69	189.17	159.89	58.65	15592.1
1.88(1.91)	3D	4320.57	184.65	160.39	68.60	14733.7
1.88(1.91)	3E	4407.26	184.07	156.07	54.21	12680.5
1.88(1.89)	4B	4350.90	193.52	162.37	45.93	11724.8
1.88(1.89)	5C	4603.51	184.29	156.28	56.56	12837.6
1.88(1.90)	5D	4393.85	185.95	158.45	39.62	7514.2
	AVE	4401.54	186.88	159.22	52.96	12011.8
1.91(1.94)	1D	4330.92	185.80	159.40	40.64	7542.2
1.91(1.94)	2C	4400.82	188.45	160.83	60.99	15119.1
1.91(1.93)	2D	4370.90	187.17	161.95	57.52	11840.1
1.91(1.92)	3C	4484.69	185.63	161.06	70.15	15057.6
1.91(1.94)	3E	4407.26	183.18	157.07	58.10	12629.4
1.91(1.92)	4B	4350.90	190.22	163.41	53.51	11426.4
1.91(1.93)	5D	4393.85	190.22	159.93	35.69	7323.0
	AVE	4391.33	187.24	160.52	53.80	11562.5
1.93(1.95)	2A	4381.07	188.97	160.12	37.41	7394.8
1.93(1.96)	2B	4535.42	192.60	163.26	50.81	11747.8
1.93(1.96)	2E	4455.81	180.39	160.45	55.69	7450.9
1.93(1.96)	3A	4247.87	189.31	158.68	47.24	12347.6
1.93(1.96)	3B	4317.52	190.22	162.72	59.79	14589.5
1.93(1.94)	3C	4484.69	189.49	161.83	61.96	15051.4
1.93(1.96)	3D	4320.57	187.21	162.17	66.03	14720.1
1.93(1.96)	4A	4388.08	195.58	162.02	31.85	7243.3
1.93(1.94)	4C	4379.27	189.20	162.10	61.69	14428.6
1.93(1.94)	4E	4419.17	190.96	160.06	35.14	7449.1
1.93(1.94)	5C	4603.51	184.15	158.03	60.52	12317.8
	AVE	4412.09	188.92	161.04	51.64	11340.1
1.96(1.99)	1D	4330.92	187.17	161.56	41.70	7558.0
1.96(1.98)	2C	4400.82	191.38	162.48	57.93	14968.4
1.96(1.98)	2D	4370.90	190.23	163.98	54.88	11784.0
1.96(1.96)	3C	4484.69	194.50	162.88	53.70	14942.0
1.96(1.99)	3E	4407.26	182.83	158.82	63.06	12556.8
1.96(1.96)	4B	4350.90	194.50	164.77	47.90	11453.5
1.96(1.98)	5D	4393.85	185.89	162.15	45.67	7398.3
	AVE	4391.33	189.50	162.38	52.12	11523.0
1.98(2.00)	2A	4381.07	195.14	161.85	32.07	7337.9
1.98(2.01)	2B	4535.42	196.90	165.43	46.97	11606.0
1.98(2.00)	2D	4370.90	190.83	164.79	55.20	11762.5

1.98(2.01)	2E	4455.81	183.66	162.50	52.09	7456.2
1.98(2.01)	3A	4247.87	192.65	160.71	44.96	12212.2
1.98(2.01)	3B	4317.52	196.34	164.91	51.74	14389.5
1.98(1.99)	3C	4484.69	197.07	164.02	51.12	14852.0
1.98(2.01)	3D	4320.57	191.96	164.16	58.93	14571.3
1.98(2.01)	4A	4368.08	198.85	164.18	30.60	7270.1
1.98(1.99)	4C	4379.27	193.82	163.93	55.44	14337.7
1.98(1.99)	4E	4419.17	193.28	162.20	34.74	7481.4
1.98(2.00)	5C	4603.51	185.28	160.07	62.42	12185.8
	AVE	4408.65	192.98	163.23	48.02	11288.5
2.13	1B	3982.14	189.60	167.09	43.14	7879.3
2.13	1C	4114.91	184.73	164.11	67.90	13657.3
2.13	2B	3992.11	196.39	170.21	49.41	10028.7
2.13	2E	4123.71	182.90	167.67	66.58	7456.8
2.13	3A	4022.30	193.28	165.59	48.75	12184.2
2.13	3B	4193.35	195.72	169.56	60.93	11961.9
2.13	3D	4006.49	192.03	168.85	65.11	12676.0
2.13	4D	4084.52	192.31	170.03	59.73	11313.4
2.13	5B	4055.75	187.58	169.24	53.91	7834.4
2.13	5C	4043.80	182.62	165.63	81.02	13439.0
	AVE	4061.91	189.72	167.80	59.56	10843.1
2.29	1D	3809.03	197.18	172.06	36.36	7517.5
2.29	2B	3763.77	207.27	175.81	37.90	10536.6
2.29	2C	3804.63	201.82	174.29	51.00	13462.7
2.29	2E	3851.76	191.20	172.50	49.76	7320.1
2.29	3A	3680.14	202.41	170.87	38.38	11926.7
2.29	3B	3916.59	206.23	175.41	46.55	12890.8
2.29	3D	3769.01	199.46	174.48	55.85	13426.5
2.29	3E	3724.41	183.44	169.63	91.23	12661.7
2.29	4B	4088.41	203.98	175.71	47.65	10900.6
2.29	5C	3960.78	190.17	170.56	67.61	12719.7
2.29	5D	3721.67	199.66	173.28	33.65	7489.3
	AVE	3826.38	198.44	173.24	50.54	10986.6
2.44	1B	3282.65	194.77	176.45	42.83	7344.8
2.44	1C	3277.80	194.40	173.87	52.90	12478.7
2.44	2B	3115.47	207.15	180.82	37.23	10835.4
2.44	2E	3266.02	194.95	177.19	43.91	7217.7
2.44	3A	3231.52	203.12	175.78	38.59	11844.6
2.44	3B	3249.13	208.25	180.43	42.36	13432.3
2.44	3D	3260.86	200.07	179.40	57.97	13838.5
2.44	4D	3318.35	202.44	180.36	47.64	11320.1
2.44	5B	3371.81	198.26	179.14	41.80	7259.8
2.44	5C	3623.35	195.67	175.39	58.97	12244.7
	AVE	3299.70	199.91	177.88	46.42	10781.7

RUN 41103B

MASS FLOW = .0770 LBM/SEC INLET VAPOR TEMP = 237.0 DEG F TOTAL POWER = 5.73 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	355.23	259.42	242.29	33.59	8643.9
12	4A	350.60	259.87	242.31	32.32	8640.1
12	4C	348.25	256.46	242.23	61.75	17146.3
12	4E	341.75	258.69	242.28	33.75	8649.1
	AVE	348.96	258.61	242.28	40.35	10769.8
24	1B	564.65	275.23	247.84	32.85	8606.8
24	1C	551.38	269.40	246.45	53.14	14342.5
24	4D	571.06	271.60	248.43	53.03	12917.9
24	5B	576.11	271.65	247.93	38.82	8629.4
	AVE	565.80	271.97	247.66	44.46	11124.2
39	2A	912.49	298.50	258.07	35.05	8302.0
39	4A	896.70	299.46	258.17	33.70	8273.2
39	4C	912.92	295.20	258.15	59.61	16290.7
39	4E	887.24	299.47	258.06	33.25	8292.2
	AVE	902.34	298.16	258.11	40.40	10289.5
48	1B	1100.25	328.10	273.17	30.06	8133.4
48	1C	1111.89	317.78	269.57	48.28	13729.9
48	4D	1103.99	320.10	275.63	50.38	12482.0
48	5B	1126.08	321.54	273.97	35.68	8015.4
	AVE	1110.55	321.88	273.08	41.10	10590.2
60	2A	1338.10	346.80	292.41	35.86	7736.9
60	4A	1313.29	344.59	293.55	37.54	7642.9
60	4C	1294.34	338.18	293.23	65.61	15288.5
60	4E	1319.36	340.66	292.10	39.79	7817.5
	AVE	1316.27	342.55	292.82	44.70	9621.5

RUN 411038

MASS FLOW = .0770 LBM/SEC INLET VAPOR TEMP = 237.0 DEG F TOTAL POWER = 5.73 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.7)	2A	1388.61	367.57	304.91	31.49	7894.9
67 (67.9)	4A	1390.83	374.91	307.78	29.21	7145.1
67 (67.1)	4C	1388.04	362.01	307.07	55.92	13500.0
67 (67.3)	4E	1400.69	366.61	304.54	32.09	7678.1
	AVE	1392.04	367.77	306.07	37.18	9054.5
70 (70.7)	1B	1430.74	374.38	309.66	31.14	8007.9
70 (70.6)	1C	1383.02	355.58	304.43	53.53	13334.3
70 (70.7)	2D	1385.39	371.02	314.40	46.36	11689.8
70 (70.2)	3C	1421.45	368.90	311.55	54.40	14263.9
70 (70.5)	4D	1404.02	371.15	315.57	47.81	11099.2
70 (71.1)	5B	1359.73	360.15	312.58	40.60	7876.7
	AVE	1397.39	366.86	311.37	45.64	11045.3
71 (72.1)	1D	1372.72	366.65	311.48	35.19	9300.1
71 (71.6)	2D	1385.39	375.55	315.84	43.76	12053.3
71 (71.1)	3C	1421.45	372.12	313.24	52.78	13682.4
71 (72.1)	3E	1396.91	362.47	307.78	50.17	14170.6
71 (71.3)	4B	1379.05	382.21	318.89	40.78	11158.0
71 (71.7)	5D	1392.66	365.52	311.99	36.82	8639.2
	AVE	1391.36	370.76	313.20	43.25	11500.6
72 (72.7)	1B	1430.74	375.54	312.70	31.96	10934.0
72 (72.7)	1C	1383.02	364.40	308.07	48.15	17678.1
72 (73.2)	2E	1412.30	361.67	313.68	41.72	10970.0
72 (73.2)	3A	1346.39	376.59	311.04	39.82	17329.4
72 (73.0)	5B	1359.73	355.38	315.33	48.35	11564.2
72 (72.4)	5C	1459.12	361.54	309.63	55.18	15678.6
	AVE	1398.55	365.85	311.74	44.19	14025.7
74 (75.2)	1D	1372.72	364.40	316.66	40.58	7552.9
74 (75.3)	2B	1437.55	374.40	322.50	52.03	11833.8
74 (75.0)	2C	1394.87	367.39	319.24	53.27	15162.9
74 (74.7)	2D	1385.39	370.00	321.48	53.85	12037.4
74 (75.3)	2E	1412.30	357.86	317.24	49.30	7414.8
74 (75.4)	3A	1346.39	374.05	314.58	43.86	12456.4

74 (75.2)	3B	1368.47	369.89	321.84	61.97	14611.7
74 (74.2)	3C	1421.45	372.51	319.80	58.65	15592.1
74 (75.2)	3D	1369.44	364.37	320.71	68.66	14733.7
74 (75.2)	3E	1396.91	363.32	312.93	54.21	12680.5
74 (74.4)	4B	1379.05	380.34	324.27	45.93	11724.8
74 (74.6)	5C	1459.11	363.73	313.31	56.56	12837.6
74 (74.6)	5D	1392.66	366.72	317.21	39.62	7514.2
	AVE	1395.10	368.38	318.60	52.96	12011.8
75 (76.4)	1D	1372.72	366.43	318.91	40.64	7542.2
75 (76.3)	2C	1394.87	371.22	321.49	60.99	15119.1
75 (75.8)	2D	1385.39	368.90	323.50	57.52	11840.1
75 (75.4)	3C	1421.45	366.14	321.92	70.13	15057.6
75 (76.3)	3E	1396.91	361.73	314.72	58.10	12629.4
75 (75.6)	4B	1379.05	374.40	326.13	53.51	11426.4
75 (76.1)	5D	1392.66	374.40	319.87	35.69	7323.0
	AVE	1391.87	369.03	320.93	53.80	11562.5
76 (76.9)	2A	1388.61	372.15	320.22	37.41	7394.8
76 (77.1)	2B	1437.53	378.69	325.86	50.81	11747.8
76 (77.2)	2E	1412.30	356.70	320.81	55.69	7450.9
76 (77.2)	3A	1346.39	372.76	317.63	47.24	12347.6
76 (77.0)	3B	1368.47	374.40	324.89	59.79	14589.5
76 (76.2)	3C	1421.45	373.08	323.29	61.90	15051.4
76 (77.1)	3D	1369.44	368.99	323.90	66.03	14720.1
76 (77.0)	4A	1390.83	384.04	323.64	31.85	7243.3
76 (76.3)	4C	1388.04	372.56	323.78	61.69	14428.6
76 (76.5)	4E	1406.69	375.73	320.11	35.14	7449.1
76 (76.5)	5C	1459.11	363.47	316.46	60.52	12317.8
	AVE	1398.44	372.05	321.87	51.64	11340.1
77 (78.5)	1D	1372.72	368.90	322.82	41.70	7558.0
77 (78.0)	2C	1394.87	376.49	324.46	57.93	14968.4
77 (77.8)	2D	1385.39	374.41	327.16	54.88	11784.0
77 (77.3)	3C	1421.45	382.10	325.18	53.70	14942.0
77 (78.2)	3E	1396.91	361.10	317.87	63.06	12556.8
77 (77.2)	4B	1379.05	382.10	328.59	47.90	11453.5
77 (78.1)	5D	1392.66	366.60	323.86	45.67	7398.3
	AVE	1391.87	373.10	324.28	52.12	11523.0
78 (78.6)	2A	1388.61	383.25	323.32	32.07	7337.9
78 (79.2)	2B	1437.53	386.42	329.77	46.97	11606.0
78 (78.6)	2D	1385.39	375.50	328.62	55.20	11762.5

78 (79.2)	2E	1412.30	362.59	324.50	52.09	7456.2
78 (79.3)	3A	1346.39	376.77	321.27	44.96	12212.2
78 (79.3)	3B	1368.47	385.41	328.84	51.74	14389.5
78 (78.5)	3C	1421.45	386.72	327.24	51.12	14852.0
78 (79.2)	3D	1369.44	377.53	327.48	58.93	14571.3
78 (79.0)	4A	1390.83	389.93	327.53	30.60	7270.1
78 (78.3)	4C	1388.04	380.87	327.07	55.44	14337.7
78 (78.5)	4E	1400.69	379.90	323.97	34.74	7481.4
78 (78.6)	5C	1459.11	365.50	320.12	62.42	12185.8
	AVE	1397.36	379.37	325.81	48.02	11288.5
84	1B	1262.17	373.29	332.77	43.14	7879.3
84	1C	1304.25	364.52	327.41	67.90	13657.3
84	2B	1265.33	385.50	338.38	49.41	10028.7
84	2E	1307.04	361.22	333.81	66.58	7456.8
84	3A	1274.90	379.90	330.06	48.75	12184.2
84	3B	1329.11	384.30	337.20	60.03	11961.9
84	3D	1269.89	377.66	335.92	65.11	12676.0
84	4D	1294.62	378.16	338.05	59.73	11313.4
84	5B	1285.50	369.65	336.63	53.91	7834.4
84	5C	1281.71	365.72	330.13	81.02	13439.0
	AVE	1287.45	373.49	334.03	59.56	10843.1
90	1D	1207.30	386.92	341.71	36.36	7517.5
90	2B	1192.95	405.09	348.46	37.90	10536.6
90	2C	1205.90	395.27	345.71	51.00	13462.7
90	2E	1220.84	376.16	342.51	49.76	7320.1
90	3A	1166.45	396.34	339.56	38.38	11926.7
90	3B	1241.38	403.22	347.75	46.55	12890.8
90	3D	1194.61	391.02	346.06	55.85	13426.5
90	3E	1186.48	352.20	337.34	91.23	12661.7
90	4B	1295.85	399.17	350.08	47.65	10900.6
90	5C	1255.40	374.31	339.01	67.61	12719.7
90	5D	1179.61	391.38	343.90	33.65	7489.3
	AVE	1212.80	389.19	343.83	50.54	10986.6
96	1B	1040.46	382.58	349.61	42.83	7344.8
96	1C	1038.92	381.91	344.96	52.90	12478.7
96	2B	987.47	404.88	357.47	37.23	10835.4
96	2E	1035.19	382.90	350.93	43.91	7217.7
96	3A	1024.25	397.62	348.40	38.59	11844.6
96	3B	1029.84	406.86	356.77	42.36	13432.3
96	3D	1033.55	392.12	354.92	57.97	13838.5
96	4D	1051.77	396.39	356.65	47.64	11320.1
96	5B	1068.72	388.86	354.45	41.80	7259.8
96	5C	1148.45	384.21	347.71	58.97	12244.7
	AVE	1045.86	391.83	352.19	46.42	10781.7

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41003C
Test Date: 8/13/80
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.147 MPa (21.3 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.13 kw/m (0.040 kw/ft)
Flow rate	0.035 kg/sec (0.077 lb/sec)
Coolant temperature	112°C (234°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 11460

(See following pages for additional results.)

C. Comments:

RUN 41003C

MASS FLOW = .0349 KG/SEC INLET VAPOR TEMP = 112.2 DEG C TOTAL POWER = 6.05 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	1132.76	130.14	115.14	21.45	8596.2
.30	4A	1118.46	130.71	115.16	20.39	8588.5
.30	4C	1067.61	126.50	115.11	41.56	17094.1
.30	4E	1044.81	128.33	115.15	22.56	8617.9
	AVE	1090.92	128.92	115.14	26.49	10724.2
.61	1B	1741.44	136.64	118.20	26.47	8587.7
.61	1C	1789.02	133.67	117.46	42.91	14301.2
.61	4D	1809.55	133.89	118.57	44.72	12898.8
.61	5B	1739.88	138.93	118.22	23.47	8559.1
	AVE	1769.97	135.78	118.11	34.39	11086.7
.99	2A	2747.21	154.72	123.85	24.14	8225.2
.99	4A	2845.86	154.04	123.89	25.63	8211.0
.99	4C	3002.98	147.99	123.88	52.99	16247.9
.99	4E	2882.96	152.14	123.88	27.77	8250.0
	AVE	2869.75	152.22	123.88	32.63	10233.5
1.22	1B	3241.87	165.06	132.16	26.05	8130.1
1.22	1C	3405.16	158.60	130.25	44.34	13730.3
1.22	4D	3581.96	162.79	133.62	43.78	12431.9
1.22	5B	3445.71	168.78	132.49	24.96	7934.6
	AVE	3418.67	163.81	132.13	34.78	10556.7
1.52	2A	4216.10	179.10	142.89	29.75	7743.6
1.52	4A	4076.71	179.23	143.46	29.09	7645.3
1.52	4E	4124.81	179.22	142.79	28.93	7783.3
	AVE	4139.21	179.18	143.05	29.26	7724.1

RUN 410030

MASS FLOW = .0349 KG/SEC INLET VAPOR TEMP = 112.2 DEG C TOTAL POWER = 6.05 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SCM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.71)	2A	4570.75	189.60	149.66	29.55	7686.7
1.70(1.71)	4A	4254.42	190.47	150.86	26.73	7141.3
1.70(1.71)	4C	4317.62	185.26	151.21	51.65	13464.0
1.70(1.69)	4E	4441.11	190.22	149.19	27.01	7658.1
	AVE	4445.97	188.89	150.23	33.48	9037.5
1.78(1.80)	1B	4498.72	178.56	152.77	44.01	8163.3
1.78(1.80)	1C	4466.KK	183.57	149.89	46.04	13143.6
1.78(1.79)	2D	4399.35	187.94	155.02	44.68	11668.0
1.78(1.80)	3C	4439.05	187.15	154.54	52.62	13985.1
1.78(1.80)	4D	4518.57	193.31	156.29	40.44	10961.2
1.78(1.80)	5B	4538.37	191.50	153.68	29.70	7726.4
	AVE	4476.68	187.01	153.70	42.92	10941.3
1.80(1.81)	2D	4399.35	189.38	155.86	43.08	11674.1
1.80(1.83)	3C	4439.05	189.68	155.50	49.96	13983.1
1.80(1.81)	3E	4551.41	185.13	150.83	45.92	12870.7
1.80(1.82)	5D	4428.57	186.61	153.93	33.76	8933.3
	AVE	4454.60	187.83	154.03	43.18	11865.3
1.83(1.83)	3A	4627.73	194.50	152.45	37.51	13242.8
1.83(1.83)	5C	4484.71	190.27	152.06	40.26	13416.8
	AVE	4556.22	192.38	152.26	38.88	13329.8
1.88(1.93)	1D	4295.10	179.31	157.37	49.04	7691.9
1.88(1.89)	2B	4391.76	181.70	158.46	63.46	12587.6
1.88(1.91)	2C	4193.16	180.50	157.67	71.35	15410.6
1.88(1.89)	2D	4399.35	180.81	158.42	66.04	12816.4
1.88(1.93)	2E	4242.98	174.27	157.62	64.23	7666.5
1.88(1.88)	3A	4627.73	184.67	154.35	52.59	13571.3
1.88(1.89)	3B	4475.47	180.59	158.25	79.55	15404.2
1.88(1.91)	3C	4439.05	178.21	158.77	88.84	15702.0
1.88(1.90)	3D	4374.17	179.17	158.03	80.47	15140.0
1.88(1.89)	3E	4551.41	179.76	153.82	60.92	13567.5
1.88(1.93)	4B	4405.45	184.53	160.82	61.94	11616.6
1.88(1.88)	5C	4484.71	186.03	154.01	48.19	13664.3

1.88(1.90)	5D	4428.57	180.40	156.89	47.13	7573.0
	AVE	4408.37	180.73	157.27	64.13	12493.2
1.91(1.95)	1D	4295.10	182.83	158.52	43.97	7708.3
1.91(1.94)	2C	4193.16	186.55	158.70	57.92	15273.3
1.91(1.91)	2D	4399.35	179.76	159.06	71.41	12098.7
1.91(1.93)	3C	4439.05	182.55	159.78	75.30	15670.2
1.91(1.92)	3E	4551.41	176.11	154.74	74.21	12569.2
1.91(1.96)	4B	4405.45	188.69	161.69	54.00	11661.9
1.91(1.94)	5D	4428.57	182.22	158.63	46.74	7520.0
	AVE	4387.44	182.68	158.73	60.50	11785.9
1.93(1.95)	2A	4570.75	185.63	158.51	41.77	7622.6
1.93(1.94)	2B	4391.76	186.81	159.71	53.94	12171.2
1.93(1.94)	2D	4399.35	182.84	159.76	53.75	12147.5
1.93(1.96)	2E	4242.90	177.33	158.97	57.89	7701.5
1.93(1.93)	3A	4627.73	179.76	155.68	67.07	12261.9
1.93(1.94)	3B	4475.47	184.26	159.72	70.25	14881.2
1.93(1.96)	3C	4439.05	186.33	160.61	66.23	15552.0
1.93(1.95)	3D	4374.17	184.65	159.54	67.10	14940.9
1.93(1.94)	4A	4254.42	185.28	159.54	40.93	7346.0
1.93(1.94)	4C	4517.62	186.51	160.62	65.49	14664.4
1.93(1.92)	4E	4441.11	182.22	157.64	45.05	7503.3
	AVE	4430.39	183.79	159.68	58.13	11526.6
1.96(2.00)	1D	4295.10	187.15	160.44	39.68	7705.9
1.96(1.94)	2C	4193.16	185.89	158.79	59.56	15280.5
1.96(1.96)	2D	4399.35	186.20	160.37	56.67	12126.5
1.96(1.98)	3C	4439.05	190.53	161.44	58.16	15411.3
1.96(1.96)	3E	4551.41	179.17	156.42	69.26	12334.3
1.96(2.00)	4B	4405.45	193.87	163.09	46.95	11651.1
1.96(1.97)	5D	4428.57	185.97	159.89	42.00	7540.4
	AVE	4387.44	186.97	160.06	53.18	11721.4
1.98(2.00)	2A	4570.75	193.92	160.54	33.47	7583.8
1.98(2.02)	2B	4391.76	195.11	162.20	43.76	12006.3
1.98(1.99)	2D	4399.35	189.02	161.36	51.50	12080.0
1.98(2.03)	2E	4242.90	183.44	161.52	47.93	7692.6
1.98(1.98)	3A	4627.73	184.04	157.90	60.75	12046.5
1.98(1.99)	3B	4475.47	192.65	161.57	54.71	14653.8
1.98(2.00)	3C	4439.05	193.22	162.36	54.56	15284.4
1.98(2.00)	3D	4374.17	192.06	161.51	54.46	14725.2
1.98(2.00)	4A	4254.42	189.41	161.69	37.66	7417.0

1.98(2.00)	4C	4517.62	193.13	161.88	54.88	14516.7
1.98(1.98)	4E	4441.11	188.36	159.67	38.42	7543.7
1.98(1.98)	5C	4484.71	182.83	157.59	61.11	12154.4
	AVE	4434.92	189.82	160.83	49.44	11474.9
2.13	1B	3975.25	192.03	165.38	36.31	7852.9
2.13	1C	4109.77	185.28	162.67	61.86	13473.7
2.13	2B	4074.78	192.21	166.75	52.36	10316.2
2.13	2E	4034.74	180.51	165.74	47.64	7471.5
2.13	3A	4215.89	187.17	163.82	58.28	12225.4
2.13	3B	4046.28	190.81	166.76	63.63	12208.9
2.13	3D	4074.81	191.94	166.33	60.13	12811.0
2.13	4D	4205.48	195.78	167.19	47.87	11426.6
2.13	5B	4009.07	192.61	166.66	37.52	7856.3
2.13	5C	4057.11	188.41	163.62	55.40	13376.5
	AVE	4060.32	190.27	165.49	52.18	10901.9
2.29	2B	3770.58	206.34	172.54	35.85	10866.7
2.29	2C	4153.15	204.25	171.46	46.73	13540.8
2.29	2E	3759.76	195.12	171.05	37.56	7343.5
2.29	3A	3821.44	195.11	168.90	48.56	12003.2
2.29	3B	3826.52	204.27	172.34	44.17	13143.6
2.29	3D	3839.98	203.01	171.78	45.43	13512.8
2.29	3E	3292.23	192.13	168.11	45.88	12388.9
2.29	4B	3982.97	206.67	173.48	38.15	11045.5
2.29	5C	3851.03	195.11	168.45	48.13	12672.3
2.29	5D	4153.91	193.67	171.10	43.95	7682.8
	AVE	3845.16	199.56	170.92	43.44	11420.0
2.44	1B	3285.93	199.39	175.68	33.37	7337.5
2.44	1C	3326.58	195.38	172.44	48.69	12274.8
2.44	2B	3448.48	208.30	177.55	35.73	11130.5
2.44	2E	3202.09	198.70	176.03	33.58	7255.7
2.44	3A	3507.74	198.25	173.80	47.25	11866.7
2.44	3B	3394.74	207.26	177.22	41.22	13651.1
2.44	3D	3365.14	205.15	176.03	43.18	13873.5
2.44	4D	3247.64	206.56	177.39	35.21	11423.3
2.44	5B	3338.27	202.61	176.74	30.25	7311.3
2.44	5C	3451.76	198.16	175.24	45.65	12249.9
	AVE	3356.84	201.91	175.67	39.41	10837.4

RUN 41003C

MASS FLOW = .0770 LBM/SEC INLET VAPOR TEMP = 234.0 DEG F TOTAL POWER = 5.74 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	359.04	266.24	239.26	21.45	8596.2
12	4A	354.51	267.29	239.28	20.39	8588.5
12	4C	338.39	259.70	239.19	41.56	17094.1
12	4E	331.16	263.00	239.27	22.56	8617.9
	AVE	345.77	264.06	239.25	26.49	10724.2
24	1B	551.96	277.94	244.76	26.47	8587.7
24	1C	567.04	272.61	243.43	42.91	14301.2
24	4D	573.55	273.01	245.42	44.72	12898.8
24	5B	551.47	282.08	244.80	23.47	8559.1
	AVE	561.01	276.41	244.60	34.39	11086.7
39	2A	870.75	310.49	254.93	24.14	8225.2
39	4A	902.02	309.27	255.00	25.63	8211.0
39	4C	951.82	298.39	254.98	52.99	16247.9
39	4E	913.78	305.86	254.98	27.77	8250.0
	AVE	909.59	306.00	254.98	32.63	10233.5
48	1B	1027.54	329.10	269.88	26.05	8130.1
48	1C	1079.29	317.48	266.46	44.34	13730.3
48	4D	1135.33	325.03	272.52	43.78	12431.9
48	5B	1092.14	335.81	270.48	24.96	7934.6
	AVE	1083.57	326.85	269.84	34.78	10556.7
60	2A	1336.32	354.38	289.20	29.75	7743.6
60	4A	1292.14	354.61	290.22	29.09	7645.3
60	4E	1307.39	354.60	289.03	28.93	7783.3
	AVE	1311.95	354.53	289.48	29.26	7724.1

RUN 410030

MASS FLOW = .0770 LBM/SEC INLET VAPOR TEMP = 234.0 DEG F TOTAL POWER = 5.74 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.5)	2A	1448.73	373.29	301.38	28.55	7886.7
67 (67.4)	4A	1348.47	374.85	303.55	26.73	7141.3
67 (67.3)	4C	1431.89	365.47	304.17	51.65	13464.0
67 (66.7)	4E	1407.64	374.40	300.55	27.01	7658.1
	AVE	1409.18	372.00	302.41	33.48	9037.5
70 (71.0)	1B	1425.90	353.41	306.99	44.01	8163.3
70 (70.8)	1C	1415.53	362.42	301.80	46.04	13143.6
70 (70.3)	2D	1394.41	370.30	311.03	44.58	11668.0
70 (71.0)	3C	1406.99	368.07	310.18	52.62	13985.1
70 (70.8)	4D	1432.19	379.96	313.32	40.44	10961.2
70 (70.9)	5B	1438.47	376.71	308.63	29.70	7726.4
	AVE	1418.92	368.61	308.66	42.92	10941.3
71 (71.2)	2D	1394.41	373.78	312.94	43.08	11674.1
71 (71.9)	3C	1406.99	373.43	311.90	49.96	13983.1
71 (71.2)	3E	1442.68	365.24	303.50	45.92	12870.7
71 (71.6)	5D	1403.67	367.99	309.08	33.76	8933.3
	AVE	1411.92	370.09	309.26	43.18	11865.3
72 (71.9)	3A	1466.79	362.10	306.41	37.51	13242.8
72 (71.9)	5C	1421.46	374.49	305.72	40.26	13416.8
	AVE	1444.13	378.29	306.06	38.88	13329.8
74 (75.8)	1D	1361.36	354.75	315.27	49.04	7691.9
74 (74.6)	2B	1392.00	359.05	317.24	63.46	12587.6
74 (75.2)	2C	1329.05	356.90	315.61	71.35	15410.6
74 (74.3)	2D	1394.41	357.46	317.15	66.04	12816.4
74 (75.9)	2E	1344.82	345.59	315.72	64.23	7666.5
74 (74.1)	3A	1466.79	364.40	309.82	52.59	13571.3
74 (74.6)	3B	1418.53	356.17	316.85	79.55	15404.2
74 (75.0)	3C	1406.99	352.78	317.79	88.84	15702.0
74 (74.9)	3D	1386.42	354.51	316.46	80.47	15140.0
74 (74.3)	3E	1442.60	355.56	306.68	69.92	13567.5
74 (75.8)	4B	1396.34	364.15	321.47	61.94	11616.6
74 (74.1)	5C	1421.46	366.85	309.22	48.19	13664.3

74 (74.9)	5D	1403.67	356.72	314.40	47.13	7573.0
	AVE	1397.27	357.31	315.08	64.13	12493.2
75 (76.9)	1D	1361.36	361.10	317.34	43.97	7708.3
75 (76.4)	2C	1329.05	367.79	317.66	57.92	15273.3
75 (75.3)	2D	1394.41	355.60	318.30	71.41	12098.7
75 (76.1)	3C	1406.99	360.59	319.61	75.38	15670.2
75 (75.4)	3E	1442.60	349.00	320.53	74.21	12569.2
75 (77.0)	4B	1396.34	371.65	323.04	54.00	11661.9
75 (76.5)	5D	1403.67	366.00	317.53	46.74	7520.0
	AVE	1390.63	360.82	317.72	60.50	11785.9
76 (76.7)	2A	1448.73	366.14	317.32	41.77	7622.6
76 (76.4)	2B	1392.00	368.25	319.48	53.94	12171.2
76 (76.3)	2D	1394.41	361.12	319.56	63.75	12147.5
76 (77.2)	2E	1344.82	351.26	318.15	57.89	7701.5
76 (75.9)	3A	1466.79	355.58	312.58	67.07	12261.9
76 (76.4)	3B	1418.53	363.67	319.49	70.25	14881.2
76 (77.0)	3C	1406.99	367.40	321.10	66.23	15552.0
76 (76.7)	3D	1386.42	364.38	319.18	67.10	14940.9
76 (76.5)	4A	1348.47	365.50	319.17	40.93	7346.0
76 (76.5)	4C	1431.89	367.72	320.04	65.49	14064.4
76 (75.7)	4E	1407.64	360.00	315.76	45.05	7503.3
	AVE	1404.25	362.81	318.35	58.13	11526.6
77 (78.8)	1D	1361.36	368.86	320.79	39.68	7705.9
77 (76.5)	2C	1329.05	366.60	317.81	59.56	15280.5
77 (77.1)	2D	1394.41	367.16	320.66	56.67	12126.5
77 (77.9)	3C	1406.99	374.95	322.59	58.16	15411.3
77 (77.2)	3E	1442.60	354.51	313.56	69.26	12334.3
77 (78.7)	4B	1396.34	366.97	325.56	46.95	11651.1
77 (77.7)	5D	1403.67	366.74	319.80	42.00	7540.4
	AVE	1390.63	368.54	320.11	53.18	11721.4
78 (78.7)	2A	1448.73	361.05	320.98	33.47	7583.8
78 (79.4)	2B	1392.00	383.20	323.96	43.76	12000.3
78 (78.3)	2D	1394.41	373.31	322.46	51.50	12080.0
78 (79.3)	2E	1344.82	362.19	322.73	47.93	7692.6
78 (78.0)	3A	1466.79	363.27	316.22	60.75	12046.5
78 (78.5)	3B	1418.53	378.77	322.83	54.71	14653.8
78 (78.9)	3C	1406.99	379.79	324.25	54.56	15284.4
78 (78.9)	3D	1386.42	377.70	322.71	54.46	14725.2
78 (78.6)	4A	1348.47	372.95	323.05	37.68	7417.0

78 (78.6)	4C	1431.89	379.63	323.39	54.88	14516.7
78 (77.8)	4E	1407.64	371.35	319.77	38.42	7543.7
78 (78.0)	5C	1421.46	361.10	315.67	61.11	12154.4
	AVE	1405.68	373.67	321.50	49.44	11474.9
84	1B	1259.98	377.66	329.68	36.31	7852.9
84	1C	1302.62	365.50	324.80	61.86	13473.7
84	2B	1291.53	377.98	332.16	52.36	10316.2
84	2E	1278.84	367.71	330.34	47.64	7471.5
84	3A	1272.86	368.91	326.87	58.28	12225.4
84	3B	1282.50	375.46	332.16	63.63	12208.9
84	3D	1291.54	377.49	331.40	60.13	12811.0
84	4D	1332.96	384.40	332.94	47.87	11426.6
84	5B	1270.7[illegible]	378.7[illegible]	332.00	37.52	7856.3
84	5C	1285.93	371.13	326.52	55.40	13376.5
	AVE	1286.95	374.49	329.89	52.10	10901.9
90	2B	1195.11	402.38	342.57	35.85	10866.7
90	2C	1316.37	399.56	340.63	46.73	13540.8
90	2E	1191.68	383.21	339.89	37.58	7343.5
90	3A	1211.23	383.20	336.03	48.56	12003.2
90	3B	1212.84	399.68	342.20	44.17	13143.6
90	3D	1217.11	397.41	341.20	45.43	13512.8
90	3E	1043.5[illegible]	377.83	334.60	45.88	12388.9
90	4B	1262.43	404.[illegible]	344.26	38.15	11045.5
90	5C	1220.61	383.20	335.22	48.13	12672.3
90	5D	1316.61	380.97	339.98	43.95	7682.8
	AVE	1218.75	391.20	339.66	43.44	11420.0
96	1B	1041.50	390.36	348.22	33.37	7337.5
96	1C	1054.38	383.14	342.39	48.69	12274.8
96	2B	1093.02	406.41	351.59	35.73	11130.5
96	2E	1014.93	389.37	346.85	33.58	7255.7
96	3A	1111.8[illegible]	388.85	344.84	47.25	11866.7
96	3B	1075.99	405.06	351.00	41.22	13651.1
96	3D	1066.61	401.27	349.94	43.18	13873.5
96	4D	1029.36	403.80	351.30	35.21	11423.3
96	5B	1058.09	397.06	350.14	30.25	7311.3
96	5C	1094.06	388.09	343.83	45.65	12249.9
	AVE	1063.97	395.43	348.21	39.41	10837.4

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41103D
Test Date: 10/7/80
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.148 MPa (21.4 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.125 kw/m (0.0382 kw/ft)
Flow rate	0.035 kg/sec (0.077 lb/sec)
Coolant temperature	122°C (251°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 10958

(See following pages for additional results.)

C. Comments:

RUN 411030

MASS FLOW = .0349 KG/SEC INLET VAPOR TEMP = 121.7 DEG C TOTAL POWER = 5.80 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	1047.89	135.89	124.65	25.91	8397.9
.30	4A	1054.10	135.48	124.63	27.04	8403.5
.30	4C	996.16	131.28	124.58	64.70	16770.0
	AVE	1032.71	134.22	124.62	39.22	11190.5
.61	1C	1742.08	139.08	126.87	54.37	14006.6
.61	4E	1721.70	140.28	127.55	37.22	8424.7
.61	5B	1629.63	141.40	127.57	32.36	8410.9
	AVE	1697.80	140.26	127.33	41.32	10280.7
.99	2A	2785.98	158.47	133.06	29.21	8066.9
.99	4A	2762.63	156.52	133.01	31.39	8070.7
.99	4C	2728.82	151.08	132.98	63.06	15990.5
	AVE	2759.14	155.36	133.02	41.23	10709.4
1.22	1C	3217.90	163.89	139.24	47.24	13464.0
1.22	4E	3286.18	162.06	140.98	40.89	8058.9
	AVE	3252.04	162.98	140.11	44.07	10761.5
1.52	2A	4025.31	189.03	151.45	26.68	7542.7
1.52	4A	3779.26	179.81	151.78	34.00	7548.2
1.52	4C	3767.42	177.77	151.60	56.58	14997.4
	AVE	3857.33	182.20	151.61	39.09	10029.4

RUN 41103D

MASS FLOW = .0349 KG/SEC INLET VAPOR TEMP = 121.7 DEG C TOTAL POWER = 5.80 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.72)	2A	4158.82	198.17	158.76	25.70	7545.7
1.70(1.72)	4A	4273.84	198.11	158.72	26.43	7487.2
1.70(1.72)	4C	4374.10	188.75	158.96	56.28	14550.8
	AVE	4268.92	195.01	158.81	36.14	9861.2
1.78(1.80)	1C	4153.60	189.66	158.52	45.38	13709.1
1.78(1.79)	3C	4402.62	191.49	161.47	55.83	16172.0
1.78(1.82)	4E	4204.08	187.14	161.68	40.68	8707.2
	AVE	4253.43	189.43	160.56	47.29	12862.8
1.80(1.87)	2C	4185.00	196.46	164.49	49.27	16739.3
1.80(1.81)	2D	4347.46	202.08	164.42	37.38	13162.6
1.80(1.82)	3C	4402.62	192.03	162.45	56.52	16271.1
1.80(1.82)	3E	4090.27	180.81	158.99	64.52	14093.2
1.80(1.80)	4D	4366.97	209.77	163.76	30.44	13745.5
	AVE	4276.46	196.23	162.82	47.63	14802.4
1.83(1.83)	1B	4400.67	195.81	161.99	31.66	8453.2
1.83(1.84)	2D	4347.46	199.71	165.11	40.77	13435.7
1.83(1.84)	3C	4402.62	194.05	163.40	54.34	16898.9
1.83(1.84)	3D	4353.30	196.77	163.08	48.71	15953.1
1.83(1.83)	4D	4366.97	195.73	164.58	45.78	12764.1
	AVE	4374.20	196.41	163.63	44.25	13501.0
1.88(1.88)	1B	4400.67	197.22	164.11	32.18	8595.0
1.88(1.89)	1D	4228.48	194.66	164.70	34.27	8568.6
1.88(1.89)	2B	4496.11	199.53	167.36	45.22	13282.3
1.88(1.95)	2C	4185.00	194.47	167.39	58.11	14760.3
1.88(1.89)	2D	4347.46	197.36	166.68	46.04	13647.3
1.88(1.88)	2E	4277.43	190.86	164.02	38.91	9282.3
1.88(1.91)	3A	4350.68	193.12	162.93	48.51	12848.9
1.88(1.89)	3B	4395.97	194.10	166.03	59.02	16500.9
1.88(1.90)	4B	4056.13	192.75	167.70	52.87	12775.7
1.88(1.88)	4D	4366.97	192.50	166.27	54.48	14644.7
1.88(1.88)	5C	4262.48	185.97	162.40	61.53	14326.7
1.88(1.87)	5D	4088.37	181.67	163.83	56.69	9187.4

	AVE	4287.98	192.85	165.29	48.99	12368.4
1.91(1.92)	1D	4228.48	195.20	165.49	34.49	8072.4
1.91(1.98)	2C	4185.00	194.19	168.47	61.10	14572.8
1.91(1.92)	2D	4347.46	198.43	167.88	46.08	13047.9
1.91(1.93)	3E	4090.27	180.50	163.34	81.57	12620.1
1.91(1.93)	4B	4056.13	193.80	168.81	52.84	11776.9
1.91(1.91)	4D	4366.97	193.12	167.40	55.44	13659.7
1.91(1.93)	5D	4088.37	183.69	165.57	55.54	7601.1
	AVE	4194.67	191.28	166.71	55.29	11621.6
1.93(1.93)	1B	4406.67	197.81	165.61	33.06	7442.0
1.93(1.95)	2A	4158.82	196.99	166.72	33.16	7331.0
1.93(1.94)	2B	4496.11	198.72	169.13	49.12	11618.8
1.93(1.95)	3A	4350.68	193.89	164.66	49.93	12094.2
1.93(1.94)	3B	4395.97	193.85	167.65	63.12	14676.3
1.93(1.95)	3C	4402.62	194.08	167.76	62.89	14962.0
1.93(1.94)	3D	4353.30	197.37	167.12	53.92	14886.4
1.93(1.95)	4A	4273.84	193.79	166.69	38.10	7295.7
1.93(1.95)	4C	4374.10	192.82	168.04	66.44	14611.2
1.93(1.93)	4D	4366.97	192.87	168.25	57.84	11882.9
	AVE	4357.31	195.22	167.15	50.75	11680.0
1.96(1.96)	1D	4228.48	195.12	166.90	36.24	7383.4
1.96(2.02)	2C	4185.00	197.01	169.99	57.83	14432.0
1.96(1.97)	2D	4347.46	197.92	169.61	49.66	11638.7
1.96(1.97)	3C	4402.62	194.24	168.62	64.52	14898.3
1.96(1.97)	3E	4090.27	182.33	164.72	79.12	12349.1
1.96(1.97)	4B	4056.13	197.16	170.39	48.96	11486.9
1.96(1.96)	5D	4088.37	186.02	166.74	51.93	7327.3
	AVE	4199.76	192.83	168.14	55.47	11359.4
1.98(1.98)	1B	4406.67	202.44	167.57	30.19	7214.9
1.98(2.00)	2A	4158.82	203.06	168.94	29.09	7324.1
1.98(1.98)	2B	4496.11	201.81	170.78	46.53	11425.9
1.98(1.99)	2D	4347.46	198.97	170.64	49.49	11625.1
1.98(2.00)	3A	4350.68	197.68	166.56	46.53	11903.7
1.98(1.99)	3B	4395.97	198.19	169.67	57.47	14370.7
1.98(2.00)	3C	4402.62	194.99	169.67	65.12	14875.7
1.98(1.99)	3D	4353.30	195.63	169.09	61.42	14638.2
1.98(2.00)	4A	4273.84	197.24	168.52	35.82	7207.3
1.98(2.00)	4C	4374.10	197.20	169.94	59.89	14477.4
1.98(1.98)	4D	4366.97	192.25	170.24	64.58	11668.4

1.98(1.98)	5C	4262.48	187.01	165.72	67.69	12373.6
	AVE	4348.58	197.21	168.94	51.15	11592.1
2.13	1B	3938.76	195.49	173.64	43.18	7672.8
2.13	1C	3920.31	192.66	170.80	59.74	13122.3
2.13	2B	4010.86	197.58	176.20	60.13	9937.9
2.13	2E	3882.86	194.50	174.02	45.44	7248.8
2.13	3A	4012.43	195.14	171.67	56.71	11938.8
2.13	3B	3878.65	193.99	174.85	75.50	11930.8
2.13	3D	3780.43	195.10	174.28	67.55	12565.0
2.13	4E	3937.84	189.01	173.11	59.91	7990.4
2.13	5B	4039.86	184.12	173.84	95.67	7970.8
2.13	5C	3869.77	186.03	171.22	88.26	13417.0
	AVE	3929.18	192.36	173.36	65.21	10379.5
2.29	1B	3933.74	203.60	178.28	36.58	7329.5
2.29	1D	3888.80	196.94	178.23	49.38	7447.6
2.29	2B	3783.41	209.12	181.69	43.21	10475.8
2.29	2C	3746.64	209.37	179.73	45.73	13241.3
2.29	2E	3666.72	200.09	178.73	40.58	7148.8
2.29	3A	3779.57	202.15	176.84	48.73	11678.9
2.29	3B	3711.21	206.65	180.55	51.65	12814.4
2.29	3E	3734.05	196.39	175.80	59.71	12238.5
2.29	4B	3692.09	206.91	181.37	45.44	10804.7
2.29	5C	3729.67	194.18	176.00	67.76	12660.6
2.29	5D	3895.32	188.29	178.17	92.56	7578.1
	AVE	3777.75	201.24	178.67	52.85	10310.8
2.44	1B	3115.36	205.25	182.96	32.62	7135.4
2.44	1C	3339.61	201.78	180.27	50.44	11938.5
2.44	2B	3363.87	211.73	186.60	41.51	10740.6
2.44	2E	3324.93	206.11	183.28	33.94	7043.0
2.44	3A	3272.25	200.61	181.68	56.16	11623.3
2.44	3B	3358.83	209.12	185.46	51.06	13332.5
2.44	3D	3279.17	207.19	184.75	52.74	13619.9
2.44	4E	3278.56	201.13	182.38	41.07	7291.9
2.44	5B	3256.73	197.54	182.61	51.51	7459.6
2.44	5C	3406.99	194.96	180.69	78.24	12276.3
	AVE	3299.63	203.54	183.07	48.93	10246.1

RUN 411030

MASS FLOW = .0770 LBM/SEC INLET VAPOR TEMP = 251.0 DEG F TOTAL POWER = 5.50 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	332.14	276.61	256.37	25.91	8397.9
12	4A	334.10	275.87	256.34	27.04	8403.5
12	4C	315.74	268.30	256.25	64.70	16770.0
	AVE	327.33	273.59	256.32	39.22	11190.5
24	1C	552.10	282.34	260.37	54.37	14066.6
24	4E	545.70	284.51	261.59	37.22	8424.7
24	5B	516.52	286.53	261.62	32.36	8410.9
	AVE	538.13	284.46	261.19	41.32	10280.7
39	2A	883.04	317.25	271.52	29.21	8066.9
39	4A	875.64	313.74	271.42	31.39	8070.7
39	4C	864.92	303.94	271.37	63.08	15990.5
	AVE	874.53	311.65	271.44	41.23	10709.4
48	1C	1019.94	327.01	282.64	47.24	13464.0
48	4E	1041.58	323.71	285.77	40.89	8058.9
	AVE	1030.76	325.36	284.20	44.07	10761.5
51	2A	1275.85	372.25	304.61	26.68	7542.7
60	4A	1197.87	355.65	305.20	34.00	7548.2
60	4C	1194.11	351.99	304.88	56.58	14997.4
	AVE	1222.61	359.97	304.90	39.09	10029.4

RUN 411030

MASS FLOW = .0770 LBM/SEC INLET VAPOR TEMP = 251.0 DEG F TOTAL POWER = 5.50 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.8)	2A	1318.17	388.70	317.76	25.70	7545.7
67 (67.6)	4A	1354.62	388.60	317.69	26.43	7487.2
67 (67.8)	4C	1386.40	371.75	318.12	56.28	14550.8
	AVE	1353.06	383.02	317.86	36.14	9861.2
70 (70.9)	1C	1316.52	373.39	317.33	45.38	13709.1
70 (70.6)	3C	1395.44	376.68	322.65	55.83	16172.0
70 (71.5)	4E	1332.52	368.84	323.03	40.68	8707.2
	AVE	1348.16	372.97	321.00	47.29	12862.8
71 (73.5)	2C	1326.47	385.63	328.08	49.27	16739.3
71 (71.4)	2D	1377.96	395.74	327.96	37.38	13162.6
71 (71.6)	3C	1395.44	377.65	324.41	56.52	16271.1
71 (71.6)	3E	1296.44	357.46	318.19	64.52	14093.2
71 (71.0)	4D	1384.14	409.59	326.77	30.44	13745.5
	AVE	1356.09	385.21	325.08	47.63	14802.4
72 (71.9)	1B	1394.82	384.45	323.59	31.66	8453.2
72 (72.4)	2D	1377.96	391.48	329.20	40.77	13435.7
72 (72.6)	3C	1395.44	381.29	326.12	54.34	16898.9
72 (72.4)	3D	1379.81	386.19	325.54	48.71	15953.1
72 (72.0)	4D	1384.14	384.31	328.24	45.78	12764.1
	AVE	1386.43	385.54	326.54	44.25	13501.0
74 (74.1)	1B	1394.82	386.99	327.40	32.18	8595.0
74 (74.5)	1D	1340.25	382.38	328.47	34.27	8568.6
74 (74.4)	2B	1425.07	391.16	333.24	45.22	13282.3
74 (76.6)	2C	1326.47	382.04	333.31	58.11	14760.3
74 (74.4)	2D	1377.96	387.25	332.03	46.04	13647.3
74 (74.0)	2E	1355.76	375.55	327.23	38.91	9282.3
74 (75.0)	3A	1378.98	379.61	325.28	48.51	12848.9
74 (74.6)	3B	1393.33	381.37	330.85	59.02	16500.9
74 (74.7)	4B	1285.62	378.95	333.86	52.87	12775.7
74 (74.0)	4D	1384.14	378.50	331.29	54.48	14644.7
74 (74.2)	5C	1351.03	366.74	324.33	61.53	14326.7
74 (73.8)	5D	1295.84	359.01	326.89	56.69	9167.4

	AVE	1359.11	379.13	329.51	48.99	12368.4
75 (75.4)	1D	1346.25	383.35	329.88	34.49	8072.4
75 (77.8)	2C	1326.47	381.55	335.25	61.10	14572.8
75 (75.6)	2D	1377.96	389.18	334.18	46.08	13047.9
75 (76.1)	3E	1296.44	356.91	326.02	81.57	12620.1
75 (75.9)	4B	1285.62	380.85	335.87	52.84	11776.9
75 (75.1)	4D	1384.14	379.61	333.33	55.44	13659.7
75 (75.8)	5D	1295.84	362.64	330.02	55.54	7601.1
	AVE	1329.53	376.30	332.08	55.29	11621.6
76 (75.9)	1B	1394.82	388.05	330.10	33.06	7442.0
76 (76.7)	2A	1318.17	386.58	332.10	33.16	7331.0
76 (76.3)	2B	1425.07	389.69	336.43	49.12	11618.8
76 (76.9)	3A	1378.98	381.00	328.38	49.93	12094.2
76 (76.3)	3B	1393.33	380.93	333.78	63.12	14676.3
76 (76.8)	3C	1395.44	381.34	333.96	62.89	14962.0
76 (76.4)	3D	1379.81	387.27	332.82	53.92	14886.4
76 (76.7)	4A	1354.62	380.82	331.87	38.10	7295.7
76 (76.9)	4C	1386.40	379.08	334.47	66.44	14611.2
76 (76.6)	4D	1384.14	379.17	334.85	57.84	11882.9
	AVE	1381.08	383.39	332.88	50.75	11680.0
77 (77.0)	1D	1340.25	383.21	332.41	36.24	7383.4
77 (79.5)	2C	1326.47	386.62	337.99	57.83	14432.0
77 (77.4)	2D	1377.96	388.25	337.29	49.66	11638.7
77 (77.7)	3C	1395.44	381.64	335.52	64.52	14898.3
77 (77.6)	3E	1296.44	360.20	328.49	79.12	12349.1
77 (77.6)	4B	1285.62	386.90	338.70	48.96	11486.9
77 (77.0)	5D	1295.84	366.84	332.13	51.93	7327.3
	AVE	1331.14	379.09	334.65	55.47	11359.4
78 (77.9)	1B	1394.82	396.40	333.62	30.19	7214.9
78 (78.9)	2A	1318.17	397.50	336.10	29.09	7324.1
78 (78.1)	2B	1425.07	395.25	339.40	46.53	11425.9
78 (78.5)	2D	1377.96	390.14	339.15	49.49	11625.1
78 (78.9)	3A	1378.98	387.83	331.81	46.53	11903.7
78 (78.5)	3B	1393.33	388.74	337.40	57.47	14370.7
78 (78.8)	3C	1395.44	382.98	337.40	65.12	14875.7
78 (78.5)	3D	1379.81	384.13	336.35	61.42	14638.2
78 (78.6)	4A	1354.62	387.03	335.33	35.81	7207.3
78 (78.9)	4C	1386.40	386.96	337.89	59.89	14477.4
78 (78.0)	4D	1384.14	378.05	338.42	64.58	11668.4

78 (78.1)	5C	1351.03	368.62	330.30	67.69	12373.8
	AVE	1378.32	386.97	336.10	51.15	11592.1
84	1B	1248.42	383.89	344.56	43.18	7672.8
84	1C	1242.57	378.80	339.44	59.74	13122.3
84	2B	1271.27	387.65	349.16	60.13	9937.9
84	2E	1230.70	382.11	345.23	45.44	7248.8
84	3A	1271.77	383.25	341.01	56.71	11938.8
84	3B	1229.37	381.18	346.74	75.50	11930.8
84	3D	1198.24	383.19	345.70	67.55	12565.0
84	4E	1248.13	372.21	343.59	59.91	7990.4
84	5B	1280.46	363.41	344.92	95.67	7970.8
84	5C	1232.89	366.85	340.19	88.26	13417.0
	AVE	1245.38	378.25	344.05	65.21	10379.5
90	1B	1246.83	398.48	352.91	36.58	7329.5
90	1D	1232.58	386.50	352.82	49.38	7447.6
90	2B	1199.18	408.41	359.03	43.21	10475.8
90	2C	1185.62	408.87	355.52	45.73	13241.3
90	2E	1162.19	392.15	353.71	40.58	7148.8
90	3A	1197.96	395.87	350.32	48.73	11678.9
90	3B	1176.29	403.98	357.00	51.65	12814.4
90	3E	1183.54	385.50	348.43	59.71	12238.5
90	4B	1170.23	404.44	358.46	45.44	10804.7
90	5C	1182.15	381.52	348.80	67.76	12660.6
90	5D	1234.65	370.92	352.71	92.56	7578.1
	AVE	1197.38	394.24	353.61	52.85	10310.8
96	1B	987.44	401.46	361.33	32.62	7135.4
96	1C	1058.52	395.21	356.49	50.44	11938.5
96	2B	1066.20	413.12	367.88	41.51	10740.6
96	2E	1053.86	403.00	361.90	33.94	7043.0
96	3A	1037.15	393.10	359.03	56.16	11623.3
96	3B	1064.61	408.42	365.83	51.06	13332.5
96	3D	1039.36	404.94	364.54	52.74	13619.9
96	4E	1039.17	394.03	360.28	41.07	7291.9
96	5B	1032.24	387.56	360.71	51.51	7459.6
96	5C	1079.87	382.92	357.24	78.24	12276.3
	AVE	1045.84	398.38	361.52	48.93	10246.1

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 40503E
Test Date: 11/26/80
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.143 MPa (20.7 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.125 kw/m (0.0380 kw/ft)
Flow rate	0.034 kg/sec (0.076 lb/sec)
Coolant temperature	112°C (233°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 11061

(See following pages for additional results.)

C. Comments:

RUN 40503E

MASS FLOW = .0345 KG/SEC INLET VAPOR TEMP = 111.7 DEG C TOTAL POWER = 5.72 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	1B	1084.53	126.67	114.40	25.28	8542.2
.30	2A	1051.85	126.00	114.40	25.95	8550.7
	AVE	1068.19	126.33	114.40	25.61	8546.4
.61	1C	1655.40	129.50	116.63	50.41	14235.3
.61	5B	1578.37	129.60	117.37	36.62	8579.4
	AVE	1616.89	129.55	117.00	43.51	11407.3
.99	1B	2725.22	149.81	122.91	27.73	8187.7
.99	2A	2713.97	149.19	122.89	28.27	8197.9
.99	4C	2750.16	139.19	122.91	72.90	16282.0
.99	4E	2689.17	146.04	122.90	31.97	8230.3
	AVE	2719.63	146.06	122.90	40.22	10224.4
1.22	1C	3192.56	156.76	128.89	42.51	13629.6
1.22	3B	3163.66	155.33	131.29	54.91	14892.5
1.22	5B	3159.23	155.34	131.06	34.93	8000.5
	AVE	3171.81	155.81	130.41	44.12	12174.2
1.52	1B	4196.53	176.95	141.04	30.04	7723.7
1.52	2A	4043.66	177.72	141.14	28.38	7679.5
1.52	4C	4144.11	164.36	141.52	73.72	15281.0
	AVE	4128.10	173.01	141.23	44.05	10228.1

RUN 40503E

MASS FLOW = .0345 KG/SEC INLET VAPOR TEMP = 111.7 DEG C TOTAL POWER = 5.72 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.68)	2A	4110.64	181.64	147.06	39.11	7849.8
1.70(1.69)	2B	4013.69	182.70	149.44	40.98	12250.8
1.70(1.68)	2C	4086.15	177.27	146.74	53.04	15071.4
1.70(1.69)	2E	4103.56	185.91	147.34	26.79	7750.5
1.70(1.69)	4A	4094.36	175.13	147.45	37.79	7893.8
1.70(1.70)	4B	4083.85	180.56	150.12	45.66	12090.6
1.70(1.71)	4C	4179.34	179.78	148.67	52.92	15073.4
1.70(1.70)	4E	4107.00	182.22	147.69	30.08	7860.1
	AVE	4097.32	180.65	148.06	39.67	10730.1
1.78(1.79)	2C	4086.15	182.64	150.67	50.00	18790.2
1.78(1.76)	3C	4014.50	178.54	149.93	55.26	17100.6
1.78(1.78)	3D	4123.70	181.00	151.06	54.02	18793.7
	AVE	4074.78	180.73	150.56	53.09	18228.1
1.83(1.81)	3E	4099.40	184.13	148.92	40.47	17286.6
1.83(1.88)	5C	4098.54	182.84	151.84	45.85	16333.8
	AVE	4098.97	183.49	150.38	43.16	16810.2
1.85(1.85)	1B	4181.37	186.50	151.65	30.00	12642.6
1.85(1.86)	2A	4110.64	188.56	151.76	27.85	12990.5
	AVE	4146.00	187.53	151.70	28.93	12816.6
1.88(1.89)	2D	4118.99	179.76	155.34	57.01	18412.7
1.88(1.88)	4D	4047.73	176.72	155.27	64.10	18579.3
	AVE	4083.36	178.25	155.31	60.55	18496.0
1.91(1.91)	1B	4181.37	186.85	153.32	31.16	11583.1
1.91(1.90)	1D	4072.19	187.17	152.85	29.59	10838.1
1.91(1.92)	2E	4103.56	182.56	153.75	35.71	10428.9
1.91(1.90)	5D	4129.52	189.38	152.98	64.35	11420.8
	AVE	4121.66	181.49	153.22	40.19	11067.7
1.93(1.92)	1D	4072.19	184.65	153.58	32.77	10070.3

1.93(1.92)	3A	4123.00	179.78	153.29	54.10	13228.4
1.93(1.92)	3D	4123.70	186.24	155.91	49.18	19837.3
1.93(1.93)	4A	4094.36	177.14	154.91	46.46	8520.5
1.93(1.93)	4B	4083.85	180.72	158.64	52.20	12749.2
1.93(1.93)	4D	4047.73	176.12	156.99	71.75	16505.0
1.93(1.97)	5C	4098.54	177.94	154.74	51.42	12721.3
1.93(1.93)	5D	4129.52	170.00	153.68	64.55	10683.9
	AVE	4096.61	179.32	155.22	55.30	13039.5
1.96(1.96)	1B	4181.37	189.06	154.74	30.23	9686.8
1.96(1.96)	1C	3991.30	181.59	153.61	49.44	13910.3
1.96(1.95)	1D	4072.19	184.70	154.59	33.77	9311.3
1.96(1.96)	2A	4110.64	186.96	155.25	33.22	8975.3
1.96(1.96)	2C	4086.15	192.65	157.00	43.85	16437.2
1.96(1.95)	2D	4118.99	182.22	157.30	55.57	15280.5
1.96(1.96)	3B	4095.20	181.48	158.91	70.31	13646.4
1.96(1.97)	5B	4112.59	177.89	156.03	47.32	8266.2
1.96(1.94)	5D	4129.52	171.20	154.18	51.74	10227.9
	AVE	4099.77	182.98	155.73	47.27	11749.1
1.98(1.99)	1C	3991.30	181.67	154.67	51.15	13432.6
1.98(1.98)	2B	4013.69	187.39	158.45	46.22	14208.9
1.98(1.97)	2E	4103.56	181.00	155.56	40.42	8860.7
1.98(1.98)	3A	4123.00	173.06	156.13	85.11	11532.5
1.98(1.98)	3B	4095.20	181.01	159.87	75.00	13360.7
1.98(1.99)	3C	4014.58	184.97	160.70	63.62	10512.8
1.98(1.98)	4A	4094.36	177.50	156.89	49.95	7799.4
1.98(1.98)	4B	4083.85	183.46	160.70	59.93	11487.0
1.98(1.99)	4C	4179.34	184.47	160.03	65.87	13140.9
1.98(1.98)	4D	4047.73	179.78	158.69	64.61	14000.3
1.98(2.00)	4E	4107.00	181.38	155.99	40.48	8712.1
1.98(1.99)	5D	4129.52	174.89	155.64	54.21	9156.1
	AVE	4081.92	180.08	157.77	58.05	11350.3
2.01(2.01)	2C	3967.68	184.87	158.77	59.12	15219.9
2.01(2.00)	2D	4118.99	185.89	158.93	51.00	13749.0
2.01(2.01)	3A	4123.00	176.45	157.32	74.86	11666.5
2.01(2.02)	3C	3972.11	185.25	161.88	65.24	10443.0
2.01(2.00)	3E	4099.40	180.46	155.33	56.49	12435.2
2.01(2.05)	5C	4098.54	172.29	157.59	97.32	12766.5
	AVE	4063.28	180.83	158.30	67.34	12713.3
2.03(2.02)	2B	3931.68	191.44	159.96	41.30	13410.6

2.03(2.02)	3D	4123.70	182.84	159.60	68.55	14853.8
2.03(2.03)	4A	3973.65	179.78	159.16	48.15	7731.9
2.03(2.04)	4E	3985.33	182.31	157.87	40.65	8490.9
2.03(2.05)	5B	3830.74	179.78	159.50	47.18	7933.3
2.03(2.10)	5C	3947.58	174.25	159.63	93.72	13254.2
	AVE	3965.35	181.73	159.29	56.59	10945.8
2.06(2.04)	3D	4123.70	182.83	160.32	70.71	14547.9
	AVE	4123.70	182.83	160.32	70.71	14547.9
2.08(2.07)	3E	3808.91	183.44	158.33	52.10	12808.4
	AVE	3808.91	183.44	158.33	52.10	12808.4
2.13	1C	3793.42	182.22	159.63	57.67	13392.0
2.13	2B	3931.08	198.10	164.05	49.72	10529.7
2.13	2C	3967.68	185.86	163.35	67.47	12907.0
2.13	2D	3951.12	190.56	163.99	48.97	10474.1
2.13	3C	3972.11	184.67	166.00	81.30	11328.7
2.13	3D	3905.49	189.98	163.80	56.76	13076.6
2.13	3E	3808.91	183.07	160.65	56.63	13020.1
2.13	4A	3973.65	179.16	163.77	64.13	7635.9
2.13	4D	3915.50	182.83	163.95	69.04	11806.9
2.13	5B	3830.74	177.33	163.09	67.06	7858.7
2.13	5C	3947.58	178.21	160.60	77.29	13137.0
	AVE	3908.84	184.05	162.99	63.27	11378.8
2.29	1D	3747.01	194.16	166.68	33.05	7508.5
2.29	2B	3719.70	200.74	169.01	38.75	10883.4
2.29	2C	3703.00	193.89	168.75	55.35	13601.5
2.29	2D	3665.58	196.14	169.73	45.00	10914.5
2.29	2E	3672.26	195.72	167.35	31.29	7295.3
2.29	3A	3792.86	183.78	167.56	78.32	12124.7
2.29	3B	3802.86	194.50	170.69	59.82	13099.4
2.29	3C	3829.98	194.79	171.02	60.30	13068.0
2.29	3D	3731.91	196.94	169.23	50.38	13678.6
2.29	3E	3661.16	196.98	165.61	48.57	12504.8
2.29	4A	3734.69	188.36	169.16	47.37	7277.7
2.29	4B	3784.48	197.46	171.36	46.84	10870.0
2.29	4D	3702.46	194.16	169.43	48.70	11576.6
2.29	5C	3756.36	183.82	165.36	69.21	12567.5
2.29	5D	3657.36	185.26	166.02	48.14	7700.6
	AVE	3730.77	192.71	168.54	50.74	10978.1

2.44	1C	3199.80	193.98	169.18	43.03	12133.2
2.44	2D	3176.93	200.61	174.80	39.39	11051.4
2.44	2E	3117.72	195.21	172.14	32.47	7199.9
2.44	3B	3233.05	197.51	175.57	54.58	13589.7
2.44	3C	3194.15	197.55	175.47	53.58	13830.9
2.44	3D	3216.14	198.58	174.16	48.78	13929.1
2.44	3E	3210.40	193.59	170.32	45.76	12203.7
2.44	4B	3265.58	196.67	176.29	51.46	11098.5
2.44	4D	3205.37	194.03	174.46	51.36	11462.1
2.44	5B	3164.10	189.42	173.06	45.79	7266.0
2.44	5C	3308.52	186.56	169.96	67.34	12201.7
	AVE	3208.34	194.94	173.21	48.58	11451.5

RUN 40503E

MASS FLOW = .0760 LBM/SEC INLET VAPOR TEMP = 253.0 DEG F TOTAL POWER = 5.42 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (66.3)	2A	1302.98	358.95	296.71	30.11	7849.8
67 (66.7)	2B	1272.17	360.86	300.98	40.98	12250.8
67 (66.0)	2C	1295.14	351.09	296.14	53.04	15071.4
67 (66.7)	2E	1300.65	366.63	297.22	26.79	7750.5
67 (66.5)	4A	1297.74	347.24	297.41	37.79	7893.8
67 (66.8)	4B	1294.41	357.01	302.22	45.66	12090.6
67 (67.5)	4C	1324.67	355.60	299.01	52.92	15073.4
67 (67.0)	4E	1301.74	360.00	297.85	30.08	7860.1
	AVE	1298.68	357.17	298.52	39.67	10730.1
70 (70.4)	2C	1295.14	360.75	303.20	50.00	18790.2
70 (69.2)	3C	1272.42	353.38	301.88	55.26	17100.6
70 (70.1)	3D	1307.04	357.80	303.94	54.02	18793.7
	AVE	1291.53	357.31	303.01	53.09	18226.1
72 (71.4)	3E	1299.33	363.44	300.06	40.47	17286.6
72 (74.0)	5C	1299.06	361.12	305.32	45.85	16333.8
	AVE	1299.20	362.28	302.69	43.16	16810.2
73 (73.0)	1B	1325.31	367.70	304.96	30.00	12642.6
73 (73.3)	2A	1302.90	371.41	305.17	27.85	12990.5
	AVE	1314.11	369.55	305.07	28.93	12816.6
74 (74.5)	2D	1305.54	355.60	311.61	57.01	18412.7
74 (73.9)	4D	1282.96	350.10	311.49	64.10	18579.3
	AVE	1294.25	352.85	311.55	60.55	18496.0
75 (75.3)	1B	1325.31	368.33	307.98	31.10	11583.1
75 (74.7)	1D	1290.71	368.91	307.12	29.59	10838.1
75 (75.6)	2E	1308.65	360.60	308.75	35.71	10428.9
75 (74.8)	5D	1308.88	336.89	307.37	64.35	11420.8
	AVE	1306.39	358.08	307.80	40.19	11067.7
76 (75.6)	1D	1290.71	364.38	308.44	32.77	10070.3

RUN 40503E

MASS FLOW = .0760 LBM/SEC INLET VAPOR TEMP = 233.0 DEG F TOTAL POWER = 5.42 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	1B	343.75	260.01	237.93	25.28	8542.2
12	2A	333.39	258.80	237.92	25.95	8550.7
	AVE	338.57	259.40	237.92	25.61	8546.4
24	1C	524.69	265.10	241.93	50.41	14235.3
24	5B	500.28	265.27	243.27	36.62	8579.4
	AVE	512.48	265.19	242.60	43.51	11407.3
39	1B	863.78	301.66	253.24	27.73	8187.7
39	2A	860.21	300.54	253.20	28.27	8197.9
39	4C	871.68	282.54	253.23	72.90	16282.0
39	4E	852.35	294.87	253.21	31.97	8230.3
	AVE	862.01	294.90	253.22	40.22	10224.4
48	1C	1011.90	314.17	254.01	42.51	13629.6
48	3B	1002.75	311.59	268.31	54.91	14892.5
48	5B	1001.33	311.52	257.90	34.93	8000.5
	AVE	1005.33	312.46	255.74	44.12	12174.2
60	1B	1330.12	350.52	285.87	30.04	7723.7
60	2A	1281.67	351.90	286.05	28.38	7679.5
60	4C	1313.51	327.85	286.73	73.72	15281.0
	AVE	1308.43	343.42	286.22	44.05	10228.1

76 (75.6)	3A	1306.81	355.60	307.92	54.10	13228.4
76 (75.6)	3D	1307.04	370.82	312.65	49.18	19837.3
76 (76.0)	4A	1297.74	350.85	310.84	46.46	8520.5
76 (75.9)	4B	1294.41	357.24	317.56	62.20	12749.2
76 (76.0)	4D	1282.96	349.02	314.58	71.75	16505.0
76 (77.6)	5C	1299.06	352.30	310.53	61.42	12721.3
76 (75.8)	5D	1308.88	338.00	308.62	64.55	10683.9
	AVE	1298.45	354.78	311.39	55.30	13039.5
77 (77.3)	1B	1325.31	372.31	310.52	30.23	9686.8
77 (77.1)	1C	1265.07	358.87	308.51	49.44	13910.3
77 (76.8)	1D	1290.71	364.45	310.26	33.77	9311.3
77 (77.3)	2A	1302.90	366.91	311.45	33.22	8975.3
77 (77.1)	2C	1295.14	378.77	314.61	43.85	16437.2
77 (76.8)	2D	1305.54	359.99	315.13	55.57	15280.5
77 (77.1)	3B	1298.00	358.67	318.05	70.31	13646.4
77 (77.4)	5B	1303.52	352.20	312.65	47.32	8266.2
77 (76.5)	5D	1308.88	340.17	309.52	61.74	10227.9
	AVE	1299.45	361.37	312.32	47.27	11749.1
78 (78.4)	1C	1265.07	359.01	310.41	51.15	13432.6
78 (77.8)	2B	1272.17	369.30	317.20	45.22	14208.9
78 (77.7)	2E	1300.65	357.81	312.00	40.42	8860.7
78 (78.1)	3A	1306.81	343.53	313.03	85.11	11532.5
78 (78.1)	3B	1298.00	357.82	319.76	75.00	13360.7
78 (78.2)	3C	1272.42	364.94	321.25	63.62	10512.8
78 (77.8)	4A	1297.74	351.50	314.41	49.95	7799.4
78 (78.1)	4B	1294.41	362.23	321.26	59.93	11487.0
78 (78.4)	4C	1324.67	364.05	320.05	65.87	13140.9
78 (78.1)	4D	1282.96	355.50	317.64	54.61	14000.3
78 (78.6)	4E	1301.74	358.49	312.78	40.48	8712.1
78 (78.3)	5D	1308.88	346.80	312.15	54.21	9156.1
	AVE	1293.79	357.59	315.99	58.05	11350.3
79 (79.1)	2C	1257.58	364.40	317.79	59.12	15219.9
79 (78.7)	2D	1305.54	366.60	318.08	51.00	13749.0
79 (79.2)	3A	1306.81	349.60	315.18	74.86	11666.5
79 (79.4)	3C	1258.99	365.46	323.39	65.24	10443.0
79 (78.6)	3E	1299.33	356.82	311.59	56.49	12435.2
79 (80.8)	5C	1299.06	342.12	315.66	97.32	12766.5
	AVE	1287.89	357.50	316.95	67.34	12713.3
80 (79.7)	2B	1245.98	376.60	319.93	41.30	13410.6

80 (79.6)	3D	1307.04	361.11	319.28	68.55	14853.8
80 (79.8)	4A	1259.46	355.60	318.49	48.15	7731.9
80 (80.4)	4E	1263.18	360.16	316.16	40.65	8490.9
80 (80.7)	5B	1214.18	355.60	319.10	47.18	7933.3
80 (82.8)	5C	1251.21	345.66	319.33	93.72	13254.2
	AVE	1256.85	359.12	318.72	56.59	10945.8
81 (80.4)	3D	1307.04	361.10	320.58	70.71	14547.9
	AVE	1307.04	361.10	320.58	70.71	14547.9
82 (81.5)	3E	1207.26	362.19	316.99	52.10	12808.4
	AVE	1207.26	362.19	316.99	52.10	12808.4
84	1C	1202.35	360.00	319.34	57.67	13392.0
84	2B	1245.98	374.18	327.28	49.72	10529.7
84	2C	1257.58	366.54	326.02	67.47	12907.0
84	2D	1252.34	375.02	327.19	48.97	10474.1
84	3C	1258.99	364.40	330.60	81.36	11328.7
84	3D	1237.87	373.96	326.84	55.76	13076.6
84	3E	1207.26	362.61	321.17	56.63	13020.1
84	4A	1259.48	354.49	326.78	64.13	7635.9
84	4D	1241.04	361.09	327.11	69.04	11806.9
84	5B	1214.18	351.20	325.56	67.16	7858.7
84	5C	1251.21	352.78	321.08	77.29	13137.0
	AVE	1238.94	363.30	325.38	63.27	11378.8
90	1D	1187.64	361.49	332.03	33.05	7508.5
90	2B	1178.99	393.33	337.66	38.75	10883.4
90	2C	1173.69	361.00	335.74	55.35	13601.5
90	2D	1161.81	365.35	337.51	45.00	10914.5
90	2E	1163.95	364.30	333.24	31.29	7295.3
90	3A	1202.18	362.00	333.25	78.32	12124.7
90	3B	1205.34	362.10	339.25	59.82	13099.4
90	3C	1213.94	362.02	339.04	60.30	13068.0
90	3D	1182.86	386.49	336.62	50.36	13678.6
90	3E	1160.43	375.76	330.10	48.57	12504.8
90	4A	1183.74	371.04	336.48	47.37	7277.7
90	4B	1199.52	387.42	340.45	46.84	10870.0
90	4D	1173.52	381.48	336.97	48.70	11576.6
90	5C	1190.61	362.07	329.66	69.21	12567.5
90	5D	1159.23	365.47	331.91	48.14	7700.6
	AVE	1182.50	376.88	335.38	50.74	10978.1

96	1C	1014.20	381.16	336.52	43.03	12133.2
96	2D	1006.95	393.10	346.63	39.39	11051.4
96	2E	988.18	383.39	341.86	32.47	7199.9
96	3B	1024.74	387.52	348.02	54.58	13589.7
96	3C	1012.41	387.00	347.64	53.58	13830.9
96	3D	1019.38	389.45	345.38	48.70	13929.1
96	3E	1017.56	360.55	338.58	45.76	12203.7
96	4B	1035.85	386.00	349.32	51.46	11098.5
96	4D	1015.96	382.34	340.03	51.30	11462.1
96	5B	1002.88	372.96	343.51	46.79	7266.0
96	5C	1048.66	367.70	337.93	67.34	12201.7
	AVE	1016.91	382.90	343.78	48.58	11451.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41103F
Test Date: 6/19/80
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.1406 MPa (20.39 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.129 kw/m (0.0393 kw/ft)
Flow rate	0.0344 kg/sec (0.0759 lb/sec)
Coolant temperature	118.5°C (245.4°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 10822

(See following pages for additional results.)

C. Comments:

RUN 41103F

MASS FLOW = .0344 KG/SEC INLET VAPOR TEMP = 118.3 DEG C TOTAL POWER = 5.97 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	4C	1169.04	130.72	121.54	55.76	16651.7
.30	4E	1098.75	132.71	121.55	27.65	8374.1
	AVE	1133.89	131.71	121.54	41.71	12512.9
.61	3E	1642.47	136.70	123.85	49.11	13950.6
	AVE	1642.47	136.70	123.85	49.11	13950.6
.99	1B	2847.13	157.79	130.18	27.65	8008.8
.99	2A	2702.75	160.22	130.16	24.03	7985.1
.99	4C	2894.77	152.89	130.35	53.86	15810.4
	AVE	2814.88	156.96	130.23	35.18	10601.4
1.22	1C	3260.15	165.12	136.34	41.13	13340.4
1.22	2C	3271.07	165.11	138.42	49.98	15262.4
1.22	2E	3250.06	166.28	138.24	30.36	7941.8
1.22	3E	3213.42	158.47	136.36	53.26	13469.1
	AVE	3248.68	163.75	137.34	43.69	12503.4
1.52	1B	4009.86	186.11	148.79	26.99	7544.6
1.52	2A	4096.16	190.20	148.88	24.77	7468.6
1.52	4E	4263.56	177.92	148.94	37.55	7628.1
	AVE	4129.86	184.75	148.87	29.77	7547.1

RUN 41103F

MASS FLOW = .0344 KG/SEC INLET VAPOR TEMP = 118.3 DEG C TOTAL POWER = 5.97 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.67)	2A	4241.36	193.89	154.47	26.54	7527.2
1.70(1.70)	2B	4277.85	195.06	157.67	37.78	11959.4
1.70(1.70)	4B	4269.24	204.28	158.76	30.54	11654.2
1.70(1.70)	5C	4290.35	185.86	153.12	45.19	12199.0
1.70(1.70)	5D	4259.37	190.92	156.05	30.18	7357.9
	AVE	4267.63	194.00	156.01	34.05	10139.5
1.78(1.77)	3C	4317.80	193.28	158.57	47.46	17687.8
1.78(1.78)	4E	4291.33	194.84	158.74	29.12	10567.4
	AVE	4304.60	194.06	158.65	38.29	14127.6
1.80(1.80)	3D	4386.57	196.93	160.11	45.13	19778.1
	AVE	4386.57	196.93	160.11	45.13	19778.1
1.88(1.87)	4D	4259.61	193.81	163.79	46.54	20408.4
	AVE	4259.61	193.81	163.79	46.54	20408.4
1.91(1.90)	1B	4313.52	191.05	161.34	35.61	13430.9
1.91(1.89)	1D	4284.30	192.66	161.12	33.26	12084.2
1.91(1.90)	2D	4245.44	187.18	163.95	60.48	20300.2
1.91(1.89)	4D	4259.61	189.00	164.37	57.06	20402.3
	AVE	4275.72	189.97	162.69	46.66	16554.4
1.93(1.93)	1D	4284.30	189.04	162.15	39.15	10555.6
1.93(1.94)	2E	4320.79	183.45	162.21	50.37	10085.4
1.93(1.94)	4B	4269.24	196.33	168.56	49.93	12152.5
1.93(1.92)	4D	4259.61	189.62	165.34	57.77	18581.1
1.93(1.94)	5C	4290.35	183.94	162.78	69.18	13788.1
1.93(1.93)	5D	4259.37	185.91	162.64	45.14	11117.0
	AVE	4280.61	188.05	163.95	51.92	12713.3
1.96(1.95)	1B	4313.52	194.35	162.75	33.27	10708.8
1.96(1.95)	1D	4284.30	189.84	163.06	39.21	9664.9
1.96(1.95)	2A	4241.36	196.42	163.08	30.91	9038.4

1.96(1.96)	2B	4277.85	198.17	156.50	43.89	14542.0
1.96(1.95)	2D	4245.44	188.79	165.78	60.76	15463.6
1.96(1.95)	3B	4298.61	198.40	167.33	51.80	13141.6
1.96(1.96)	5B	4324.74	192.62	164.58	37.58	8379.9
	AVE	4283.69	194.08	164.73	42.49	11562.7
1.98(1.97)	1C	4252.81	188.30	162.95	56.90	14169.2
1.98(1.98)	2A	4241.36	197.79	164.30	30.66	8424.5
1.98(1.98)	2B	4277.85	198.78	167.18	43.89	13916.6
1.98(1.98)	3A	4259.35	196.89	164.58	44.08	10520.8
1.98(1.97)	4A	4306.94	203.40	165.36	27.16	7573.3
1.98(1.99)	4B	4269.24	199.38	170.00	46.92	11040.0
1.98(1.99)	4C	4448.18	195.10	169.32	64.68	12493.6
1.98(1.97)	4D	4259.61	190.83	167.23	59.16	14781.8
1.98(1.99)	4E	4291.33	193.26	164.20	35.96	8879.2
1.98(1.99)	5C	4296.35	187.77	164.57	62.62	12376.0
1.98(1.99)	5D	4259.37	191.39	164.51	38.68	9399.3
	AVE	4286.94	194.81	165.84	46.43	11234.0
2.01(2.00)	1B	4313.52	197.57	164.44	31.52	9562.0
2.01(2.00)	1C	4252.81	188.94	163.89	57.46	13821.2
2.01(2.00)	2C	4231.95	198.07	167.38	51.63	14972.3
2.01(2.00)	2D	4245.44	193.28	167.52	53.83	13429.1
2.01(1.99)	2E	4320.79	184.60	164.17	52.15	8626.7
2.01(2.00)	3A	4203.21	199.81	165.66	40.93	10705.2
2.01(2.00)	3B	4298.61	201.22	169.35	50.15	12281.4
2.01(2.02)	3D	4386.57	195.53	168.31	60.47	13636.3
2.01(2.01)	4B	4269.24	201.11	170.49	44.87	10919.4
2.01(2.01)	5B	4324.74	190.67	166.76	44.07	7910.1
2.01(2.01)	5C	4290.35	189.61	165.53	60.09	12333.3
	AVE	4285.20	194.58	166.68	49.74	11654.3
2.03(2.03)	1B	4313.52	198.34	165.47	31.69	9239.8
2.03(2.03)	1C	4109.17	189.47	164.90	56.46	13696.3
2.03(2.03)	2B	4123.87	202.43	168.87	39.56	13157.6
2.03(2.03)	2D	4222.27	194.67	168.39	52.31	12995.5
2.03(2.02)	3C	4237.95	198.20	171.71	59.55	8830.4
2.03(2.04)	3D	4199.96	196.95	169.32	56.86	13263.7
2.03(2.02)	4A	4033.40	206.73	167.77	24.64	7407.7
2.03(2.03)	4E	4120.30	193.23	166.18	36.99	8602.2
	AVE	4170.05	197.50	167.83	44.76	10899.1
2.06(2.05)	3E	4061.48	188.47	165.80	60.52	12029.2

	AVE	4061.48	188.47	165.80	60.52	12029.2
2.13	1C	4109.17	193.74	168.48	54.36	13264.5
2.13	2B	4123.87	202.23	172.56	44.53	10420.5
2.13	2D	4222.27	201.83	172.65	46.38	10138.7
2.13	3C	4237.90	198.26	175.53	69.04	10779.8
2.13	3D	4199.96	203.61	172.91	56.15	12400.5
2.13	3E	4061.48	192.06	168.90	58.70	12557.7
2.13	4A	4033.40	204.28	172.68	30.28	7278.8
2.13	4D	4235.99	195.11	173.36	62.95	11430.1
2.13	5B	4110.06	191.46	172.09	51.26	7674.4
2.13	5D	4093.59	194.74	170.70	41.03	8131.6
	AVE	4142.77	197.43	171.99	51.47	10407.7
2.29	1D	3840.65	203.44	175.66	32.69	7478.2
2.29	2B	3715.85	214.44	178.48	32.30	10732.4
2.29	2C	3846.07	207.35	177.96	47.70	13232.2
2.29	2D	3825.79	208.55	178.55	40.19	10579.0
2.29	2E	3846.56	200.59	175.49	36.41	7224.1
2.29	3A	3764.26	209.67	176.58	36.77	11427.3
2.29	3B	3901.02	215.66	179.57	38.86	12654.2
2.29	3C	3977.38	212.01	180.60	45.69	12541.8
2.29	3D	3874.06	212.06	178.50	41.78	13009.5
2.29	4A	3953.40	211.53	178.19	27.65	6994.1
2.29	4B	3857.59	215.54	180.21	34.00	10637.2
2.29	4D	4028.65	209.65	179.20	41.59	11128.0
2.29	5B	3874.68	202.70	177.23	35.94	7307.5
2.29	5C	3760.58	201.83	175.30	46.40	12074.6
	AVE	3862.04	208.93	177.97	38.43	10501.4
2.44	1C	3342.23	202.71	178.77	45.43	11805.0
2.44	2C	3357.96	209.06	183.01	46.55	13488.7
2.44	2D	3308.30	210.05	183.70	39.21	10764.8
2.44	2E	3308.14	203.70	180.29	33.20	7099.5
2.44	3C	3355.76	213.28	185.09	42.64	13350.8
2.44	3D	3519.24	211.69	183.38	44.70	13387.6
2.44	3E	3374.35	202.24	178.99	47.24	11773.5
2.44	4A	3323.75	211.00	183.36	27.86	6928.5
2.44	4B	3443.35	214.99	185.18	35.77	10819.6
2.44	4D	3443.38	210.89	184.48	40.63	11052.5
2.44	5B	3473.76	203.98	182.23	37.41	7153.6
2.44	5C	3371.74	202.76	180.29	48.71	11763.7
	AVE	3385.16	208.03	182.40	40.78	10782.3

RUN 41103F

MASS FLOW = .0759 LBM/SEC INLET VAPOR TEMP = 245.0 DEG F TOTAL POWER = 5.66 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	4C	370.54	267.30	250.78	55.76	16651.7
12	4E	348.26	270.87	250.78	27.65	8374.1
	AVE	359.40	269.09	250.78	41.71	12512.9
24	3E	520.59	278.07	254.93	49.11	13950.6
	AVE	520.59	278.07	254.93	49.11	13950.6
39	1B	902.42	316.02	266.33	27.65	8008.8
39	2A	656.66	320.39	266.29	24.03	7985.1
39	4C	917.52	307.20	266.63	53.86	15810.4
	AVE	892.20	314.54	266.42	35.18	10601.4
48	1C	1033.33	329.22	277.41	41.13	13340.4
48	2C	1036.79	329.20	281.16	49.98	15262.4
48	2E	1030.13	331.30	280.84	30.38	7941.8
48	3E	1018.52	317.25	277.44	53.26	13469.1
	AVE	1029.69	326.74	279.21	43.69	12503.4
60	1B	1270.96	367.01	299.81	26.99	7544.6
60	2A	1298.31	374.37	299.99	24.77	7468.6
60	4E	1357.70	352.26	300.09	37.55	7628.1
	AVE	1308.99	364.54	299.96	29.77	7547.1

RUN 41103F

MASS FLOW = .0759 LBM/SEC INLET VAPOR TEMP = 245.0 DEG F TOTAL POWER = 5.66 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (65.7)	2A	1344.33	381.00	310.04	26.54	7527.2
67 (66.8)	2B	1355.89	383.11	315.80	37.78	11959.4
67 (67.1)	4B	1353.16	399.70	317.76	30.54	11654.2
67 (67.1)	5C	1359.86	366.54	307.61	45.19	12199.0
67 (66.9)	5D	1350.04	375.66	312.89	30.18	7357.9
	AVE	1352.66	381.20	312.82	34.05	10139.5
70 (69.5)	3C	1368.58	379.90	317.42	47.46	17687.8
70 (70.0)	4E	1360.17	382.70	317.74	29.12	10567.4
	AVE	1364.37	381.30	317.58	38.29	14127.6
71 (70.7)	3D	1390.35	386.48	320.21	45.13	19778.1
	AVE	1390.35	386.48	320.21	45.13	19778.1
74 (73.6)	4D	1350.11	380.86	326.82	46.54	20408.4
	AVE	1350.11	380.86	326.82	46.54	20408.4
75 (74.7)	1B	1367.20	375.88	322.41	35.61	13430.9
75 (74.5)	1D	1357.94	378.79	322.02	33.26	12084.2
75 (74.7)	2D	1345.62	369.92	327.10	60.48	20300.2
75 (74.4)	4D	1350.11	372.20	327.87	57.06	20402.3
	AVE	1355.22	373.95	324.85	46.60	16554.4
76 (75.8)	1D	1357.94	372.28	323.88	39.15	10555.6
76 (76.4)	2E	1369.50	362.21	323.99	50.37	10085.4
76 (76.2)	4B	1353.16	385.40	335.41	49.93	12152.5
76 (75.5)	4D	1350.11	373.31	329.61	57.77	18581.1
76 (76.2)	5C	1359.86	363.09	325.00	69.18	13788.1
76 (75.9)	5D	1350.04	366.63	324.75	45.14	11117.0
	AVE	1356.77	370.49	327.10	51.92	12713.3
77 (76.9)	1B	1367.20	381.83	324.95	33.27	10708.8
77 (76.8)	1D	1357.94	373.72	325.50	39.21	9664.9
77 (76.9)	2A	1344.33	385.55	325.55	30.91	9038.4

77 (77.2)	2B	1355.89	388.70	331.70	43.89	14542.0
77 (76.9)	2D	1345.62	371.82	330.40	60.76	15463.6
77 (76.7)	3B	1362.48	389.12	333.20	51.80	13141.6
77 (77.0)	5B	1370.76	378.72	328.25	37.58	8379.9
	AVE	1357.75	381.35	328.51	42.49	11562.7
78 (77.7)	1C	1347.96	370.93	325.31	56.90	14169.2
78 (78.0)	2A	1344.33	388.02	327.75	30.66	8424.5
78 (78.0)	2B	1355.89	389.81	332.92	43.89	13916.6
78 (78.0)	3A	1350.03	386.40	328.25	44.08	10520.8
78 (77.7)	4A	1365.11	398.13	329.65	27.16	7573.3
78 (78.4)	4B	1353.16	390.88	338.01	46.92	11040.0
78 (78.2)	4C	1409.88	383.19	336.77	64.68	12493.6
78 (77.5)	4D	1350.11	375.50	333.02	59.16	14781.8
78 (78.3)	4E	1360.17	379.88	327.55	35.96	8879.2
78 (78.3)	5C	1359.86	369.99	328.23	62.62	12376.0
78 (78.2)	5D	1350.04	376.50	328.12	38.66	9399.3
	AVE	1358.78	382.66	330.51	46.43	11234.0
79 (78.9)	1B	1367.20	387.63	327.99	31.51	9562.0
79 (78.8)	1C	1347.96	372.09	327.01	57.46	13821.2
79 (78.6)	2C	1341.35	388.52	333.28	51.63	14972.3
79 (78.9)	2D	1345.62	379.90	333.54	53.83	13429.1
79 (78.5)	2E	1369.50	364.28	327.51	52.15	8626.7
79 (78.9)	3A	1332.24	391.66	330.18	40.93	10705.2
79 (78.9)	3B	1362.48	394.20	336.83	50.15	12281.4
79 (79.5)	3D	1390.35	383.96	334.95	60.47	13636.3
79 (79.0)	4B	1353.16	394.00	338.89	44.87	10919.4
79 (79.1)	5B	1370.76	375.20	332.17	44.07	7910.1
79 (79.3)	5C	1359.86	373.30	329.95	60.09	12333.3
	AVE	1358.23	382.25	332.03	49.74	11654.3
80 (80.0)	1B	1367.20	389.01	329.84	31.69	9239.8
80 (80.0)	1C	1302.43	373.04	328.83	56.48	13696.3
80 (80.1)	2B	1307.09	396.38	335.97	39.50	13157.6
80 (79.9)	2D	1336.28	382.41	335.10	52.31	12995.5
80 (79.6)	3C	1343.23	388.75	341.07	59.55	8830.4
80 (80.5)	3D	1331.21	386.51	336.78	56.86	13263.7
80 (79.7)	4A	1278.41	404.11	333.99	24.64	7407.7
80 (80.1)	4E	1305.96	379.82	331.12	36.99	8602.2
	AVE	1321.73	387.50	334.09	44.76	10899.1
81 (80.9)	3E	1287.32	371.24	330.45	60.52	12029.2

	AVE	1287.32	371.24	330.45	60.52	12029.2
84	1C	1302.43	380.72	335.27	54.36	13264.5
84	2B	1307.09	396.01	342.60	44.53	10420.5
84	2D	1338.26	395.29	342.76	46.38	10138.7
84	3C	1343.23	388.86	347.96	69.04	10779.8
84	3D	1331.21	393.10	343.24	56.15	12400.5
84	3E	1287.32	377.70	336.03	58.70	12557.7
84	4A	1276.41	399.70	342.83	30.28	7278.8
84	4D	1342.63	383.20	344.06	62.95	11430.1
84	5B	1302.71	376.62	341.76	51.26	7674.4
84	5D	1297.49	382.54	339.27	41.03	8131.6
	AVE	1313.08	387.37	341.58	51.47	10407.7
90	1D	1217.32	398.19	348.18	32.69	7478.2
90	2B	1177.77	418.00	353.26	32.30	10732.4
90	2C	1219.04	405.23	352.33	47.70	13232.2
90	2D	1212.61	407.39	353.40	40.19	10579.0
90	2E	1219.83	393.06	347.88	36.41	7224.1
90	3A	1193.11	409.41	349.84	36.77	11427.3
90	3B	1236.46	420.19	355.22	38.86	12654.2
90	3C	1260.66	413.62	357.08	45.69	12541.8
90	3D	1227.91	413.70	353.29	41.78	13009.5
90	4A	1253.06	412.75	352.75	27.65	6994.1
90	4B	1222.69	419.98	356.37	34.00	10637.2
90	4D	1276.91	409.37	354.56	41.59	11128.0
90	5B	1228.11	396.86	351.02	35.94	7307.5
90	5C	1191.94	395.30	347.55	46.40	12074.6
	AVE	1224.10	408.07	352.34	38.43	10501.4
96	1C	1059.34	396.87	353.79	45.43	11805.0
96	2C	1064.33	408.31	351.42	46.55	13488.7
96	2D	1048.59	410.08	362.65	39.21	10764.8
96	2E	1048.54	398.66	356.52	33.20	7099.5
96	3C	1063.63	415.90	365.17	42.64	13350.8
96	3D	1115.45	413.05	362.08	44.70	13387.6
96	3E	1069.52	396.03	354.18	47.24	11773.5
96	4A	1053.49	411.80	362.06	27.86	6928.5
96	4B	1091.39	418.98	365.33	35.77	10819.6
96	4D	1091.40	411.60	364.06	40.63	11052.5
96	5B	1101.03	399.16	360.01	37.41	7153.6
96	5C	1068.70	396.97	356.52	48.71	11763.7
	AVE	1072.95	406.45	360.32	40.78	10782.3

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 44529A
Test Date: 5/13/80
Test Type: Steam Cooling
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.141 MPa (20.4 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.03 kw/m (0.009 kw/ft)
Flow rate	0.00807 kg/sec (0.0178 lb/sec)
Coolant temperature	109.8°C (299.6°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 2760

(See following pages for additional results.)

C. Comments:

Condensation in the injection line and lower plenum, downstream of the flow measurement location, reduced the steam flow into the bundle.

The following heater rod thermocouples were not used because of reverse heat transfer: 2E at 2.13, 2.29, and 2.44 m (84, 90, and 96 in.); 5B at 2.13 and 2.44 m (84 and 96 in.); 5D at 2.29 m (90 in.); 1D at 2.29 m (90 in.); and 1B at 2.44 m (96 in.).

The following heater rod thermocouples were not used because of small [3°C (5°F)] vapor-to-rod temperature difference: 1B and 2B at 2.13 m (84 in.) and 4D and 5C at 2.44 m (96 in.).

RUN 44529A

MASS FLOW = .0056 KG/SEC INLET VAPOR TEMP = 109.4 DEG C TOTAL POWER = 1.38 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	252.93	118.72	113.46	13.93	1341.3
.30	4A	254.95	119.40	113.48	12.45	1339.9
.30	4C	253.30	119.36	113.77	20.37	2852.1
	AVE	253.73	119.16	113.57	15.58	1844.4
.61	1B	385.42	124.72	117.34	14.92	1353.7
.61	1C	383.02	125.86	116.24	15.69	2329.2
.61	4D	388.86	125.03	118.52	22.92	2115.0
.61	5B	388.60	124.10	117.38	16.53	1354.7
	AVE	386.49	124.93	117.37	17.52	1788.2
.99	2A	665.72	140.89	124.84	11.47	1281.4
.99	4A	649.62	139.03	124.90	12.74	1278.0
.99	4C	634.44	139.70	125.50	19.21	2730.2
	AVE	649.93	139.87	125.08	14.47	1763.2
1.22	1B	789.13	149.34	136.07	16.90	1263.1
1.22	1C	769.50	151.95	133.06	15.13	2218.5
1.22	4D	776.53	153.61	139.05	19.13	2024.3
1.22	5B	770.84	148.06	136.50	17.97	1249.9
	AVE	776.52	150.74	136.17	17.06	1689.0
1.52	2A	959.21	161.58	151.22	24.00	1319.4
1.52	4A	958.31	162.62	152.65	24.82	1115.4
1.52	4C	965.63	165.42	151.89	28.56	2153.7
1.52	4E	954.48	157.78	151.84	41.80	1243.2
	AVE	959.41	161.85	151.90	29.79	1457.9

RUN 44529A

MASS FLOW = .0056 KG/SEC INLET VAPOR TEMP = 109.4 DEG C TOTAL POWER = 1.38 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.72)	2A	1005.14	170.00	160.92	27.98	1179.4
1.70(1.72)	4A	1003.09	175.50	163.05	20.14	1123.8
1.70(1.72)	4C	995.96	161.70	162.70	20.20	2346.7
1.70(1.72)	4E	991.33	169.99	161.38	29.08	1169.7
	AVE	998.88	174.30	162.01	24.35	1454.9
1.78(1.80)	1B	1019.91	168.61	164.69	65.67	1183.2
1.78(1.81)	1C	1000.54	177.95	160.01	19.25	2082.6
1.78(1.78)	2D	1026.96	183.92	168.11	21.48	1886.5
1.78(1.80)	3C	1006.35	185.30	166.77	20.71	2444.5
1.78(1.78)	4D	1031.03	182.97	169.02	24.42	1844.4
1.78(1.80)	5B	988.73	175.37	166.32	27.19	1144.7
	AVE	1012.25	179.02	165.82	29.79	1764.3
1.80(1.85)	1D	1020.03	173.70	167.73	42.61	1161.9
1.80(1.83)	2C	1020.41	185.18	167.26	21.71	2448.6
1.80(1.80)	2D	1026.96	184.63	169.26	22.03	1882.5
1.80(1.83)	3C	1006.35	187.17	168.13	20.08	2440.7
1.80(1.82)	3E	1003.39	179.16	160.94	18.97	2032.2
1.80(1.82)	4B	1004.38	184.67	172.34	26.75	1828.9
1.80(1.82)	5D	1006.89	176.66	167.05	25.95	1139.1
	AVE	1012.63	181.60	167.53	25.44	1847.7
1.83(1.85)	1B	1019.91	171.85	167.41	57.43	1167.8
1.83(1.86)	1C	1000.54	180.35	162.51	19.23	2058.6
1.83(1.83)	2D	1026.96	185.73	171.12	23.08	1875.8
1.83(1.86)	3B	1040.04	190.44	170.59	19.74	2372.2
1.83(1.85)	3C	1006.35	188.41	169.50	20.14	2438.0
1.83(1.86)	3D	1040.65	190.22	169.61	19.06	2382.3
1.83(1.84)	5B	988.73	177.36	168.94	29.07	1136.4
1.83(1.82)	5C	1013.59	177.94	161.49	21.24	2027.0
	AVE	1017.10	182.79	167.65	26.12	1932.3
1.88(1.93)	1D	1020.03	176.65	171.95	53.52	1144.5
1.88(1.91)	2C	1020.41	190.36	171.52	20.38	2415.6
1.88(1.89)	2D	1026.96	189.30	174.69	23.35	1859.6

1.88(1.84)	2E	976.52	176.49	167.65	27.42	1143.6
1.88(1.92)	3B	1040.04	193.50	173.49	19.41	2362.3
1.88(1.90)	3C	1006.35	192.66	172.22	18.46	2425.0
1.88(1.92)	3D	1040.65	192.77	172.65	19.37	2373.1
1.88(1.89)	3E	1003.39	182.79	164.91	19.13	2009.5
1.88(1.90)	4B	1004.38	188.40	176.75	28.00	1824.6
1.88(1.87)	5C	1013.59	179.77	164.20	22.30	2014.1
1.88(1.90)	5D	1006.89	181.02	171.46	25.82	1125.4
	AVE	1014.47	185.76	171.05	25.20	1881.6
1.91(1.96)	1D	1020.03	177.64	173.59	61.85	1138.7
1.91(1.94)	2C	1020.41	191.91	173.17	20.40	2404.6
1.91(1.91)	2D	1026.96	189.61	175.55	23.71	1856.0
1.91(1.93)	3C	1006.35	193.29	173.86	19.35	2422.1
1.91(1.93)	3E	1003.39	182.88	166.59	20.94	2004.2
1.91(1.93)	4B	1004.38	189.57	178.46	29.24	1821.8
1.91(1.93)	5D	1006.89	181.80	172.97	27.87	1121.8
	AVE	1012.63	186.67	173.45	29.05	1824.2
1.93(1.95)	2A	1005.14	179.07	173.67	45.63	1128.9
1.93(1.92)	2B	972.17	188.34	176.21	26.05	1862.0
1.93(1.93)	2D	1026.96	189.99	176.55	24.75	1852.6
1.93(1.89)	2E	976.52	179.14	170.39	27.48	1134.3
1.93(1.96)	3B	1040.04	194.50	175.97	20.87	2357.1
1.93(1.96)	3C	1006.35	194.50	175.08	19.30	2417.3
1.93(1.96)	3D	1040.65	194.29	175.14	20.24	2365.6
1.93(1.95)	4A	1003.09	182.23	175.40	35.80	1111.1
1.93(1.95)	4E	991.33	180.39	173.78	36.70	1125.3
1.93(1.95)	4C	995.96	192.04	175.14	22.01	2357.5
	AVE	1005.82	187.45	174.73	27.88	1771.2
1.96(2.00)	1D	1020.03	179.79	176.03	66.22	1129.5
1.96(1.99)	2C	1020.41	193.59	175.79	21.35	2389.8
1.96(1.95)	2D	1026.96	190.81	177.83	25.57	1847.5
1.96(1.98)	3C	1006.35	195.72	176.31	19.24	2412.0
1.96(1.97)	3E	1003.39	184.20	168.93	22.22	1994.2
1.96(1.98)	4B	1004.38	191.95	181.01	32.17	1817.0
1.96(1.97)	5D	1006.89	184.04	175.56	28.85	1114.6
	AVE	1012.63	188.46	175.92	30.80	1814.9
1.98(2.01)	3D	1040.65	195.73	178.01	21.75	2356.6
1.98(2.00)	2A	1005.14	181.10	176.42	52.29	1120.5
1.98(1.98)	2D	1026.96	191.14	179.54	28.53	1842.4

1.98(2.01)	3B	1040.04	195.68	178.83	22.82	2349.1
1.98(2.00)	3C	1006.35	197.40	177.67	18.85	2404.7
1.98(2.01)	4A	1003.09	183.94	178.25	42.62	1105.7
1.98(2.00)	4E	991.33	182.94	176.65	38.25	1116.5
1.98(2.00)	4C	995.96	193.78	178.03	23.47	2351.0
	AVE	1013.69	190.22	177.92	31.07	1830.8
2.13	1C	912.24	186.83	176.92	30.70	2140.2
2.13	3A	906.89	186.85	179.02	30.59	1934.1
2.13	3B	931.73	198.20	184.81	25.44	1910.6
2.13	3D	938.09	197.11	184.06	26.36	2005.0
2.13	4D	955.87	193.45	187.65	52.34	1748.0
	AVE	928.96	192.89	182.49	33.08	1947.6
2.29	2C	869.26	202.52	191.54	28.50	2178.7
2.29	3A	907.48	196.07	186.10	29.60	1905.9
2.29	3B	915.73	206.89	193.15	23.82	2092.8
2.29	3D	878.37	202.44	192.20	30.86	2161.1
2.29	3E	880.54	189.45	184.74	61.39	1979.2
2.29	4B	877.79	201.69	195.76	46.01	1708.3
2.29	5C	898.40	189.01	184.96	72.97	2037.0
	AVE	889.65	198.30	189.78	41.88	2009.0
2.44	3D	763.75	203.72	198.89	55.31	2229.9
2.44	1C	729.79	195.41	189.97	43.39	1950.6
2.44	3B	762.49	209.67	199.86	27.40	2185.3
	AVE	752.01	202.93	196.24	42.37	2121.9

RUN 44529A

MASS FLOW = .0123 LBM/SEC INLET VAPOR TEMP = 229.0 DEG F TOTAL POWER = 1.31 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	80.17	245.70	236.23	13.93	1341.3
12	4A	80.81	246.92	236.26	12.45	1339.9
12	4C	80.29	246.84	236.78	20.37	2852.1
	AVE	80.42	246.49	236.43	15.58	1844.4
24	1B	122.16	256.50	243.22	14.92	1353.7
24	1C	121.40	258.55	241.22	15.69	2329.2
24	4D	123.25	257.06	245.33	22.92	2115.0
24	5B	123.19	255.38	243.28	16.53	1354.7
	AVE	122.50	256.87	243.26	17.52	1788.2
39	2A	211.00	285.60	256.71	11.47	1281.4
39	4A	205.90	282.26	256.82	12.74	1278.0
39	4C	201.09	283.46	257.91	19.21	2730.2
	AVE	206.00	283.77	257.15	14.47	1763.2
48	1B	250.12	300.82	276.93	16.00	1263.1
48	1C	243.92	305.52	271.50	15.13	2218.5
48	4D	246.13	308.51	282.30	19.13	2024.3
48	5B	244.32	298.50	277.70	17.97	1249.9
	AVE	246.12	303.34	277.11	17.06	1689.0
60	2A	304.03	322.84	304.20	24.00	1319.4
60	4A	303.74	324.71	306.77	24.82	1115.4
60	4C	306.06	329.75	305.40	28.56	2153.7
60	4E	302.53	316.00	305.31	41.80	1243.2
	AVE	304.09	323.32	305.42	29.79	1457.9

RUN 44529A

MASS FLOW = .0123 LBM/SEC INLET VAPOR TEMP = 229.0 DEG F TOTAL POWER = 1.31 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.6)	2A	318.59	338.00	321.66	27.98	1179.4
67 (67.9)	4A	317.94	347.90	325.49	20.14	1123.8
67 (67.7)	4C	315.68	359.06	324.86	20.20	2346.7
67 (67.6)	4E	314.21	337.98	322.48	29.08	1169.7
	AVE	316.60	345.74	323.62	24.35	1454.9
70 (70.8)	1B	323.27	335.49	328.45	65.67	1183.2
70 (71.3)	1C	317.13	352.32	320.01	19.25	2082.6
70 (70.0)	2D	325.50	363.06	334.61	21.48	1886.5
70 (70.9)	3C	318.97	365.53	332.18	20.71	2444.5
70 (70.1)	4D	326.79	361.35	336.23	24.42	1844.4
70 (70.7)	5B	313.38	347.67	331.37	27.19	1144.7
	AVE	320.84	354.24	330.48	29.79	1764.3
71 (72.7)	1D	323.30	344.65	333.92	42.61	1161.9
71 (72.0)	2C	323.42	365.32	333.07	21.71	2448.6
71 (70.8)	2D	325.50	364.33	336.67	22.03	1882.5
71 (71.9)	3C	318.97	368.90	334.64	20.08	2440.7
71 (71.5)	3E	318.03	354.49	321.70	18.97	2032.2
71 (71.7)	4B	318.34	364.40	342.21	26.75	1828.9
71 (71.5)	5D	319.14	350.02	332.69	25.95	1139.1
	AVE	320.96	358.87	333.56	25.44	1847.7
72 (72.8)	1B	323.27	341.33	333.35	57.43	1167.8
72 (73.3)	1C	317.13	356.03	324.51	19.23	2058.6
72 (72.1)	2D	325.50	366.31	340.01	23.08	1875.8
72 (73.3)	3B	329.65	374.80	339.07	19.74	2372.2
72 (72.9)	3C	318.97	371.13	337.10	20.14	2438.0
72 (73.2)	3D	329.84	374.39	337.30	19.06	2382.3
72 (72.6)	5B	313.38	351.24	336.10	29.07	1136.4
72 (71.6)	5C	321.26	352.29	322.68	21.24	2027.0
	AVE	322.38	361.01	333.76	26.12	1932.3
74 (75.8)	1D	323.30	349.98	341.52	53.52	1144.5
74 (75.1)	2C	323.42	374.64	340.73	20.38	2415.6
74 (74.6)	2D	325.50	372.20	346.44	23.35	1859.6

74 (72.4)	2E	309.52	349.68	333.77	27.42	1143.6
74 (75.4)	3B	329.65	380.31	344.27	19.41	2362.3
74 (74.9)	3C	318.97	378.79	342.00	18.46	2425.0
74 (75.4)	3D	329.84	378.98	342.77	19.37	2373.1
74 (74.6)	3E	318.03	361.02	328.85	19.13	2009.5
74 (74.8)	4B	318.34	371.12	350.16	28.00	1824.6
74 (73.7)	5C	321.26	355.59	327.57	22.30	2014.1
74 (74.7)	5D	319.14	357.84	340.62	25.82	1125.4
	AVE	321.54	366.38	339.88	25.20	1881.6
75 (77.0)	1D	323.30	351.75	344.45	61.85	1138.7
75 (76.3)	2C	323.42	377.43	343.71	20.40	2404.6
75 (75.2)	2D	325.50	373.30	347.99	23.71	1856.0
75 (76.1)	3C	318.97	379.92	344.95	19.35	2422.1
75 (75.9)	3E	318.03	361.19	331.87	20.94	2004.2
75 (76.0)	4B	318.34	373.22	353.22	29.24	1821.8
75 (75.8)	5D	319.14	359.24	343.34	27.87	1121.8
	AVE	320.96	368.01	344.22	29.05	1824.2
76 (76.8)	2A	318.59	354.32	344.60	45.63	1128.9
76 (75.7)	2B	308.13	371.01	349.18	26.05	1862.0
76 (75.9)	2D	325.50	373.99	349.78	24.75	1852.6
76 (74.4)	2E	309.52	354.46	338.70	27.48	1134.3
76 (77.2)	3B	329.65	382.10	348.74	20.87	2357.1
76 (77.0)	3C	318.97	362.10	347.15	19.30	2417.3
76 (77.2)	3D	329.84	381.71	347.24	20.24	2365.6
76 (76.9)	4A	317.94	366.01	347.73	35.80	1111.1
76 (76.6)	4E	314.21	356.70	344.80	36.70	1125.3
76 (76.7)	4C	315.68	377.67	347.24	22.01	2357.5
	AVE	318.80	369.41	346.52	27.88	1771.2
77 (78.8)	1D	323.30	355.62	348.85	66.22	1129.5
77 (78.2)	2C	323.42	380.46	348.43	21.35	2389.8
77 (76.8)	2D	325.50	375.46	352.10	25.57	1847.5
77 (77.9)	3C	318.97	384.30	349.36	19.24	2412.0
77 (77.7)	3E	318.03	363.56	336.07	22.22	1994.2
77 (77.8)	4B	318.34	375.88	357.81	32.17	1817.0
77 (77.7)	5D	319.14	363.27	348.02	28.85	1114.6
	AVE	320.96	371.22	348.66	30.80	1814.9
78 (79.3)	3D	329.84	384.31	352.41	21.75	2356.6
78 (78.8)	2A	318.59	357.98	349.56	52.29	1120.5
78 (78.0)	2D	325.50	376.05	355.18	28.53	1842.4

78 (79.3)	3B	329.65	384.23	353.89	22.82	2349.1
78 (78.9)	3C	318.97	387.32	351.81	18.85	2404.7
78 (79.0)	4A	317.94	363.10	352.85	42.62	1105.7
78 (78.7)	4E	314.21	361.30	349.97	38.25	1116.5
78 (78.8)	4C	315.68	380.81	352.45	23.47	2351.0
	AVE	321.30	374.39	352.26	31.07	1830.8
84	1C	289.14	368.29	350.46	30.70	2140.2
84	3A	287.44	371.92	354.23	30.59	1934.1
84	3B	295.32	388.77	364.67	25.44	1910.6
84	3D	297.34	386.80	363.32	26.36	2005.0
84	4D	302.97	380.21	369.76	52.34	1748.0
	AVE	294.44	379.20	360.49	33.08	1947.6
90	2C	275.52	396.54	376.77	28.50	2178.7
90	3A	287.63	384.92	366.99	29.60	1905.9
90	3B	290.25	404.40	379.68	23.82	2092.8
90	3D	278.41	396.40	377.96	30.86	2161.1
90	3E	279.09	373.01	364.53	61.39	1979.2
90	4B	278.22	395.03	384.36	46.01	1708.3
90	5C	284.75	372.22	364.94	72.97	2037.0
	AVE	281.98	388.93	373.60	41.88	2009.0
96	3D	242.08	398.70	390.01	55.31	2229.9
96	1C	231.31	383.74	373.94	43.39	1950.6
96	3B	241.68	409.41	391.74	27.40	2185.3
	AVE	238.35	397.28	385.23	42.37	2121.9

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43129B
Test Date: 6/25/80
Test Type: Steam Cooling
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.139 MPa (20.1 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.03 kw/m (0.009 kw/ft)
Flow rate	0.00807 kg/sec (0.0178 lb/sec)
Coolant temperature	111°C (231°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 2680

(See page 6-26.)

C. Comments:

Condensation in the injection line and lower plenum, downstream of the flow measurement location, reduced the steam flow into the bundle.

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41329C
Test Date: 8/13/80
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.144 MPa (20.9 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.03 kw/m (0.009 kw/ft)
Flow rate	0.0082 kg/sec (0.018 lb/sec)
Coolant temperature	113°C (235°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 2680

(See following pages for additional results.)

C. Comments:

Condensation in the injection line and lower plenum, downstream of the flow measurement location, reduced the steam flow into the bundle.

The following heater rod thermocouples were not used because of reverse heat transfer and very small temperature differences: 1B at 1.78 m (70 in.), 2E at 1.88 m (74 in.), 2E at 1.93 m (76 in.) 2E and 1B at 2.13 m (84 in.); 5D and 2E at 2.29 m (90 in.); and 1B, 2E and 5B at 2.44 m (96 in.).

RUN 41329C

MASS FLOW = .0062 KG/SEC INLET VAPOR TEMP = 112.8 DEG C TOTAL POWER = 1.40 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	261.84	123.46	116.14	10.24	1482.2
.30	4A	258.54	122.77	116.16	11.21	1483.5
.30	4C	246.78	123.32	116.43	15.95	3147.5
.30	4E	241.51	122.19	116.15	11.47	1484.8
	AVE	252.17	122.93	116.22	12.22	1899.5
.61	1B	402.54	128.89	119.77	12.48	1497.7
.61	1C	413.54	127.76	118.75	17.97	2580.3
.61	4D	418.29	129.45	120.84	18.46	2335.1
	AVE	411.46	128.70	119.78	16.30	2137.7
.99	2A	635.03	143.28	126.61	10.46	1423.1
.99	4A	657.84	143.25	126.67	10.90	1415.9
.99	4C	694.16	143.80	127.26	17.88	3017.0
.99	4E	666.41	143.28	126.66	11.02	1421.9
	AVE	663.36	143.40	126.80	12.56	1819.5
1.22	1B	749.38	153.50	136.95	12.09	1401.5
1.22	1C	787.12	151.17	134.23	17.24	2471.8
1.22	4D	827.99	157.38	139.64	16.63	2244.6
1.22	5B	796.49	155.97	137.33	11.37	1379.0
	AVE	790.25	154.50	137.04	14.33	1874.2
1.52	2A	974.58	165.94	150.79	15.51	1331.3
1.52	4A	942.36	168.13	151.41	14.46	1317.8
1.52	4E	953.47	164.74	150.68	17.49	1340.3
	AVE	956.80	166.61	150.96	15.82	1329.8

RUN 41329C

MASS FLOW = .0062 KG/SEC INLET VAPOR TEMP = 112.8 DEG C TOTAL POWER = 1.40 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.71)	2A	1056.56	172.57	159.06	19.73	1340.3
1.70(1.71)	4A	983.43	175.47	160.47	16.43	1245.4
1.70(1.71)	4C	1044.27	179.75	161.05	21.63	2533.7
1.70(1.69)	4E	1026.59	172.25	158.59	18.98	1318.9
	AVE	1027.71	175.01	159.79	19.19	1609.6
1.78(1.80)	1C	1032.34	175.41	158.58	21.28	2332.2
1.78(1.79)	2D	1016.94	180.39	166.34	24.08	2094.8
1.78(1.80)	3C	1026.11	184.01	165.28	20.97	2575.2
1.78(1.80)	4D	1044.49	184.67	167.62	20.24	2004.4
1.78(1.80)	5B	1049.07	176.12	164.12	21.80	1338.9
	AVE	1033.79	180.12	164.39	21.67	2069.1
1.80(1.81)	2D	1016.94	181.60	167.28	23.56	2094.8
1.80(1.83)	3C	1026.11	184.65	166.45	21.52	2560.3
1.80(1.81)	3E	1052.08	176.18	159.68	22.06	2306.4
1.80(1.82)	5D	1023.69	175.42	164.49	23.37	1540.6
	AVE	1029.71	179.46	164.48	22.63	2125.5
1.83(1.83)	3A	1069.73	179.78	161.67	20.29	2409.3
1.83(1.83)	5C	1036.67	179.15	161.26	19.93	2423.3
	AVE	1053.20	179.47	161.46	20.11	2416.3
1.88(1.93)	1D	992.84	172.56	168.77	65.25	1291.5
1.88(1.89)	2B	1015.18	182.83	170.40	26.93	2170.3
1.88(1.91)	2C	969.27	180.39	169.13	32.92	2745.1
1.88(1.89)	2D	1016.94	180.41	170.35	33.44	2220.9
1.88(1.88)	3A	1069.73	179.09	164.17	24.57	2468.5
1.88(1.89)	3B	1034.53	183.44	169.62	28.48	2766.8
1.88(1.91)	3C	1026.11	181.80	170.43	34.46	2813.9
1.88(1.90)	3D	1011.11	180.93	169.40	33.52	2721.7
1.88(1.89)	3E	1052.08	175.51	163.64	30.53	2446.7
1.88(1.93)	4B	1016.34	182.17	172.87	36.06	2068.7
1.88(1.88)	5C	1036.67	179.78	163.84	22.28	2477.1
1.88(1.90)	5D	1023.69	175.38	168.21	35.43	1278.4

	AVE	1022.21	179.52	168.40	33.65	2289.1
1.91(1.95)	1D	992.84	174.89	170.19	52.26	1297.7
1.91(1.94)	2C	969.27	182.83	170.38	29.64	2736.4
1.91(1.91)	2D	1016.94	177.93	171.07	49.21	2110.1
1.91(1.93)	3C	1026.11	181.97	171.67	37.92	2822.9
1.91(1.92)	3E	1052.08	172.77	164.73	45.19	2259.9
1.91(1.96)	4B	1018.34	183.88	173.96	33.64	2084.4
1.91(1.94)	5D	1023.69	175.47	170.30	49.03	1277.4
	AVE	1014.18	178.53	170.33	42.41	2084.1
1.93(1.95)	2A	1056.56	175.95	170.09	44.61	1288.4
1.93(1.94)	2B	1015.18	182.22	171.87	32.31	2128.6
1.93(1.94)	2D	1016.94	179.15	171.91	46.42	2128.8
1.93(1.93)	3A	1069.73	174.86	165.97	41.37	2222.9
1.93(1.94)	3B	1034.53	182.22	171.40	36.38	2695.7
1.93(1.96)	3C	1026.11	183.92	172.69	34.61	2808.7
1.93(1.95)	3D	1011.11	182.22	171.26	35.12	2702.5
1.93(1.94)	4A	983.43	177.33	171.16	39.29	1262.1
1.93(1.94)	4C	1044.27	182.96	171.71	35.26	2676.3
1.93(1.92)	4E	1026.59	174.77	169.10	44.88	1273.1
	AVE	1028.44	179.56	170.72	39.02	2118.7
1.96(2.00)	1D	992.84	177.35	172.60	51.45	1296.2
1.96(1.94)	2C	969.27	181.80	170.49	32.66	2739.4
1.96(1.96)	2D	1016.94	181.00	172.68	40.27	2131.1
1.96(1.98)	3C	1026.11	186.59	173.70	30.02	2790.7
1.96(1.96)	3E	1052.08	174.79	166.74	44.90	2216.0
1.96(2.00)	4B	1018.34	187.54	175.80	28.21	2082.9
1.96(1.97)	5D	1023.69	177.97	171.84	41.12	1281.7
	AVE	1014.18	181.00	171.98	38.37	2076.9
1.98(2.00)	2A	1056.56	180.47	172.65	33.09	1285.1
1.98(2.02)	2B	1015.18	187.36	175.11	26.98	2112.8
1.98(1.99)	2D	1016.94	183.40	173.98	35.43	2126.5
1.98(2.03)	2E	980.77	177.35	173.97	71.32	1289.1
1.98(1.98)	3A	1069.73	177.92	168.38	38.28	2185.8
1.98(1.99)	3B	1034.53	187.77	173.72	27.70	2670.5
1.98(2.00)	3C	1026.11	188.86	174.83	27.45	2771.6
1.98(2.00)	3D	1011.11	187.42	173.72	27.80	2678.2
1.98(2.00)	4A	983.43	181.67	173.83	30.63	1267.3
1.98(2.00)	4C	1044.27	187.78	174.03	28.56	2659.0
1.98(1.98)	4E	1026.59	178.07	171.81	40.36	1284.7
1.98(1.98)	5C	1036.67	178.57	168.10	33.77	2191.4

	AVE	1025.16	183.05	172.84	35.11	2043.5
2.13	1C	950.00	182.23	174.43	41.01	2386.6
2.13	2B	941.91	192.06	180.91	27.13	1827.5
2.13	3A	928.30	185.22	175.66	32.49	2180.3
2.13	3B	935.32	192.07	180.23	29.30	2220.8
2.13	3D	941.92	191.44	179.78	30.01	2326.1
2.13	4D	972.12	192.66	181.29	27.43	2011.7
2.13	5B	926.72	184.67	180.06	48.49	1339.0
2.13	5C	937.82	185.89	175.43	29.98	2374.5
	AVE	941.76	188.28	178.47	33.23	2083.3
2.29	2B	871.59	199.47	188.31	24.58	1942.6
2.29	2C	960.02	200.00	186.11	25.16	2502.4
2.29	3A	883.35	189.88	181.84	36.20	2154.1
2.29	3B	884.52	200.61	187.12	23.81	2437.8
2.29	3D	887.63	198.31	186.52	27.45	2495.7
2.29	3E	761.02	187.12	181.00	41.22	2212.0
2.29	4B	920.69	202.54	189.24	21.66	1958.9
2.29	5C	890.19	189.52	181.24	35.47	2255.5
	AVE	882.38	195.93	185.17	29.44	2244.9
2.44	1C	766.96	189.44	186.22	78.18	2188.5
2.44	2B	797.14	202.45	194.84	32.53	1971.2
2.44	3A	810.84	192.07	187.76	61.43	2134.2
2.44	3B	784.71	205.83	193.28	22.36	2506.8
2.44	3D	777.87	202.75	192.67	27.73	2540.5
2.44	4D	750.71	202.54	194.91	30.57	1994.4
2.44	5C	797.89	192.92	187.03	44.13	2182.0
	AVE	784.02	198.29	190.96	42.42	2216.8

RUN 41329C

MASS FLOW = .0137 LBM/SEC INLET VAPOR TEMP = 235.0 DEG F TOTAL POWER = 1.33 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	82.99	254.23	241.05	10.24	1482.2
12	4A	81.95	252.98	241.09	11.21	1483.5
12	4C	78.22	253.97	241.58	15.95	3147.5
12	4E	76.55	251.95	241.07	11.47	1484.8
	AVE	79.93	253.28	241.20	12.22	1899.5
24	1B	127.59	264.00	247.58	12.48	1497.7
24	1C	131.08	261.96	245.74	17.97	2580.3
24	4D	132.58	265.01	249.51	18.46	2335.1
	AVE	130.41	263.66	247.61	16.36	2137.7
39	2A	201.28	289.90	259.89	10.46	1423.1
39	4A	208.51	289.85	260.00	10.96	1415.9
39	4C	220.02	290.85	261.06	17.88	3017.0
39	4E	211.22	289.90	259.99	11.02	1421.9
	AVE	210.26	290.12	260.24	12.56	1819.5
48	1B	237.52	308.30	278.51	12.09	1401.5
48	1C	249.48	304.11	273.61	17.24	2471.8
48	4D	262.44	315.28	283.35	16.63	2244.6
48	5B	252.45	312.74	279.20	11.37	1379.0
	AVE	250.47	310.11	278.67	14.33	1874.2
60	2A	308.90	332.50	303.41	15.51	1331.3
60	4A	298.69	334.63	304.54	14.46	1317.8
60	4E	302.21	328.54	303.23	17.49	1340.3
	AVE	303.27	331.89	303.73	15.82	1329.8

RUN 41329C

MASS FLOW = .0137 LBM/SEC INLET VAPOR TEMP = 235.0 DEG F TOTAL POWER = 1.33 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.5)	2A	334.88	342.62	318.30	19.73	1340.3
67 (67.4)	4A	311.71	347.85	320.84	16.43	1245.4
67 (67.3)	4C	330.99	355.54	321.90	21.63	2533.7
67 (66.7)	4E	325.38	342.06	317.46	18.98	1318.9
	AVE	325.74	347.02	319.63	19.19	1609.6
70 (70.8)	1C	327.21	347.74	317.44	21.28	2332.2
70 (70.3)	2D	322.32	356.71	331.41	24.08	2094.8
70 (71.0)	3C	325.23	363.21	329.51	20.97	2575.2
70 (70.8)	4D	331.06	364.40	333.72	20.24	2004.4
70 (70.9)	5B	332.51	349.01	327.41	21.80	1338.9
	AVE	327.67	356.21	327.90	21.67	2069.1
71 (71.2)	2D	322.32	358.88	333.10	23.56	2094.8
71 (71.9)	3C	325.23	364.38	331.62	21.52	2560.3
71 (71.2)	3E	333.47	349.13	319.42	22.06	2306.4
71 (71.6)	5D	324.47	347.76	328.09	23.37	1540.6
	AVE	326.37	355.03	328.06	22.63	2125.5
72 (71.9)	3A	339.06	355.60	323.00	20.29	2409.3
72 (71.9)	5C	328.58	354.48	322.27	19.93	2423.3
	AVE	333.82	355.04	322.64	20.11	2416.3
74 (75.8)	1D	314.69	342.61	335.79	65.25	1291.5
74 (74.6)	2B	321.77	361.10	338.71	26.93	2170.3
74 (75.2)	2C	307.22	356.70	336.43	32.92	2745.1
74 (74.3)	2D	322.32	356.74	338.62	33.44	2220.9
74 (74.1)	3A	339.06	354.37	327.51	24.57	2468.5
74 (74.6)	3B	327.90	362.20	337.31	28.48	2766.8
74 (75.0)	3C	325.23	359.24	338.78	34.40	2813.9
74 (74.9)	3D	320.48	357.68	336.93	33.52	2721.7
74 (74.3)	3E	333.47	347.92	326.54	30.53	2446.7
74 (75.8)	4B	322.77	359.90	343.17	36.06	2068.7
74 (74.1)	5C	328.58	355.60	326.91	22.28	2477.1
74 (74.9)	5D	324.47	347.69	334.78	35.43	1278.4

	AVE	324.00	355.14	335.12	33.65	2289.1
75 (76.9)	1D	314.69	346.81	338.34	52.26	1297.7
75 (76.4)	2C	307.22	361.09	338.69	29.64	2736.4
75 (75.3)	2D	322.32	352.27	339.93	49.21	2110.1
75 (76.1)	3C	325.23	359.54	341.01	37.92	2822.9
75 (75.4)	3E	333.47	342.98	328.51	45.19	2259.9
75 (77.0)	4B	322.77	362.98	345.12	33.64	2084.4
75 (76.5)	5D	324.47	347.84	338.54	49.03	1277.4
	AVE	321.45	353.36	338.59	42.41	2084.1
76 (76.7)	2A	334.88	348.70	338.16	44.61	1288.4
76 (76.4)	2B	321.77	360.00	341.36	32.31	2128.6
76 (76.3)	2D	322.32	354.48	341.43	46.42	2128.8
76 (75.9)	3A	339.06	346.75	330.75	41.37	2222.9
76 (76.4)	3B	327.90	360.00	340.53	36.38	2695.7
76 (77.0)	3C	325.23	363.06	342.84	34.61	2808.7
76 (76.7)	3D	320.48	359.99	340.27	35.12	2702.5
76 (76.5)	4A	311.71	351.20	340.09	39.29	1262.1
76 (76.5)	4C	330.99	361.33	341.08	35.26	2676.3
76 (75.7)	4E	325.38	346.59	336.38	44.88	1273.1
	AVE	325.97	355.21	339.29	39.02	2118.7
77 (78.8)	1D	314.69	351.22	342.68	51.45	1296.2
77 (76.5)	2C	307.22	359.24	338.88	32.66	2739.4
77 (77.1)	2D	322.32	357.81	342.82	40.27	2131.1
77 (77.9)	3C	325.23	367.86	344.66	30.02	2790.7
77 (77.2)	3E	333.47	346.62	332.13	44.90	2216.0
77 (78.7)	4B	322.77	369.57	348.43	28.21	2082.9
77 (77.7)	5D	324.47	352.34	341.32	41.12	1281.7
	AVE	321.45	357.81	341.56	38.37	2076.9
78 (78.7)	2A	334.88	356.85	342.78	33.09	1285.1
78 (79.4)	2B	321.77	369.25	347.19	26.98	2112.8
78 (78.3)	2D	322.32	362.11	345.17	35.43	2126.5
78 (79.8)	2E	310.86	351.22	345.14	71.32	1289.1
78 (78.0)	3A	339.06	352.25	335.09	38.28	2185.8
78 (78.5)	3B	327.90	369.99	344.69	27.70	2670.5
78 (78.9)	3C	325.23	371.95	346.70	27.45	2771.6
78 (78.9)	3D	320.48	369.35	344.70	27.80	2678.2
78 (78.6)	4A	311.71	359.00	344.89	30.63	1267.3
78 (78.6)	4C	330.99	370.01	345.25	28.56	2659.0
78 (77.8)	4E	325.38	352.52	341.25	40.36	1284.7
78 (78.0)	5C	328.58	353.43	334.58	33.77	2191.4

	AVE	324.93	361.49	343.12	35.11	2043.5
84	1C	301.11	360.01	345.98	41.01	2386.6
84	2B	298.54	377.70	357.63	27.13	1827.5
84	3A	294.23	365.40	348.20	32.49	2180.3
84	3B	296.46	377.72	356.41	29.30	2220.8
84	3D	298.55	376.59	355.60	30.01	2326.1
84	4D	308.12	378.79	358.33	27.43	2011.7
84	5B	293.73	364.40	356.11	48.49	1339.0
84	5C	297.25	366.60	347.77	29.98	2374.5
	AVE	298.50	370.90	353.25	33.23	2083.3
90	2B	276.26	391.04	370.96	24.58	1942.6
90	2C	304.29	392.00	367.00	25.16	2502.4
90	3A	279.98	373.79	359.32	36.20	2154.1
90	3B	280.36	393.10	368.81	23.81	2437.8
90	3D	281.34	388.95	367.73	27.45	2495.7
90	3E	241.21	368.81	357.81	41.22	2212.0
90	4B	291.82	396.57	372.63	21.66	1958.9
90	5C	282.15	373.13	358.22	35.47	2255.5
	AVE	279.68	384.68	365.31	29.44	2244.9
96	1C	243.73	373.00	367.20	78.18	2188.5
96	2B	252.66	396.41	382.71	32.53	1971.2
96	3A	257.00	377.72	369.98	61.43	2134.2
96	3B	248.72	402.49	379.90	22.36	2506.8
96	3D	246.55	396.95	378.80	27.73	2540.5
96	4D	237.94	396.56	382.83	30.57	1994.4
96	5C	252.90	379.26	368.65	44.13	2182.0
	AVE	248.50	388.91	375.72	42.42	2216.8

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41529D
Test Date: 10/8/80
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.146 MPa (21.2 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.031 kw/m (0.0094 kw/ft)
Flow rate	0.0082 kg/sec (0.018 lb/sec)
Coolant temperature	118°C (244°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 2586

(See following pages for additional results.)

C. Comments:

Condensation in the injection line and lower plenum, downstream of the flow measurement location, reduced the steam flow into the bundle.

The following heater rod thermocouples were not used because of reverse heat transfer and very small temperature differences: 2E, 4E, and 5B at 2.13 m (84 in.), 1D, 2E, and 5D at 2.29 m (90 in.), and 5B at 2.44 m (96 in.).

RUN 41529D

MASS FLOW = .0065 KG/SEC INLET VAPOR TEMP = 117.8 DEG C TOTAL POWER = 1.42 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	2A	256.32	128.89	120.77	8.91	1527.1
.30	4A	257.84	128.89	120.75	8.94	1527.3
.30	4C	243.67	128.89	121.02	13.57	3241.2
	AVE	252.61	128.89	120.84	10.48	2098.5
.61	1C	426.13	133.11	123.31	16.79	2657.8
.61	4E	421.14	134.62	124.27	11.34	1542.9
.61	5B	398.62	134.88	124.29	10.48	1542.3
	AVE	415.30	134.21	123.96	12.87	1914.4
.99	2A	681.48	146.60	131.07	11.77	1471.0
.99	4A	675.77	146.19	131.01	12.09	1465.4
.99	4C	667.50	149.18	131.58	15.94	3110.3
	AVE	674.91	147.39	131.22	13.27	2015.6
1.22	1C	787.13	157.73	138.57	15.02	2542.2
1.22	4E	803.83	155.33	141.12	14.98	1453.0
	AVE	795.48	156.53	139.85	15.00	1997.6
1.52	2A	984.63	178.13	154.84	10.65	1363.0
1.52	4A	924.45	171.26	155.18	14.60	1365.8
1.52	4C	921.55	176.14	155.13	17.20	2892.3
	AVE	943.54	175.18	155.05	14.15	1873.7

RUN 41529D

MASS FLOW = .0065 KG/SEC INLET VAPOR TEMP = 117.8 DEG C TOTAL POWER = 1.42 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.72)	2A	1017.29	186.22	164.03	11.27	1362.5
1.70(1.72)	4A	1045.43	183.26	163.92	13.34	1362.5
1.70(1.72)	4C	1069.95	185.32	164.57	19.71	2803.5
	AVE	1044.22	184.94	164.17	14.77	1842.8
1.78(1.80)	1C	1016.01	182.83	162.95	17.45	2565.3
1.78(1.79)	3C	1076.93	189.60	167.83	18.71	3114.1
1.78(1.82)	4E	1028.36	178.55	167.80	23.63	1565.6
	AVE	1040.43	183.66	166.19	19.93	2415.0
1.80(1.87)	2C	1023.69	192.60	171.71	18.37	3233.5
1.80(1.81)	2D	1063.43	193.28	172.27	16.41	2444.0
1.80(1.82)	3C	1076.93	190.22	169.08	19.22	3143.8
1.80(1.82)	3E	1000.52	177.33	163.78	25.36	2656.7
1.80(1.80)	4D	1068.20	192.22	171.38	16.66	2581.9
	AVE	1046.56	189.13	169.64	19.20	2812.0
1.83(1.83)	1B	1076.45	187.79	167.79	13.14	1528.9
1.83(1.84)	2D	1063.43	194.51	173.00	15.99	2505.4
1.83(1.84)	3C	1076.93	191.50	170.29	19.09	3280.3
1.83(1.84)	3D	1064.86	192.49	169.98	17.77	3086.5
1.83(1.83)	4D	1068.20	190.83	172.34	18.79	2387.5
	AVE	1069.97	191.43	170.68	16.96	2557.7
1.88(1.88)	1B	1076.45	189.63	170.62	13.74	1520.8
1.88(1.89)	1D	1034.33	186.02	171.35	17.17	1561.2
1.88(1.89)	2B	1099.79	196.25	175.84	17.32	2447.4
1.88(1.95)	2C	1023.69	194.91	175.30	19.41	2808.0
1.88(1.89)	2D	1063.43	194.16	174.85	17.77	2577.6
1.88(1.88)	2E	1046.30	182.83	170.50	20.78	1688.0
1.88(1.91)	3A	1064.22	192.07	168.56	15.14	2377.3
1.88(1.89)	3B	1075.30	194.45	173.56	19.19	3138.9
1.88(1.90)	4B	992.17	193.28	176.04	18.57	2373.8
1.88(1.88)	4D	1068.20	188.38	174.31	24.71	2765.0
1.88(1.88)	5C	1042.65	184.67	168.15	21.35	2696.7
1.88(1.87)	5D	1000.06	178.05	170.35	32.01	1641.1

	AVE	1048.88	189.56	172.45	19.76	2299.6
1.91(1.92)	1D	1034.33	186.59	172.33	17.61	1471.8
1.91(1.98)	2C	1023.69	194.50	176.65	21.30	2769.1
1.91(1.92)	2D	1063.43	195.44	176.36	17.92	2449.8
1.91(1.93)	3E	1000.52	182.05	169.03	26.04	2350.3
1.91(1.93)	4B	992.17	193.25	177.33	20.08	2197.5
1.91(1.91)	4D	1068.20	188.61	175.84	27.16	2563.0
1.91(1.93)	5D	1000.06	179.23	172.67	37.39	1359.2
	AVE	1026.06	188.52	174.32	23.93	2165.8
1.93(1.93)	1B	1076.45	191.76	172.51	13.49	1317.0
1.93(1.95)	2A	1017.29	190.23	174.08	15.19	1297.0
1.93(1.94)	2B	1099.79	196.63	178.05	18.96	2137.6
1.93(1.95)	3A	1064.22	190.83	170.83	17.77	2245.2
1.93(1.94)	3B	1075.30	193.89	175.61	21.88	2785.9
1.93(1.95)	3C	1076.93	194.50	175.82	21.44	2850.4
1.93(1.94)	3D	1064.86	193.97	175.02	20.93	2848.3
1.93(1.95)	4A	1045.43	185.27	173.51	21.60	1306.4
1.93(1.95)	4C	1069.95	192.07	176.22	25.15	2802.1
1.93(1.93)	4D	1068.20	189.77	176.92	26.91	2217.7
	AVE	1065.84	191.89	174.86	20.33	2180.7
1.96(1.96)	1D	1034.33	185.28	174.01	22.30	1337.9
1.96(2.02)	2C	1023.69	196.94	178.59	20.59	2742.4
1.96(1.97)	2D	1063.43	194.92	178.60	20.90	2167.3
1.96(1.97)	3C	1076.93	195.06	176.93	22.03	2834.7
1.96(1.97)	3E	1000.52	181.03	170.76	32.98	2301.2
1.96(1.97)	4B	992.17	193.89	179.21	21.69	2151.3
1.96(1.96)	5D	1000.06	181.00	174.11	35.43	1316.8
	AVE	1027.30	189.73	176.03	25.13	2121.7
1.98(1.98)	1B	1076.45	192.84	174.97	14.46	1285.5
1.98(2.00)	2A	1017.29	195.05	177.01	13.45	1305.2
1.98(1.98)	2B	1099.79	199.01	180.11	18.52	2108.8
1.98(1.99)	2D	1063.43	195.11	179.96	22.47	2164.2
1.98(2.00)	3A	1064.22	193.61	173.34	17.41	2217.7
1.98(1.99)	3B	1075.30	196.74	178.20	21.42	2728.0
1.98(2.00)	3C	1076.93	195.72	178.26	22.81	2829.2
1.98(1.99)	3D	1064.86	193.89	177.54	24.17	2788.5
1.98(2.00)	4A	1045.43	188.14	175.86	20.54	1293.0
1.98(2.00)	4C	1069.95	194.50	178.58	24.89	2775.2
1.98(1.98)	4D	1068.20	189.61	179.44	33.90	2175.7

1.98(1.98)	5C	1042.65	184.70	172.24	28.14	2327.2
	AVE	1063.71	193.24	177.12	21.85	2166.5
2.13	1B	963.46	193.91	182.63	20.26	1367.2
2.13	1C	958.95	194.50	178.56	19.79	2418.7
2.13	2B	981.10	201.83	186.76	20.46	1855.3
2.13	3A	981.48	196.97	180.06	18.98	2211.6
2.13	3B	948.76	200.61	184.89	21.98	2265.1
2.13	3D	924.73	200.61	184.23	20.58	2377.2
2.13	5C	951.48	188.99	179.20	32.19	2468.9
	AVE	958.56	196.78	182.33	22.03	2137.7
2.29	1B	962.23	196.26	188.70	29.84	1288.6
2.29	2B	925.46	208.47	193.73	19.36	1977.1
2.29	2C	915.00	211.44	190.89	15.85	2547.8
2.29	3A	924.52	198.76	186.32	24.06	2191.2
2.29	3B	907.80	207.97	191.86	20.13	2489.8
2.29	3E	913.39	195.17	184.80	28.71	2270.3
2.29	4B	903.12	206.16	192.54	20.55	2032.8
2.29	5C	912.32	192.96	185.04	37.63	2330.1
	AVE	920.48	202.15	189.23	24.51	2141.0
2.44	1B	762.05	198.95	194.93	43.91	1252.5
2.44	1C	816.90	201.32	190.45	24.10	2211.9
2.44	2B	822.84	212.04	200.10	20.97	2010.7
2.44	2E	813.31	197.30	195.20	89.85	1252.1
2.44	3A	800.41	196.34	192.32	64.07	2186.0
2.44	3B	821.60	212.06	197.95	20.51	2563.8
2.44	3D	802.12	210.27	197.24	21.77	2607.0
2.44	4E	801.97	197.07	193.91	58.90	1279.0
2.44	5C	833.38	195.82	190.85	54.10	2252.8
	AVE	808.29	202.35	194.77	44.24	1957.3

RUN 415290

MASS FLOW = .0143 LBM/SEC INLET VAPOR TEMP = 244.0 DEG F TOTAL POWER = 1.34 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	2A	81.24	264.00	249.39	8.91	1527.1
12	4A	81.73	264.00	249.35	8.94	1527.3
12	4C	77.23	264.00	249.83	13.57	3241.2
	AVE	80.07	264.00	249.52	10.48	2098.5
24	1C	135.06	271.60	253.97	16.79	2657.8
24	4E	133.48	274.32	255.68	11.34	1542.9
24	5B	126.35	274.79	255.71	10.48	1542.3
	AVE	131.63	273.57	255.12	12.87	1914.4
39	2A	216.00	296.23	267.92	11.77	1471.0
39	4A	214.19	295.15	267.81	12.09	1465.4
39	4C	211.57	300.52	268.84	15.94	3110.3
	AVE	213.92	297.30	268.19	13.27	2015.6
48	1C	249.49	315.91	281.43	15.02	2542.2
48	4E	254.78	311.59	286.02	14.98	1453.0
	AVE	252.13	313.75	283.72	15.00	1997.6
60	2A	312.09	352.63	310.72	10.65	1363.0
60	4A	293.01	340.28	311.32	14.60	1365.8
60	4C	292.09	349.04	311.23	17.20	2892.3
	AVE	299.06	347.32	311.09	14.15	1873.7

RUN 41529D

MASS FLOW = .0143 LBM/SEC INLET VAPOR TEMP = 244.0 DEG F TOTAL POWER = 1.34 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (67.8)	2A	322.44	367.20	327.25	11.27	1362.5
67 (67.6)	4A	331.36	361.87	327.06	13.34	1362.5
67 (67.8)	4C	339.13	365.58	328.22	19.71	2803.5
	AVE	330.97	364.88	327.51	14.77	1842.8
70 (70.9)	1C	322.03	361.10	325.31	17.45	2565.3
70 (70.6)	3C	341.34	373.29	334.10	18.71	3114.1
70 (71.5)	4E	325.95	353.40	334.04	23.63	1565.6
	AVE	329.77	362.59	331.15	19.93	2415.0
71 (73.5)	2C	324.47	378.69	341.09	18.37	3233.5
71 (71.4)	2D	337.06	379.90	342.08	16.41	2444.0
71 (71.6)	3C	341.34	374.40	336.34	19.22	3143.8
71 (71.6)	3E	317.12	351.20	326.80	25.36	2656.7
71 (71.0)	4D	338.58	378.00	340.48	16.66	2581.9
	AVE	331.71	372.44	337.36	19.20	2812.0
72 (71.9)	1B	341.19	370.02	334.02	13.14	1528.9
72 (72.4)	2D	337.06	382.12	343.41	15.99	2505.4
72 (72.6)	3C	341.34	376.71	338.53	19.09	3280.3
72 (72.4)	3D	337.52	378.48	337.96	17.77	3086.5
72 (72.0)	4D	338.58	375.50	342.20	18.79	2387.5
	AVE	339.14	376.57	339.22	16.96	2557.7
74 (74.1)	1B	341.19	373.33	339.12	13.74	1520.8
74 (74.5)	1D	327.84	366.83	340.43	17.17	1561.2
74 (74.4)	2B	348.59	385.24	348.51	17.32	2447.4
74 (76.6)	2C	324.47	382.84	347.55	19.41	2808.0
74 (74.4)	2D	337.06	381.48	346.72	17.77	2577.6
74 (74.0)	2E	331.63	361.10	338.91	20.78	1688.0
74 (75.0)	3A	337.31	377.73	335.41	15.14	2377.3
74 (74.6)	3B	340.82	382.01	344.40	19.19	3138.9
74 (74.7)	4B	314.48	379.90	348.88	18.57	2373.8
74 (74.0)	4D	338.58	371.09	345.76	24.71	2765.0
74 (74.2)	5C	330.47	364.40	334.68	21.35	2696.7
74 (73.8)	5D	316.98	352.48	338.62	32.01	1641.1

	AVE	332.45	373.20	342.42	19.76	2299.6
75 (75.4)	1D	327.84	367.87	342.19	17.61	1471.8
75 (77.8)	2C	324.47	382.10	349.98	21.30	2769.1
75 (75.6)	2D	337.06	383.79	349.45	17.92	2449.8
75 (76.1)	3E	317.12	359.69	336.25	26.04	2350.3
75 (75.9)	4B	314.48	379.84	351.20	20.08	2197.5
75 (75.1)	4D	338.58	371.49	348.50	27.16	2563.0
75 (75.8)	5D	316.98	354.61	342.80	37.39	1359.2
	AVE	325.22	371.34	345.77	23.93	2165.8
76 (75.9)	1B	341.19	377.16	342.51	13.49	1317.0
76 (76.7)	2A	322.44	374.42	345.34	15.19	1297.0
76 (76.3)	2B	348.59	385.93	352.50	18.96	2137.6
76 (76.9)	3A	337.31	375.50	339.49	17.77	2245.2
76 (76.3)	3B	340.82	381.01	348.09	21.88	2785.9
76 (76.8)	3C	341.34	382.10	348.48	21.44	2850.4
76 (76.4)	3D	337.52	381.14	347.04	20.93	2848.3
76 (76.7)	4A	331.36	365.49	344.32	21.60	1306.4
76 (76.9)	4C	339.13	377.73	349.19	25.15	2802.1
76 (76.0)	4D	338.58	373.58	350.45	26.91	2217.7
	AVE	337.83	377.41	346.74	20.33	2180.7
77 (77.0)	1D	327.84	365.50	345.23	22.30	1337.9
77 (79.5)	2C	324.47	386.50	353.47	20.59	2742.4
77 (77.4)	2D	337.06	382.86	353.47	20.90	2167.3
77 (77.7)	3C	341.34	383.11	350.47	22.03	2834.7
77 (77.6)	3E	317.12	357.86	339.37	32.98	2301.2
77 (77.6)	4B	314.48	381.00	354.57	21.69	2151.3
77 (77.0)	5D	316.98	357.81	345.40	35.43	1316.8
	AVE	325.61	373.52	348.86	25.13	2121.7
78 (77.9)	1B	341.19	379.12	346.95	14.46	1285.5
78 (78.9)	2A	322.44	383.09	350.61	13.45	1305.2
78 (78.1)	2B	348.59	390.23	356.20	18.52	2108.8
78 (78.5)	2D	337.06	383.20	355.93	22.47	2164.2
78 (78.9)	3A	337.31	380.50	344.02	17.41	2217.7
78 (78.5)	3B	340.82	386.14	352.75	21.42	2728.0
78 (78.8)	3C	341.34	384.30	352.87	22.81	2829.2
78 (78.5)	3D	337.52	381.00	351.57	24.17	2788.5
78 (78.6)	4A	331.36	370.65	348.55	20.54	1293.0
78 (78.9)	4C	339.13	382.10	353.44	24.89	2775.2
78 (78.0)	4D	338.58	373.30	354.99	33.90	2175.7

78 (78.1)	5C	330.47	364.45	342.03	28.14	2327.2
	AVE	337.15	379.84	350.82	21.85	2166.5
84	1B	305.38	381.04	360.74	20.26	1367.2
84	1C	303.95	382.11	353.41	19.79	2418.7
84	2B	310.97	395.30	368.17	20.46	1855.3
84	3A	311.09	386.55	356.11	18.98	2211.6
84	3B	300.72	393.10	364.81	21.98	2265.1
84	3D	293.10	393.10	363.61	20.58	2377.2
84	5C	301.58	372.18	354.56	32.19	2468.9
	AVE	303.82	386.20	360.20	22.03	2137.7
90	1B	304.99	385.27	371.66	29.84	1288.6
90	2B	293.33	407.25	380.71	19.36	1977.1
90	2C	290.02	412.60	375.60	15.85	2547.8
90	3A	293.03	389.76	367.38	24.06	2191.2
90	3B	287.73	406.34	377.34	20.13	2489.8
90	3E	289.50	383.31	364.65	28.71	2270.3
90	4B	286.25	403.10	378.57	20.55	2032.8
90	5C	289.17	379.33	365.07	37.63	2330.1
	AVE	291.75	395.87	372.62	24.51	2141.0
96	1B	241.54	390.12	382.88	43.91	1252.5
96	1C	258.92	394.37	374.81	24.10	2211.9
96	2B	260.80	413.68	392.18	20.97	2010.7
96	2E	257.79	387.15	383.37	89.85	1252.1
96	3A	253.70	385.41	378.17	64.07	2186.0
96	3B	260.41	413.71	388.31	20.51	2563.8
96	3D	254.24	410.48	387.04	21.77	2607.0
96	4E	254.19	386.73	381.03	58.90	1279.0
96	5C	264.15	384.48	375.53	54.10	2252.6
	AVE	256.19	396.24	382.59	44.24	1957.3

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43929E
Test Date: 2/24/81
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.138 MPa (20.0 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.0310 kw/m (0.00945 kw/ft)
Flow rate	0.0086 kg/sec (0.019 lb/sec)
Coolant temperature	112°C (233°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 2755

(See following pages for additional results.)

C. Comments:

Condensation in the injection line and lower plenum, downstream of the flow measurement location, reduced the steam flow into the bundle.

The following heater rod thermocouple were not used because of reverse heat transfer or very small temperature differences: 5C at 2.01 m (79 in.), 5B and 5C at 2.03 m (80 in.) 1C, 3E, 4A, and 5B at 2.13 m (84 in.), 2B, 2C, 2D, 3E, 4B, 1D, 2E, 3C, 4A, and 5D at 2.29 m (90 in.), and all thermocouples at 2.44 m (96 in.).

RUN 43929E

MASS FLOW = .0059 KG/SEC INLET VAPOR TEMP = 110.6 DEG C TOTAL POWER = 1.44 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	1B	272.55	126.50	114.74	6.63	1398.3
.30	2A	264.34	125.33	114.73	7.15	1400.7
.30	4E	276.44	124.72	114.73	7.93	1401.9
	AVE	271.11	125.52	114.73	7.24	1400.3
.61	1C	416.01	129.36	117.77	14.06	2543.2
.61	3B	418.38	131.22	119.07	15.12	2642.4
.61	5B	396.66	130.51	119.03	9.77	1407.3
	AVE	410.35	130.37	118.62	12.98	2197.6
.99	1B	684.87	143.28	126.34	11.13	1351.7
.99	2A	682.04	146.17	126.30	9.41	1347.6
.99	4C	691.13	144.91	127.15	16.58	2790.3
.99	4E	675.81	143.24	126.36	11.02	1352.1
	AVE	683.46	144.40	126.54	12.03	1710.4
1.22	1C	802.31	155.01	134.35	14.35	2388.2
1.22	3B	795.06	160.15	139.48	15.76	2459.5
1.22	5B	793.93	152.18	138.00	14.98	1316.8
	AVE	797.10	155.78	137.28	15.04	2054.8
1.52	1B	1054.62	168.20	152.04	16.74	1263.6
1.52	2A	1016.20	166.38	152.17	18.40	1262.8
1.52	4C	1041.44	169.37	153.71	26.41	2609.2
	AVE	1037.42	167.98	152.64	20.51	1711.9

RUN 43929E

MASS FLOW = .0059 KG/SEC INLET VAPOR TEMP = 110.6 DEG C TOTAL POWER = 1.44 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.68)	2A	1033.03	170.90	160.97	26.26	1276.1
1.70(1.69)	2B	1008.67	181.04	164.97	20.94	2051.6
1.70(1.68)	2C	1026.88	182.16	160.75	18.53	2575.6
1.70(1.69)	2E	1031.25	173.51	161.44	21.48	1266.1
1.70(1.69)	4A	1028.94	171.91	161.83	25.70	1276.8
1.70(1.70)	4B	1026.30	180.97	166.24	23.20	2030.1
1.70(1.71)	4C	1050.30	181.79	163.77	22.43	2593.5
1.70(1.70)	4E	1032.12	176.73	162.14	17.68	1273.7
	AVE	1029.69	177.38	162.77	22.03	1792.9
1.78(1.79)	2C	1026.88	186.23	166.35	19.70	3207.3
1.78(1.76)	3C	1008.87	201.35	165.88	10.63	2851.5
1.78(1.78)	3D	1036.31	186.13	167.37	21.03	3152.1
	AVE	1024.02	191.24	166.53	17.12	3070.3
1.83(1.81)	3E	1030.21	182.40	163.52	18.65	2986.2
1.83(1.88)	5C	1029.99	174.17	168.03	57.63	2785.0
	AVE	1030.10	178.28	165.78	38.14	2885.6
1.85(1.85)	1B	1050.81	173.78	167.67	42.87	2122.2
1.85(1.86)	2A	1033.03	176.43	167.74	29.49	2165.2
	AVE	1041.92	175.10	167.71	36.18	2143.7
1.88(1.89)	2D	1035.13	188.04	173.33	22.97	3139.3
1.88(1.88)	4D	1017.22	186.71	173.40	25.00	3171.1
	AVE	1026.18	187.37	173.36	23.99	3155.2
1.91(1.90)	1D	1023.37	178.92	169.72	27.45	1809.2
1.91(1.92)	2E	1031.25	180.88	170.98	25.58	1696.5
1.91(1.90)	5D	1037.78	175.93	169.79	41.84	1879.0
	AVE	1030.80	178.58	170.16	31.62	1794.9
1.93(1.92)	1D	1023.37	178.76	170.91	32.09	1694.4
1.93(1.92)	3A	1036.14	181.22	170.43	32.53	2230.9

1.93(1.92)	3D	1036.31	195.01	174.27	18.62	3289.7
1.93(1.93)	4A	1028.94	177.78	173.10	54.05	1372.9
1.93(1.93)	4B	1026.30	185.27	178.66	50.54	2150.8
1.93(1.93)	4D	1017.22	186.19	175.96	32.42	2750.8
1.93(1.97)	5C	1029.99	177.89	172.51	65.08	2251.8
1.93(1.93)	5D	1037.78	176.49	170.92	46.05	1752.6
	AVE	1029.51	182.33	173.35	41.42	2186.7
1.96(1.96)	1B	1050.81	176.39	172.55	67.47	1577.0
1.96(1.96)	1C	1003.04	178.60	170.81	43.76	2475.3
1.96(1.95)	1D	1023.37	179.59	172.53	35.55	1571.3
1.96(1.96)	2A	1033.03	178.65	173.66	50.80	1437.7
1.96(1.95)	2D	1035.13	189.15	176.28	26.13	2553.3
1.96(1.96)	3B	1029.15	191.19	179.03	31.49	2285.8
1.96(1.94)	5D	1037.78	176.75	171.73	51.09	1666.6
	AVE	1030.33	181.47	173.80	43.76	1938.1
1.98(1.99)	1C	1003.04	178.44	172.41	56.46	2375.2
1.98(1.98)	2B	1008.67	185.53	178.14	44.37	2374.7
1.98(1.97)	2E	1031.25	181.63	173.98	32.94	1413.6
1.98(1.98)	3A	1036.14	179.80	175.24	76.74	2007.1
1.98(1.98)	3B	1029.15	190.44	180.53	38.61	2236.7
1.98(1.99)	3C	1008.87	207.02	182.01	14.63	1546.7
1.98(1.98)	4A	1028.94	180.08	176.32	66.68	1258.9
1.98(1.98)	4B	1026.30	186.69	181.75	67.15	1945.2
1.98(1.99)	4C	1050.30	188.71	180.65	48.55	2251.9
1.98(1.98)	4D	1017.22	186.73	178.63	40.74	2318.3
1.98(2.00)	4E	1032.12	182.06	174.76	34.51	1346.8
1.98(1.99)	5D	1037.78	178.90	174.15	53.56	1465.6
	AVE	1025.81	185.50	177.38	47.91	1878.4
2.01(2.00)	2D	1035.13	190.71	178.81	28.08	2280.5
2.01(2.01)	3A	1036.14	183.25	177.09	56.36	2024.3
2.01(2.00)	3E	1030.21	182.07	173.46	40.36	2086.4
	AVE	1033.82	185.34	176.45	41.60	2130.4
2.03(2.02)	2B	987.91	188.30	180.42	40.51	2230.0
2.03(2.02)	3D	1036.31	193.93	179.84	27.23	2435.7
2.03(2.03)	4A	998.61	183.63	179.87	64.22	1232.8
2.03(2.04)	4E	1001.54	186.91	177.83	79.11	1320.8
	AVE	1006.09	186.69	179.49	52.77	1804.8

2.06(2.04)	3D	1036.31	194.25	180.90	28.68	2378.5
	AVE	1036.31	194.25	180.90	28.68	2378.5
2.08(2.07)	3E	957.20	181.95	177.99	81.00	2174.8
	AVE	957.20	181.95	177.99	81.00	2174.8
2.13	2B	987.91	190.76	186.28	70.53	1673.0
2.13	2C	997.10	193.80	185.24	42.80	2099.9
2.13	2D	992.94	192.12	186.09	52.55	1674.7
2.13	3C	998.22	193.34	189.35	91.69	1879.2
2.13	3D	981.48	195.14	185.93	39.07	2145.7
2.13	4D	983.99	192.08	186.18	53.19	1893.0
2.13	5C	992.05	184.69	181.27	96.31	2231.1
	AVE	990.53	191.70	185.76	63.73	1942.4
2.29	3B	955.69	201.75	196.04	59.99	2232.1
2.29	3D	937.86	199.91	193.46	52.42	2338.8
2.29	4D	930.45	197.89	194.19	78.64	1892.1
2.29	5C	944.00	191.98	188.21	81.52	2093.2
	AVE	942.00	197.88	192.97	68.14	2139.0

RUN 43929E

MASS FLOW = .0129 LBM/SEC INLET VAPOR TEMP = 231.0 DEG F TOTAL POWER = 1.36 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	1B	86.39	259.70	238.53	6.63	1398.3
12	2A	83.78	257.60	238.52	7.15	1400.7
12	4E	87.62	256.50	238.51	7.93	1401.9
	AVE	85.93	257.93	238.52	7.24	1400.3
24	1C	131.86	264.86	243.99	14.06	2543.2
24	3B	132.61	268.20	246.33	15.12	2642.4
24	5B	125.72	266.92	246.25	9.77	1407.3
	AVE	130.06	266.66	245.52	12.98	2197.6
39	1B	217.07	289.90	259.42	11.13	1351.7
39	2A	216.18	295.10	259.34	9.41	1347.6
39	4C	219.06	292.83	260.87	16.58	2790.3
39	4E	214.20	289.83	259.45	11.02	1352.1
	AVE	216.63	291.92	259.77	12.03	1710.4
48	1C	254.30	311.03	273.84	14.35	2388.2
48	3B	252.00	320.27	283.07	15.76	2459.5
48	5B	251.64	305.92	280.41	14.98	1316.8
	AVE	252.65	312.41	279.11	15.04	2054.8
60	1B	334.27	334.75	305.67	16.74	1263.6
60	2A	322.09	331.48	305.91	18.40	1262.8
60	4C	330.09	336.87	308.68	26.41	2609.2
	AVE	328.82	334.37	306.75	20.51	1711.9

RUN 43929E

MASS FLOW = .0129 LBM/SEC INLET VAPOR TEMP = 231.0 DEG F TOTAL POWER = 1.36 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (66.3)	2A	327.43	339.63	321.75	26.26	1276.1
67 (66.7)	2B	319.70	357.86	328.95	20.94	2051.6
67 (66.0)	2C	325.48	359.89	321.36	18.53	2575.6
67 (66.7)	2E	326.86	344.32	322.60	21.48	1266.1
67 (66.5)	4A	326.13	341.44	323.30	25.70	1276.8
67 (66.8)	4B	325.29	357.74	331.24	23.20	2030.1
67 (67.5)	4C	332.90	359.23	326.78	22.43	2593.5
67 (67.0)	4E	327.14	350.12	323.85	17.68	1273.7
	AVE	326.37	351.28	324.98	22.03	1792.9
70 (70.4)	2C	325.48	367.21	331.44	19.70	3207.3
70 (69.2)	3C	319.77	394.43	330.58	10.63	2851.5
70 (70.1)	3D	328.47	367.03	333.26	21.03	3152.1
	AVE	324.57	376.22	331.76	17.12	3070.3
72 (71.4)	3E	326.53	360.32	326.34	18.65	2986.2
72 (74.0)	5C	326.46	345.50	334.45	57.63	2785.0
	AVE	326.50	352.91	330.40	38.14	2885.6
73 (73.0)	1B	333.06	344.80	333.81	42.87	2122.2
73 (73.3)	2A	327.43	349.58	333.93	29.49	2165.2
	AVE	330.24	347.19	333.87	36.18	2143.7
74 (74.5)	2D	328.09	370.47	343.99	22.97	3139.3
74 (73.9)	4D	322.42	368.07	344.12	25.00	3171.1
	AVE	325.25	369.27	344.06	23.99	3155.2
75 (74.7)	1D	324.36	354.05	337.50	27.45	1809.2
75 (75.6)	2E	326.86	357.58	339.76	25.58	1696.5
75 (74.8)	5D	328.93	348.68	337.62	41.84	1879.0
	AVE	326.72	353.44	338.29	31.62	1794.9
76 (75.6)	1D	324.36	353.77	339.64	32.09	1694.4
76 (75.6)	3A	328.41	358.20	338.77	32.53	2230.9

76 (75.6)	3D	328.47	383.01	345.69	18.62	3289.7
76 (76.0)	4A	326.13	352.01	343.59	54.05	1372.9
76 (75.9)	4B	325.29	365.48	353.59	50.54	2150.8
76 (76.0)	4D	322.42	367.14	348.72	32.42	2750.8
76 (77.6)	5C	326.46	352.20	342.52	65.08	2251.8
76 (75.8)	5D	328.93	349.68	339.66	46.05	1752.6
	AVE	326.31	360.19	344.02	41.42	2186.7
77 (77.3)	1B	333.06	349.49	342.58	67.47	1577.0
77 (77.1)	1C	317.92	353.49	339.45	43.76	2475.3
77 (76.8)	1D	324.36	355.27	342.55	35.55	1571.3
77 (77.3)	2A	327.43	353.57	344.59	50.80	1437.7
77 (76.8)	2D	328.09	372.46	349.31	26.13	2553.3
77 (77.1)	3B	326.20	376.14	354.25	31.49	2285.8
77 (76.5)	5D	328.93	350.14	341.12	51.09	1666.6
	AVE	326.57	358.65	344.84	43.76	1938.1
78 (78.4)	1C	317.92	353.20	342.35	56.46	2375.2
78 (77.8)	2B	319.70	365.96	352.64	44.37	2374.7
78 (77.7)	2E	326.86	358.93	345.16	32.94	1413.6
78 (78.1)	3A	328.41	355.64	347.44	76.74	2007.1
78 (78.1)	3B	326.20	374.80	356.96	38.61	2236.7
78 (78.2)	3C	319.77	404.64	359.63	14.63	1546.7
78 (77.8)	4A	326.13	356.15	349.37	66.68	1258.9
78 (78.1)	4B	325.29	368.05	359.15	67.15	1945.2
78 (78.4)	4C	332.90	371.67	357.16	48.55	2251.9
78 (78.1)	4D	322.42	368.12	353.53	40.74	2318.3
78 (78.6)	4E	327.14	359.70	346.57	34.51	1346.8
78 (78.3)	5D	328.93	354.02	345.47	53.56	1465.6
	AVE	325.14	365.91	351.29	47.91	1878.4
79 (78.7)	2D	328.09	375.28	353.86	28.08	2280.5
79 (79.2)	3A	328.41	361.85	350.76	56.36	2024.3
79 (78.6)	3E	326.53	359.72	344.23	40.36	2086.4
	AVE	327.68	365.62	349.62	41.60	2130.4
80 (79.7)	2B	313.12	370.93	356.75	40.51	2230.0
80 (79.6)	3D	328.47	381.08	355.71	27.23	2435.7
80 (79.8)	4A	316.52	362.53	355.76	64.22	1232.8
80 (80.4)	4E	317.45	357.63	352.09	79.11	1320.8
	AVE	318.89	368.04	355.08	52.77	1804.8

81 (80.4)	3D	328.47	381.66	357.61	28.68	2378.5
	AVE	328.47	381.66	357.61	28.68	2378.5
82 (81.5)	3E	303.39	359.50	352.37	81.00	2174.8
	AVE	303.39	359.50	352.37	81.00	2174.8
84	2B	313.12	375.37	367.31	70.53	1673.0
84	2C	316.04	380.85	365.43	42.80	2099.9
84	2D	314.72	377.81	366.96	52.55	1674.7
84	3C	316.39	380.01	372.84	91.69	1879.2
84	3D	311.09	383.25	366.67	39.07	2145.7
84	4D	311.88	377.74	367.12	53.19	1893.0
84	5C	314.44	364.44	358.28	96.31	2231.1
	AVE	313.96	377.07	366.37	63.73	1942.4
90	3B	302.91	395.14	384.86	59.99	2232.1
90	3D	297.26	391.83	380.22	52.42	2338.8
90	4D	294.91	388.20	381.54	78.64	1892.1
90	5C	299.21	377.57	370.77	81.52	2093.2
	AVE	298.57	388.19	379.35	68.14	2139.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 44029E
Test Date: 2/24/81
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.137 MPa (19.9 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.0307 kw/m (0.00935 kw/ft)
Flow rate	0.0086 kg/sec (0.019 lb/sec)
Coolant temperature	112°C (234°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 2751

(See following pages for additional results.)

C. Comments:

This test was a repeat of run 43929E.

Condensation in the injection line and lower plenum, downstream of the flow measurement location, reduced the steam flow into the bundle.

The following heater rod thermocouples were not used because of reverse heat transfer or small temperature differences: 1B at 1.91 m (75 in.), 5B at 1.96 m (77 in.), 5C at 2.01 m (79 in.), 5B and 5C at 2.03 m (80 in.), 1C, 3E, 4A, 5B at 2.13 m (84 in.), 1D, 2B, 2C, 2D, 2E, 3E, 4A, 4B, and 5D at 2.29 m (90 in.), and all thermocouples at 2.44 m (96 in.).

RUN 44029E

MASS FLOW = .0056 KG/SEC INLET VAPOR TEMP = 111.7 DEG C TOTAL POWER = 1.42 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	1B	269.22	127.11	116.00	6.92	1333.9
.30	2A	261.11	126.50	115.99	7.16	1335.1
.30	4E	273.06	125.32	115.99	8.37	1337.4
	AVE	267.80	126.31	115.99	7.46	1335.4
.61	1C	410.94	130.11	118.90	14.33	2329.9
.61	3B	413.28	133.11	120.44	14.27	2693.7
.61	5B	391.81	131.89	120.10	9.37	1348.1
	AVE	405.34	131.70	119.81	12.66	2123.9
.99	1B	676.51	143.83	127.91	11.66	1282.7
.99	2A	673.71	147.44	127.88	9.40	1277.1
.99	4C	682.70	146.75	128.57	15.94	2718.0
.99	4E	667.56	143.83	127.90	11.49	1282.7
	AVE	675.12	145.46	128.07	12.12	1640.1
1.22	1C	792.52	155.92	136.17	14.78	2219.0
1.22	3B	785.35	162.06	140.65	14.99	2492.9
1.22	5B	784.24	153.62	139.67	14.97	1247.1
	AVE	787.37	157.20	138.83	14.91	1986.4
1.52	1B	1041.74	169.87	154.75	17.58	1196.5
1.52	2A	1003.80	168.07	154.90	19.47	1195.1
1.52	4C	1028.73	171.81	155.45	24.83	2518.3
	AVE	1024.76	169.92	155.03	20.62	1636.6

RUN 44029E

MASS FLOW = .0056 KG/SEC INLET VAPOR TEMP = 111.7 DEG C TOTAL POWER = 1.42 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.68)	2A	1020.42	172.72	163.42	27.54	1214.1
1.70(1.69)	2B	996.35	182.91	167.50	21.43	1959.9
1.70(1.68)	2C	1014.34	184.46	163.01	18.16	2464.6
1.70(1.69)	2E	1018.67	174.88	163.83	23.04	1205.5
1.70(1.69)	4A	1016.38	173.67	163.85	25.92	1217.2
1.70(1.70)	4B	1013.77	183.44	168.39	22.27	1942.2
1.70(1.71)	4C	1037.48	184.07	165.87	21.82	2482.4
1.70(1.70)	4E	1019.52	178.47	164.47	18.11	1212.1
	AVE	1017.12	179.33	165.04	22.29	1712.2
1.78(1.79)	2C	1014.34	188.93	168.72	19.01	3059.5
1.78(1.76)	3C	996.56	204.81	167.83	10.00	2725.0
1.78(1.78)	3D	1023.67	188.97	169.75	20.14	3005.4
	AVE	1011.52	194.23	168.77	16.38	2929.9
1.83(1.81)	3E	1017.63	184.59	165.81	18.41	2848.6
1.83(1.88)	5C	1017.42	176.13	169.83	55.22	2662.4
	AVE	1017.52	180.36	167.82	36.81	2755.5
1.85(1.85)	1B	1037.98	175.27	169.70	46.15	2028.3
1.85(1.86)	2A	1020.42	178.34	169.76	29.35	2067.5
	AVE	1029.20	176.81	169.73	37.75	2047.9
1.88(1.89)	2D	1022.50	190.81	175.85	22.15	2991.7
1.88(1.88)	4D	1004.80	189.35	175.83	24.14	3024.1
	AVE	1013.65	190.08	175.84	23.14	3007.9
1.91(1.90)	1D	1010.88	180.50	171.56	27.78	1731.1
1.91(1.92)	2E	1018.67	182.79	172.85	25.05	1621.6
1.91(1.90)	5D	1025.11	177.91	171.60	40.04	1796.9
	AVE	1018.22	180.40	172.00	30.95	1716.5
1.93(1.92)	1D	1010.88	180.39	172.69	32.17	1621.8
1.93(1.92)	3A	1023.49	183.36	172.07	30.56	2134.1

1.93(1.92)	3D	1023.67	198.16	176.72	17.65	3129.3
1.93(1.93)	4A	1016.38	179.79	174.58	47.68	1314.9
1.93(1.93)	4B	1013.77	187.83	180.99	47.93	2053.1
1.93(1.93)	4D	1004.80	188.88	178.41	31.08	2626.4
1.93(1.97)	5C	1017.42	179.95	173.97	57.47	2157.2
1.93(1.93)	5D	1025.11	178.38	172.66	44.03	1676.5
	AVE	1016.94	184.60	175.26	38.57	2088.4
1.96(1.96)	1B	1037.98	177.70	174.28	74.59	1507.6
1.96(1.96)	1C	990.80	180.39	172.50	42.51	2368.9
1.96(1.95)	1D	1010.88	181.36	174.25	34.75	1503.7
1.96(1.96)	2A	1020.42	180.39	175.36	49.51	1374.4
1.96(1.95)	2D	1022.50	191.72	178.84	25.56	2431.6
1.96(1.96)	3B	1016.59	193.86	181.44	30.25	2179.6
1.96(1.94)	5D	1025.11	178.56	173.42	48.98	1594.4
	AVE	1017.75	183.43	175.73	43.74	1851.4
1.98(1.99)	1C	990.80	180.14	174.01	54.67	2274.0
1.98(1.98)	2B	996.35	187.79	180.71	45.49	2261.5
1.98(1.97)	2E	1018.67	183.25	175.67	32.66	1351.7
1.98(1.98)	3A	1023.49	181.99	176.73	65.36	1922.2
1.98(1.98)	3B	1016.59	193.25	182.97	36.56	2132.8
1.98(1.99)	3C	996.56	217.42	184.56	10.81	1459.2
1.98(1.98)	4A	1016.38	182.20	177.75	55.54	1205.1
1.98(1.98)	4B	1013.77	189.18	184.12	64.38	1856.7
1.98(1.99)	4C	1037.48	191.41	183.04	45.86	2148.9
1.98(1.98)	4D	1004.80	189.19	181.11	40.13	2208.3
1.98(2.00)	4E	1019.52	183.72	176.39	33.79	1287.1
1.98(1.99)	5D	1025.11	180.45	175.73	53.05	1462.2
	AVE	1013.29	188.33	179.40	44.85	1792.5
2.01(2.00)	2D	1022.50	193.30	181.40	27.55	2171.2
2.01(2.01)	3A	1023.49	185.27	178.59	51.08	1938.8
2.01(2.00)	3E	1017.63	184.01	175.02	37.99	1996.5
	AVE	1021.21	187.53	178.34	38.87	2035.5
2.03(2.02)	2B	975.85	190.64	183.01	41.10	2123.4
2.03(2.02)	3D	1023.67	196.94	182.36	25.80	2319.6
2.03(2.03)	4A	986.42	185.44	181.35	58.03	1179.9
2.03(2.04)	4E	989.32	182.69	179.45	74.01	1262.3
	AVE	993.81	188.93	181.54	49.73	1721.3

2.06(2.04)	3D	1023.67	197.20	183.44	27.29	2265.6
	AVE	1023.67	197.20	183.44	27.29	2265.6
2.08(2.07)	3E	945.52	183.75	179.61	76.24	2081.9
	AVE	945.52	183.75	179.61	76.24	2081.9
2.13	2B	975.85	193.27	188.99	72.27	1593.7
2.13	2C	984.93	196.84	187.89	40.16	2000.3
2.13	2D	980.82	194.50	188.78	54.34	1595.7
2.13	3C	986.03	197.54	192.00	64.51	1790.3
2.13	3D	969.50	197.98	188.57	37.47	2044.3
2.13	4D	971.98	194.57	188.80	53.41	1802.8
2.13	5C	979.94	186.64	182.81	84.59	2136.7
	AVE	978.44	194.48	188.26	58.11	1852.0
2.29	3B	944.02	204.31	198.64	59.35	2126.6
2.29	3D	926.41	202.45	196.52	55.90	2223.5
2.29	4D	919.10	200.47	197.38	92.32	1799.7
2.29	5C	932.48	194.11	189.85	70.97	2000.7
	AVE	930.50	200.33	195.60	69.64	2037.6

RUN 44329E

MASS FLOW = .0124 LBM/SEC INLET VAPOR TEMP = 233.0 DEG F TOTAL POWER = 1.35 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	1B	85.33	260.80	240.80	6.92	1333.9
12	2A	82.76	259.70	240.79	7.10	1335.1
12	4E	86.55	257.58	240.78	8.37	1337.4
	AVE	84.88	259.36	240.79	7.46	1335.4
24	1C	130.25	266.20	246.02	14.33	2329.9
24	3B	130.99	271.60	248.79	14.27	2693.7
24	5B	124.19	269.40	248.18	9.37	1348.1
	AVE	128.48	269.07	247.67	12.66	2123.9
39	1B	214.42	290.90	262.24	11.66	1282.7
39	2A	213.54	297.40	262.19	9.40	1277.1
39	4C	216.39	296.14	263.43	15.94	2718.0
39	4E	211.59	290.90	262.21	11.49	1282.7
	AVE	213.98	293.83	262.52	12.12	1640.1
48	1C	251.19	312.66	277.11	14.78	2219.0
48	3B	248.92	323.70	285.17	14.99	2492.9
48	5B	248.57	308.52	283.41	14.97	1247.1
	AVE	249.56	314.96	281.90	14.91	1986.4
60	1B	330.19	337.76	310.56	17.58	1196.5
60	2A	318.16	334.53	310.81	19.47	1195.1
60	4C	326.06	341.26	311.82	24.83	2518.3
	AVE	324.80	337.85	311.06	20.62	1636.6

RUN 44029E

MASS FLOW = .0124 LBM/SEC INLET VAPOR TEMP = 233.0 DEG F TOTAL POWER = 1.35 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (66.3)	2A	323.43	342.89	326.16	27.54	1214.1
67 (66.7)	2B	315.80	361.24	333.50	21.43	1959.9
67 (66.0)	2C	321.50	364.02	325.41	18.16	2464.6
67 (66.7)	2E	322.87	346.79	326.89	23.04	1205.5
67 (66.5)	4A	322.15	344.61	326.93	25.92	1217.2
67 (66.8)	4B	321.32	362.20	335.10	22.27	1942.2
67 (67.5)	4C	328.84	363.32	330.57	21.82	2482.4
67 (67.0)	4E	323.14	353.24	328.05	18.11	1212.1
	AVE	322.38	354.79	329.08	22.29	1712.2
70 (70.4)	2C	321.50	372.07	335.70	19.01	3059.5
70 (69.2)	3C	315.87	400.65	334.09	10.00	2725.0
70 (70.1)	3D	324.46	372.14	337.55	20.14	3005.4
	AVE	320.61	381.62	335.78	16.38	2929.9
72 (71.4)	3E	322.55	364.26	330.46	18.41	2848.6
72 (74.0)	5C	322.48	349.03	337.70	55.22	2662.4
	AVE	322.51	356.64	334.08	36.81	2755.5
73 (73.0)	1B	329.00	347.49	337.45	46.15	2028.3
73 (73.3)	2A	323.43	353.01	337.56	29.35	2067.5
	AVE	326.21	350.25	337.51	37.75	2047.9
74 (74.5)	2D	324.09	375.47	348.53	22.15	2991.7
74 (73.9)	4D	318.48	372.82	348.49	24.14	3024.1
	AVE	321.28	374.15	348.51	23.14	3007.9
75 (74.7)	1D	320.41	356.90	340.81	27.78	1731.1
75 (75.6)	2E	322.87	361.02	343.14	25.05	1621.6
75 (74.8)	5D	324.92	352.23	340.88	40.04	1796.9
	AVE	322.73	356.72	341.61	30.95	1716.5
76 (75.6)	1D	320.41	356.71	342.84	32.17	1621.8
76 (75.6)	3A	324.40	362.06	341.72	30.56	2134.1

76 (75.6)	3D	324.46	388.69	350.09	17.65	3129.3
76 (76.0)	4A	322.15	355.63	346.24	47.68	1314.9
76 (75.9)	4B	321.32	370.09	357.79	47.93	2053.1
76 (76.0)	4D	318.48	371.99	353.14	31.08	2620.4
76 (77.6)	5C	322.48	355.92	345.15	57.47	2157.2
76 (75.8)	5D	324.92	353.09	342.79	44.03	1676.5
	AVE	322.33	364.27	347.47	38.57	2088.4
77 (77.3)	1B	329.00	351.86	345.71	74.59	1507.6
77 (77.1)	1C	314.04	356.70	342.50	42.51	2368.9
77 (76.8)	1D	320.41	358.45	345.65	34.75	1503.7
77 (77.3)	2A	323.43	356.71	347.65	49.51	1374.4
77 (76.8)	2D	324.09	377.10	353.91	25.58	2431.6
77 (77.1)	3B	322.22	380.96	358.60	30.25	2179.6
77 (76.5)	5D	324.92	353.41	344.16	48.98	1594.4
	AVE	322.58	362.17	348.31	43.74	1851.4
78 (78.4)	1C	314.04	356.25	345.22	54.67	2274.0
78 (77.8)	2B	315.80	370.02	357.28	45.49	2261.5
78 (77.7)	2E	322.87	361.86	348.20	32.66	1351.7
78 (78.1)	3A	324.40	359.58	350.12	65.38	1922.2
78 (78.1)	3B	322.22	379.85	361.35	36.50	2132.8
78 (78.2)	3C	315.87	423.35	364.20	10.81	1459.2
78 (77.8)	4A	322.15	359.96	351.96	55.54	1205.1
78 (78.1)	4B	321.32	372.52	363.41	64.38	1856.7
78 (78.4)	4C	328.84	376.54	361.48	45.86	2148.9
78 (78.1)	4D	318.48	372.54	358.00	40.13	2208.3
78 (78.6)	4E	323.14	362.69	349.50	33.79	1287.1
78 (78.3)	5D	324.92	356.81	348.32	53.05	1402.2
	AVE	321.17	371.00	354.92	44.85	1792.5
79 (78.7)	2D	324.09	379.93	358.51	27.55	2171.2
79 (79.2)	3A	324.40	365.49	353.46	51.08	1938.8
79 (78.6)	3E	322.55	363.22	347.04	37.99	1996.5
	AVE	323.68	369.55	353.00	38.87	2035.5
80 (79.7)	2B	309.30	375.15	361.43	41.10	2123.4
80 (79.6)	3D	324.46	386.50	360.25	25.80	2319.6
80 (79.8)	4A	312.65	365.79	358.42	58.03	1179.9
80 (80.4)	4E	313.57	360.85	355.02	74.01	1262.3
	AVE	315.00	372.07	358.78	49.73	1721.3

81 (80.4)	3D	324.46	386.96	362.19	27.29	2265.6
	AVE	324.46	386.96	362.19	27.29	2265.6
82 (81.5)	3E	299.69	362.75	355.30	76.24	2081.9
	AVE	299.69	362.75	355.30	76.24	2081.9
84	2B	309.30	379.89	372.18	72.27	1593.7
84	2C	312.18	386.31	370.21	40.16	2000.3
84	2D	310.88	382.10	371.80	54.34	1595.7
84	3C	312.53	387.58	377.60	64.51	1790.3
84	3D	307.29	388.37	371.42	37.47	2044.3
84	4D	308.08	382.22	371.84	53.41	1802.8
84	5C	310.60	367.95	361.05	84.59	2136.7
	AVE	310.12	382.06	370.87	58.11	1852.0
90	3B	299.21	399.75	389.56	59.35	2126.6
90	3D	293.63	396.41	385.73	55.90	2223.5
90	4D	291.31	392.85	387.28	92.32	1799.7
90	5C	295.56	381.41	373.73	70.97	2000.7
	AVE	294.93	392.60	384.08	69.64	2037.6

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41229F
Test Date: 6/19/81
Test Type: Steam Cooling
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.1414 MPa (20.51 psia)
Initial peak clad temperature and location	N/A
Initial peak rod power	0.029 kw/m (0.0089 kw/ft)
Flow rate	0.00853 kg/sec (0.0188 lb/sec)
Coolant temperature	113.2°C (235.8°F)
Average and range of initial 1.83 m (72 in.) housing temperature	N/A
Initial bundle water level	N/A

B. Summary Results:

Inlet Reynolds number: 2724

(See following pages for additional results.)

C. Comments:

Condensation in the injection line and lower plenum, downstream of the flow measurement location, reduced the steam flow into the bundle.

The following heater rod thermocouples were not used because of reverse heat transfer: 1D and 2E at 2.29 m (90 in.) and 2E, 4A, and 5B at 2.44 m (96 in.).

RUN 41229F

MASS FLOW = .0057 KG/SEC INLET VAPOR TEMP = 113.3 DEG C TOTAL POWER = 1.35 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
.30	4C	264.70	125.37	117.30	14.56	2898.7
.30	4E	248.78	125.33	117.21	8.74	1361.2
	AVE	256.74	125.35	117.26	11.65	2129.9
.61	3E	371.89	130.37	120.02	14.00	2370.4
	AVE	371.89	130.37	120.02	14.00	2370.4
.99	1B	644.66	146.72	128.54	9.68	1361.6
.99	2A	611.97	148.07	128.51	8.52	1300.6
.99	4C	655.44	147.44	128.81	14.89	2770.5
	AVE	637.36	147.41	128.62	11.03	1790.7
1.22	1C	738.17	159.00	136.25	11.89	2251.9
1.22	2C	740.65	158.35	139.39	16.06	2665.6
1.22	2E	735.89	156.55	139.22	11.26	1281.7
1.22	3E	727.59	152.89	136.29	16.19	2271.6
	AVE	735.56	156.70	137.79	13.85	2117.7
1.52	1B	907.93	175.45	153.57	19.51	1213.3
1.52	2A	927.47	176.75	153.71	19.17	1206.9
1.52	4E	969.90	165.15	153.79	21.93	1229.3
	AVE	935.10	172.45	153.69	14.26	1216.5

RUN 41229F

MASS FLOW = .0057 KG/SEC INLET VAPOR TEMP = 113.3 DEG C TOTAL POWER = 1.35 KW

Z (M)	ROD LOCATION	HEAT FLUX (WATT/SQM)	WALL SURFACE TEMP (DEG C)	VAPOR TEMP (DEG C)	NU /PR**.33	REYNOLDS NO.
1.70(1.67)	2A	960.34	180.39	161.06	12.37	1211.2
1.70(1.70)	2B	968.61	186.81	165.26	14.85	1997.5
1.70(1.70)	4B	966.66	190.28	166.55	13.38	1978.6
1.70(1.70)	5C	971.44	174.28	158.33	21.20	2064.2
1.70(1.70)	5D	964.42	173.89	163.14	22.48	1193.5
	AVE	966.29	181.13	162.87	16.86	1689.0
1.78(1.77)	3C	977.67	187.05	165.77	17.50	3014.6
1.78(1.78)	4E	971.66	181.61	166.57	15.94	1736.7
	AVE	974.66	184.33	166.17	16.72	2375.7
1.80(1.80)	3D	993.22	187.21	168.13	19.76	3346.7
	AVE	993.22	187.21	168.13	19.76	3346.7
1.88(1.87)	4D	964.48	188.41	172.70	20.04	3545.0
	AVE	964.48	188.41	172.70	20.04	3545.0
1.91(1.90)	1B	976.68	184.05	169.29	16.21	2221.4
1.91(1.89)	1D	970.07	185.28	169.10	14.67	1994.0
1.91(1.90)	2D	961.27	188.88	172.76	19.45	3429.7
1.91(1.89)	4D	964.48	188.95	173.39	20.19	3494.1
	AVE	968.12	186.79	171.13	17.63	2784.8
1.93(1.93)	1D	970.07	184.05	170.52	17.54	1763.2
1.93(1.94)	2E	978.33	178.18	170.43	31.12	1597.8
1.93(1.94)	4B	966.66	189.42	178.76	29.33	2066.8
1.93(1.92)	4D	964.48	189.62	174.67	29.97	3106.9
1.93(1.94)	5C	971.44	179.71	171.27	39.03	2444.3
1.93(1.93)	5D	964.42	181.60	171.23	22.80	1846.2
	AVE	969.23	183.76	172.81	26.80	2137.5
1.96(1.95)	1B	976.68	185.19	170.99	16.78	1722.8
1.96(1.95)	1D	970.07	183.21	171.79	20.77	1599.5
1.96(1.95)	2A	960.34	186.33	171.93	16.22	1440.2

1.96(1.96)	2B	968.61	192.65	176.27	19.10	2424.0
1.96(1.95)	2D	961.27	189.00	175.22	22.67	2517.5
1.96(1.95)	3B	973.31	193.89	177.19	21.66	2241.1
1.96(1.96)	5B	979.22	179.20	173.45	41.76	1372.8
	AVE	969.93	187.07	173.83	22.71	1902.5
1.98(1.97)	1C	962.94	183.41	171.30	26.84	2490.1
1.98(1.98)	2A	960.34	188.17	173.58	15.93	1348.1
1.98(1.98)	2B	968.61	193.28	177.09	19.29	2328.7
1.98(1.98)	3A	964.42	187.98	173.88	22.85	1885.0
1.98(1.97)	4A	975.19	185.70	174.62	21.37	1244.5
1.98(1.99)	4B	966.66	191.45	180.27	27.81	1884.1
1.98(1.99)	4C	1007.17	191.41	179.76	32.12	2083.2
1.98(1.97)	4D	964.48	189.61	177.50	25.78	2412.9
1.98(1.99)	4E	971.66	187.77	173.50	16.49	1401.9
1.98(1.99)	5C	971.44	182.83	173.56	35.29	2187.6
1.98(1.99)	5D	964.42	186.34	173.83	18.71	1511.3
	AVE	970.67	188.00	175.35	23.86	1888.9
2.01(2.00)	1B	976.68	186.99	173.31	17.32	1517.2
2.01(2.00)	1C	962.94	184.05	172.50	28.06	2403.6
2.01(2.00)	2C	958.21	194.38	177.42	20.98	2520.0
2.01(2.00)	2D	961.27	191.39	177.67	22.63	2160.3
2.01(1.99)	2E	978.33	177.88	173.24	51.86	1324.3
2.01(2.00)	3A	951.71	190.18	175.31	21.27	1906.9
2.01(2.00)	3B	973.31	197.55	179.56	19.93	2124.4
2.01(2.02)	3D	993.22	196.20	179.18	21.55	2185.6
2.01(2.01)	4B	966.66	192.66	180.81	26.18	1858.6
2.01(2.01)	5B	979.22	180.52	176.07	53.67	1282.7
2.01(2.01)	5C	971.44	184.67	174.81	33.04	2170.1
	AVE	970.27	188.77	176.35	28.77	1950.3
2.03(2.03)	1B	976.68	187.61	174.75	18.37	1459.1
2.03(2.03)	1C	930.41	184.87	173.63	28.28	2354.4
2.03(2.03)	2B	933.74	196.33	179.16	17.40	2199.2
2.03(2.03)	2D	956.02	192.31	178.88	22.93	2081.5
2.03(2.02)	3C	959.56	198.87	183.09	22.26	1375.5
2.03(2.04)	3D	950.97	196.94	180.57	21.39	2135.9
2.03(2.02)	4A	913.26	188.25	177.77	20.98	1209.9
2.03(2.03)	4E	932.93	189.56	176.19	16.80	1350.9
	AVE	944.20	191.84	178.03	21.05	1770.8
2.06(2.05)	3E	919.61	184.68	175.54	33.72	2033.1

	AVE	919.61	184.68	175.54	33.72	2033.1
2.13	1C	930.41	189.01	178.77	30.11	2189.3
2.13	2B	933.74	199.93	183.91	18.45	1653.2
2.13	2D	956.02	196.33	184.63	25.96	1610.1
2.13	3C	959.56	202.57	187.89	23.67	1810.2
2.13	3D	950.97	199.98	185.20	23.46	2038.5
2.13	3E	919.61	187.78	179.63	37.42	2125.7
2.13	4A	913.26	192.52	184.11	25.74	1191.3
2.13	4D	959.13	197.60	185.74	25.60	1812.6
2.13	5B	930.61	185.89	182.84	73.17	1256.1
2.13	5D	926.88	192.06	182.21	22.42	1282.3
	AVE	938.02	194.37	183.49	30.60	1696.9
2.29	2B	841.36	206.15	191.80	18.20	1777.8
2.29	2C	870.84	204.28	191.24	24.01	2242.7
2.29	2D	866.25	203.65	192.31	23.77	1758.7
2.29	3A	852.32	201.19	189.55	23.52	1921.8
2.29	3B	883.28	211.19	193.05	17.30	2164.4
2.29	3C	900.57	209.67	194.19	20.69	2193.3
2.29	3D	877.18	207.40	192.11	20.52	2237.5
2.29	4A	895.14	196.36	191.06	39.45	1136.0
2.29	4B	873.45	206.77	193.32	20.11	1784.4
2.29	4D	912.18	206.65	193.33	21.20	1815.6
2.29	5B	877.32	192.56	189.45	66.45	1178.5
2.29	5C	851.48	197.54	187.72	28.08	2005.6
	AVE	875.11	203.62	191.59	26.94	1851.4
2.44	1C	756.76	195.34	192.36	82.12	1951.1
2.44	2C	760.32	207.99	197.80	25.45	2298.2
2.44	2D	749.08	205.96	199.12	33.67	1800.8
2.44	3C	759.82	213.87	199.94	19.13	2306.7
2.44	3D	796.84	210.31	198.29	23.40	2299.2
2.44	3E	764.03	195.43	192.72	91.08	1974.2
2.44	4B	779.66	209.62	199.92	24.57	1797.9
2.44	4D	779.66	209.67	200.27	25.33	1818.4
2.44	5C	763.44	197.90	194.38	69.56	1943.1
	AVE	767.73	205.12	197.20	43.92	2021.1

RUN 41229F

MASS FLOW = .0126 LBM/SEC INLET VAPOR TEMP = 236.0 DEG F TOTAL POWER = 1.28 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
12	4C	83.90	257.66	243.15	14.56	2898.7
12	4E	78.85	257.60	242.98	8.74	1361.2
	AVE	81.38	257.63	243.07	11.65	2129.9
24	3E	117.87	266.66	248.03	14.00	2370.4
	AVE	117.87	266.66	248.03	14.00	2370.4
39	1B	204.33	296.09	263.37	9.68	1301.6
39	2A	193.97	298.53	263.32	8.52	1300.0
39	4C	207.75	297.39	263.85	14.89	2770.5
	AVE	202.01	297.34	263.51	11.03	1790.7
48	1C	233.97	318.20	277.25	11.89	2251.9
48	2C	234.75	317.03	282.90	16.06	2665.6
48	2E	233.25	313.80	282.59	11.26	1281.7
48	3E	230.62	307.20	277.32	16.19	2271.6
	AVE	233.15	314.06	280.02	13.85	2117.7
60	1B	287.77	347.81	308.43	10.51	1213.3
60	2A	293.97	350.15	308.68	10.17	1206.9
60	4E	307.42	329.28	308.83	21.93	1229.3
	AVE	296.39	342.41	308.65	14.20	1216.5

RUN 41229F

MASS FLOW = .0126 LBM/SEC INLET VAPOR TEMP = 236.0 DEG F TOTAL POWER = 1.28 BTU/SEC

Z (IN)	ROD LOCATION	HEAT FLUX (BTU/HR-SQFT)	WALL SURFACE TEMP (DEG F)	VAPOR TEMP (DEG F)	NU /PR**.33	REYNOLDS NO.
67 (65.7)	2A	304.39	356.70	321.92	12.37	1211.2
67 (66.8)	2B	307.01	368.25	329.46	14.85	1997.5
67 (67.1)	4B	306.39	374.50	331.79	13.38	1978.6
67 (67.1)	5C	307.90	345.70	317.00	21.20	2064.2
67 (66.9)	5D	305.68	344.99	325.65	22.48	1193.5
	AVE	306.27	358.03	325.16	16.86	1689.0
70 (69.5)	3C	309.88	368.68	330.38	17.50	3014.6
70 (70.0)	4E	307.97	358.90	331.83	15.94	1736.7
	AVE	308.93	363.79	331.10	16.72	2375.7
71 (70.7)	3D	314.81	368.98	334.63	19.76	3346.7
	AVE	314.81	368.98	334.63	19.76	3346.7
74 (73.6)	4D	305.70	371.13	342.86	20.04	3545.0
	AVE	305.70	371.13	342.86	20.04	3545.0
75 (74.7)	1B	309.57	363.30	336.73	16.21	2221.4
75 (74.5)	1D	307.47	365.50	336.38	14.67	1994.0
75 (74.7)	2D	304.68	371.98	342.96	19.45	3429.7
75 (74.4)	4D	305.70	372.11	344.10	20.19	3494.1
	AVE	306.85	368.22	340.04	17.63	2784.8
76 (75.8)	1D	307.47	363.29	338.94	17.54	1763.2
76 (76.4)	2E	310.09	352.73	336.78	31.12	1597.8
76 (76.2)	4B	306.39	372.96	353.78	29.33	2066.8
76 (75.5)	4D	305.70	373.31	346.40	20.97	3106.9
76 (76.2)	5C	307.90	355.48	340.28	39.03	2444.3
76 (75.9)	5D	305.68	358.89	340.22	22.80	1846.2
	AVE	307.20	362.77	343.07	26.80	2137.5
77 (76.9)	1B	309.57	365.35	339.79	16.78	1722.8
77 (76.8)	1D	307.47	361.77	341.22	20.77	1599.5
77 (76.9)	2A	304.39	367.39	341.47	16.22	1440.2

77 (77.2)	2B	307.01	378.77	349.29	19.10	2424.0
77 (76.9)	2D	304.68	372.20	347.39	22.67	2517.5
77 (76.7)	3B	308.50	381.00	350.94	21.66	2241.1
77 (77.0)	5B	310.37	354.55	344.21	41.76	1372.8
	AVE	307.43	368.72	344.90	22.71	1902.5
78 (77.7)	1C	305.21	362.14	340.35	26.84	2490.1
78 (78.0)	2A	304.39	370.71	344.44	15.93	1348.1
78 (78.0)	2B	307.01	379.90	350.76	19.29	2328.7
78 (78.0)	3A	305.68	378.36	344.98	22.85	1885.0
78 (77.7)	4A	309.09	366.26	346.32	21.37	1244.5
78 (78.4)	4B	306.39	376.61	350.48	27.81	1884.1
78 (78.2)	4C	319.23	376.53	355.56	32.12	2083.2
78 (77.5)	4D	305.70	373.30	351.50	25.78	2412.9
78 (78.3)	4E	307.97	369.99	344.30	16.49	1401.9
78 (78.3)	5C	307.90	361.10	344.41	35.29	2187.6
78 (78.2)	5D	305.68	367.41	344.90	18.71	1511.3
	AVE	307.66	370.39	347.64	23.86	1886.9
79 (78.9)	1B	309.57	368.59	343.96	17.32	1517.2
79 (78.8)	1C	305.21	363.30	342.50	28.06	2403.6
79 (78.6)	2C	303.71	381.88	351.36	20.98	2520.0
79 (78.9)	2D	304.68	376.50	351.81	22.63	2160.3
79 (78.5)	2E	310.09	352.16	343.83	51.86	1324.3
79 (78.9)	3A	301.65	374.33	347.55	21.27	1906.9
79 (78.9)	3B	308.50	387.60	355.21	19.93	2124.4
79 (79.5)	3D	314.81	385.17	354.52	21.55	2185.6
79 (79.0)	4B	306.39	378.79	357.45	26.18	1858.6
79 (79.1)	5B	310.37	356.93	348.92	53.67	1282.7
79 (79.3)	5C	307.90	364.40	346.65	33.04	2170.1
	AVE	307.53	371.79	349.43	28.77	1950.3
80 (80.0)	1B	309.57	369.70	346.55	18.37	1459.1
80 (80.0)	1C	294.90	364.77	344.90	28.28	2354.4
80 (80.1)	2B	295.96	385.40	354.48	17.40	2199.2
80 (79.9)	2D	303.02	378.15	353.99	22.93	2081.5
80 (79.6)	3C	304.14	389.96	361.56	22.26	1375.5
80 (80.5)	3D	301.42	386.49	357.02	21.39	2135.9
80 (79.7)	4A	289.46	370.85	351.98	20.98	1209.9
80 (80.1)	4E	295.70	373.21	349.14	16.80	1350.9
	AVE	299.27	377.32	352.45	21.05	1770.8
81 (80.9)	3E	291.48	364.42	347.98	33.72	2033.1

	AVE	291.48	364.42	347.98	33.72	2033.1
84	1C	294.90	372.22	353.79	30.11	2189.3
84	2B	295.96	391.87	363.03	18.45	1653.2
84	2D	303.02	385.39	364.33	25.96	1610.1
84	3C	304.14	396.02	370.21	23.67	1810.2
84	3D	301.42	391.96	365.37	23.46	2038.5
84	3E	291.48	370.00	355.33	37.42	2125.7
84	4A	289.46	378.54	363.39	25.74	1191.3
84	4D	304.00	387.69	366.33	25.60	1812.6
84	5B	294.96	366.60	361.11	73.17	1256.1
84	5D	293.78	377.70	359.98	22.42	1282.3
	AVE	297.31	381.86	362.29	30.60	1696.9
90	2B	266.67	403.07	377.24	18.20	1777.8
90	2C	276.02	399.70	376.24	24.01	2242.7
90	2D	274.56	398.58	378.16	23.77	1758.7
90	3A	270.15	394.14	373.19	23.52	1921.8
90	3B	279.96	412.14	379.50	17.30	2164.4
90	3C	285.44	409.40	381.55	20.69	2193.3
90	3D	278.03	405.32	377.81	20.52	2237.5
90	4A	283.72	385.45	375.90	39.45	1136.0
90	4B	276.85	404.19	379.98	20.11	1784.4
90	4D	289.12	403.97	379.99	21.20	1815.6
90	5B	278.07	378.60	373.00	66.45	1178.5
90	5C	269.88	387.56	369.90	28.08	2005.6
	AVE	277.37	398.51	376.87	26.94	1851.4
96	1C	239.86	383.61	378.25	82.12	1951.1
96	2C	240.99	406.38	388.04	26.45	2298.2
96	2D	237.43	402.73	390.42	33.67	1800.8
96	3C	240.83	416.97	391.89	19.13	2306.7
96	3D	252.56	410.57	388.92	23.40	2299.2
96	3E	242.17	383.77	378.90	91.06	1974.2
96	4B	247.12	409.32	391.86	24.57	1797.9
96	4D	247.12	409.41	392.48	25.33	1818.4
96	5C	241.98	368.23	381.89	69.56	1943.1
	AVE	243.34	401.22	386.96	43.92	2021.1

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42430A
Test Date: 3/31/80
Test Type: Forced Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.276 MPa (40.0 psia)
Initial peak clad temperature and location	872°C (1602°F), 3C 1.83 m (72 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28.2 mm/sec (1.11 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	501°C (493°C - 504°C) [933°F (920°F - 940°F)]
Initial bundle water level	17.2 mm (0.676 in.)

B. Summary Results:

C. Comments:

This test was misnumbered; it should be 42407A.

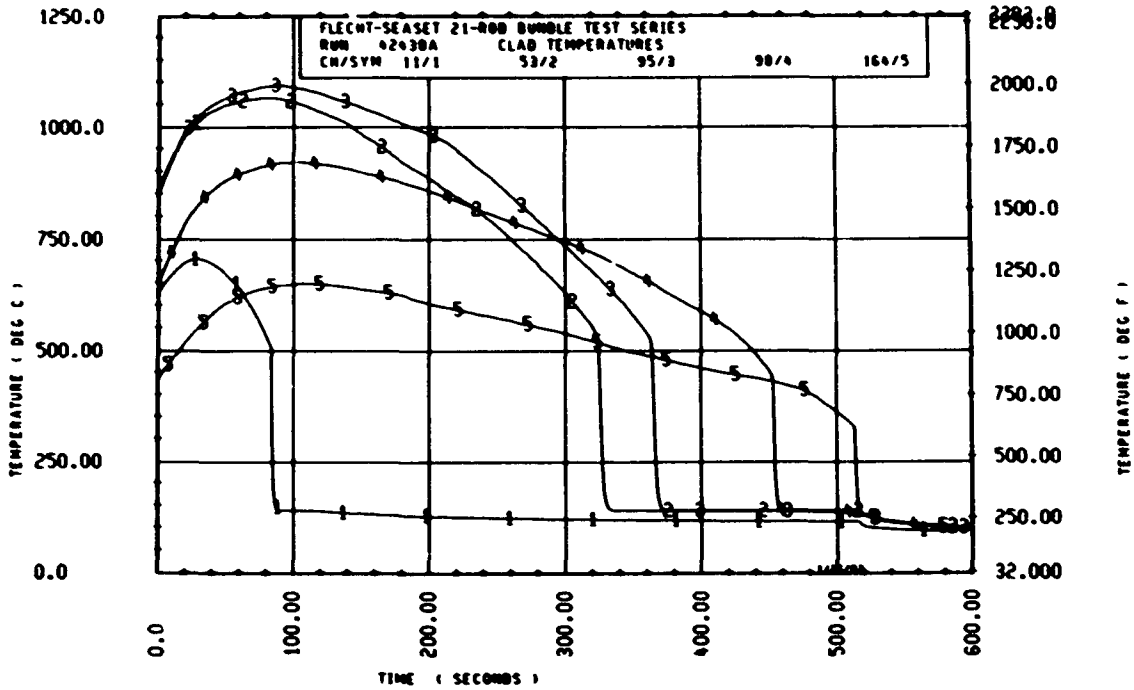
FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42430A

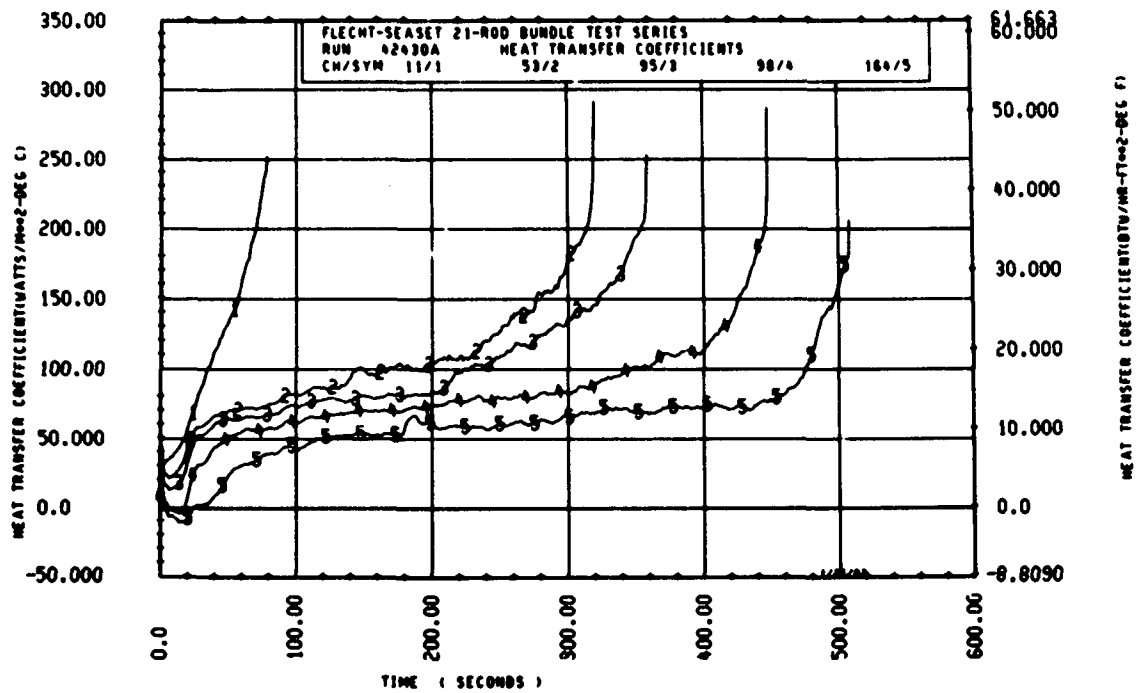
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1115.	1261.	146.	31.5	906.	86.4
4C 3- 3	11	1171.	1304.	133.	28.5	937.	83.9
1C 4- 0	14	1309.	1491.	182.	42.0	894.	136.6
2A 5- 0	17	1365.	1649.	285.	75.0	899.	215.7
2A 5- 7	21	1462.	1720.	258.	71.5	985.	266.8
1D 6- 2	50	1472.	1825.	353.	82.5	1035.	326.8
2D 6- 2	53	1580.	1952.	372.	82.5	942.	324.8
3D 5- 2	58	1592.	1975.	383.	75.0	994.	328.7
5C 6- 2	61	1512.	1808.	295.	59.5	1009.	309.7
1D 6- 3	63	1458.	1812.	354.	110.0	1030.	337.8
4B 5- 3	68	1557.	1938.	382.	85.0	890.	349.8
5D 6- 3	69	1480.	1863.	383.	87.5	936.	333.7
2A 6- 4	70	1468.	1841.	353.	86.5	951.	350.4
3B 6- 4	75	1583.	1985.	403.	82.5	1017.	339.8
3D 6- 6	79	1546.	1979.	433.	87.0	912.	366.8
2D 6- 5	84	1568.	1969.	401.	82.5	889.	353.7
3C 6- 5	85	1587.	2010.	423.	82.0	962.	353.8
3E 6- 5	86	1513.	1893.	380.	88.0	1048.	340.8
3C 6- 6	95	1570.	2002.	432.	87.5	950.	363.8
4A 6- 6	97	1442.	1843.	401.	91.0	973.	359.8
3D 8- 0	98	1211.	1693.	482.	102.0	827.	452.9
5C 5- 6	101	1480.	1783.	303.	60.0	1023.	344.7
1C 7- 0	110	1407.	1694.	287.	46.5	793.	401.9
2B 7- 0	111	1429.	1673.	244.	24.5	710.	407.0
3D 7- 0	115	1454.	1740.	286.	45.0	787.	404.8
5B 7- 0	117	1332.	1669.	337.	89.5	751.	400.7
2B 7- 6	120	1401.	1736.	335.	56.0	793.	431.9
2C 7- 6	121	1376.	1760.	384.	62.0	837.	417.9
2E 7- 6	122	1240.	1621.	381.	57.5	772.	412.9
3A 7- 6	123	1287.	1640.	352.	75.0	761.	437.0
3B 7- 6	124	1417.	1791.	374.	62.0	828.	423.0
4B 7- 6	127	1386.	1792.	406.	90.5	741.	436.3
5C 7- 6	128	1239.	1600.	361.	106.0	844.	414.0
1C 8- 0	131	1176.	1628.	452.	90.5	796.	451.0
2E 8- 0	133	704.	1205.	501.	154.0	673.	468.0
4C 6- 6	136	1558.	1991.	433.	88.0	906.	364.7
5B 8- 0	138	1171.	1594.	423.	88.5	776.	439.0
5C 8- 0	139	1110.	1525.	414.	109.0	742.	442.0
1C 8- 6	141	1001.	1423.	422.	82.5	603.	471.0
1D 8- 6	142	842.	1227.	385.	121.0	518.	465.6
2C 8- 6	143	1045.	1471.	426.	71.0	713.	460.0
4B 8- 6	145	1111.	1471.	360.	56.0	646.	485.0
5D 8- 6	148	985.	1400.	415.	109.0	587.	485.0
3D 9- 3	154	865.	1371.	506.	123.0	722.	489.0
4C 9- 3	156	966.	1369.	403.	106.0	711.	489.3
1D10- 0	161	598.	1050.	452.	160.0	670.	481.8
4B10- 0	164	823.	1204.	380.	106.0	625.	513.0
5D10- 0	167	718.	1135.	416.	128.0	669.	452.0
2A11- 0	168	536.	775.	239.	108.0	625.	355.0
4C11- 0	170	636.	973.	337.	110.0	472.	508.0
1D11- 6	172	397.	805.	408.	160.0	265.	401.0

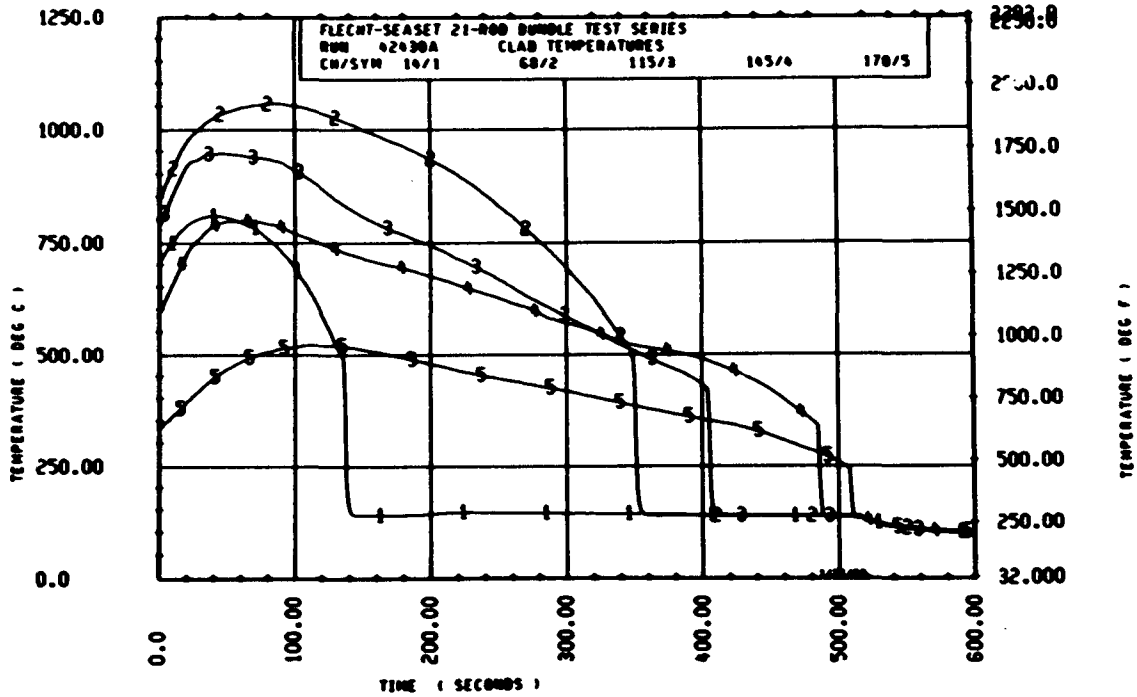
RUN 42430A HEATER ROD STATISTICAL DATA

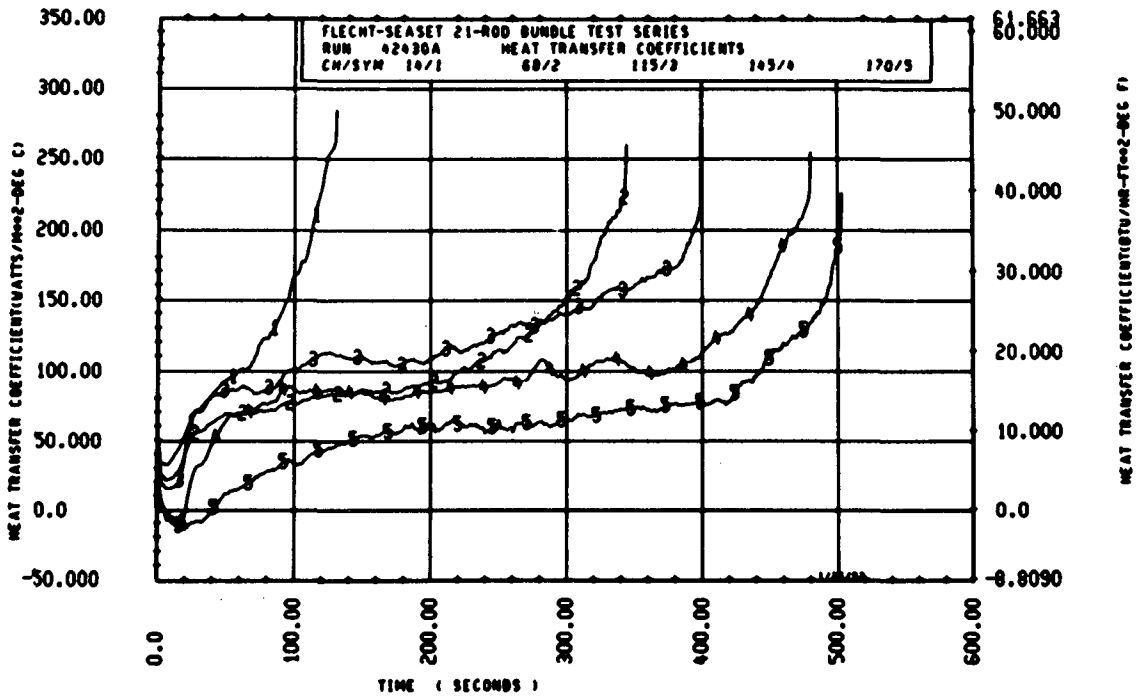
ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	503.2	484.9	492.2	531.1	517.2	523.1	9.5	9.0	9.3
24	814.0	750.7	783.0	872.7	816.8	843.4	17.5	17.0	17.4
39	1171.0	1079.7	1121.9	1303.7	1217.1	1260.6	31.5	26.0	28.7
48	1322.8	1219.4	1275.5	1518.2	1437.7	1471.4	52.5	36.0	42.8
60	1446.9	1311.3	1367.4	1733.0	1572.2	1642.5	75.0	41.5	62.4
67	1551.9	1447.5	1478.9	1863.2	1719.6	1769.4	71.5	55.5	63.8
70	1593.5	1476.1	1543.4	1947.6	1802.2	1876.6	82.5	64.5	75.2
71	1595.6	1474.3	1544.3	1961.3	1797.7	1885.6	78.5	62.0	73.2
72	1602.1	1466.2	1533.6	1972.8	1751.9	1860.5	106.0	46.5	74.5
74	1593.5	1464.7	1545.0	1982.0	1764.2	1903.0	82.5	59.5	75.0
75	1589.1	1458.2	1539.3	1990.0	1812.3	1920.1	110.0	76.5	86.5
76	1588.1	1455.0	1530.1	2001.5	1708.5	1907.6	91.5	44.5	80.7
77	1567.0	1439.4	1526.4	2009.7	1833.8	1932.3	110.0	82.0	89.2
78	1569.7	1442.2	1510.0	2001.5	1783.2	1914.8	105.0	60.0	86.3
84	1453.9	1246.2	1369.5	1744.1	1554.9	1664.0	95.0	24.5	58.7
90	1416.9	1216.3	1322.9	1792.1	1594.9	1701.8	108.0	55.5	76.6
96	1276.9	703.8	1149.1	1731.9	1204.5	1590.6	154.0	73.0	101.8
102	1110.7	841.9	997.7	1545.2	1226.5	1404.9	121.0	43.0	84.4
111	972.5	777.1	894.1	1447.3	1149.4	1284.7	123.0	63.5	90.4
120	823.4	597.6	703.2	1231.7	1050.1	1154.6	160.0	106.0	133.1
132	636.1	498.4	556.8	972.8	762.8	832.9	133.0	106.0	115.5
138	598.6	397.4	485.1	928.4	789.8	852.9	160.0	125.0	140.6

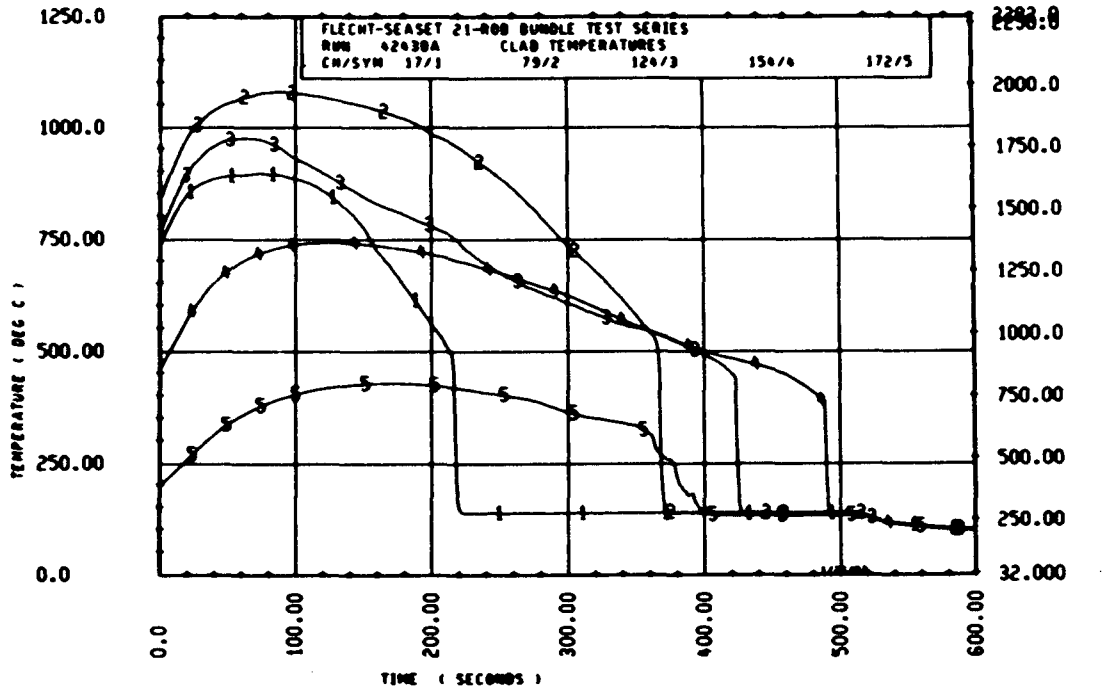
ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	32.3	27.9	30.9	548.9	521.5	556.2	10.0	7.3	9.0
24	60.1	55.5	60.4	791.8	744.8	763.2	30.9	28.2	29.1
39	146.0	132.7	136.7	936.8	840.6	894.5	87.4	83.9	85.9
48	219.3	182.5	195.9	1030.9	893.7	951.2	136.6	119.0	126.8
60	304.3	225.7	275.2	933.7	878.6	900.2	215.7	208.9	212.5
67	312.2	257.5	290.6	985.2	950.6	970.8	266.8	261.7	264.3
70	354.1	322.9	333.2	990.0	929.0	956.5	299.8	287.7	293.0
71	365.7	323.4	341.4	1059.7	858.0	951.8	310.7	285.7	298.6
72	370.7	257.7	326.9	1054.9	904.7	967.5	315.8	292.2	306.4
74	388.5	295.4	358.0	1034.8	881.8	971.9	339.7	309.7	322.6
75	400.9	354.1	380.8	1060.3	889.5	969.0	349.8	324.7	335.7
76	413.4	249.1	377.5	1016.7	929.2	962.5	350.4	326.8	341.6
77	427.1	379.0	405.9	1048.1	889.1	956.2	365.9	340.8	352.6
78	436.1	303.5	404.3	1023.2	863.6	946.7	368.4	344.7	360.8
84	337.2	244.1	294.5	819.0	695.7	747.5	410.0	387.9	402.2
90	411.2	335.4	376.9	892.7	741.4	811.5	437.0	412.9	424.7
96	500.7	379.6	441.5	867.6	673.1	776.9	468.0	439.0	451.4
102	504.4	295.7	407.3	712.9	517.5	622.1	485.0	460.0	471.6
111	530.5	316.9	390.6	751.1	541.7	679.0	497.0	430.0	474.7
120	550.3	359.2	451.4	701.6	624.8	666.9	513.0	440.0	486.3
132	336.7	239.0	276.1	681.5	472.1	579.1	508.0	321.0	400.7
138	431.1	289.5	367.9	607.8	284.5	506.7	507.0	364.7	443.7

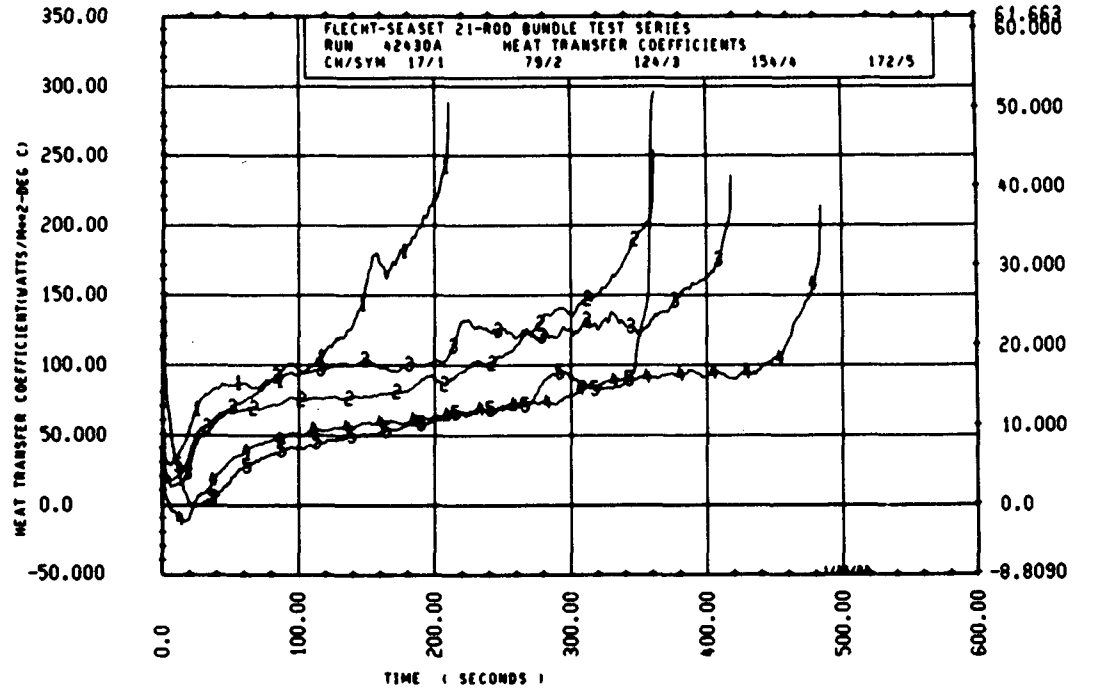

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42430A CLAD TEMPERATURES
CH/SYM 11/1 53/2 95/3 98/4 164/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

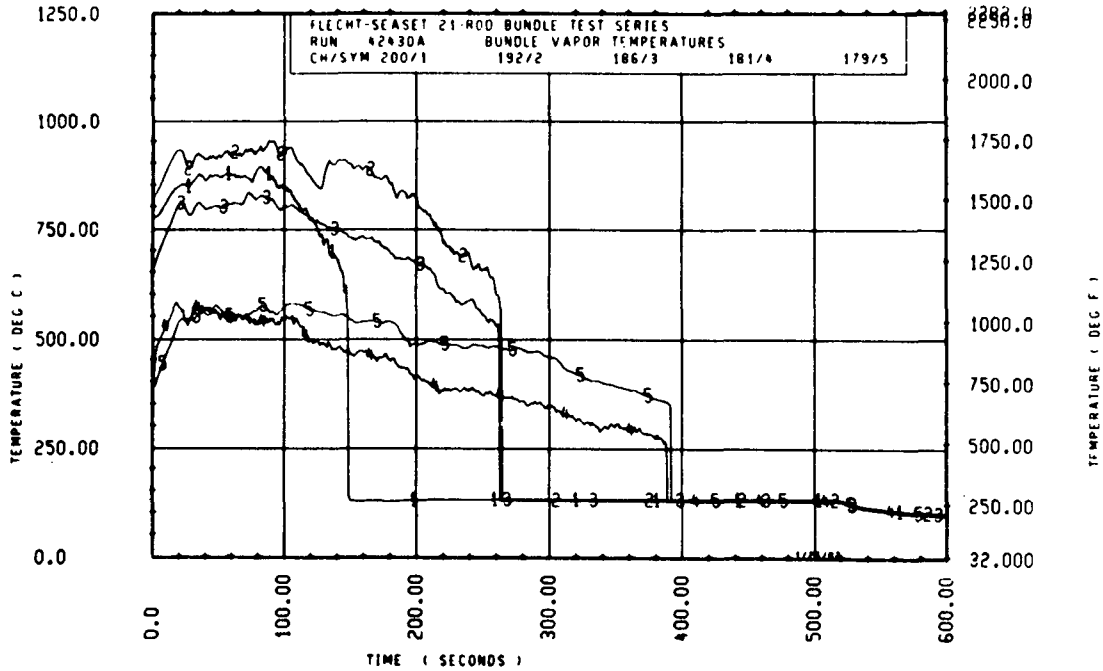

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42430A HEAT TRANSFER COEFFICIENTS
CH/SYM 11/1 53/2 95/3 98/4 164/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

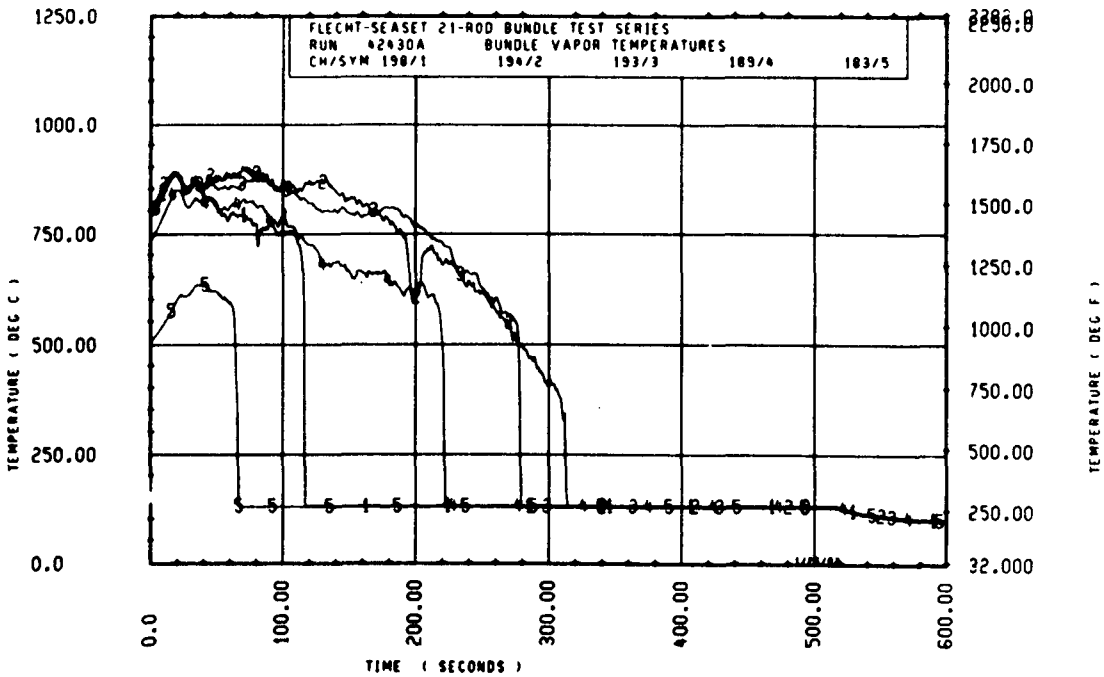

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42430A CLAD TEMPERATURES
CH/SYM 14/1 68/2 115/3 145/4 170/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

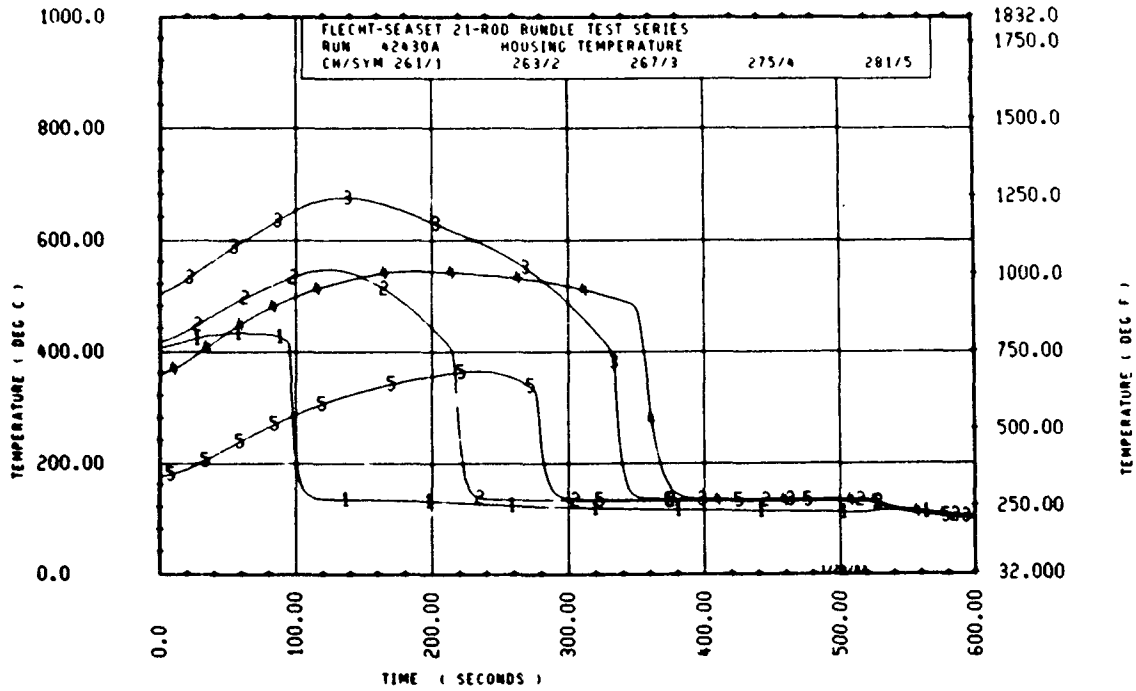

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42430A HEAT TRANSFER COEFFICIENTS
CH/SYM 14/1 68/2 115/3 145/4 170/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

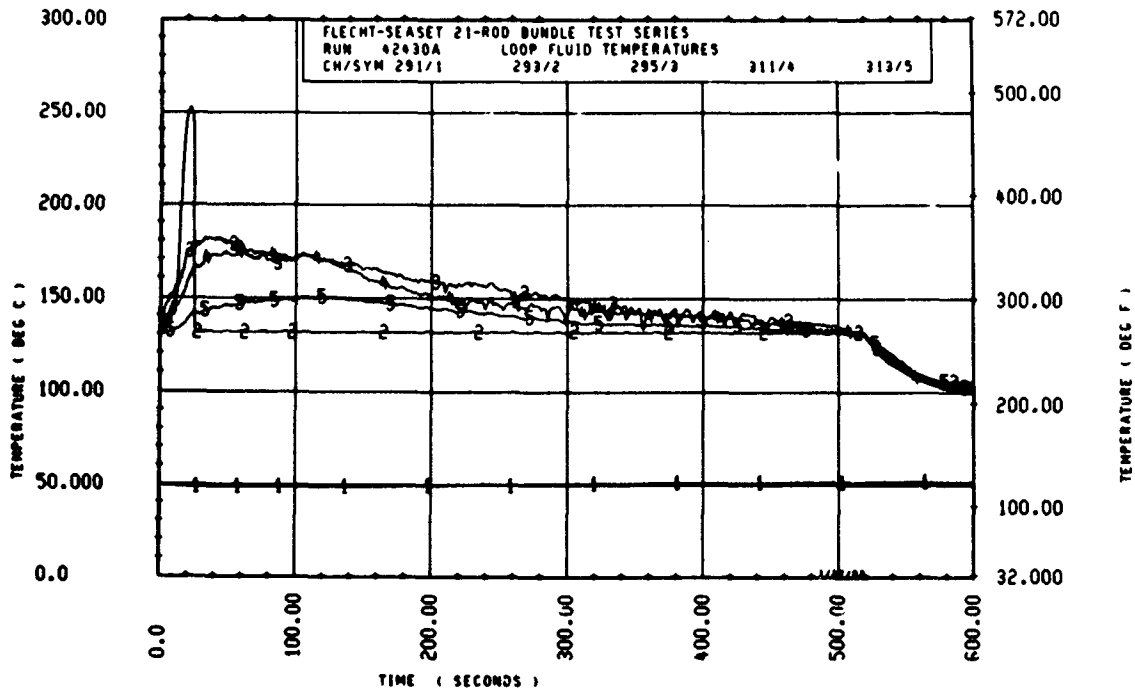

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42430A CLAD TEMPERATURES
CH/SYM 17/1 79/2 124/3 154/4 172/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

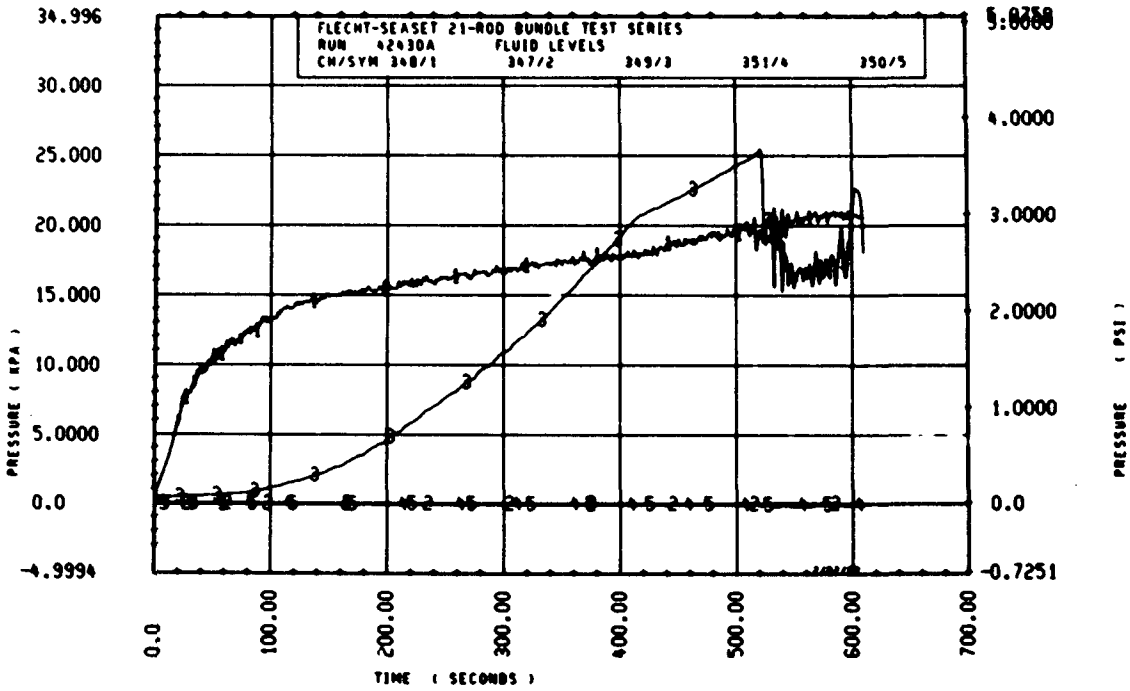

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42430A HEAT TRANSFER COEFFICIENTS
CH/SYM 17/1 79/2 124/3 154/4 172/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

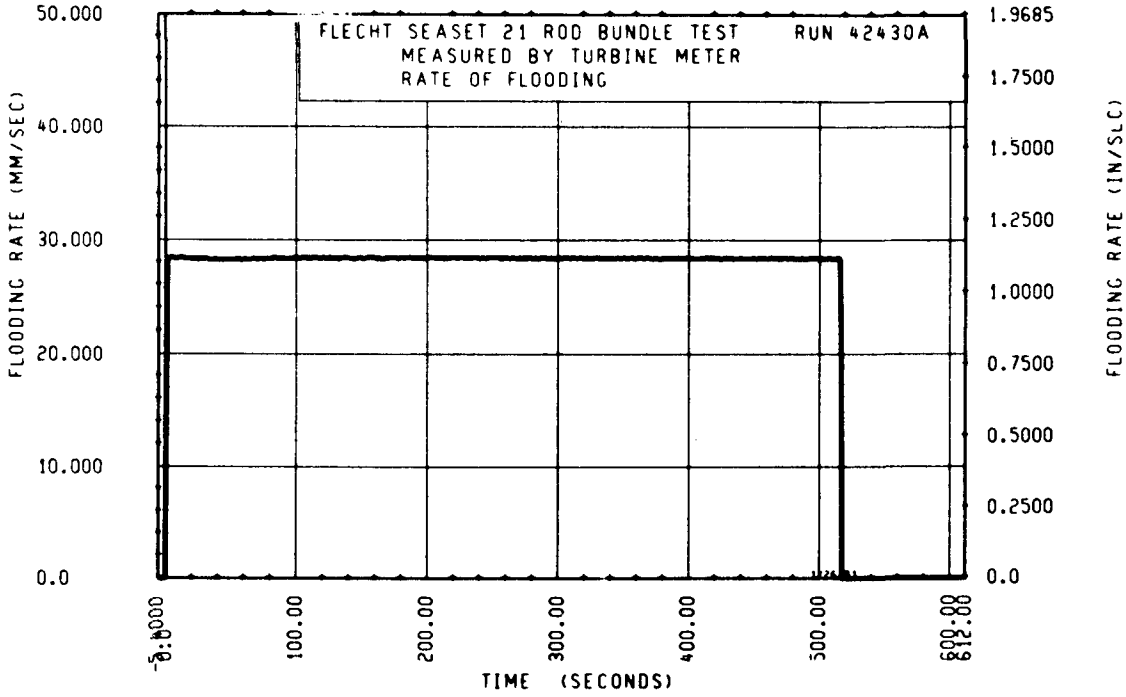

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42430A BUNDLE VAPOR TEMPERATURES
CH/SYM 200/1 192/2 186/3 181/4 179/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

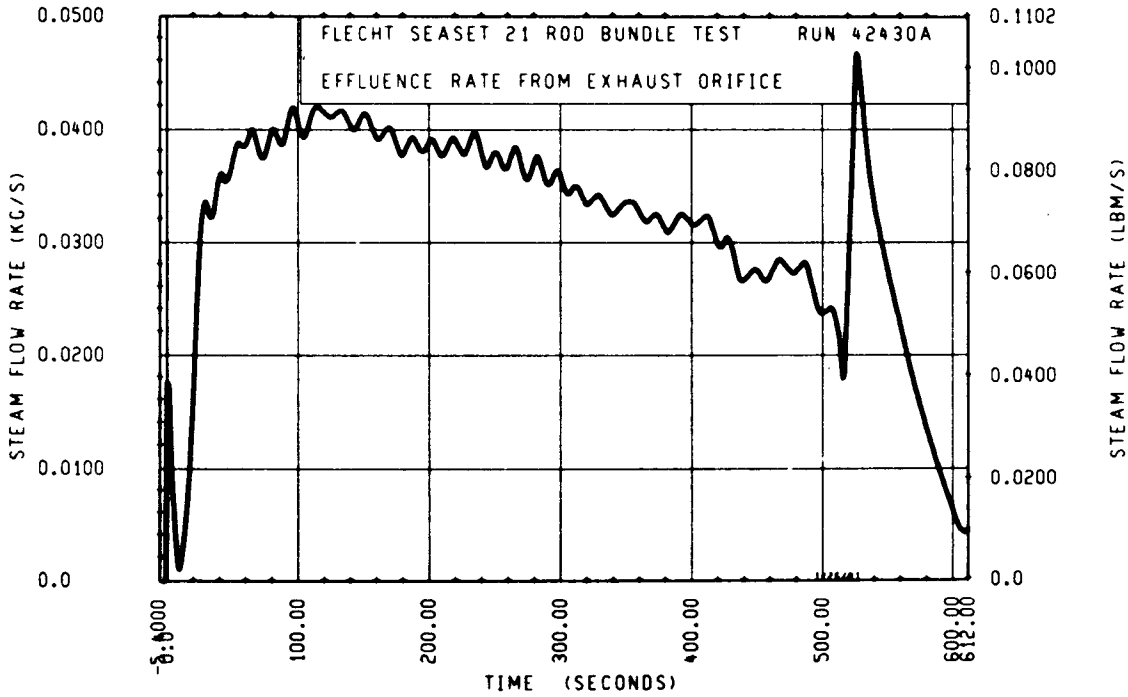

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42430A BUNDLE VAPOR TEMPERATURES
CH/SYM 190/1 194/2 193/3 189/4 183/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

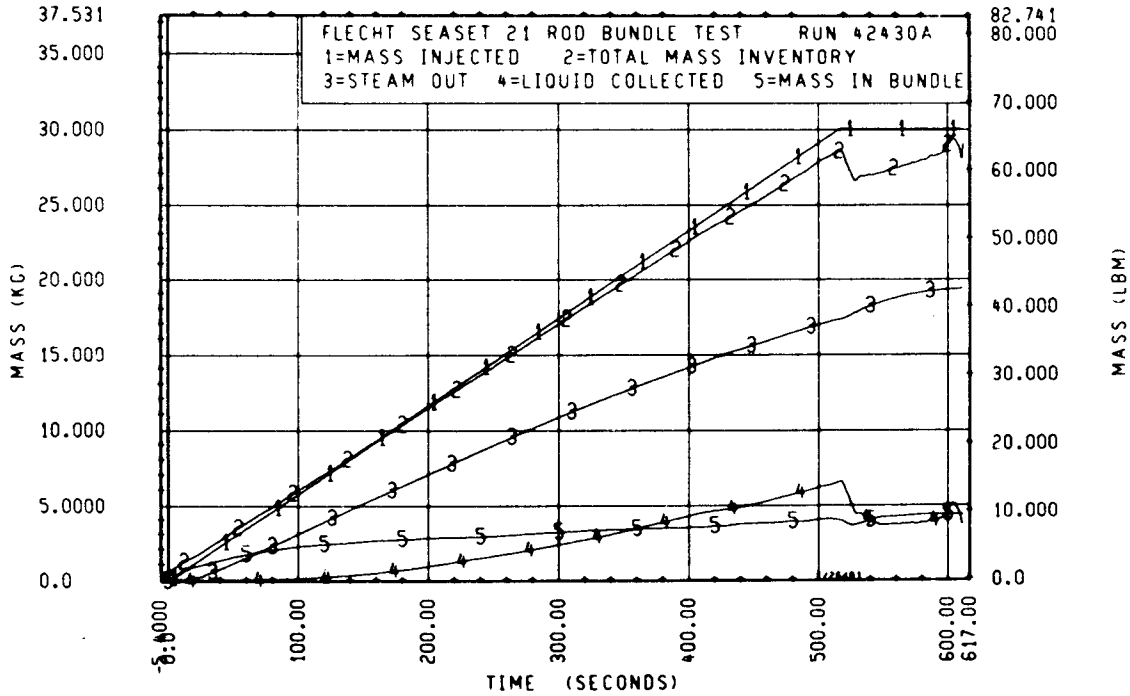

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42430A HOUSING TEMPERATURE
CH/SYM 261/1 263/2 267/3 275/4 281/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1000.0
800.00
600.00
400.00
200.00
0.0
1832.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
100.00
200.00
300.00
400.00
500.00
600.00

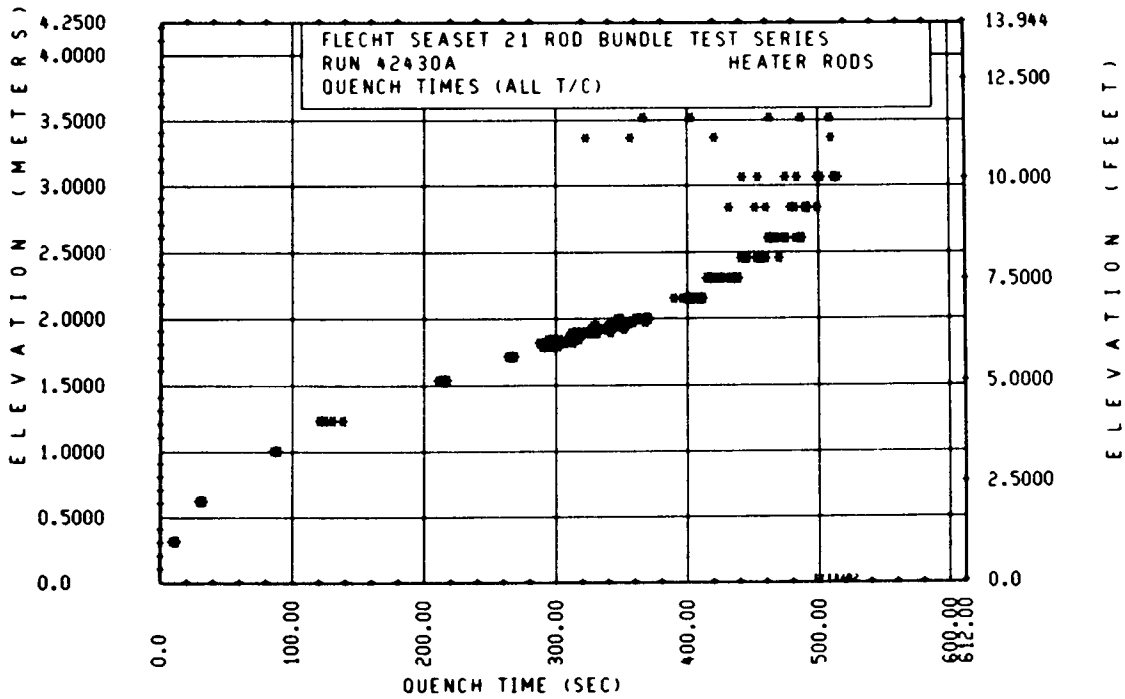

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42430A LOOP FLUID TEMPERATURES
CH/SYM 291/1 293/2 295/3 311/4 313/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
300.00
250.00
200.00
150.00
100.00
50.000
0.0
572.00
500.00
400.00
300.00
200.00
100.00
32.000
100.00
200.00
300.00
400.00
500.00
600.00

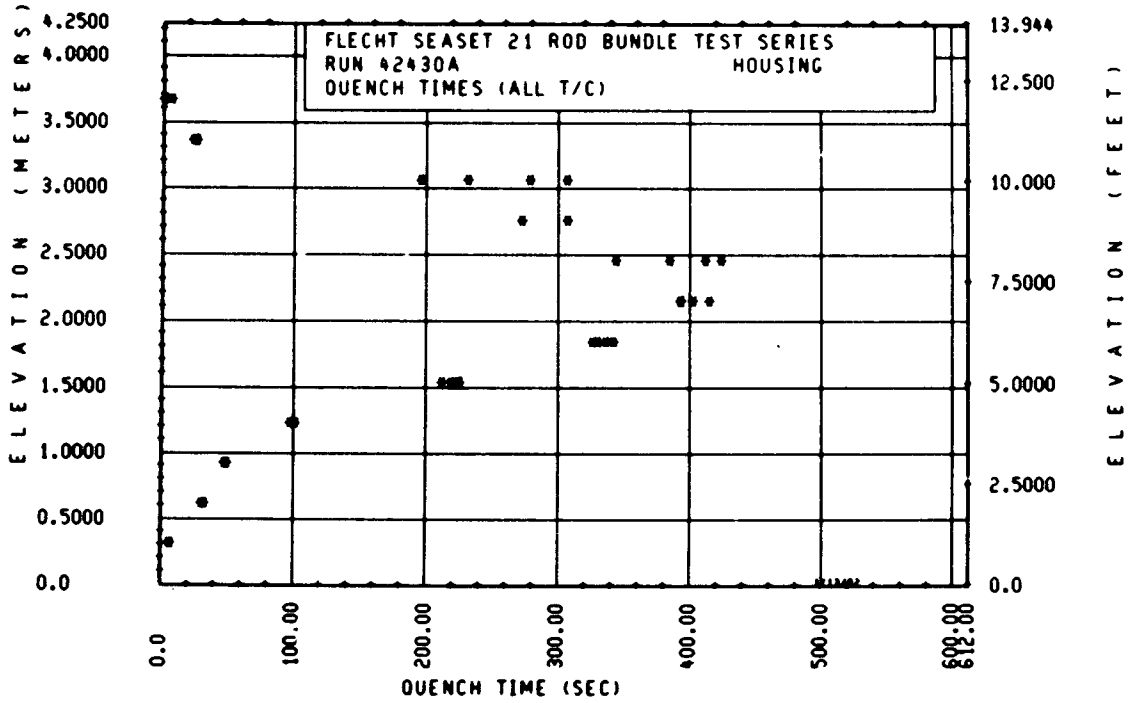

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42430A FLUID LEVELS
CH/SYM 348/1 347/2 349/3 351/4 350/5
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)

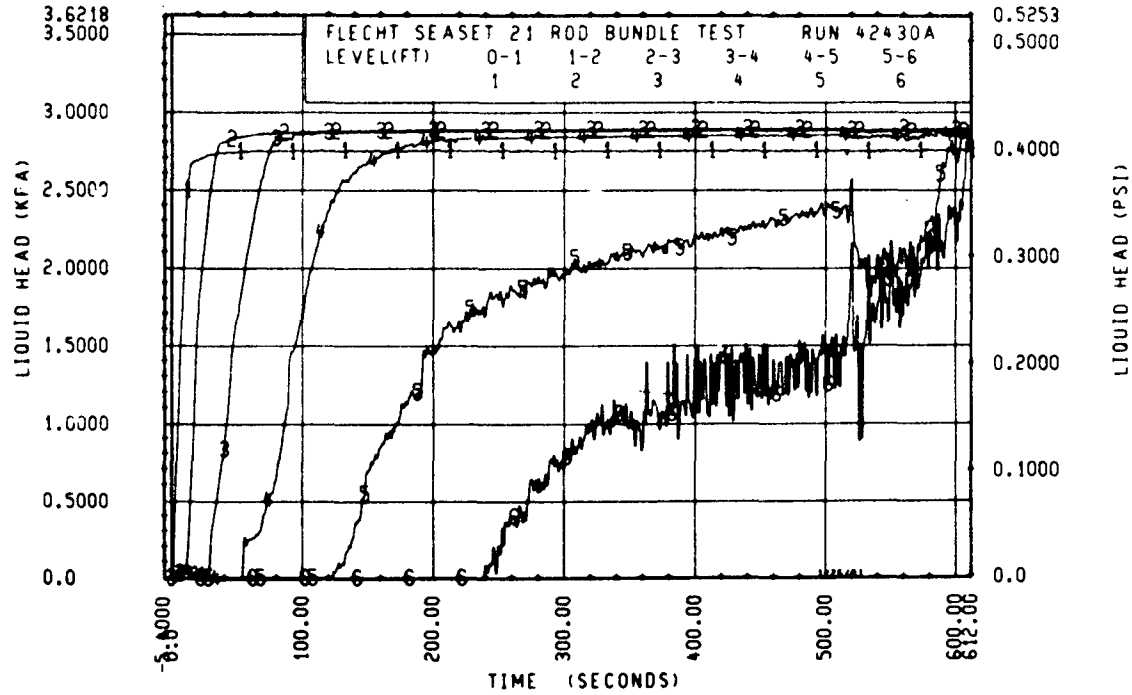

FLECHT SEASET 21 ROD BUNDLE TEST RUN 42430A
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
TIME (SECONDS)

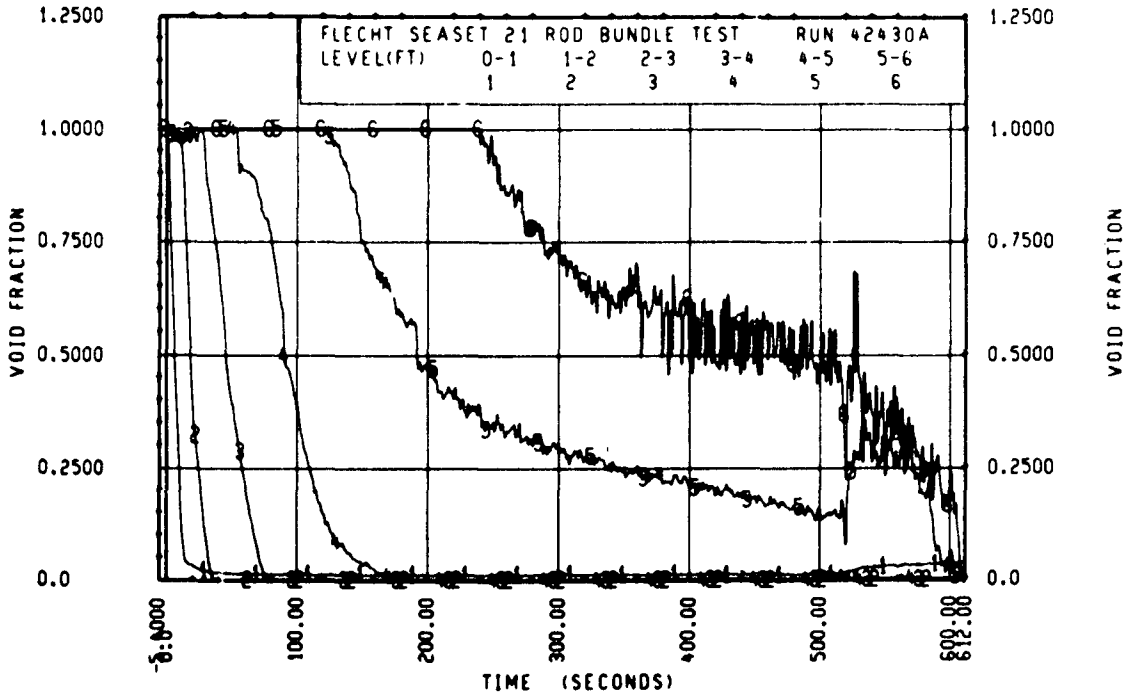

FLECHT SEASET 21 ROD BUNDLE TEST RUN 42430A
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
TIME (SECONDS)
0.0500
0.0400
0.0300
0.0200
0.0100
0.0
0.1102
0.1000
0.0800
0.0600
0.0400
0.0200
0.0
-5.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
612.00

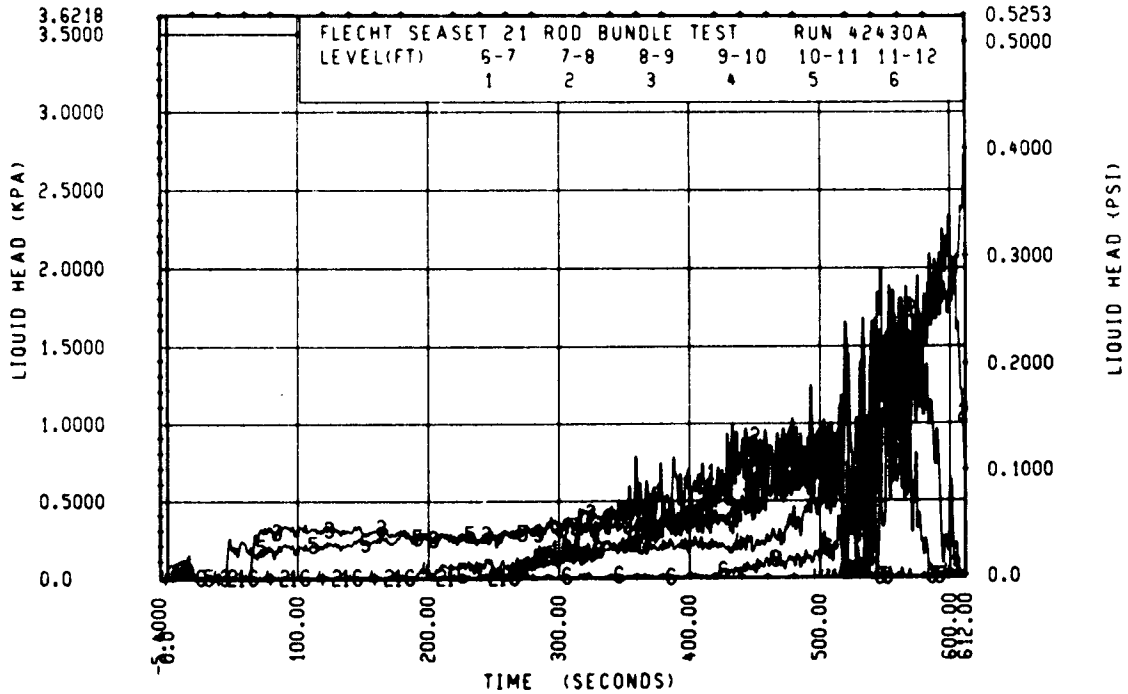

FLECHT SEASET 21 ROD BUNDLE TEST RUN 42430A
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
TIME (SECONDS)
37.531
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
82.741
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
-5.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
617.00

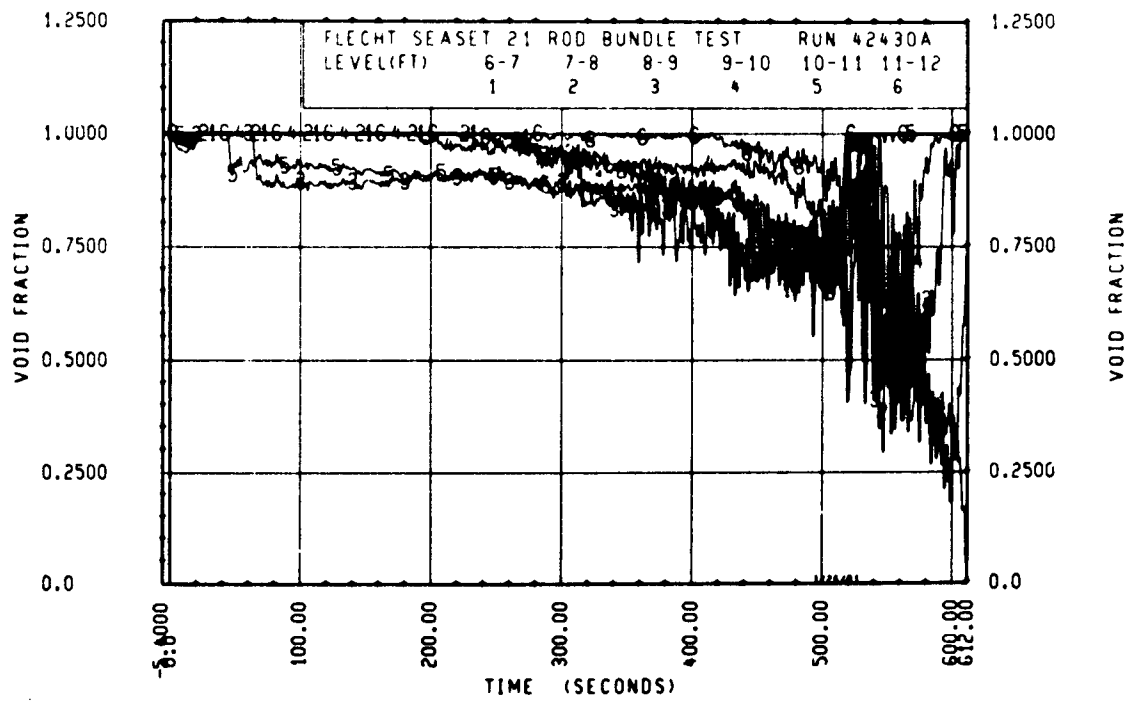

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN 42430A
HEATER RODS
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
4.2500
4.0000
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
13.944
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
QUENCH TIME (SEC)


FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN 42430A
HOUSING
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
4.2500
4.0000
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
13.944
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
QUENCH TIME (SEC)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 42430A
LEVEL(FT) 0-1 1-2 2-3 3-4 4-5 5-6
1 2 3 4 5 6
LIQUID HEAD (KPA)
LIQUID HEAD (PSI)
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 42430A
LEVEL(FT) 0-1 1-2 2-3 3-4 4-5 5-6
1 2 3 4 5 6
VOID FRACTION
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 42430A
LEVEL(FT) 6-7 7-8 8-9 9-10 10-11 11-12
1 2 3 4 5 6
LIQUID HEAD (KPA)
LIQUID HEAD (PSI)
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 42430A
LEVEL(FT) 6-7 7-8 8-9 9-10 10-11 11-12
1 2 3 4 5 6
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41907B
Test Date: 6/18/80
Test Type: Forced Reflood
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.277 MPa (40.1 psia)
Initial peak clad temperature and location	874°C (1606°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28.4 mm/sec (1.12 in./sec)
Coolant temperature	51°C (124°F)
Average and range of initial 1.83 m (72 in.) housing temperature	533°C (529°C - 537°C) [992°F (985°F - 999°F)]
Initial bundle water level	57.7 mm (2.27 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-2.0% constant[a]
Total power:	-0.25% constant[a]
Housing initial temperature at midplane:	+5%[a]

a. Relative to run 42430A

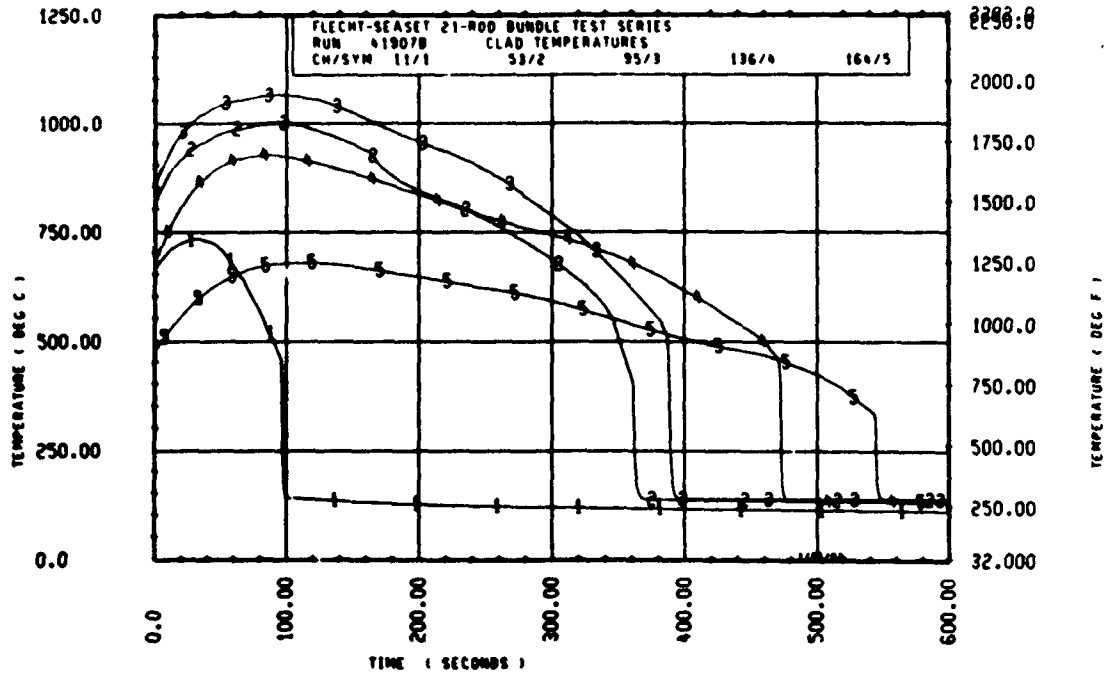
FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER419079

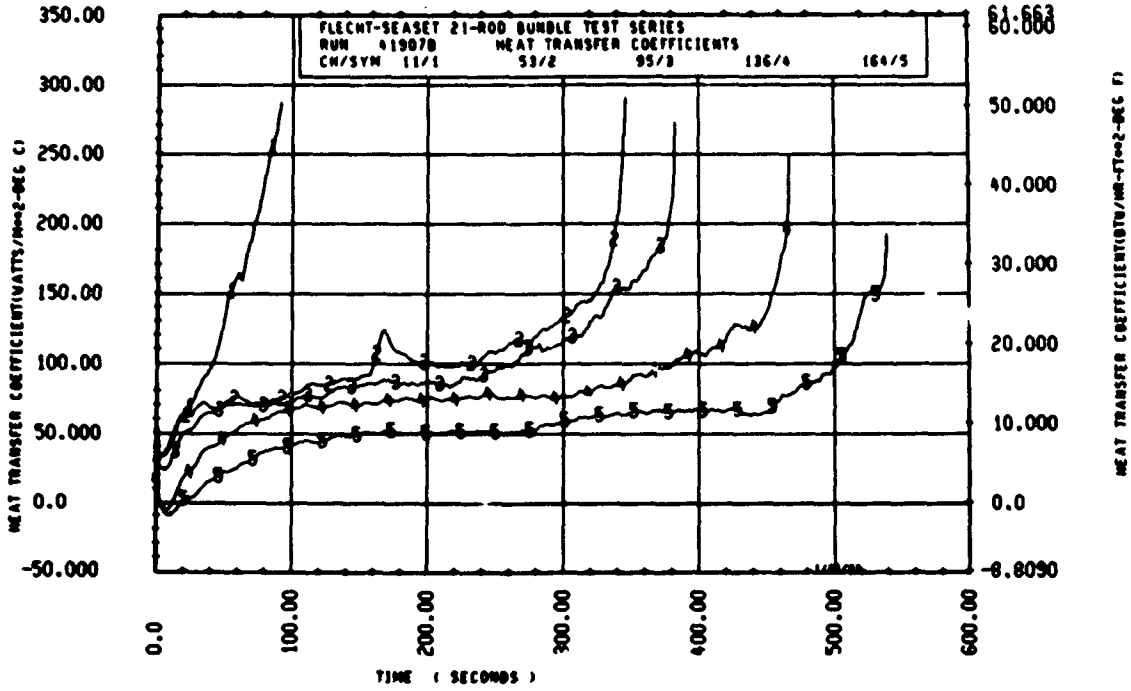
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1128.	1262.	134.	34.5	835.	98.4
4C 3- 3	11	1233.	1353.	120.	28.5	636.	96.7
1C 4- 0	14	1327.	1468.	141.	32.0	267.	147.0
2A 5- 0	17	1374.	1653.	278.	57.5	651.	231.7
2A 5- 7	21	1466.	1758.	291.	82.5	956.	266.6
1D 6- 2	50	1432.	1729.	297.	94.0	883.	347.6
2D 6- 2	53	1510.	1835.	325.	93.5	765.	361.0
3D 6- 2	58	1544.	1842.	298.	94.0	852.	354.6
5C 6- 2	61	1486.	1761.	275.	82.0	962.	342.7
1D 6- 3	63	1429.	1716.	287.	80.0	861.	324.7
4B 6- 3	68	1528.	1834.	306.	94.0	911.	369.6
5D 6- 3	69	1432.	1778.	345.	112.0	811.	397.6
2A 6- 4	70	1430.	1762.	332.	106.0	796.	378.7
2D 6- 4	72	1537.	1856.	320.	94.0	834.	377.6
3B 6- 4	75	1561.	1886.	324.	89.0	802.	362.1
3C 6- 5	85	1600.	1937.	337.	85.0	911.	378.2
3E 6- 5	86	1474.	1769.	295.	94.5	941.	366.6
3C 6- 6	95	1560.	1950.	370.	95.0	923.	387.7
3D 6- 6	96	1543.	1916.	372.	94.0	907.	384.6
4A 6- 6	97	1412.	1797.	385.	106.0	900.	396.6
4C 6- 6	98	1553.	1920.	367.	95.0	975.	360.9
5C 6- 6	101	1468.	1778.	310.	97.5	956.	365.5
1C 7- 0	110	1436.	1684.	248.	51.5	745.	427.9
2B 7- 0	111	1458.	1689.	231.	49.0	726.	443.9
3D 7- 0	115	1493.	1743.	250.	46.5	767.	422.0
5B 7- 0	117	1355.	1635.	281.	82.5	723.	444.6
2B 7- 6	120	1429.	1769.	340.	82.0	773.	469.9
2C 7- 6	121	1439.	1775.	337.	56.5	766.	462.0
2E 7- 6	122	1279.	1592.	313.	63.0	726.	467.9
3A 7- 6	123	1405.	1744.	339.	81.0	666.	453.6
3B 7- 6	124	1444.	1811.	367.	79.0	619.	458.0
4B 7- 6	127	1455.	1804.	350.	94.0	813.	460.2
5C 7- 6	128	1418.	1740.	321.	82.0	632.	460.9
1C 8- 0	131	1230.	1640.	409.	89.0	776.	462.6
2E 8- 0	133	971.	1479.	508.	103.0	691.	490.7
3D 8- 0	136	1266.	1701.	434.	82.5	641.	471.9
5B 8- 0	138	1227.	1620.	392.	98.0	705.	467.9
5C 8- 0	139	1304.	1691.	387.	93.0	770.	469.7
1C 8- 6	141	1035.	1433.	398.	85.0	629.	504.5
1D 8- 6	142	845.	1252.	407.	111.0	629.	509.6
2C 8- 6	143	1110.	1521.	411.	82.0	673.	510.0
4B 8- 6	145	1201.	1658.	457.	98.0	740.	504.8
5D 8- 6	148	1016.	1307.	291.	41.0	597.	516.3
3D 9- 3	154	932.	1369.	436.	98.5	720.	504.9
4C 9- 3	156	1045.	1423.	377.	87.0	690.	515.0
1D10- 0	161	613.	1126.	512.	166.0	603.	549.0
4B10- 0	164	898.	1256.	357.	107.0	630.	543.9
5D10- 0	167	710.	1152.	442.	169.0	772.	456.0
2A11- 0	168	555.	786.	230.	142.0	593.	516.0
4C11- 0	170	632.	973.	341.	126.0	541.	541.0
1D11- 6	172	310.	833.	523.	168.0	546.	533.0

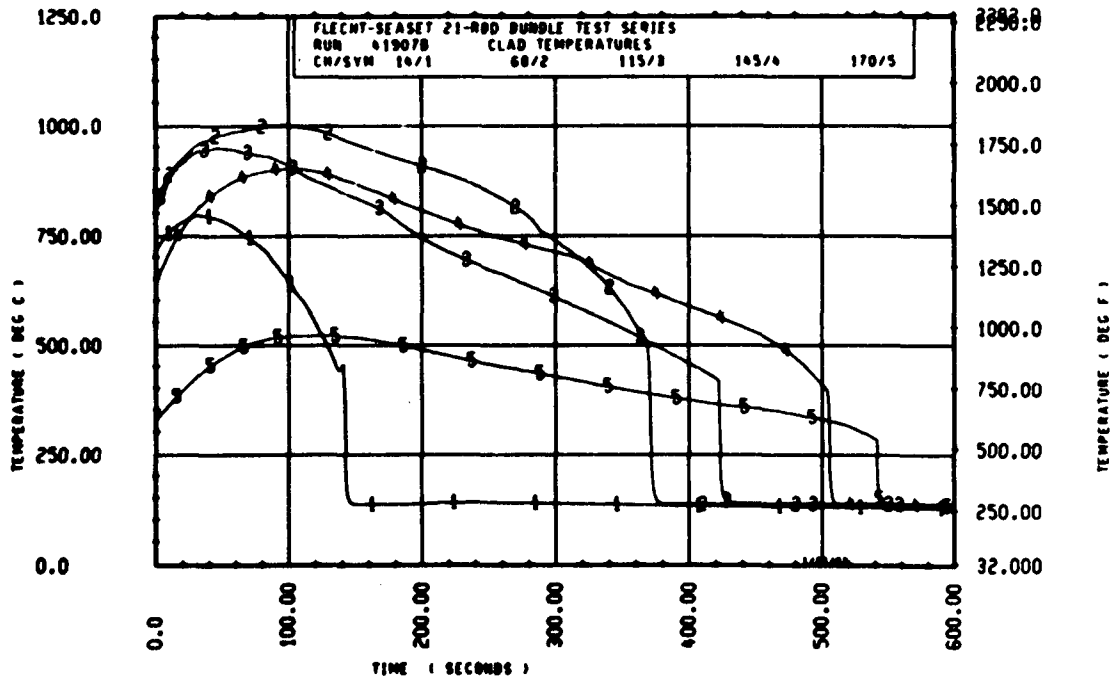
RUN 419078 HEATER ROD STATISTICAL DATA

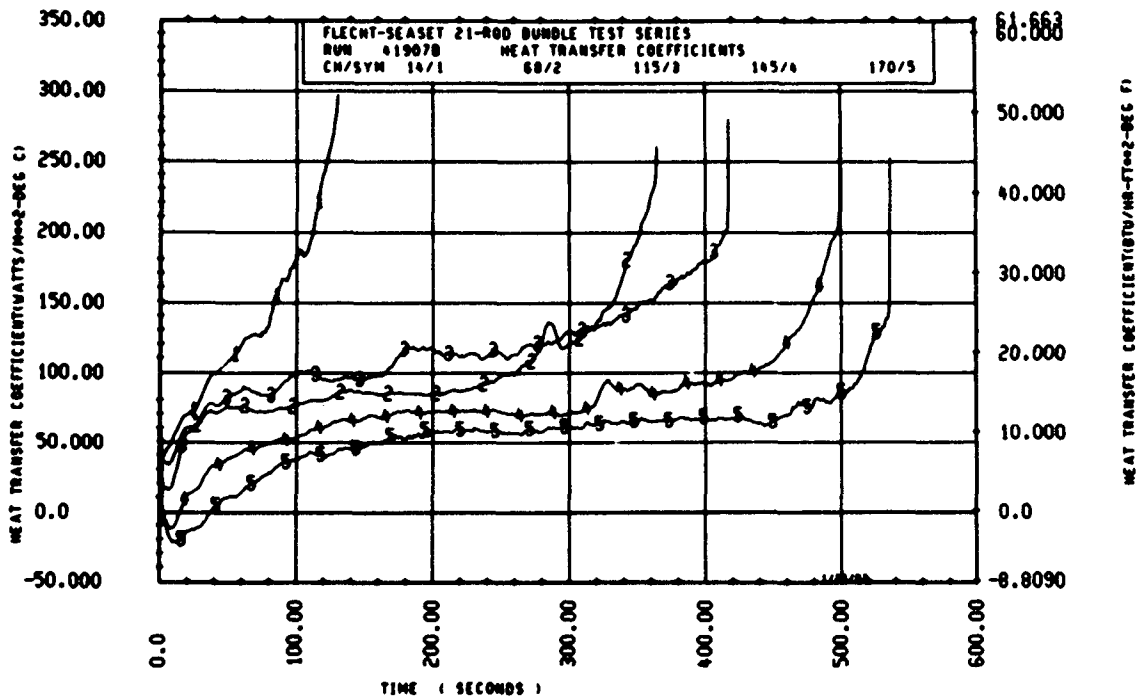
ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	640.6	578.9	600.5	652.0	594.0	614.1	6.5	5.0	5.8
24	892.7	808.6	852.3	935.7	854.0	894.4	12.5	11.5	12.0
39	1233.2	1121.2	1151.2	1353.0	1256.7	1285.5	34.5	25.0	30.4
48	1370.1	1261.8	1316.8	1543.0	1415.2	1479.8	46.5	32.0	36.3
60	1485.3	1366.7	1398.6	1768.7	1628.7	1676.5	75.0	52.5	63.5
67	1572.3	1447.8	1489.1	1848.5	1757.5	1781.4	82.5	71.5	77.3
70	1605.8	1400.1	1510.5	1924.6	1726.3	1820.1	88.5	58.0	76.9
71	1590.7	1417.8	1510.3	1928.1	1721.8	1821.9	106.0	82.0	87.2
72	1480.0	1387.5	1454.0	1791.0	1666.8	1733.8	89.5	69.5	81.8
74	1547.4	1431.7	1500.0	1887.0	1721.8	1809.2	107.0	82.0	92.0
75	1584.2	1429.0	1511.8	1887.0	1716.3	1815.7	112.0	80.0	91.3
76	1597.8	1429.6	1508.0	1898.3	1736.3	1824.2	107.0	82.5	95.1
77	1600.4	1399.0	1509.0	1937.3	1744.1	1842.9	107.0	85.0	96.1
78	1579.8	1400.1	1487.7	1949.9	1766.4	1853.9	126.0	94.0	101.0
84	1493.5	1354.6	1429.0	1747.5	1617.8	1689.6	82.5	46.5	63.6
90	1454.9	1278.5	1390.9	1811.2	1591.7	1720.8	94.0	52.5	73.4
96	1315.8	971.2	1239.4	1745.3	1479.4	1647.1	103.0	72.0	88.0
102	1201.5	844.6	1039.0	1658.1	1251.5	1434.1	111.0	41.0	77.9
111	1045.2	663.5	933.7	1422.7	1158.3	1299.1	242.0	81.5	109.9
120	898.3	613.4	739.2	1292.2	1121.4	1195.6	177.0	107.0	141.9
132	632.2	505.7	556.8	972.8	769.0	841.8	163.0	126.0	143.5
138	622.3	310.0	483.2	952.2	800.2	879.8	163.0	130.0	150.0

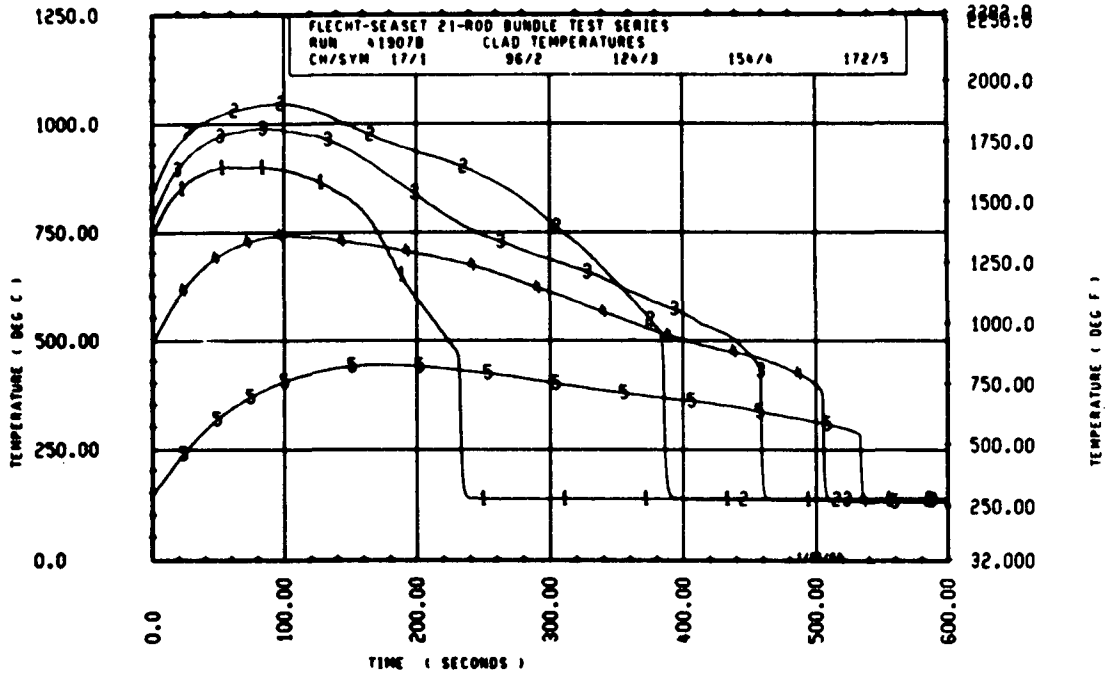
ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	15.1	11.4	13.6	606.3	579.3	589.0	12.9	10.0	11.2
24	45.2	36.0	42.0	737.0	701.9	714.5	42.3	36.9	40.7
39	149.1	119.6	134.3	858.4	827.3	839.7	100.9	96.7	99.2
48	190.8	141.0	163.0	922.0	286.6	748.6	147.0	134.7	141.1
60	289.2	260.1	277.7	950.7	833.8	871.7	233.0	222.6	226.8
67	314.2	276.2	292.3	957.2	881.2	936.4	291.6	273.6	284.4
70	336.3	254.4	309.6	939.1	868.4	918.5	314.5	301.6	309.6
71	337.4	278.3	311.6	1019.6	862.5	933.9	357.6	309.6	323.9
72	314.7	254.0	279.8	954.9	808.6	877.5	332.8	320.6	326.7
74	376.3	273.5	309.2	996.2	651.4	860.4	372.1	339.8	355.3
75	345.4	279.0	303.9	996.7	811.4	900.0	397.6	324.7	364.4
76	355.3	282.1	316.2	965.7	797.8	889.0	385.7	362.6	372.7
77	358.2	295.2	333.9	941.0	839.0	902.1	388.8	366.8	379.0
78	386.5	310.0	366.1	974.8	854.2	899.9	403.8	380.9	391.2
84	292.0	227.6	260.6	786.7	688.2	745.2	444.8	422.0	434.2
90	367.0	280.6	329.4	860.6	704.7	795.2	484.0	450.0	461.3
96	508.2	368.1	407.7	840.8	690.5	767.8	491.9	471.9	484.8
102	479.3	290.5	395.1	739.6	581.1	641.4	516.3	499.0	509.8
111	495.3	289.0	365.4	719.6	564.2	647.9	537.0	504.9	521.1
120	552.6	351.0	456.4	772.2	602.6	644.9	554.9	456.0	535.8
132	340.6	227.1	283.0	674.0	540.8	588.8	541.0	186.6	420.6
138	523.3	307.6	396.6	590.9	416.1	524.0	557.0	362.0	508.2

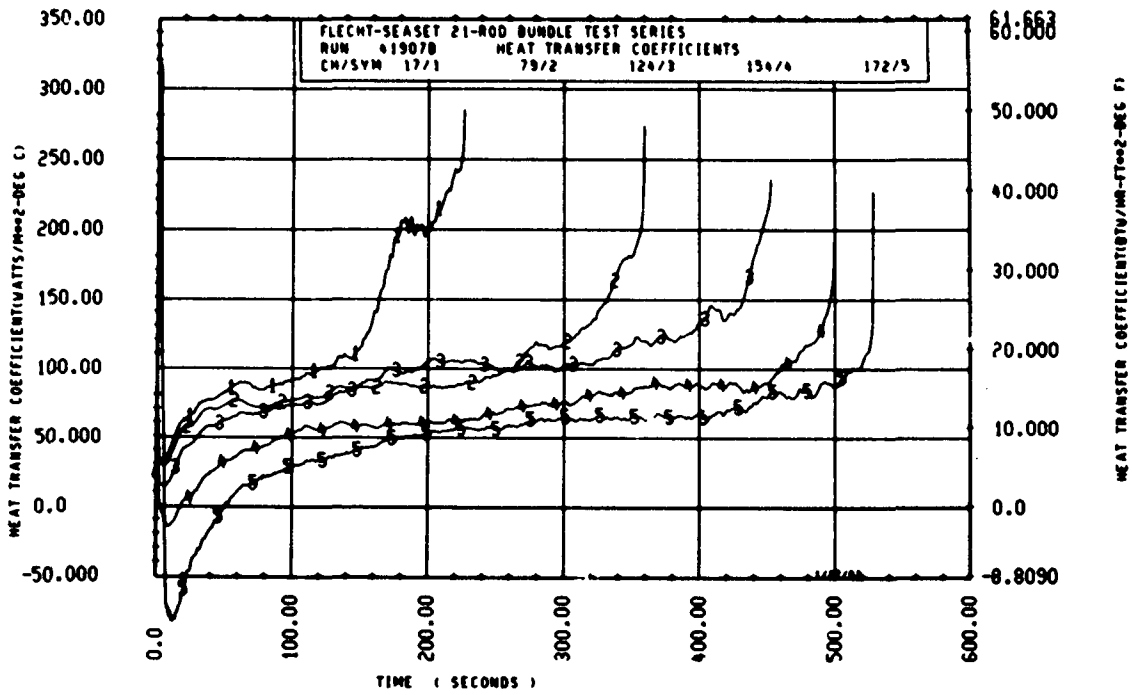

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41907B CLAD TEMPERATURES
CH/SYM 11/1 53/2 95/3 136/4 164/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

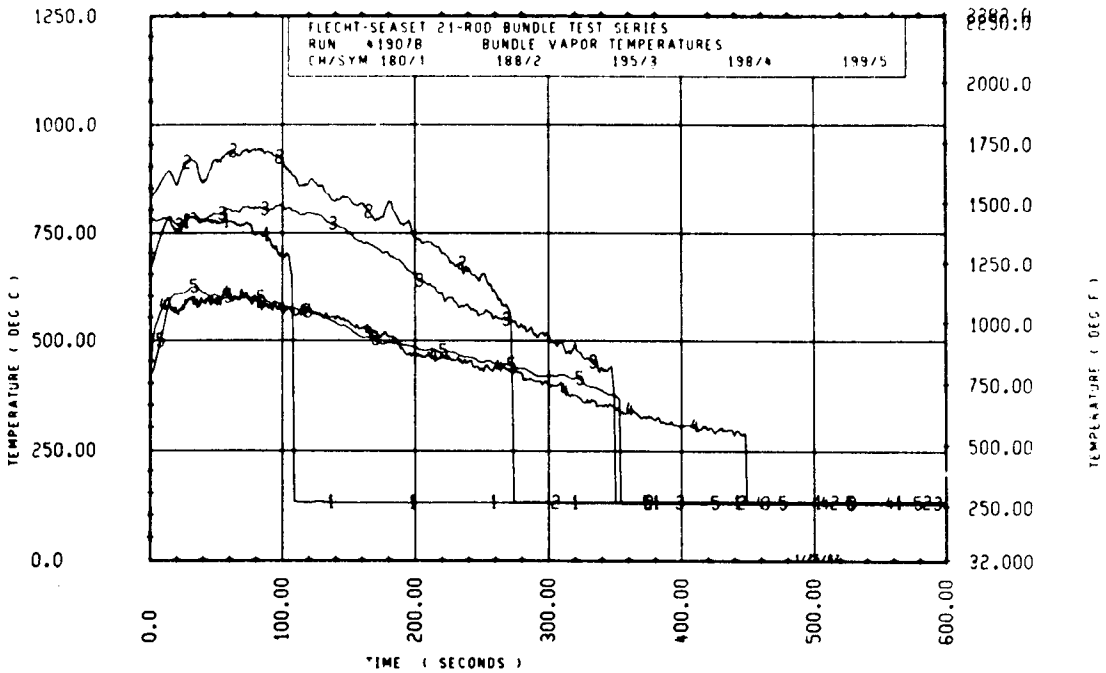

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41907B HEAT TRANSFER COEFFICIENTS
CH/SYM 11/1 53/2 95/3 136/4 164/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

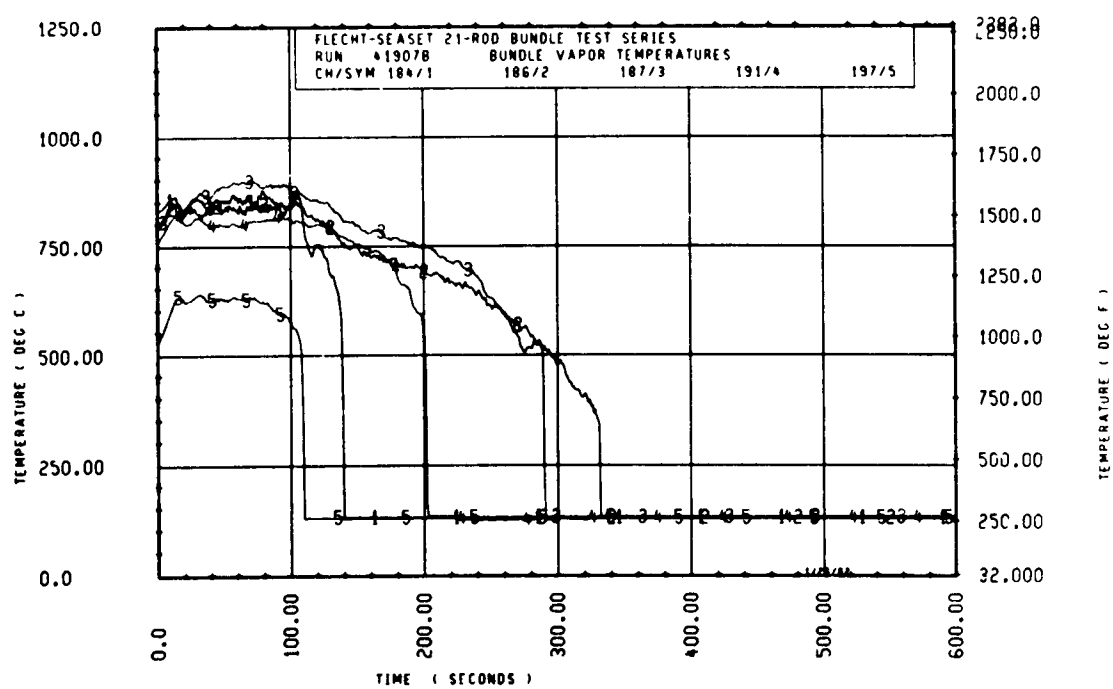

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 419078 CLAD TEMPERATURES
CH/SYM 14/1 68/2 115/3 145/4 170/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

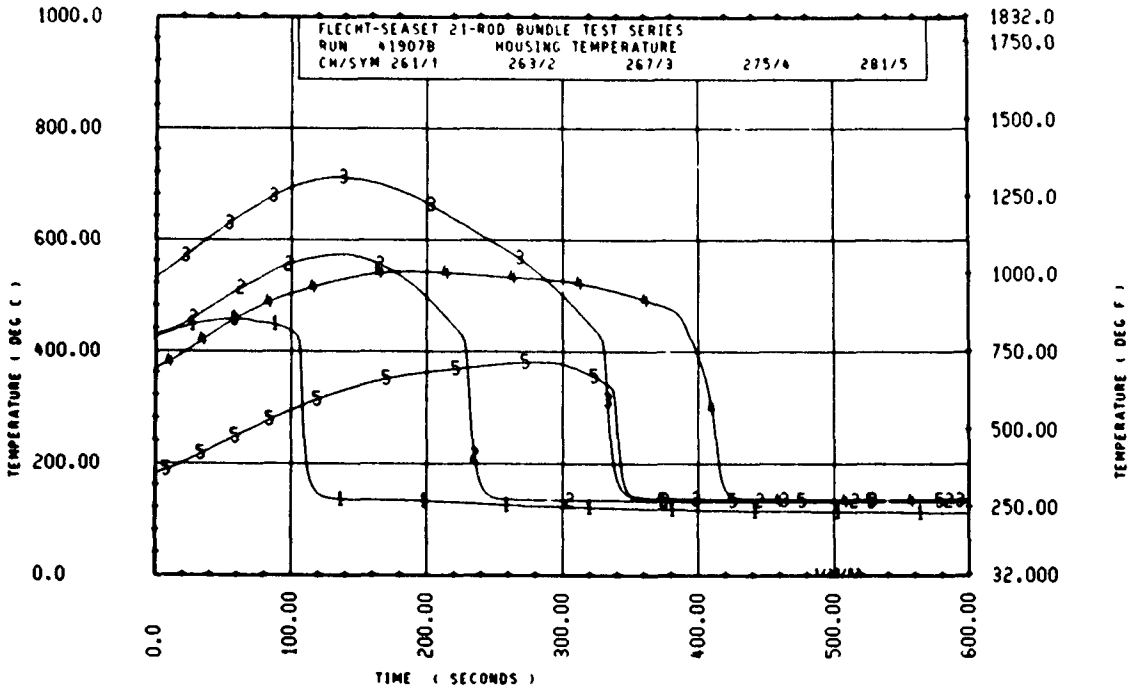

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 419078 HEAT TRANSFER COEFFICIENTS
CH/SYM 14/1 68/2 115/3 145/4 170/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

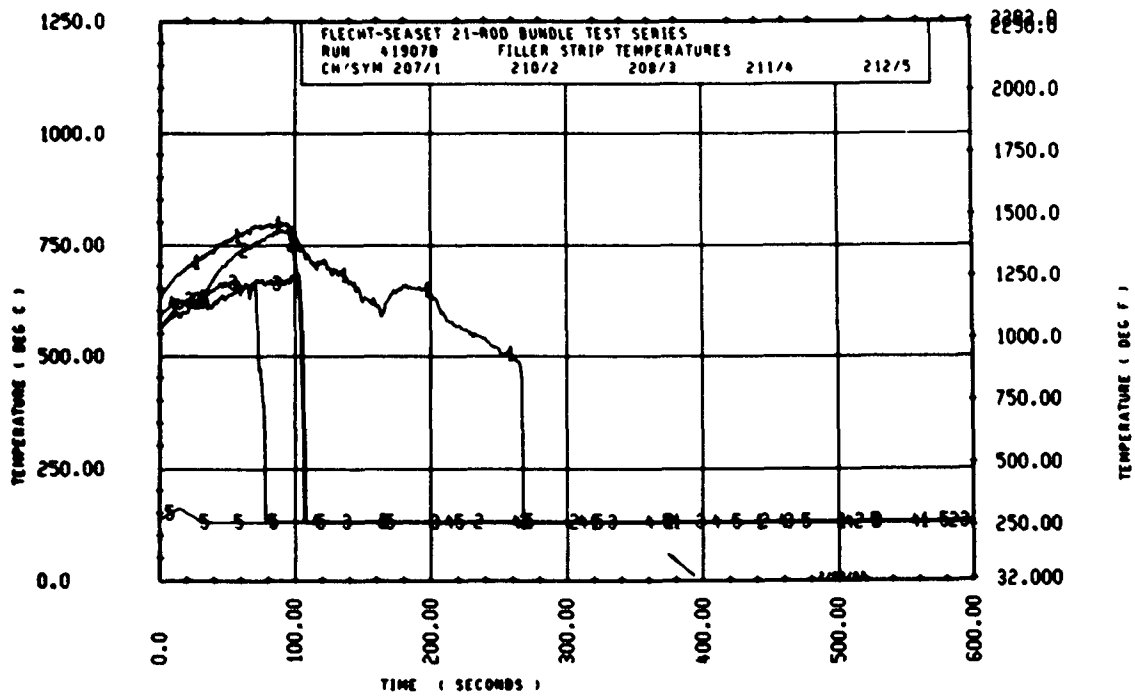

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41907B CLAD TEMPERATURES
CH/SYM 17/1 96/2 124/3 154/4 172/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

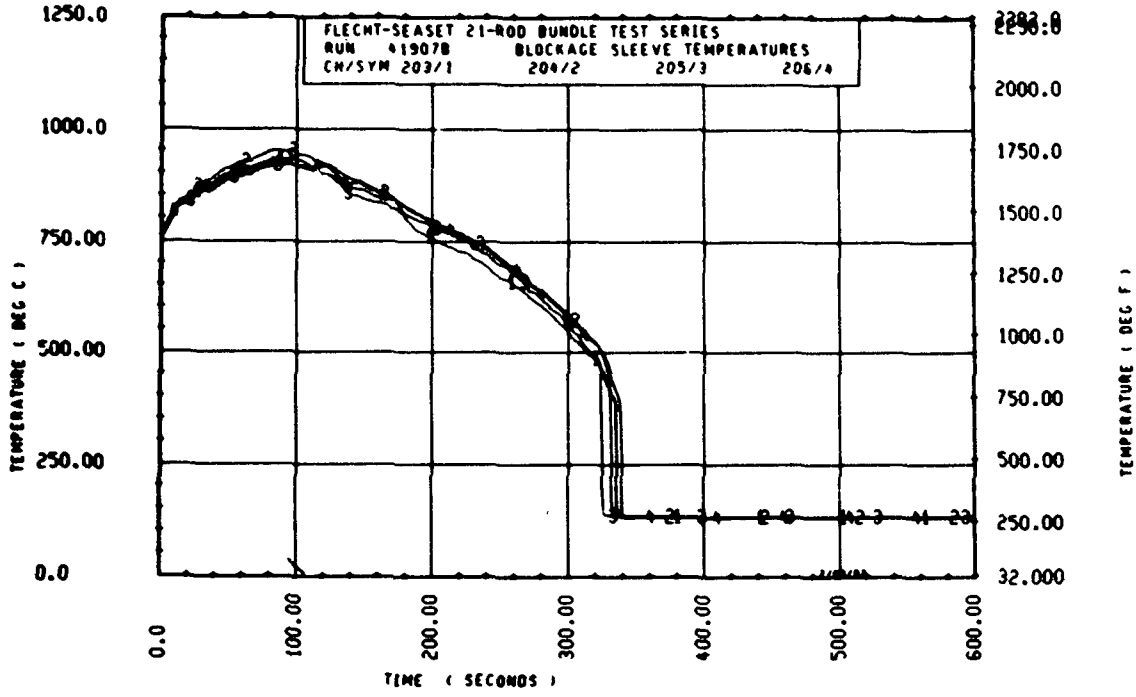

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41907B HEAT TRANSFER COEFFICIENTS
CH/SYM 17/1 79/2 124/3 154/4 172/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

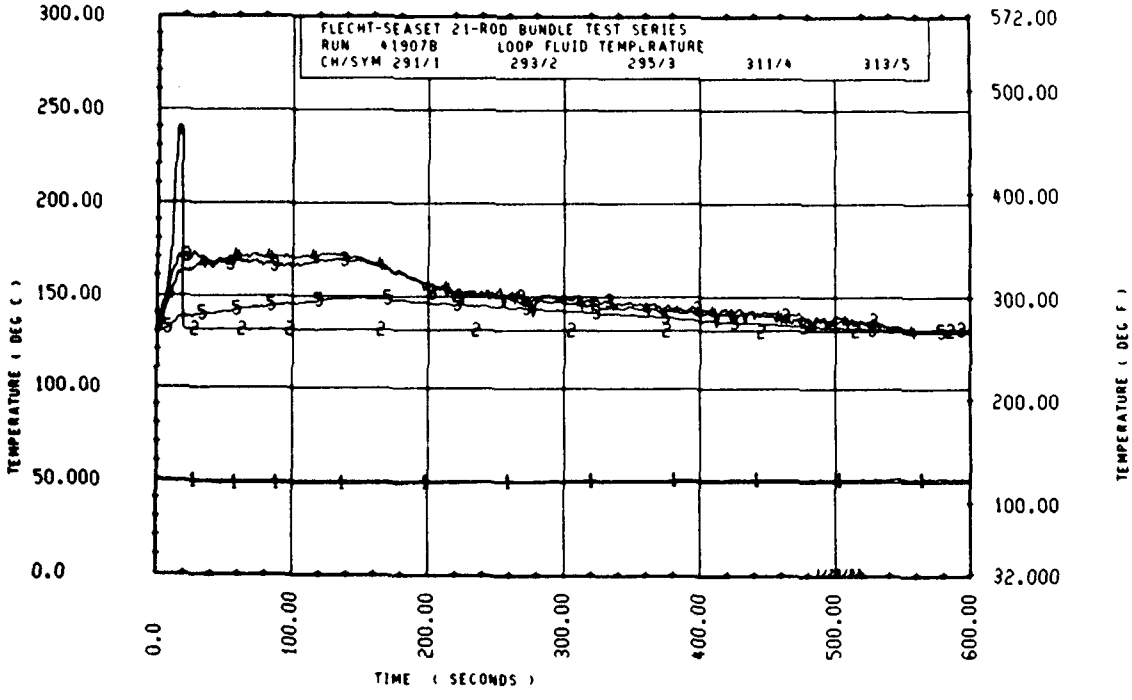

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41907B BUNDLE VAPOR TEMPERATURES
CH/SYM 180/1 188/2 195/3 198/4 199/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

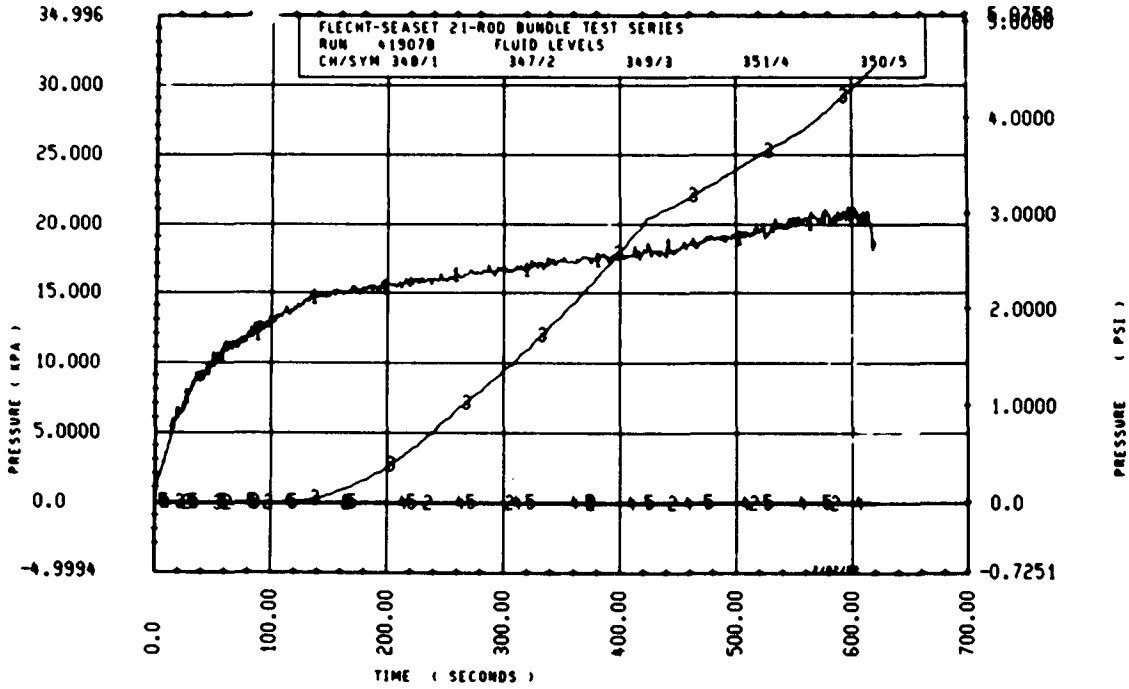

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41907B BUNDLE VAPOR TEMPERATURES
CH/SYM 184/1 186/2 187/3 191/4 197/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

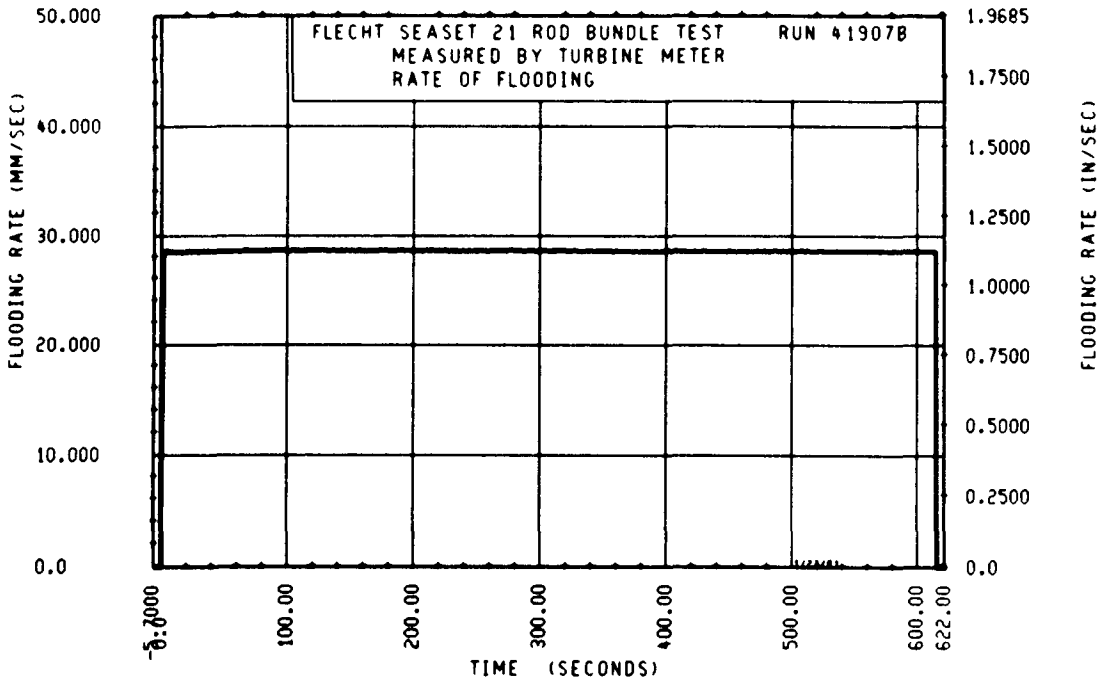

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41907B HOUSING TEMPERATURE
CH/SYM 261/1 263/2 267/3 275/4 281/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1000.0
800.00
600.00
400.00
200.00
0.0
1832.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

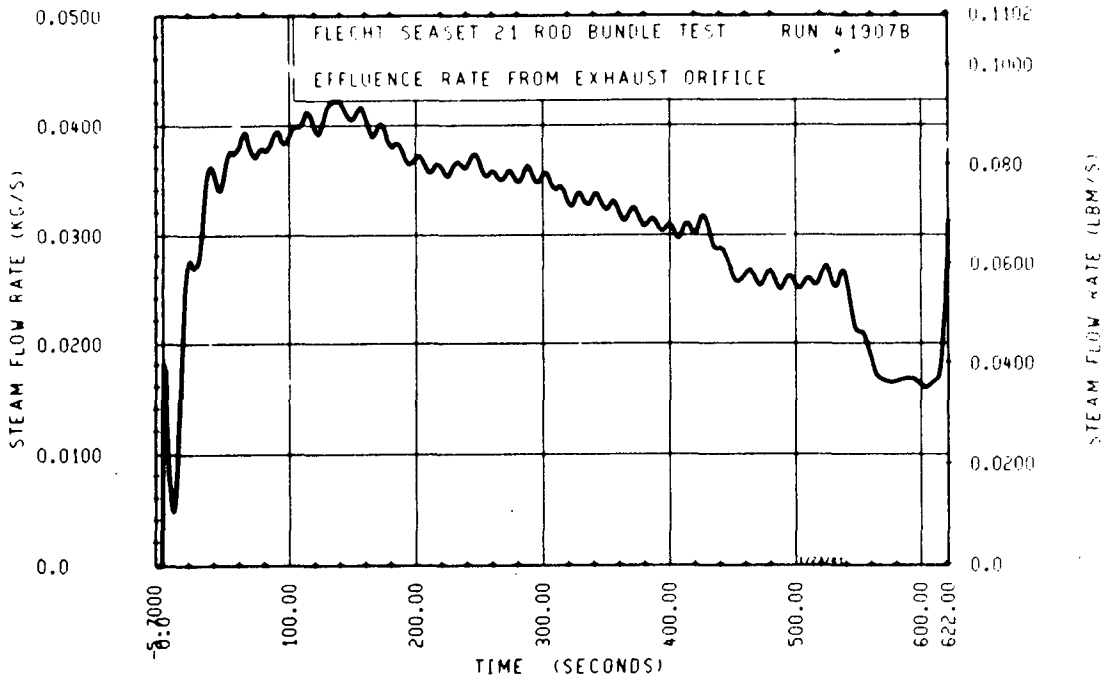

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41907B FILLER STRIP TEMPERATURES
CH/SYM 207/1 210/2 208/3 211/4 212/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

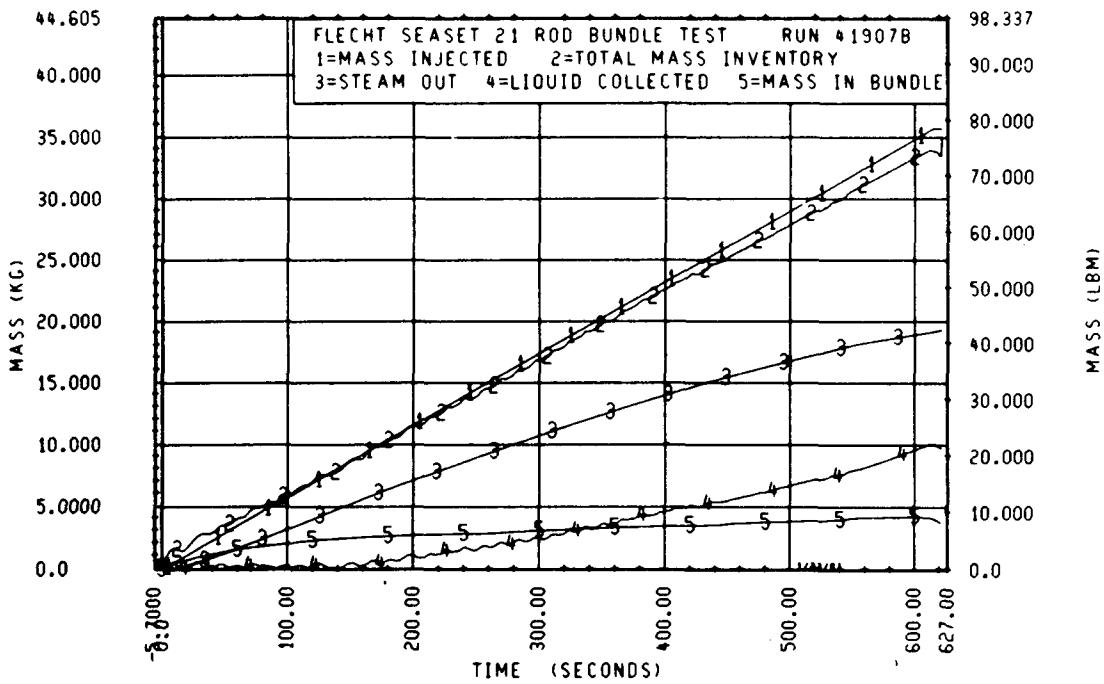

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41907B BLOCKAGE SLEEVE TEMPERATURES
CH/SYM 203/1 204/2 205/3 206/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

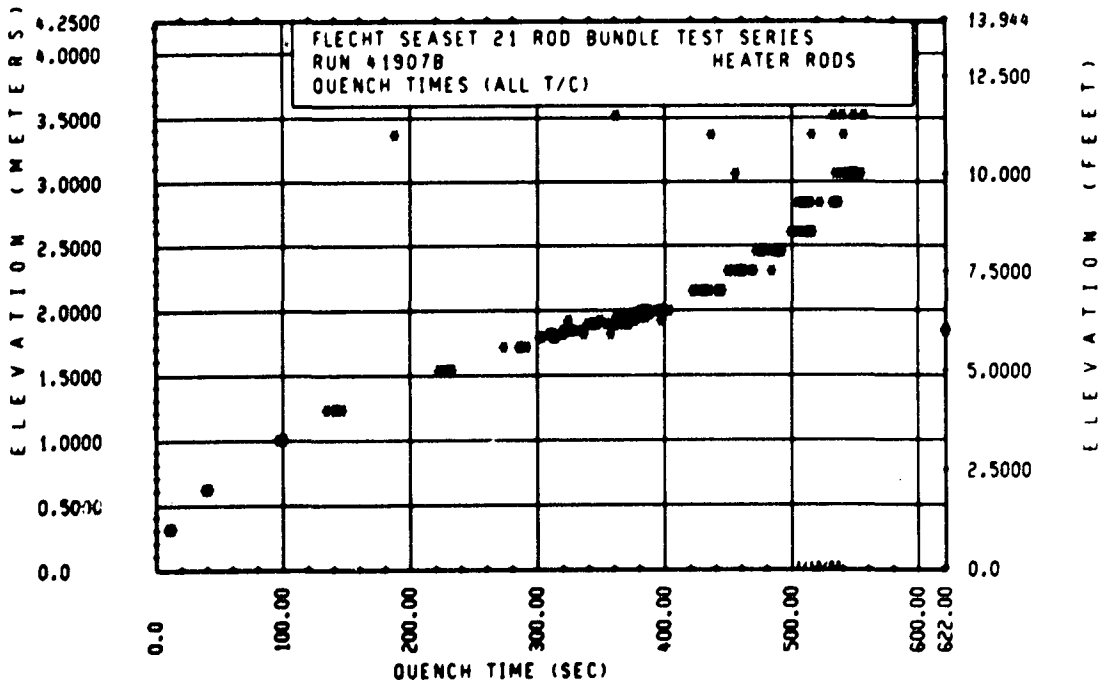

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41907B LOOP FLUID TEMPERATURE
CH/SYM 291/1 293/2 295/3 311/4 313/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
300.00
250.00
200.00
150.00
100.00
50.000
0.0
572.00
500.00
400.00
300.00
200.00
100.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

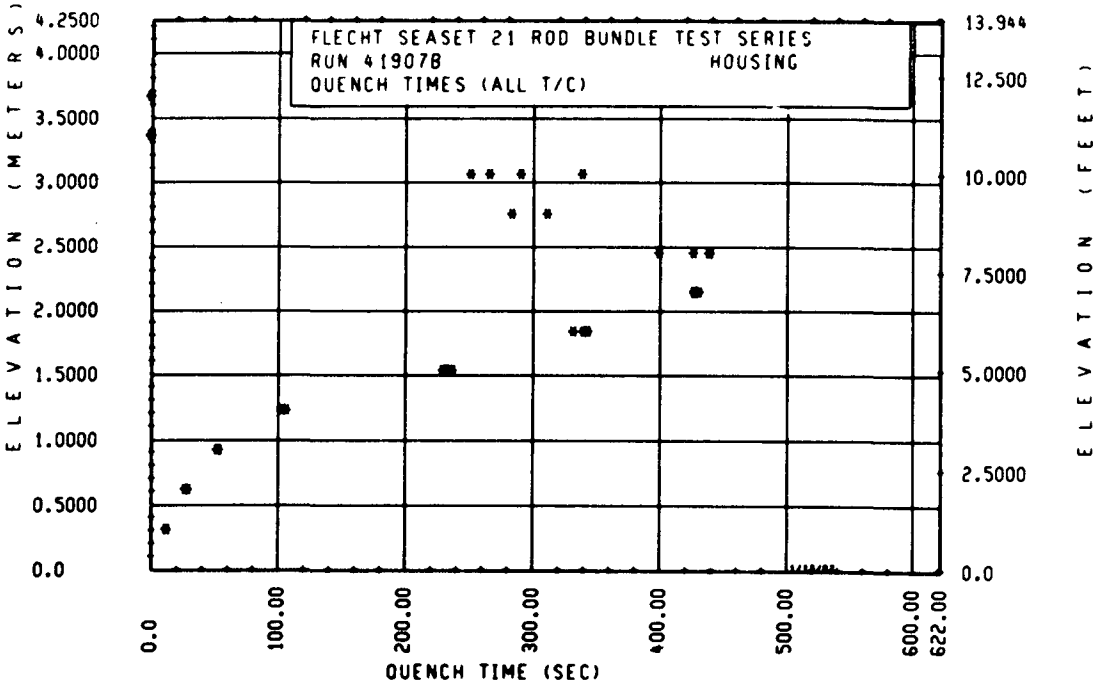

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41907B FLUID LEVELS
CH/SYM 348/1 347/2 349/3 351/4 350/5
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
34.996
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
-4.9994
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-0.7251
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00

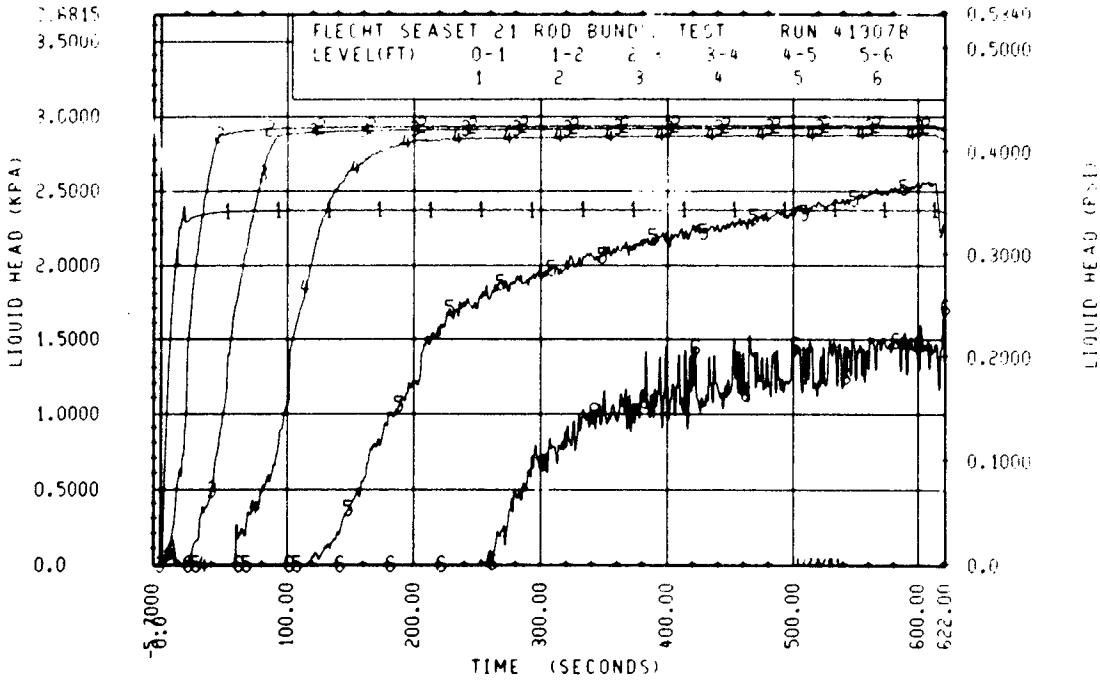

FLECHT SEASET 21 ROD BUNDLE TEST RUN 41907B
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
TIME (SECONDS)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.2000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
622.00

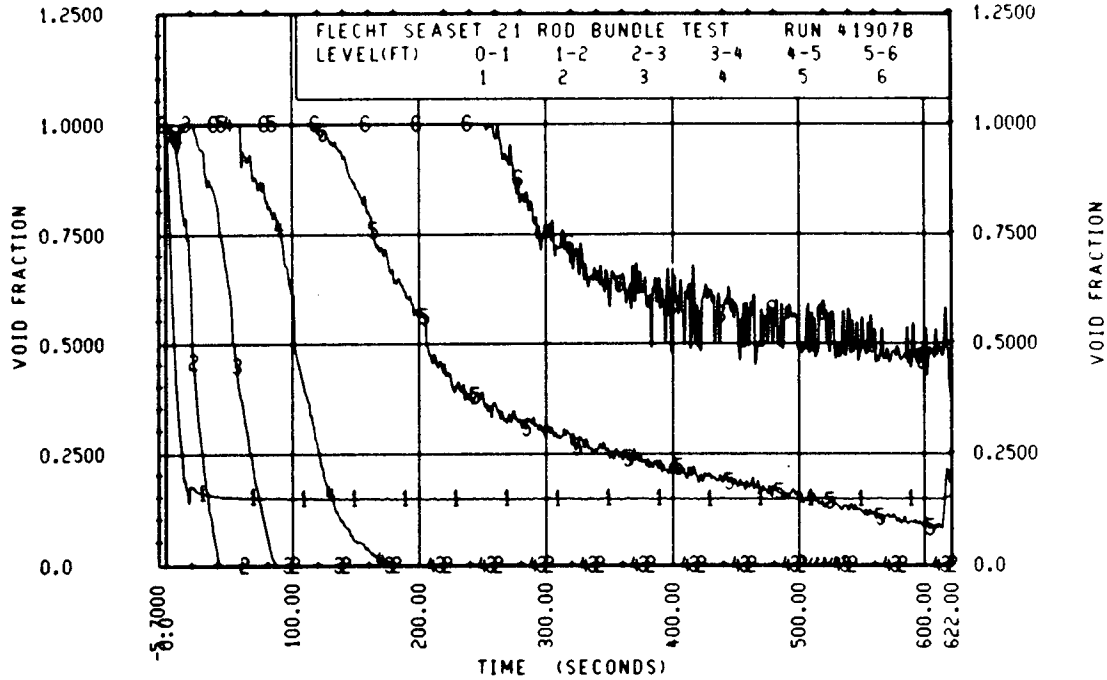

FLECHT SEASET 21 ROD BUNDLE TEST RUN 41907B
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
0.0500
0.0400
0.0300
0.0200
0.0100
0.0
0.1000
0.080
0.0600
0.0400
0.0200
0.0
-5.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
622.00
TIME (SECONDS)

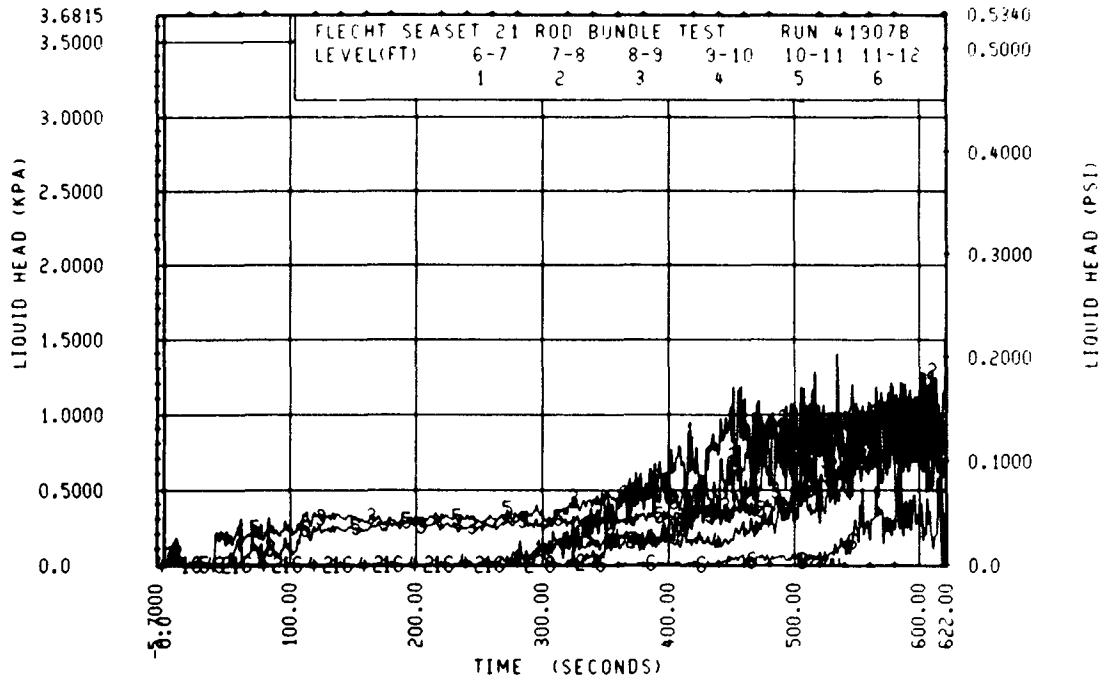

FLECHT SEASET 21 ROD BUNDLE TEST RUN 41907B
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
44.605
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
MASS (LBM)
98.337
90.000
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
-5.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
627.00
TIME (SECONDS)

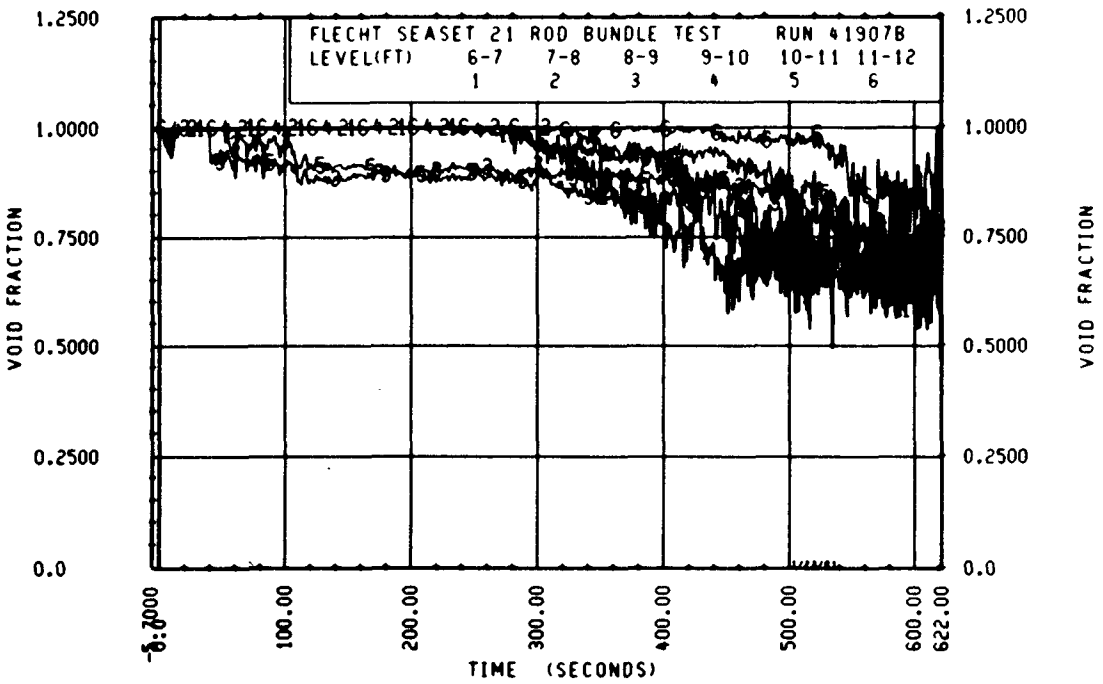

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN 41907B HEATER RODS
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
4.2500
4.0000
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
13.944
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
622.00
QUENCH TIME (SEC)


FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN 41907B HOUSING
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
4.2500
4.0000
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
13.944
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
622.00
QUENCH TIME (SEC)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 41307B
LEVEL(FT) 0-1 1-2 2-3 3-4 4-5 5-6
1 2 3 4 5 6
LIQUID HEAD (KPA)
LIQUID HEAD (PSIA)
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 41907B
LEVEL(FT) 0-1 1-2 2-3 3-4 4-5 5-6
1 2 3 4 5 6
VOID FRACTION
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 41907B
LEVEL(FT) 6-7 7-8 8-9 9-10 10-11 11-12
1 2 3 4 5 6
LIQUID HEAD (KPA)
LIQUID HEAD (PSI)
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 41907B
LEVEL(FT) 6-7 7-8 8-9 9-10 10-11 11-12
1 2 3 4 5 6
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42107C
Test Date: 8/19/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.270 MPa (39.2 psia)
Initial peak clad temperature and location	884°C (1623°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	27.7 mm/sec (1.09 in./sec)
Coolant temperature	51°C (124°F)
Average and range of initial 1.83 m (72 in.) housing temperature	498°C (485°C - 507°C) [929°F (905°F - 945°F)]
Initial bundle water level	57.7 mm (2.27 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: -6% for 50 seconds and -2.5% thereafter[a]
Total power: -0.5% constant[a]

a. Relative to run 42430A

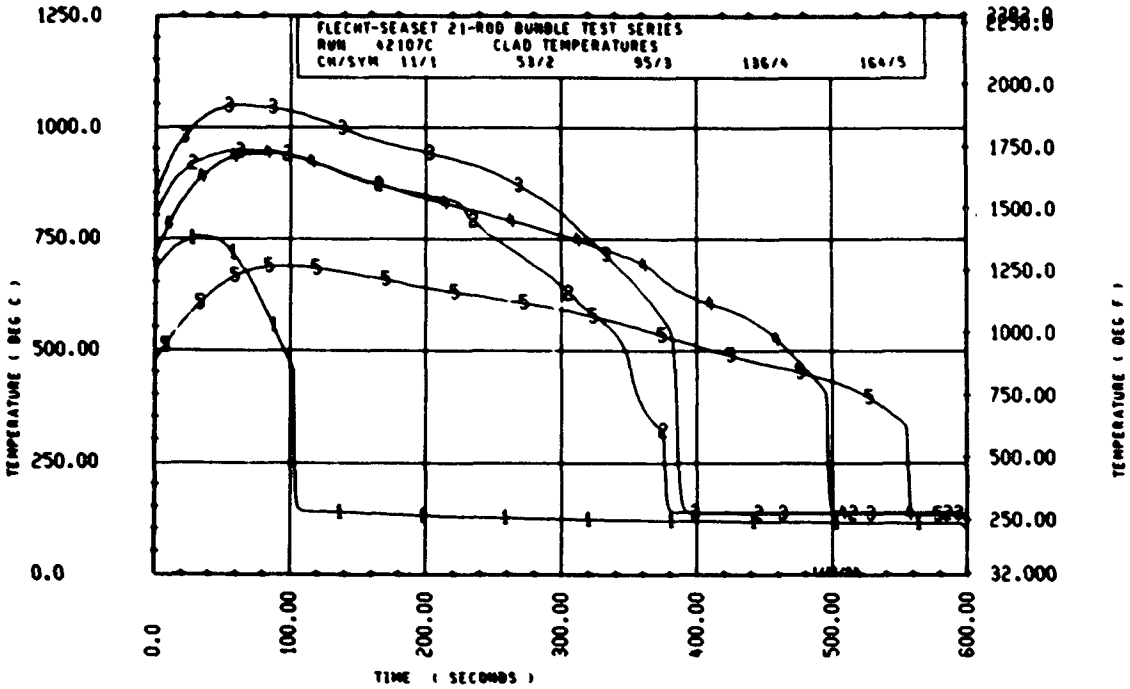
FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42107C

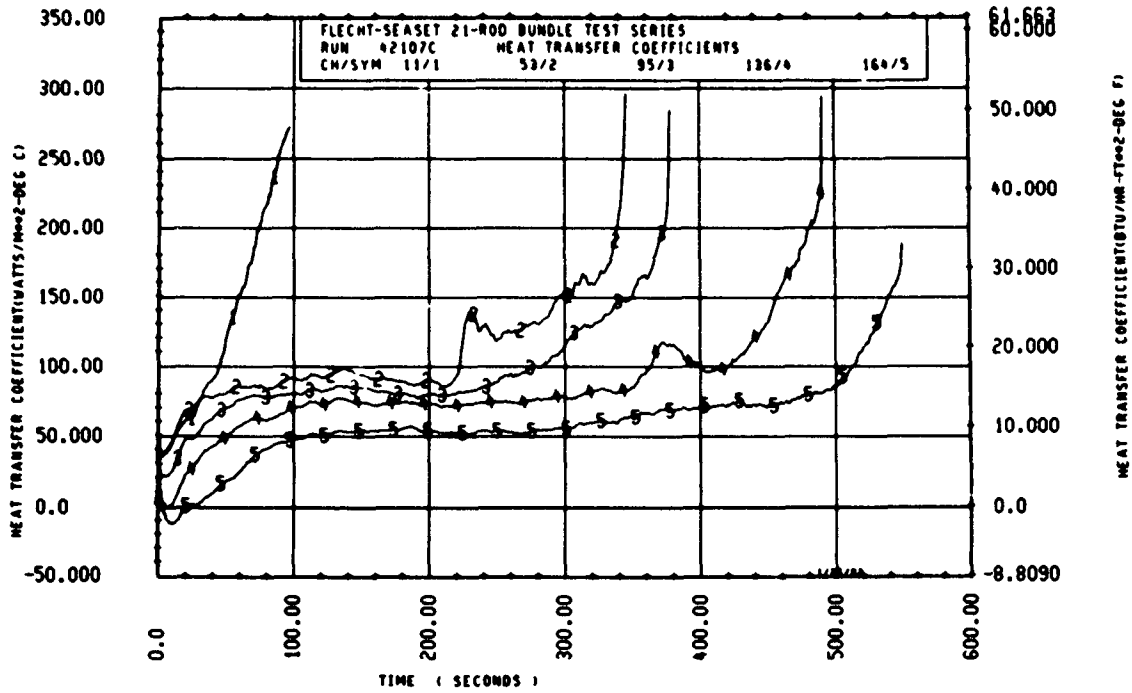
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1107.	1253.	146.	40.0	886.	88.3
4C 3- 3	11	1261.	1394.	133.	31.5	866.	102.0
1C 4- 0	14	1368.	1541.	173.	45.0	879.	152.7
2A 5- 0	17	1413.	1692.	279.	60.0	921.	224.6
2A 5- 7	21	1504.	1785.	281.	66.0	914.	281.5
1D 6- 2	50	1457.	1705.	248.	65.5	946.	338.4
2D 6- 2	53	1487.	1741.	254.	66.0	611.	375.6
3D 6- 2	58	1547.	1769.	221.	51.5	757.	370.0
4B 6- 2	60	1557.	1819.	262.	60.0	1065.	337.0
5C 6- 2	61	1477.	1787.	304.	90.0	574.	366.2
1D 6- 3	63	1446.	1725.	279.	78.5	1001.	349.9
5D 6- 3	69	1445.	1721.	276.	39.5	1065.	344.4
2A 6- 4	70	1462.	1731.	269.	53.0	1053.	307.5
3B 6- 4	75	1579.	1852.	273.	54.0	875.	372.9
2D 6- 5	84	1542.	1834.	292.	54.0	853.	390.8
3C 6- 5	85	1590.	1906.	317.	57.5	991.	371.8
3E 6- 5	86	1521.	1769.	247.	56.0	903.	386.8
3C 6- 6	95	1572.	1924.	351.	60.0	898.	383.7
3D 6- 6	96	1548.	1893.	344.	65.5	869.	401.8
4A 6- 6	97	1455.	1782.	327.	84.0	959.	337.6
4C 6- 6	98	1574.	1918.	343.	68.0	885.	401.8
5C 6- 6	101	1550.	1806.	256.	57.5	902.	385.6
1C 7- 0	110	1423.	1688.	265.	54.0	719.	439.0
2B 7- 0	111	1451.	1691.	240.	33.5	698.	444.8
3D 7- 0	115	1453.	1724.	271.	43.0	694.	444.0
5B 7- 0	117	1361.	1622.	261.	52.5	764.	427.0
2B 7- 6	120	1444.	1762.	318.	57.5	761.	469.0
2C 7- 6	121	1441.	1789.	348.	57.5	801.	467.6
2E 7- 6	122	1285.	1627.	342.	65.5	785.	459.8
3A 7- 6	123	1428.	1723.	295.	54.5	783.	457.9
3B 7- 6	124	1455.	1781.	326.	56.0	786.	461.4
4B 7- 6	127	1447.	1780.	333.	57.0	795.	456.0
5C 7- 6	128	1427.	1722.	295.	59.0	785.	450.8
1C 8- 0	131	1263.	1647.	384.	77.5	694.	500.5
2E 8- 0	133	1132.	1567.	435.	89.5	758.	493.9
3D 8- 0	136	1328.	1732.	404.	84.5	760.	495.8
5B 8- 0	138	1191.	1542.	351.	71.0	672.	478.7
5C 8- 0	139	1354.	1673.	319.	60.0	752.	479.0
1C 8- 6	141	1067.	1469.	402.	66.0	591.	521.0
1D 8- 6	142	801.	1237.	436.	105.0	611.	499.0
2C 8- 6	** BAD THERMOCOUPLE DATA *						
4B 8- 6	145	1174.	1524.	349.	55.5	663.	516.7
5D 8- 6	148	1073.	1453.	380.	94.5	660.	497.8
3D 9- 3	154	960.	1442.	481.	107.0	633.	532.0
4C 9- 3	156	1067.	1431.	365.	69.0	630.	526.0
1D10- 0	161	597.	1064.	466.	152.0	751.	511.9
4B10- 0	164	898.	1272.	375.	93.0	629.	555.0
5D10- 0	167	729.	1117.	389.	125.0	730.	496.5
2A11- 0	168	583.	826.	243.	152.0	633.	406.4
4C11- 0	170	677.	1043.	366.	103.0	474.	550.0
1D11- 6	172	442.	846.	404.	154.0	576.	511.4

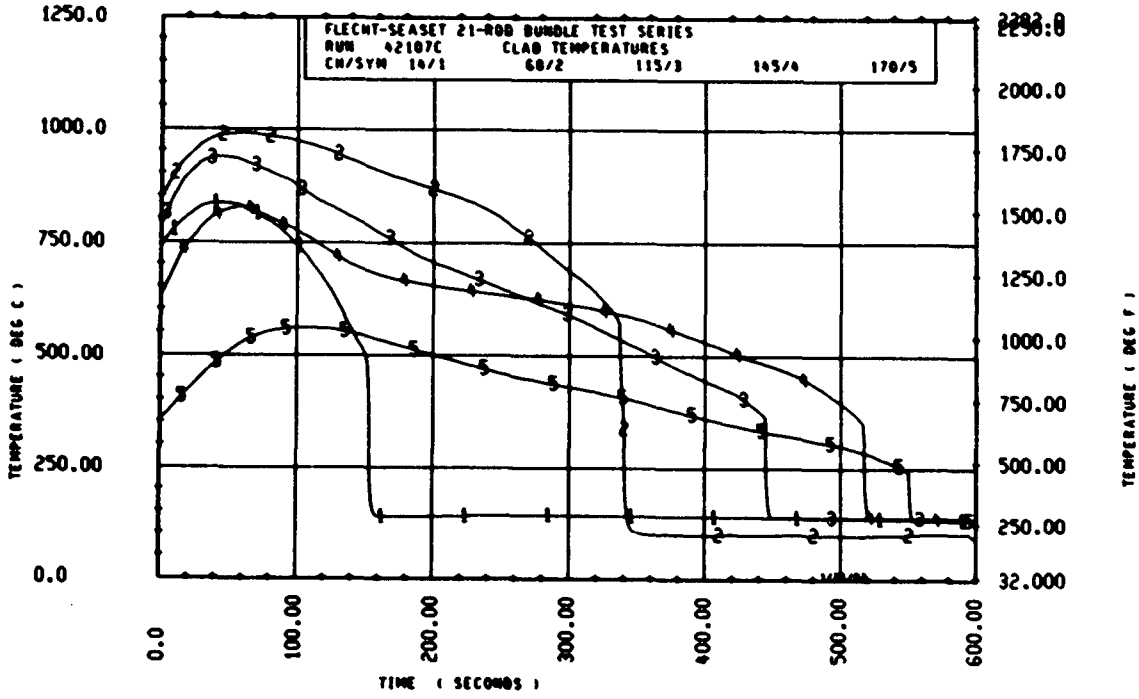
RUN 421070 HEATER ROD STATISTICAL DATA

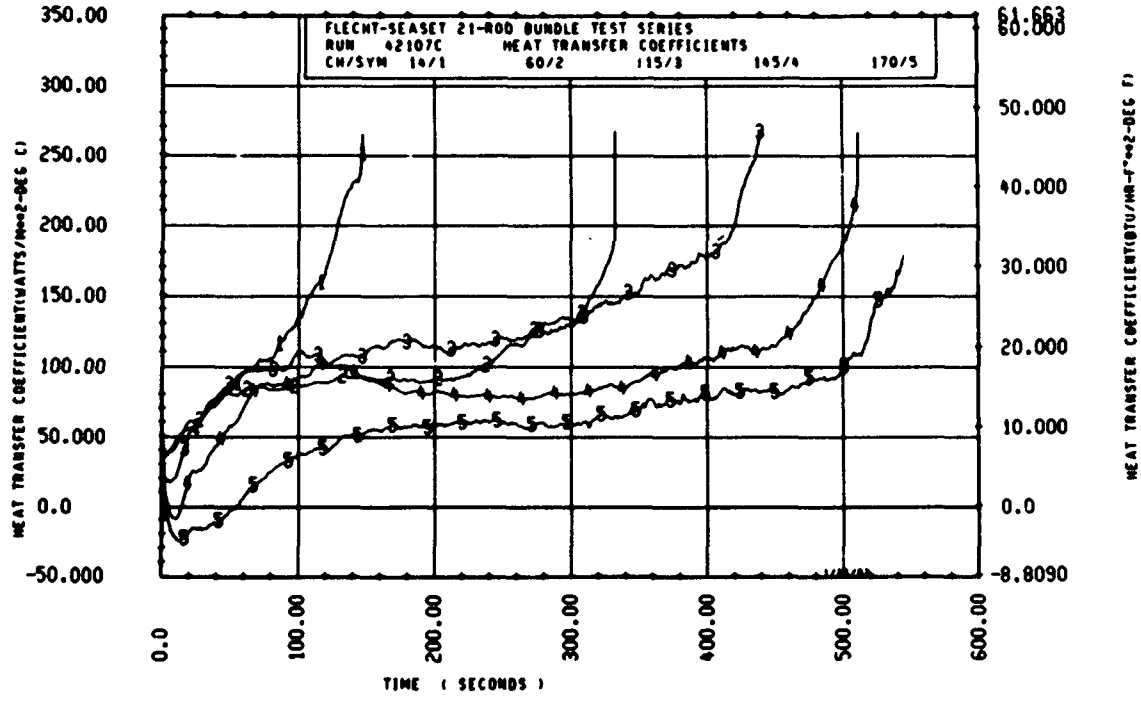
	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	653.1	586.6	608.5	662.6	597.2	619.4	5.0	4.5	4.8
24	900.6	819.9	863.0	944.9	868.5	905.0	15.5	11.0	14.0
39	1260.9	1106.8	1165.8	1393.9	1252.5	1310.1	40.0	31.5	36.4
48	1396.0	1316.3	1353.3	1590.6	1523.6	1551.1	54.5	43.5	46.6
60	1429.1	1413.0	1419.8	1759.8	1691.9	1732.7	82.5	60.0	70.3
67	1523.2	1497.6	1531.4	1931.5	1763.1	1821.7	68.0	60.0	63.6
70	1600.3	1407.7	1539.2	1959.0	1642.8	1862.3	85.0	44.0	67.9
71	1551.7	1452.7	1524.5	1900.6	1773.1	1850.9	94.5	66.5	73.9
72	1525.7	1514.9	1520.3	1841.7	1828.2	1834.9	83.5	56.0	69.8
74	1569.0	1430.2	1508.4	1819.1	1664.6	1743.0	89.5	51.5	64.6
75	1589.5	1445.2	1524.0	1868.9	1705.1	1785.3	89.5	51.5	64.0
76	1593.8	1426.9	1529.8	1897.2	1721.8	1798.6	87.5	43.5	60.2
77	1589.5	1421.6	1518.3	1906.3	1740.8	1823.0	94.5	54.0	67.8
78	1574.4	1391.8	1516.1	1923.5	1758.6	1840.1	95.0	52.0	69.0
84	1467.7	1213.9	1398.3	1754.2	1486.9	1672.9	86.5	33.5	51.1
90	1454.8	1284.9	1409.7	1788.8	1626.5	1729.6	82.5	54.5	60.9
96	1379.2	1131.8	1291.2	1753.1	1341.9	1657.7	89.5	59.5	70.6
102	1174.4	801.3	1050.5	1534.4	1236.9	1444.1	105.0	55.5	78.6
111	1075.8	694.1	966.8	1441.9	1171.2	1349.2	125.0	60.0	87.6
120	923.3	597.2	776.6	1322.6	1063.5	1205.4	162.0	54.0	118.8
132	677.3	495.9	582.6	1042.8	795.0	871.2	152.0	103.0	130.5
138	547.8	441.8	512.5	1009.9	914.7	900.1	154.0	121.0	136.4

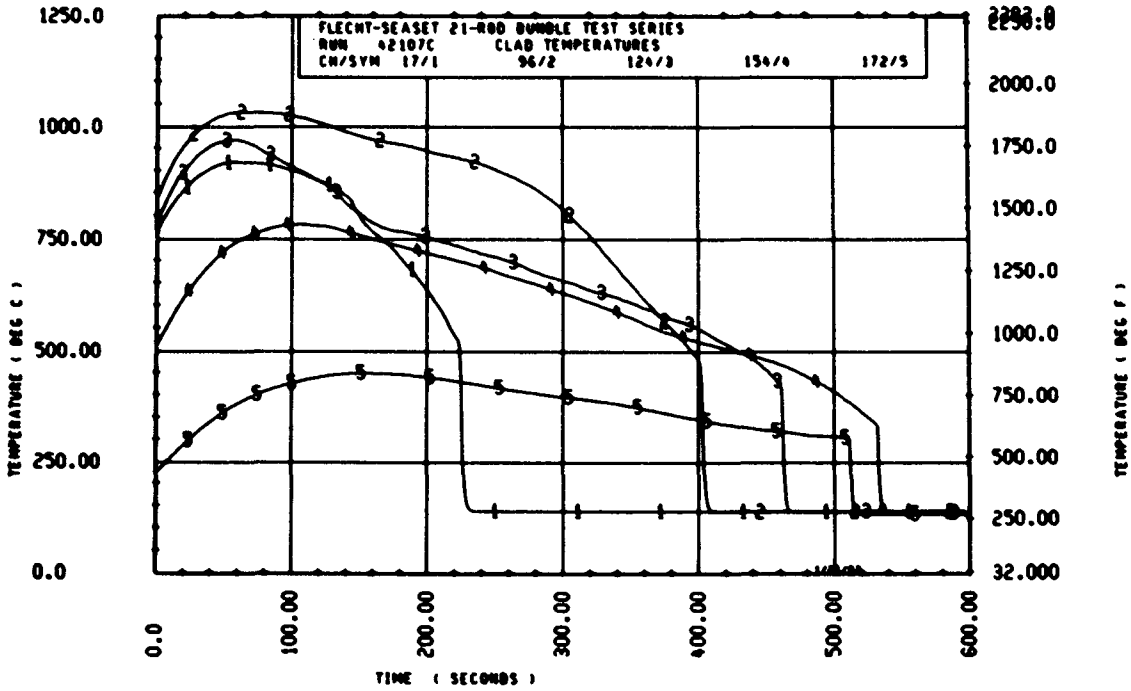
	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	11.6	9.5	10.8	619.1	591.1	605.3	12.4	7.9	9.3
24	48.6	33.2	42.0	766.3	737.0	751.0	41.5	36.3	39.3
39	159.4	133.0	144.2	885.5	842.9	868.7	102.0	88.3	97.0
48	233.2	173.2	197.9	949.1	879.4	904.8	152.8	145.8	149.9
60	330.7	278.9	312.9	947.1	793.5	887.2	235.2	224.0	229.2
67	309.1	262.2	290.2	981.2	905.7	935.9	293.5	279.8	286.1
70	358.7	235.1	323.1	979.2	897.6	929.4	327.7	313.7	321.0
71	348.9	299.9	326.4	1044.2	750.9	928.7	333.8	313.7	325.0
72	326.8	302.5	314.6	1003.7	969.7	986.7	325.6	324.7	325.2
74	262.0	220.5	234.6	1064.5	595.1	824.3	378.0	314.2	353.9
75	309.7	186.9	261.3	1064.9	778.6	938.9	378.9	344.4	360.6
76	303.4	190.3	268.8	1091.7	761.0	897.6	405.9	297.5	363.9
77	350.8	247.3	304.6	1061.3	853.1	957.3	390.8	357.6	373.6
78	366.8	256.1	323.9	979.8	803.6	890.2	417.8	337.6	386.2
84	294.6	240.3	274.6	773.8	694.2	735.5	444.8	409.0	432.3
90	348.6	275.6	320.0	843.0	757.3	791.0	469.9	417.9	456.6
96	435.0	319.4	366.4	825.1	671.9	748.4	500.5	467.4	488.6
102	435.6	349.2	393.6	662.5	590.8	633.6	525.9	497.8	510.2
111	481.5	313.2	382.5	762.2	585.8	638.7	543.4	436.3	516.7
120	551.6	313.6	428.8	751.4	471.0	656.9	559.0	394.5	515.0
132	365.5	242.7	288.6	659.6	474.2	596.7	550.0	282.1	381.1
138	468.1	308.5	387.6	575.9	282.3	506.5	533.1	199.6	447.4

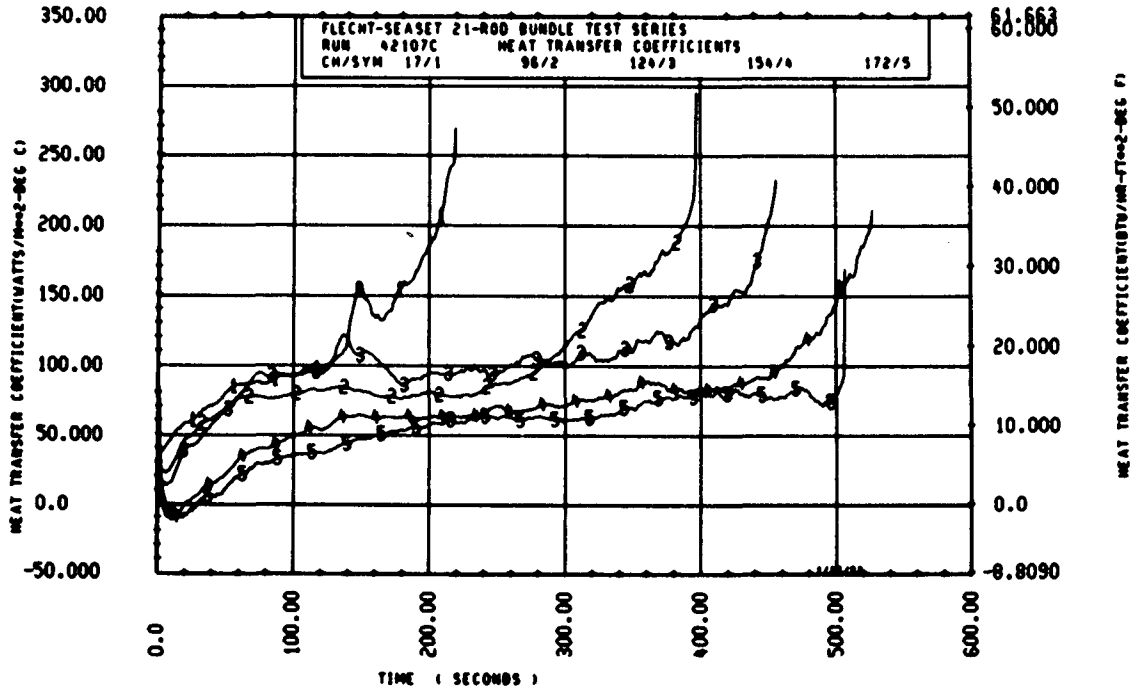

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42107C CLAD TEMPERATURES
CH/SYM 11/1 53/2 95/3 136/4 164/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

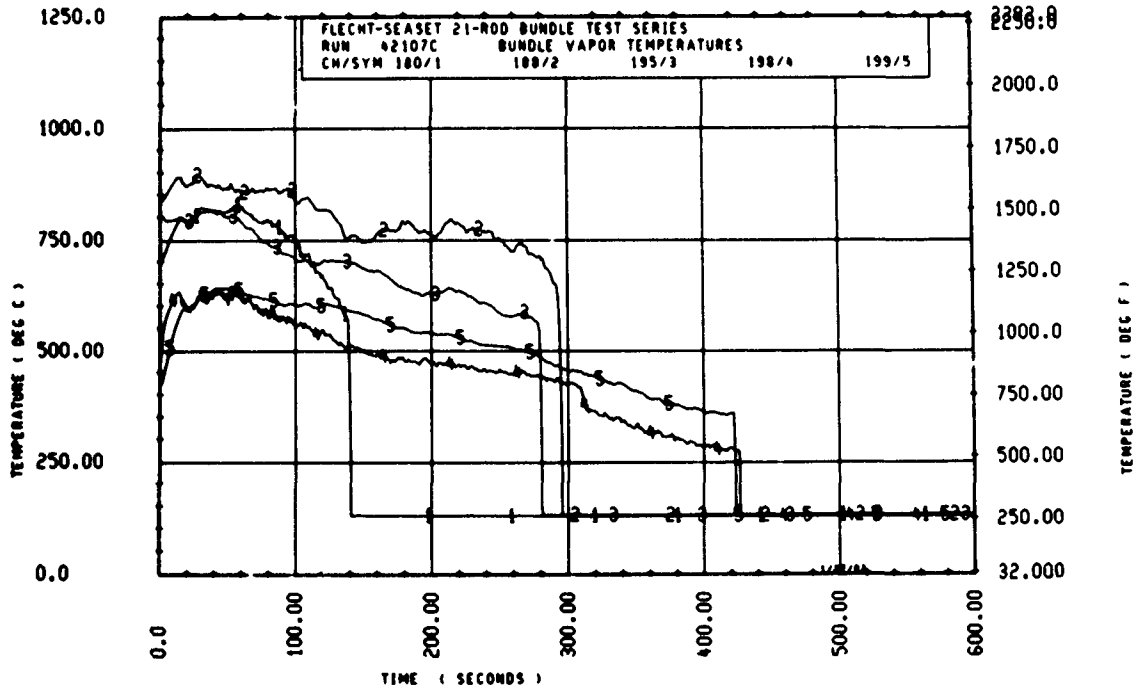

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42107C HEAT TRANSFER COEFFICIENTS
CH/SYM 11/1 53/2 95/3 136/4 164/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

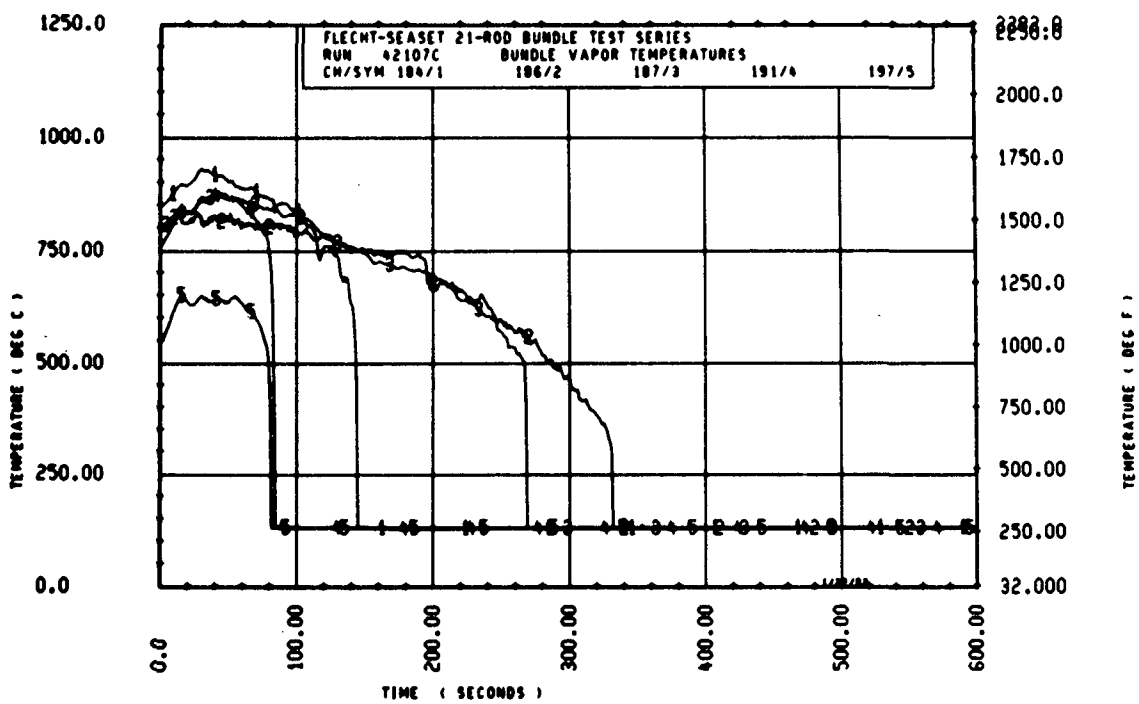

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42107C CLAD TEMPERATURES
CH/SYM 14/1 60/2 115/3 145/4 170/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

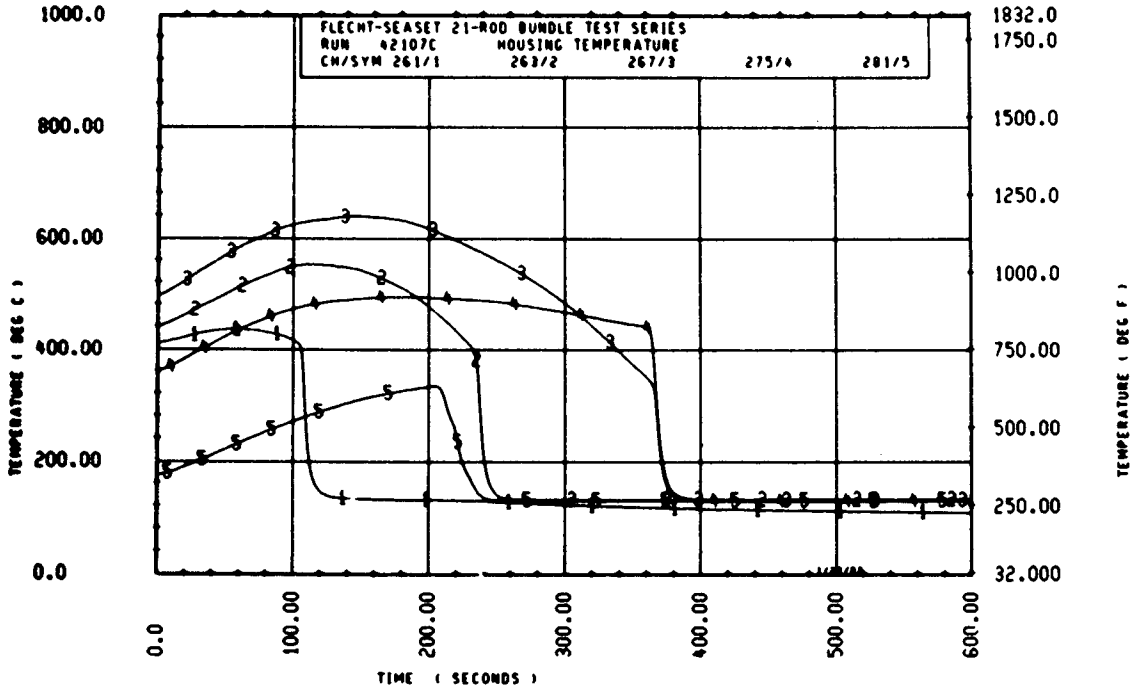

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42107C HEAT TRANSFER COEFFICIENTS
CH/SYM 14/1 60/2 115/3 145/4 170/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

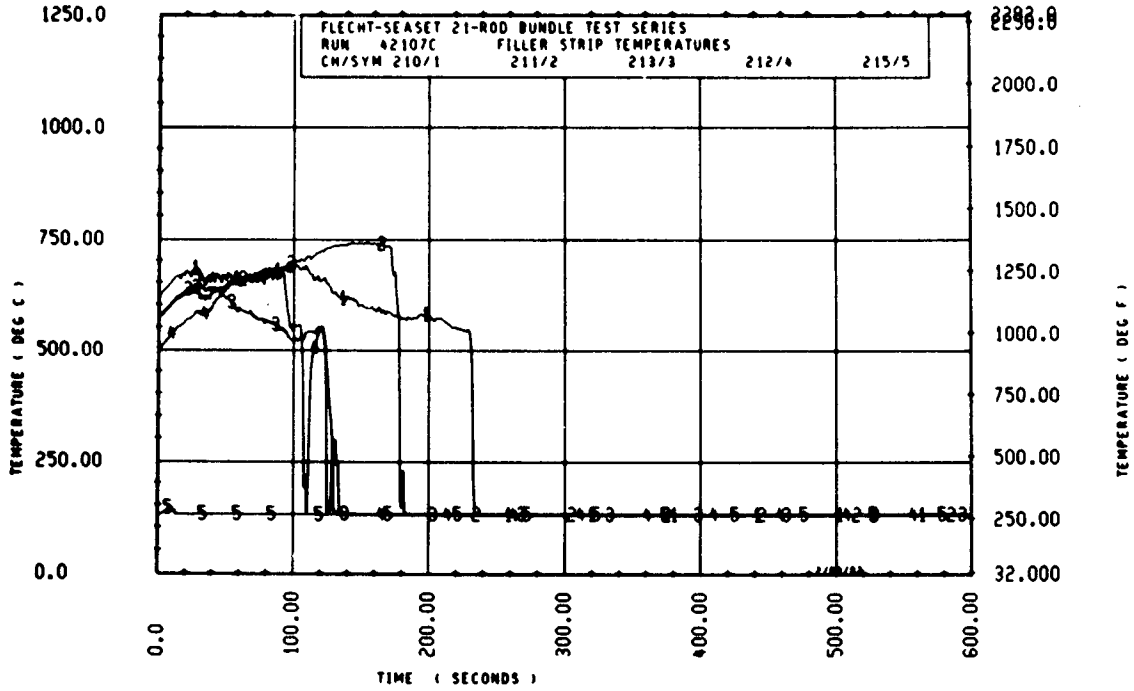

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42107C CLAD TEMPERATURES
CH/SYM 17/1 96/2 124/3 154/4 172/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

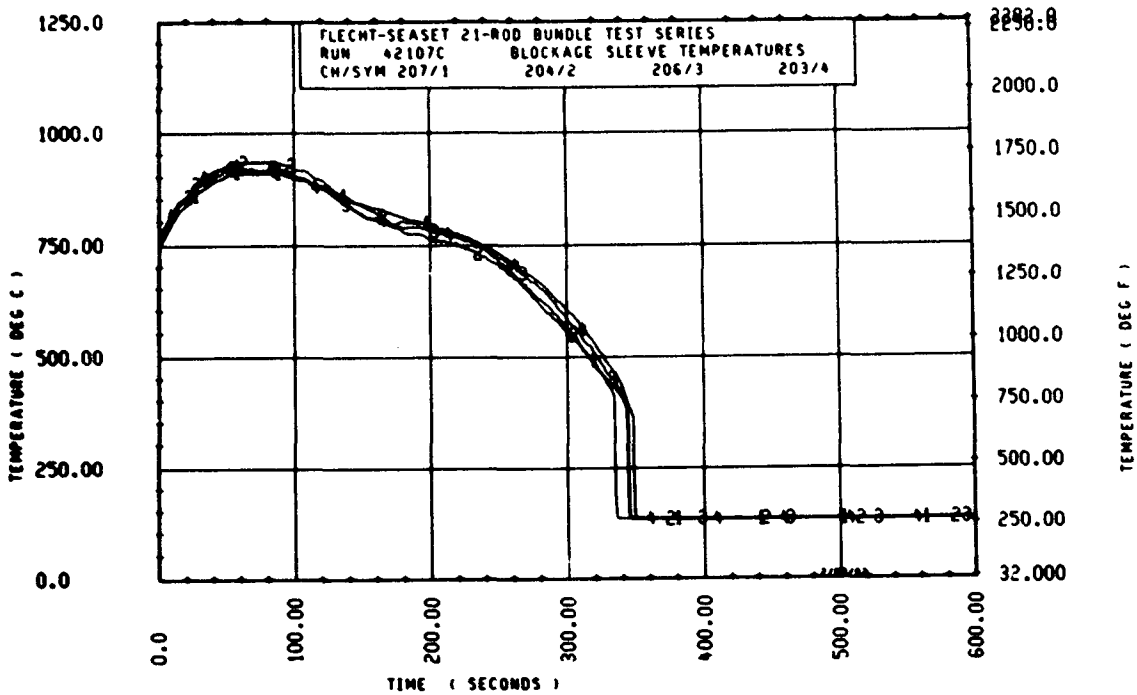

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42107C HEAT TRANSFER COEFFICIENTS
CH/SYM 17/1 96/2 124/3 154/4 172/5
HEAT TRANSFER COEFFICIENT(WATTS/MM**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

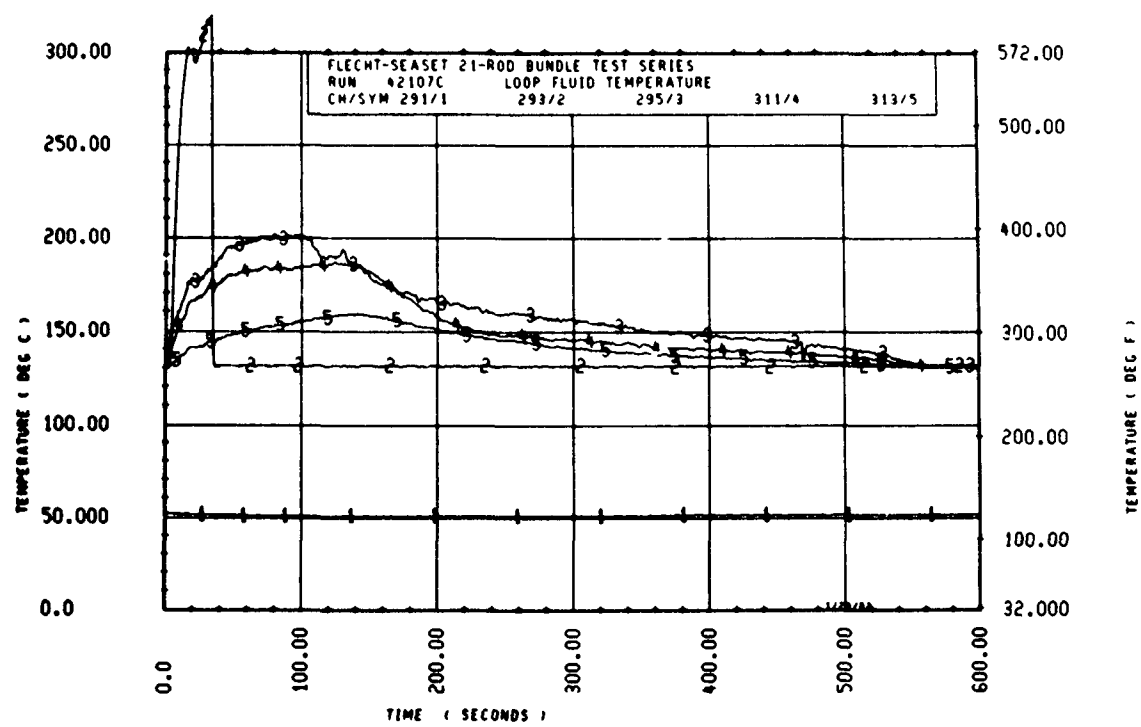

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42107C BUNDLE VAPOR TEMPERATURES
CH/SYM 180/1 188/2 195/3 198/4 199/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

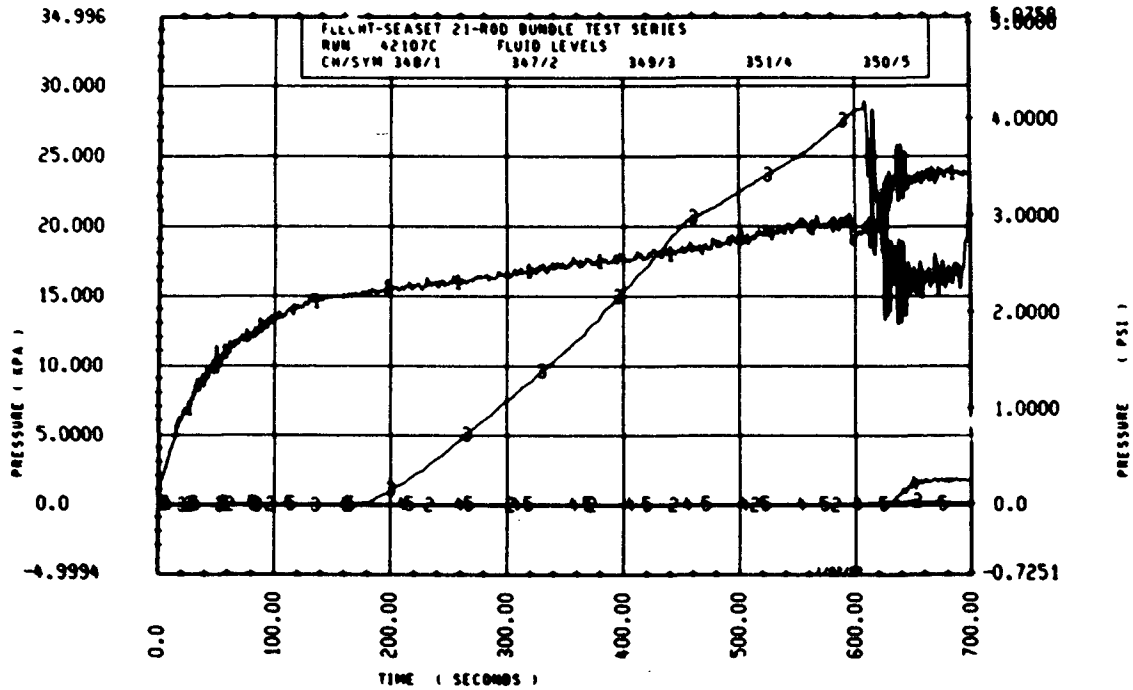

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42107C BUNDLE VAPOR TEMPERATURES
CH/SYM 184/1 186/2 187/3 191/4 197/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

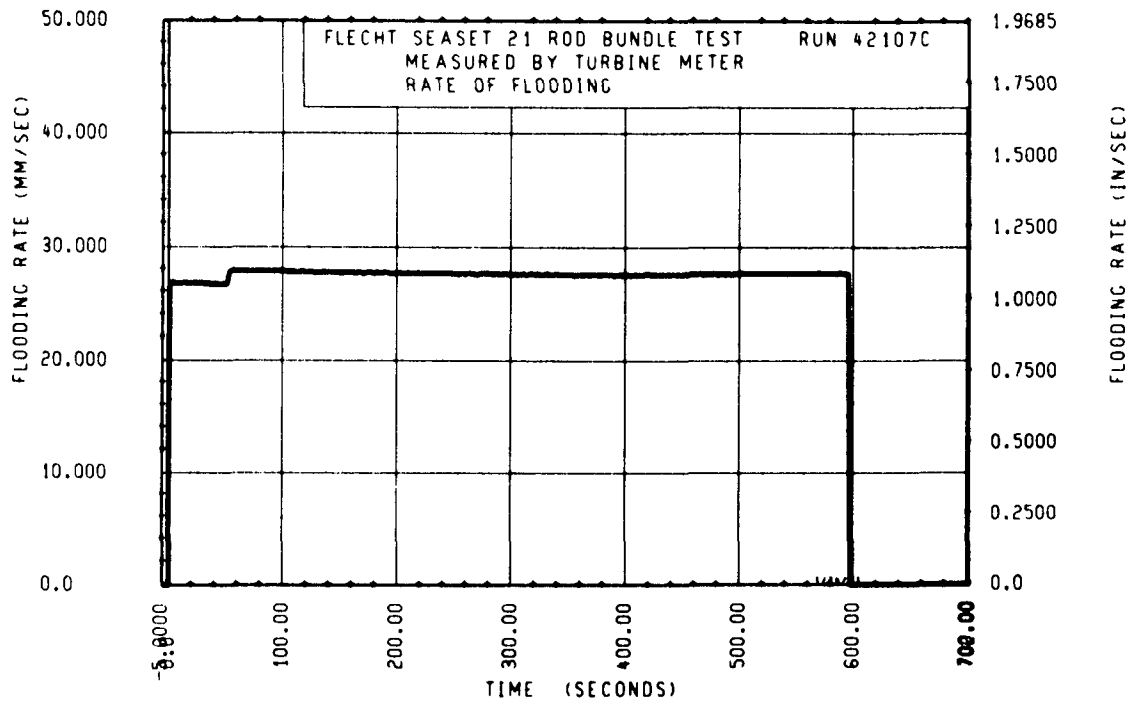

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42107C HOUSING TEMPERATURE
CH/SYM 261/1 263/2 267/3 275/4 281/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1000.0
800.00
600.00
400.00
200.00
0.0
1832.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
100.00
200.00
300.00
400.00
500.00
600.00

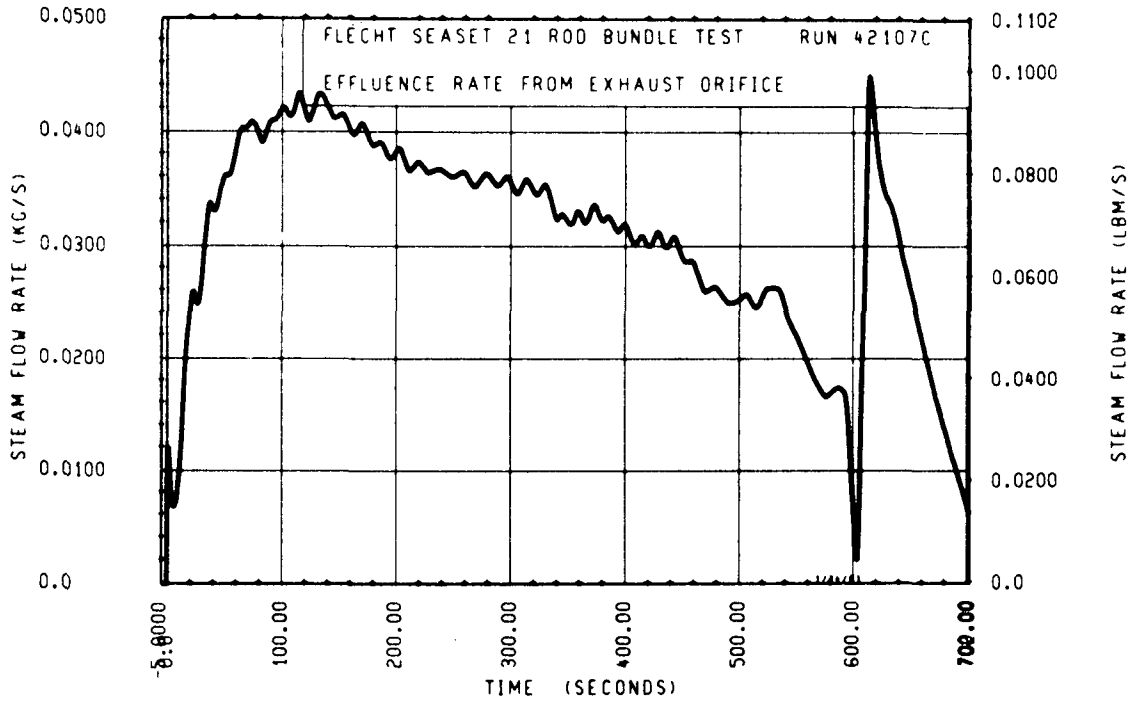

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42107C FILLER STRIP TEMPERATURES
CH/SYM 210/1 211/2 213/3 212/4 215/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
100.00
200.00
300.00
400.00
500.00
600.00

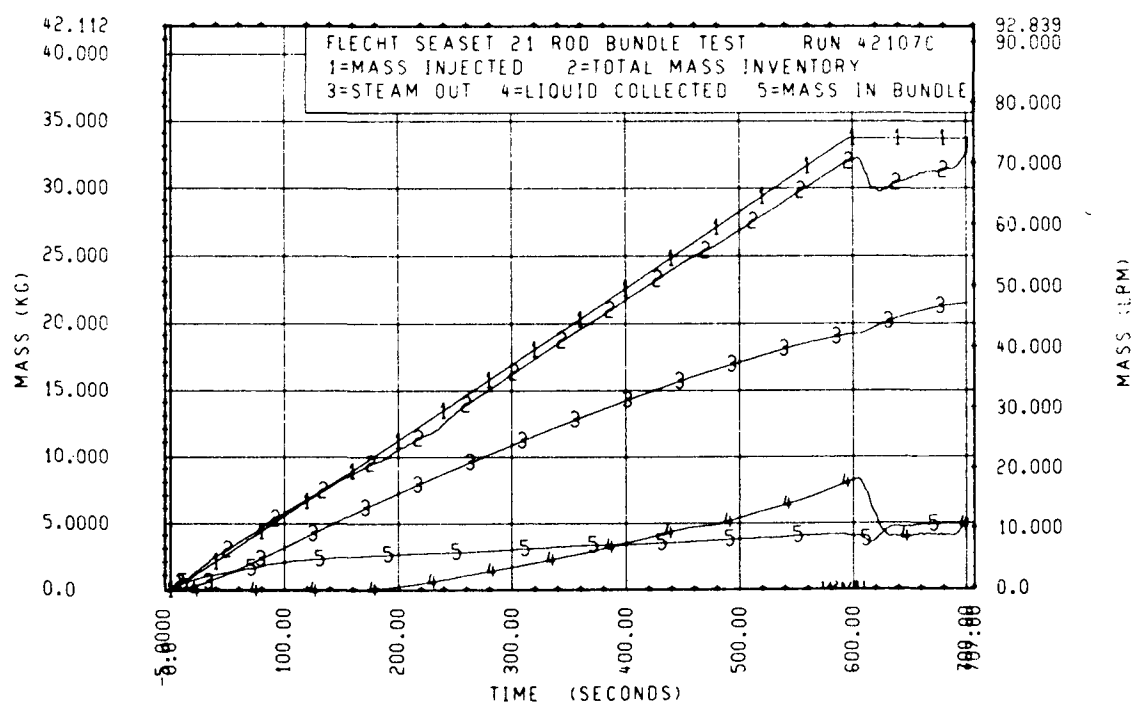

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42107C BLOCKAGE SLEEVE TEMPERATURES
CH/SYM 207/1 204/2 206/3 203/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

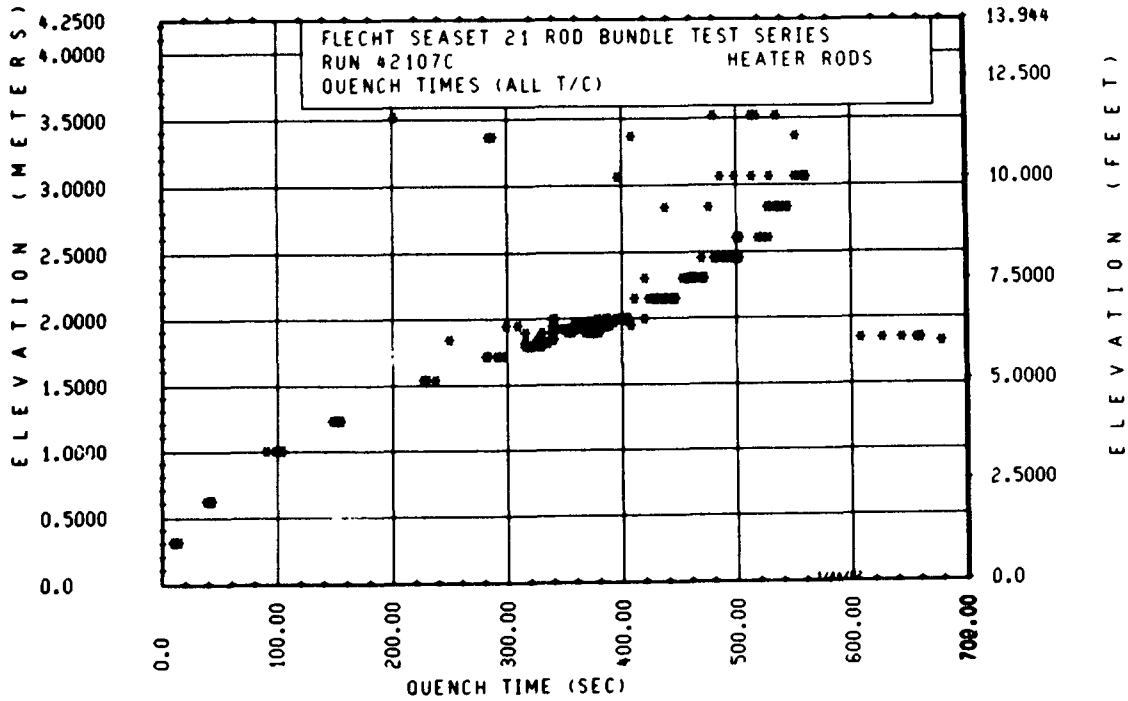

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42107C LOOP FLUID TEMPERATURE
CH/SYM 291/1 293/2 295/3 311/4 313/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
300.00
250.00
200.00
150.00
100.00
50.000
0.0
572.00
500.00
400.00
300.00
200.00
100.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

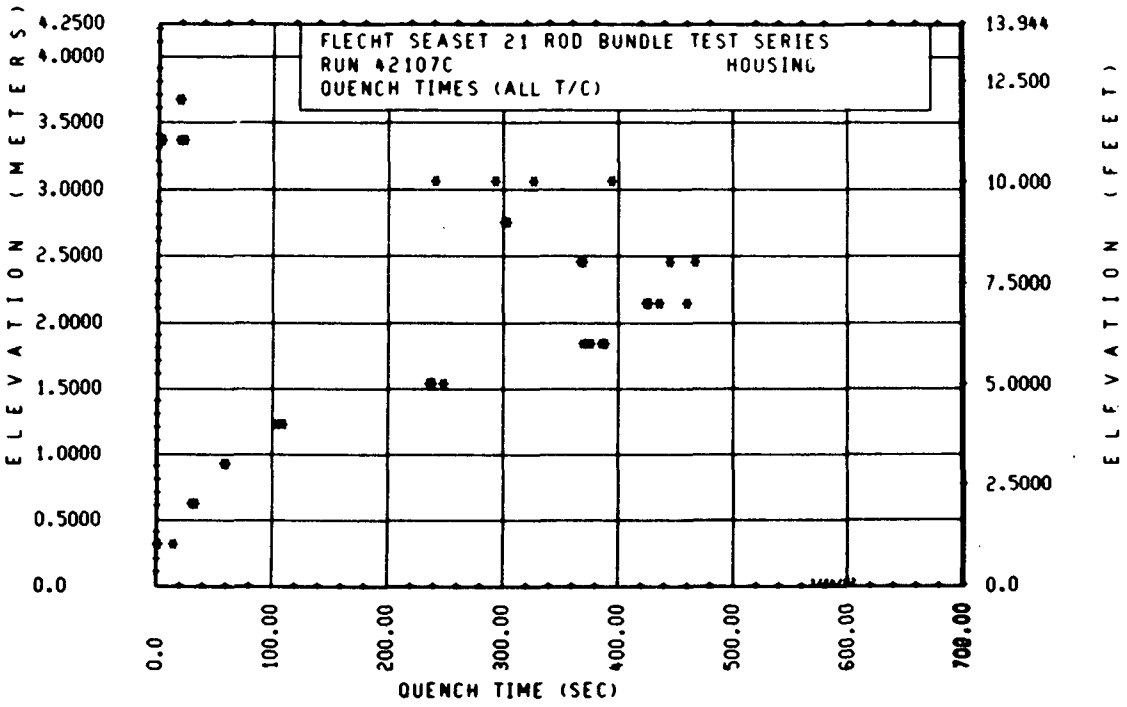

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42107C FLUID LEVELS
CH/SYM 348/1 347/2 349/3 351/4 350/5
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)

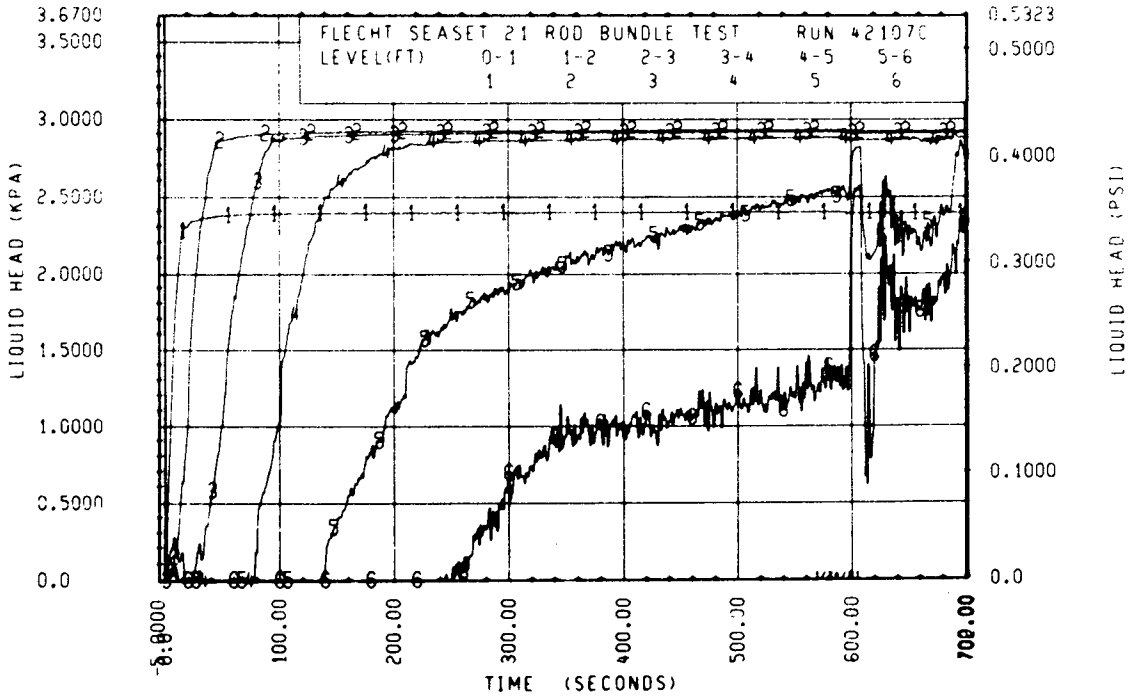

FLECHT SEASET 21 ROD BUNDLE TEST RUN 42107C
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
TIME (SECONDS)

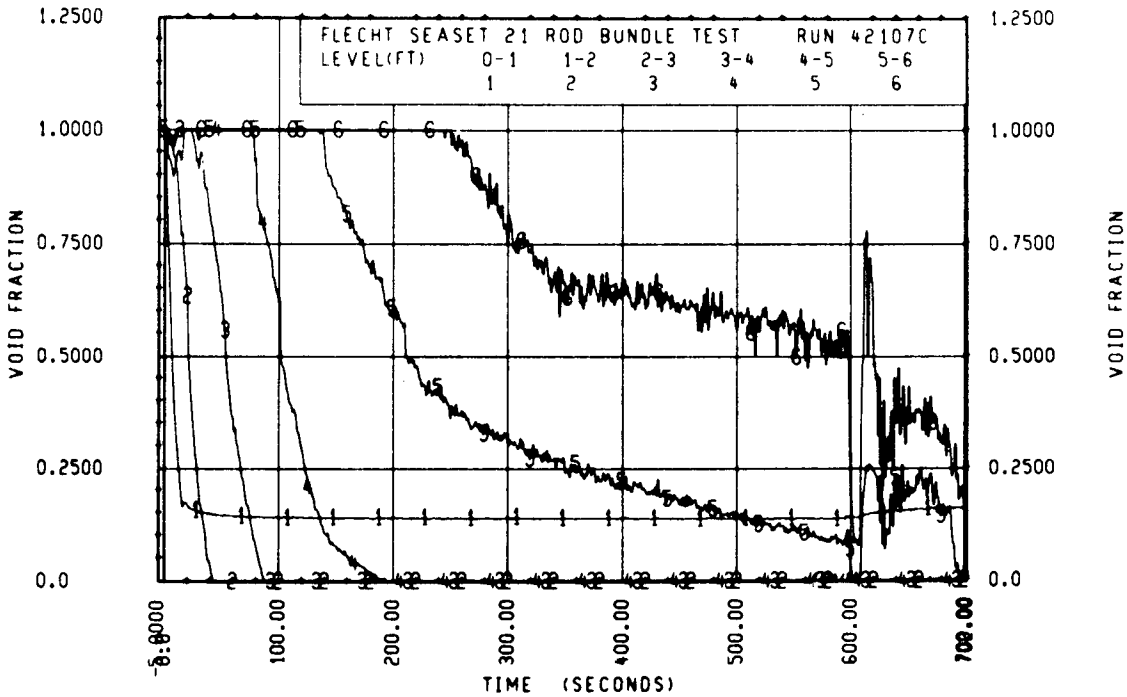

FLECHT SEASET 21 ROD BUNDLE TEST RUN 42107C
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
TIME (SECONDS)
0.0500
0.0400
0.0300
0.0200
0.0100
0.0
0.1102
0.1000
0.0800
0.0600
0.0400
0.0200
0.0
-5.0000
0.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00

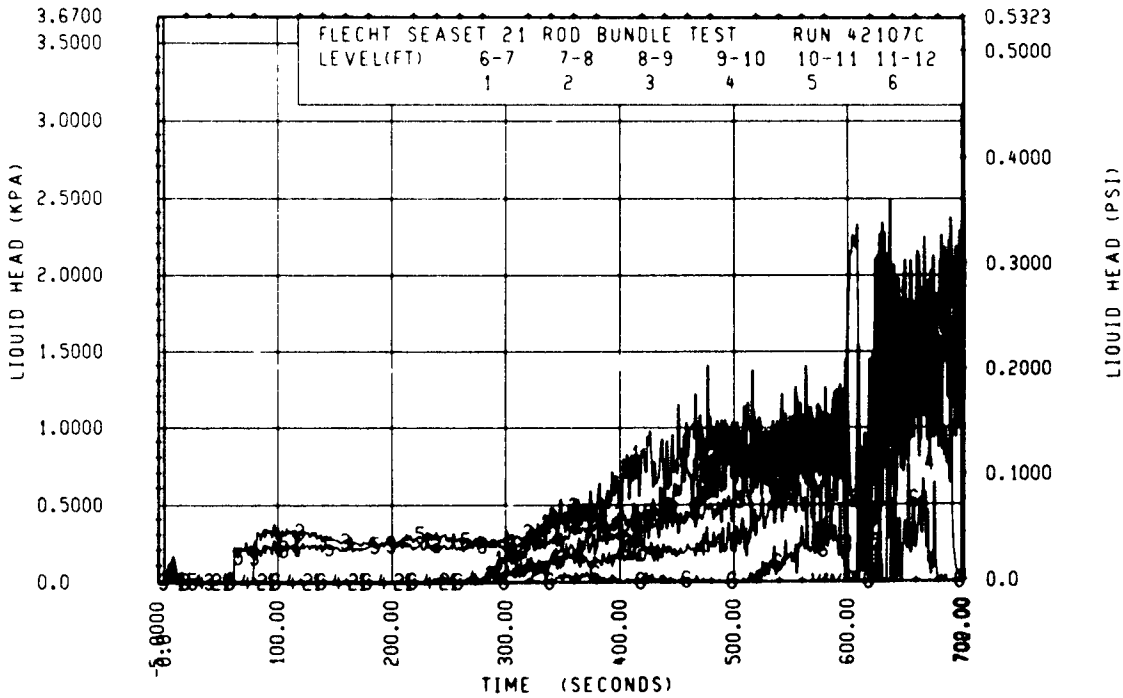

FLECHT SEASET 21 ROD BUNDLE TEST RUN 42107C
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
TIME (SECONDS)
42.112
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
92.839
90.000
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
-5.0000
0.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00

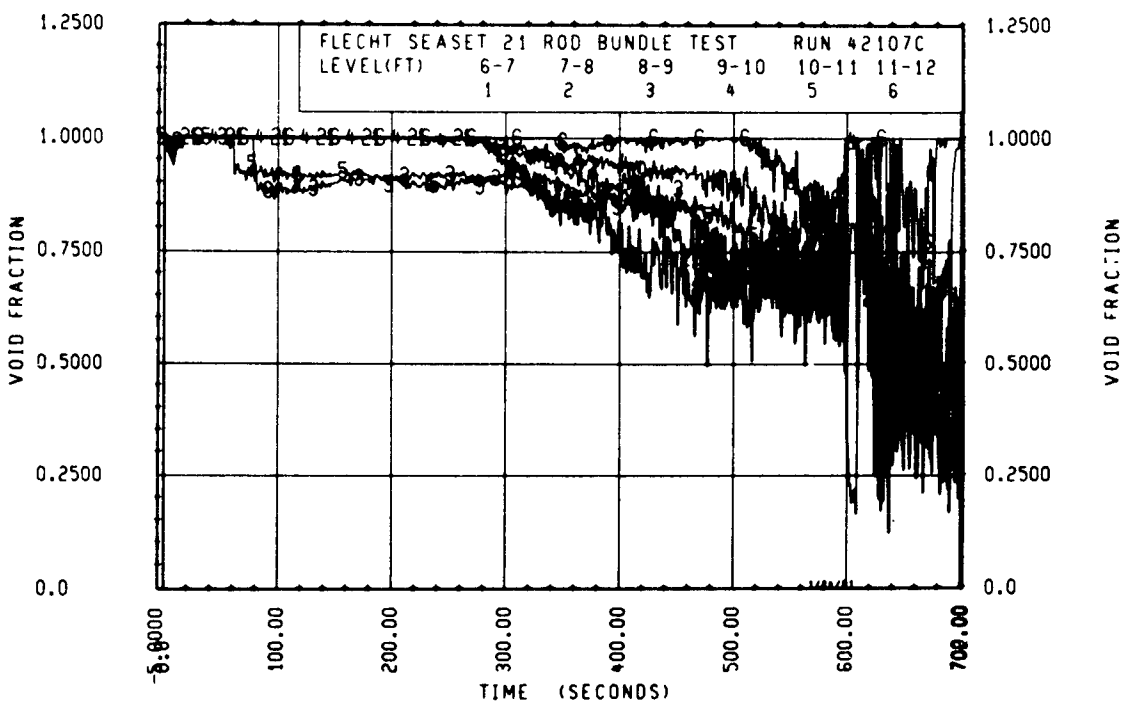

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN 42107C
HEATER RODS
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
4.2500
4.0000
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
13.944
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
QUENCH TIME (SEC)


FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN 42107C
HOUSING
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
4.2500
4.0000
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
13.944
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
QUENCH TIME (SEC)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 42107C
LEVEL(FT) 0-1 1-2 2-3 3-4 4-5 5-6
1 2 3 4 5 6
LIQUID HEAD (KPA)
LIQUID HEAD (PSI)
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 42107C
LEVEL(FT) 0-1 1-2 2-3 3-4 4-5 5-6
1 2 3 4 5 6
VOID FRACTION
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 42107C
LEVEL(FT) 6-7 7-8 8-9 9-10 10-11 11-12
1 2 3 4 5 6
LIQUID HEAD (KPA)
LIQUID HEAD (PSI)
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 42107C
LEVEL(FT) 6-7 7-8 8-9 9-10 10-11 11-12
1 2 3 4 5 6
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42615D
Test Date: 10/18/80
Test Type: Forced Reflood (second repeat)
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.279 MPa (40.5 psia)
Initial peak clad temperature and location	872°C (1602°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.5 kw/m (0.77 kw/ft)
Flow rate	28.2 mm/sec (1.11 in./sec)
Coolant temperature	49°C (121°F)
Average and range of initial 1.83 m (72 in.) housing temperature	501°C (492°C - 508°C) [933°F (917°F - 946°F)]
Initial bundle water level	21 mm (0.84 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	approximately +1% with ±0.5% oscillations[a]
Total Power:	-1% constant[a]
Housing temperature at midplane:	approximately -2% constant[a]

a. Relative to run 43115D

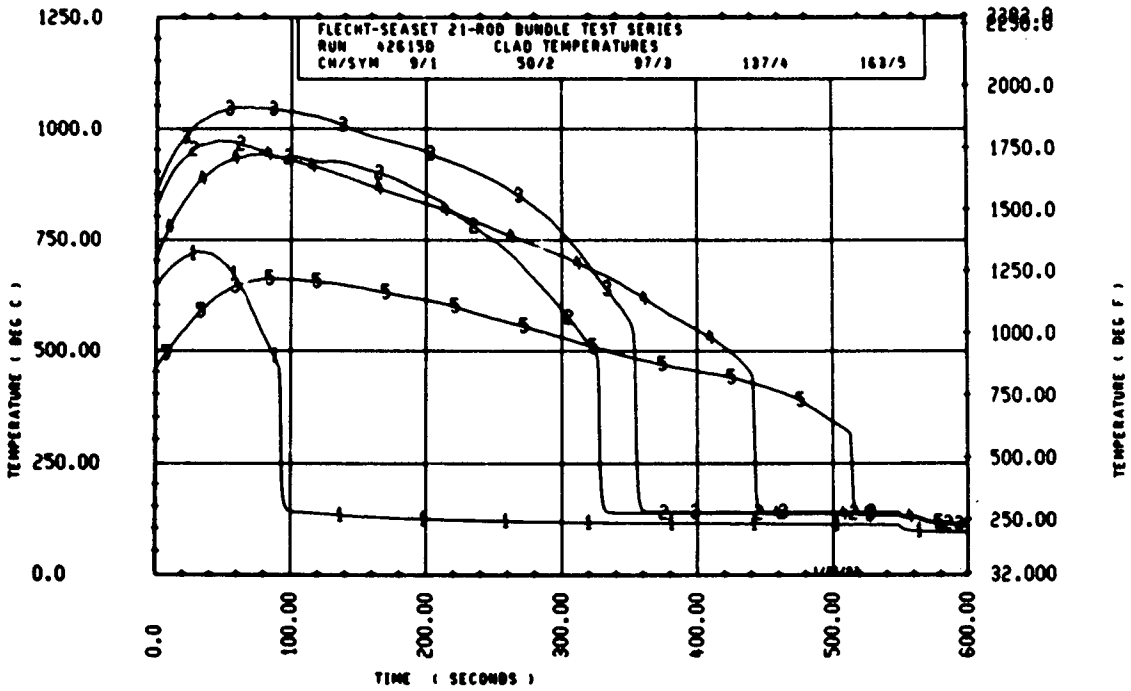
RUN 426150 HEATER ROD STATISTICAL DATA

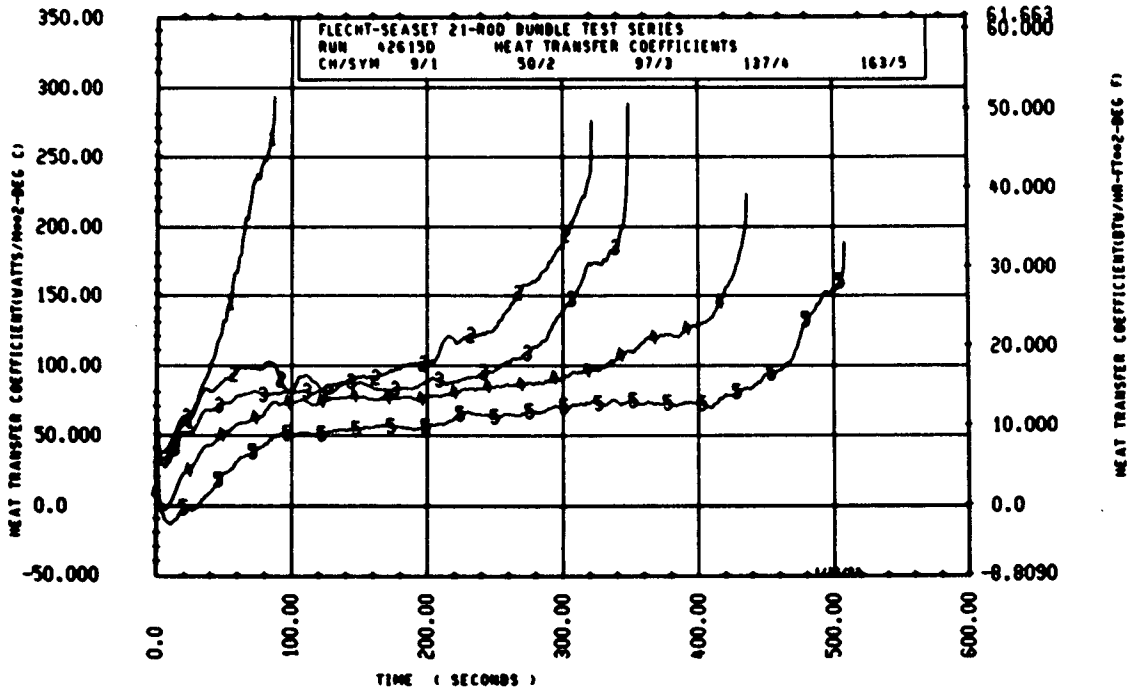
ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	648.8	597.5	614.9	661.5	613.1	629.6	6.5	5.5	6.0
24	824.0	798.7	812.3	861.3	846.8	856.5	12.0	11.5	11.8
39	1200.2	1082.2	1122.9	1333.1	1224.4	1264.8	35.5	30.5	33.3
48	1306.0	1295.2	1300.6	1462.3	1461.2	1461.7	44.0	39.5	41.8
60	1491.7	1365.0	1413.2	1775.4	1672.3	1716.9	70.5	70.0	70.3
67	1596.1	1466.0	1509.5	1872.3	1717.4	1772.7	57.0	46.0	51.2
70	1601.6	1520.5	1561.0	1884.7	1824.8	1854.7	60.0	46.0	53.0
71	1541.0	1541.0	1541.0	1836.1	1836.1	1836.1	58.0	58.0	58.0
72	1584.2	1360.2	1519.1	1867.8	1651.6	1801.7	88.0	50.0	62.9
74	1562.2	1423.2	1509.1	1865.5	1726.3	1790.4	83.5	46.0	67.3
75	1545.7	1466.4	1502.3	1822.5	1733.0	1773.0	80.0	58.0	68.3
76	1581.0	1471.4	1531.7	1876.8	1739.7	1813.6	80.0	54.5	63.1
77	1600.5	1463.9	1520.7	1900.6	1747.5	1817.2	83.0	59.5	74.0
78	1589.2	1461.7	1531.5	1920.1	1776.5	1839.8	79.5	58.0	66.8
84	1467.1	1335.0	1408.3	1729.6	1574.4	1669.2	80.5	30.5	48.8
90	1468.9	1307.7	1404.2	1785.4	1558.2	1692.8	81.5	45.0	57.8
96	1369.3	1109.8	1266.6	1764.2	1462.3	1620.2	82.5	61.0	73.9
102	1160.0	859.3	1039.9	1502.0	1285.9	1425.6	118.0	45.0	73.9
111	1004.6	811.8	937.6	1422.7	1120.3	1297.7	95.0	68.5	83.3
120	367.0	615.8	708.4	1224.4	1059.3	1137.0	160.0	74.5	120.8
132	661.8	573.7	605.2	1014.0	820.9	888.7	126.0	94.0	114.0
138	645.7	289.2	486.2	959.4	778.4	837.6	143.0	121.0	130.5

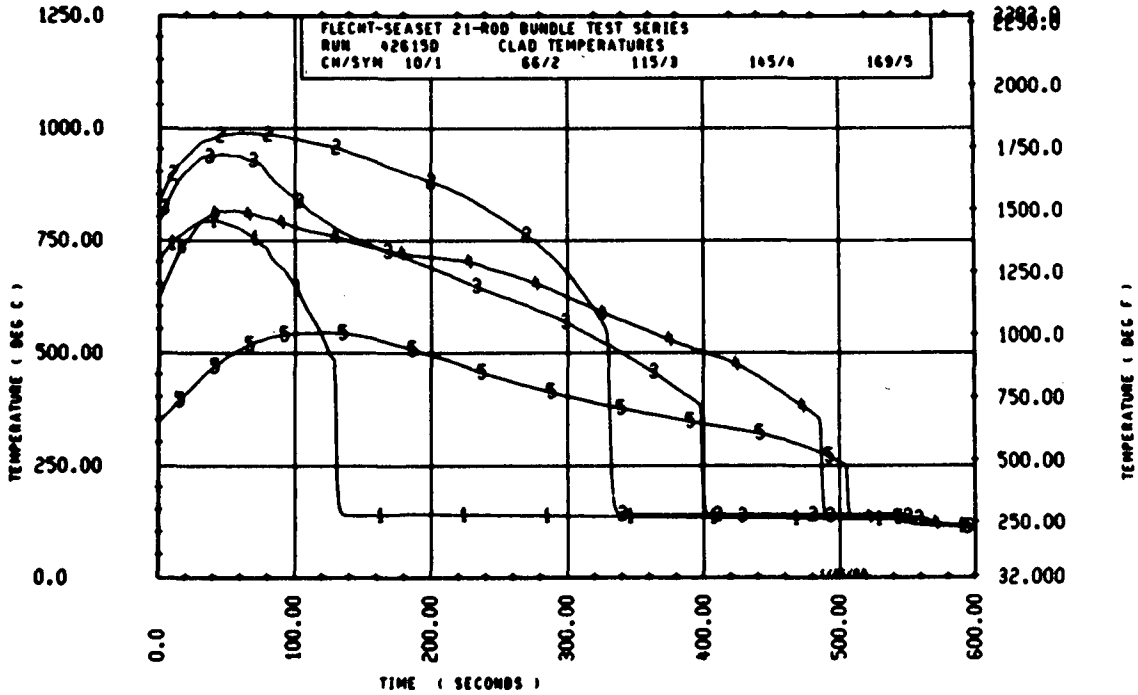
ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	16.5	12.7	14.7	623.6	592.0	603.7	12.0	11.0	11.6
24	48.1	37.3	44.1	728.7	724.7	726.1	37.4	35.9	36.4
39	150.6	132.9	141.9	848.7	810.9	832.4	96.4	92.4	93.9
48	166.0	156.3	161.1	900.3	866.2	883.2	142.9	129.8	136.3
60	320.0	283.7	303.7	996.0	860.0	919.1	224.8	210.6	219.7
67	276.2	251.0	263.2	1022.1	908.6	953.0	274.3	259.8	269.7
70	304.3	283.1	293.7	1025.1	1018.9	1022.0	285.7	276.3	281.0
71	295.1	295.1	295.1	949.7	949.7	949.7	307.7	307.7	307.7
72	300.9	264.0	282.6	975.9	836.1	898.3	317.1	292.6	307.0
74	315.4	247.4	281.3	965.9	746.3	877.4	337.8	276.5	318.3
75	297.3	252.6	270.7	1008.2	896.4	952.5	337.3	311.8	326.9
76	321.0	249.2	281.9	1012.8	811.9	906.3	352.7	323.7	340.8
77	357.4	262.4	296.5	997.4	898.5	953.1	361.8	327.6	345.2
78	337.2	270.5	308.3	1021.4	924.2	966.3	367.9	333.8	352.9
84	287.0	231.9	260.9	799.9	678.5	730.2	414.0	382.0	394.2
90	372.2	208.7	288.5	856.4	718.5	795.8	437.9	386.9	415.7
96	414.8	281.3	353.6	860.1	685.4	762.1	478.6	427.6	446.9
102	531.4	271.0	385.7	711.2	580.4	637.1	499.0	458.0	482.9
111	482.0	268.6	360.2	715.2	544.2	611.4	506.1	424.0	472.8
120	518.8	323.7	428.6	691.2	281.3	573.9	520.0	358.8	478.8
132	352.2	247.2	283.6	577.0	483.9	525.0	505.0	428.9	464.3
138	489.2	294.6	351.5	620.3	491.5	555.0	518.0	292.1	443.8

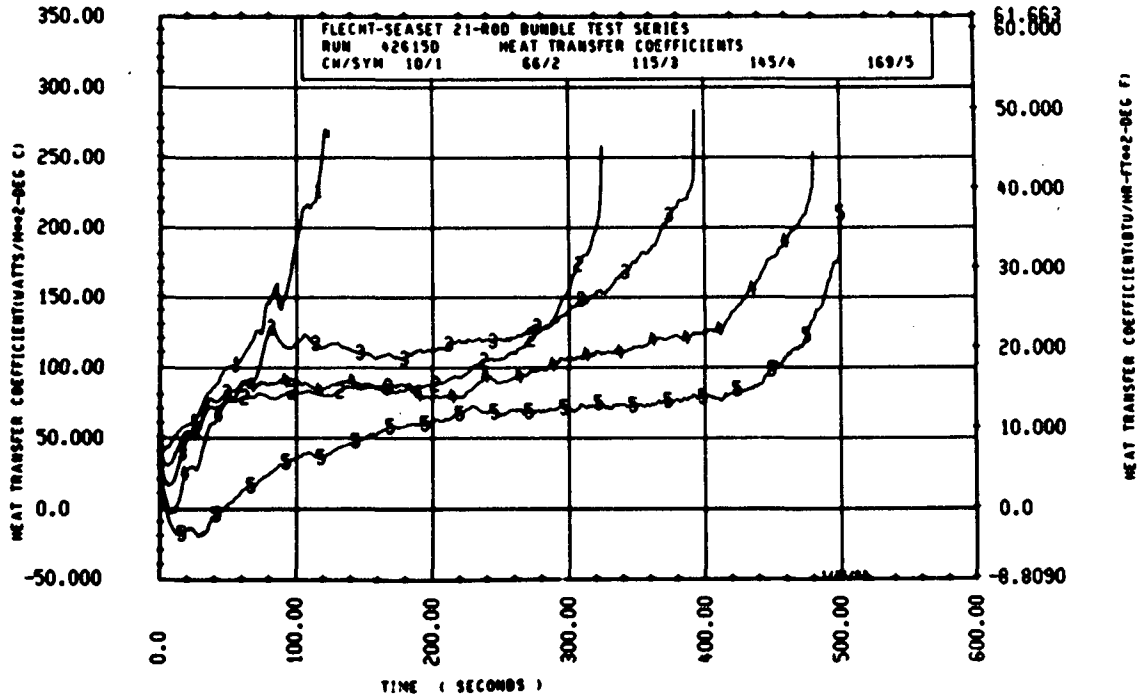
FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 428150

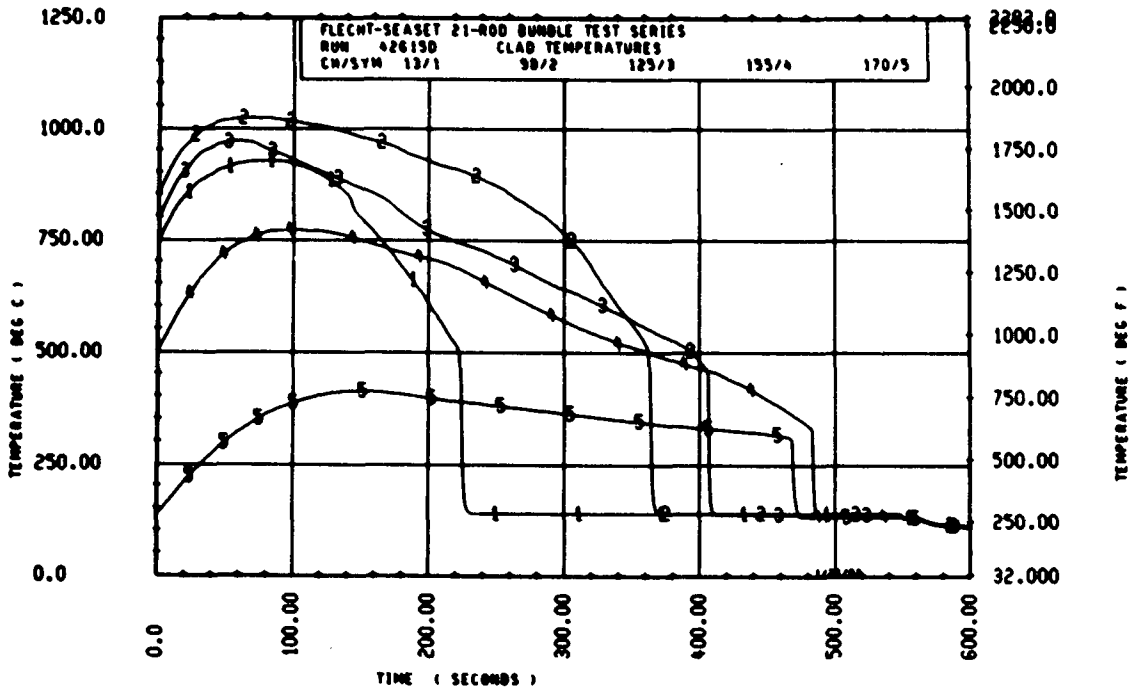
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1082.	1224.	142.	34.0	849.	92.9
4C 3- 3	9	1200.	1333.	133.	30.5	838.	92.4
1C 4- 0	10	1306.	1462.	156.	39.5	900.	129.8
2A 5- 0	13	1383.	1703.	320.	70.5	901.	223.6
2A 5- 7	16	1466.	1729.	262.	57.0	928.	274.8
2D 6- 2	50	1527.	1784.	257.	46.0	899.	326.8
3D 6- 2	55	1509.	1829.	321.	60.5	248.	601.0
5C 6- 2	59	1535.	1785.	250.	30.5	922.	327.7
1D 6- 3	61	1479.	1746.	268.	69.0	1008.	311.8
4B 6- 3	66	1546.	1815.	269.	59.5	994.	329.8
5D 6- 3	68	1466.	1733.	267.	75.0	919.	328.8
2A 6- 4	70	1471.	1749.	277.	60.0	1013.	323.7
3B 6- 4	* * B A D T H E R M O C O U P L E D A T A *						
1D 6- 5	82	1466.	1748.	281.	79.5	997.	327.6
2D 6- 5	* * B A D T H E R M O C O U P L E D A T A *						
3C 6- 5	85	1600.	1899.	299.	59.5	957.	344.8
3E 6- 5	86	1502.	1764.	262.	83.0	898.	352.6
3C 6- 6	97	1588.	1920.	332.	59.5	982.	353.8
3D 6- 6	98	1569.	1879.	310.	58.5	927.	362.8
4A 6- 6	100	1469.	1778.	309.	69.0	931.	367.9
4C 6- 6	101	1570.	1907.	337.	57.0	1020.	352.9
5C 6- 6	103	1532.	1802.	271.	79.5	971.	354.8
1C 7- 0	* * B A D T H E R M O C O U P L E D A T A *						
2B 7- 0	111	1437.	1669.	232.	30.5	752.	389.9
3D 7- 0	115	1467.	1730.	262.	46.0	724.	398.0
5B 7- 0	117	1336.	1574.	238.	44.0	678.	404.0
2B 7- 6	121	1443.	1754.	311.	56.5	841.	412.0
2C 7- 6	122	1402.	1774.	372.	69.0	800.	432.8
2E 7- 6	123	1308.	1558.	250.	45.0	817.	417.0
3A 7- 6	124	1441.	1736.	295.	59.5	824.	412.9
3B 7- 6	125	1469.	1786.	317.	58.0	896.	406.0
4B 7- 6	128	1457.	1773.	316.	57.5	796.	429.6
5C 7- 6	129	1437.	1722.	285.	57.5	815.	412.0
1C 8- 0	132	1169.	1563.	394.	82.5	729.	466.5
2E 8- 0	134	1110.	1462.	353.	78.0	727.	439.0
3D 8- 0	137	1317.	1732.	415.	80.5	830.	441.2
5B 8- 0	139	1271.	1599.	328.	80.5	694.	402.7
5C 8- 0	140	1348.	1673.	325.	71.5	803.	435.7
1C 8- 6	141	993.	1433.	441.	80.5	592.	496.0
1D 8- 6	142	859.	1391.	531.	118.0	711.	482.9
2C 8- 6	143	1058.	1488.	430.	83.0	586.	481.0
4B 8- 6	145	1160.	1502.	342.	55.0	667.	485.9
5D 8- 6	148	1101.	1453.	351.	79.5	710.	463.6
3D 9- 3	155	941.	1423.	482.	95.0	629.	483.0
4C 9- 3	157	1005.	1410.	405.	83.5	634.	483.0
1D10- 0	160	619.	1059.	441.	121.0	619.	505.9
4B10- 0	163	867.	1224.	357.	81.5	602.	513.1
5D10- 0	166	747.	1095.	349.	103.0	691.	456.8
2A11- 0	167	574.	821.	247.	126.0	577.	428.9
4C11- 0	169	662.	1014.	352.	122.0	484.	505.0
1D11- 6	170	289.	778.	489.	143.0	588.	468.0

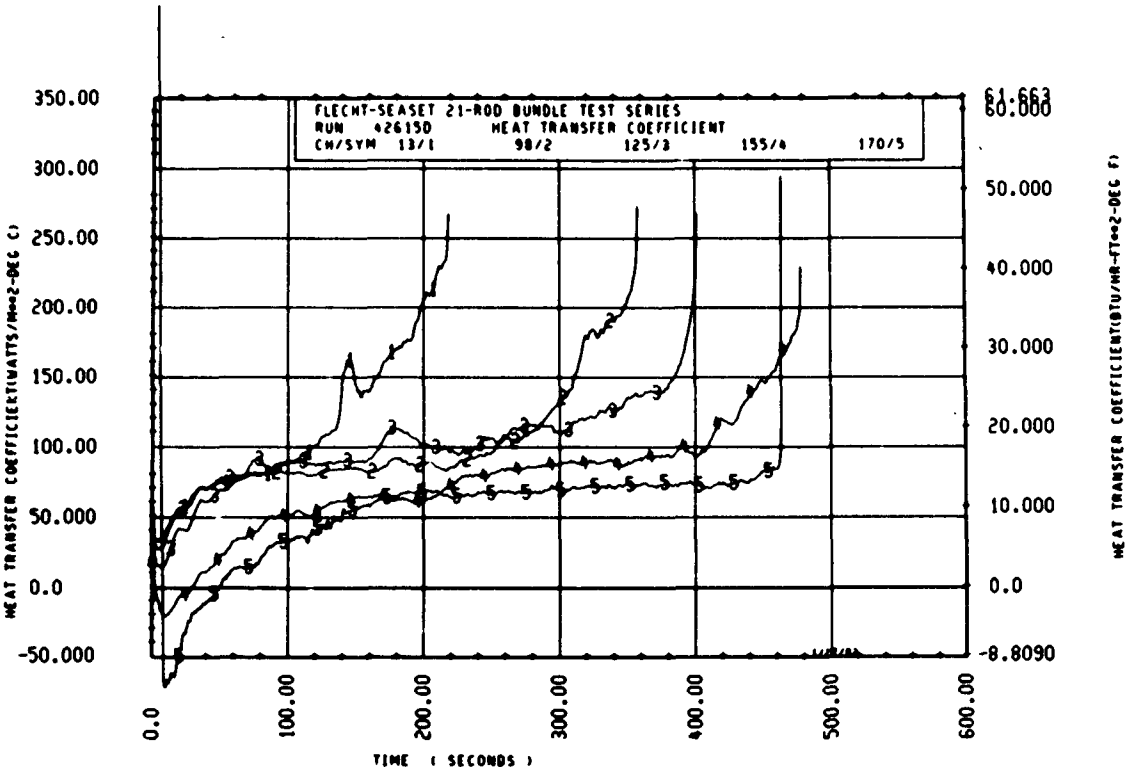

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 426150 CLAD TEMPERATURES
CH/SYM 9/1 50/2 97/3 137/4 163/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

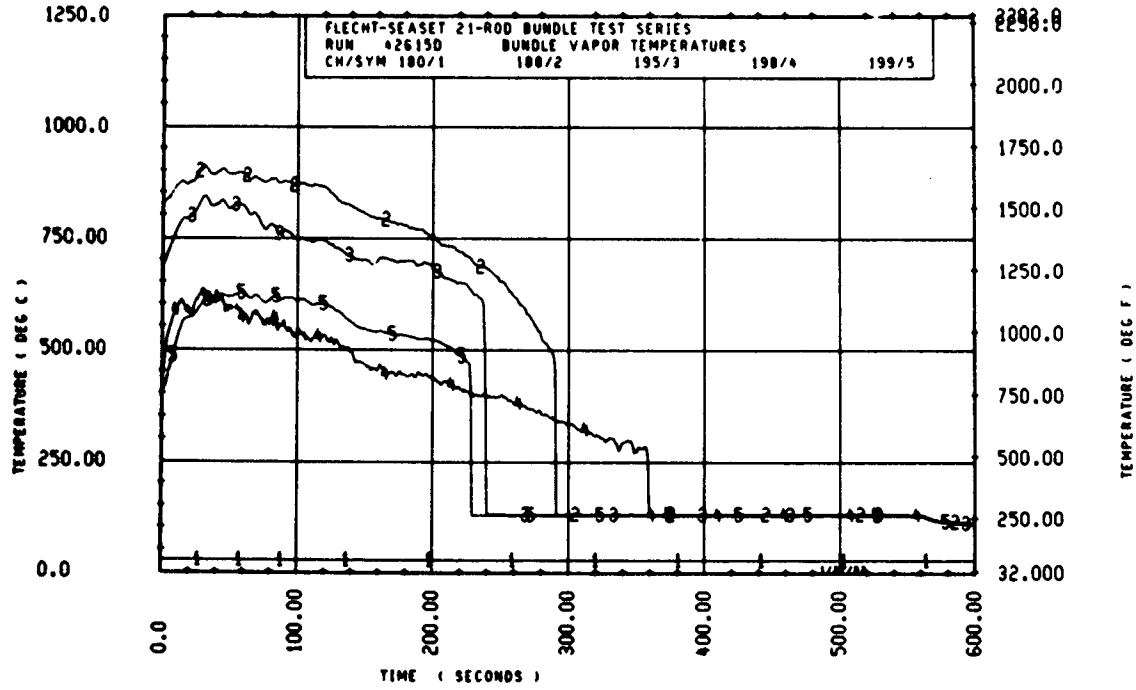

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 426150 HEAT TRANSFER COEFFICIENTS
CH/SYM 9/1 50/2 97/3 137/4 163/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

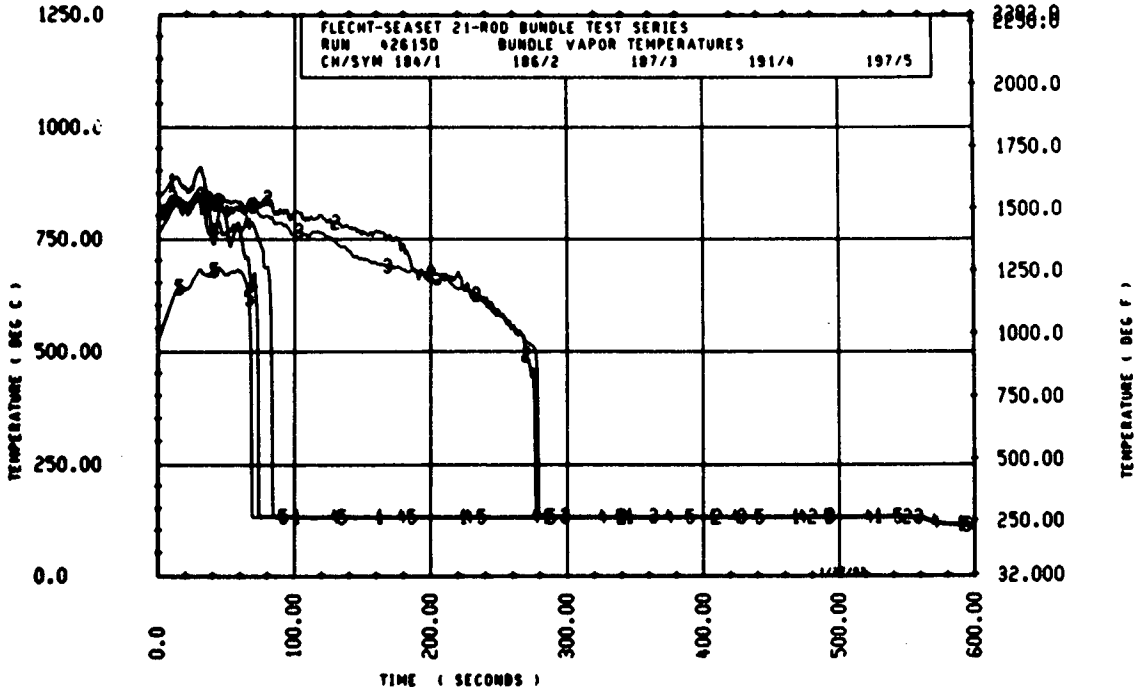

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42615D CLAD TEMPERATURES
CH/SYM 10/1 66/2 115/3 145/4 169/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

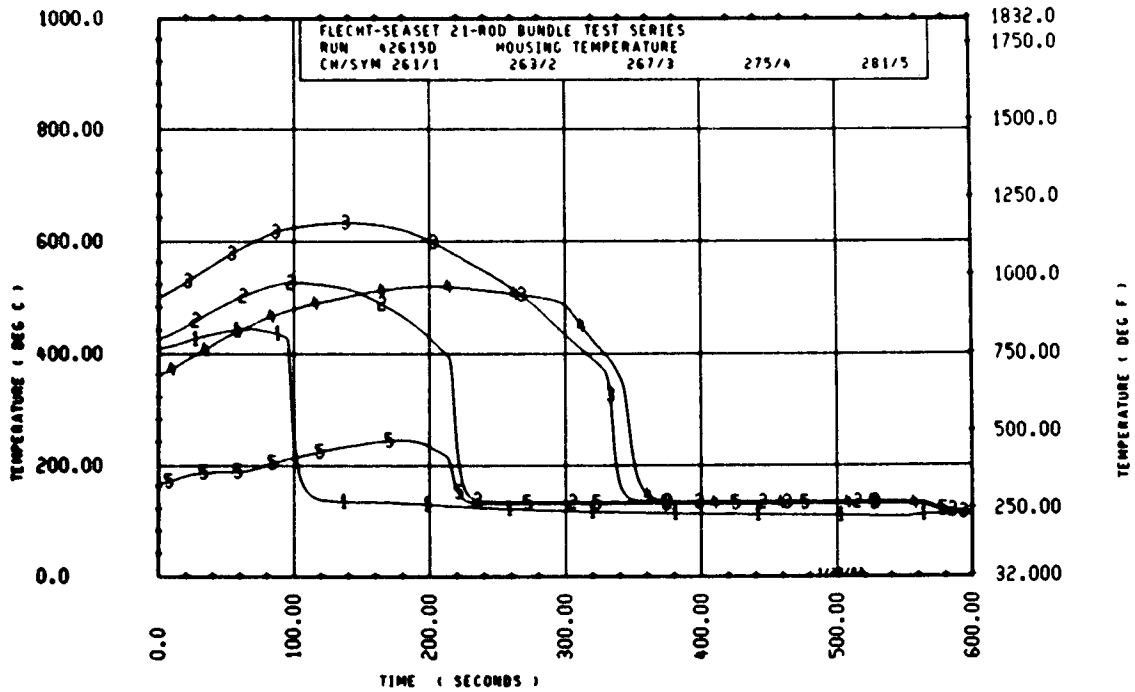

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42615D HEAT TRANSFER COEFFICIENTS
CH/SYM 10/1 66/2 115/3 145/4 169/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

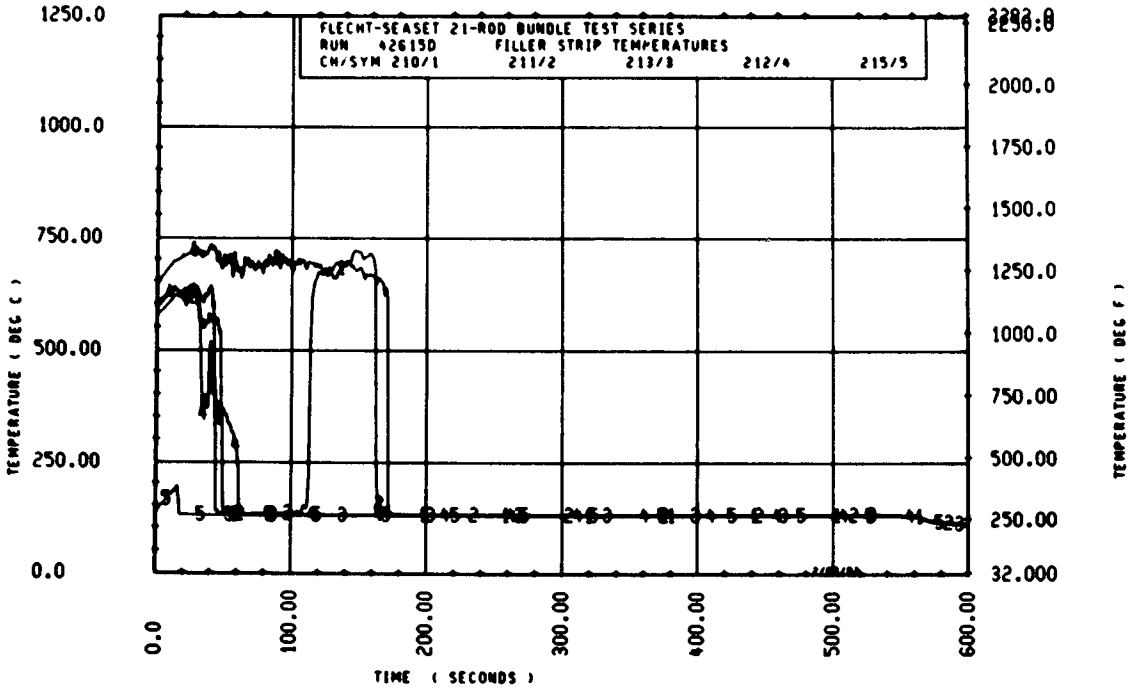

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 426150 CLAD TEMPERATURES
CH/SYM 13/1 90/2 125/3 155/4 170/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

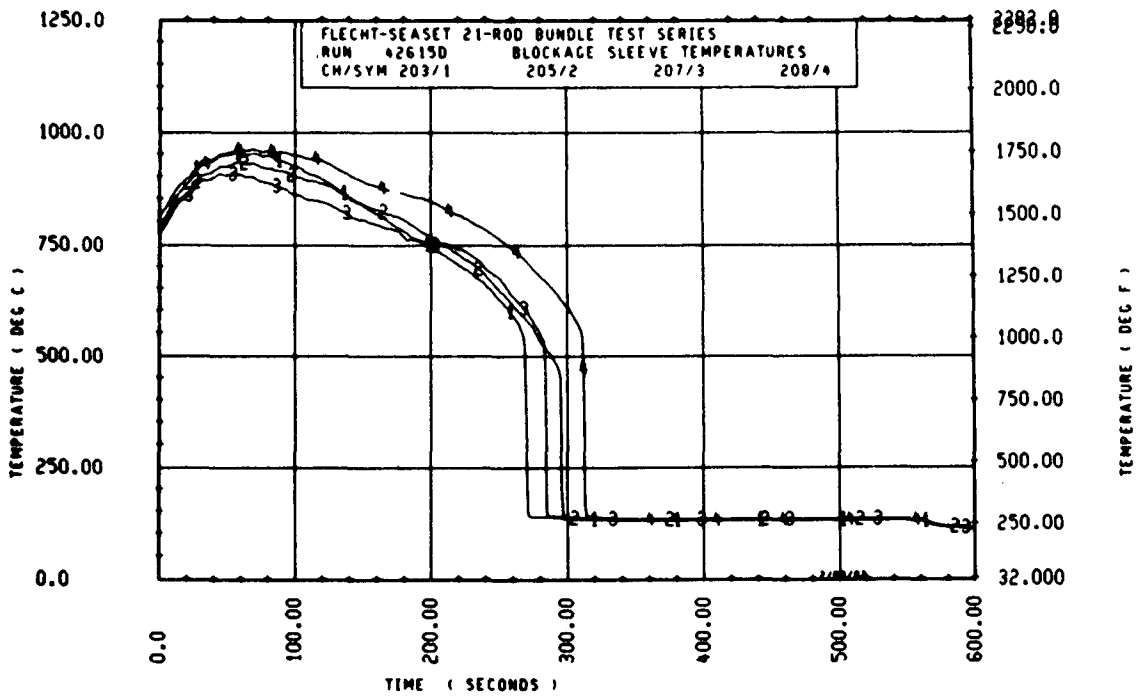

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 426150 HEAT TRANSFER COEFFICIENT
CH/SYM 13/1 90/2 125/3 155/4 170/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

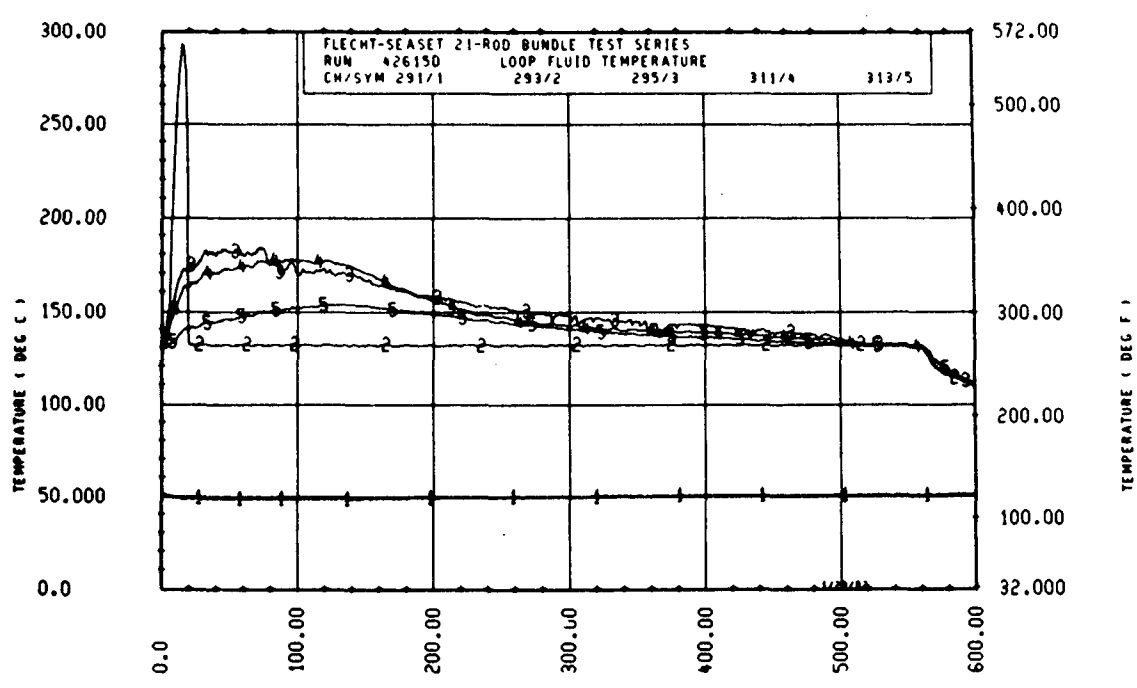

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42615D BUNDLE VAPOR TEMPERATURES
CH/SYM 180/1 188/2 195/3 198/4 199/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

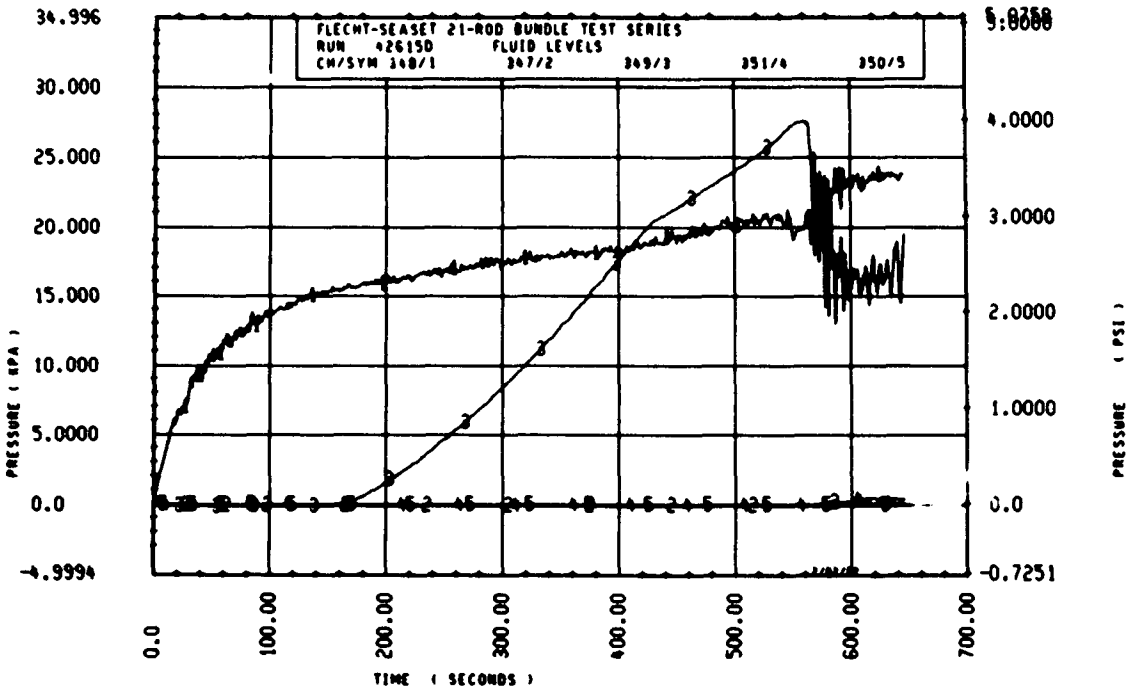

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42615D BUNDLE VAPOR TEMPERATURES
CH/SYM 184/1 186/2 187/3 191/4 197/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

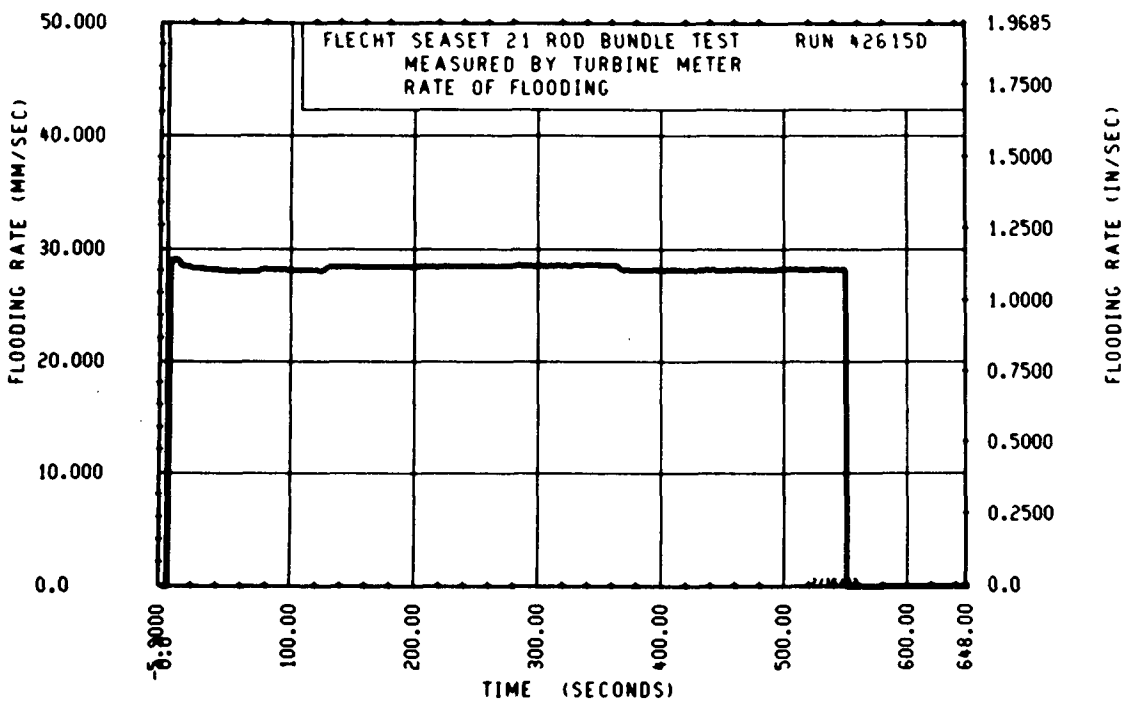

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42615D HOUSING TEMPERATURE
CH/SYM 261/1 263/2 267/3 275/4 281/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1000.0
800.00
600.00
400.00
200.00
0.0
1832.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

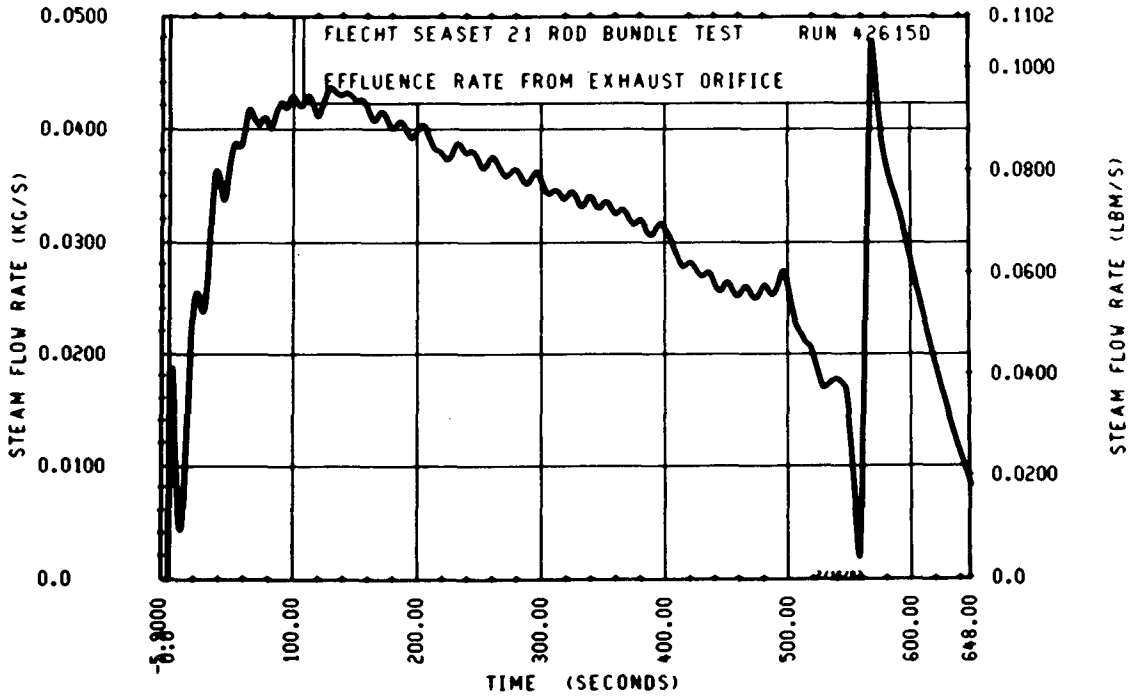

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42615D FILLER STRIP TEMPERATURES
CH/SYM 210/1 211/2 213/3 212/4 215/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

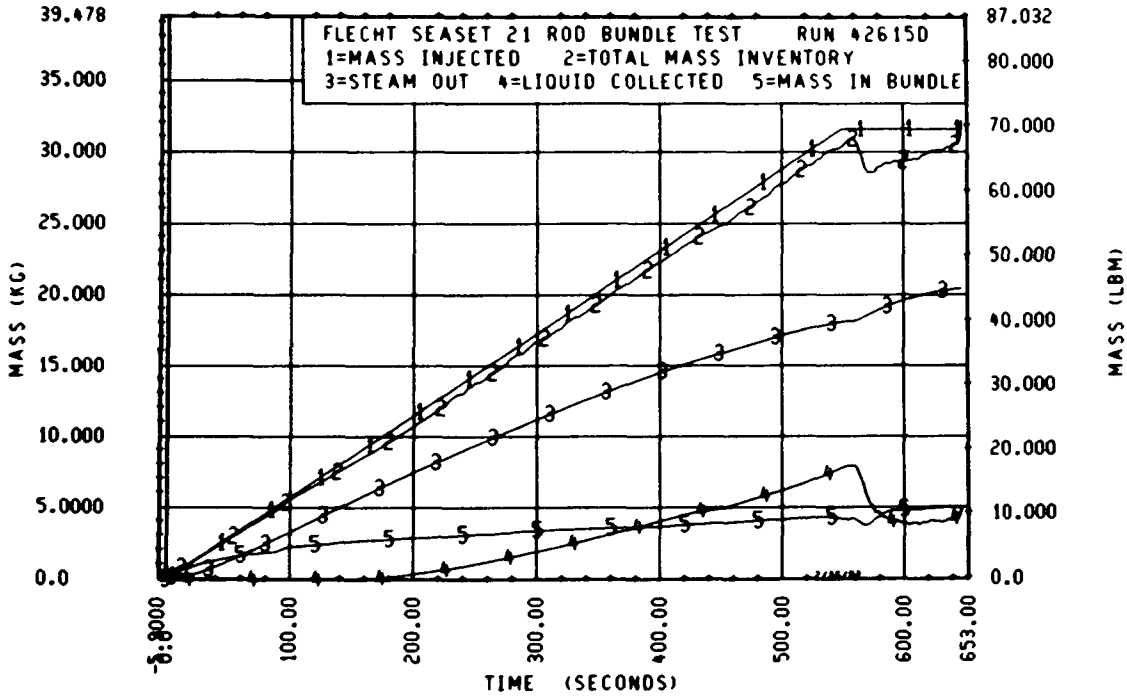

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42615D BLOCKAGE SLEEVE TEMPERATURES
CH/SYM 203/1 205/2 207/3 208/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

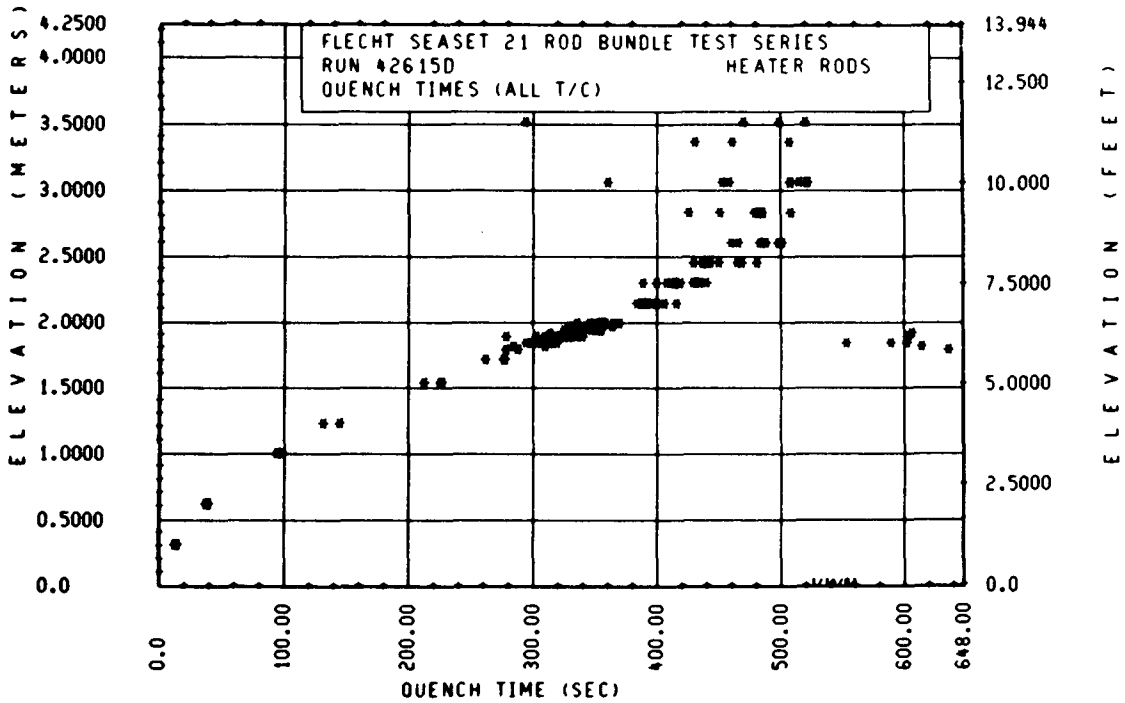

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42615D LOOP FLUID TEMPERATURE
CH/SYM 291/1 293/2 295/3 311/4 313/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
300.00
250.00
200.00
150.00
100.00
50.000
0.0
572.00
500.00
400.00
300.00
200.00
100.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

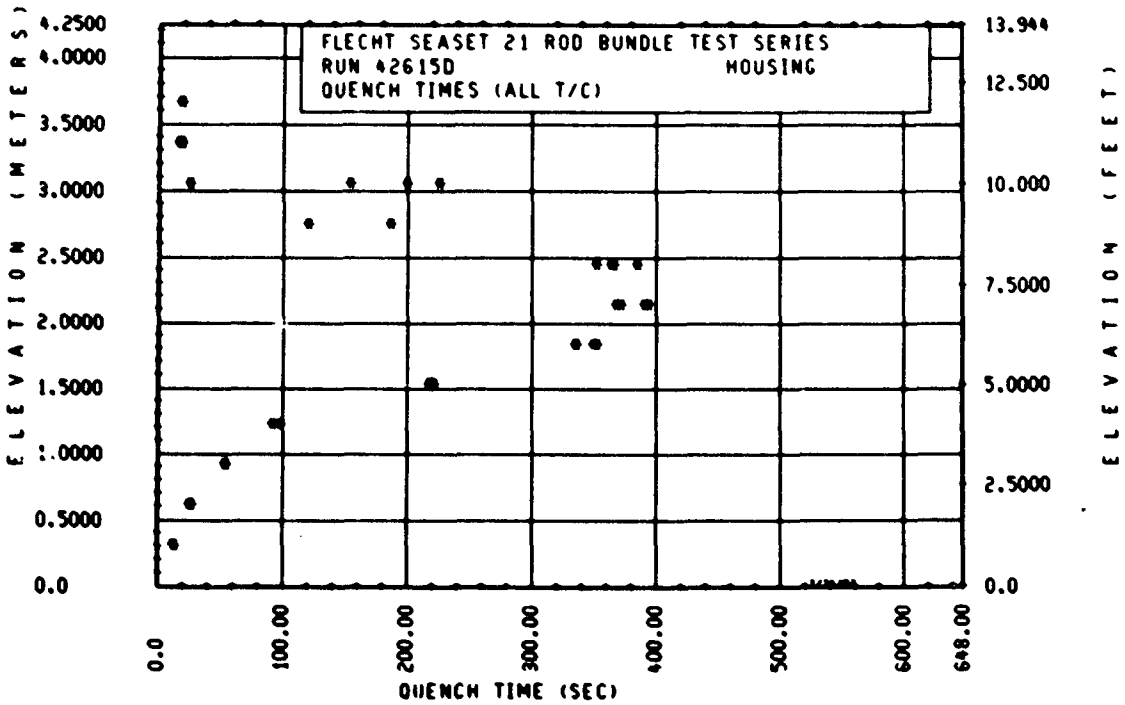

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 42615D FLUID LEVELS
CH/SYM 348/1 347/2 349/3 351/4 350/5
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)

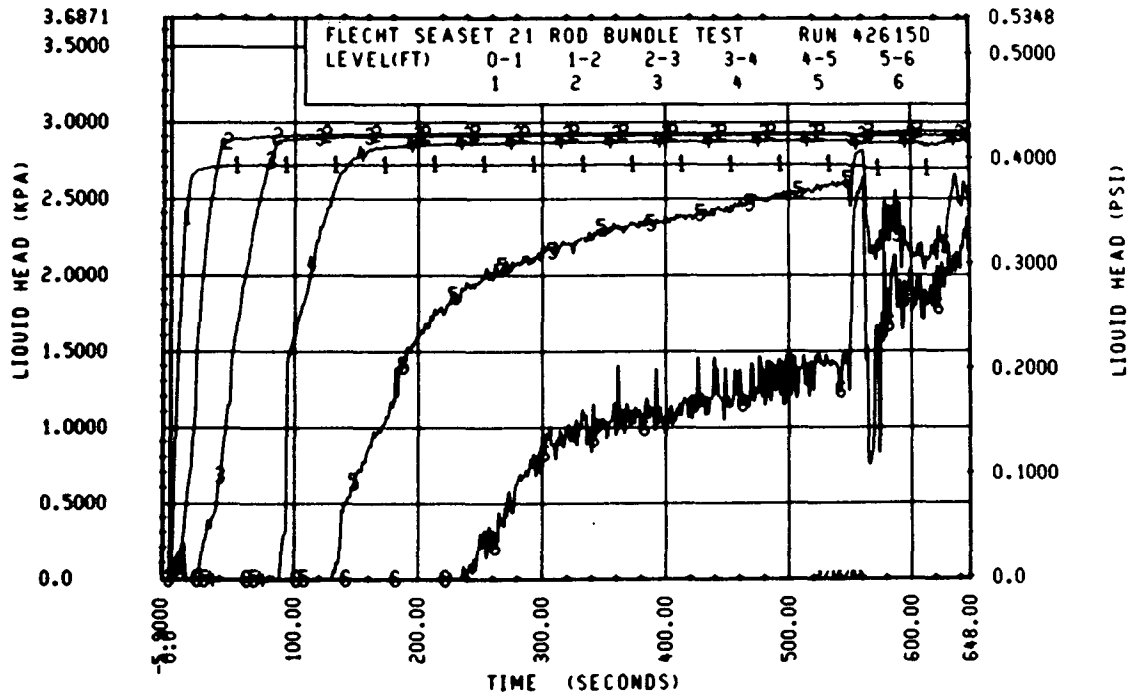

FLECHT SEASET 21 ROD BUNDLE TEST RUN 42615D
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
TIME (SECONDS)

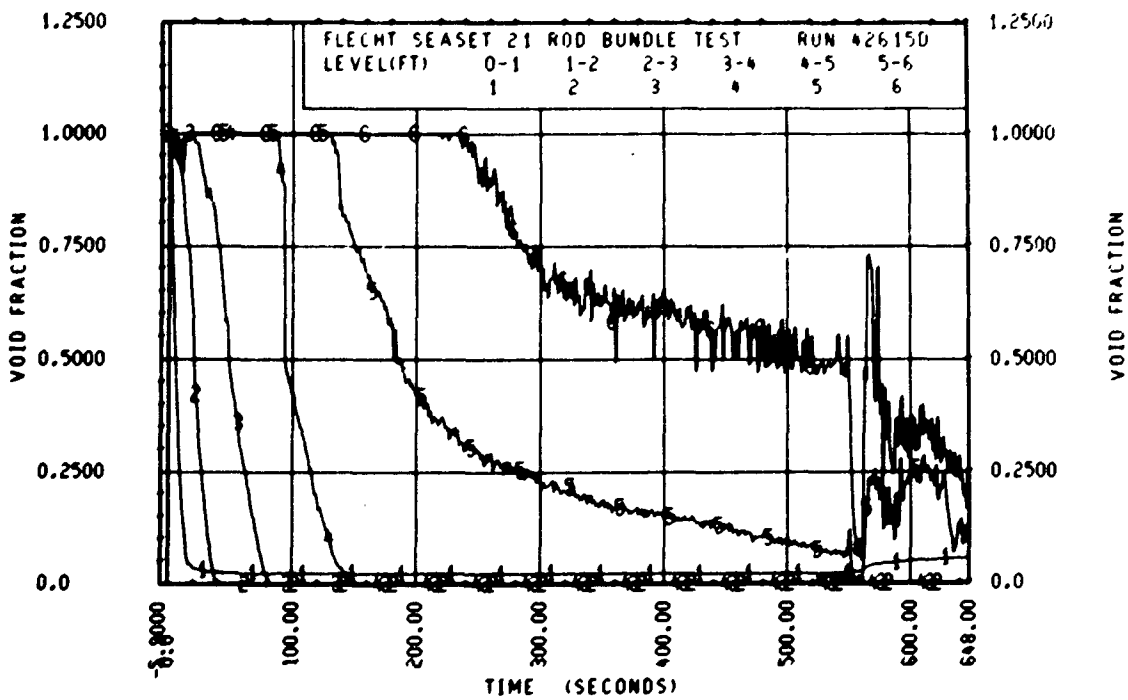

FLECHT SEASET 21 ROD BUNDLE TEST RUN 42615D
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.0500
0.0400
0.0300
0.0200
0.0100
0.0
0.1102
0.1000
0.0800
0.0600
0.0400
0.0200
0.0
-5.8000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
648.00
TIME (SECONDS)

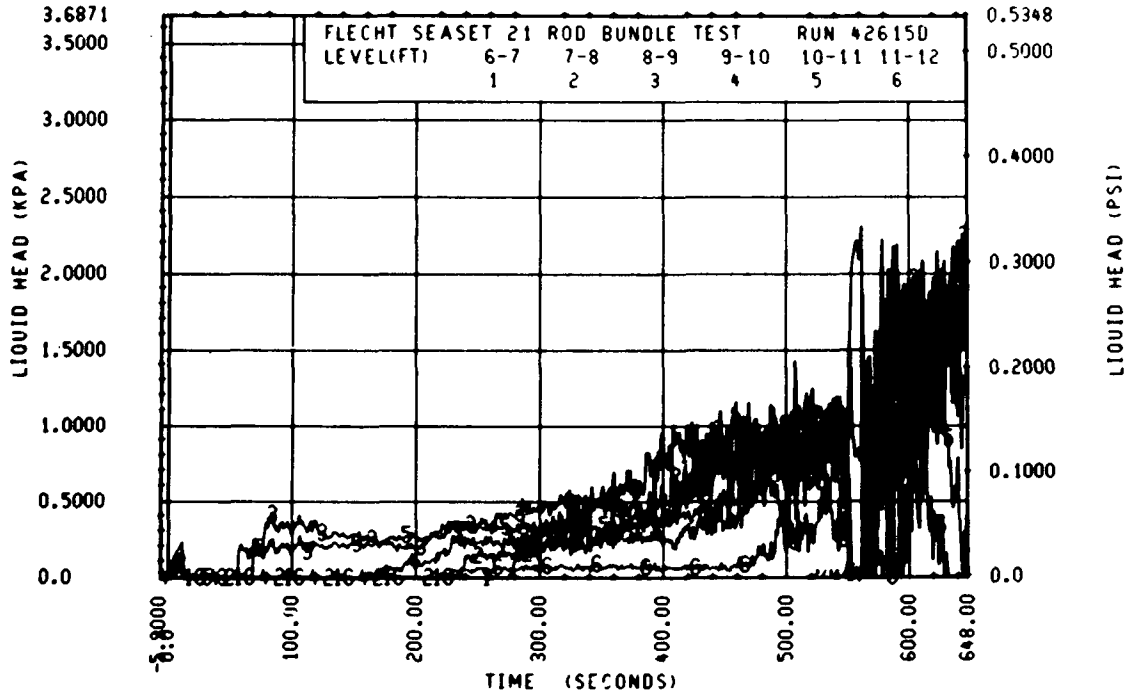

FLECHT SEASET 21 ROD BUNDLE TEST RUN 42615D
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
39.478
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
87.032
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
-5.8000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
653.00
TIME (SECONDS)

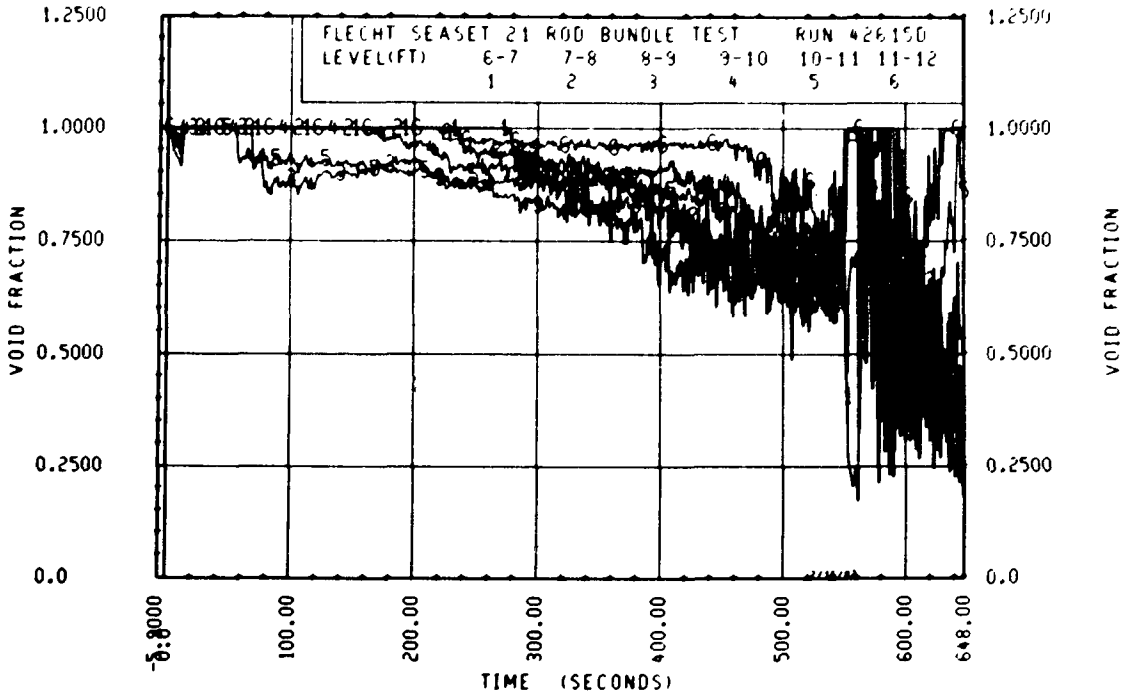

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN 42615D
HEATER RODS
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
4.2500
4.0000
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
13.944
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
648.00
QUENCH TIME (SEC)


FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN 42615D
HOUSING
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
4.2500
4.0000
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
13.944
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
648.00
QUENCH TIME (SEC)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 426150
LEVEL(FT) 0-1 1-2 2-3 3-4 4-5 5-6
1 2 3 4 5 6
LIQUID HEAD (KPA)
LIQUID HEAD (PSI)
TIME (SECONDS)
3.6871
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5348
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
648.00


FLECHT SEASET 21 ROD BUNDLE TEST RUN 426150
LEVEL(FT) 0-1 1-2 2-3 3-4 4-5 5-6
1 2 3 4 5 6
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
100.00
200.00
300.00
400.00
500.00
600.00
648.00


FLECHT SEASET 21 ROD BUNDLE TEST RUN 42615D
LEVEL(FT) 6-7 7-8 8-9 9-10 10-11 11-12
1 2 3 4 5 6
LIQUID HEAD (KPA)
LIQUID HEAD (PSI)
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 42615D
LEVEL(FT) 6-7 7-8 8-9 9-10 10-11 11-12
1 2 3 4 5 6
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41515E
Test Date: 12/4/80
Test Type: Forced Reflood (second repeat)
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.276 MPa (40.1 psia)
Initial peak clad temperature and location	874°C (1605°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	51°C (123°F)
Average and range of initial 1.83 m (72 in.) housing temperature	517°C (509°C - 522°C) [962°F (949°F - 971°F)]
Initial bundle water level	38.7 mm (1.52 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-1% with ±0.5% oscillations[a]
Housing temperature at midplane:	±1% throughout test[a]

a. Relative to run 42215E

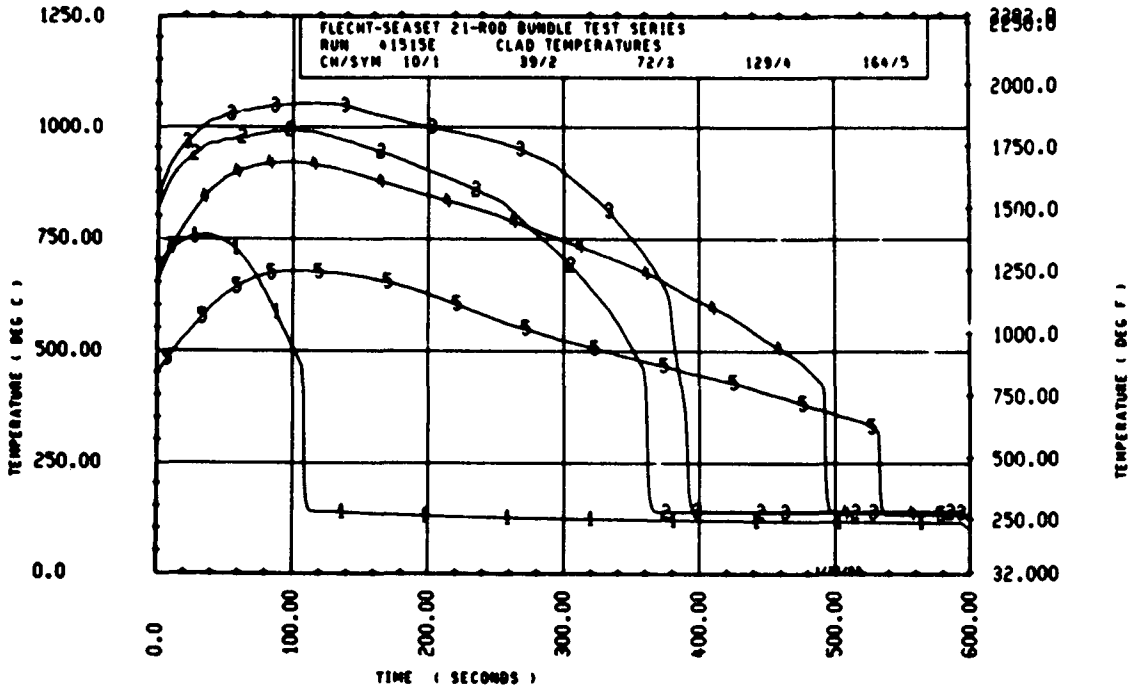
FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER41515E

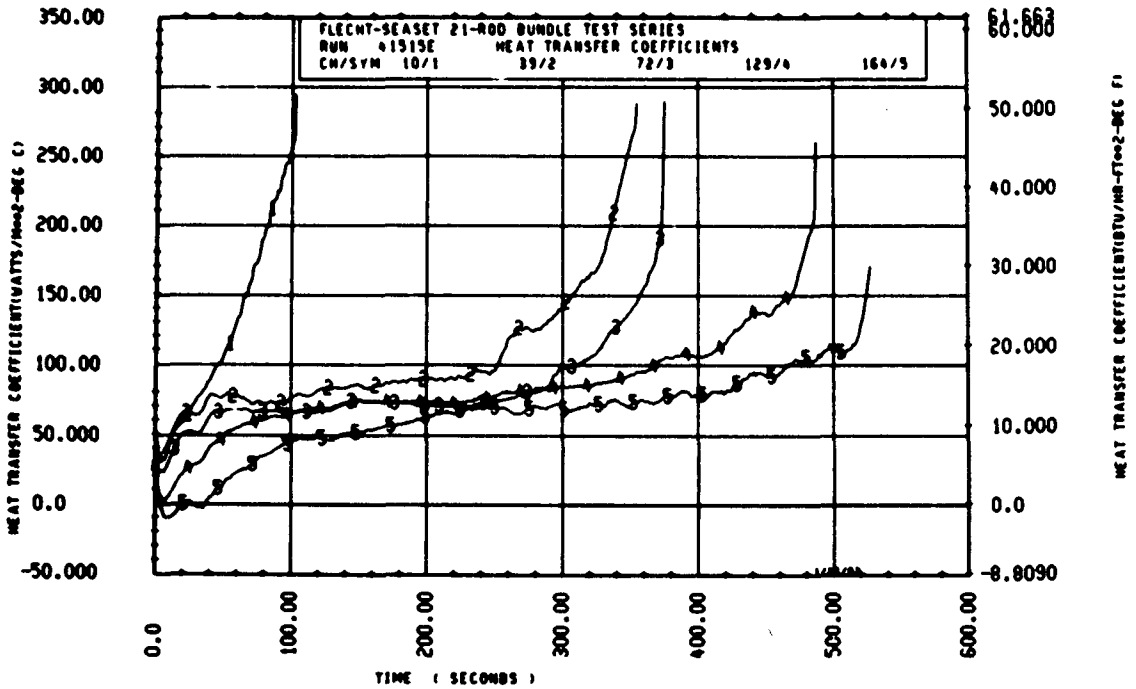
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1261.	1353.	152.	34.5	827.	112.9
4C 3- 3	10	1275.	1397.	122.	30.5	864.	107.8
1C 4- 0	12	1383.	1590.	207.	50.0	943.	145.9
2A 5- 0	16	1518.	1812.	295.	61.5	926.	246.7
2A 5- 7	19	1533.	1804.	272.	60.0	873.	303.5
5C 6- 0	36	1427.	1766.	339.	99.5	1134.	319.1
2D 6- 2	39	1516.	1820.	304.	95.0	817.	360.4
1D 6- 4	47	1480.	1753.	273.	96.5	863.	356.7
3D 6- 4	50	1460.	1884.	423.	103.0	254.	844.0
4B 6- 4	52	1532.	1837.	305.	95.0	698.	351.5
5C 6- 4	54	1475.	1804.	330.	101.0	1063.	340.3
5D 6- 4	55	1497.	1752.	255.	98.5	875.	358.6
1D 6- 5	58	1490.	1779.	289.	97.0	894.	365.2
2A 6- 5	59	1485.	1774.	289.	98.5	752.	409.9
2D 6- 5	61	1533.	1845.	312.	97.0	915.	376.6
3B 6- 5	63	1555.	1871.	316.	97.0	745.	384.0
3C 6- 6	72	1569.	1932.	363.	117.0	1127.	378.5
4C 6- 6	75	1579.	1921.	343.	101.0	751.	407.0
3C 6- 7	* * B A D T H E R M O C O U P L E D A T A *						
3E 6- 7	83	1495.	1842.	346.	109.0	895.	388.4
3D 6- 8	86	1541.	1941.	400.	102.0	866.	416.9
4A 6- 8	87	1447.	1753.	306.	98.5	763.	432.6
1C 7- 0	93	1411.	1656.	245.	59.5	757.	413.8
2B 7- 0	94	1452.	1675.	223.	37.0	715.	439.4
3D 7- 0	98	1467.	1730.	263.	39.0	767.	446.7
5B 7- 0	103	1384.	1631.	247.	51.0	736.	435.4
2B 7- 6	110	1391.	1736.	345.	70.0	779.	473.6
2C 7- 6	111	1429.	1744.	316.	59.5	816.	449.6
2E 7- 6	113	1258.	1596.	338.	59.5	728.	470.3
3A 7- 6	* * B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	115	1120.	1615.	494.	93.0	701.	512.0
4B 7- 6	120	1425.	1783.	358.	81.5	833.	456.9
5C 7- 6	122	1414.	1723.	309.	82.5	822.	455.9
1C 8- 0	124	1188.	1604.	418.	101.0	768.	487.9
2E 8- 0	126	1028.	1409.	380.	113.0	696.	493.7
3D 8- 0	129	1223.	1690.	466.	95.0	790.	491.9
5B 8- 0	133	1209.	1582.	373.	79.5	806.	468.1
5C 8- 0	134	1285.	1669.	384.	82.0	749.	481.9
1C 8- 6	135	983.	1447.	464.	97.0	679.	516.8
1D 8- 6	136	870.	1334.	464.	108.0	659.	528.9
2C 8- 6	138	1130.	1647.	517.	97.5	734.	518.1
4B 8- 6	143	1111.	1533.	422.	72.5	884.	510.8
5D 8- 6	145	1008.	1408.	399.	75.5	781.	482.3
3D 9- 3	150	869.	1353.	484.	112.0	833.	523.3
4C 9- 3	152	981.	1421.	439.	97.5	817.	526.0
1D10- 0	157	584.	1098.	514.	150.0	203.	555.0
4B10- 0	164	846.	1253.	405.	102.0	810.	532.0
5D10- 0	166	681.	1039.	358.	130.0	742.	405.8
2A11- 0	168	563.	766.	203.	99.0	510.	391.0
4C11- 0	169	657.	1017.	360.	139.0	530.	503.0
1D11- 6	171	295.	774.	479.	160.0	543.	429.0

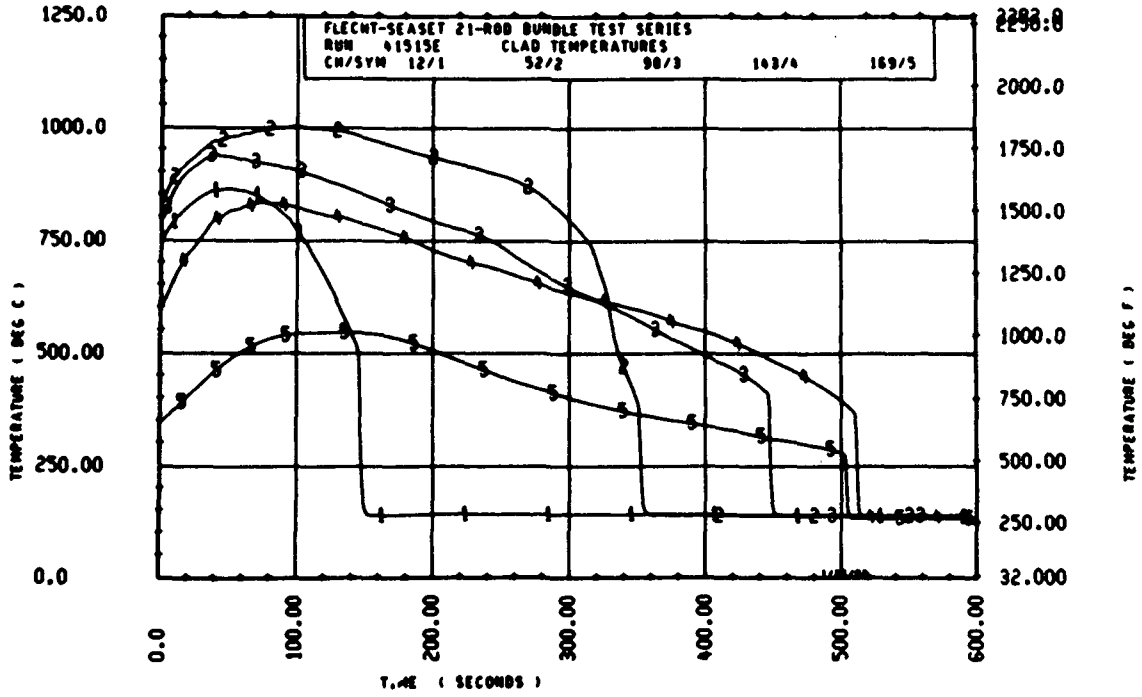
RUN 41515E HEATER ROD STATISTICAL DATA

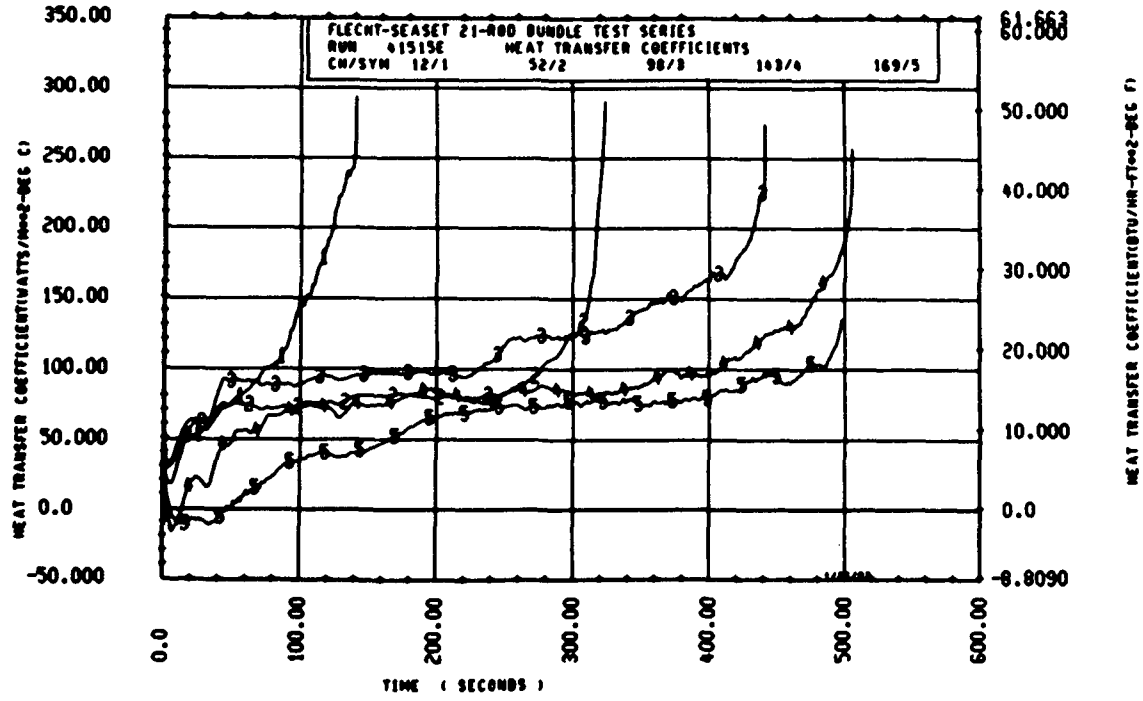
ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	662.5	631.5	651.5	676.2	647.8	666.4	5.5	5.5	5.5
24	950.1	875.7	910.0	987.2	919.2	948.0	15.5	11.5	13.0
39	1275.5	1181.1	1210.2	1397.0	1328.9	1352.5	36.5	30.5	33.6
48	1440.3	1360.3	1394.5	1631.9	1549.5	1590.3	51.0	46.5	49.8
60	1548.4	1506.8	1524.3	1814.6	1812.3	1813.1	82.5	61.5	71.2
67	1605.2	1504.1	1553.6	1907.4	1768.7	1845.5	102.0	48.5	76.2
70	1592.2	1544.6	1566.8	1894.9	1871.1	1879.8	87.5	82.5	84.5
73	1484.2	1484.2	1484.2	1794.3	1794.3	1794.3	96.5	96.5	96.5
74	1517.6	1516.0	1516.8	1840.6	1820.3	1830.4	95.0	82.5	88.8
75	1492.3	1465.5	1479.3	1770.9	1750.8	1763.4	107.0	96.0	99.5
76	1550.0	1474.6	1502.7	1867.8	1730.8	1790.9	101.0	94.0	96.8
77	1554.9	1484.2	1500.5	1871.1	1766.4	1799.7	110.0	97.0	100.1
78	1578.6	1453.2	1521.6	1931.5	1747.5	1836.5	117.0	94.0	103.4
79	1557.0	1495.5	1530.0	1914.3	1794.3	1848.1	109.0	94.0	103.0
80	1540.8	1434.4	1488.5	1940.7	1753.1	1845.9	107.0	97.0	101.5
81	1526.8	1526.8	1526.8	1952.2	1952.2	1952.2	110.0	110.0	110.0
82	1473.0	1473.0	1473.0	1865.5	1865.5	1865.5	108.0	108.0	108.0
84	1491.2	1363.9	1439.0	1759.8	1611.2	1694.0	59.5	37.0	46.4
90	1489.1	1120.3	1352.5	1798.8	1525.7	1701.1	97.0	38.5	73.9
96	1295.9	1028.4	1217.2	1743.0	1408.7	1638.5	113.0	66.0	90.2
102	1433.9	787.2	1029.7	1794.3	1118.2	1455.8	113.0	50.0	87.0
111	981.0	710.3	839.5	1449.4	1058.3	1264.3	127.0	75.5	104.2
120	1057.8	574.3	768.3	1422.7	1038.7	1182.8	159.0	64.0	120.0
132	657.2	461.3	540.9	1017.1	739.9	819.1	151.0	99.0	127.8
138	568.7	294.7	441.7	827.1	774.2	800.6	160.0	131.0	145.5

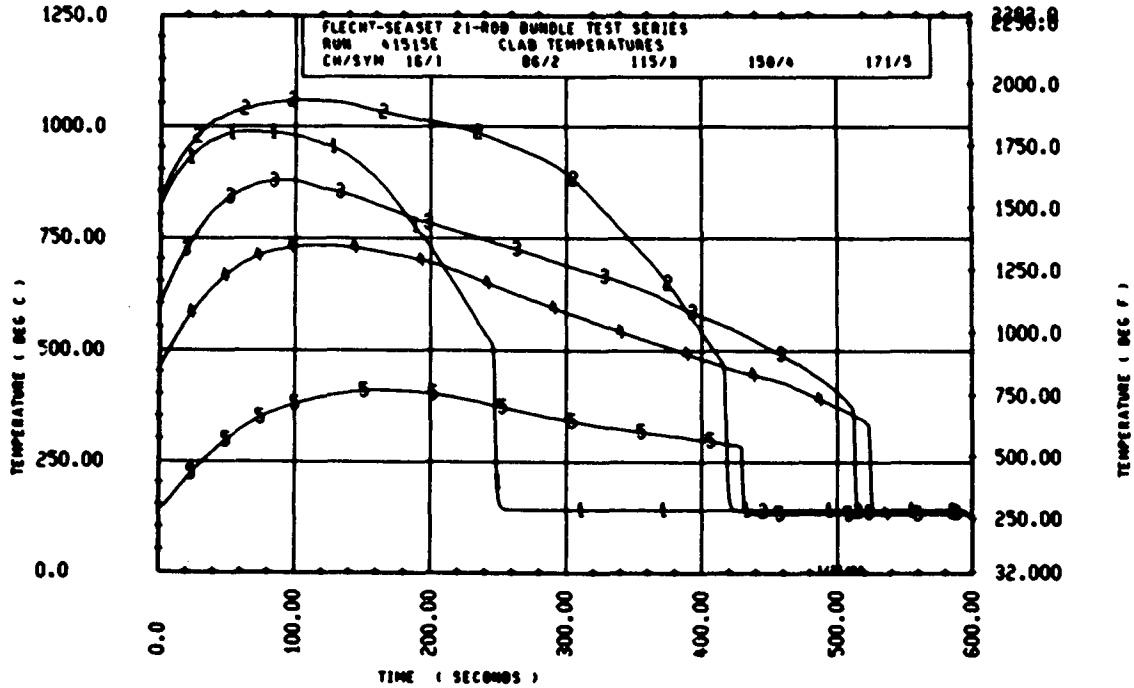
ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	16.3	13.6	14.9	621.3	593.1	608.1	18.5	16.5	17.3
24	43.4	33.4	38.0	766.3	743.9	757.6	43.9	43.4	43.7
39	151.6	121.5	142.3	914.0	827.4	861.2	112.9	99.4	106.2
48	206.7	189.2	195.8	959.8	929.2	944.2	149.8	144.8	146.6
60	305.5	266.2	288.8	970.5	928.4	944.5	246.7	233.3	239.2
67	310.1	248.9	291.8	1033.3	856.4	933.0	317.8	280.7	296.8
70	328.8	301.6	311.0	959.2	898.3	925.8	339.7	319.6	328.6
73	310.1	310.1	310.1	817.2	817.2	817.2	329.5	329.5	329.5
74	323.0	304.3	313.7	816.9	691.9	754.4	360.4	349.1	354.7
75	296.5	266.6	284.1	967.7	675.5	771.6	384.0	346.6	356.1
76	329.8	247.6	286.2	1062.8	666.0	853.8	403.8	340.3	362.3
77	316.2	255.6	291.2	964.7	696.6	853.5	409.9	357.6	378.1
78	368.2	235.3	314.9	1126.6	730.0	885.8	414.7	368.3	386.7
79	357.3	254.0	317.5	945.6	805.7	896.8	393.9	373.6	388.5
80	413.0	286.7	357.4	943.8	763.4	874.5	432.6	389.2	409.6
81	425.3	425.3	425.3	840.2	840.2	840.2	422.7	422.7	422.7
82	392.5	392.5	392.5	891.8	891.8	891.8	405.5	405.5	405.5
84	290.0	221.7	255.0	806.3	688.0	763.8	459.0	413.6	433.6
90	494.2	292.5	346.6	846.9	700.7	780.9	512.0	449.6	467.6
96	466.3	372.7	421.3	807.7	695.9	769.2	506.2	468.1	486.9
102	542.5	320.5	426.1	802.1	658.7	715.3	528.9	342.5	464.3
111	500.8	337.3	424.8	665.7	522.5	601.8	552.0	463.0	521.3
120	513.6	284.6	414.5	741.8	283.4	599.4	555.0	290.4	497.2
132	359.8	202.8	278.2	567.4	510.4	540.7	503.0	381.4	421.6
138	479.5	236.4	358.9	542.8	524.8	533.8	460.0	429.0	444.5

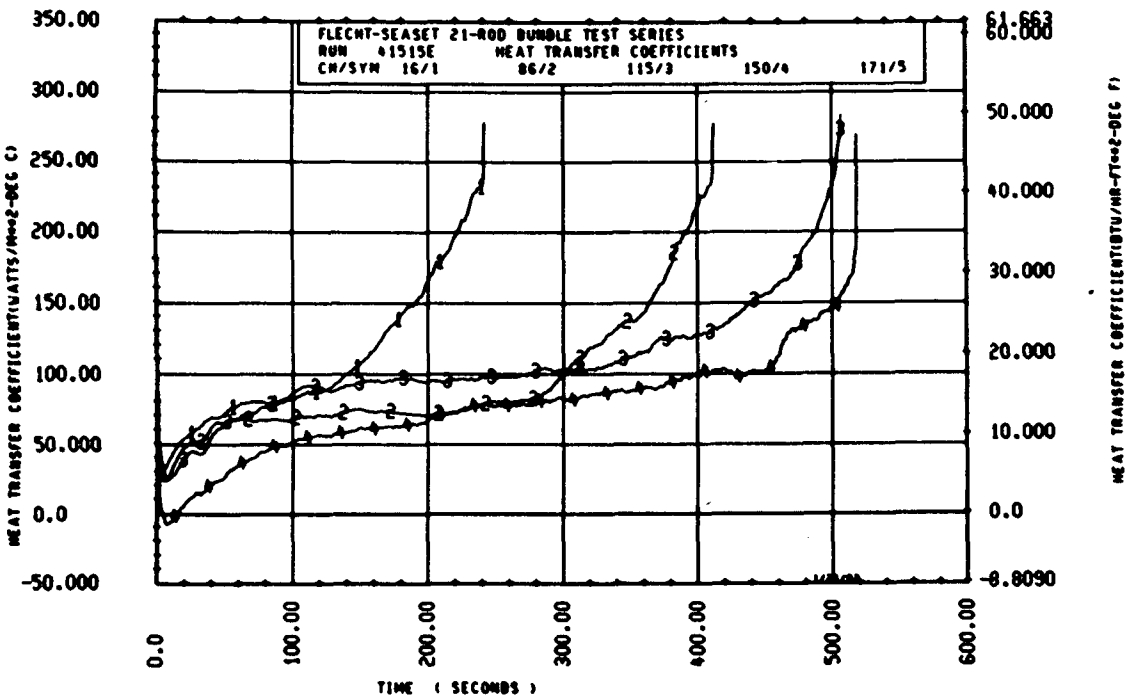

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41515E CLAD TEMPERATURES
CH/SYM 10/1 39/2 72/3 129/4 164/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

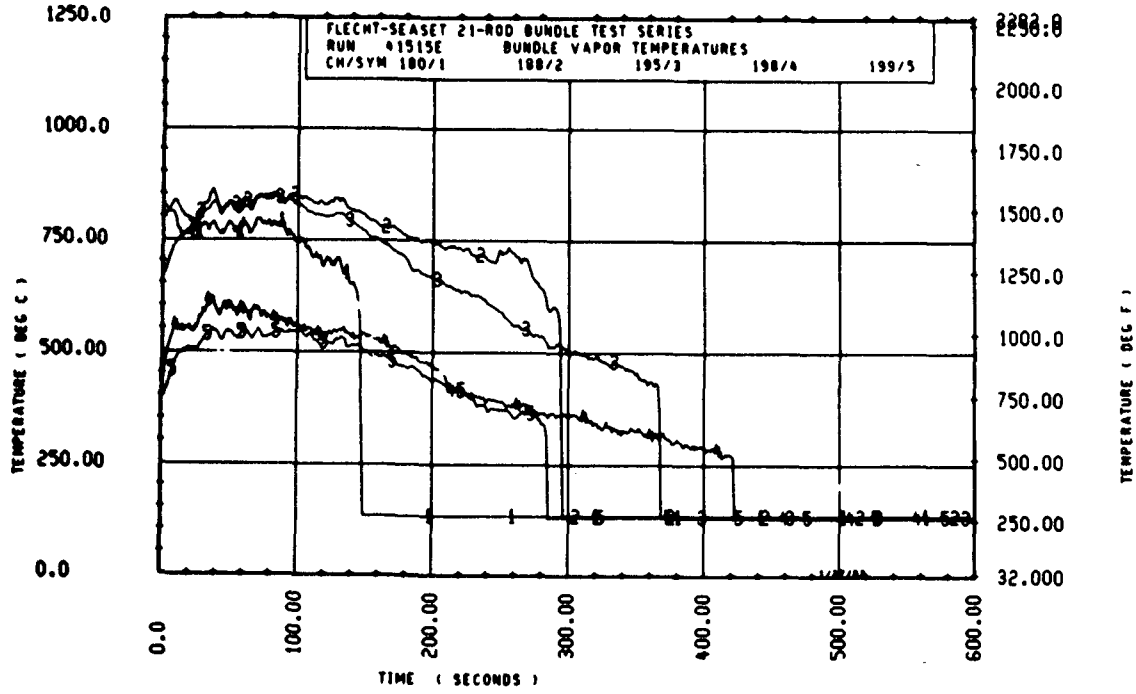

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41515E HEAT TRANSFER COEFFICIENTS
CH/SYM 10/1 39/2 72/3 129/4 164/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

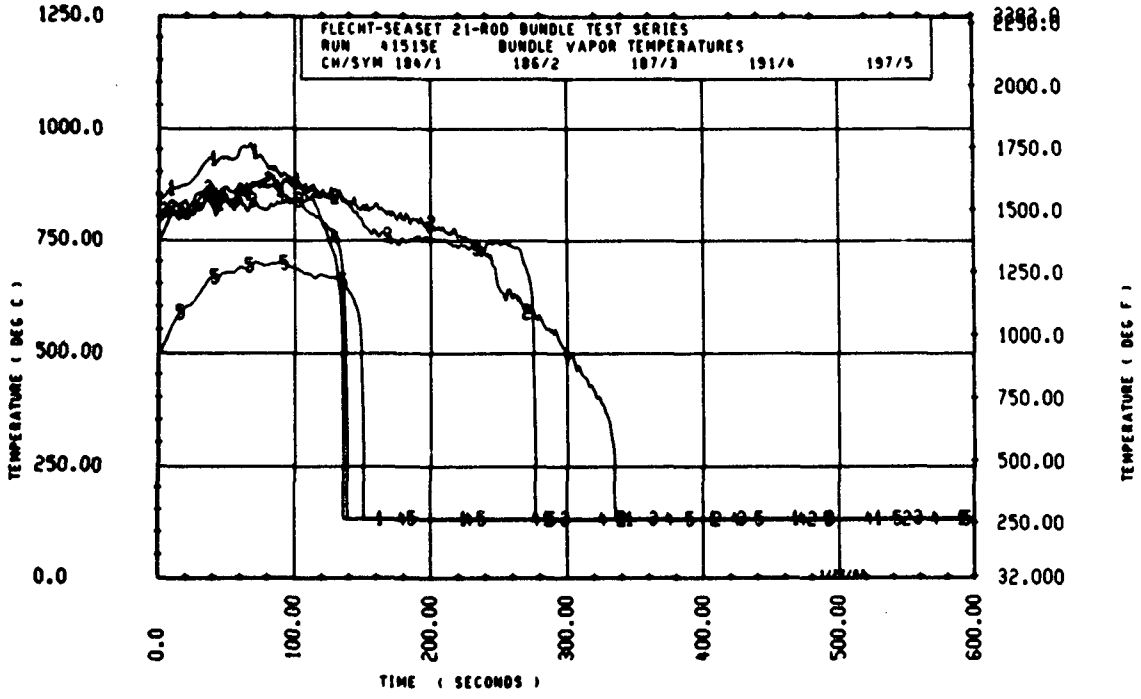

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41515E CLAD TEMPERATURES
CH/SYM 12/1 52/2 98/3 143/4 169/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

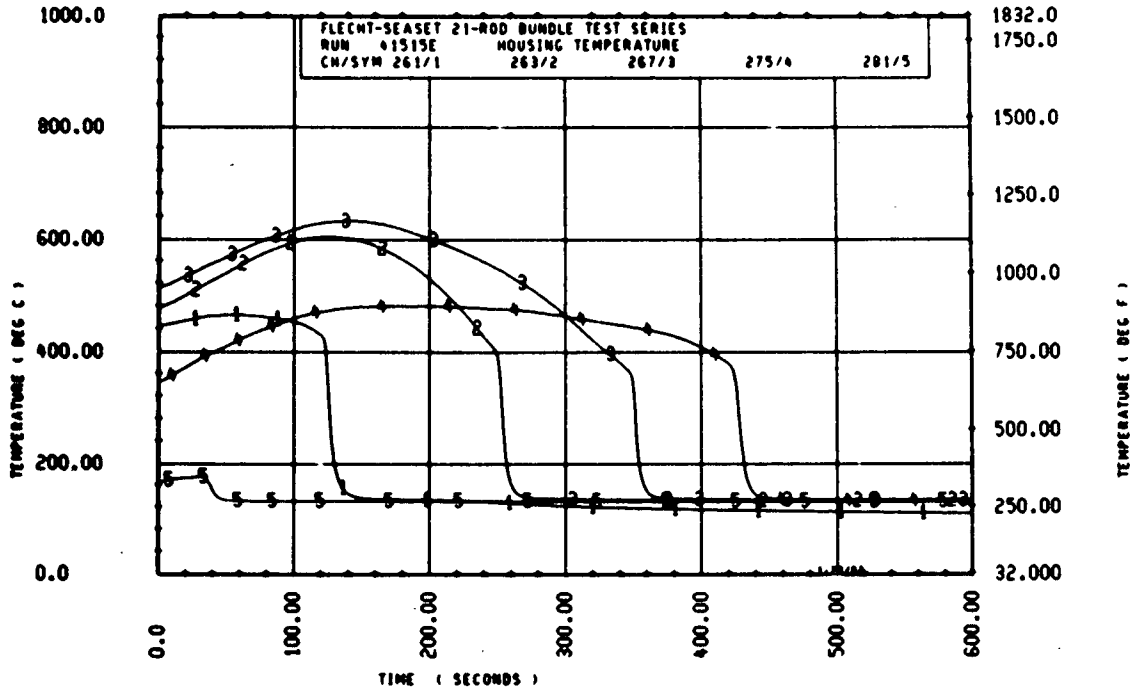

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41515E HEAT TRANSFER COEFFICIENTS
CH/SYM 12/1 52/2 98/3 143/4 169/5
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
61.663
60.000
50.000
40.000
30.000
20.000
10.000
0.0
-8.8090
0.0
100.00
200.00
300.00
400.00
500.00
600.00

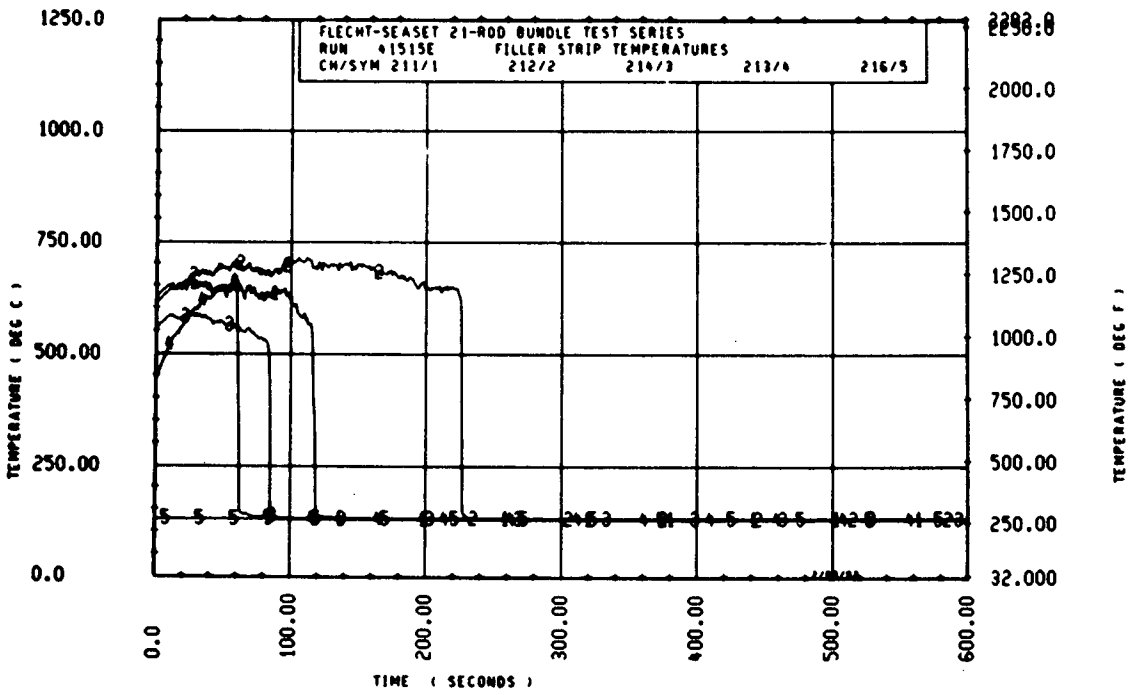

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41515E CLAD TEMPERATURES
CH/SYM 16/1 86/2 115/3 150/4 171/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

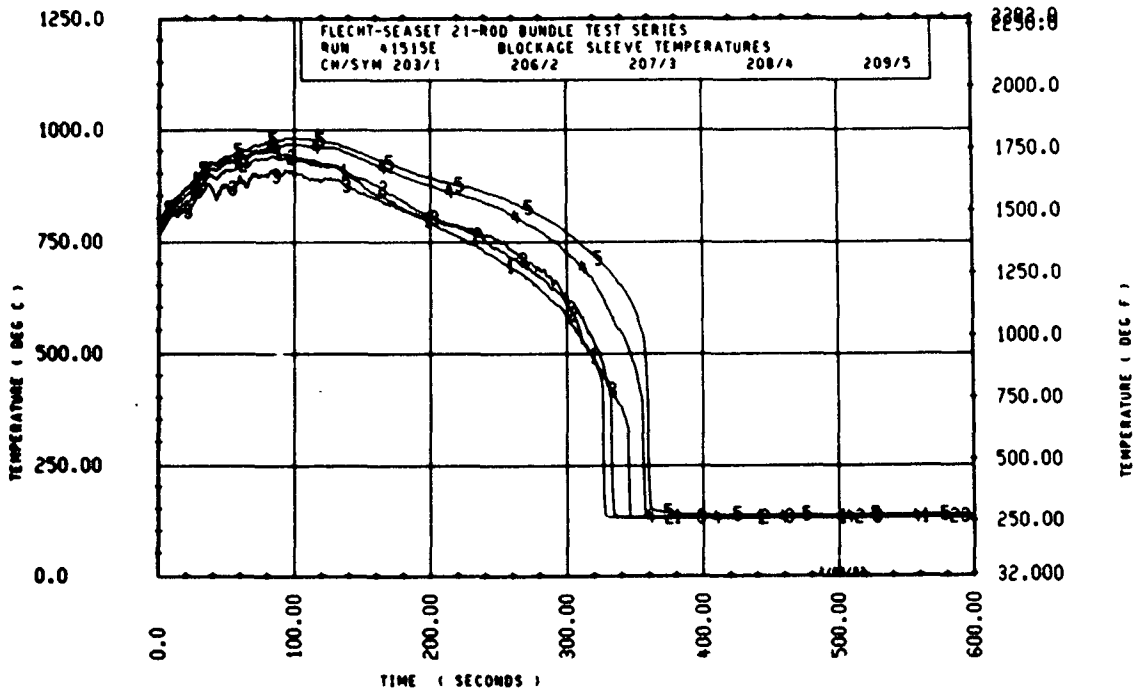

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41515E HEAT TRANSFER COEFFICIENTS
CH/SYM 16/1 86/2 115/3 150/4 171/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

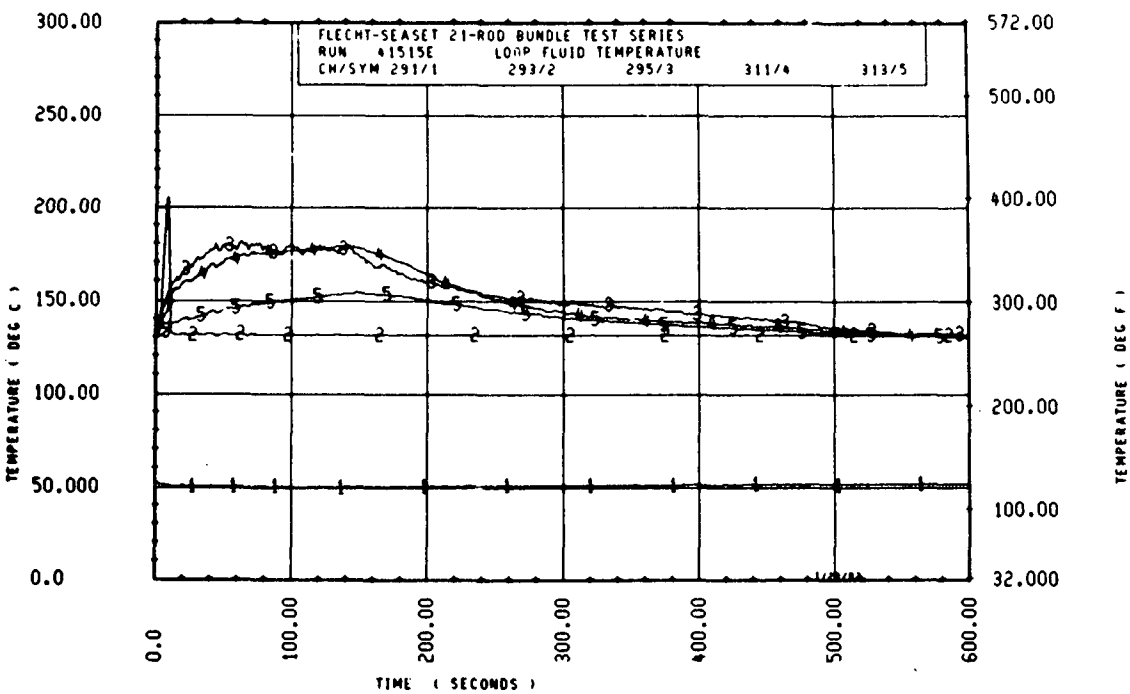

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41515E BUNDLE VAPOR TEMPERATURES
CH/SYM 180/1 188/2 195/3 198/4 199/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

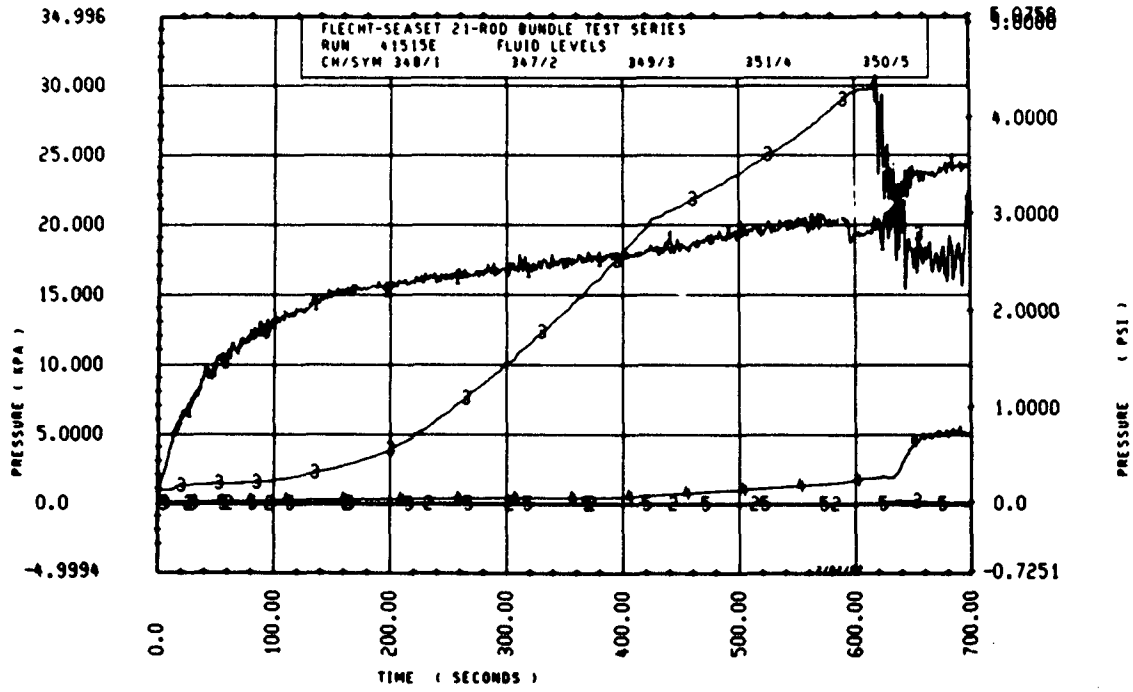

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41515E BUNDLE VAPOR TEMPERATURES
CH/SYM 184/1 186/2 187/3 191/4 197/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

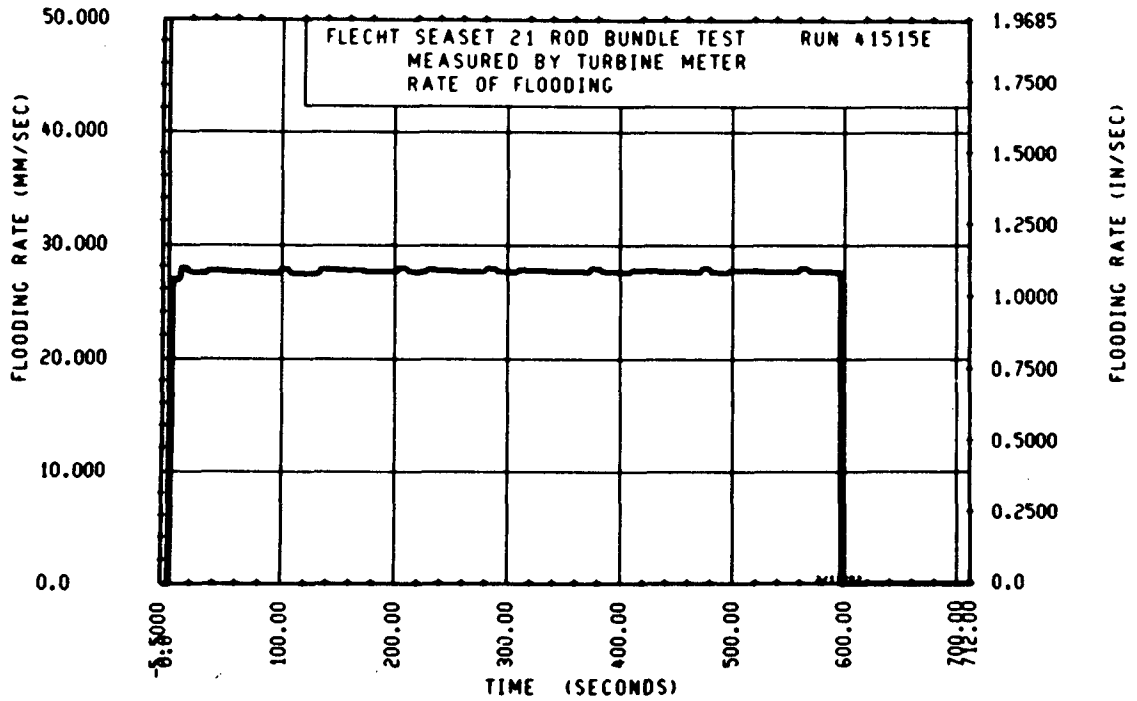

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41515E HOUSING TEMPERATURE
CH/SYM 261/1 263/2 267/3 275/4 281/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1000.0
800.00
600.00
400.00
200.00
0.0
1832.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

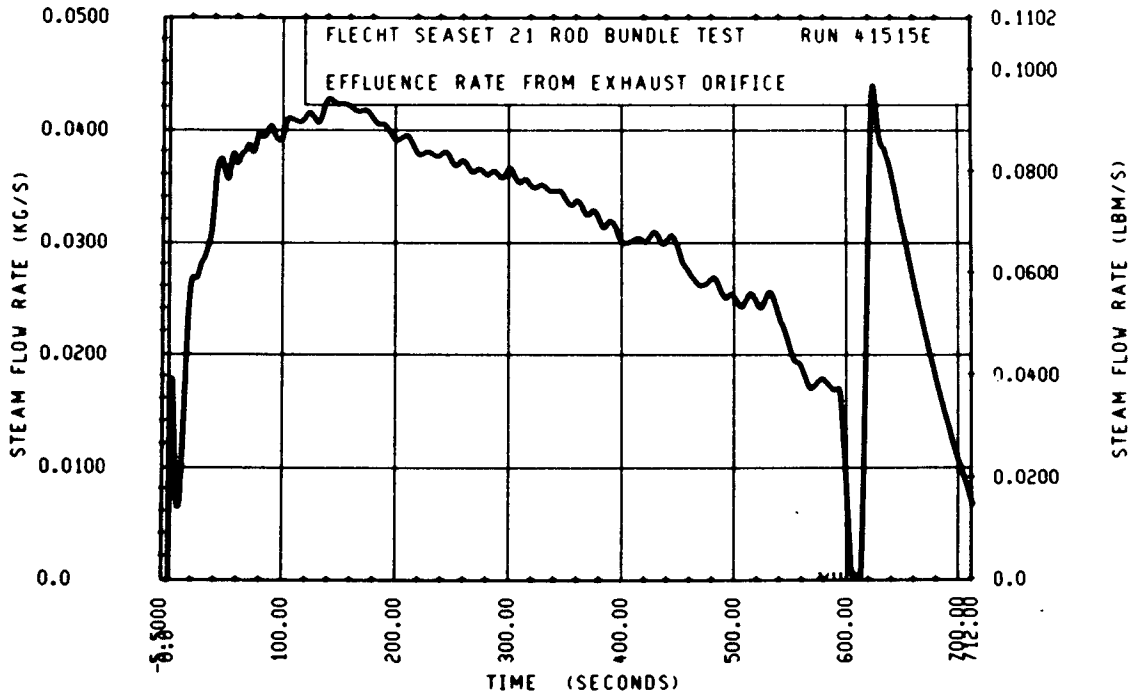

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41515E FILLER STRIP TEMPERATURES
CH/SYM 211/1 212/2 214/3 213/4 216/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

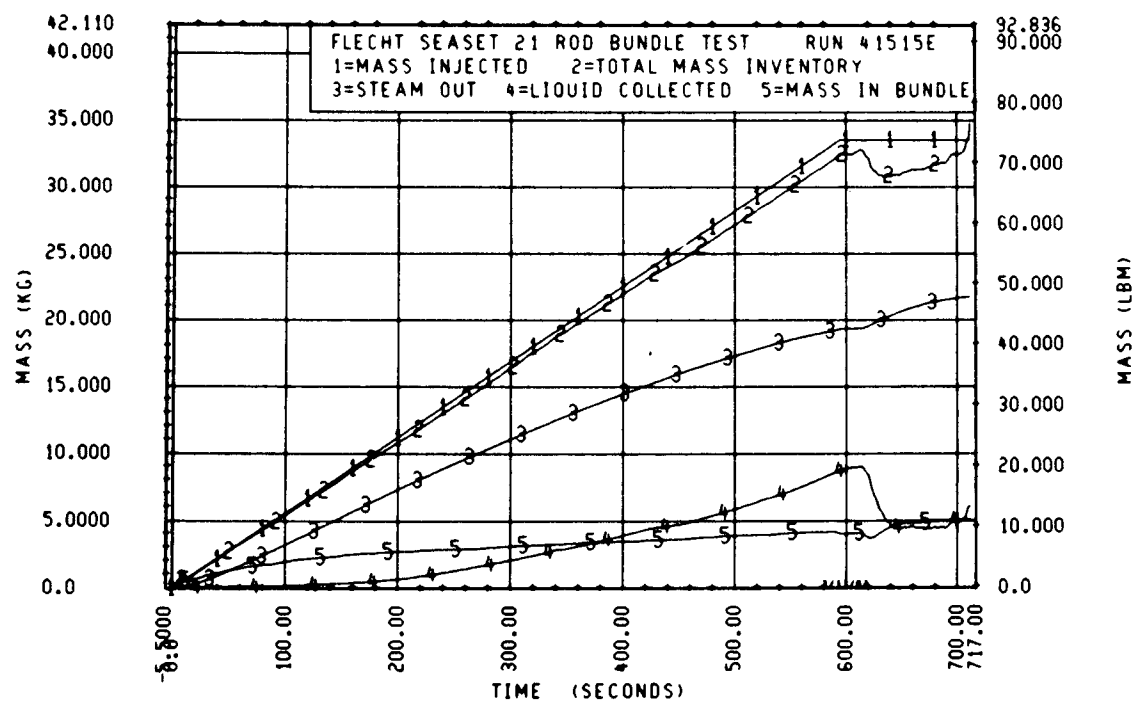

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41515E BLOCKAGE SLEEVE TEMPERATURES
CH/SYM 203/1 206/2 207/3 208/4 209/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

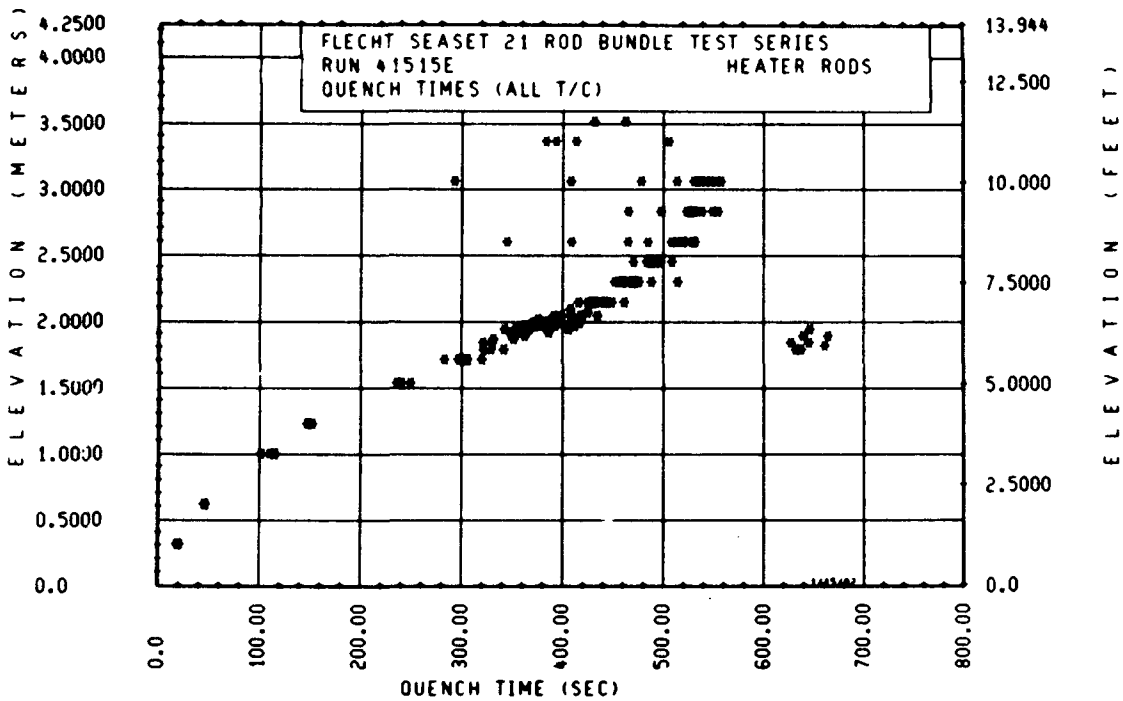

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41515E LOOP FLUID TEMPERATURE
CH/SYM 291/1 293/2 295/3 311/4 313/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

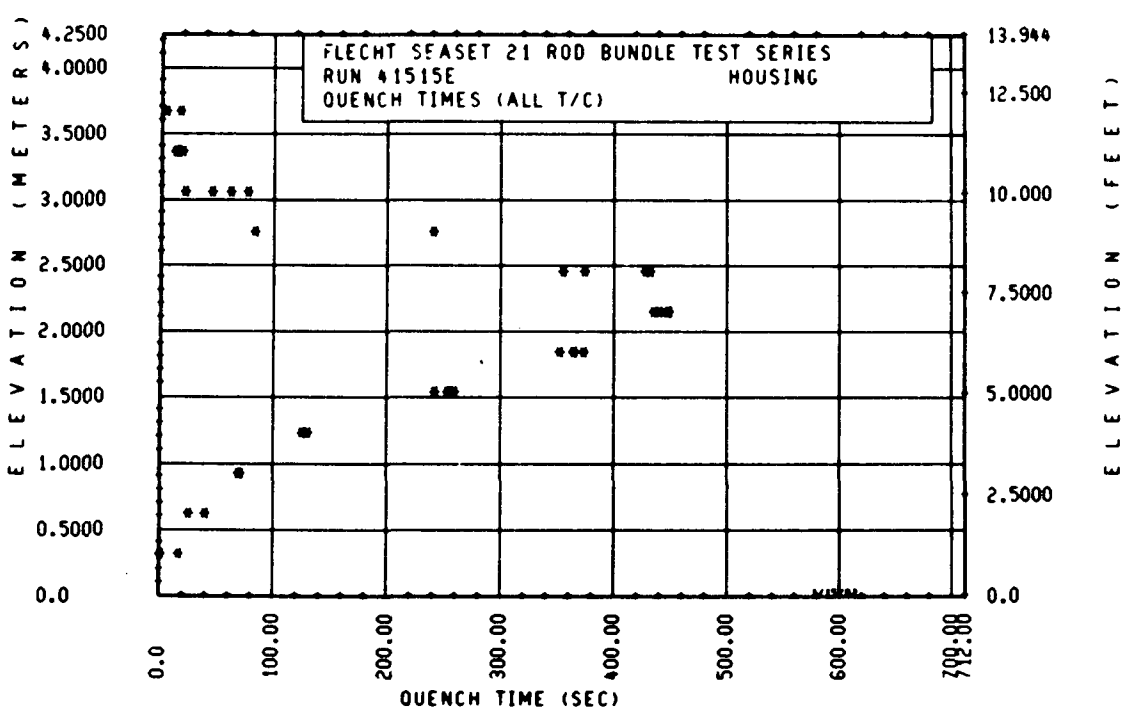

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41515E FLUID LEVELS
CH/SYM 348/1 347/2 349/3 351/4 350/5
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)

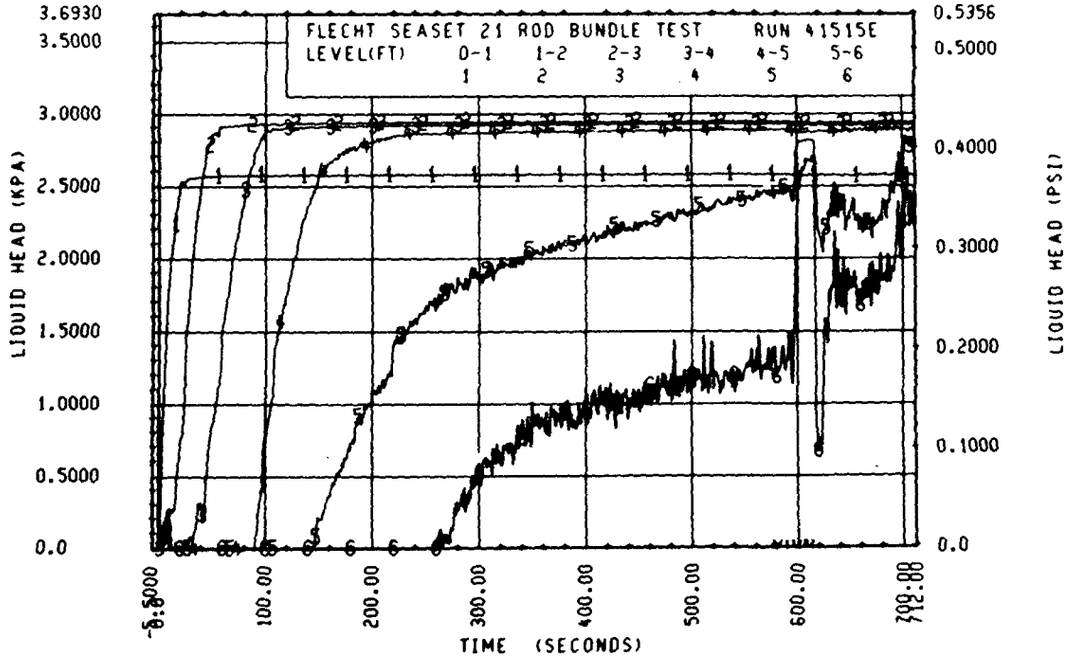

FLECHT SEASET 21 ROD BUNDLE TEST RUN 41515E
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
TIME (SECONDS)

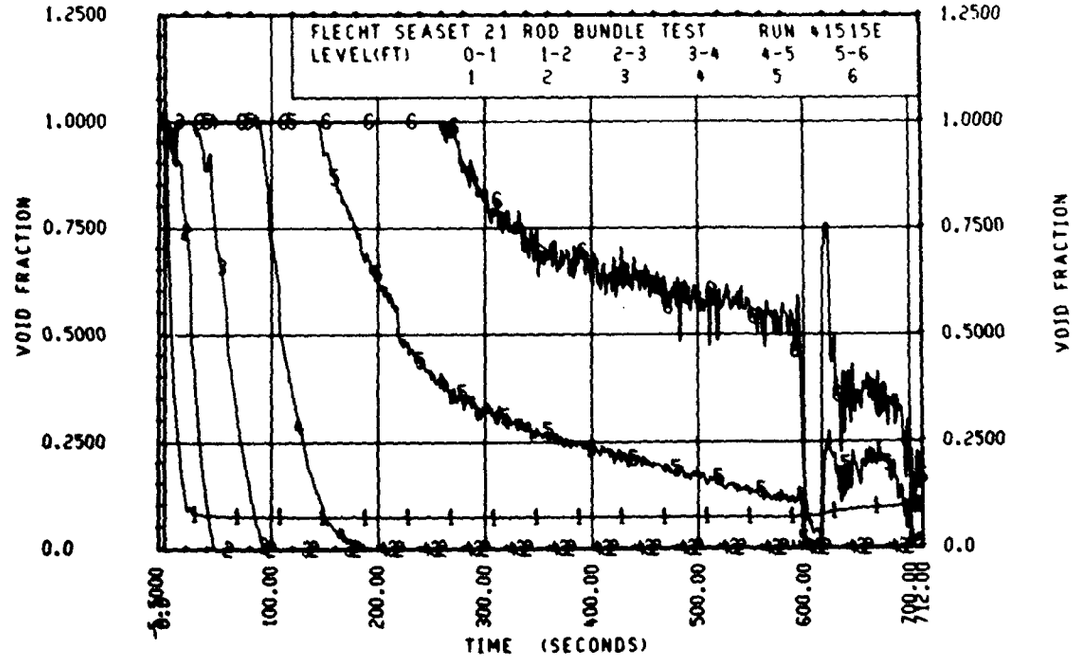

FLECHT SEASET 21 ROD BUNDLE TEST RUN 41515E
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
TIME (SECONDS)

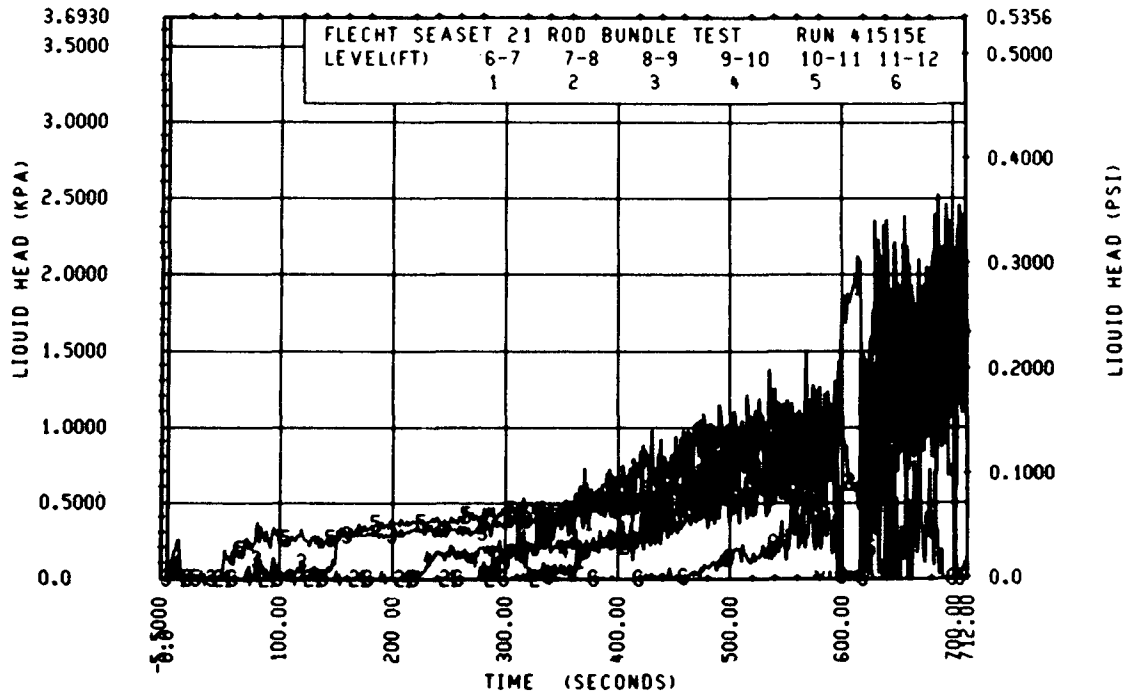

FLECHT SEASET 21 ROD BUNDLE TEST RUN 41515E
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
TIME (SECONDS)

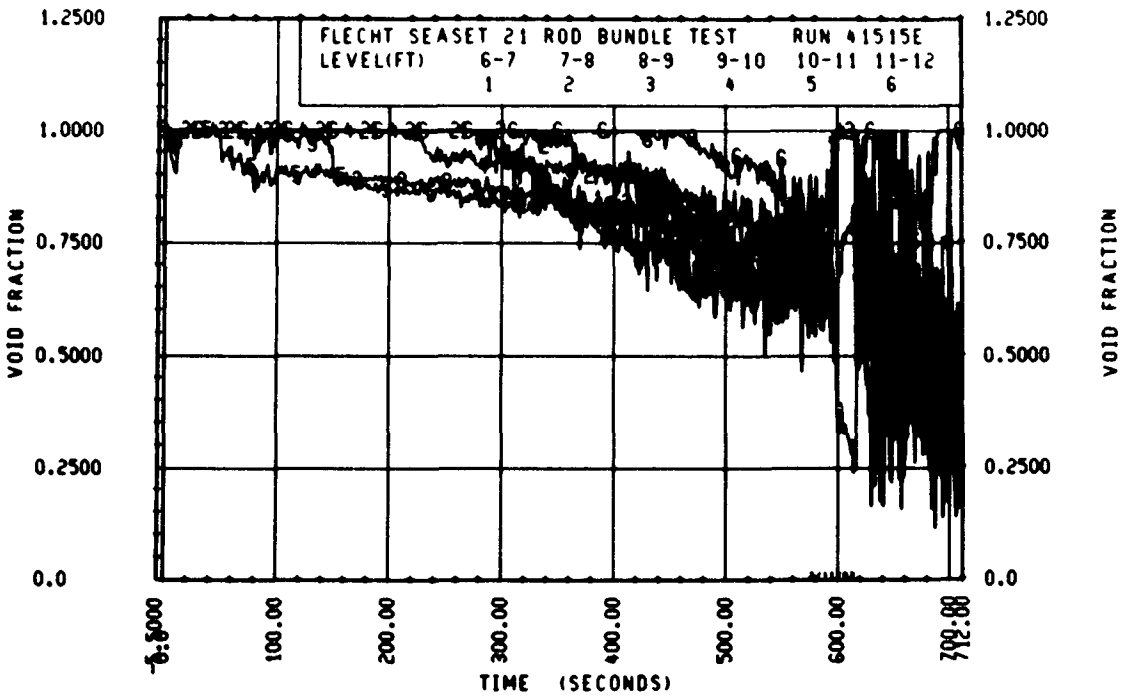

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN 41515E
HEATER RODS
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
4.2500
4.0000
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
13.944
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
QUENCH TIME (SEC)


FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN 41515E
HOUSING
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
4.2500
4.0000
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
13.944
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
QUENCH TIME (SEC)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 41515E
LEVEL(FT) 0-1 1-2 2-3 3-4 4-5 5-6
1 2 3 4 5 6
LIQUID HEAD (KPA)
LIQUID HEAD (PSI)
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 41515E
LEVEL(FT) 0-1 1-2 2-3 3-4 4-5 5-6
1 2 3 4 5 6
VOID FRACTION
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 41515E
LEVEL(FT) 6-7 7-8 8-9 9-10 10-11 11-12
1 2 3 4 5 6
LIQUID HEAD (KPA)
LIQUID HEAD (PSI)
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 41515E
LEVEL(FT) 6-7 7-8 8-9 9-10 10-11 11-12
1 2 3 4 5 6
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41807F
Test Date: 6/26/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.277 MPa (40.2 psia)
Initial peak clad temperature and location	873°C (1603°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.56 kw/m (0.778 kw/ft)
Flow rate	28.07 mm/sec (1.105 in./sec)
Coolant temperature	49°C (121°F)
Average and range of initial 1.83 m (72 in.) housing temperature	502°C (489°C - 510°C) [936°F (913°F - 950°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: -2.0% to 100 seconds and -2.5% thereafter[a]
Total power: -0.25% constant[a]

a. Relative to run 42430A

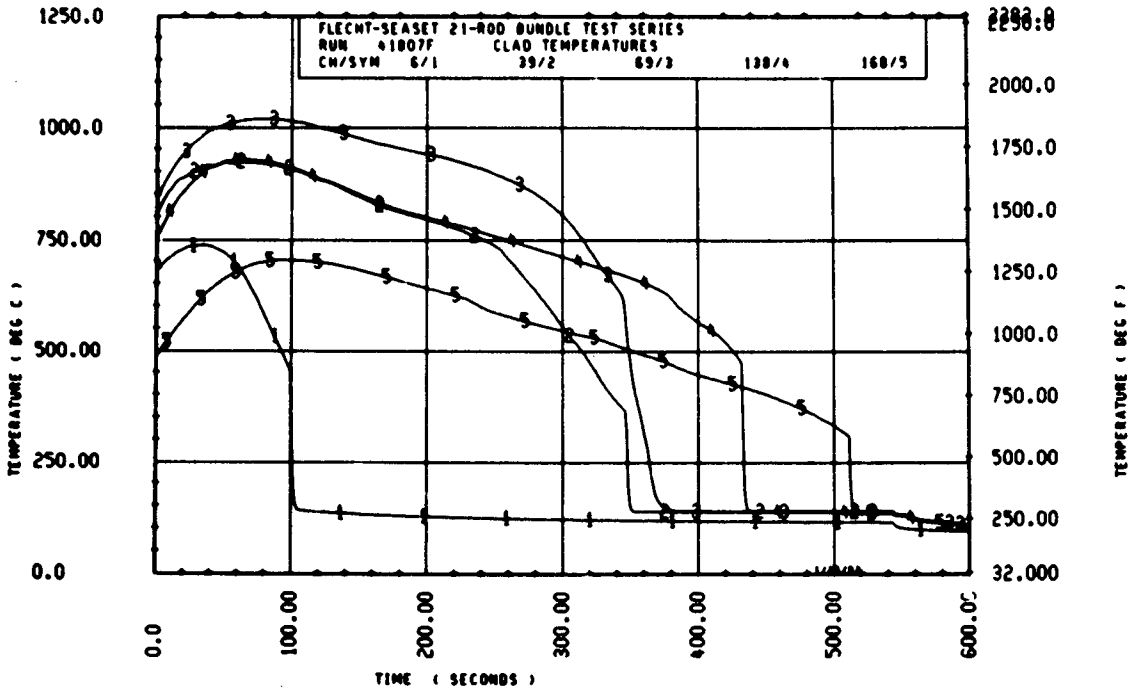
FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 41807F

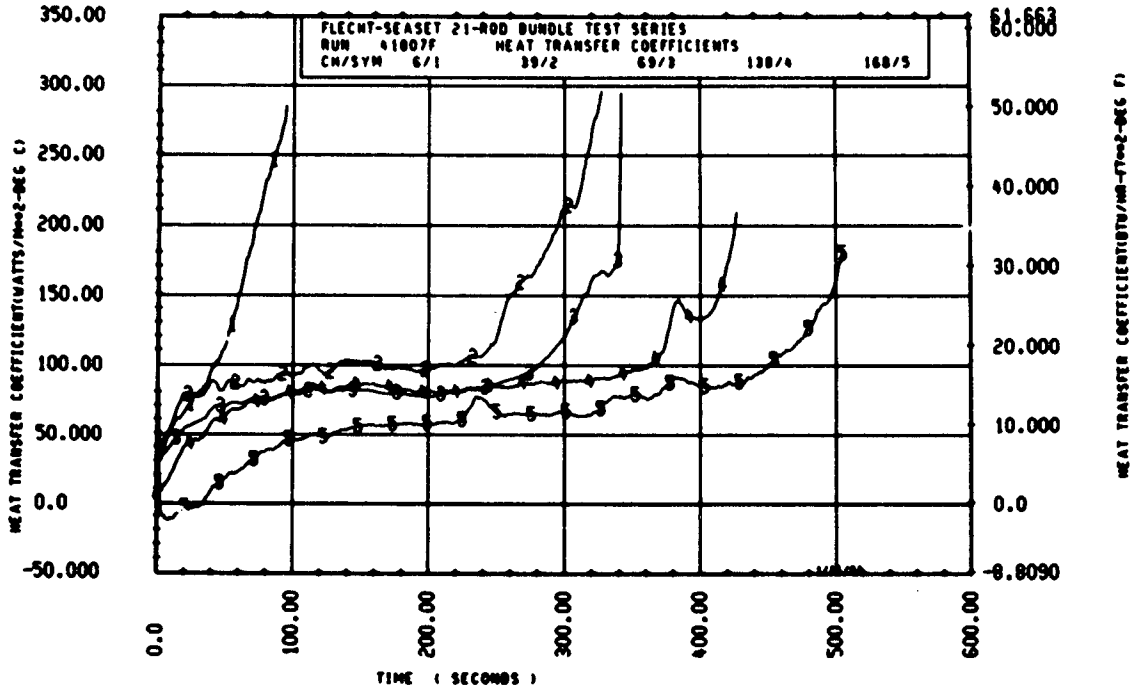
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1179.	1340.	161.	39.5	868.	103.9
4C 3- 3	6	1258.	1364.	105.	33.0	840.	99.7
1C 4- 0	7	1378.	1539.	161.	44.5	908.	151.4
2A 5- 0	12	1513.	1820.	307.	73.0	959.	222.8
2A 5- 7	14	1525.	1765.	240.	50.0	927.	274.8
5C 6- 2	33	1445.	1709.	264.	64.0	267.	560.0
2D 6- 3	39	1491.	1697.	207.	52.0	691.	346.6
1D 6- 4	46	1467.	1667.	200.	61.0	948.	305.8
3D 6- 4	50	1487.	1834.	347.	83.0	244.	635.0
4B 6- 4	51	1546.	1730.	184.	50.0	801.	350.2
5D 6- 4	56	1474.	1654.	180.	50.0	705.	350.0
1D 6- 5	58	1464.	1684.	220.	60.5	961.	313.7
2A 6- 5	59	1462.	1700.	238.	63.0	861.	300.9
2D 6- 5	62	1527.	1739.	211.	52.0	789.	355.4
3B 6- 5	63	1556.	1807.	251.	61.5	571.	367.0
3C 6- 6	69	1551.	1869.	318.	83.0	1130.	345.3
3E 6- 6	70	1478.	1737.	260.	35.0	287.	383.0
4C 6- 6	73	1584.	1816.	232.	62.0	781.	358.0
5C 6- 6	76	1533.	1727.	195.	50.5	861.	366.9
3D 6- 7	85	1574.	1847.	273.	84.5	798.	365.1
3C 6- 8	93	1591.	1884.	292.	85.0	925.	362.9
4A 6- 8	95	1432.	1704.	272.	85.0	991.	317.7
1C 7- 0	109	1495.	1684.	189.	36.5	697.	418.0
2B 7- 0	110	1515.	1680.	164.	36.5	778.	391.0
3D 7- 0	113	1559.	1722.	163.	36.0	759.	388.8
5B 7- 0	117	1376.	1571.	196.	37.5	668.	428.6
2B 7- 6	120	1485.	1743.	258.	50.0	896.	419.0
2C 7- 6	121	1506.	1770.	264.	52.5	884.	417.9
2E 7- 6	123	1354.	1574.	221.	40.5	827.	407.5
3A 7- 6	124	1471.	1685.	214.	50.0	846.	417.5
3B 7- 6	125	1536.	1793.	257.	49.5	796.	431.8
4B 7- 6	129	1494.	1756.	262.	60.5	822.	429.0
5C 7- 6	132	1459.	1692.	233.	52.0	824.	435.9
1C 8- 0	133	1322.	1604.	282.	52.5	765.	459.3
2E 8- 0	136	1207.	1451.	243.	50.0	740.	441.4
3D 8- 0	138	1390.	1707.	317.	63.0	884.	432.0
5B 8- 0	143	1269.	1555.	286.	85.0	648.	461.5
5C 8- 0	144	1346.	1644.	298.	83.5	741.	467.3
1C 8- 6	145	1137.	1441.	303.	52.5	625.	484.7
1D 8- 6	146	1031.	1265.	234.	38.5	659.	452.0
2C 8- 6	148	1240.	1613.	374.	75.5	746.	469.9
4B 8- 6	153	1223.	1569.	346.	52.0	672.	487.0
5D 8- 6	155	1150.	1444.	294.	85.0	634.	481.5
3D 9- 3	159	1068.	1427.	359.	84.5	705.	474.4
4C 9- 3	161	1104.	1477.	373.	84.0	640.	495.9
1D10- 0	164	656.	1102.	446.	151.0	715.	476.9
4B10- 0	168	914.	1304.	389.	94.0	592.	511.0
5D10- 0	169	786.	1155.	369.	125.0	664.	455.4
2A11- 0	171	555.	800.	245.	127.0	563.	437.1
4C11- 0	172	715.	1054.	339.	125.0	509.	511.6
1D11- 6	174	288.	834.	547.	155.0	574.	485.9

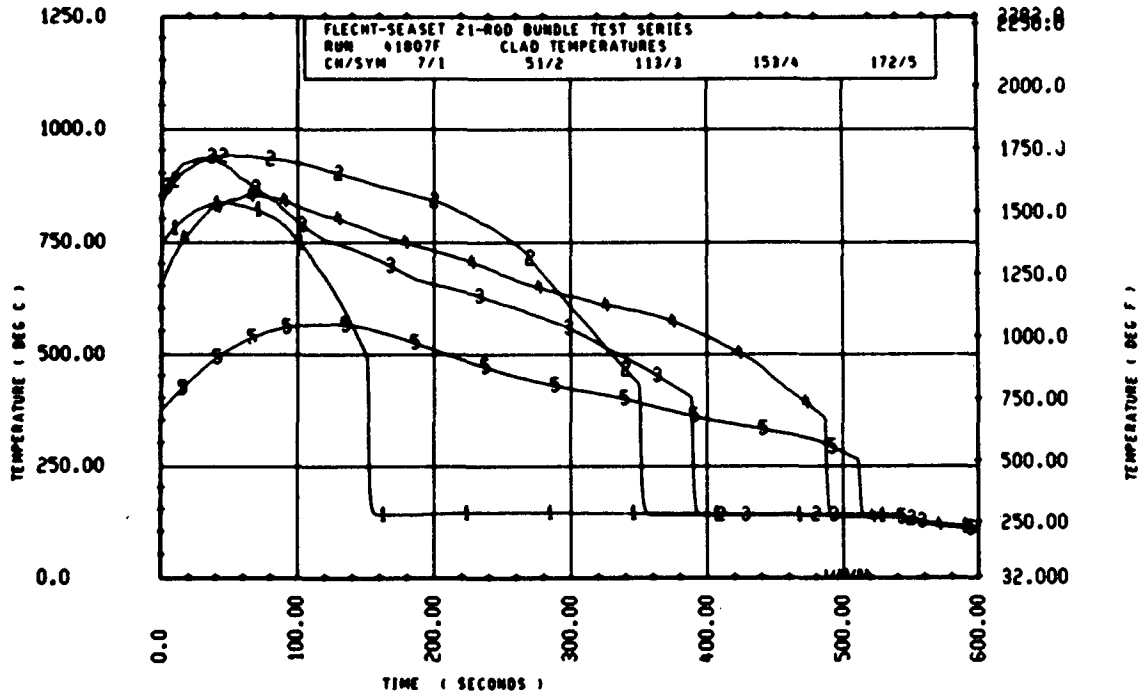
RUN 41807F HEATER ROD STATISTICAL DATA

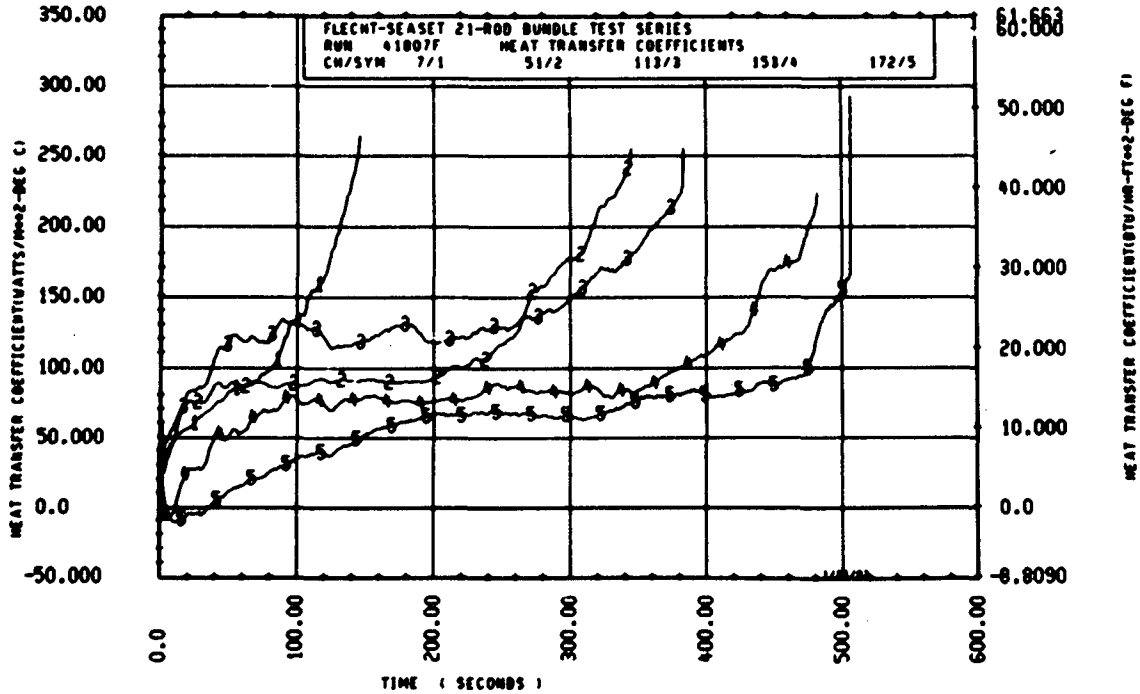
ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	731.8	678.5	705.1	744.1	692.0	718.0	5.5	4.5	5.0
24	906.1	906.1	906.1	932.6	932.6	932.6	10.0	10.0	10.0
39	1258.1	1159.1	1198.8	1363.5	1313.1	1339.0	39.5	33.0	36.8
48	1442.4	1330.2	1382.0	1589.5	1477.3	1528.7	45.0	36.0	40.5
60	1513.3	1452.1	1476.1	1820.3	1718.5	1753.2	82.5	73.0	78.7
67	1599.9	1497.1	1552.9	1871.1	1744.1	1795.3	62.0	50.0	54.2
70	1603.2	1371.0	1452.2	1855.3	1600.3	1685.6	65.5	50.0	54.1
71	1556.5	1507.9	1532.2	1825.9	1760.9	1793.4	62.5	52.0	57.2
72	1452.1	1348.2	1400.2	1773.1	1655.9	1714.5	85.0	66.5	75.7
73	1447.8	1381.6	1414.7	1735.2	1657.0	1696.1	103.0	70.5	86.7
74	1487.4	1371.3	1446.7	1787.6	1648.3	1723.9	88.5	62.0	70.3
75	1498.1	1392.3	1447.4	1832.7	1642.8	1713.1	104.0	51.0	76.8
76	1545.7	1396.3	1479.3	1833.8	1643.9	1719.7	92.0	49.0	68.7
77	1555.6	1461.7	1500.3	1806.7	1675.5	1735.2	86.5	60.5	71.1
78	1583.5	1445.7	1517.1	1868.9	1690.6	1752.2	85.0	50.5	65.3
79	1581.4	1448.9	1521.2	1847.4	1660.3	1764.7	103.0	61.5	75.3
80	1591.1	1431.7	1512.4	1883.6	1704.0	1793.3	85.0	68.5	79.4
81	1512.2	1512.2	1512.2	1756.4	1756.4	1756.4	84.5	84.5	84.5
84	1558.7	1375.5	1490.1	1750.8	1571.1	1675.6	37.5	36.0	36.5
90	1536.0	1353.5	1463.1	1799.9	1574.4	1712.5	53.0	40.5	53.3
96	1413.5	1207.1	1336.1	1755.3	1450.5	1637.0	85.0	50.0	69.1
102	1240.3	1003.0	1159.2	1613.4	1212.9	1458.8	85.0	37.5	59.6
111	1104.2	953.5	1028.7	1477.3	1216.0	1334.7	88.5	60.0	72.7
120	917.4	655.5	821.2	1339.4	1101.6	1217.7	151.0	89.5	109.6
132	715.2	485.2	569.8	1054.2	710.8	852.5	137.0	125.0	128.8
138	661.7	287.7	521.2	1037.7	834.4	912.5	155.0	126.0	136.7

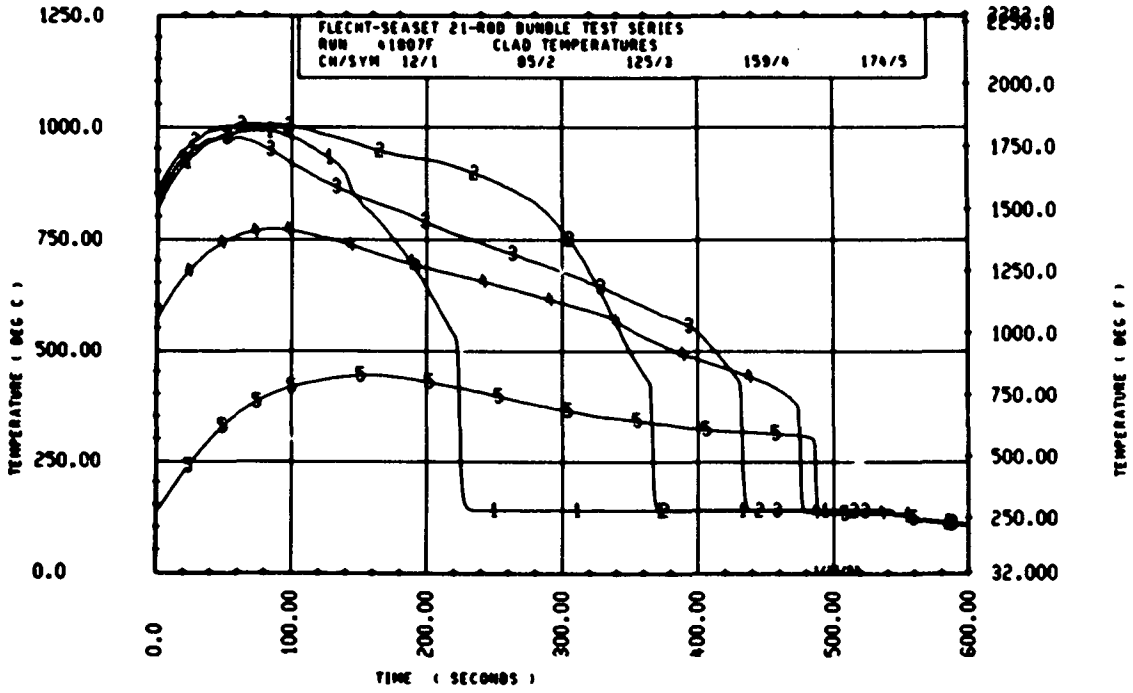
ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	13.5	12.3	12.9	658.3	632.0	645.2	17.0	16.7	16.9
24	26.5	26.5	26.5	751.6	751.6	751.6	43.5	43.5	43.5
39	161.4	105.4	140.2	887.2	840.3	865.3	103.9	99.7	102.1
48	161.1	131.9	146.8	914.5	896.7	907.3	151.4	138.0	144.6
60	307.0	257.9	277.1	958.8	832.5	894.4	237.6	222.8	231.4
67	271.2	215.2	242.3	1032.4	926.9	967.9	287.7	274.8	279.7
70	293.6	193.6	233.4	934.2	249.0	520.9	587.0	293.7	436.8
71	269.4	253.0	261.2	932.2	282.3	607.2	549.0	302.5	425.7
72	321.0	307.7	314.3	246.8	238.2	242.5	606.0	587.0	596.5
73	287.4	275.4	281.4	281.3	253.3	267.3	580.0	548.0	564.0
74	320.5	260.1	277.2	839.9	238.2	381.6	512.0	334.9	505.0
75	363.5	199.4	265.7	1230.3	231.8	578.5	625.0	208.1	432.6
76	347.2	150.2	240.4	1076.4	243.6	620.5	535.0	291.8	435.4
77	314.7	204.3	234.9	1105.7	570.7	809.6	403.0	300.9	349.8
78	317.6	194.7	235.1	1130.0	286.6	859.7	385.0	289.7	352.2
79	288.4	207.3	243.5	1025.6	768.7	861.0	410.5	310.6	368.9
80	292.5	247.4	280.9	991.0	771.7	885.7	396.4	317.7	367.3
81	244.2	244.2	244.2	853.4	853.4	853.4	366.5	366.5	366.5
84	207.2	163.1	185.5	843.6	667.8	756.9	428.6	359.0	396.6
90	268.5	214.0	249.4	950.1	696.2	840.8	444.0	400.3	420.8
96	341.8	243.4	301.0	884.2	647.7	786.6	467.3	429.8	447.9
102	373.7	209.9	299.6	746.2	603.6	662.6	494.0	452.0	475.5
111	379.3	228.5	306.0	706.7	532.0	643.6	495.9	400.9	463.7
120	446.0	368.5	396.5	714.6	592.0	641.7	511.0	455.4	490.8
132	339.0	225.6	282.7	593.2	508.9	560.5	511.6	317.9	431.4
138	546.7	251.1	391.3	574.2	525.7	556.5	518.0	485.9	498.1

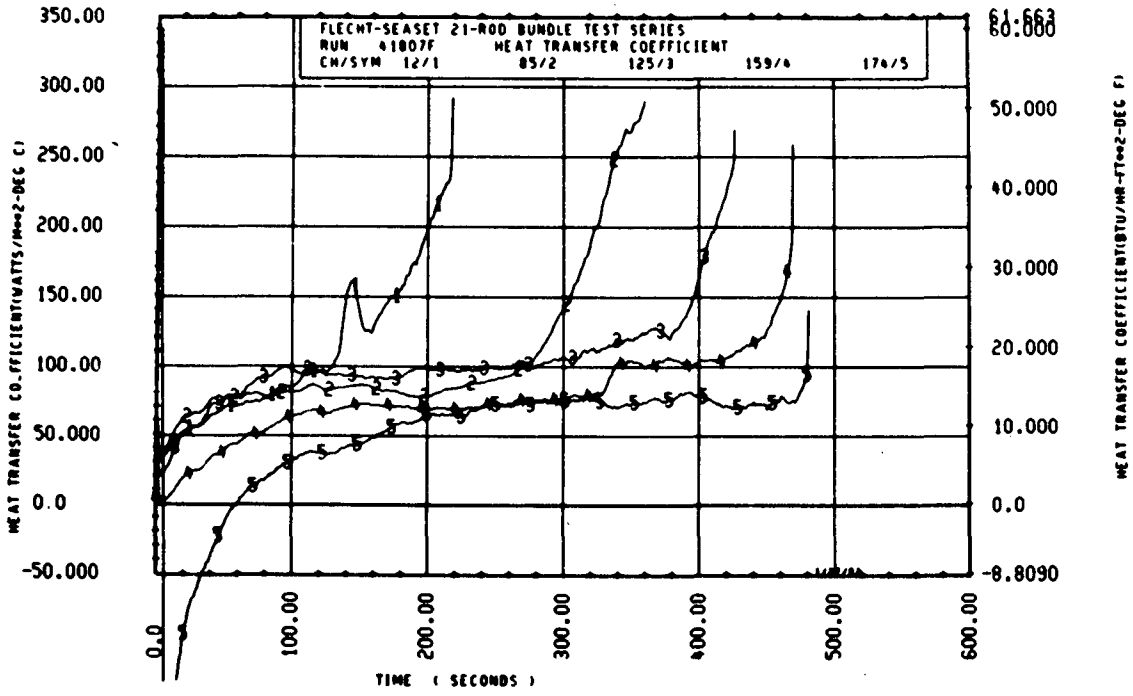

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41807F CLAD TEMPERATURES
CH/SYM 6/1 39/2 69/3 138/4 168/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

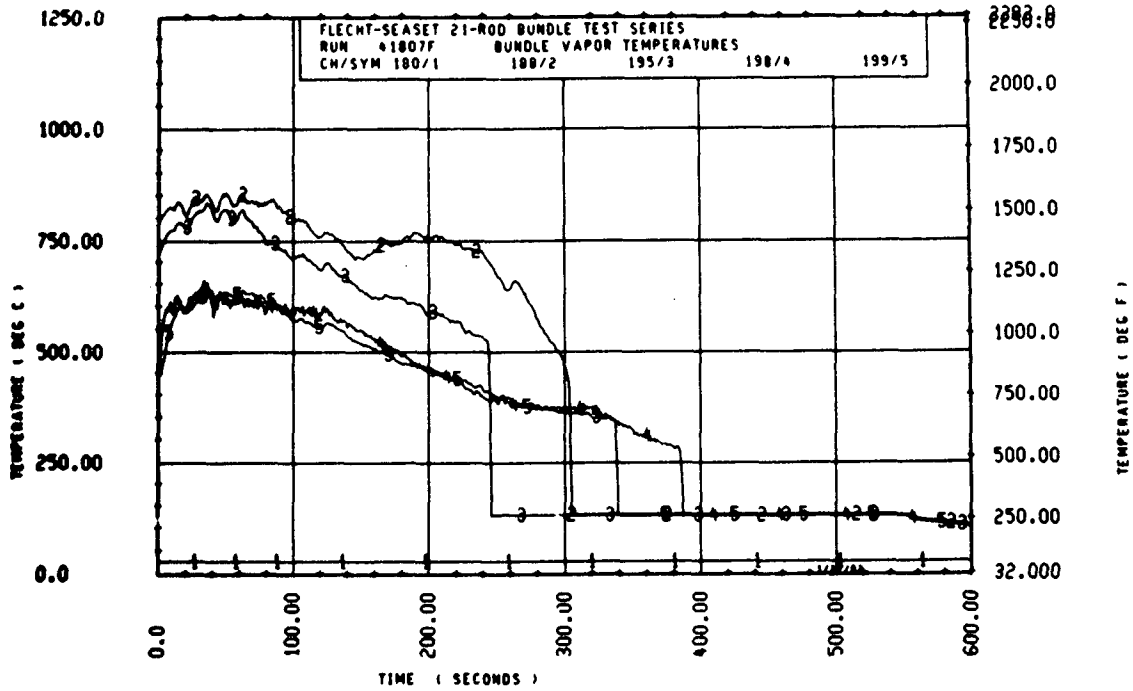

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41807F HEAT TRANSFER COEFFICIENTS
CH/SYM 6/1 39/2 69/3 138/4 168/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

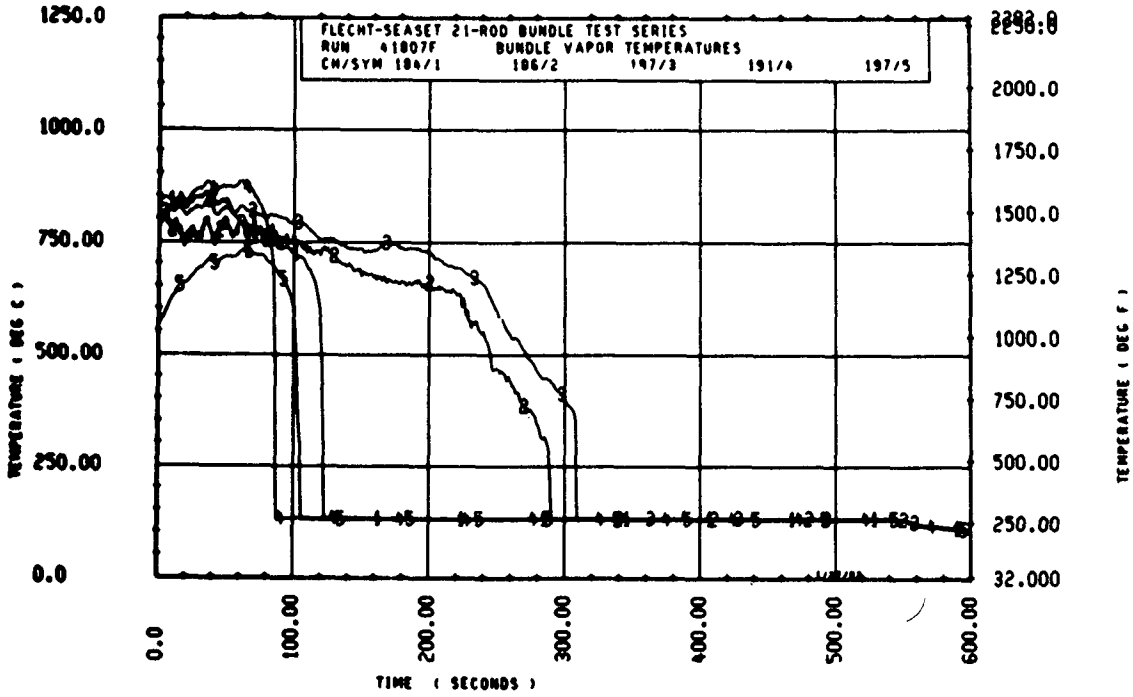

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41807F CLAD TEMPERATURES
CH/SYM 7/1 51/2 113/3 153/4 172/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

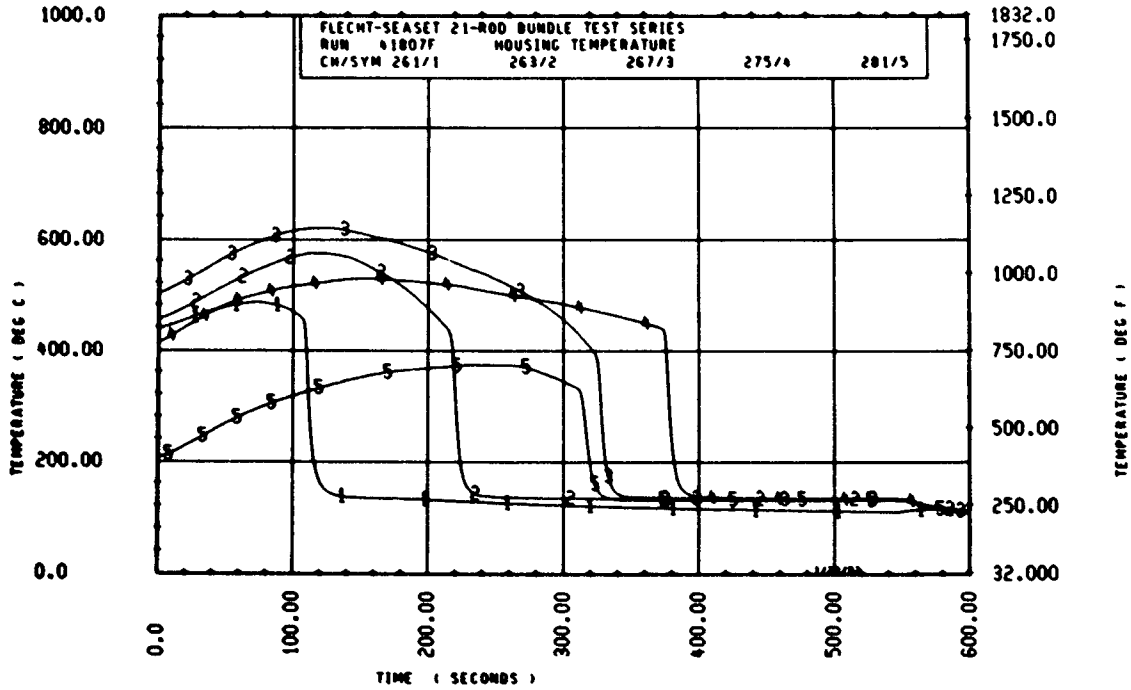

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41807F HEAT TRANSFER COEFFICIENTS
CH/SYM 7/1 51/2 113/3 153/4 172/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

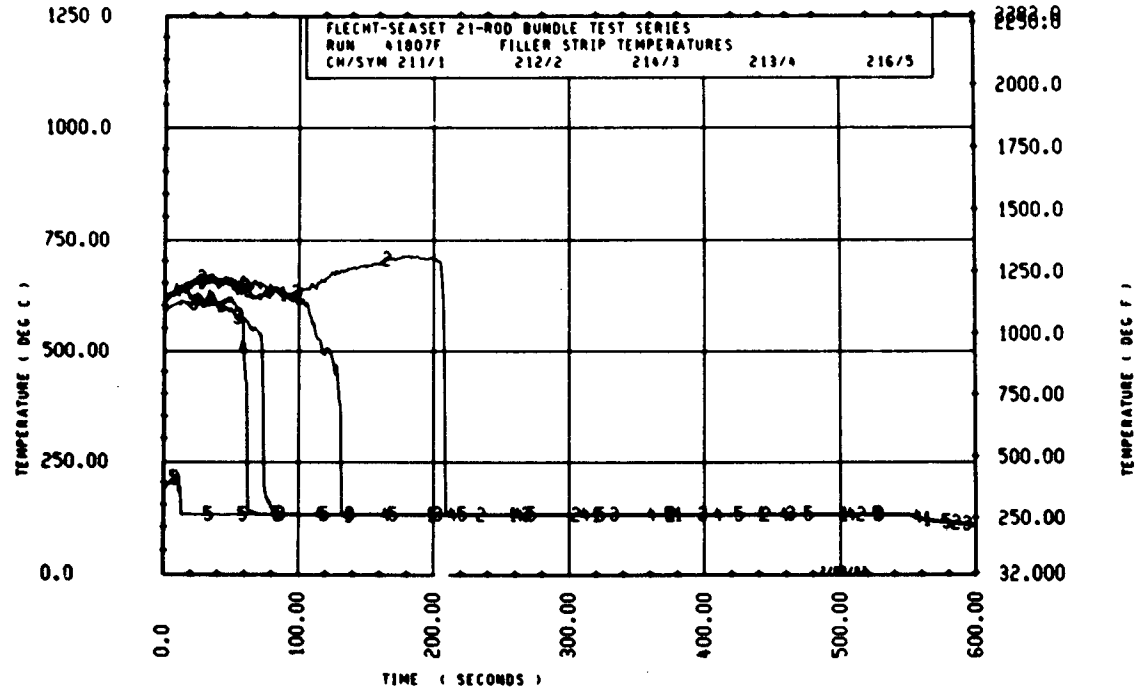

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41807F CLAD TEMPERATURES
CH/SYM 12/1 85/2 125/3 159/4 174/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

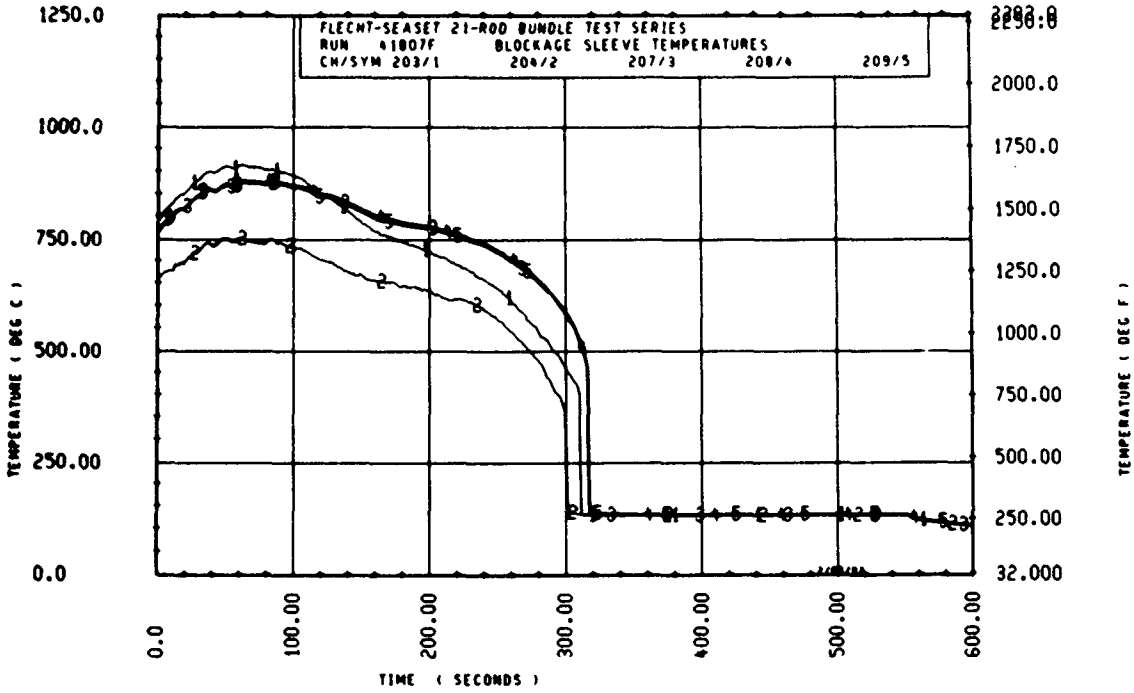

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41807F HEAT TRANSFER COEFFICIENT
CH/SYM 12/1 85/2 125/3 159/4 174/5
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)

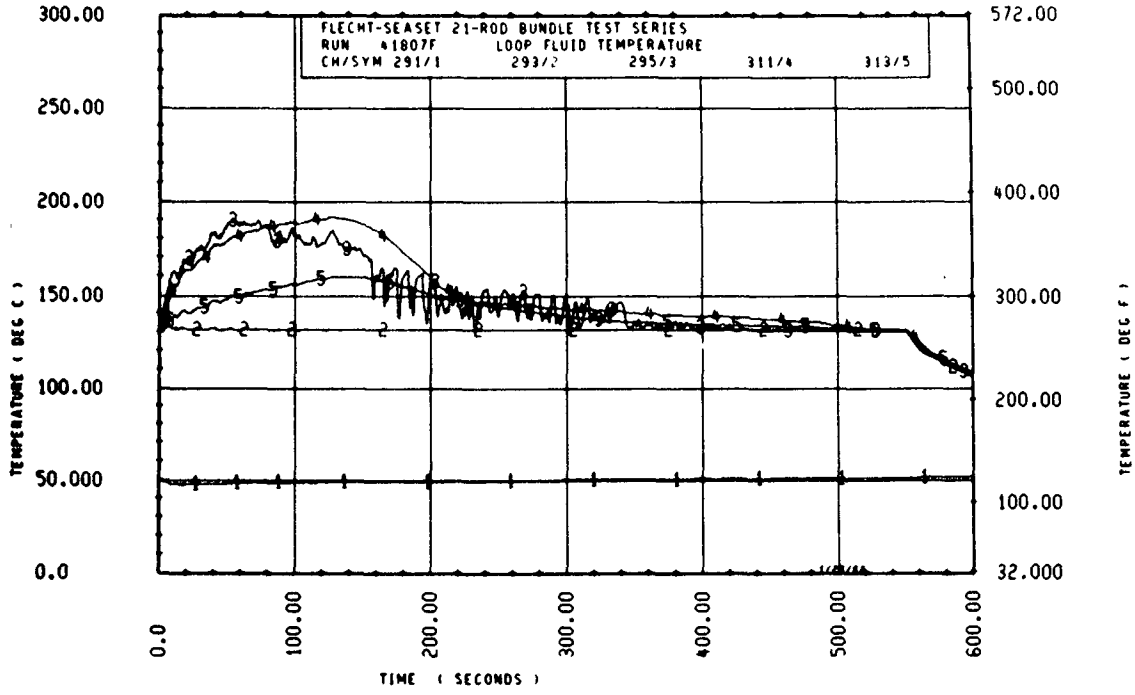

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41807F BUNDLE VAPOR TEMPERATURES
CH/SYM 180/1 188/2 195/3 198/4 199/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

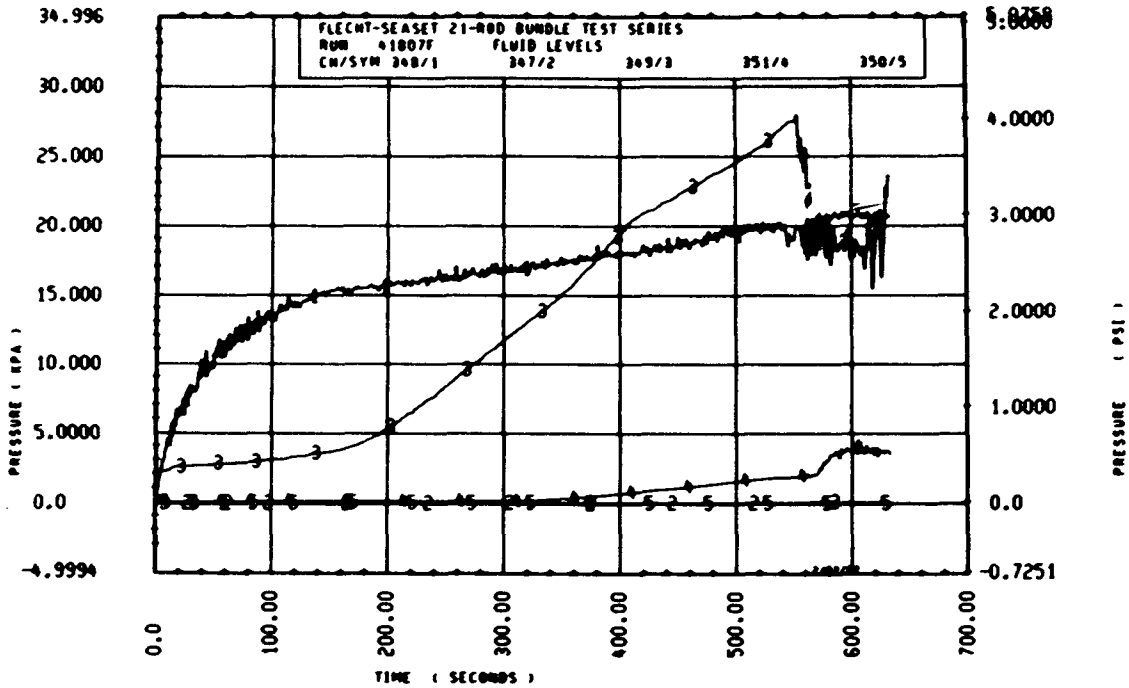

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41807F BUNDLE VAPOR TEMPERATURES
CH/SYM 186/1 186/2 197/3 191/4 197/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

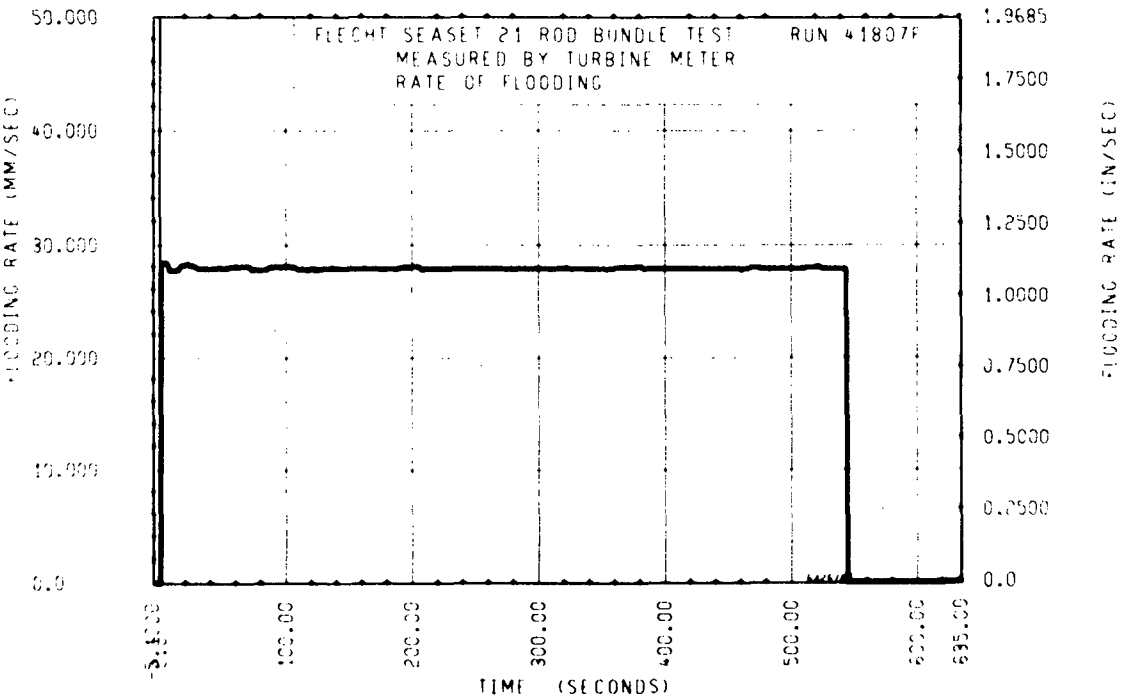

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41807F HOUSING TEMPERATURE
CH/SYM 261/1 263/2 267/3 275/4 281/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

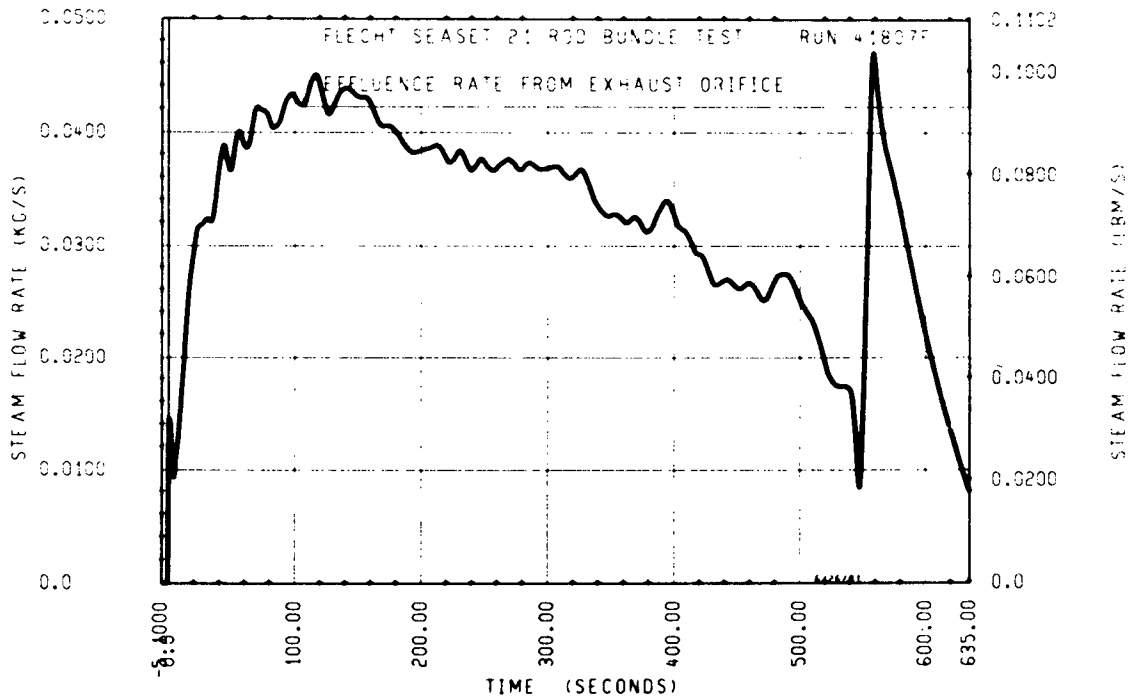

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41807F FILLER STRIP TEMPERATURES
CH/SYM 211/1 212/2 214/3 213/4 216/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

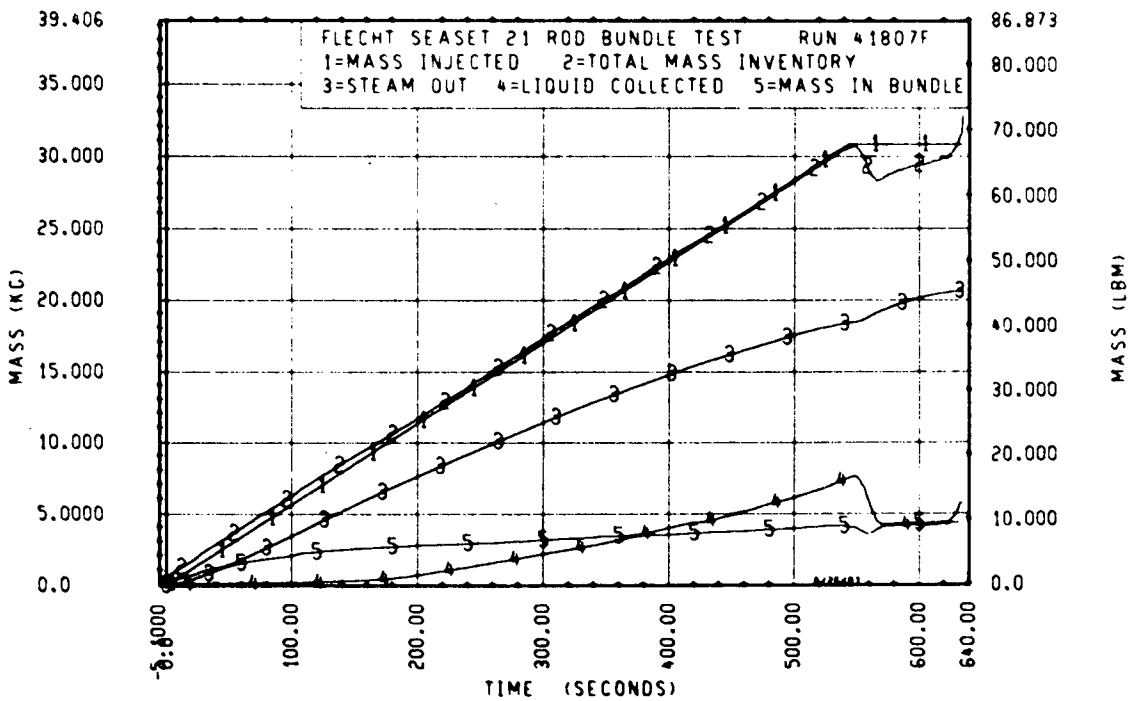

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41807F BLOCKAGE SLEEVE TEMPERATURES
CH/SYM 203/1 204/2 207/3 208/4 209/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1250.0
1000.0
750.00
500.00
250.00
0.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

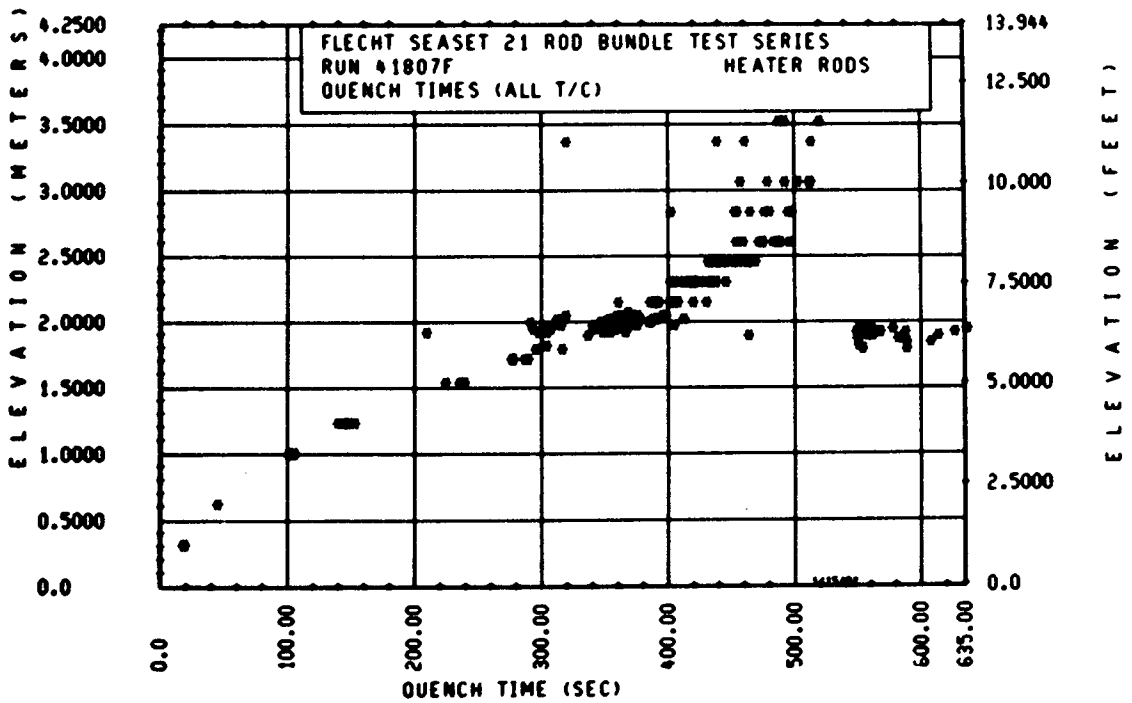

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41807F LOOP FLUID TEMPERATURE
CH/SYM 291/1 293/2 295/3 311/4 313/5
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
300.00
250.00
200.00
150.00
100.00
50.000
0.0
572.00
500.00
400.00
300.00
200.00
100.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

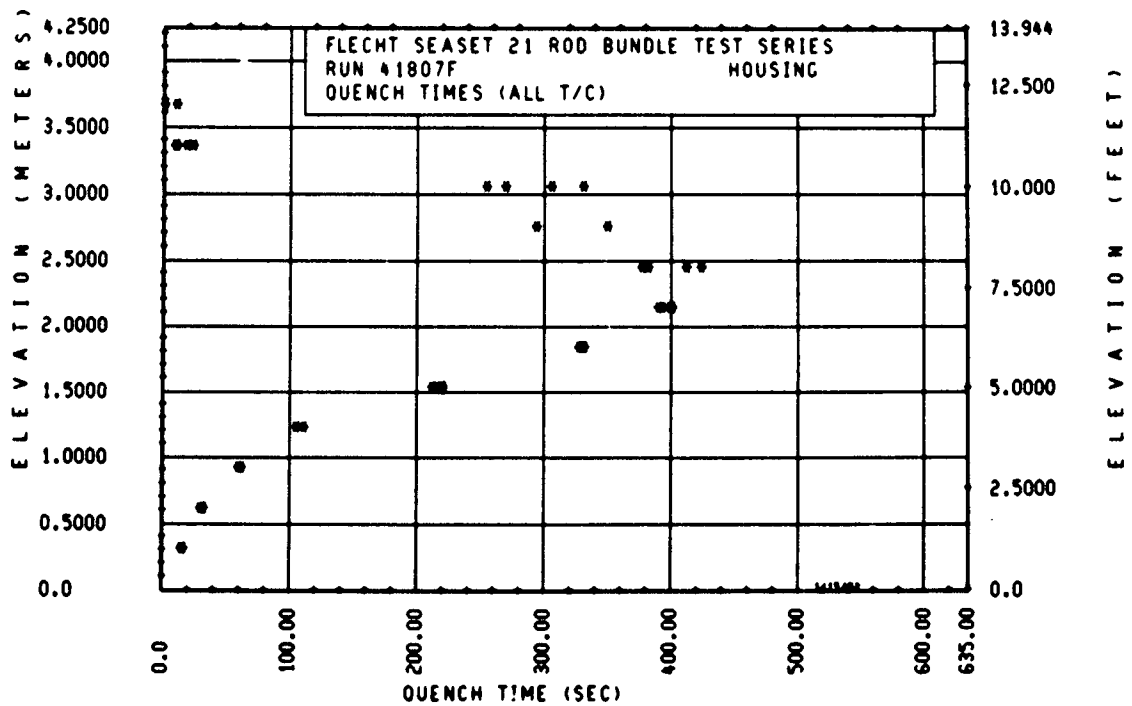

FLECHT-SEASET 21-ROD BUNDLE TEST SERIES
RUN 41807F FLUID LEVELS
CH/SYM 348/1 347/2 349/3 351/4 350/5
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
34.996
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
-4.9994
4.0000
3.0000
2.0000
1.0000
0.0
-0.7251
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00

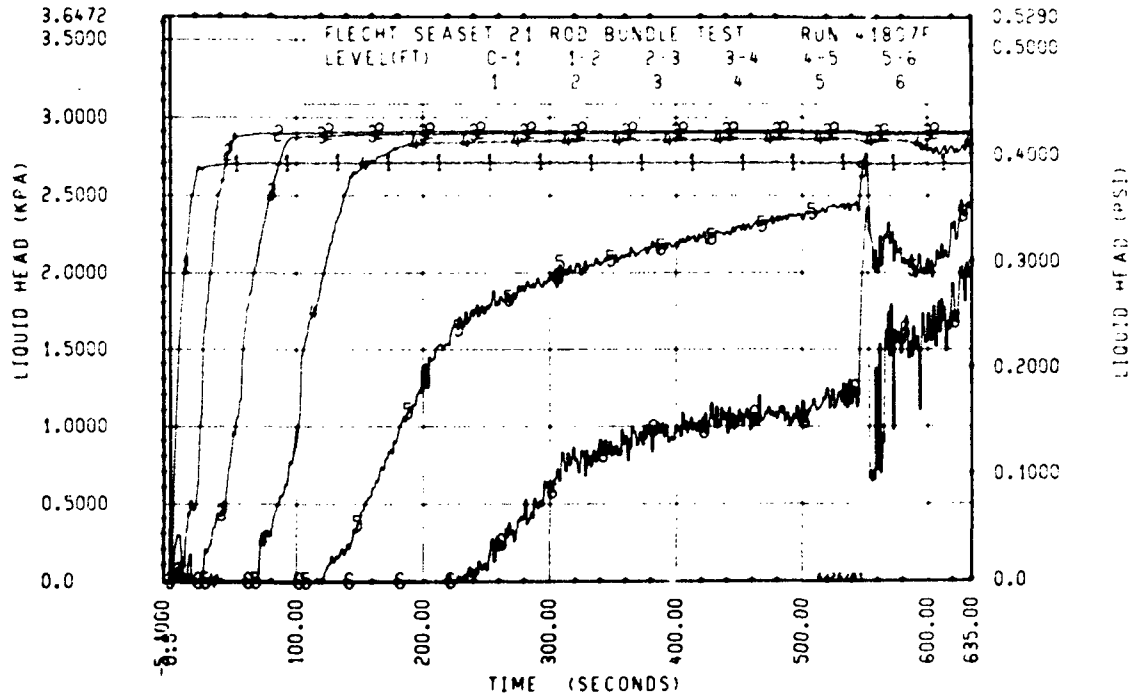

FLECHT SEASET 21 ROD BUNDLE TEST RUN 41807F
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
TIME (SECONDS)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
100.00
200.00
300.00
400.00
500.00
635.00

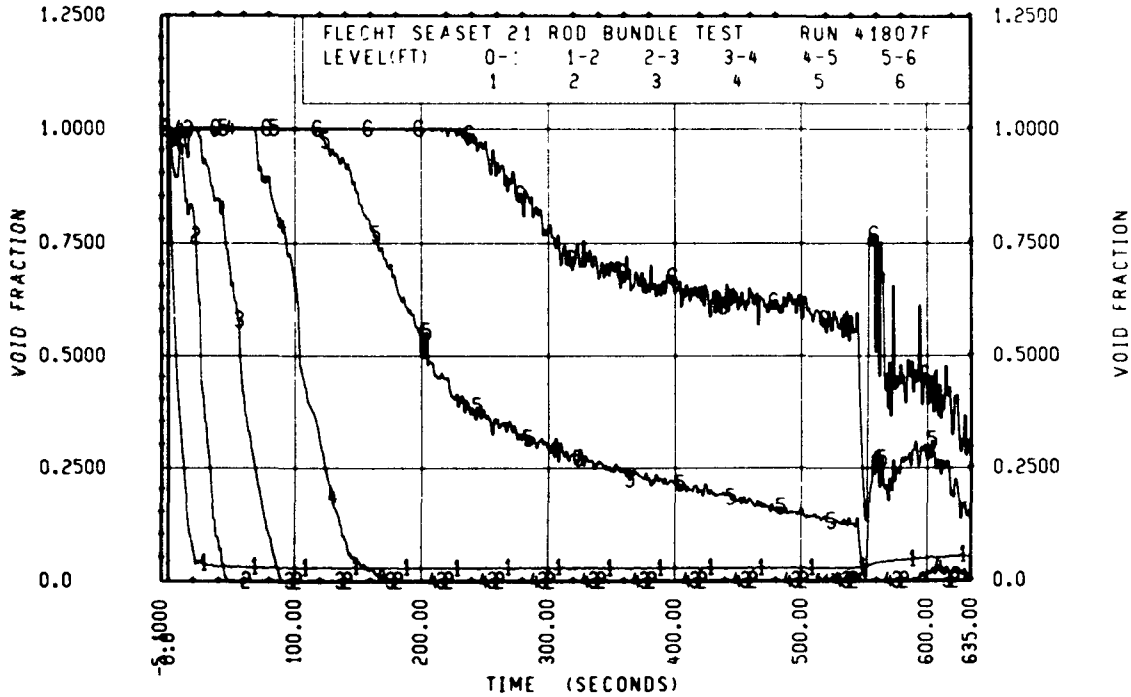

FLECHT SEASET 21 ROD BUNDLE TEST RUN 41807F
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
TIME (SECONDS)

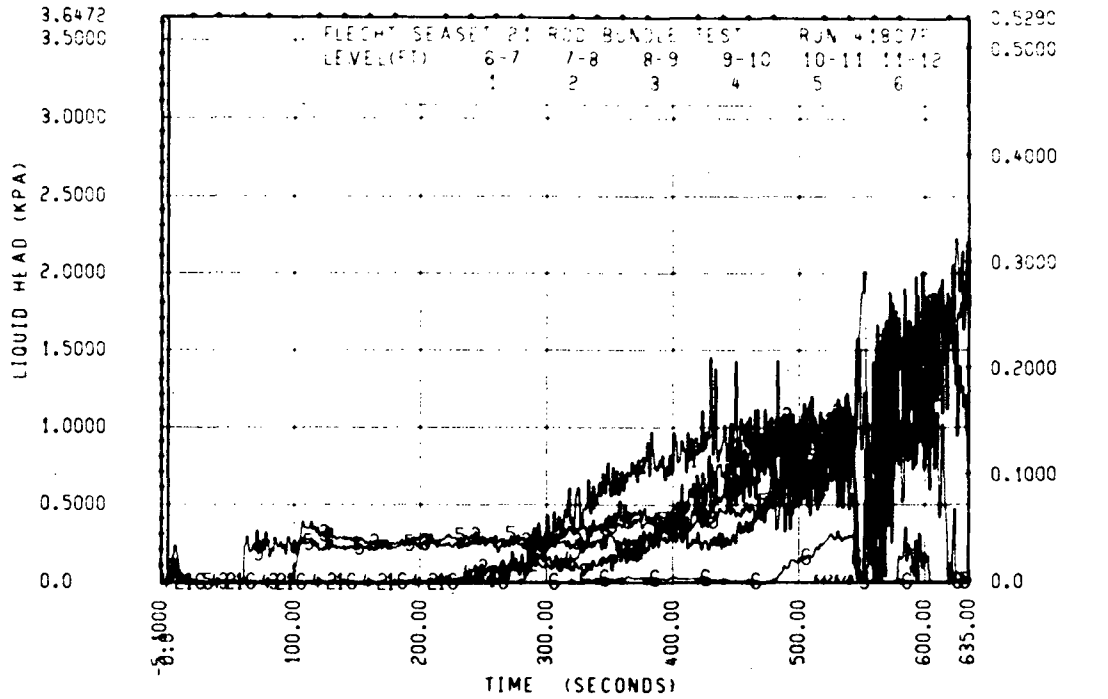

FLECHT SEASET 21 ROD BUNDLE TEST RUN 41807F
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
TIME (SECONDS)

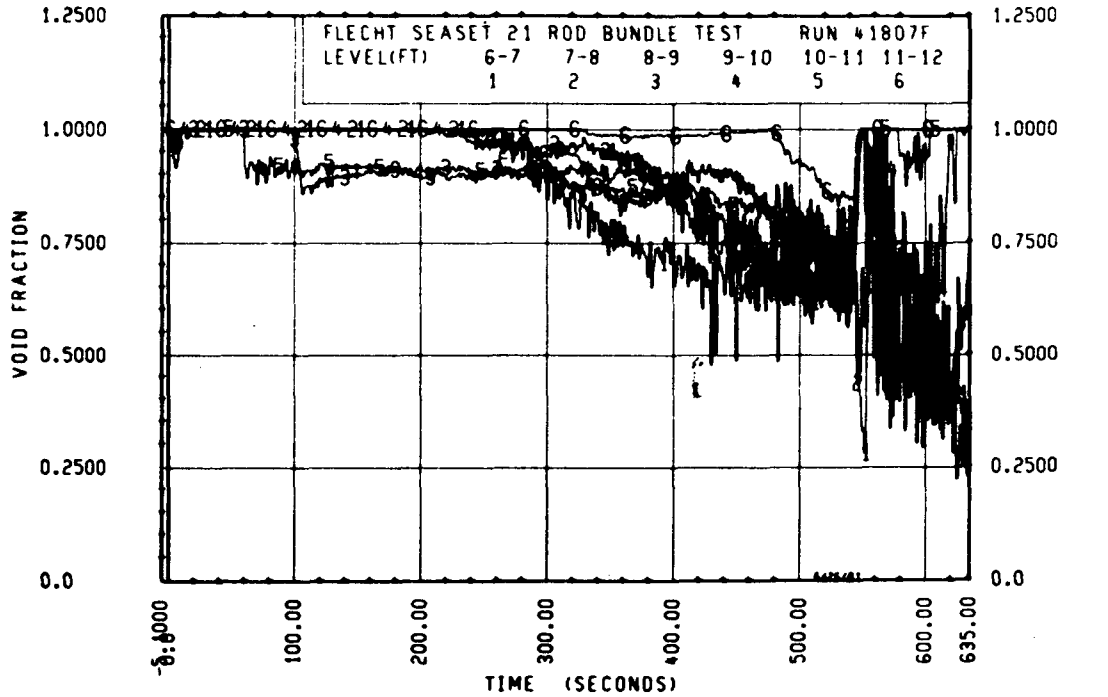

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN 41807F
HEATER RODS
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
4.2500
4.0000
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
13.944
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
635.00
QUENCH TIME (SEC)


FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN 41807F
HOUSING
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
4.2500
4.0000
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
13.944
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
635.00
QUENCH TIME (SEC)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 41807F
LEVEL(FT) 0-1 1-2 2-3 3-4 4-5 5-6
1 2 3 4 5 6
LIQUID HEAD (KPA)
LIQUID HEAD (PSI)
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 41807F
LEVEL(FT) 0-1 1-2 2-3 3-4 4-5 5-6
1 2 3 4 5 6
VOID FRACTION
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 41807F
LEVEL(FT) 6-7 7-8 8-9 9-10 10-11 11-12
1 2 3 4 5 6
LIQUID HEAD (KPA)
LIQUID HEAD (PSI)
TIME (SECONDS)


FLECHT SEASET 21 ROD BUNDLE TEST RUN 41807F
LEVEL(FT) 6-7 7-8 8-9 9-10 10-11 11-12
1 2 3 4 5 6
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42804A
Test Date: 4/2/80
Test Type: Forced Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.273 MPa (39.6 psia)
Initial peak clad temperature and location	874°C (1605°F), 3C 1.83 m (72 in.)
Initial peak rod power	1.0 kw/m (0.32 kw/ft)
Flow rate	13 mm/sec (0.52 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	522°C (516°C - 525°C) [971°F (960°F - 977°F)]
Initial bundle water level	32.3 mm (1.27 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: approximately 1.9% increase at 260 seconds[a]
Total power: exponentially increasing from 0% to -2.5% by 220 seconds[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42804A

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1061.	1115.	54.	36.5	746.	105.5
4C 3- 3	11	1163.	1219.	56.	31.5	812.	105.9
1C 4- 0	14	1300.	1368.	67.	37.0	806.	155.9
2A 5- 0	17	1329.	1444.	115.	58.5	706.	218.0
2A 5- 7	21	1462.	1578.	116.	59.5	692.	260.6
1D 6- 2	50	1473.	1635.	162.	113.0	924.	311.9
2D 6- 2	53	1573.	1751.	178.	79.5	804.	313.6
3D 6- 2	58	1588.	1780.	191.	79.5	853.	317.8
5C 6- 2	61	1512.	1643.	131.	58.0	924.	298.9
1D 6- 3	63	1458.	1623.	165.	112.0	917.	320.6
4B 6- 3	68	1546.	1734.	188.	80.5	823.	325.7
5D 6- 3	69	1474.	1642.	167.	114.0	866.	317.9
2A 6- 4	70	1473.	1649.	176.	113.0	656.	328.5
3B 6- 4	75	1574.	1777.	202.	79.5	693.	328.8
3D 6- 6	79	1535.	1773.	238.	96.5	626.	346.8
2D 6- 5	84	1558.	1755.	198.	93.0	829.	333.9
3C 6- 5	85	1577.	1802.	225.	95.5	757.	338.7
3E 6- 5	86	1496.	1675.	178.	94.0	906.	330.9
3C 6- 6	95	1559.	1798.	239.	96.5	764.	346.7
4A 6- 6	97	1427.	1623.	196.	128.0	872.	336.1
3D 8- 0	98	1197.	1612.	415.	179.0	727.	448.9
5C 6- 6	101	1457.	1590.	132.	58.5	900.	327.3
1C 7- 0	110	1377.	1618.	240.	115.0	754.	368.7
2B 7- 0	111	1409.	1665.	256.	98.0	597.	376.0
3D 7- 0	115	1432.	1704.	272.	114.0	734.	375.0
5B 7- 0	117	1277.	1505.	228.	131.0	775.	367.6
2B 7- 6	* * B A D	T H E R M O C O U P L E	D A T A *				
2C 7- 6	121	1363.	1679.	315.	131.0	769.	408.8
2E 7- 6	122	1276.	1533.	257.	179.0	785.	384.7
3A 7- 6	123	1280.	1532.	252.	160.0	637.	408.9
3B 7- 6	124	1392.	1693.	301.	160.0	764.	410.8
4B 7- 6	127	1358.	1656.	298.	161.0	726.	412.2
5C 7- 6	128	1240.	1471.	231.	130.0	819.	391.1
1C 8- 0	131	1154.	1516.	362.	179.0	774.	442.8
2E 8- 0	133	674.	1225.	551.	233.0	642.	474.0
4C 6- 6	136	1545.	1766.	222.	96.5	867.	340.9
5B 8- 0	138	1156.	1496.	340.	193.0	756.	446.9
5C 8- 0	139	1103.	1407.	303.	178.0	806.	429.1
1C 8- 6	141	979.	1439.	459.	211.0	553.	466.0
1D 8- 6	142	839.	1258.	419.	235.0	547.	453.0
2C 8- 6	143	1041.	1543.	502.	179.0	596.	471.0
4B 8- 6	145	1092.	1555.	463.	179.0	566.	482.0
5D 8- 6	148	947.	1425.	477.	194.0	526.	474.0
3D 9- 3	154	839.	1412.	573.	231.0	663.	493.0
4C 9- 3	156	937.	1427.	490.	198.0	700.	490.0
1D10- 0	161	565.	1002.	437.	182.0	582.	501.0
4B10- 0	164	793.	1230.	437.	240.0	655.	518.0
5D10- 0	167	662.	1103.	420.	192.0	741.	469.0
2A11- 0	168	496.	731.	235.	313.0	603.	483.5
4C11- 0	170	619.	973.	354.	196.0	589.	525.0
1D11- 6	172	294.	764.	470.	293.0	643.	466.8

RUN 42804A HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	498.2	473.3	482.8	514.0	491.5	500.8	16.5	15.0	16.1
24	791.7	722.0	758.6	814.7	754.5	785.6	34.5	26.5	31.6
39	1163.3	1046.7	1090.2	1219.1	1112.0	1148.7	38.5	31.5	35.5
48	1320.4	1219.5	1271.2	1404.4	1304.8	1347.8	57.0	37.0	43.3
60	1438.6	1293.6	1344.3	1585.2	1418.4	1471.8	60.5	43.5	55.3
67	1558.5	1457.3	1485.0	1706.2	1577.6	1614.1	77.0	59.0	63.9
70	1599.8	1461.9	1544.0	1769.8	1618.8	1688.8	78.5	59.0	65.5
71	1600.2	1484.1	1548.6	1779.8	1626.5	1706.0	80.0	59.0	73.1
72	1605.2	1474.4	1540.5	1786.5	1611.2	1693.4	80.5	56.0	71.7
74	1593.7	1467.5	1541.9	1794.3	1622.1	1713.7	113.0	56.0	80.5
75	1587.2	1458.4	1533.4	1796.6	1623.2	1715.8	114.0	79.5	91.7
76	1584.0	1456.6	1531.2	1799.9	1634.1	1721.5	115.0	79.5	92.6
77	1577.1	1431.6	1514.6	1802.2	1626.5	1714.4	128.0	80.0	99.6
78	1559.1	1427.3	1498.5	1797.7	1589.5	1707.8	128.0	56.5	101.0
84	1432.2	1249.7	1356.6	1704.0	1505.2	1613.9	131.0	98.0	119.7
90	1391.7	1183.6	1302.0	1693.0	1470.9	1586.9	179.0	130.0	147.4
96	1262.3	674.4	1129.4	1650.5	1225.4	1510.7	233.0	170.0	186.8
102	1092.2	636.9	983.1	1554.9	1257.8	1449.6	235.0	179.0	198.7
111	946.3	701.2	800.3	1426.9	1192.0	1322.5	233.0	147.0	206.2
120	792.7	565.0	675.7	1294.3	1001.5	1151.5	287.0	182.0	244.4
132	618.5	403.1	530.7	972.8	727.5	790.8	313.0	196.0	257.5
138	569.7	294.2	454.7	968.6	763.9	834.5	298.0	284.0	289.2

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	18.2	15.8	17.6	512.0	491.5	499.1	19.6	19.0	19.2
24	32.5	22.7	27.0	763.0	694.3	726.0	48.4	45.0	46.2
39	65.3	54.4	58.5	812.3	692.9	751.1	106.9	105.5	106.1
48	85.3	67.2	76.5	901.2	776.9	830.5	155.9	142.8	148.3
60	148.5	114.6	127.1	746.6	671.2	700.8	226.0	216.0	220.2
67	147.7	116.0	129.1	892.0	792.2	855.9	265.9	259.7	262.5
70	170.0	126.6	144.6	874.6	802.2	850.2	288.3	281.6	284.5
71	179.5	142.4	157.3	947.6	794.1	864.4	297.3	283.6	291.0
72	181.3	124.2	152.9	912.9	818.3	869.3	302.5	282.7	295.6
74	200.5	131.3	171.9	924.2	803.8	867.6	317.9	296.9	310.6
75	209.3	164.8	182.4	925.6	788.9	854.4	325.7	317.9	321.7
76	215.8	175.4	190.3	892.7	816.3	855.8	331.9	310.8	325.9
77	225.1	176.0	199.8	906.0	757.5	845.3	338.9	330.9	334.8
78	236.5	132.2	209.3	899.5	783.8	851.2	346.8	327.3	341.1
84	302.9	221.3	255.3	775.1	597.3	699.0	376.0	360.0	371.2
90	319.7	230.5	284.8	842.3	725.6	793.0	412.2	364.7	403.6
96	550.9	303.2	381.3	806.5	641.6	745.1	474.0	429.1	447.5
102	507.4	418.9	466.5	600.6	518.2	559.9	482.0	435.6	463.8
111	573.0	390.0	462.2	780.4	613.2	694.4	498.0	412.8	477.2
120	589.6	337.0	475.8	741.0	582.2	650.4	518.0	469.0	503.1
132	354.3	202.2	259.8	715.0	588.7	646.0	525.0	373.0	444.6
138	464.9	269.9	379.8	731.9	542.1	634.2	536.0	437.8	487.9

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42204B
Test Date: 6/20/80
Test Type: Forced Reflood
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.274 MPa (39.7 psia)
Initial peak clad temperature and location	878°C (1613°F), 3C 1.78 m (70 in.)
Initial peak rod power	0.99 kw/m (0.30 kw/ft)
Flow rate	13 mm/sec (0.52 in./sec)
Coolant temperature	52°C (125°F)
Average and range of initial 1.83 m (72 in.) housing temperature	547°C (541°C - 549°C) [1016°F (1006°F - 1021°F)]
Initial bundle water level	36.1 mm (1.42 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-1% to 80 seconds, -0.5% to 260 seconds, and -3% thereafter[a]
Total power:	-0.5% linearly increasing to +1.25%[a]
Housing initial temperature at midplane:	+7%[a]

a. Relative to run 42804A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER422048

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1106.	1145.	39.	29.0	706.	119.0
4C 3- 3	11	1253.	1283.	30.	26.0	819.	118.0
1C 4- 0	14	1321.	1354.	33.	26.0	782.	160.4
2A 5- 0	17	1364.	1496.	131.	68.5	713.	242.4
2A 5- 7	21	1471.	1587.	116.	70.0	854.	289.8
1D 6- 2	50	1419.	1581.	162.	142.0	854.	340.1
2D 6- 2	53	1510.	1691.	181.	105.0	682.	353.8
3D 6- 2	58	1547.	1720.	172.	95.5	779.	347.0
5C 6- 2	61	1477.	1611.	134.	88.0	887.	337.7
1D 6- 3	63	1431.	1574.	144.	69.5	825.	320.8
4B 6- 3	68	1534.	1665.	131.	93.0	826.	352.9
5D 6- 3	69	1418.	1606.	188.	143.0	838.	370.9
2A 6- 4	70	1417.	1560.	143.	141.0	765.	361.6
2D 6- 4	72	1534.	1688.	154.	91.5	778.	366.2
3B 6- 4	75	1566.	1709.	143.	90.0	775.	365.8
3C 6- 5	85	1600.	1754.	154.	91.0	777.	362.6
3E 6- 5	86	1468.	1608.	140.	109.0	839.	361.6
3C 6- 6	95	1579.	1762.	183.	91.5	849.	371.2
3D 6- 6	96	1541.	1732.	191.	104.0	774.	377.7
4A 6- 6	97	1411.	1594.	182.	144.0	854.	374.7
4C 6- 6	98	1551.	1732.	180.	91.5	813.	373.2
5C 6- 6	101	1454.	1596.	142.	127.0	893.	368.9
1C 7- 0	110	1412.	1604.	191.	127.0	691.	403.0
2B 7- 0	111	1444.	1670.	226.	110.0	674.	414.1
3D 7- 0	115	1484.	1717.	233.	108.0	668.	408.0
5B 7- 0	117	1339.	1524.	185.	144.0	719.	409.9
2B 7- 6	120	1409.	1665.	256.	142.0	732.	454.8
2C 7- 6	121	1419.	1697.	278.	144.0	723.	449.2
2E 7- 6	122	1228.	1502.	274.	193.0	751.	447.9
3A 7- 6	123	1387.	1618.	231.	143.0	791.	444.8
3B 7- 6	124	1436.	1701.	264.	144.0	766.	447.9
4B 7- 6	127	1443.	1677.	234.	127.0	693.	442.5
5C 7- 6	128	1400.	1609.	209.	143.0	804.	434.9
1C 8- 0	131	1175.	1552.	377.	179.0	761.	476.9
2E 8- 0	133	975.	1474.	499.	245.0	681.	484.8
3D 8- 0	136	1250.	1629.	378.	162.0	728.	476.9
5B 8- 0	138	1146.	1486.	340.	225.0	704.	491.5
5C 8- 0	139	1278.	1565.	287.	193.0	752.	472.8
1C 8- 6	141	985.	1481.	495.	161.0	558.	507.6
1D 8- 6	142	802.	1355.	553.	244.0	563.	505.8
2C 8- 6	143	1082.	1582.	500.	161.0	565.	517.6
4B 8- 6	145	1176.	1600.	425.	210.0	652.	511.8
5D 8- 6	148	1000.	1438.	437.	228.0	509.	512.0
3D 9- 3	154	917.	1433.	516.	226.0	682.	529.0
4C 9- 3	156	1009.	1467.	457.	225.0	667.	532.0
1D10- 0	161	598.	1114.	516.	297.0	635.	545.0
4B10- 0	164	879.	1342.	462.	221.0	624.	561.0
5D10- 0	167	711.	1103.	391.	297.0	602.	555.0
2A11- 0	168	552.	784.	232.	352.0	601.	537.0
4C11- 0	170	653.	1068.	415.	214.0	569.	571.9
1D11- 6	172	309.	835.	526.	338.0	667.	516.0

RUN 422048 HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	660.7	588.3	614.6	663.6	597.2	622.3	15.0	3.0	10.8
24	921.2	830.2	864.0	937.7	853.0	882.7	26.5	16.5	21.4
39	1253.1	1106.3	1154.9	1282.8	1145.3	1194.7	44.0	26.0	35.4
48	1386.7	1275.7	1315.9	1441.9	1340.4	1372.0	58.0	26.0	43.2
60	1495.3	1351.5	1395.0	1618.8	1474.1	1516.4	68.5	49.0	62.2
67	1586.1	1461.9	1502.0	1708.5	1587.3	1623.0	88.0	61.0	72.2
70	1613.2	1432.5	1521.0	1755.3	1561.4	1651.8	89.5	64.5	74.4
71	1596.9	1406.2	1509.5	1756.4	1573.3	1662.6	142.0	67.5	84.4
72	1473.3	1414.3	1448.4	1637.4	1571.1	1505.0	95.0	68.0	86.8
74	1551.9	1418.6	1495.7	1762.0	1580.9	1561.2	142.0	88.0	107.5
75	1586.1	1417.9	1510.3	1734.1	1574.4	1656.4	143.0	69.5	96.1
76	1600.2	1416.9	1505.3	1740.8	1560.3	1651.1	143.0	88.0	106.2
77	1600.2	1383.6	1504.4	1754.2	1577.6	1665.3	157.0	91.0	114.9
78	1578.6	1384.0	1481.0	1762.0	1569.0	1561.3	144.0	91.5	116.4
84	1484.0	1328.0	1412.3	1717.4	1523.6	1622.5	144.0	105.0	122.6
90	1442.9	1228.1	1368.1	1700.6	1502.0	1517.9	193.0	126.0	149.4
96	1298.7	974.7	1206.9	1653.7	1474.1	1566.4	245.0	159.0	192.7
102	1175.6	801.8	1018.9	1600.3	1355.1	1487.6	244.0	161.0	211.1
111	1009.4	688.4	917.3	1466.6	1144.2	1353.2	275.0	225.0	237.1
120	879.5	598.3	728.8	1371.9	1102.6	1226.5	298.0	212.0	273.0
132	653.0	507.6	563.8	1067.6	731.6	838.5	352.0	169.0	244.8
138	637.5	309.3	476.4	1039.8	774.2	894.6	338.0	228.0	288.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	9.5	2.8	7.6	637.3	589.3	609.2	21.2	20.5	20.8
24	25.9	12.1	18.7	751.0	701.7	726.2	58.5	55.4	56.8
39	51.0	29.7	39.8	819.4	706.2	742.6	123.9	118.0	120.9
48	76.2	33.3	56.2	826.2	776.0	791.3	166.6	160.4	164.6
60	131.4	108.0	121.4	779.8	711.4	735.6	245.0	240.9	242.8
67	130.8	114.9	121.0	871.0	850.1	859.0	290.6	285.7	288.7
70	142.1	108.4	130.9	904.9	831.2	855.1	316.8	305.6	312.2
71	168.7	128.0	153.1	936.4	822.7	872.9	348.7	315.4	323.0
72	173.4	127.0	156.6	890.3	749.9	847.7	329.9	319.8	326.0
74	239.7	133.7	165.5	986.0	682.1	834.2	355.7	326.9	344.6
75	187.9	124.0	146.2	872.2	774.0	824.1	370.9	320.8	351.9
76	170.6	120.3	145.8	884.5	765.2	810.1	367.4	352.9	360.0
77	194.0	139.6	160.8	839.1	773.7	800.3	374.6	356.7	365.6
78	190.8	142.0	180.3	893.3	761.4	816.6	382.5	368.9	375.0
84	239.5	177.2	210.2	738.9	636.2	585.8	414.1	400.0	407.3
90	299.8	208.6	249.9	804.3	692.9	747.6	454.8	434.9	444.3
96	499.4	286.8	359.5	770.4	680.2	722.7	491.5	472.8	481.4
102	553.3	419.4	468.7	651.9	509.0	568.1	517.6	498.7	509.3
111	516.1	378.4	435.9	694.7	552.5	535.0	542.0	528.0	534.3
120	606.8	386.7	497.7	854.1	597.3	643.4	562.0	512.9	550.6
132	414.6	188.4	274.6	601.4	535.6	560.8	571.9	520.0	549.9
138	526.1	282.3	418.2	756.4	284.5	565.9	584.0	367.9	517.2

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42804C
Test Date: 8/27/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.273 MPa (39.6 psia)
Initial peak clad temperature and location	877°C (1610°F), 4C 1.70 m (67 in.)
Initial peak rod power	0.98 kw/m (0.30 kw/ft)
Flow rate	13 mm/sec (0.52 in./sec)
Coolant temperature	49°C (121°F)
Average and range of initial 1.83 m (72 in.) housing temperature	529°C (516°C - 538°C) [985°F (960°F - 1001°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+6% for 10 seconds, -0.5% to 150 seconds; increased to -1.5% thereafter[a]
Total power:	-0.5% linearly increasing to +1.25%[a]

a. Relative to run 42804A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 42804C

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1080.	1125.	44.	45.5	814.	108.8
4C 3- 3	11	1226.	1254.	28.	25.0	803.	118.0
1C 4- 0	14	1352.	1402.	50.	43.0	762.	163.4
2A 5- 0	17	1394.	1507.	113.	64.5	799.	232.9
2A 5- 7	21	1506.	1604.	98.	64.5	856.	275.6
1D 6- 2	50	1465.	1591.	126.	121.0	842.	344.6
2D 6- 2	53	1458.	1648.	190.	121.0	837.	349.0
3D 6- 2	56	1558.	1710.	152.	86.5	861.	353.1
4B 6- 2	60	1565.	1671.	107.	82.5	760.	348.6
5C 6- 2	61	1471.	1646.	175.	106.0	1066.	322.7
1D 6- 3	63	1446.	1594.	145.	121.0	861.	350.9
5D 6- 3	69	1480.	1595.	115.	88.0	853.	348.6
2A 6- 4	70	1455.	1583.	128.	87.0	856.	325.5
3B 6- 4	75	1577.	1696.	120.	67.0	775.	350.8
2D 6- 5	84	1544.	1695.	151.	87.5	783.	361.9
3C 6- 5	85	1591.	1765.	174.	85.5	763.	358.8
3E 6- 5	86	1512.	1608.	96.	82.5	850.	353.6
3C 6- 6	95	1569.	1771.	201.	90.5	767.	366.7
3D 6- 6	96	1544.	1736.	193.	88.0	756.	372.8
4A 6- 6	97	1457.	1611.	154.	106.0	805.	363.6
4C 6- 6	98	1567.	1745.	179.	86.5	802.	363.5
5C 6- 6	101	1532.	1633.	101.	67.0	801.	360.5
1C 7- 0	110	1364.	1605.	241.	121.0	861.	389.0
2B 7- 0	111	1403.	1680.	277.	101.0	596.	391.7
3D 7- 0	115	1412.	1712.	300.	104.0	715.	360.9
5B 7- 0	117	1324.	1527.	203.	122.0	810.	355.7
2B 7- 6	120	1376.	1649.	273.	122.0	735.	421.9
2C 7- 6	121	1367.	1678.	311.	137.0	673.	431.7
2E 7- 6	122	1085.	1497.	412.	179.0	647.	419.9
3A 7- 6	123	1373.	1605.	232.	122.0	756.	406.1
3B 7- 6	124	1402.	1681.	279.	121.0	726.	420.8
4B 7- 6	127	1391.	1657.	266.	121.0	726.	426.0
5C 7- 6	128	1380.	1595.	215.	122.0	737.	405.9
1C 8- 0	131	1159.	1537.	378.	172.0	670.	457.8
2E 8- 0	133	950.	1482.	531.	222.0	659.	459.7
3D 8- 0	136	1240.	1637.	397.	209.0	677.	458.3
5B 8- 0	138	1153.	1464.	311.	204.0	713.	461.7
5C 8- 0	139	1298.	1565.	267.	156.0	767.	437.8
1C 8- 6	141	977.	1487.	510.	157.0	551.	464.8
1D 8- 6	142	766.	1383.	617.	187.0	452.	469.4
2C 8- 6	** B A D	T H E R M O C O U P L E	D A T A *				
4B 8- 6	145	1106.	1492.	387.	141.0	569.	469.4
5D 8- 6	148	999.	1430.	431.	202.0	564.	481.9
3D 9- 3	154	900.	1440.	540.	214.0	652.	509.2
4C 9- 3	156	963.	1424.	441.	221.0	647.	506.6
1D10- 0	161	592.	982.	390.	283.0	646.	504.0
4B10- 0	164	837.	1299.	462.	259.0	615.	536.0
5D10- 0	167	692.	1083.	392.	213.0	714.	477.1
2E11- 0	168	553.	754.	200.	337.0	503.	522.5
4C11- 0	170	640.	1079.	438.	218.0	543.	541.0
1D11- 6	172	286.	761.	475.	316.0	507.	550.8

RUN 42804C HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	673.0	599.3	625.9	675.2	604.6	629.6	9.5	3.0	7.3
24	903.7	823.5	867.3	916.1	844.7	882.3	24.5	15.0	18.2
39	1225.9	1080.4	1130.8	1253.6	1124.5	1182.5	48.5	25.0	39.4
48	1379.7	1304.2	1335.9	1439.8	1364.5	1398.8	57.0	43.0	47.9
60	1399.6	1376.1	1390.5	1532.2	1507.4	1516.0	82.0	64.5	70.8
67	1609.5	1474.6	1519.7	1722.9	1592.7	1628.8	82.0	63.0	72.8
70	1599.2	1485.3	1556.6	1760.9	1628.7	1698.5	84.5	65.5	76.4
71	1552.7	1457.5	1522.9	1750.8	1622.1	1684.6	87.5	63.0	65.9
72	1512.7	1499.2	1506.0	1659.2	1647.2	1653.2	87.5	65.5	76.5
74	1579.2	1445.7	1515.0	1729.6	1573.3	1652.4	141.0	63.5	94.3
75	1599.8	1448.3	1533.9	1729.6	1590.5	1654.0	121.0	63.5	84.4
76	1600.3	1430.7	1530.0	1747.5	1583.0	1651.9	137.0	65.0	85.2
77	1591.1	1406.0	1521.1	1765.3	1594.9	1670.2	121.0	81.5	90.9
78	1569.5	1360.1	1506.6	1770.9	1599.2	1675.8	157.0	67.0	101.8
84	1433.9	1174.6	1355.5	1715.1	1423.7	1619.3	176.0	86.0	117.3
90	1402.3	1064.6	1336.6	1681.0	1496.6	1620.5	179.0	121.0	135.4
96	1306.3	950.1	1207.4	1647.2	1464.4	1563.1	222.0	136.0	175.1
102	1105.7	766.4	984.5	1558.2	1383.4	1473.7	205.0	141.0	182.3
111	994.9	790.3	932.6	1439.8	1246.3	1368.6	279.0	205.0	226.0
120	836.9	592.4	726.3	1305.8	982.0	1188.6	283.0	189.0	234.3
132	640.4	466.3	556.8	1078.9	753.5	863.6	337.0	218.0	265.8
138	622.5	265.6	475.8	972.6	760.7	850.6	316.0	208.0	267.4

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	5.2	2.1	3.7	645.2	595.4	614.5	21.4	16.9	19.7
24	21.2	11.3	15.0	763.5	722.6	737.5	56.7	55.2	55.9
39	62.9	27.6	43.7	829.6	763.5	802.4	118.6	106.6	114.1
48	81.2	49.9	62.9	799.2	776.3	786.0	165.9	159.7	163.1
60	132.5	113.5	125.4	853.6	762.2	805.0	235.9	230.9	233.2
67	121.4	97.9	109.1	924.2	836.5	868.7	279.8	272.3	275.8
70	161.6	115.6	141.9	836.6	840.9	870.0	308.7	298.7	303.9
71	201.3	123.1	161.7	967.6	860.0	905.0	313.8	303.8	309.7
72	159.9	134.4	147.2	911.3	871.5	891.4	305.6	304.5	305.1
74	189.9	106.5	137.4	836.5	636.7	748.7	353.1	327.7	342.8
75	145.5	72.4	120.2	861.3	736.3	807.4	356.9	344.1	349.7
76	161.6	54.6	121.9	858.5	734.3	794.2	361.0	325.5	349.4
77	188.9	95.7	149.1	858.0	782.7	818.6	370.9	348.6	359.4
78	224.2	100.8	166.7	867.2	751.7	795.3	376.7	349.4	364.4
84	311.7	203.2	263.9	810.0	598.0	682.7	399.0	355.7	381.5
90	412.0	215.2	281.9	783.0	647.1	725.8	431.7	371.8	413.2
96	531.5	266.6	355.6	766.7	659.1	705.6	463.9	437.8	455.0
102	616.9	366.6	489.2	568.9	451.5	537.6	492.0	469.4	482.4
111	539.7	379.2	436.0	670.3	606.1	646.6	511.0	480.0	500.9
120	539.8	369.6	460.4	739.7	590.9	654.1	536.0	449.9	502.9
132	438.4	200.0	304.8	722.2	502.8	609.0	541.0	410.1	473.9
138	475.1	266.6	374.8	869.7	285.6	598.1	550.8	326.8	444.6

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42404D
Test Date: 10/17/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.278 MPa (40.3 psia)
Initial peak clad temperature and location	878°C (1613°F), 3C 1.78 m (70 in.)
Initial peak rod power	1.0 kw/m (0.31 kw/ft)
Flow rate	13 mm/sec (0.51 in./sec)
Coolant temperature	51°C (124°F)
Average and range of initial 1.83 m (72 in.) housing temperature	542°C (532°C - 550°C) [1007°F (989°F - 1022°F)]
Initial bundle water level	50.5 mm (1.99 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-0.5% for 260 seconds, and decreased to -3% thereafter[a]
Total power:	-0.5% constant[a]
Housing initial temperature at midplane:	approximately +4%[a]

a. Relative to run 42804A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 42404D

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1090.	1136.	46.	45.5	792.	115.7
4C 3- 3	9	1203.	1241.	38.	36.5	816.	115.2
1C 4- 0	10	1306.	1351.	45.	45.5	860.	152.9
2A 5- 0	13	1393.	1527.	134.	76.5	844.	233.9
2A 5- 7	16	1475.	1578.	103.	90.0	898.	275.3
2D 6- 2	50	1539.	1687.	148.	67.5	808.	328.9
3D 6- 2	55	1530.	1733.	203.	87.5	287.	560.0
5C 6- 2	59	1531.	1646.	115.	78.5	842.	327.8
1D 6- 3	61	1481.	1629.	147.	95.0	850.	332.9
4B 6- 3	66	1549.	1694.	145.	82.0	842.	337.8
5D 6- 3	68	1465.	1594.	129.	99.5	851.	329.8
2A 6- 4	70	1469.	1615.	146.	95.5	879.	338.9
3B 6- 4	* * B A D T H E R M O C O U P L E D A T A *						
1D 6- 5	82	1461.	1613.	152.	95.0	846.	343.8
2D 6- 5	84	1547.	1701.	153.	58.0	833.	346.0
3C 6- 5	85	1598.	1760.	162.	79.0	871.	342.8
3E 6- 5	86	1487.	1612.	126.	81.0	862.	345.9
3C 6- 6	97	1586.	1762.	176.	82.0	824.	350.5
3D 6- 6	98	1563.	1734.	172.	82.5	790.	354.9
4A 6- 6	100	1460.	1628.	167.	101.0	823.	360.4
4C 6- 6	101	1567.	1740.	173.	86.0	817.	356.5
5C 6- 6	103	1520.	1637.	117.	81.5	871.	348.9
1C 7- 0	* * B A D T H E R M O C O U P L E D A T A *						
2B 7- 0	111	1413.	1692.	279.	95.5	624.	381.0
3D 7- 0	115	1431.	1705.	274.	98.0	608.	381.0
5B 7- 0	117	1306.	1544.	238.	128.0	675.	356.9
2B 7- 6	121	1391.	1664.	273.	141.0	763.	409.5
2C 7- 6	122	1359.	1670.	311.	141.0	745.	430.7
2E 7- 6	123	1214.	1482.	268.	143.0	744.	409.2
3A 7- 6	124	1393.	1617.	224.	141.0	778.	403.9
3B 7- 6	125	1425.	1692.	267.	124.0	755.	408.2
4B 7- 6	128	1418.	1672.	254.	126.0	724.	421.9
5C 7- 6	129	1397.	1604.	206.	126.0	766.	399.9
1C 8- 0	132	1162.	1489.	327.	176.0	748.	456.6
2E 8- 0	134	1112.	1457.	345.	175.0	765.	444.8
3D 8- 0	137	1291.	1635.	344.	174.0	753.	444.7
5B 8- 0	139	1241.	1527.	286.	160.0	719.	445.4
5C 8- 0	140	1315.	1582.	267.	144.0	765.	431.0
1C 8- 6	141	977.	1479.	502.	191.0	593.	491.0
1D 8- 6	142	865.	1476.	611.	191.0	650.	481.9
2C 8- 6	143	1022.	1568.	546.	190.0	544.	490.0
4B 8- 6	145	1136.	1537.	400.	144.0	572.	489.0
5D 8- 6	148	1063.	1448.	385.	191.0	620.	474.7
3D 9- 3	155	880.	1471.	591.	208.0	666.	500.0
4C 9- 3	157	962.	1442.	480.	207.0	665.	503.5
1D10- 0	160	566.	1067.	501.	288.0	287.	510.0
4B10- 0	163	831.	1289.	458.	225.0	637.	536.0
5D10- 0	166	701.	1105.	404.	209.0	704.	489.9
2A11- 0	167	553.	793.	240.	206.0	548.	537.0
4C11- 0	169	640.	1093.	453.	224.0	592.	543.0
1D11- 6	170	274.	718.	444.	335.0	443.	531.8

RUN 424040 HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	680.8	627.2	647.2	681.5	632.0	651.0	8.0	.5	5.2
24	851.3	827.5	839.2	861.3	850.9	857.5	26.5	14.0	21.0
39	1203.2	1084.8	1126.1	1241.1	1135.9	1172.7	48.5	36.5	43.5
48	1306.0	1288.8	1297.4	1350.9	1327.8	1339.3	45.5	40.0	42.8
60	1496.0	1361.1	1416.7	1599.2	1490.2	1538.7	76.5	53.0	66.0
67	1596.5	1467.8	1513.1	1702.9	1576.5	1619.0	82.0	64.5	75.5
70	1612.8	1522.6	1567.7	1745.3	1653.7	1699.5	87.5	65.0	76.2
71	1557.2	1557.2	1557.2	1727.4	1727.4	1727.4	81.5	81.5	81.5
72	1599.7	1381.4	1530.6	1739.7	1561.4	1677.4	99.0	67.0	82.6
74	1554.1	1435.7	1513.0	1738.6	1598.1	1660.1	126.0	67.5	91.8
75	1548.9	1464.6	1503.4	1701.8	1593.8	1647.4	99.5	82.0	90.1
76	1581.0	1468.9	1529.3	1756.4	1599.2	1676.0	101.0	84.0	90.9
77	1597.6	1459.2	1519.6	1759.8	1591.7	1673.4	101.0	68.0	85.7
78	1585.7	1452.8	1524.6	1762.0	1611.2	1685.6	127.0	80.5	93.9
84	1436.0	1296.5	1373.6	1718.5	1512.8	1623.3	128.0	93.0	106.6
90	1425.3	1213.7	1347.7	1691.9	1481.6	1595.4	143.0	124.0	134.5
96	1343.7	1112.2	1241.2	1667.9	1456.9	1550.6	190.0	143.0	163.9
102	1136.1	864.9	1002.8	1567.9	1360.6	1471.1	207.0	144.0	183.1
111	961.6	803.7	891.5	1470.9	1129.7	1350.9	254.0	207.0	220.3
120	831.0	566.0	675.3	1289.1	1005.7	1149.0	299.0	205.0	250.9
132	640.2	552.8	583.4	1093.4	793.0	929.0	336.0	206.0	255.3
138	525.0	273.7	431.6	1027.4	718.1	836.2	335.0	278.0	302.5

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	5.9	0.0	3.6	648.0	618.4	631.5	19.5	18.4	19.0
24	23.4	10.0	18.3	715.4	285.6	570.8	56.5	55.0	55.6
39	56.3	37.9	46.6	815.8	740.4	782.0	118.1	115.2	116.3
48	44.9	39.0	42.0	859.8	826.5	843.2	160.6	152.9	156.8
60	133.8	103.2	122.0	856.0	786.3	828.7	234.9	230.9	233.2
67	108.7	102.7	105.9	899.7	889.3	895.6	276.8	274.9	275.7
70	132.5	131.1	131.8	949.6	912.9	931.3	291.6	291.0	291.3
71	170.2	170.2	170.2	866.8	866.8	866.8	317.8	317.8	317.8
72	130.0	132.3	146.8	901.4	807.1	850.1	316.8	305.9	310.8
74	177.3	114.8	153.1	958.5	701.3	816.6	340.7	306.7	325.8
75	166.2	129.2	144.0	850.5	813.3	835.6	337.8	328.8	332.8
76	198.7	106.9	146.7	1000.2	806.2	854.2	350.7	331.9	341.2
77	197.0	125.6	153.8	870.9	812.5	849.3	359.6	337.7	346.4
78	185.7	117.0	161.0	871.2	790.4	833.3	360.4	335.3	351.3
84	282.5	170.1	249.7	734.2	587.7	641.0	381.0	356.9	376.0
90	310.7	206.4	247.7	806.8	633.7	740.5	430.7	372.1	406.1
96	344.7	266.5	309.4	765.3	672.9	732.3	460.2	431.0	445.8
102	611.3	362.1	468.2	650.4	531.9	581.4	491.0	474.7	483.8
111	591.2	314.2	459.4	866.7	581.5	640.8	512.8	493.6	500.2
120	584.3	395.0	473.7	703.7	286.6	586.3	535.0	489.9	519.3
132	453.2	240.2	345.6	642.8	548.2	594.3	543.0	497.9	526.0
138	444.4	328.3	404.6	655.9	442.9	570.0	549.1	428.8	512.2

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42704E
Test Date: 12/12/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.278 MPa (40.3 psia)
Initial peak clad temperature and location	874°C (1606°F), 4C 1.70 m (67 in.)
Initial peak rod power	0.98 kw/m (0.30 kw/ft)
Flow rate	13 mm/sec (0.53 in./sec)
Coolant temperature	49°C (120°F)
Average and range of initial 1.83 m (72 in.) housing temperature	542°C (532°C - 548°C) [1008°F (989°F - 1019°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+2.0% to 250 seconds and 1% thereafter[a]
Total power:	-0.5% increasing linearly to +1%[a]
Housing initial temperature at midplane:	+4%[a]

a. Relative to run 42804A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42704E

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1174.	1216.	42.	37.5	727.	122.9
4C 3- 3	10	1257.	1273.	16.	15.0	816.	118.9
1C 4- 0	12	1379.	1441.	61.	48.5	907.	155.2
2A 5- 0	16	1487.	1577.	90.	56.5	773.	225.0
2A 5- 7	19	1526.	1617.	90.	66.5	848.	263.6
5C 6- 0	36	1432.	1617.	185.	98.5	237.	583.0
2D 6- 2	39	1510.	1716.	206.	101.0	904.	296.5
1D 6- 4	47	1466.	1610.	144.	120.0	822.	328.0
3D 6- 4	50	1475.	1745.	270.	121.0	238.	573.0
4B 6- 4	52	1525.	1700.	175.	101.0	603.	320.0
5C 6- 4	54	1462.	1623.	161.	126.0	1086.	319.0
5D 6- 4	55	1483.	1612.	129.	139.0	850.	334.8
1D 6- 5	58	1477.	1621.	144.	118.0	855.	334.0
2A 6- 5	59	1474.	1601.	128.	117.0	705.	356.0
2D 6- 5	61	1523.	1692.	169.	121.0	959.	319.9
3B 6- 5	63	1554.	1731.	177.	98.0	782.	335.0
3C 6- 6	72	1566.	1752.	186.	99.0	547.	312.7
4C 6- 6	75	1572.	1722.	149.	96.5	938.	336.8
3C 6- 7	** BAD THERMOCOUPLE DATA *						
3E 6- 7	83	1491.	1654.	162.	103.0	829.	347.4
3D 6- 8	86	1545.	1745.	200.	101.0	794.	362.2
4A 6- 8	87	1441.	1597.	156.	116.0	829.	360.3
1C 7- 0	93	1413.	1584.	171.	103.0	663.	363.8
2B 7- 0	94	1456.	1672.	216.	99.0	602.	374.5
3D 7- 0	98	1473.	1723.	250.	102.0	756.	362.6
5B 7- 0	103	1395.	1586.	191.	102.0	616.	373.0
2B 7- 6	110	1401.	1645.	244.	102.0	735.	406.4
2C 7- 6	111	1427.	1673.	247.	102.0	739.	382.8
2E 7- 6	113	1212.	1516.	304.	143.0	785.	397.4
3A 7- 6	** BAD THERMOCOUPLE DATA *						
3B 7- 6	115	1142.	1618.	475.	172.0	643.	462.0
4B 7- 6	120	1437.	1685.	249.	121.0	759.	400.7
5C 7- 6	122	1420.	1634.	214.	141.0	789.	393.9
1C 8- 0	124	1194.	1504.	310.	154.0	753.	436.3
2E 8- 0	126	959.	1421.	461.	196.0	771.	443.0
3D 8- 0	129	1233.	1641.	408.	173.0	766.	437.9
5B 8- 0	133	1224.	1489.	265.	140.0	735.	436.8
5C 8- 0	134	1303.	1599.	296.	174.0	778.	425.8
1C 8- 6	135	1004.	1459.	455.	138.0	636.	469.3
1D 8- 6	136	933.	1397.	464.	174.0	644.	481.8
2C 8- 6	138	1143.	1607.	463.	172.0	702.	465.9
4B 8- 6	143	1126.	1592.	466.	172.0	616.	468.6
5D 8- 6	145	1013.	1519.	507.	204.0	629.	465.9
3D 9- 3	150	909.	1447.	538.	214.0	702.	489.0
4C 9- 3	152	989.	1470.	481.	204.0	694.	487.8
1D10- 0	157	676.	1252.	575.	314.0	630.	522.0
4B10- 0	164	836.	1254.	417.	206.0	641.	517.0
5D10- 0	166	693.	1136.	443.	269.0	806.	451.2
2A11- 0	168	551.	726.	176.	294.0	597.	470.7
4C11- 0	169	657.	1059.	403.	222.0	575.	526.5
1D11- 6	171	299.	889.	591.	315.0	558.	525.2

RUN 42704E HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	665.3	630.2	652.8	669.9	636.2	658.7	9.5	7.0	8.0
24	937.7	864.7	898.2	942.9	879.9	907.1	29.0	9.5	16.8
39	1256.9	1156.6	1188.0	1273.4	1182.7	1223.3	47.0	15.0	30.9
48	1436.2	1351.5	1389.0	1495.5	1418.4	1451.6	48.5	45.5	47.0
60	1531.0	1470.0	1495.9	1646.1	1576.5	1603.7	56.5	49.0	53.2
67	1606.0	1498.3	1552.9	1740.8	1616.7	1678.0	97.0	63.0	74.1
70	1594.8	1537.9	1567.5	1756.4	1728.5	1742.6	100.0	67.0	78.2
73	1459.7	1459.7	1459.7	1601.4	1601.4	1601.4	104.0	104.0	104.0
74	1516.6	1510.2	1513.4	1717.4	1716.3	1716.8	104.0	101.0	102.5
75	1477.9	1451.2	1464.6	1639.6	1570.0	1616.7	137.0	123.0	126.8
76	1541.5	1462.5	1493.5	1712.9	1610.1	1645.4	139.0	98.0	117.3
77	1554.1	1462.9	1497.5	1730.8	1575.4	1633.5	136.0	98.0	116.7
78	1572.5	1449.0	1514.7	1751.9	1607.9	1666.3	141.0	96.5	108.5
79	1538.6	1491.5	1513.8	1705.1	1599.2	1650.5	120.0	101.0	106.5
80	1545.4	1430.4	1483.9	1745.3	1597.1	1651.2	140.0	101.0	118.2
81	1533.6	1533.6	1533.6	1753.1	1753.1	1753.1	104.0	104.0	104.0
82	1470.0	1470.0	1470.0	1662.5	1662.5	1662.5	120.0	120.0	120.0
84	1504.0	1385.7	1445.6	1760.9	1584.1	1665.0	103.0	90.0	100.1
90	1489.3	1142.3	1351.9	1748.6	1503.0	1630.6	172.0	101.0	131.7
96	1316.5	959.3	1221.4	1681.0	1420.5	1579.6	195.0	140.0	168.1
102	1445.0	749.2	1040.2	1707.3	1033.6	1468.8	204.0	102.0	171.7
111	989.5	692.2	861.9	1510.6	1167.1	1368.2	231.0	192.0	210.2
120	1066.1	600.0	779.7	1478.4	1045.9	1262.2	314.0	174.0	237.9
132	656.5	427.0	527.2	1059.3	725.4	851.2	336.0	222.0	281.8
138	576.2	298.5	437.4	889.2	806.4	847.8	315.0	197.0	256.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	7.1	4.6	5.9	643.8	610.9	632.8	23.0	21.1	22.0
24	15.2	5.2	8.9	766.0	742.9	755.1	56.6	56.4	56.5
39	56.6	16.5	35.3	816.4	727.2	765.7	124.7	114.4	120.3
48	66.9	59.3	62.6	922.0	864.2	897.7	162.5	155.2	158.5
60	118.4	89.7	107.7	788.1	751.6	771.0	232.0	222.0	226.3
67	153.4	90.3	125.1	947.6	848.1	893.4	275.7	262.6	269.4
70	218.5	148.2	175.1	933.5	856.7	886.0	305.4	287.6	297.2
73	141.7	141.7	141.7	864.5	864.5	864.5	291.7	291.7	291.7
74	206.1	200.8	203.5	903.8	631.2	767.5	322.0	296.5	309.2
75	188.4	102.1	152.1	954.1	654.5	796.6	329.9	298.9	316.4
76	174.6	129.0	151.9	1086.4	603.1	817.4	338.7	319.0	328.9
77	176.7	112.5	136.0	959.1	705.5	832.2	356.0	319.9	337.9
78	185.9	110.0	151.6	938.2	547.0	839.6	347.9	312.7	337.4
79	166.5	78.2	136.6	885.3	808.9	849.7	348.8	338.6	345.7
80	199.9	106.9	167.3	918.2	793.7	840.9	365.9	351.9	358.2
81	219.5	219.5	219.5	810.6	810.6	810.6	365.0	365.0	365.0
82	192.5	192.5	192.5	861.7	861.7	861.7	356.9	356.9	356.9
84	256.9	170.8	219.4	756.5	602.1	668.0	377.0	349.7	367.6
90	475.5	212.6	278.7	835.0	642.7	757.4	462.0	382.8	401.9
96	461.2	265.2	358.3	785.4	711.6	750.6	443.1	425.8	436.0
102	577.8	262.3	428.6	764.1	567.5	665.3	481.8	400.0	454.8
111	550.9	434.0	506.3	701.5	561.5	661.5	497.0	485.0	490.5
120	652.5	299.8	482.5	805.6	594.1	651.0	522.0	451.2	503.3
132	402.8	175.8	324.0	606.7	575.3	595.1	526.5	470.7	489.7
138	590.7	230.2	410.4	557.6	543.1	550.3	528.4	525.2	526.8

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43104F
Test Date: 7/14/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.276 MPa (40.1 psia)
Initial peak clad temperature and location	877°C (1611°F), 3C 1.79 m (70 in.)
Initial peak rod power	1.013 kw/m (0.3089 kw/ft)
Flow rate	13.2 mm/sec (0.518 in./sec)
Coolant temperature	49°C (120°F)
Average and range of initial 1.83 m (72 in.) housing temperature	537°C (515°C - 550°C) [998°F (959°F - 1022°F)]
Initial bundle water level	43.4 mm (1.71 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-1.5% to 20 seconds, ±1% to 260 seconds, and -2% thereafter[a]
Total power:	-0.25% increasing linearly to -1.5%[a]

a. Relative to run 42804A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 43104F

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1163.	1199.	37.	35.0	733.	119.9
4C 3- 3	6	1266.	1277.	11.	12.0	816.	115.4
1C 4- 0	7	1380.	1414.	34.	43.5	897.	163.4
2A 5- 0	12	1488.	1578.	90.	47.0	655.	223.9
2A 5- 7	14	1529.	1610.	81.	53.0	948.	260.7
5C 6- 2	33	1446.	1599.	153.	95.0	1043.	321.2
2D 6- 3	39	1496.	1664.	168.	93.5	790.	323.9
1D 6- 4	46	1476.	1585.	109.	121.0	798.	339.7
3D 6- 4	50	1507.	1727.	220.	136.0	233.	751.0
4B 6- 4	51	1549.	1656.	107.	89.0	792.	338.6
5D 6- 4	56	1475.	1559.	84.	90.0	785.	344.0
1D 6- 5	58	1472.	1579.	107.	120.0	820.	345.7
2A 6- 5	59	1472.	1555.	83.	122.0	791.	333.6
2D 6- 5	62	1528.	1668.	140.	97.0	837.	336.9
3B 6- 5	63	1568.	1690.	121.	90.0	655.	340.0
3C 6- 6	69	1571.	1742.	171.	99.5	1084.	317.4
3E 6- 6	70	1483.	1624.	141.	123.0	969.	336.2
4C 6- 6	73	1590.	1712.	122.	91.5	802.	342.0
5C 6- 6	76	78.	1031.	953.	622.0	327.	695.8
3D 6- 7	85	1581.	1734.	153.	90.0	789.	352.8
3C 6- 8	93	1602.	1754.	152.	92.5	857.	340.6
4A 6- 8	95	1448.	1574.	126.	91.0	853.	359.7
1C 7- 0	109	1480.	1639.	159.	90.5	658.	379.0
2B 7- 0	110	1514.	1678.	153.	91.5	603.	377.8
3D 7- 0	113	1544.	1733.	189.	91.5	614.	370.0
5B 7- 0	117	1403.	1583.	180.	93.5	605.	359.3
2B 7- 6	120	1468.	1669.	201.	92.5	774.	408.9
2C 7- 6	121	1489.	1704.	215.	98.0	789.	399.0
2E 7- 6	123	1297.	1546.	250.	124.0	771.	409.6
3A 7- 6	124	1435.	1547.	112.	91.5	799.	399.1
3B 7- 6	125	1511.	1691.	180.	89.5	764.	405.8
4B 7- 6	129	1476.	1648.	173.	88.0	728.	410.0
5C 7- 6	132	1428.	1590.	161.	89.5	779.	407.9
1C 8- 0	133	1257.	1568.	311.	139.0	770.	439.7
2E 8- 0	136	1051.	1487.	436.	157.0	718.	444.8
3D 8- 0	138	1332.	1673.	341.	158.0	753.	435.6
5B 8- 0	143	1223.	1464.	241.	177.0	825.	447.7
5C 8- 0	144	1301.	1555.	254.	173.0	777.	447.9
1C 8- 6	145	1031.	1476.	445.	139.0	573.	465.4
1D 8- 6	146	884.	1391.	506.	193.0	613.	443.0
2C 8- 6	148	1168.	1608.	440.	156.0	673.	465.9
4B 8- 6	153	1181.	1565.	384.	158.0	590.	480.0
5D 8- 6	155	1094.	1473.	379.	191.0	601.	459.0
3D 9- 3	159	940.	1419.	480.	209.0	683.	496.0
4C 9- 3	161	1030.	1486.	456.	210.0	677.	499.9
1D10- 0	164	608.	1066.	457.	273.0	577.	511.3
4B10- 0	168	878.	1371.	493.	236.0	649.	529.0
5D10- 0	169	735.	1176.	441.	220.0	637.	515.0
2A11- 0	171	528.	913.	385.	324.0	580.	508.8
4C11- 0	172	683.	1164.	481.	254.0	601.	542.0
1D11- 6	** B A D T H E R M O C O U P L E D A T A *						

RUN 43104F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	759.9	695.8	727.8	761.8	700.4	731.1	7.5	3.0	5.3
24	939.5	939.5	939.5	942.9	942.9	942.9	4.0	4.0	4.0
39	1265.9	1162.7	1200.2	1276.6	1199.3	1235.5	49.0	12.0	32.0
48	1457.9	1338.1	1390.6	1491.2	1387.6	1426.7	45.0	28.0	37.6
60	1487.9	1433.7	1457.5	1577.6	1552.7	1567.9	67.0	47.0	57.0
67	1600.2	1485.6	1550.7	1720.7	1610.1	1655.3	67.0	63.0	65.3
70	1610.5	1406.3	1476.0	1749.7	1573.3	1624.9	90.0	67.5	79.1
71	1552.0	1513.7	1532.9	1730.8	1715.1	1722.9	93.5	90.5	92.0
72	1471.2	1369.0	1420.1	1696.3	1580.9	1638.6	106.0	95.0	100.5
73	1456.7	1399.9	1428.3	1664.6	1594.9	1629.7	125.0	104.0	114.5
74	1502.3	1368.9	1457.1	1725.2	1564.6	1648.0	140.0	92.5	104.8
75	1502.3	1402.1	1462.6	1712.9	1546.3	1625.9	126.0	90.5	111.7
76	1548.8	1429.9	1490.2	1728.5	1559.2	1629.8	140.0	65.5	105.3
77	1568.2	1471.7	1509.3	1696.3	1552.7	1620.1	122.0	89.0	104.4
78	1589.9	77.8	1412.5	1741.9	1030.5	1585.3	622.0	64.0	137.5
79	1592.0	1433.7	1524.2	1734.1	1564.6	1642.5	124.0	65.5	98.9
80	1601.8	1448.1	1517.4	1754.2	1574.4	1659.4	123.0	91.0	104.6
81	1496.5	1496.5	1496.5	1642.8	1642.8	1642.8	103.0	103.0	103.0
84	1546.6	1403.1	1484.8	1738.6	1578.7	1665.5	97.0	90.0	92.4
90	1521.8	1296.7	1436.0	1739.7	1496.6	1630.0	124.0	77.5	97.3
96	1380.1	1050.6	1271.0	1691.9	1425.9	1581.1	188.0	124.0	156.8
102	1194.4	833.7	1079.4	1607.9	1382.3	1504.1	193.0	139.0	165.5
111	1030.2	827.9	932.6	1502.0	1282.8	1381.8	262.0	196.0	226.4
120	878.0	608.0	764.7	1391.8	1065.5	1250.7	273.0	220.0	249.2
132	683.2	472.3	549.0	1164.0	762.8	944.4	324.0	234.0	279.0
138	628.0	603.7	615.9	1142.1	960.4	1051.2	319.0	292.0	305.5

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	4.6	1.9	3.3	704.9	673.5	689.2	22.5	22.3	22.4
24	3.4	3.4	3.4	768.5	768.5	768.5	57.9	57.9	57.9
39	58.6	10.7	35.3	816.0	733.2	773.9	122.0	115.4	119.1
48	49.5	27.8	36.2	914.0	826.5	887.3	163.4	157.0	160.1
60	122.4	89.7	110.3	711.9	654.6	691.3	230.9	223.9	227.6
67	126.7	80.8	104.6	954.3	777.3	901.8	273.7	260.7	268.8
70	167.0	139.2	148.9	1085.6	286.6	641.2	365.0	287.7	322.1
71	201.3	178.8	190.1	1133.2	902.4	1017.8	301.7	294.7	298.2
72	225.1	211.8	218.5	1038.7	1026.6	1032.6	307.4	299.5	303.4
73	207.9	195.0	201.5	987.3	286.6	637.0	541.0	307.5	424.2
74	222.9	153.2	190.9	1412.6	286.6	938.0	684.0	218.5	371.5
75	217.0	100.3	163.4	1390.4	231.8	816.0	757.0	249.3	356.5
76	220.1	83.9	139.6	1012.8	232.8	598.8	751.0	312.4	410.1
77	182.1	76.1	110.7	1061.0	654.8	820.6	345.7	320.8	333.8
78	952.7	60.2	172.8	1084.1	326.9	822.0	595.8	317.4	371.7
79	153.3	77.0	118.3	1049.8	788.9	849.5	362.0	327.6	346.9
80	167.1	116.5	141.9	883.7	793.0	824.6	367.9	340.6	358.1
81	146.3	146.3	146.3	786.9	786.9	786.9	358.4	358.4	358.4
84	213.0	145.0	180.7	693.0	602.6	632.3	381.9	359.3	372.6
90	267.5	112.0	194.0	832.2	727.0	776.2	419.8	392.8	405.4
96	436.3	237.2	310.2	825.3	709.7	765.2	453.8	430.9	441.9
102	548.6	350.7	424.7	672.7	551.7	597.3	480.0	440.9	462.1
111	487.7	396.9	449.2	683.8	623.9	661.5	503.9	485.7	495.5
120	520.3	441.5	486.0	674.3	577.1	636.8	529.0	511.3	522.0
132	480.8	290.5	395.4	715.5	496.5	598.3	542.0	475.7	505.3
138	514.1	356.7	435.4	651.0	616.2	633.6	555.0	539.0	547.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42705A
Test Date: 4/1/80
Test Type: Forced Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.273 MPa (39.6 psia)
Initial peak clad temperature and location	873°C (1603°F), 3C 1.83 m (72 in.)
Initial peak rod power	1.5 kw/m (0.45 kw/ft)
Flow rate	18 mm/sec (0.72 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	498°C (489°C - 504°C) [928°F (913°F - 939°F)]
Initial bundle water level	59.9 mm (2.36 in.)

B. Summary Results:

C. Comments:

Total power: linearly increasing from 0% to -2.1% by 420 seconds[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42705A

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1089.	1153.	64.	27.0	797.	91.4
4C 3- 3	11	1155.	1221.	66.	27.0	829.	90.8
1C 4- 0	14	1304.	1398.	94.	38.0	829.	141.3
2A 5- 0	17	1351.	1492.	141.	45.5	733.	202.0
2A 5- 7	21	1477.	1618.	141.	48.0	903.	244.8
1D 5- 2	50	1478.	1696.	219.	94.5	895.	298.6
2D 6- 2	53	1578.	1819.	241.	82.5	609.	297.5
3D 6- 2	58	1591.	1850.	259.	85.0	912.	298.8
5C 6- 2	61	1526.	1700.	174.	51.5	921.	280.8
1D 6- 3	63	1461.	1683.	222.	97.5	959.	306.9
4B 6- 3	68	1554.	1799.	245.	83.0	644.	309.8
5D 6- 3	69	1489.	1720.	231.	89.0	859.	300.7
2A 6- 4	70	1496.	1705.	209.	93.5	882.	315.8
3B 6- 4	75	1581.	1846.	265.	79.5	897.	310.7
3D 6- 6	79	1542.	1846.	304.	89.0	864.	327.8
2D 6- 5	84	1566.	1833.	267.	92.0	857.	318.8
3C 6- 5	85	1580.	1876.	296.	84.5	832.	320.4
3E 6- 5	86	1509.	1741.	231.	96.0	932.	314.8
3C 6- 6	95	1563.	1867.	304.	82.5	848.	327.9
4A 6- 6	97	1456.	1692.	236.	94.5	673.	320.5
3D 8- 0	98	1200.	1653.	452.	131.0	756.	409.8
5C 6- 6	101	1478.	1649.	171.	52.5	917.	307.9
1C 7- 0	110	1402.	1643.	241.	92.0	721.	351.0
2B 7- 0	111	1428.	1661.	234.	70.5	604.	360.0
3D 7- 0	115	1446.	1727.	281.	85.5	686.	356.5
5B 7- 0	117	1346.	1593.	246.	113.0	742.	328.7
2B 7- 6	* * B A D	T H E R M O C O U P L E	D A T A *				
2C 7- 6	121	1369.	1716.	347.	94.5	749.	362.0
2E 7- 6	122	1227.	1486.	259.	62.5	731.	364.9
3A 7- 6	123	1306.	1572.	267.	108.0	775.	366.0
3B 7- 6	124	1410.	1754.	345.	110.0	756.	382.0
4B 7- 6	127	1383.	1721.	338.	109.0	704.	367.0
5C 7- 6	128	1273.	1523.	249.	113.0	776.	369.4
1C 8- 0	131	1159.	1550.	391.	131.0	730.	405.9
2E 8- 0	133	697.	1237.	540.	154.0	690.	396.6
4C 6- 6	136	1554.	1844.	290.	85.0	882.	322.8
5B 8- 0	138	1184.	1500.	315.	146.0	684.	397.0
5C 8- 0	139	1121.	1445.	324.	146.0	703.	398.0
1C 8- 6	141	977.	1447.	470.	131.0	525.	425.0
1D 8- 6	142	798.	1290.	492.	122.0	506.	410.0
2C 8- 6	143	1026.	1534.	508.	128.0	614.	422.8
4B 8- 6	145	1097.	1526.	429.	113.0	571.	431.5
5D 8- 6	148	988.	1416.	428.	137.0	556.	421.3
3D 9- 3	154	845.	1409.	564.	167.0	617.	438.0
4C 9- 3	156	947.	1404.	458.	154.0	628.	433.4
1D10- 0	161	580.	1032.	451.	209.0	681.	389.9
4B10- 0	164	804.	1221.	418.	167.0	631.	444.6
5D10- 0	167	709.	1116.	407.	169.0	664.	370.7
2A11- 0	168	490.	745.	255.	224.0	602.	368.9
4C11- 0	170	628.	985.	357.	181.0	538.	438.0
1D11- 6	172	398.	729.	330.	170.0	286.	231.0

RUN 42705A HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	506.1	486.2	494.3	521.5	504.4	511.0	11.0	10.5	10.8
24	809.2	747.9	779.1	840.6	790.9	815.0	25.5	20.5	22.8
39	1154.9	1055.4	1099.7	1221.2	1133.8	1169.2	30.0	27.0	28.0
48	1319.2	1221.5	1274.7	1429.1	1335.2	1376.5	49.5	35.5	42.3
60	1434.3	1304.0	1357.0	1605.8	1462.3	1509.4	68.5	40.5	50.4
67	1556.4	1465.3	1494.1	1757.5	1617.8	1662.8	69.0	48.0	62.2
70	1592.0	1500.1	1550.3	1828.2	1675.5	1748.8	70.0	68.5	69.3
71	1594.2	1490.4	1551.4	1838.4	1681.0	1764.4	71.5	68.5	69.6
72	1603.4	1489.4	1548.1	1847.4	1667.9	1752.0	84.5	52.0	70.1
74	1592.0	1470.6	1547.2	1856.4	1672.3	1777.5	94.5	51.5	76.8
75	1583.4	1461.5	1539.1	1863.2	1683.2	1784.1	97.5	79.5	86.9
76	1581.8	1470.2	1541.0	1870.0	1702.9	1790.0	94.0	70.5	86.6
77	1580.1	1437.9	1523.7	1875.7	1686.5	1785.3	106.0	84.5	92.2
78	1562.9	1455.7	1512.0	1866.6	1649.4	1768.2	114.0	52.5	89.0
84	1446.0	1249.7	1382.7	1733.0	1551.7	1644.7	113.0	70.5	94.6
90	1409.6	1193.9	1314.4	1754.2	1485.9	1621.8	113.0	62.5	102.3
96	1269.5	697.0	1144.4	1681.0	1236.9	1525.5	154.0	92.0	124.3
102	1097.2	797.8	979.7	1551.7	1290.1	1438.9	145.0	113.0	127.3
111	958.0	697.0	871.7	1410.9	1172.3	1301.0	184.0	147.0	162.4
120	803.5	580.3	678.9	1278.6	1031.5	1151.0	210.0	157.0	184.3
132	627.9	490.0	541.2	985.1	745.1	824.9	224.0	181.0	199.3
138	585.1	398.2	491.4	976.9	728.5	846.8	215.0	170.0	193.4

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	18.6	15.4	17.6	519.3	504.4	511.0	11.9	11.3	11.6
24	43.0	31.4	36.1	770.6	728.9	744.4	37.0	33.4	34.6
39	78.4	63.6	69.4	828.9	697.9	774.6	93.4	90.8	91.9
48	113.7	89.6	101.8	940.6	801.3	859.4	141.3	126.8	132.7
60	171.5	138.7	152.4	798.7	711.9	740.9	207.9	202.0	203.5
67	201.1	140.7	168.7	903.3	876.5	889.0	247.3	244.7	245.9
70	236.1	172.9	198.4	901.4	837.7	870.4	271.6	263.9	268.5
71	244.2	184.1	213.0	1023.3	831.9	892.0	279.9	266.8	273.9
72	247.2	164.7	204.2	931.9	844.3	887.9	284.9	266.9	278.7
74	269.2	174.0	230.3	959.4	784.4	877.0	302.2	280.8	293.8
75	279.8	221.7	245.0	958.6	843.2	881.4	309.8	300.7	305.2
76	288.2	209.3	248.9	898.3	830.7	867.8	315.8	297.7	309.7
77	295.5	231.5	261.7	931.5	815.6	859.7	323.3	313.9	318.5
78	304.0	171.2	256.2	917.3	846.4	873.3	330.6	307.9	323.5
84	302.0	225.5	262.0	742.2	578.0	667.2	360.0	326.7	352.4
90	359.2	249.4	307.4	831.6	703.7	768.0	387.0	364.9	379.3
96	539.9	262.9	381.1	771.3	646.8	716.2	410.7	396.6	403.4
102	569.5	328.8	459.2	617.7	505.6	554.6	431.5	410.0	420.6
111	563.7	296.6	429.4	751.3	484.1	619.8	438.0	373.0	414.7
120	622.7	319.9	472.1	854.5	591.4	655.4	451.9	318.9	410.0
132	357.2	241.5	283.7	634.9	537.7	580.4	438.0	287.1	359.2
138	499.8	243.5	355.5	723.9	285.6	559.0	440.9	231.0	354.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42105B
Test Date: 6/19/80
Test Type: Forced Reflood
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.274 MPa (39.8 psia)
Initial peak clad temperature and location	880°C (1617°F), 3C 1.78 m (70 in.)
Initial peak rod power	1.5 kw/m (0.45 kw/ft)
Flow rate	19 mm/sec (0.73 in./sec)
Coolant temperature	49°C (120°F)
Average and range of initial 1.83 m (72 in.) housing temperature	486°C (484°C - 491°C) [906°F (903°F - 915°F)]
Initial bundle water level	14 mm (0.57 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: +0.5% to 200 seconds and -0.5% thereafter[a]
Total power: -0.5% linearly increasing to +1.25%[a]

a. Relative to run 42705A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER421058

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1113.	1170.	57.	31.0	734.	106.3
4C 3- 3	11	1242.	1302.	59.	26.5	821.	105.9
1C 4- 0	14	1332.	1393.	61.	34.5	1263.	140.0
2A 5- 0	17	1358.	1512.	154.	55.0	731.	227.9
2A 5- 7	21	1470.	1612.	142.	81.5	886.	273.7
1D 6- 2	50	1376.	1610.	234.	132.0	837.	320.9
2D 6- 2	53	1479.	1731.	252.	114.0	695.	335.0
3D 6- 2	58	1536.	1754.	219.	103.0	797.	325.8
5C 6- 2	61	1491.	1655.	164.	73.0	867.	316.8
1D 6- 3	63	1417.	1604.	187.	100.0	781.	303.7
4B 6- 3	68	1537.	1722.	185.	95.0	836.	337.7
5D 6- 3	69	1424.	1640.	216.	107.0	816.	350.8
2A 6- 4	70	1420.	1611.	191.	133.0	832.	342.7
2D 6- 4	72	1493.	1730.	236.	103.0	806.	346.7
3B 6- 4	75	1567.	1761.	194.	77.0	813.	344.9
3C 6- 5	85	1596.	1807.	210.	86.5	887.	337.8
3E 6- 5	86	1451.	1634.	183.	102.0	822.	339.6
3C 6- 6	95	1570.	1819.	249.	85.5	861.	346.7
3D 6- 6	96	1518.	1782.	264.	99.5	813.	354.3
4A 6- 6	97	1413.	1643.	230.	131.0	842.	355.7
4C 6- 6	98	1550.	1790.	240.	83.5	842.	350.6
5C 6- 6	101	1462.	1642.	179.	105.0	884.	347.7
1C 7- 0	110	1329.	1619.	290.	115.0	660.	383.4
2B 7- 0	111	1397.	1667.	270.	90.0	630.	393.9
3D 7- 0	115	1429.	1713.	284.	89.0	644.	385.0
5B 7- 0	117	1332.	1548.	216.	107.0	674.	388.0
2B 7- 6	120	1363.	1681.	318.	119.0	695.	413.0
2C 7- 6	121	1345.	1703.	357.	110.0	706.	408.0
2E 7- 6	122	1063.	1398.	335.	111.0	620.	409.9
3A 7- 6	123	1364.	1635.	272.	117.0	713.	405.9
3B 7- 6	124	1396.	1719.	323.	104.0	754.	403.9
4B 7- 6	127	1411.	1700.	288.	104.0	717.	407.0
5C 7- 6	128	1375.	1620.	245.	105.0	746.	403.9
1C 8- 0	131	1141.	1544.	403.	129.0	700.	427.0
2E 8- 0	133	945.	1330.	385.	104.0	627.	425.0
3D 8- 0	136	1212.	1618.	406.	111.0	742.	421.9
5B 8- 0	138	1105.	1448.	344.	133.0	625.	422.0
5C 8- 0	139	1253.	1558.	305.	129.0	706.	428.0
1C 8- 6	141	890.	1434.	544.	129.0	549.	443.4
1D 8- 6	142	826.	1162.	336.	84.0	533.	437.6
2C 8- 6	143	1021.	1544.	523.	131.0	592.	447.0
4B 8- 6	145	1138.	1581.	443.	131.0	647.	445.8
5D 8- 6	148	893.	1289.	397.	89.5	509.	436.8
3D 9- 3	154	889.	1367.	478.	185.0	618.	449.0
4C 9- 3	156	970.	1397.	427.	154.0	617.	450.0
1D10- 0	161	645.	1047.	402.	191.0	696.	430.0
4B10- 0	164	837.	1199.	363.	171.0	572.	467.0
5D10- 0	167	706.	1098.	392.	200.0	760.	403.0
2A11- 0	168	556.	740.	184.	139.0	676.	324.0
4C11- 0	170	629.	984.	355.	197.0	571.	447.0
1D11- 6	172	311.	802.	491.	235.0	577.	357.5

RUN 42105B HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	665.7	610.2	631.7	673.1	623.6	642.9	10.0	7.0	9.0
24	920.8	851.5	877.4	949.1	879.9	906.0	22.5	16.5	19.1
39	1242.2	1112.9	1158.8	1301.6	1170.2	1223.6	38.5	26.5	33.1
48	1388.8	1264.9	1316.2	1480.5	1366.6	1405.3	55.0	34.5	42.1
60	1484.2	1357.7	1393.8	1647.2	1486.9	1540.4	55.0	38.5	49.5
67	1586.4	1461.7	1504.3	1754.2	1612.3	1660.0	84.5	57.0	71.5
70	1617.5	1440.3	1530.9	1810.1	1604.7	1704.2	85.5	55.0	74.6
71	1600.1	1351.4	1504.1	1814.6	1598.1	1706.6	128.0	58.5	86.0
72	1484.2	1417.1	1455.4	1678.8	1600.3	1641.1	106.0	62.5	83.0
74	1551.8	1376.2	1486.8	1805.6	1604.7	1701.5	132.0	73.0	100.3
75	1583.8	1416.7	1501.9	1768.7	1603.6	1696.7	107.0	85.0	95.5
76	1599.0	1354.2	1497.7	1786.5	1603.6	1695.2	133.0	60.0	95.8
77	1596.4	1311.6	1483.6	1806.7	1605.8	1709.2	134.0	86.5	101.0
78	1569.8	1334.7	1468.5	1819.1	1611.2	1708.9	145.0	83.5	110.0
84	1450.3	1261.0	1369.7	1717.4	1510.6	1631.4	131.0	85.5	101.1
90	1411.0	1063.3	1299.9	1718.5	1398.1	1602.4	119.0	75.5	106.7
96	1265.2	945.1	1171.0	1667.9	1329.9	1543.9	133.0	104.0	122.5
102	1138.1	826.0	951.2	1580.9	1161.9	1401.8	131.0	84.0	115.3
111	970.2	719.3	889.3	1397.0	1116.2	1274.6	211.0	101.0	154.9
120	836.6	644.9	725.4	1295.3	1047.0	1151.8	202.0	171.0	188.6
132	629.5	528.2	561.6	984.1	696.2	802.0	217.0	186.0	199.8
138	616.2	311.2	489.3	1005.7	753.5	862.0	235.0	199.0	213.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	13.3	7.4	11.2	625.6	608.0	615.0	19.1	17.0	17.9
24	35.6	22.2	28.6	735.9	682.9	705.5	50.0	47.8	49.0
39	74.7	57.3	64.8	821.0	734.2	771.7	110.9	105.9	108.3
48	116.4	61.0	89.1	1262.5	811.1	942.1	151.5	140.0	147.0
60	153.0	117.6	146.7	785.0	731.4	750.5	230.0	226.5	227.8
67	167.8	142.0	155.7	893.8	847.0	871.1	275.1	266.8	272.4
70	192.6	145.1	173.3	880.1	775.7	841.3	297.9	287.9	293.7
71	246.7	155.6	202.5	919.8	821.1	857.3	328.8	295.6	304.4
72	203.1	153.2	185.7	901.4	743.0	841.3	310.3	299.2	305.5
74	306.7	164.1	214.7	1019.5	647.0	811.9	339.9	305.7	326.1
75	225.5	169.8	194.8	880.2	781.3	828.5	350.8	303.7	332.6
76	249.4	155.5	197.4	906.1	765.7	826.4	350.7	330.4	339.6
77	294.2	183.4	225.6	887.2	795.7	821.4	354.8	337.5	344.7
78	283.3	179.3	240.4	884.1	759.4	827.4	364.3	346.7	354.2
84	290.2	216.2	261.6	699.5	628.4	658.3	393.9	378.0	385.2
90	384.3	226.7	302.6	754.0	619.8	704.6	413.0	399.0	406.3
96	405.8	305.5	372.9	764.9	624.9	696.0	431.0	421.0	425.3
102	544.3	335.9	450.5	647.0	508.9	569.3	448.0	408.9	437.8
111	477.9	286.8	385.3	762.9	548.1	622.8	458.0	409.0	439.7
120	518.8	305.6	426.3	759.7	572.5	637.3	473.0	403.0	450.7
132	354.6	168.0	240.4	676.3	513.7	602.1	447.0	250.3	339.0
138	491.1	233.1	372.7	701.9	520.1	595.7	460.9	260.8	388.9

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42605C
Test Date: 8/26/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.275 MPa (39.9 psia)
Initial peak clad temperature and location	884°C (1623°F), 4C 1.70 m (67 in.)
Initial peak rod power	1.5 kw/m (0.45 kw/ft)
Flow rate	19 mm/sec (0.73 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	487°C (474°C - 496°C) [909°F (886°F - 924°F)]
Initial bundle water level	36.1 mm (1.42 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: +1% linearly increasing to +2.5% by 80 seconds, constant at +2.5% until 210 seconds, and ±1% thereafter[a]

a. Relative to run 42705A

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42605C

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1097.	1164.	67.	36.5	782.	91.1
4C 3- 3	11	1242.	1297.	55.	32.0	816.	102.0
1C 4- 0	14	1365.	1440.	75.	43.0	648.	146.8
2A 5- 0	17	1414.	1550.	135.	48.5	819.	208.9
2A 5- 7	21	1523.	1664.	141.	65.5	894.	252.8
1D 5- 2	50	1434.	1611.	178.	97.0	905.	304.9
2D 6- 2	53	1483.	1697.	214.	101.0	658.	310.3
3D 6- 2	58	1550.	1713.	163.	55.5	721.	319.0
4B 6- 2	60	1569.	1717.	149.	60.5	859.	313.9
5C 6- 2	61	1473.	1682.	209.	98.5	1073.	295.4
1D 6- 3	63	1403.	1615.	212.	105.0	906.	312.7
5D 6- 3	69	1487.	1642.	154.	70.0	888.	320.8
2A 6- 4	70	1473.	1633.	160.	74.5	948.	258.3
3B 6- 4	75	1578.	1749.	170.	60.0	812.	320.9
2D 6- 5	84	1510.	1731.	221.	101.0	806.	325.5
3C 6- 5	85	1584.	1817.	233.	75.0	853.	325.3
3E 6- 5	86	1518.	1646.	128.	118.0	872.	326.9
3C 6- 6	95	1566.	1825.	259.	75.0	880.	332.8
3D 6- 6	96	1532.	1783.	251.	95.0	791.	340.8
4A 6- 6	97	1473.	1671.	199.	77.5	905.	314.6
4C 6- 6	98	1577.	1807.	229.	72.0	832.	339.4
5C 6- 6	101	1556.	1692.	136.	55.5	847.	332.9
1C 7- 0	110	1378.	1588.	210.	74.0	659.	362.8
2B 7- 0	111	1415.	1668.	252.	70.5	628.	358.0
3D 7- 0	115	1400.	1694.	288.	75.0	627.	358.0
5B 7- 0	117	1355.	1553.	198.	94.0	792.	325.9
2B 7- 6	120	1398.	1669.	271.	84.0	733.	385.9
2C 7- 6	121	1385.	1698.	313.	98.5	713.	398.7
2E 7- 6	122	1057.	1402.	345.	109.0	624.	377.9
3A 7- 6	123	1399.	1636.	237.	77.0	705.	378.9
3B 7- 6	124	1410.	1709.	292.	82.0	717.	369.8
4B 7- 6	127	1419.	1697.	279.	95.0	696.	397.3
5C 7- 6	128	1409.	1634.	225.	75.0	719.	377.9
1C 8- 0	131	1193.	1530.	337.	104.0	654.	418.0
2E 8- 0	133	965.	1407.	442.	120.0	688.	404.8
3D 8- 0	136	1257.	1636.	379.	116.0	738.	413.5
5B 8- 0	138	1179.	1446.	267.	87.5	678.	398.1
5C 8- 0	139	1326.	1598.	272.	98.5	726.	401.3
1C 8- 6	141	1016.	1446.	430.	101.0	511.	428.8
1D 8- 6	142	806.	1262.	456.	85.0	519.	417.0
2C 8- 6	* * B A D	T H E R M O C O U P L E	D A T A *				
4B 8- 6	145	1117.	1473.	356.	75.0	576.	432.7
5D 8- 6	148	979.	1367.	388.	90.5	598.	414.8
3D 9- 3	154	928.	1396.	468.	143.0	600.	442.0
4C 9- 3	156	999.	1358.	359.	109.0	594.	436.0
1D10- 0	161	625.	1042.	416.	206.0	728.	401.8
4B10- 0	164	844.	1190.	346.	148.0	597.	454.0
5D10- 0	167	708.	1053.	346.	167.0	754.	366.3
2A11- 0	168	566.	762.	196.	174.0	697.	311.0
4C11- 0	170	660.	1036.	375.	163.0	481.	449.0
1D11- 6	172	312.	748.	437.	201.0	596.	387.6

RUN 42605C HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	675.0	611.9	632.6	681.5	620.4	640.4	8.5	7.0	7.9
24	907.0	831.1	872.3	932.6	860.3	896.8	19.0	14.5	17.0
39	1242.3	1097.2	1157.0	1297.4	1164.0	1224.7	40.0	32.0	35.5
48	1369.5	1317.5	1347.7	1486.9	1408.7	1441.4	55.0	43.0	47.1
60	1416.4	1403.1	1411.3	1531.9	1549.5	1560.3	64.5	48.5	54.3
67	1623.3	1496.8	1536.2	1768.8	1637.4	1695.6	72.5	48.0	61.5
70	1600.5	1418.1	1544.1	1831.6	1544.1	1727.1	81.0	47.5	70.3
71	1557.8	1467.9	1530.3	1799.9	1671.2	1736.2	75.0	53.0	67.6
72	1526.0	1513.0	1519.5	1722.9	1706.2	1714.5	71.5	65.0	68.3
74	1571.8	1413.2	1506.8	1738.6	1597.1	1674.8	119.0	55.5	84.4
75	1542.4	1402.5	1525.5	1770.9	1614.5	1690.8	105.0	38.0	71.3
76	1599.4	1393.0	1529.1	1797.7	1628.7	1697.3	120.0	49.5	76.5
77	1564.2	1353.7	1510.2	1816.9	1610.1	1713.5	119.0	68.5	89.7
78	1577.3	1350.5	1509.8	1824.8	1640.7	1727.2	126.0	55.5	84.6
84	1452.3	1154.3	1367.2	1716.3	1411.9	1617.2	94.0	62.0	77.8
90	1416.8	1056.9	1354.4	1708.5	1402.3	1631.9	109.0	75.0	90.7
96	1325.9	964.8	1231.1	1673.4	1406.6	1562.2	120.0	87.5	101.6
102	1117.4	808.2	1001.1	1490.2	1261.9	1412.0	119.0	75.0	91.3
111	1009.8	814.5	946.3	1396.0	1123.4	1294.0	148.0	94.0	113.5
120	845.5	625.5	758.4	1280.7	1018.1	1147.0	206.0	84.5	161.5
132	660.3	505.4	574.3	1035.6	761.8	844.0	179.0	157.0	168.3
136	639.2	311.6	497.5	990.3	748.3	852.4	201.0	162.0	178.6

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	9.0	6.5	7.8	634.7	611.0	620.8	16.9	13.5	14.5
24	29.2	19.3	24.5	750.2	720.3	730.7	46.0	43.4	44.9
39	67.0	55.1	67.7	835.6	782.4	804.8	102.0	91.1	97.8
48	111.0	75.1	93.7	883.0	826.6	847.8	147.9	141.9	145.3
60	165.4	135.2	149.0	892.1	774.0	828.5	215.9	208.9	211.2
67	165.5	140.6	149.3	946.2	864.5	902.4	255.9	250.7	253.7
70	231.1	120.0	183.0	942.1	838.6	898.2	284.9	276.3	280.2
71	257.8	153.8	205.9	961.1	842.5	909.9	290.7	279.7	285.7
72	209.9	180.2	195.0	960.0	934.0	947.0	284.5	282.7	283.6
74	214.5	133.8	166.0	957.0	604.9	778.5	319.0	265.5	305.5
75	212.0	90.2	165.2	906.0	790.3	853.0	322.7	312.7	317.4
76	235.6	81.1	188.2	966.7	793.6	862.8	329.6	258.3	308.6
77	256.4	127.7	203.3	888.7	806.1	850.6	337.6	319.6	327.3
78	290.2	135.7	217.3	904.5	791.4	844.2	340.8	298.6	328.5
84	290.8	197.8	250.0	792.4	624.8	671.4	371.8	325.9	354.6
90	345.4	213.9	277.5	733.3	623.8	707.4	398.7	351.6	382.9
96	441.8	266.9	331.2	737.6	654.1	704.1	418.8	398.1	408.9
102	455.7	355.6	410.9	597.6	511.2	556.6	435.3	414.8	425.2
111	467.8	216.3	347.7	1129.0	581.4	684.6	443.0	345.8	415.6
120	479.1	262.0	396.6	753.7	435.2	622.7	458.9	332.9	415.3
132	375.3	195.6	269.7	697.2	480.7	628.0	449.0	249.3	315.8
136	462.1	250.3	354.9	609.0	286.6	501.8	444.0	206.0	376.6

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42305D
Test Date: 10/17/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.279 MPa (40.5 psia)
Initial peak clad temperature and location	878°C (1613°F), 3C 1.78 m (70 in.)
Initial peak rod power	1.5 kw/m (0.45 kw/ft)
Flow rate	18 mm/sec (0.70 in./sec)
Coolant temperature	51°C (124°F)
Average and range of initial 1.83 m (72 in.) housing temperature	492°C (483°C - 499°C) [917°F (901°F - 931°F)]
Initial bundle water level	50.5 mm (1.99 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-6% for 40 seconds, decreased to -2% by 50 seconds and then linearly decreasing to -6%[a]
Total power:	+0.25% constant[a]
Inlet subcooling:	+8% linearly decreasing to +2% by 150 seconds[a]

a. Relative to run 42705A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42305D

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1111.	1191.	80.	39.5	824.	103.9
4C 3- 3	9	1242.	1307.	65.	36.5	864.	104.9
1C 4- 0	10	1320.	1399.	79.	43.0	910.	142.8
2A 5- 0	13	1421.	1604.	183.	83.5	873.	229.8
2A 5- 7	16	1483.	1649.	166.	83.0	919.	271.8
2D 6- 2	50	1542.	1735.	193.	55.5	833.	323.9
3D 6- 2	55	1510.	1780.	270.	84.5	247.	517.0
5C 6- 2	59	1540.	1698.	158.	79.5	867.	327.8
1D 6- 3	61	1485.	1685.	201.	103.0	874.	325.8
4B 6- 3	66	1546.	1748.	202.	69.5	888.	333.8
5D 6- 3	68	1466.	1640.	174.	123.0	934.	314.8
2A 6- 4	70	1475.	1683.	208.	108.0	924.	323.8
3B 6- 4	* * B A D T H E R M O C O U P L E D A T A *						
1D 6- 5	82	1465.	1669.	204.	103.0	870.	337.6
2D 6- 5	84	1551.	1755.	205.	67.0	846.	343.6
3C 6- 5	85	1601.	1833.	232.	80.0	917.	337.7
3E 6- 5	86	1491.	1668.	177.	116.0	866.	336.8
3C 6- 6	97	1591.	1842.	250.	83.5	902.	345.8
3D 6- 6	98	1565.	1798.	232.	105.0	868.	345.8
4A 6- 6	100	1474.	1694.	220.	87.0	865.	356.9
4C 6- 6	101	1573.	1810.	237.	79.0	904.	351.5
5C 6- 6	103	1536.	1689.	152.	71.0	877.	350.1
1C 7- 0	* * B A D T H E R M O C O U P L E D A T A *						
2B 7- 0	111	1441.	1734.	294.	84.0	664.	375.9
3D 7- 0	115	1449.	1733.	284.	79.5	649.	375.9
5B 7- 0	117	1336.	1566.	229.	81.0	667.	355.0
2B 7- 6	121	1422.	1717.	295.	84.0	719.	404.4
2C 7- 6	122	1402.	1733.	331.	99.5	745.	421.3
2E 7- 6	123	1305.	1504.	200.	58.5	754.	401.6
3A 7- 6	124	1420.	1670.	250.	86.5	759.	394.9
3B 7- 6	125	1450.	1760.	310.	99.5	761.	399.5
4B 7- 6	128	1441.	1732.	291.	98.5	738.	415.0
5C 7- 6	129	1420.	1641.	221.	104.0	763.	397.9
1C 8- 0	132	1200.	1527.	327.	117.0	693.	442.9
2E 8- 0	134	1131.	1400.	269.	115.0	730.	427.9
3D 8- 0	137	1321.	1665.	343.	103.0	772.	429.0
5B 8- 0	139	1258.	1540.	282.	89.5	733.	432.9
5C 8- 0	140	1337.	1618.	281.	108.0	765.	422.0
1C 8- 6	141	1044.	1468.	424.	108.0	565.	463.0
1D 8- 6	142	950.	1437.	486.	121.0	609.	449.5
2C 8- 6	143	1092.	1569.	478.	113.0	538.	458.0
4B 8- 6	145	1175.	1546.	371.	84.0	612.	459.0
5D 8- 6	148	1093.	1460.	367.	110.0	658.	439.9
3D 9- 3	155	991.	1464.	473.	133.0	617.	460.0
4C 9- 3	157	1027.	1441.	414.	120.0	631.	461.0
1D10- 0	160	617.	1095.	479.	221.0	772.	380.4
4B10- 0	163	875.	1279.	404.	163.0	602.	481.0
5D10- 0	166	760.	1125.	364.	171.0	712.	419.9
2A11- 0	167	584.	839.	254.	186.0	655.	378.7
4C11- 0	169	671.	1096.	426.	191.0	547.	468.0
1D11- 6	170	321.	742.	421.	240.0	603.	385.9

RUN 423050 HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	726.3	662.0	684.5	729.6	666.8	689.1	6.0	4.0	5.0
24	871.0	847.7	860.1	890.3	879.9	886.1	19.5	14.0	17.3
39	1242.3	1111.3	1156.5	1306.9	1191.0	1231.4	42.5	36.5	39.5
48	1319.7	1304.6	1312.1	1399.1	1378.1	1388.6	52.0	43.0	47.5
60	1517.3	1386.7	1441.6	1665.7	1557.1	1608.8	83.5	55.5	70.7
67	1600.5	1472.2	1518.5	1770.9	1637.4	1685.9	93.0	63.5	73.2
70	1612.5	1527.0	1569.8	1815.7	1733.0	1774.3	91.0	68.5	79.8
71	1552.4	1552.4	1552.4	1794.3	1794.3	1794.3	83.5	83.5	83.5
72	1597.8	1371.0	1528.5	1805.6	1600.3	1739.9	107.0	69.5	84.0
74	1561.0	1427.2	1513.4	1810.1	1637.4	1728.6	117.0	65.5	95.4
75	1545.9	1465.7	1502.1	1753.1	1639.6	1700.2	123.0	69.5	98.7
76	1580.5	1475.4	1531.3	1823.7	1663.6	1741.3	108.0	79.5	92.7
77	1601.0	1462.5	1523.5	1832.7	1646.1	1736.2	126.0	67.0	94.1
78	1593.9	1468.3	1534.7	1841.7	1670.1	1753.1	109.0	71.0	90.9
84	1460.8	1318.6	1399.1	1762.0	1517.1	1652.8	84.0	60.0	76.8
90	1450.1	1304.6	1385.8	1759.8	1504.1	1635.6	104.0	68.5	84.9
96	1371.0	1130.9	1267.4	1734.1	1400.2	1571.9	117.0	83.5	103.0
102	1175.2	950.3	1066.4	1569.0	1334.1	1459.0	121.0	79.5	101.5
111	1027.2	832.2	955.2	1464.4	1097.5	1314.6	185.0	111.0	130.6
120	874.5	610.8	720.4	1307.9	1090.3	1183.3	221.0	163.0	187.8
132	670.8	581.1	612.1	1096.4	838.5	949.6	192.0	186.0	189.7
138	652.9	321.0	493.1	1051.1	742.0	849.4	240.0	189.0	209.3

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	5.9	3.3	4.6	661.9	629.1	642.6	16.5	14.6	15.5
24	32.2	17.2	26.0	720.7	704.4	714.9	47.3	45.2	46.4
39	80.3	64.6	74.9	864.5	824.2	839.9	105.8	103.9	104.9
48	79.4	73.5	76.5	909.9	873.4	891.6	150.6	142.8	146.7
60	182.8	148.4	167.2	904.6	824.5	867.4	231.0	225.6	228.8
67	170.4	165.2	167.3	918.7	870.0	892.0	274.4	271.8	272.9
70	206.0	203.1	204.6	960.1	926.4	943.2	288.9	286.4	287.7
71	241.9	241.9	241.9	893.1	893.1	893.1	311.5	311.5	311.5
72	229.3	199.2	211.4	946.6	792.7	871.7	312.9	298.9	305.8
74	258.1	158.4	215.2	927.6	699.2	841.5	334.9	292.5	318.0
75	222.8	173.8	198.1	933.5	862.4	886.5	333.8	314.8	323.1
76	272.9	159.7	210.0	1089.7	846.4	898.1	344.9	317.9	333.8
77	268.7	177.1	212.6	936.6	846.2	886.3	354.6	323.8	339.8
78	250.4	152.4	218.3	924.0	853.1	880.0	356.9	326.0	345.3
84	301.2	169.1	253.7	772.4	614.8	669.6	376.0	355.0	370.7
90	331.1	199.5	249.8	762.7	643.6	732.5	421.3	367.0	400.1
96	363.1	249.8	304.5	835.3	661.8	741.8	442.9	386.6	425.9
102	486.3	311.5	392.6	657.7	530.8	585.2	463.0	428.1	449.9
111	473.3	247.3	359.4	778.8	527.0	620.0	461.0	374.9	444.7
120	569.5	364.4	462.9	774.7	552.4	653.0	481.0	352.7	436.1
132	425.6	254.2	337.5	654.7	534.1	578.7	468.0	378.7	426.0
138	421.0	286.1	356.3	603.2	281.3	483.0	434.0	281.0	404.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41305E
Test Date: 12/3/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.276 MPa (40.1 psia)
Initial peak clad temperature and location	872°C (1601°F), 4C 1.70 m (67 in.)
Initial peak rod power	1.5 kw/m (0.45 kw/ft)
Flow rate	19 mm/sec (0.73 in./sec)
Coolant temperature	49°C (120°F)
Average and range of initial 1.83 m (72 in.) housing temperature	472°C (467°C - 478°C) [882°F (873°F - 892°F)]
Initial bundle water level	43.4 mm (1.71 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	0% to 200 seconds and -1% thereafter[a]
Total power:	0% increasing linearly to 1%[a]
Housing initial temperature at midplane:	-5%[a]

a. Relative to run 42705A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER41305E

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1193.	1271.	78.	38.0	776.	113.9
4C 3- 3	10	1261.	1321.	59.	33.5	835.	106.9
1C 4- 0	12	1370.	1468.	98.	45.5	869.	141.9
2A 5- 0	16	1521.	1651.	130.	54.5	843.	222.8
2A 5- 7	19	1526.	1671.	145.	64.5	836.	265.7
5C 6- 0	36	1394.	1652.	257.	86.5	1084.	281.1
2D 6- 2	39	1509.	1744.	235.	101.0	735.	320.9
1D 6- 4	47	1478.	1641.	163.	103.0	926.	275.6
3D 6- 4	50	1432.	1778.	346.	110.0	251.	518.0
4B 6- 4	52	1525.	1727.	202.	78.5	691.	318.7
5C 6- 4	54	1459.	1684.	225.	107.0	1072.	304.2
5D 6- 4	55	1495.	1654.	159.	105.0	839.	312.7
1D 6- 5	58	1487.	1653.	166.	89.5	885.	290.4
2A 6- 5	59	1481.	1671.	190.	104.0	746.	345.0
2D 6- 5	61	1532.	1733.	201.	105.0	803.	331.0
3B 6- 5	63	1549.	1763.	214.	79.0	715.	332.4
3C 6- 6	72	1567.	1801.	234.	85.0	671.	336.8
4C 6- 6	75	1583.	1797.	213.	83.0	817.	341.1
3C 6- 7	** B A D T H E R M O C O U P L E D A T A *						
3E 6- 7	83	1497.	1716.	220.	105.0	847.	340.8
3D 6- 8	86	1539.	1811.	272.	103.0	863.	344.7
4A 6- 8	87	1444.	1647.	203.	108.0	807.	358.8
1C 7- 0	93	1414.	1598.	184.	59.0	664.	359.0
2B 7- 0	94	1460.	1681.	221.	78.0	661.	368.2
3D 7- 0	98	1461.	1744.	283.	78.0	760.	349.9
5B 7- 0	103	1362.	1596.	214.	79.0	629.	371.0
2B 7- 6	110	1396.	1679.	283.	87.5	712.	401.7
2C 7- 6	111	1430.	1709.	279.	86.5	727.	379.6
2E 7- 6	113	1127.	1473.	346.	79.0	670.	392.5
3A 7- 6	** B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	115	1128.	1619.	491.	135.0	635.	436.1
4B 7- 6	120	1436.	1729.	293.	105.0	719.	397.0
5C 7- 6	122	1425.	1667.	242.	102.0	762.	388.5
1C 8- 0	124	1154.	1489.	335.	116.0	700.	426.0
2E 8- 0	126	972.	1315.	343.	129.0	669.	419.9
3D 8- 0	129	1201.	1631.	430.	104.0	766.	408.9
5B 8- 0	133	1228.	1568.	340.	144.0	706.	417.0
5C 8- 0	134	1289.	1628.	338.	128.0	716.	414.0
1C 8- 6	135	953.	1404.	451.	116.0	590.	448.0
1D 8- 6	136	858.	1302.	443.	132.0	631.	440.5
2C 8- 6	138	1123.	1599.	477.	128.0	681.	440.2
4B 8- 6	143	1127.	1597.	470.	133.0	607.	443.0
5D 8- 6	145	984.	1409.	425.	84.5	699.	419.0
3D 9- 3	150	899.	1382.	483.	148.0	646.	439.3
4C 9- 3	152	1000.	1455.	455.	144.0	590.	448.0
1D10- 0	157	631.	1082.	451.	191.0	563.	460.8
4B10- 0	164	865.	1253.	387.	169.0	621.	456.9
5D10- 0	166	720.	1072.	352.	188.0	754.	349.2
2A11- 0	168	572.	745.	174.	217.0	516.	340.4
4C11- 0	169	668.	1080.	412.	176.0	557.	450.6
1D11- 6	171	313.	754.	440.	203.0	553.	429.9

RUN 41305E HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	662.4	635.0	653.3	673.1	645.7	663.6	8.0	8.0	8.0
24	925.7	856.0	888.0	950.1	883.0	911.9	19.5	13.5	15.7
39	1261.1	1172.1	1200.8	1320.5	1244.2	1274.0	39.5	33.5	37.0
48	1420.7	1335.0	1375.2	1529.0	1445.2	1480.6	49.5	44.0	46.3
60	1544.3	1513.0	1526.0	1699.5	1650.5	1668.6	54.5	48.0	51.8
67	1600.5	1500.0	1547.2	1791.0	1643.9	1719.5	78.5	52.0	67.5
70	1584.8	1535.7	1561.2	1787.6	1767.6	1778.0	79.0	67.0	74.7
73	1484.6	1484.6	1484.6	1679.9	1679.9	1679.9	103.0	103.0	103.0
74	1508.7	1505.0	1506.8	1756.4	1744.1	1750.2	101.0	91.5	96.3
75	1492.1	1459.3	1475.4	1655.9	1650.5	1654.0	117.0	103.0	107.5
76	1547.6	1459.3	1496.0	1769.8	1606.8	1680.4	107.0	78.5	97.7
77	1549.1	1480.7	1507.0	1763.1	1647.2	1682.8	106.0	66.0	95.5
78	1583.3	1448.0	1521.1	1801.0	1641.7	1720.6	105.0	76.0	88.8
79	1558.9	1496.8	1533.2	1787.6	1671.2	1728.4	105.0	76.5	88.7
80	1539.4	1432.5	1490.3	1811.2	1647.2	1720.8	111.0	103.0	106.8
81	1524.8	1524.8	1524.8	1819.1	1819.1	1819.1	102.0	102.0	102.0
82	1469.4	1469.4	1469.4	1733.0	1733.0	1733.0	105.0	105.0	105.0
84	1493.5	1382.1	1439.3	1762.0	1587.3	1682.6	79.0	59.0	75.3
90	1491.9	1126.6	1335.3	1783.2	1471.9	1648.1	135.0	79.0	97.0
96	1300.2	972.0	1200.4	1700.6	1315.2	1580.0	144.0	104.0	121.4
102	1442.6	798.5	1032.2	1749.7	1009.9	1440.1	142.0	84.5	119.2
111	999.8	766.7	870.1	1469.8	1119.3	1301.5	180.0	116.0	153.6
120	1073.5	628.2	793.6	1489.1	1001.6	1204.0	191.0	134.0	176.4
132	668.2	504.6	564.9	1080.0	739.9	831.4	244.0	175.0	203.0
138	593.9	313.2	453.6	835.4	753.5	794.4	203.0	182.0	192.5

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	10.7	9.6	10.3	617.9	588.3	602.4	20.9	18.4	19.4
24	27.0	20.3	23.9	754.0	720.5	738.0	45.5	45.0	45.3
39	87.8	59.4	73.1	865.5	775.6	816.1	113.9	96.9	107.8
48	110.2	97.7	105.4	925.4	868.6	894.2	148.7	141.9	144.5
60	155.2	129.9	142.7	875.4	841.1	853.2	222.8	214.8	219.9
67	190.5	142.2	172.3	929.5	834.3	870.9	269.4	253.8	262.8
70	243.0	202.8	216.7	885.7	857.4	873.8	294.8	276.7	287.8
73	195.3	195.3	195.3	929.0	929.0	929.0	238.9	238.9	238.9
74	251.4	235.4	243.4	734.8	683.7	709.2	320.9	314.9	317.9
75	191.2	163.6	178.6	993.2	652.9	796.6	302.6	263.4	284.6
76	225.0	135.1	184.4	1071.6	690.6	848.8	333.3	275.6	311.6
77	214.0	156.3	175.8	922.8	710.2	812.2	345.0	290.4	323.5
78	250.4	141.8	199.5	875.2	671.1	821.2	344.8	317.7	332.2
79	228.7	124.7	195.3	875.3	815.3	843.8	342.9	331.0	337.5
80	286.0	155.1	230.5	866.7	800.1	842.7	360.8	336.7	347.8
81	294.3	294.3	294.3	836.0	836.0	836.0	349.9	349.9	349.9
82	263.6	263.6	263.6	838.9	838.9	838.9	352.8	352.8	352.8
84	289.8	184.4	243.2	760.4	628.8	676.3	377.0	349.9	366.7
90	491.0	241.7	312.8	820.4	635.5	710.3	436.1	379.6	396.3
96	433.8	334.8	379.6	785.6	669.4	709.0	430.0	408.9	419.4
102	476.6	211.4	407.9	789.6	590.0	667.5	448.0	355.7	422.7
111	533.5	341.5	431.4	665.8	550.8	595.3	457.1	407.0	438.5
120	494.5	215.6	410.4	782.2	546.1	638.1	467.0	333.4	430.8
132	411.8	173.6	266.5	632.1	518.2	580.9	450.6	313.2	366.5
138	440.3	241.5	340.9	552.5	533.3	542.9	441.3	429.9	435.6

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42105F
Test Date: 6/30/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.279 MPa (40.4 psia)
Initial peak clad temperature and location	874°C (1606°F), 3C 1.78 m (70 in.)
Initial peak rod power	1.46 kw/m (0.444 kw/ft)
Flow rate	19 mm/sec (0.73 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	480°C (466°C - 486°C) [896°F (870°F - 907°F)]
Initial bundle water level	43.4 mm (1.71 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+1.5% to 30 seconds, ±0.5% to 150 seconds, and -1% thereafter[a]
Total power:	-1% increasing linearly to -2%[a]
Housing initial temperature at midplane:	approximately -3.5%[a]

a. Relative to run 42705A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42105F

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1208.	1269.	62.	36.5	807.	105.8
4C 3- 3	6	1283.	1318.	36.	21.0	822.	102.0
1C 4- 0	7	1406.	1460.	55.	40.0	865.	146.0
2A 5- 0	12	1529.	1663.	134.	51.0	906.	203.9
2A 5- 7	14	1538.	1648.	111.	51.5	893.	240.6
5C 6- 2	33	1438.	1609.	171.	98.0	287.	382.0
2D 6- 3	39	1466.	1653.	187.	86.5	815.	283.7
1D 6- 4	46	1419.	1587.	168.	109.0	918.	275.7
3D 6- 4	50	1458.	1740.	282.	98.0	232.	609.0
4B 6- 4	51	1544.	1666.	122.	54.0	808.	311.8
5D 6- 4	56	1472.	1564.	92.	54.0	731.	325.7
1D 6- 5	58	1399.	1584.	185.	101.0	893.	286.8
2A 6- 5	59	1457.	1595.	138.	98.0	831.	287.7
2D 6- 5	62	1478.	1659.	181.	86.5	870.	299.7
3B 6- 5	63	1547.	1714.	167.	80.0	569.	325.0
3C 6- 6	69	1525.	1761.	236.	94.5	1093.	310.4
3E 6- 6	70	1439.	1615.	176.	110.0	1065.	303.4
4C 6- 6	73	1572.	1725.	153.	76.0	774.	320.0
5C 6- 6	76	1530.	1637.	107.	51.5	817.	328.4
3D 6- 7	85	1540.	1744.	204.	97.0	762.	335.3
3C 6- 8	93	1567.	1775.	209.	89.5	859.	327.4
4A 6- 8	95	1440.	1587.	148.	101.0	889.	305.7
1C 7- 0	109	1407.	1600.	194.	78.5	640.	360.0
2B 7- 0	110	1477.	1655.	178.	77.5	624.	355.7
3D 7- 0	113	1488.	1673.	185.	53.0	618.	353.0
5B 7- 0	117	1373.	1530.	157.	53.0	583.	356.0
2B 7- 6	120	1422.	1655.	233.	79.0	747.	376.9
2C 7- 6	121	1414.	1676.	261.	86.5	776.	370.0
2E 7- 6	123	1225.	1413.	188.	57.0	714.	368.9
3A 7- 6	124	1430.	1568.	138.	63.5	724.	368.4
3B 7- 6	125	1487.	1694.	207.	57.5	719.	378.0
4B 7- 6	129	1455.	1655.	200.	74.0	704.	378.8
5C 7- 6	132	1419.	1598.	179.	64.5	733.	378.0
1C 8- 0	133	1215.	1514.	299.	96.5	692.	397.0
2E 8- 0	136	1058.	1355.	297.	96.5	659.	390.1
3D 8- 0	138	1312.	1631.	319.	98.0	781.	386.6
5B 8- 0	143	1179.	1339.	161.	72.0	620.	390.8
5C 8- 0	144	1290.	1529.	239.	95.5	682.	398.9
1C 8- 6	145	1024.	1398.	374.	99.5	553.	414.0
1D 8- 6	146	881.	1198.	317.	66.0	588.	395.0
2C 8- 6	148	1153.	1555.	402.	100.0	698.	405.0
4B 8- 6	153	1162.	1493.	332.	124.0	605.	416.7
5D 8- 6	155	1079.	1370.	291.	79.5	589.	406.0
3D 9- 3	159	966.	1352.	386.	143.0	667.	415.9
4C 9- 3	161	1032.	1413.	382.	137.0	624.	421.0
1D10- 0	164	636.	995.	359.	173.0	678.	416.9
4B10- 0	168	881.	1275.	394.	151.0	605.	435.9
5D10- 0	169	760.	1091.	332.	161.0	733.	364.3
2A11- 0	171	549.	802.	253.	162.0	586.	386.9
4C11- 0	172	692.	1062.	370.	160.0	543.	435.0
1D11- 6	** B A D T H E R M O C O U P L E D A T A *						

RUN 42105F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	748.3	700.4	724.3	753.5	706.7	730.1	6.0	5.5	5.8
24	939.8	939.8	939.8	950.1	950.1	950.1	10.0	10.0	10.0
39	1282.8	1182.7	1224.4	1318.4	1240.0	1275.9	41.5	21.0	33.0
48	1476.2	1362.4	1413.5	1527.9	1420.5	1463.7	40.0	21.0	34.0
60	1529.0	1453.7	1480.2	1662.5	1576.5	1608.4	51.5	49.5	50.7
67	1600.3	1499.8	1557.5	1758.6	1634.1	1693.0	78.5	51.5	57.7
70	1605.8	1396.0	1460.7	1777.6	1551.7	1620.6	77.5	51.5	65.5
71	1548.4	1504.1	1526.2	1749.7	1722.9	1736.3	78.5	75.5	77.0
72	1441.9	1346.7	1394.3	1707.3	1574.4	1640.8	99.0	91.5	95.3
73	1424.8	1360.3	1392.5	1666.8	1594.9	1630.8	109.0	92.0	100.5
74	1475.2	1324.7	1430.9	1726.3	1558.2	1650.7	119.0	76.5	94.6
75	1486.9	1387.6	1437.3	1733.0	1567.9	1638.2	107.0	78.5	93.1
76	1544.1	1371.9	1458.9	1739.7	1557.1	1634.8	113.0	51.5	85.6
77	1547.3	1399.1	1477.1	1714.0	1561.4	1635.0	101.0	80.0	93.4
78	1572.2	1437.7	1505.5	1760.9	1581.9	1645.5	111.0	51.5	79.5
79	1572.2	1365.6	1493.8	1744.1	1561.4	1654.9	109.0	52.0	86.0
80	1566.8	1432.3	1484.1	1775.4	1587.3	1676.2	108.0	88.0	97.4
81	1466.6	1466.6	1466.6	1639.6	1639.6	1639.6	97.0	97.0	97.0
84	1494.4	1372.9	1436.9	1708.5	1530.1	1623.5	78.5	53.0	62.7
90	1486.9	1122.4	1386.0	1720.7	1413.0	1599.5	86.5	63.5	73.5
96	1348.8	1058.3	1251.6	1674.5	1339.4	1521.5	98.0	65.0	88.5
102	1173.3	834.4	1065.9	1554.9	1186.8	1408.5	124.0	66.0	100.7
111	1031.5	785.7	920.8	1426.9	1087.2	1252.4	176.0	126.0	149.6
120	881.0	636.2	789.8	1310.0	995.4	1165.1	188.0	141.0	161.5
132	592.0	496.9	567.8	1062.4	672.0	841.7	152.0	155.0	158.5
138	629.9	603.6	616.7	1040.8	886.1	963.4	181.0	180.0	180.5

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	6.3	5.2	5.8	672.2	642.0	657.1	18.2	18.0	18.1
24	10.3	10.3	10.3	739.0	739.0	739.0	47.8	47.8	47.8
39	61.5	35.6	51.5	822.3	806.7	815.4	105.8	102.0	104.2
48	58.1	36.4	50.2	873.4	802.7	853.2	146.0	138.4	142.1
60	133.5	118.5	128.2	906.2	734.3	802.6	214.8	203.9	210.4
67	159.4	110.7	135.5	932.2	855.4	897.1	252.5	240.6	247.3
70	197.8	134.4	159.9	906.3	286.6	592.7	536.0	260.6	349.9
71	218.8	201.3	210.0	927.2	287.7	607.5	425.0	274.6	349.8
72	265.4	227.7	246.6	1090.1	257.6	673.8	561.0	279.4	420.2
73	242.0	234.6	238.3	287.7	283.4	285.5	531.0	363.0	447.0
74	269.4	171.3	219.7	1035.0	231.8	562.2	606.0	286.1	418.3
75	286.8	133.5	201.0	1419.8	231.8	615.0	604.0	224.2	399.3
76	281.7	83.2	175.9	1065.8	231.8	611.4	509.0	275.7	398.5
77	256.9	85.3	157.8	1094.0	568.8	819.2	333.0	286.8	307.2
78	236.3	85.5	140.0	1092.6	748.4	865.3	336.0	280.7	317.7
79	220.2	104.0	161.1	981.4	762.3	838.2	341.6	299.4	325.6
80	240.7	147.5	192.1	888.8	775.5	826.7	343.6	305.7	331.2
81	173.0	173.0	173.0	825.1	825.1	825.1	331.4	331.4	331.4
84	215.1	150.7	186.7	704.7	583.5	652.9	362.0	327.0	351.1
90	296.0	137.7	213.5	808.4	699.7	735.2	382.0	360.9	372.7
96	325.7	151.7	269.8	781.1	619.8	710.3	400.6	381.9	391.0
102	402.4	290.9	342.7	698.4	526.1	599.7	416.7	395.0	407.4
111	418.1	271.3	331.6	718.0	520.3	631.7	421.0	355.0	399.7
120	432.1	331.6	375.4	733.1	605.3	651.6	435.9	364.3	418.0
132	370.4	175.1	273.9	679.7	542.9	599.8	435.0	285.4	360.0
138	410.9	282.5	346.7	573.2	550.3	561.8	448.0	436.9	442.4

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42606A
Test Date: 4/1/80
Test Type: Forced Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.273 MPa (39.6 psia)
Initial peak clad temperature and location	872°C (1601°F), 3C 1.83 m (72 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	23 mm/sec (0.91 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	502°C (493°C - 508°C) [935°F (920°F - 947°F)]
Initial bundle water level	49.20 mm (1.937 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: approximately 1% decrease between 100 and 140 seconds[a]
Total power: exponentially increasing from +0.2% to -1% by 570 seconds[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42606A

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1105.	1265.	161.	40.5	900.	98.9
4C 3- 3	11	1164.	1306.	142.	33.0	944.	95.9
1C 4- 0	14	1311.	1532.	221.	54.0	903.	159.8
2A 5- 0	17	1353.	1667.	314.	86.5	853.	251.9
2A 5- 7	21	1469.	1795.	327.	88.5	981.	313.6
1D 6- 2	50	1461.	1922.	461.	120.0	1002.	391.6
2D 6- 2	53	1574.	2046.	472.	102.0	924.	392.8
3D 6- 2	58	1591.	2082.	491.	96.5	995.	396.8
5C 6- 2	61	1522.	1886.	364.	70.5	997.	372.6
1D 6- 3	63	1446.	1905.	459.	122.0	1009.	404.8
4B 6- 3	68	1554.	2030.	475.	102.0	927.	413.7
5D 6- 3	69	1489.	1948.	458.	103.0	946.	403.6
2A 6- 4	70	1491.	1927.	436.	105.0	934.	419.7
3B 6- 4	75	1580.	2086.	505.	101.0	1038.	410.4
3D 6- 6	79	1542.	2085.	542.	107.0	889.	441.5
2D 6- 5	84	1563.	2068.	505.	104.0	897.	425.7
3C 6- 5	85	1562.	2115.	533.	98.5	951.	424.6
3E 6- 5	86	1514.	1990.	476.	121.0	1014.	414.7
3C 6- 6	95	1564.	2108.	544.	106.0	938.	436.7
4A 6- 6	97	1453.	1945.	492.	120.0	967.	437.4
3D 8- 0	98	1202.	1819.	618.	131.0	829.	561.0
5C 6- 6	101	1481.	1846.	366.	71.5	961.	415.7
1C 7- 0	110	1405.	1800.	395.	90.0	797.	480.0
2B 7- 0	111	1426.	1764.	338.	57.5	704.	487.8
3D 7- 0	115	1448.	1856.	409.	87.0	766.	465.0
5B 7- 0	117	1330.	1775.	445.	121.0	777.	476.7
2B 7- 6	* * B A D T H E R M O C O U P L E D A T A *						
2C 7- 6	121	1377.	1889.	512.	99.5	846.	518.1
2E 7- 6	122	1191.	1703.	511.	83.5	762.	505.7
3A 7- 6	123	1289.	1761.	472.	118.0	814.	531.9
3B 7- 6	124	1411.	1945.	534.	105.0	835.	523.7
4B 7- 6	127	1379.	1925.	546.	120.0	804.	529.0
5C 7- 6	128	1251.	1724.	474.	136.0	866.	499.9
1C 8- 0	131	1159.	1730.	571.	121.0	793.	560.7
2E 8- 0	133	703.	1324.	621.	154.0	672.	589.0
4C 6- 6	136	1555.	2092.	536.	103.0	938.	434.8
5B 8- 0	138	1140.	1689.	549.	119.0	811.	554.0
5C 8- 0	139	1104.	1633.	529.	136.0	814.	540.0
1C 8- 6	141	981.	1547.	566.	103.0	598.	584.0
1D 8- 6	142	802.	1351.	548.	74.5	611.	568.0
2C 8- 6	143	1030.	1632.	602.	103.0	692.	574.0
4B 8- 6	145	1096.	1612.	516.	115.0	633.	592.7
5D 8- 6	148	955.	1486.	531.	93.0	586.	596.0
3D 9- 3	154	851.	1506.	656.	149.0	699.	605.0
4C 9- 3	156	951.	1527.	576.	136.0	708.	598.0
1D10- 0	161	591.	1146.	556.	178.0	699.	551.9
4B10- 0	164	816.	1356.	540.	137.0	618.	631.9
5D10- 0	167	709.	1245.	536.	183.0	728.	518.8
2A11- 0	168	530.	871.	340.	183.0	628.	475.0
4C11- 0	170	626.	1111.	485.	159.0	496.	613.0
1D11- 6	172	392.	880.	488.	185.0	621.	435.4

RUN 42606A HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	573.0	540.2	553.8	596.2	568.4	580.4	9.5	8.5	8.9
24	859.8	783.2	819.4	924.3	857.2	886.1	20.5	20.0	20.1
39	1164.1	1068.5	1112.4	1305.8	1229.6	1266.8	40.5	33.0	36.0
48	1322.7	1223.2	1277.5	1563.6	1474.1	1515.0	69.5	46.0	55.1
60	1439.2	1303.9	1359.2	1753.1	1591.7	1663.6	93.5	43.0	73.6
67	1556.1	1459.5	1488.2	1954.5	1795.4	1853.2	95.5	82.5	87.8
70	1593.9	1493.2	1546.2	2048.3	1894.9	1969.9	99.5	86.5	94.6
71	1595.3	1472.1	1547.4	2065.8	1899.4	1987.0	119.0	84.5	99.1
72	1600.8	1478.8	1538.9	2072.8	1835.0	1952.8	103.0	71.0	90.7
74	1590.7	1456.0	1543.8	2082.1	1845.1	1997.4	120.0	70.5	98.5
75	1586.4	1446.4	1537.4	2092.7	1905.1	2015.6	122.0	96.5	105.9
76	1584.2	1472.1	1538.3	2106.8	1926.9	2026.1	132.0	96.5	108.4
77	1582.4	1426.4	1523.7	2115.2	1912.0	2025.5	139.0	98.5	115.4
78	1564.0	1452.8	1510.7	2108.0	1846.3	2004.0	131.0	71.5	106.5
84	1447.7	1252.7	1380.2	1879.1	1685.4	1790.8	138.0	57.5	99.2
90	1411.3	1191.5	1308.1	1945.3	1675.5	1810.8	138.0	69.5	106.4
96	1268.4	702.7	1138.2	1871.1	1323.6	1699.7	154.0	88.5	120.8
102	1096.3	802.5	976.1	1669.0	1350.9	1524.4	136.0	61.0	99.8
111	963.1	704.8	877.4	1549.5	1270.3	1420.4	152.0	99.5	127.7
120	816.4	590.7	698.1	1381.3	1146.3	1276.5	186.0	137.0	168.8
132	626.3	493.5	551.7	1111.0	870.6	945.9	219.0	159.0	186.8
138	578.6	391.5	489.2	1065.5	879.9	971.8	200.0	180.0	185.4

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	28.2	23.2	26.7	594.8	567.1	578.7	10.5	10.1	10.3
24	74.0	61.5	66.7	813.9	759.4	778.3	39.9	34.9	36.5
39	161.1	141.7	154.4	943.8	814.6	886.1	99.9	95.9	98.2
48	267.0	220.7	237.5	1062.3	903.3	965.1	159.8	137.9	147.3
60	338.9	251.1	304.4	852.6	801.6	828.7	256.8	250.8	253.2
67	398.4	326.5	365.1	997.4	934.2	967.6	319.3	312.6	315.8
70	454.3	401.7	423.7	965.7	923.3	941.2	354.6	346.7	350.2
71	470.4	407.0	439.7	1034.0	885.9	939.4	369.6	344.6	356.8
72	472.8	331.8	414.0	1037.2	902.5	958.1	381.6	350.7	368.6
74	491.4	364.4	453.8	1034.8	826.3	960.7	401.8	372.6	388.1
75	508.3	458.4	478.2	1036.7	885.5	957.4	413.7	395.8	403.8
76	522.6	435.5	487.7	1038.5	889.6	949.6	419.7	393.8	412.6
77	532.8	474.9	501.9	1014.4	896.8	945.0	433.6	414.7	424.2
78	544.0	365.7	493.3	987.8	872.4	930.1	441.6	415.7	434.1
84	445.3	338.2	410.6	809.7	680.8	753.2	494.0	473.9	483.4
90	548.0	452.0	502.8	873.6	722.5	822.9	531.9	499.9	519.1
96	620.9	456.3	561.5	842.2	671.9	787.8	589.0	540.0	561.3
102	658.7	401.7	548.3	692.1	579.2	623.0	596.0	568.0	583.4
111	655.5	450.8	542.9	856.7	521.5	684.9	612.0	455.5	574.6
120	680.5	494.3	578.4	732.1	617.7	674.5	631.9	518.8	586.8
132	484.7	340.3	394.3	796.9	495.7	534.4	613.0	341.7	488.5
138	575.5	403.0	482.3	621.3	528.1	565.4	628.0	435.4	547.7

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42306B
Test Date: 6/20/80
Test Type: Forced Reflood
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.274 MPa (39.8 psia)
Initial peak clad temperature and location	875°C (1607°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	23 mm/sec (0.91 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	529°C (523°C - 532°C) [984°F (973°F - 990°F)]
Initial bundle water level	43.4 mm (1.71 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+1% to 140 seconds and -0.5% thereafter[a]
Total power:	-0.5% constant[a]
Housing initial temperature at midplane:	+4%[a]

a. Relative to run 42606A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 42306B

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1092.	1245.	153.	38.5	807.	107.9
4C 3- 3	11	1236.	1374.	138.	32.5	882.	105.0
1C 4- 0	14	1310.	1497.	186.	42.5	881.	156.9
2A 5- 0	17	1365.	1680.	315.	93.0	768.	266.9
2A 5- 7	21	1478.	1862.	384.	116.0	880.	340.7
1D 6- 2	50	1431.	1806.	375.	106.0	898.	409.7
2D 6- 2	53	1510.	1940.	429.	107.0	707.	434.9
3D 6- 2	58	1548.	1963.	414.	116.0	814.	427.0
5C 6- 2	61	1484.	1878.	394.	130.0	935.	407.7
1D 6- 3	63	1440.	1797.	356.	100.0	875.	380.6
4B 6- 3	68	1532.	1944.	412.	116.0	856.	440.7
5D 6- 3	69	1429.	1895.	466.	149.0	857.	476.6
2A 6- 4	70	1433.	1859.	425.	148.0	872.	440.6
2D 6- 4	72	1534.	1948.	413.	106.0	803.	431.6
3B 6- 4	75	1564.	1999.	436.	116.0	871.	449.7
3C 6- 5	85	1600.	2048.	448.	116.0	921.	449.4
3E 6- 5	86	1475.	1878.	403.	130.0	914.	453.3
3C 6- 6	95	1581.	2063.	483.	116.0	913.	461.8
3D 6- 6	96	1544.	2026.	482.	115.0	874.	466.7
4A 6- 6	97	1424.	1893.	468.	145.0	866.	472.8
4C 6- 6	98	1553.	2035.	433.	115.0	938.	459.7
5C 6- 6	101	1462.	1884.	422.	132.0	944.	454.8
1C 7- 0	110	1427.	1787.	359.	102.0	731.	514.0
2B 7- 0	111	1459.	1804.	346.	103.0	741.	525.6
3D 7- 0	115	1498.	1875.	376.	103.0	782.	511.9
5B 7- 0	117	1359.	1735.	376.	115.0	791.	526.4
2B 7- 6	120	1424.	1879.	455.	116.0	812.	568.0
2C 7- 6	121	1440.	1913.	473.	113.0	810.	562.8
2E 7- 6	122	1270.	1660.	391.	94.5	703.	570.8
3A 7- 6	123	1398.	1840.	442.	116.0	840.	550.5
3B 7- 6	124	1446.	1925.	479.	113.0	847.	557.4
4B 7- 6	127	1448.	1901.	453.	113.0	830.	557.5
5C 7- 6	128	1407.	1842.	435.	110.0	822.	549.4
1C 8- 0	131	1213.	1753.	540.	118.0	709.	591.9
2E 8- 0	133	1070.	1616.	545.	109.0	610.	594.0
3D 8- 0	136	1290.	1851.	561.	116.0	822.	582.0
5B 8- 0	138	1171.	1675.	503.	114.0	656.	601.5
5C 8- 0	139	1293.	1780.	487.	127.0	769.	587.1
1C 8- 6	141	1033.	1564.	531.	118.0	619.	519.0
1D 8- 6	142	789.	1361.	572.	150.0	639.	616.0
2C 8- 6	143	1120.	1666.	546.	116.0	652.	523.0
4B 8- 6	145	1208.	1771.	563.	116.0	720.	518.4
5D 8- 6	148	1051.	1467.	416.	54.0	553.	635.9
3D 9- 3	154	960.	1520.	550.	137.0	708.	623.8
4C 9- 3	156	1051.	1540.	489.	113.0	689.	528.0
1D10- 0	161	588.	1211.	623.	199.0	575.	564.0
4B10- 0	164	912.	1353.	441.	116.0	627.	661.0
5D10- 0	167	737.	1252.	514.	202.0	762.	615.9
2A11- 0	168	573.	843.	270.	138.0	645.	522.8
4C11- 0	170	688.	1105.	416.	158.0	555.	662.0
1D11- 6	172	290.	940.	650.	201.0	614.	594.0

RUN 423068 HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	615.1	563.6	582.0	634.1	589.8	605.6	8.5	8.0	8.3
24	899.0	812.1	843.8	959.4	873.7	905.5	17.5	15.0	16.6
39	1235.8	1092.3	1140.4	1373.9	1245.2	1290.2	38.5	30.5	35.0
48	1372.4	1264.0	1302.9	1599.2	1473.0	1521.7	54.0	42.5	47.6
60	1485.9	1350.8	1393.1	1778.7	1619.9	1681.4	98.5	59.5	78.8
67	1577.6	1465.0	1502.7	1956.7	1845.1	1882.1	116.0	93.0	104.1
70	1606.8	1435.5	1521.0	2031.9	1820.3	1924.3	138.0	99.0	113.5
71	1593.3	1415.7	1510.1	2038.9	1801.0	1920.2	139.0	94.5	113.9
72	1477.8	1420.5	1456.1	1902.9	1786.5	1847.2	137.0	103.0	115.6
74	1552.8	1430.7	1500.8	2021.4	1804.4	1920.5	134.0	106.0	116.8
75	1586.8	1429.0	1514.2	2002.7	1796.6	1922.5	149.0	100.0	119.4
76	1599.3	1433.3	1511.1	2013.2	1832.7	1930.0	143.0	106.0	121.9
77	1599.8	1392.8	1507.8	2048.3	1829.3	1949.0	143.0	106.0	127.0
78	1580.8	1406.5	1490.5	2063.4	1856.4	1956.1	167.0	111.0	128.2
84	1498.2	1349.3	1427.4	1874.5	1701.8	1797.2	138.0	87.5	107.6
90	1447.8	1269.8	1389.1	1924.6	1660.3	1828.6	116.0	90.0	105.9
96	1318.9	1070.1	1240.5	1873.4	1615.6	1764.2	127.0	87.5	113.0
102	1207.6	789.3	1053.7	1770.9	1361.4	1562.0	150.0	64.0	105.6
111	1050.6	664.7	947.3	1539.8	1268.2	1414.5	173.0	94.0	118.9
120	912.4	588.2	745.1	1429.1	1210.6	1305.1	202.0	116.0	170.6
132	688.3	494.8	583.1	1104.7	831.3	923.4	215.0	168.0	190.3
138	672.0	289.9	474.6	1105.8	871.6	989.0	220.0	171.0	194.0

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	26.2	18.9	23.7	613.2	583.6	595.4	12.5	11.3	11.8
24	70.9	53.8	61.7	765.5	708.4	732.2	43.9	41.4	42.7
39	157.3	138.0	149.8	882.4	807.0	832.7	111.6	105.0	108.8
48	253.6	186.1	218.9	953.8	880.8	907.7	159.9	156.7	158.0
60	314.9	249.1	288.3	870.7	767.8	800.1	272.2	263.9	268.3
67	399.4	355.5	379.4	966.9	880.3	937.0	342.7	329.7	338.7
70	433.8	359.5	403.3	990.3	870.9	912.2	330.3	358.3	371.1
71	445.6	367.3	410.1	990.1	869.7	937.7	422.6	368.7	387.9
72	429.7	351.0	391.1	950.3	790.6	880.4	400.8	384.7	392.3
74	507.0	359.2	419.6	1099.2	665.4	865.8	436.2	405.6	422.2
75	465.9	356.3	408.2	971.9	855.5	892.6	476.6	380.5	434.7
76	436.6	390.6	418.9	1010.1	841.4	899.5	452.7	427.8	442.6
77	470.8	403.3	441.2	951.6	826.0	887.5	453.3	446.6	454.4
78	496.1	421.9	465.6	943.6	836.9	894.4	475.7	450.7	466.2
84	406.8	323.1	369.8	787.6	727.6	753.9	529.0	500.2	516.8
90	478.9	390.5	439.4	846.7	698.7	799.6	577.5	549.4	559.9
96	560.6	487.1	523.7	824.3	610.0	752.3	593.6	581.0	591.3
102	572.1	415.5	508.3	719.7	552.6	627.3	535.9	609.4	623.2
111	610.8	351.0	467.1	767.1	542.9	653.2	550.9	590.3	531.8
120	690.0	435.3	560.0	762.0	575.2	640.7	670.0	615.9	655.4
132	420.3	255.4	340.4	733.7	554.7	630.6	562.0	280.5	506.6
138	649.9	361.5	514.4	648.5	511.1	575.6	677.0	379.7	598.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42506C
Test Date: 8/26/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.268 MPa (38.9 psia)
Initial peak clad temperature and location	874°C (1606°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	23 mm/sec (0.91 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	520°C (505°C - 531°C) [968°F (941°F - 987°F)]
Initial bundle water level	

B. Summary Results:

C. Comments:

Inlet mass flow:	+1% to 170 seconds, -1% to 310 seconds, and 0% thereafter[a]
Housing initial temperature at midplane:	approximately +3.5%[a]

a. Relative to run 42606A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 42506C

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1092.	1258.	166.	40.5	844.	93.3
4C 3- 3	11	1238.	1384.	146.	31.5	886.	104.0
1C 4- 0	14	1349.	1559.	211.	51.5	934.	156.7
2A 5- 0	17	1407.	1710.	303.	65.0	850.	248.8
2A 5- 7	21	1512.	1852.	340.	102.0	966.	315.5
1D 6- 2	50	1479.	1770.	291.	98.0	929.	398.2
2D 6- 2	53	1499.	1835.	336.	98.5	647.	415.9
3D 6- 2	56	1556.	1847.	291.	99.0	749.	414.0
4B 6- 2	60	1568.	1869.	301.	98.5	945.	406.7
5C 6- 2	61	1478.	1870.	392.	104.0	599.	413.1
1D 6- 3	63	1468.	1782.	315.	97.0	957.	407.7
5D 6- 3	69	1468.	1814.	326.	100.0	943.	415.6
2A 6- 4	70	1460.	1801.	321.	102.0	1021.	340.5
3B 6- 4	75	1576.	1911.	332.	98.5	932.	439.5
2D 6- 5	84	1552.	1912.	360.	98.5	887.	432.7
3C 6- 5	85	1596.	1998.	402.	99.0	967.	416.4
3E 6- 5	86	1535.	1845.	311.	98.0	977.	420.8
3C 6- 6	95	1580.	2013.	434.	100.0	955.	428.7
3D 6- 6	96	1556.	1981.	425.	99.5	805.	446.5
4A 6- 6	97	1478.	1845.	367.	98.5	963.	416.6
4C 6- 6	98	1580.	1997.	417.	98.0	946.	440.0
5C 6- 6	101	1554.	1863.	309.	113.0	936.	433.6
1C 7- 0	110	1429.	1731.	302.	55.0	780.	479.5
2B 7- 0	111	1450.	1744.	294.	43.5	723.	481.9
3D 7- 0	115	1461.	1797.	335.	56.0	716.	490.9
5B 7- 0	117	1375.	1685.	310.	64.5	796.	487.8
2B 7- 6	120	1437.	1818.	381.	70.0	792.	528.7
2C 7- 6	121	1443.	1863.	420.	99.0	780.	541.5
2E 7- 6	122	1290.	1651.	361.	94.5	690.	523.6
3A 7- 6	123	1421.	1772.	351.	66.5	814.	515.5
3B 7- 6	124	1445.	1837.	392.	85.5	796.	529.7
4B 7- 6	127	1440.	1841.	400.	66.0	787.	540.6
5C 7- 6	128	1424.	1781.	357.	81.0	809.	512.7
1C 8- 0	131	1234.	1715.	482.	105.0	752.	573.9
2E 8- 0	133	1051.	1619.	527.	98.5	749.	559.7
3D 8- 0	136	1294.	1821.	528.	102.0	807.	569.9
5B 8- 0	138	1201.	1629.	428.	100.0	724.	562.6
5C 8- 0	139	1335.	1752.	417.	98.0	817.	546.9
1C 8- 6	141	1038.	1554.	516.	100.0	579.	599.0
1D 8- 6	142	777.	1346.	571.	122.0	569.	588.0
2C 8- 6	* * B A D	T H E R M O C O U P L E	D A T A *				
4B 8- 6	145	1147.	1560.	413.	66.0	631.	606.0
5D 8- 6	148	1047.	1524.	476.	98.0	625.	595.7
3D 9- 3	154	912.	1521.	610.	123.0	644.	609.0
4C 9- 3	156	1015.	1483.	467.	91.0	643.	603.0
1D10- 0	161	564.	1139.	575.	190.0	752.	579.7
4B10- 0	164	876.	1332.	456.	114.0	605.	643.7
5D10- 0	167	712.	1176.	465.	255.0	690.	556.3
2A11- 0	168	567.	851.	284.	145.0	663.	456.8
4C11- 0	170	674.	1116.	442.	143.0	489.	629.0
1D11- 6	172	301.	894.	594.	186.0	582.	573.4

RUN 42506C HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	647.0	562.0	591.3	660.4	583.4	610.1	9.5	7.0	7.8
24	896.7	810.1	856.3	956.3	876.8	915.4	19.0	14.5	16.7
39	1238.5	1092.2	1149.7	1384.4	1257.8	1314.2	43.5	31.5	39.3
48	1376.6	1305.6	1335.1	1606.8	1536.5	1568.1	66.0	51.5	56.1
60	1407.4	1392.6	1402.3	1777.6	1709.6	1749.0	99.5	65.0	83.3
67	1605.5	1486.0	1523.8	1994.6	1840.6	1883.9	102.0	91.5	96.3
70	1592.5	1402.9	1533.4	2047.1	1689.7	1932.5	111.0	53.5	92.5
71	1546.4	1466.2	1524.9	1993.4	1866.6	1936.5	106.0	98.0	101.0
72	1520.9	1511.6	1516.4	1917.8	1905.1	1911.4	105.0	102.0	103.5
74	1577.4	1454.2	1521.1	1874.5	1748.6	1825.0	109.0	96.0	100.1
75	1597.5	1467.5	1541.3	1931.5	1765.3	1854.1	100.0	77.5	94.6
76	1601.2	1452.6	1540.1	1974.0	1783.2	1868.2	113.0	97.5	100.3
77	1595.7	1439.2	1535.4	1996.0	1801.0	1893.0	102.0	98.0	99.3
78	1579.5	1418.9	1526.7	2013.2	1827.0	1912.3	113.0	66.5	99.0
84	1477.4	1216.6	1406.9	1825.9	1538.7	1733.8	98.5	43.5	63.6
90	1445.3	1269.6	1410.1	1864.4	1650.5	1790.0	89.5	65.5	77.5
96	1346.2	1091.4	1266.0	1821.4	1618.8	1735.9	106.0	89.0	100.4
102	1147.2	776.6	1027.5	1610.1	1347.7	1530.3	129.0	86.0	100.1
111	1040.0	821.1	967.5	1521.4	1302.7	1425.2	146.0	85.5	104.4
120	905.0	563.6	754.4	1407.7	1156.8	1280.7	255.0	77.0	154.7
132	674.4	476.3	573.3	1116.2	850.9	939.5	173.0	139.0	150.0
136	651.6	299.6	449.7	1103.7	856.1	966.9	186.0	144.0	165.4

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	21.4	15.4	18.6	637.2	563.4	606.1	12.0	6.0	10.1
24	66.7	51.1	59.1	785.7	738.1	759.2	42.0	38.0	40.7
39	186.6	145.9	164.6	888.4	843.5	870.7	105.8	93.3	100.3
48	264.4	210.5	233.0	965.1	884.3	923.7	162.8	154.5	157.6
60	370.2	302.9	340.7	910.2	841.2	867.2	256.8	246.6	252.7
67	369.1	334.7	360.1	1010.9	941.2	979.0	320.6	314.6	317.6
70	454.6	266.6	359.1	1030.3	859.8	947.0	365.6	350.6	356.6
71	440.5	379.0	411.6	1023.3	895.7	963.8	372.4	354.6	363.2
72	406.0	384.2	395.1	1017.5	984.2	1000.9	359.5	358.6	359.1
74	339.0	240.5	304.0	1056.6	626.0	828.7	415.9	346.4	398.3
75	357.0	230.8	312.6	982.4	804.1	918.7	419.6	399.7	411.5
76	372.6	233.2	326.1	1027.7	823.1	924.4	433.1	340.5	404.4
77	402.3	310.6	362.6	976.9	886.5	934.5	441.6	411.6	425.6
78	433.7	294.7	365.0	983.2	836.7	910.8	447.7	389.1	436.6
84	352.3	294.5	327.0	805.6	709.3	757.0	500.9	464.4	480.9
90	437.5	319.2	379.9	814.1	689.8	783.7	541.5	487.9	524.2
96	527.6	410.6	469.9	817.1	723.8	780.7	576.9	546.9	564.1
102	570.9	413.1	502.8	644.6	578.9	617.1	606.0	564.0	596.2
111	609.0	366.0	457.7	797.9	619.9	670.1	615.7	504.1	564.1
120	683.4	396.7	526.3	773.1	474.4	648.1	643.7	472.3	586.9
132	441.7	264.5	366.2	673.2	489.3	611.4	629.0	317.9	434.7
136	666.4	373.7	517.3	562.0	264.5	500.0	630.0	245.9	529.9

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42206D
Test Date: 10/16/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.278 MPa (40.3 psia)
Initial peak clad temperature and location	878°C (1612°F), 3C 1.96 m (78 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	23 mm/sec (0.90 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	503°C (494°C - 512°C) [938°F (921°F - 953°F)]
Initial bundle water level	36.1 mm (1.42 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: -2% to 125 seconds, decreased to +1% for 20 seconds and -2% thereafter[a]

Total power: -0.25% constant[a]

a. Relative to run 42606A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42206D

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1106.	1287.	181.	43.5	860.	104.6
4C 3- 3	9	1214.	1389.	175.	41.5	807.	102.5
1C 4- 0	10	1318.	1524.	205.	45.5	982.	144.8
2A 5- 0	13	1412.	1780.	368.	96.5	936.	261.6
2A 5- 7	18	1489.	1828.	339.	108.0	926.	329.7
2D 5- 2	50	1543.	1913.	371.	117.0	916.	402.8
3D 6- 2	55	1521.	1992.	472.	94.5	1100.	391.2
5C 6- 2	59	1550.	1906.	356.	119.0	928.	403.6
1D 6- 3	61	1497.	1877.	379.	123.0	948.	406.6
4B 6- 3	66	1561.	1951.	390.	116.0	941.	415.4
5D 6- 3	68	1481.	1849.	368.	128.0	880.	416.8
2A 6- 4	70	1489.	1883.	393.	128.0	965.	416.6
3B 6- 4	* * B A D	T H E R M O C O U P L E	D A T A *				
1D 6- 5	82	1483.	1863.	380.	132.0	978.	423.7
2D 6- 5	84	1562.	1965.	403.	119.0	908.	432.8
3C 6- 5	85	1612.	2061.	449.	114.0	958.	420.7
3E 6- 5	88	1512.	1897.	385.	118.0	869.	435.8
3C 6- 6	97	1599.	2072.	472.	116.0	961.	432.8
3D 6- 6	98	1578.	2037.	459.	119.0	945.	438.7
4A 6- 6	100	1483.	1914.	431.	117.0	880.	457.8
4C 6- 6	101	1581.	2046.	465.	115.0	958.	441.2
5C 6- 6	103	1547.	1919.	372.	130.0	968.	438.7
1C 7- 0	* * B A D	T H E R M O C O U P L E	D A T A *				
2B 7- 0	111	1448.	1833.	385.	73.0	738.	493.8
3D 7- 0	115	1465.	1877.	411.	74.0	748.	484.7
5B 7- 0	117	1340.	1704.	364.	95.0	694.	494.9
2B 7- 6	121	1424.	1881.	458.	96.0	838.	538.9
2C 7- 6	122	1371.	1918.	547.	100.0	848.	555.8
2E 7- 6	123	1274.	1634.	360.	59.5	788.	532.8
3A 7- 6	124	1429.	1845.	416.	96.0	855.	521.9
3B 7- 6	125	1453.	1922.	469.	96.0	838.	525.9
4B 7- 6	128	1446.	1913.	467.	96.0	787.	551.8
5C 7- 6	129	1428.	1844.	416.	97.0	850.	517.9
1C 8- 0	132	1161.	1690.	529.	112.0	745.	592.9
2E 8- 0	134	1128.	1544.	418.	95.0	814.	578.0
3D 8- 0	137	1306.	1852.	546.	94.5	850.	570.0
5B 8- 0	139	1252.	1704.	452.	87.5	712.	593.5
5C 8- 0	140	1337.	1793.	457.	104.0	833.	559.8
1C 8- 6	141	1008.	1582.	575.	109.0	570.	623.0
1D 8- 6	142	864.	1554.	689.	131.0	892.	612.8
2C 8- 6	143	1085.	1659.	594.	106.0	804.	611.0
4B 8- 6	145	1159.	1629.	470.	75.0	874.	615.3
5D 8- 6	148	1072.	1585.	513.	107.0	874.	596.7
3D 9- 3	155	941.	1588.	647.	116.0	888.	618.0
4C 9- 3	157	1008.	1559.	551.	106.0	888.	619.0
1D10- 0	160	831.	1199.	568.	172.0	821.	639.9
4B10- 0	163	865.	1360.	495.	119.0	824.	651.0
5D10- 0	166	753.	1231.	478.	133.0	867.	599.8
2A11- 0	167	574.	918.	344.	172.0	608.	572.0
4C11- 0	169	656.	1176.	520.	173.0	501.	647.8
1D11- 6	170	297.	854.	557.	194.0	610.	596.0

RUN 422060 HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	643.9	593.9	610.5	661.5	614.1	630.3	8.0	7.5	7.7
24	832.8	809.2	817.9	886.1	869.6	878.9	17.5	15.5	16.5
39	1213.6	1090.0	1139.3	1368.6	1287.0	1321.9	44.5	41.5	43.2
48	1316.5	1291.3	1304.9	1523.6	1511.7	1517.6	56.0	45.5	50.7
60	1505.5	1377.8	1431.6	1856.4	1738.6	1791.6	96.5	86.5	90.8
67	1609.4	1485.5	1527.9	1976.5	1820.3	1875.7	108.0	92.5	98.0
72	1599.2	1387.0	1535.9	2022.5	1788.8	1955.0	141.0	93.5	112.8
74	1571.5	1444.8	1523.8	2029.6	1859.8	1930.5	131.0	104.0	115.9
75	1560.7	1460.6	1515.6	1978.5	1848.5	1910.8	128.0	93.5	115.5
76	1592.0	1489.2	1543.0	2048.3	1864.4	1945.8	134.0	114.0	119.9
77	1612.2	1476.9	1537.1	2061.1	1862.1	1953.1	132.0	106.0	119.7
78	1600.9	1474.4	1543.0	2071.6	1864.7	1975.6	131.0	114.0	120.3
84	1465.4	1336.3	1406.6	1876.8	1704.0	1793.6	95.0	59.5	77.9
90	1453.0	1273.7	1384.3	1922.3	1634.1	1809.9	110.0	59.0	90.0
96	1357.5	1126.2	1255.9	1910.9	1544.1	1732.7	117.0	87.5	101.8
102	1156.9	864.3	1029.5	1659.2	1445.2	1567.4	131.0	75.0	100.2
111	1007.9	797.6	920.0	1568.4	1202.4	1410.8	129.0	96.0	111.5
120	804.9	623.7	712.3	1389.7	1199.3	1282.1	173.0	119.0	147.4
132	656.5	574.0	602.1	1176.4	918.1	1010.4	173.0	130.0	158.3
136	644.5	296.6	488.3	1095.4	854.0	941.0	194.0	175.0	186.3

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	21.3	17.6	19.7	629.8	598.3	611.0	13.1	12.0	12.5
24	65.4	53.3	61.0	741.8	725.0	734.4	41.8	39.7	40.8
39	191.5	179.0	182.6	1063.3	860.4	943.5	104.6	102.5	103.8
48	220.4	205.1	212.8	981.7	918.4	950.1	156.7	144.8	150.7
60	368.2	350.9	360.0	947.4	887.7	924.4	265.8	254.8	260.8
67	369.1	334.6	347.8	979.0	925.7	950.4	330.6	323.6	328.0
72	436.2	398.8	419.1	1020.0	852.0	907.3	384.6	360.8	377.5
74	458.1	358.1	406.8	980.2	653.5	863.8	421.3	372.2	403.0
75	443.8	367.9	395.2	948.4	854.9	906.4	416.8	406.6	412.9
76	461.0	349.5	403.3	1121.0	842.9	939.9	441.4	405.6	423.6
77	469.9	386.2	416.0	976.2	868.9	932.8	444.6	420.7	431.7
78	472.4	371.9	432.6	981.5	876.6	933.9	457.6	416.7	439.8
84	411.4	348.8	385.0	802.9	693.7	744.8	494.9	478.8	486.8
90	547.1	309.5	425.6	855.4	720.2	810.7	555.6	491.0	529.9
96	553.4	390.4	476.8	850.3	692.1	787.3	598.2	559.8	575.6
102	689.5	410.1	537.9	692.0	569.5	632.5	632.0	596.7	614.0
111	647.5	344.5	482.8	790.7	526.7	641.4	635.0	529.9	607.3
120	669.4	479.3	569.8	687.0	568.7	616.8	654.0	462.5	608.0
132	519.9	344.1	406.3	607.9	501.0	546.6	647.8	572.0	611.9
136	557.4	398.5	452.6	610.0	287.7	483.3	662.0	404.0	576.7

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41206E
Test Date: 12/3/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.279 MPa (40.4 psia)
Initial peak clad temperature and location	872°C (1602°F), 2C 1.70 m (67 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	23 mm/sec (0.92 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	509°C (501°C - 515°C) [949°F (934°F - 959°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: -2% for 20 seconds, +2% to 150 seconds, and ±1% thereafter[a]

a. Relative to run 42606A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER41206E

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNARDOUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1229.	1414.	185.	43.5	829.	129.2
4C 3- 3	10	1305.	1462.	157.	42.0	892.	121.9
1C 4- 0	12	1417.	1648.	232.	53.0	976.	162.9
2A 5- 0	16	1526.	1886.	360.	85.0	903.	282.6
2A 5- 7	19	1534.	1872.	338.	85.0	846.	353.6
5C 6- 0	36	1415.	1852.	437.	131.0	1116.	367.1
2D 6- 2	39	1491.	1922.	432.	133.0	724.	426.5
1D 6- 4	47	1434.	1823.	389.	120.0	989.	380.7
3D 6- 4	50	1427.	1977.	551.	133.0	1150.	417.3
4B 6- 4	52	1513.	1924.	411.	104.0	644.	408.7
5C 6- 4	54	1462.	1905.	443.	133.0	1123.	389.8
5D 6- 4	55	1473.	1846.	373.	131.0	955.	365.7
1D 6- 5	58	1413.	1842.	429.	131.0	986.	394.7
2A 6- 5	59	1458.	1879.	422.	124.0	724.	463.0
2D 6- 5	61	1485.	1934.	448.	131.0	836.	438.7
3B 6- 5	63	1523.	1961.	438.	117.0	728.	440.8
3C 6- 6	72	1530.	1999.	469.	133.0	1106.	430.3
4C 6- 6	75	1545.	2003.	457.	129.0	901.	443.9
3C 6- 7	* * B A D T H E R M O C O U P L E D A T A *						
3E 6- 7	83	1439.	1905.	466.	134.0	876.	448.7
3D 6- 8	86	1482.	2006.	524.	132.0	877.	463.5
4A 6- 8	87	1421.	1854.	433.	133.0	748.	488.4
1C 7- 0	93	1368.	1704.	336.	75.0	753.	474.9
2B 7- 0	94	1422.	1752.	330.	71.0	713.	493.2
3D 7- 0	98	1427.	1775.	349.	59.0	790.	498.7
5B 7- 0	103	1359.	1719.	360.	175.0	705.	485.9
2B 7- 6	110	1357.	1810.	453.	85.0	811.	537.9
2C 7- 6	111	1393.	1815.	422.	78.5	826.	500.7
2E 7- 6	113	1208.	1597.	390.	82.0	785.	534.6
3A 7- 6	* * B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	115	1091.	1713.	622.	103.0	705.	582.0
4B 7- 6	120	1401.	1872.	471.	100.0	805.	531.2
5C 7- 6	122	1385.	1790.	405.	80.0	813.	520.7
1C 8- 0	124	1144.	1645.	501.	103.0	760.	564.8
2E 8- 0	126	926.	1491.	566.	116.0	741.	564.9
3D 8- 0	129	1150.	1734.	584.	96.0	810.	560.4
5B 8- 0	133	1181.	1635.	454.	74.5	723.	565.7
5C 8- 0	134	1238.	1721.	482.	94.5	753.	550.4
1C 8- 6	135	974.	1528.	554.	103.0	675.	596.0
1D 8- 6	136	923.	1460.	537.	125.0	657.	598.2
2C 8- 6	138	1101.	1732.	631.	108.0	753.	585.9
4B 8- 6	143	1091.	1613.	523.	96.5	672.	592.0
5D 8- 6	145	920.	1432.	513.	132.0	643.	588.1
3D 9- 3	150	889.	1481.	592.	132.0	689.	598.6
4C 9- 3	152	991.	1525.	533.0	109.0	648.	605.0
1D10- 0	157	608.	1219.	611.	172.0	594.	638.1
4B10- 0	164	836.	1331.	495.	135.0	622.	622.0
5D10- 0	166	684.	1182.	498.	189.0	764.	549.1
2A11- 0	168	546.	860.	315.	219.0	282.	536.0
4C11- 0	169	639.	1147.	508.	165.0	525.	633.0
1D11- 6	171	302.	871.	569.	202.0	552.	609.9

RUN 41206E HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	709.2	672.8	695.0	725.4	692.0	712.5	7.0	6.5	6.7
24	990.0	911.7	948.9	1030.5	960.4	991.3	14.5	11.5	13.0
39	1305.3	1215.1	1241.5	1462.3	1394.9	1418.1	46.5	42.0	44.0
48	1460.0	1385.6	1422.8	1689.7	1609.0	1649.0	53.0	45.5	48.5
60	1560.2	1520.8	1535.8	1923.5	1880.2	1896.5	92.5	82.0	86.5
67	1602.4	1501.4	1552.9	1977.4	1840.6	1913.7	122.0	67.0	94.4
70	1563.9	1534.2	1558.6	1974.0	1949.9	1960.2	115.0	106.0	109.7
73	1477.8	1477.8	1477.8	1881.3	1881.3	1881.3	103.0	103.0	103.0
74	1497.1	1490.7	1493.9	1922.3	1910.9	1916.6	133.0	118.0	125.5
75	1467.8	1421.7	1446.6	1867.8	1841.7	1850.5	144.0	101.0	128.0
76	1521.9	1433.9	1477.0	1947.6	1821.4	1877.7	133.0	104.0	122.8
77	1523.4	1412.5	1469.4	1961.3	1841.7	1886.5	132.0	103.0	125.0
78	1545.4	1372.4	1460.4	2002.7	1851.9	1922.0	143.0	108.0	126.9
79	1521.9	1439.3	1484.7	1982.0	1905.1	1933.6	135.0	117.0	130.2
80	1504.6	1380.6	1449.4	2006.2	1854.2	1932.8	133.0	109.0	128.8
81	1465.4	1465.4	1465.4	2016.7	2016.7	2016.7	133.0	133.0	133.0
82	1404.7	1404.7	1404.7	1924.6	1924.6	1924.6	132.0	132.0	132.0
84	1456.8	1356.8	1404.3	1855.3	1704.0	1766.5	175.0	47.0	91.2
90	1456.8	1090.8	1313.4	1872.3	1574.4	1757.6	117.0	62.5	84.7
96	1250.3	925.6	1156.6	1822.5	1491.2	1692.5	116.0	74.5	98.6
102	1403.6	758.8	1005.6	1889.2	1144.2	1535.6	158.0	61.0	111.6
111	993.9	708.2	860.9	1564.6	1230.6	1403.8	149.0	109.0	131.7
120	1035.1	594.2	763.2	1494.4	1126.6	1296.6	189.0	73.5	151.0
132	639.1	454.5	531.5	1147.3	840.6	922.7	220.0	159.0	190.8
136	565.6	301.7	433.7	963.5	870.6	917.0	202.0	191.0	196.5

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	19.2	16.2	17.6	637.4	611.4	620.3	25.4	21.5	23.1
24	48.7	36.0	42.4	787.7	747.6	769.6	52.4	51.4	52.1
39	185.4	157.0	176.6	952.1	829.4	884.9	129.2	112.9	123.0
48	231.5	223.4	226.2	1017.1	945.2	979.5	169.7	162.9	165.2
60	363.3	359.3	360.8	948.5	902.9	928.5	282.6	270.8	276.3
67	381.1	321.9	360.8	971.7	846.4	902.4	356.8	324.5	344.9
70	422.5	390.1	401.6	935.1	692.6	916.2	389.7	366.6	377.7
73	403.5	403.5	403.5	881.4	881.4	881.4	344.6	344.6	344.6
74	431.6	413.6	422.7	723.6	676.2	699.9	426.5	417.7	422.1
75	429.1	377.8	403.9	1061.1	731.1	840.1	426.9	365.7	385.6
76	443.3	362.9	400.8	1123.2	643.7	874.3	458.0	360.7	408.7
77	448.5	391.8	417.1	1041.1	723.4	858.0	463.0	394.7	424.5
78	501.0	374.6	441.5	1105.8	729.1	889.9	469.7	401.8	435.5
79	478.9	384.4	448.8	928.1	822.1	877.2	453.6	426.6	442.9
80	530.1	428.0	483.4	972.2	747.8	872.3	488.4	424.5	457.7
81	551.3	551.3	551.3	865.0	865.0	865.0	470.5	470.5	470.5
82	519.9	519.9	519.9	906.5	906.5	906.5	464.8	464.8	464.8
84	423.1	319.7	362.1	811.9	687.4	754.2	513.5	473.1	489.4
90	622.1	369.5	444.3	859.9	704.6	793.6	582.0	500.7	532.7
96	583.8	454.4	535.9	812.2	723.4	764.6	575.0	550.4	561.3
102	669.0	385.4	530.0	796.7	643.4	714.0	600.8	451.4	567.5
111	642.6	445.7	542.9	696.4	542.0	630.8	623.3	585.0	606.9
120	649.0	379.6	533.5	812.2	587.6	654.5	638.1	447.6	596.9
132	506.2	314.5	391.2	595.5	282.3	497.3	633.0	465.6	557.6
136	568.9	397.9	463.4	551.7	534.1	542.9	609.9	603.1	606.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42006F
Test Date: 6/30/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.278 MPa (40.3 psia)
Initial peak clad temperature and location	875°C (1607°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.56 kw/m (0.779 kw/ft)
Flow rate	23 mm/sec (0.90 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	526°C (509°C - 534°C) [978°F (948°F - 993°F)]
Initial bundle water level	43.4 mm (1.71 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-0.5% to 140 seconds and -1.5% thereafter[a]
Total power:	-0.25% increasing linearly to -0.5%[a]
Housing initial temperature at midplane:	+5%[a]

a. Relative to run 42606A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42006F

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1180.	1361.	181.	42.5	695.	109.9
4C 3- 3	6	1261.	1392.	131.	37.5	899.	103.8
1C 4- 0	7	1378.	1573.	195.	49.0	999.	159.8
2A 5- 0	12	1519.	1858.	338.	75.5	947.	248.7
2A 5- 7	14	1537.	1843.	306.	73.0	912.	306.0
5C 6- 2	33	1451.	1803.	352.	99.5	279.	643.0
2D 6- 3	39	1490.	1798.	307.	89.5	751.	301.3
1D 6- 4	46	1462.	1745.	283.	106.0	974.	355.8
3D 6- 4	50	1492.	1925.	432.	94.5	240.	729.0
4B 6- 4	51	1542.	1809.	267.	72.0	637.	395.7
5D 6- 4	56	1477.	1739.	261.	93.0	742.	424.5
1D 6- 5	58	1459.	1751.	292.	99.0	995.	365.8
2A 6- 5	59	1460.	1765.	305.	91.0	937.	315.6
2D 6- 5	62	1520.	1819.	299.	92.5	836.	394.4
3B 6- 5	63	1553.	1888.	335.	79.0	924.	411.8
3C 6- 6	69	1545.	1949.	403.	96.0	1100.	395.3
3E 6- 6	70	1470.	1811.	342.	113.0	492.	408.6
4C 6- 6	73	1575.	1901.	326.	82.0	817.	402.0
5C 6- 6	76	1527.	1807.	280.	106.0	881.	416.8
3D 6- 7	85	1563.	1933.	370.	91.5	764.	426.7
3C 6- 8	93	1581.	1966.	385.	93.0	908.	416.6
4A 6- 8	95	1434.	1762.	328.	106.0	942.	396.6
1C 7- 0	109	1439.	1740.	301.	59.0	727.	474.0
2B 7- 0	110	1488.	1755.	267.	49.0	764.	458.3
3D 7- 0	113	1516.	1788.	271.	47.5	747.	453.6
5B 7- 0	117	1376.	1630.	253.	51.5	707.	472.8
2B 7- 6	120	1443.	1804.	362.	74.5	847.	492.0
2C 7- 6	121	1447.	1833.	385.	74.5	802.	460.8
2E 7- 6	123	1241.	1594.	353.	57.5	769.	484.5
3A 7- 6	124	1440.	1719.	279.	59.0	860.	479.0
3B 7- 6	125	1500.	1847.	348.	60.5	818.	494.8
4B 7- 6	129	1466.	1814.	348.	73.5	821.	494.8
5C 7- 6	132	1429.	1759.	330.	94.0	833.	496.3
1C 8- 0	133	1274.	1671.	398.	90.5	780.	528.0
2E 8- 0	136	1136.	1513.	377.	94.0	742.	517.9
3D 8- 0	138	1348.	1793.	445.	91.5	863.	507.9
5B 8- 0	143	1210.	1547.	337.	67.0	842.	529.3
5C 8- 0	144	1312.	1701.	389.	92.0	788.	532.8
1C 8- 6	145	1090.	1503.	413.	78.0	823.	554.0
1D 8- 6	146	983.	1287.	304.	71.0	852.	524.0
2C 8- 6	148	1203.	1701.	497.	92.0	755.	537.9
4B 8- 6	153	1197.	1611.	414.	66.0	854.	501.0
5D 8- 6	155	1115.	1513.	398.	99.0	596.	556.4
3D 9- 3	159	1007.	1498.	491.	111.0	732.	549.0
4C 9- 3	161	1066.	1559.	493.	112.0	664.	566.0
1D10- 0	164	663.	1172.	509.	193.0	722.	555.9
4B10- 0	168	905.	1422.	517.	142.0	820.	591.0
5D10- 0	169	752.	1220.	468.	137.0	676.	536.7
2A11- 0	171	537.	879.	342.	161.0	564.	553.0
4C11- 0	172	700.	1192.	492.	152.0	531.	594.9
1D11- 6	* * B A D T H E R M O C O U P L E D A T A *						

RUN 42006F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	738.2	661.8	710.0	749.3	696.2	722.7	6.0	5.0	5.5
24	909.5	909.5	909.5	943.9	943.9	943.9	14.0	14.0	14.0
39	1260.8	1157.6	1199.6	1391.8	1325.7	1359.6	42.5	37.5	40.6
48	1445.0	1337.9	1385.5	1634.1	1525.7	1569.8	53.0	46.5	49.4
60	1519.4	1452.5	1475.5	1857.6	1717.4	1773.4	92.5	72.0	80.0
67	1600.4	1506.4	1558.9	1951.0	1825.9	1875.0	92.5	69.5	77.3
70	1607.0	1400.1	1468.8	1956.7	1670.1	1775.4	105.0	76.5	91.1
71	1559.4	1516.9	1538.2	1930.4	1875.7	1903.0	89.0	82.0	85.5
72	1464.6	1373.8	1419.2	1887.0	1739.7	1813.3	104.0	95.5	99.8
73	1450.3	1380.1	1415.2	1821.4	1751.9	1786.6	113.0	93.5	103.3
74	1488.9	1381.1	1454.8	1883.6	1734.1	1818.6	112.0	84.0	94.3
75	1498.5	1396.9	1452.6	1916.6	1725.2	1801.7	114.0	81.5	96.3
76	1542.1	1411.0	1480.6	1924.6	1729.6	1804.6	111.0	72.0	95.5
77	1552.9	1458.9	1497.6	1888.1	1743.0	1809.0	111.0	79.0	95.9
78	1574.5	1452.5	1512.1	1948.7	1747.5	1824.0	113.0	72.0	91.0
79	1572.3	1444.7	1512.2	1932.7	1741.9	1836.8	135.0	73.5	96.0
80	1581.0	1433.5	1501.7	1965.9	1762.0	1866.9	106.0	92.5	98.7
81	1493.5	1493.5	1493.5	1837.2	1837.2	1837.2	102.0	102.0	102.0
84	1521.8	1376.2	1457.5	1816.9	1629.7	1742.0	71.0	47.5	55.7
90	1499.6	1241.2	1411.3	1876.8	1593.8	1762.2	94.0	57.5	70.8
96	1379.3	1136.1	1289.7	1840.6	1512.8	1695.9	103.0	67.0	86.1
102	1216.9	667.7	1113.9	1700.6	1229.6	1521.9	99.0	66.0	81.2
111	1066.4	871.5	972.8	1559.2	1270.3	1402.2	152.0	75.5	111.3
120	904.9	663.2	800.6	1431.2	1172.3	1300.6	193.0	115.0	142.3
132	699.7	463.7	549.0	1192.0	752.4	935.6	161.0	127.0	147.3
138	633.7	605.7	619.7	1145.3	952.2	1048.7	164.0	156.0	161.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	14.4	11.1	12.7	679.1	642.9	661.0	16.8	16.2	16.5
24	34.4	34.4	34.4	773.1	773.1	773.1	44.9	44.9	44.9
39	180.9	131.0	160.0	918.3	894.9	904.1	109.9	103.8	107.2
48	195.3	165.2	184.3	998.8	893.0	960.4	159.8	146.7	154.1
60	338.2	264.9	297.9	946.6	806.1	861.5	260.8	246.7	256.7
67	350.6	282.1	316.1	1028.2	911.7	974.6	320.6	306.8	312.5
70	349.7	244.7	306.6	985.3	249.0	607.6	688.0	329.6	505.1
71	371.0	358.6	364.9	973.1	282.3	627.7	645.0	345.7	495.3
72	422.4	365.9	394.1	264.0	244.7	254.3	698.0	673.0	685.5
73	371.8	371.1	371.4	1117.8	272.6	695.2	668.0	352.8	510.4
74	403.3	351.9	363.9	876.0	231.8	390.7	726.0	383.1	566.0
75	439.2	277.0	349.0	1448.9	231.8	697.5	728.0	308.4	478.5
76	432.2	238.1	324.1	1129.8	240.4	633.3	729.0	355.8	567.1
77	395.5	273.2	311.4	1103.3	553.6	832.5	437.0	315.6	391.9
78	403.4	265.1	311.9	1106.1	491.5	877.2	436.9	330.4	404.4
79	377.7	284.1	324.6	1059.7	784.2	888.8	447.4	382.7	419.8
80	384.9	326.5	365.2	942.4	803.0	874.9	448.6	396.6	426.6
81	343.7	343.7	343.7	889.3	889.3	889.3	421.7	421.7	421.7
84	308.7	253.5	284.5	845.6	706.8	762.0	475.1	432.5	457.0
90	399.6	276.9	350.9	921.8	771.4	839.5	502.8	466.7	487.5
96	461.3	337.0	406.1	863.1	642.2	787.5	532.8	503.2	519.1
102	497.3	304.1	408.0	755.1	595.6	658.3	561.0	523.0	546.5
111	498.9	349.3	429.4	731.6	522.6	655.8	582.0	497.3	550.6
120	530.0	467.9	500.0	721.6	620.5	668.4	591.0	536.7	569.3
132	492.3	286.7	366.6	582.1	492.9	542.6	594.9	321.9	501.6
138	511.6	346.5	429.1	586.5	553.4	569.9	603.3	564.0	593.6

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42207A
Test Date: 3/26/80
Test Type: Forced Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.273 MPa (39.6 psia)
Initial peak clad temperature and location	872°C (1601°F), 3C 1.96 m (77 in.)
Initial peak rod power	2.3 kw/m (0.70 kw/ft)
Flow rate	28.2 mm/sec (1.11 in./sec)
Coolant temperature	52°C (125°F)
Average and range of initial 1.83 m (72 in.) housing temperature	222°C (219°C - 224°C) [431°F (426°F - 435°F)]
Initial bundle water level	31.62 mm (1.245 in.)

B. Summary Results:

C. Comments:

This test was conducted with a "cold" housing.

Inlet mass flow: approximately 3% increase between 35 and 200 seconds[a]
Total power: linearly increasing from 0% to -1.2% by 370 seconds[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42207A

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1108.	1201.	94.	24.0	881.	74.7
4C 3- 3	11	1196.	1284.	88.	24.0	893.	74.3
1C 4- 0	14	1296.	1411.	115.	26.5	866.	118.6
2A 5- 0	17	1326.	1550.	223.	54.5	884.	174.7
2A 5- 7	21	1365.	1572.	207.	56.0	864.	208.6
1D 6- 2	50	1377.	1652.	275.	60.0	928.	252.9
2D 6- 2	53	1554.	1797.	243.	41.0	961.	247.6
3D 6- 2	58	1587.	1828.	241.	42.0	987.	248.8
5C 6- 2	61	1483.	1675.	191.	39.5	946.	242.8
1D 6- 3	63	1368.	1651.	282.	75.0	921.	261.8
4B 6- 3	68	1542.	1794.	252.	53.5	888.	269.8
5D 6- 3	69	1403.	1693.	290.	66.5	833.	264.7
2A 6- 4	70	1380.	1664.	284.	71.0	905.	269.3
3B 6- 4	75	1585.	1843.	258.	55.0	1018.	258.3
3D 6- 6	79	1556.	1824.	267.	53.5	970.	276.0
2D 6- 5	84	1556.	1808.	251.	53.5	945.	269.8
3C 6- 5	85	1601.	1868.	267.	53.5	917.	273.6
3E 6- 5	86	1486.	1723.	237.	54.5	964.	268.9
3C 6- 6	95	1587.	1860.	272.	53.5	922.	279.8
4A 6- 6	97	1365.	1659.	294.	72.5	940.	276.8
3D 8- 0	98	1300.	1595.	295.	68.0	844.	340.8
5C 6- 6	101	1466.	1655.	189.	40.5	908.	272.8
1C 7- 0	110	1393.	1594.	200.	39.5	709.	308.0
2B 7- 0	111	1400.	1597.	197.	26.5	693.	303.9
3D 7- 0	115	1460.	1663.	202.	27.5	735.	299.0
5B 7- 0	117	1287.	1544.	257.	59.0	669.	302.0
2B 7- 6	120	1414.	1640.	226.	41.5	779.	318.9
2C 7- 6	121	1439.	1684.	246.	41.5	839.	310.0
2E 7- 6	122	1290.	1520.	230.	42.5	721.	314.0
3A 7- 6	123	1292.	1530.	238.	53.5	758.	329.2
3B 7- 6	124	1446.	1703.	257.	41.0	793.	310.0
4B 7- 6	127	1402.	1672.	271.	54.5	742.	329.0
5C 7- 6	128	1256.	1497.	240.	64.5	737.	318.0
1C 8- 0	131	1251.	1519.	268.	65.5	780.	349.5
2E 8- 0	133	942.	1176.	234.	58.5	639.	362.0
4C 6- 6	136	1571.	1840.	269.	55.0	955.	277.7
5B 8- 0	138	1158.	1508.	351.	98.0	801.	330.8
5C 8- 0	139	1142.	1419.	278.	80.0	710.	341.9
1C 8- 6	141	1118.	1364.	246.	41.5	592.	369.0
1D 8- 6	142	1040.	1230.	190.	41.5	555.	362.9
2C 8- 6	143	1158.	1438.	279.	40.5	707.	350.9
4B 8- 6	145	1125.	1417.	292.	41.5	622.	377.0
5D 8- 6	148	996.	1307.	311.	69.0	578.	380.0
3D 9- 3	154	1034.	1333.	299.	79.5	674.	374.0
4C 9- 3	156	1036.	1317.	282.	66.0	663.	374.0
1D10- 0	161	757.	1049.	292.	98.5	696.	348.0
4B10- 0	164	846.	1141.	295.	79.0	608.	394.0
5D10- 0	167	792.	1051.	259.	77.5	467.	373.4
2A11- 0	168	625.	756.	131.	69.5	628.	229.4
4C11- 0	170	680.	924.	244.	92.5	278.	389.0
1D11- 6	172	491.	792.	301.	119.0	646.	278.5

RUN 42207A HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	666.2	615.1	632.5	677.3	625.7	643.3	4.5	4.0	4.4
24	834.4	747.2	790.0	867.5	782.6	823.2	12.0	10.5	11.4
39	1195.7	1065.0	1122.8	1283.9	1164.0	1216.4	24.5	24.0	24.2
48	1326.2	1193.1	1260.4	1450.5	1327.8	1384.2	38.5	26.0	29.5
60	1489.1	1281.2	1357.1	1682.1	1504.1	1565.3	54.5	40.5	49.4
67	1557.6	1365.0	1416.2	1757.5	1572.2	1624.2	56.0	39.0	47.5
70	1593.8	1397.5	1498.2	1823.7	1622.1	1720.9	58.5	39.0	47.0
71	1595.4	1381.8	1504.0	1833.8	1629.7	1736.0	54.5	39.5	45.1
72	1600.8	1380.7	1492.9	1844.0	1589.5	1711.6	54.5	38.5	45.2
74	1593.8	1376.5	1508.8	1842.9	1605.8	1750.7	60.0	39.5	50.1
75	1594.3	1368.2	1504.6	1851.9	1650.5	1762.8	75.0	41.0	56.6
76	1598.1	1360.8	1492.3	1859.8	1596.0	1747.3	77.5	35.5	58.4
77	1600.9	1365.5	1502.4	1867.8	1675.5	1774.7	80.5	53.5	61.4
78	1587.3	1365.0	1482.7	1859.8	1654.8	1751.5	77.5	40.5	60.3
84	1460.1	1214.4	1348.8	1662.5	1451.6	1566.3	69.0	26.5	40.3
90	1445.7	1256.2	1359.2	1702.9	1496.6	1601.5	70.5	40.5	50.6
96	1317.8	942.3	1207.1	1611.2	1176.4	1496.2	98.0	53.5	73.8
102	1158.3	995.9	1078.7	1437.7	1229.6	1341.7	69.0	40.5	47.3
111	1144.2	916.0	993.1	1408.7	1105.8	1241.0	79.5	51.5	65.9
120	863.3	756.5	814.0	1188.9	1027.4	1100.5	98.5	73.0	90.2
132	680.4	624.6	643.6	924.3	755.5	811.7	82.5	69.5	74.6
138	567.3	491.0	606.6	907.8	791.9	836.2	119.0	90.5	101.8

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	11.1	10.5	10.8	628.1	591.5	603.8	12.0	10.3	11.2
24	35.3	31.6	33.2	749.2	708.6	722.5	32.8	26.9	29.0
39	99.0	88.2	93.6	893.1	820.9	865.1	76.9	74.3	75.3
48	134.7	115.0	123.8	958.5	865.9	904.7	118.6	103.0	109.8
60	223.3	193.0	208.2	951.7	884.3	912.5	174.7	160.0	168.4
67	217.3	199.9	208.0	953.6	863.9	898.5	209.6	197.6	204.3
70	238.0	209.3	222.7	1005.4	912.8	948.4	229.9	215.9	223.7
71	255.6	205.1	232.0	1040.4	861.7	939.3	236.8	221.9	229.8
72	245.6	162.9	218.7	1039.5	859.8	928.3	244.7	226.6	235.4
74	276.7	191.3	241.8	1025.4	832.0	937.8	260.8	241.9	248.6
75	290.2	227.8	258.2	993.7	833.5	922.5	269.8	248.9	259.9
76	294.0	156.8	255.0	1017.8	878.7	928.6	269.3	256.8	262.6
77	310.0	236.5	272.3	964.2	825.7	909.2	282.5	262.7	273.1
78	310.4	188.8	268.8	989.9	867.2	930.4	281.8	272.7	276.9
84	257.1	192.5	217.5	759.9	621.6	686.8	313.0	297.5	304.5
90	270.6	219.3	242.3	868.5	721.3	786.4	329.2	310.0	319.0
96	350.6	234.0	289.1	877.9	639.3	779.5	352.0	328.0	343.1
102	310.9	189.9	263.0	707.2	555.0	613.3	380.0	350.9	364.5
111	299.0	176.8	248.0	816.7	483.9	655.7	385.0	302.0	353.9
120	358.6	237.0	286.5	826.7	466.8	653.0	396.0	281.7	359.4
132	243.8	130.9	168.2	627.6	278.0	532.1	389.0	192.9	272.1
138	300.9	167.2	229.6	646.3	490.6	572.0	393.0	246.4	322.8

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42108A
Test Date: 3/26/80
Test Type: Forced Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.269 MPa (39.0 psia)
Initial peak clad temperature and location	872°C (1601°F), 3C 1.83 m (72 in.)
Initial peak rod power	2.3 kw/m (0.70 kw/ft)
Flow rate	39.4 mm/sec (1.55 in./sec)
Coolant temperature	52°C (125°F)
Average and range of initial 1.83 m (72 in.) housing temperature	221°C (217°C - 222°C) [429°F (423°F - 432°F)]
Initial bundle water level	41.10 mm (1.618 in.)

B. Summary Results:

C. Comments:

This test was conducted with a "cold" housing.

Inlet mass flow: approximately 1.3% decrease for first 60 seconds[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42108A

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1092.	1151.	58.	15.5	865.	61.2
4C 3- 3	11	1171.	1230.	59.	15.5	835.	64.6
1C 4- 0	14	1303.	1381.	78.	23.0	845.	98.5
2A 5- 0	17	1312.	1473.	161.	39.0	857.	139.8
2A 5- 7	21	1382.	1504.	122.	36.0	827.	160.4
1D 6- 2	50	1393.	1577.	183.	40.5	877.	183.9
2D 6- 2	53	1558.	1717.	159.	24.0	909.	186.8
3D 6- 2	58	1588.	1743.	155.	23.5	952.	187.0
5C 6- 2	61	1480.	1607.	127.	24.0	848.	185.7
1D 6- 3	63	1383.	1572.	189.	40.5	866.	188.9
4B 6- 3	68	1541.	1700.	158.	38.0	830.	204.7
5D 6- 3	69	1405.	1600.	195.	40.5	810.	198.1
2A 6- 4	70	1390.	1568.	178.	41.0	859.	193.7
3B 6- 4	75	1587.	1740.	160.	24.0	987.	192.0
3D 6- 6	79	1552.	1727.	175.	24.5	961.	205.0
2D 6- 5	84	1559.	1722.	163.	24.0	931.	199.0
3C 6- 5	85	1600.	1766.	166.	24.0	927.	203.8
3E 6- 5	86	1490.	1642.	152.	39.0	912.	200.2
3C 6- 6	95	1584.	1755.	171.	24.0	928.	209.0
4A 6- 6	97	1370.	1560.	190.	40.0	871.	199.0
3D 6- 0	98	1302.	1481.	179.	38.5	843.	259.0
5C 6- 6	101	1464.	1586.	122.	24.0	1809.	155.7
1C 7- 0	110	1412.	1530.	118.	23.0	691.	235.0
2B 7- 0	111	1407.	1501.	94.	10.5	694.	229.1
3D 7- 0	115	1470.	1587.	117.	23.0	708.	225.0
5B 7- 0	117	1294.	1439.	144.	24.5	662.	216.0
2B 7- 6	120	1422.	1566.	144.	23.5	735.	242.5
2C 7- 6	121	1449.	1603.	154.	24.0	792.	234.3
2E 7- 6	122	1300.	1441.	141.	24.5	700.	235.7
3A 7- 6	123	1300.	1443.	143.	24.0	736.	251.0
3B 7- 6	124	1457.	1617.	159.	23.5	749.	234.0
4B 7- 6	127	1414.	1573.	159.	24.0	715.	255.0
5C 7- 6	128	1265.	1401.	136.	39.0	727.	238.0
1C 8- 0	131	1255.	1423.	167.	39.0	775.	259.0
2E 8- 0	133	945.	1083.	138.	39.0	640.	267.0
4C 6- 6	136	1567.	1736.	169.	37.5	939.	206.1
5B 8- 0	138	1162.	1381.	219.	58.0	823.	239.0
5C 8- 0	139	1146.	1314.	168.	40.5	723.	256.9
1C 8- 6	141	1116.	1270.	154.	24.0	580.	288.0
1D 8- 6	142	1035.	1149.	114.	24.5	594.	272.9
2C 8- 6	143	1158.	1334.	176.	23.5	702.	269.1
4B 8- 6	145	1119.	1304.	185.	24.0	630.	293.9
5D 8- 6	148	1008.	1182.	174.	38.0	592.	293.0
3D 9- 3	154	1038.	1213.	175.	39.0	659.	289.0
4C 9- 3	156	1039.	1206.	167.	40.0	626.	293.0
1D10- 0	161	750.	938.	187.	59.0	679.	247.9
4B10- 0	164	843.	1024.	182.	56.5	646.	284.0
5D10- 0	167	789.	979.	190.	60.0	672.	267.0
2A11- 0	168	622.	699.	78.	40.0	637.	117.8
4C11- 0	170	682.	818.	135.	57.5	490.	257.0
1D11- 6	172	443.	707.	263.	89.5	634.	197.7

RUN 42108A HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	644.9	593.6	612.4	653.1	602.5	620.9	3.5	3.5	3.5
24	844.2	753.3	798.2	865.4	776.3	819.6	7.0	6.0	6.5
39	1170.9	1037.8	1100.2	1229.6	1099.5	1159.9	18.0	15.5	16.3
48	1323.3	1196.9	1260.4	1401.2	1283.9	1342.5	23.0	21.0	22.4
60	1457.9	1263.7	1333.7	1598.1	1426.9	1484.2	39.0	24.0	31.4
67	1557.4	1363.8	1422.1	1686.5	1503.0	1553.7	36.0	23.5	27.4
70	1594.8	1396.7	1505.3	1743.0	1534.4	1646.0	36.0	23.5	26.0
71	1595.9	1393.2	1510.2	1748.6	1547.3	1659.7	39.0	23.5	26.0
72	1601.3	1382.0	1498.7	1756.4	1521.4	1638.6	39.0	23.0	26.8
74	1595.2	1393.2	1513.0	1753.1	1537.6	1669.3	40.5	23.5	29.1
75	1594.8	1383.1	1509.1	1756.4	1572.2	1675.9	40.5	24.0	30.9
76	1599.2	1356.9	1494.8	1763.1	1547.3	1659.1	43.0	22.5	30.1
77	1600.2	1374.3	1505.1	1766.4	1580.9	1681.6	44.0	24.0	33.6
78	1584.4	1356.9	1482.1	1755.3	1556.0	1656.5	44.5	24.0	35.2
84	1470.1	1215.3	1357.1	1588.4	1365.6	1485.4	24.5	10.5	22.3
90	1457.3	1264.8	1368.4	1616.7	1401.2	1515.3	40.0	23.5	26.6
96	1319.7	945.4	1203.2	1500.9	1083.0	1380.0	58.0	25.0	40.0
102	1158.1	1000.3	1074.8	1334.1	1149.4	1238.8	38.0	23.5	25.7
111	1144.3	917.2	995.0	1309.0	1047.0	1144.8	40.5	24.0	37.7
120	861.8	750.2	809.8	1049.0	937.7	993.4	60.0	56.5	58.2
132	682.4	621.7	643.8	817.8	699.4	743.0	57.5	39.5	46.0
138	567.7	443.4	590.4	799.2	706.7	751.4	89.5	57.5	67.4

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	8.9	6.1	8.5	599.4	550.7	570.6	9.5	7.4	8.6
24	23.0	20.2	21.4	737.7	700.0	714.9	27.8	20.9	24.1
39	61.7	58.5	59.6	865.0	777.8	826.0	66.3	61.2	64.0
48	87.0	77.9	82.1	887.3	816.3	853.3	98.5	88.5	92.7
60	163.2	137.4	150.5	914.5	850.6	881.9	139.8	130.0	136.6
67	139.2	122.1	131.7	904.8	826.9	869.6	161.9	153.7	158.8
70	148.2	133.1	140.7	903.2	845.9	880.0	179.9	166.8	172.9
71	161.6	132.9	149.5	937.6	768.1	863.2	184.6	172.3	177.7
72	155.0	107.5	139.8	957.6	284.5	815.1	189.0	171.5	180.3
74	185.9	126.5	156.3	966.4	284.5	838.3	199.0	183.0	188.0
75	195.1	144.8	166.8	952.9	810.0	885.4	204.7	188.4	194.3
76	193.7	108.9	164.3	986.6	850.1	913.5	199.9	189.7	193.5
77	210.9	151.9	176.5	978.1	807.3	901.4	212.9	196.0	202.4
78	199.1	122.2	174.4	1808.5	266.6	949.4	209.0	185.7	201.6
84	150.3	93.6	128.3	737.0	625.8	683.9	235.0	216.0	226.9
90	159.4	134.0	146.8	842.7	699.5	759.9	255.0	234.0	241.2
96	219.3	137.6	176.8	850.9	625.8	763.7	270.2	239.0	258.9
102	193.5	114.3	164.0	710.9	580.2	631.3	293.9	256.0	277.2
111	175.1	116.0	149.8	760.5	460.1	637.1	297.0	215.9	267.4
120	222.5	164.6	183.6	758.3	577.2	641.6	308.0	193.7	267.8
132	135.4	77.7	99.2	637.0	489.5	583.3	257.0	117.8	185.7
138	263.3	100.8	161.0	633.9	282.3	518.1	281.0	194.9	231.1

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43208A
Test Date: 4/21/80
Test Type: Forced Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.280 MPa (40.6 psia)
Initial peak clad temperature and location	873°C (1604°F), 3C 1.83 m (72 in.)
Initial peak rod power	2 kw/m (0.7 kw/ft)
Flow rate	38 mm/sec (1.5 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	525°C (518°C - 529°C) [977°F (965°F - 984°F)]
Initial bundle water level	32.41 mm (1.276 in.)

B. Summary Results:

C. Comments:

Total power: linearly increasing from +0.1% to -0.9% by 320 seconds[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43208A

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1094.	1180.	85.	19.0	627.	73.3
4C 3- 3	11	1154.	1220.	66.	17.0	664.	72.9
1C 4- 0	14	1313.	1411.	98.	25.5	834.	113.9
2A 5- 0	17	1345.	1487.	141.	31.5	769.	166.6
2A 5- 7	21	1469.	1633.	164.	38.0	924.	200.7
1D 6- 2	50	1469.	1658.	189.	43.5	931.	241.9
2D 6- 2	53	1573.	1760.	186.	36.5	910.	230.8
3D 6- 2	56	1591.	1792.	201.	36.5	1035.	235.9
5C 6- 2	61	1562.	1665.	163.	35.5	919.	235.9
1D 6- 3	63	1456.	1643.	187.	38.5	940.	249.5
4B 6- 3	66	1542.	1748.	205.	58.5	607.	247.4
5D 6- 3	69	1464.	1656.	192.	40.0	863.	252.9
2A 6- 4	70	1460.	1647.	187.	53.0	901.	259.3
3B 6- 4	75	1573.	1802.	230.	53.0	1029.	251.9
3D 6- 6	79	1535.	1775.	241.	58.5	980.	258.6
2D 6- 5	84	1560.	1772.	212.	41.0	910.	248.8
3C 6- 5	85	1577.	1817.	240.	53.5	961.	250.9
3E 6- 5	86	1400.	1681.	193.	53.0	894.	266.4
3C 6- 6	95	1555.	1802.	247.	54.0	916.	257.7
4A 6- 6	97	1415.	1654.	238.	65.0	957.	264.8
3D 7- 0	98	1103.	1408.	285.	66.5	796.	325.5
5C 6- 6	* * B A D T H E R M O C O U P L E D A T A *						
1C 7- 0	110	1407.	1559.	152.	28.0	694.	301.0
2B 7- 0	111	1421.	1564.	142.	17.5	696.	285.0
3D 7- 0	115	1453.	1603.	149.	18.0	766.	285.0
5B 7- 0	117	1329.	1501.	172.	39.5	719.	283.0
2B 7- 6	* * B A D T H E R M O C O U P L E D A T A *						
2C 7- 6	121	1369.	1575.	207.	30.0	930.	255.9
2E 7- 6	122	1288.	1431.	143.	28.0	718.	302.4
3A 7- 6	123	1315.	1500.	184.	39.0	723.	322.0
3B 7- 6	124	1419.	1620.	201.	32.5	745.	311.0
4B 7- 6	127	1394.	1605.	211.	37.0	765.	312.4
5C 7- 6	128	1284.	1451.	167.	39.5	678.	311.0
1C 8- 0	131	1131.	1411.	280.	65.0	662.	338.7
2E 8- 0	133	701.	1091.	390.	118.0	505.	334.0
4C 8- 6	136	1541.	1782.	241.	58.0	681.	255.0
5B 8- 0	138	1199.	1461.	262.	69.5	693.	319.0
5C 8- 0	139	1123.	1352.	229.	67.5	620.	331.5
1C 8- 6	141	965.	1207.	241.	43.5	550.	339.0
1D 8- 6	142	810.	1060.	251.	59.5	541.	315.8
2C 8- 6	143	1016.	1264.	248.	34.5	743.	302.6
4B 8- 6	145	1085.	1291.	206.	29.5	600.	354.9
5D 8- 6	148	950.	1262.	312.	71.5	603.	350.8
3D 9- 3	154	842.	1181.	339.	87.5	622.	353.0
4C 9- 3	156	944.	1172.	229.	59.0	625.	346.0
1D10- 0	161	597.	888.	291.	96.5	629.	279.9
4B10- 0	164	798.	1013.	215.	69.0	414.	366.9
5D10- 0	167	704.	934.	229.	87.5	604.	303.0
2A11- 0	168	535.	667.	132.	69.0	614.	166.3
4C11- 0	170	625.	802.	177.	71.5	283.	311.0
1D11- 6	172	288.	616.	328.	107.0	283.	209.0

RUN 43208A HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	566.6	534.6	546.5	577.0	546.0	558.6	5.5	4.5	5.1
24	846.4	769.6	807.2	876.8	807.5	839.3	12.0	11.0	11.3
39	1154.5	1049.9	1099.5	1220.2	1133.8	1177.9	19.0	17.0	17.8
48	1328.7	1225.3	1279.9	1432.3	1355.1	1388.6	37.5	24.0	28.5
60	1439.9	1314.0	1355.5	1564.6	1451.6	1490.0	32.5	19.0	25.6
67	1569.4	1466.9	1494.8	1743.0	1633.0	1664.9	38.0	32.5	35.0
70	1599.7	1461.4	1544.3	1794.3	1650.5	1721.9	38.0	31.5	35.7
71	1599.4	1474.2	1545.1	1811.2	1635.2	1726.7	39.5	34.5	37.6
72	1604.0	1456.0	1535.7	1810.1	1624.3	1709.5	42.5	34.0	37.6
74	1590.7	1466.4	1537.7	1796.6	1610.1	1726.5	46.5	35.5	39.4
75	1564.5	1455.7	1529.2	1804.4	1642.8	1730.5	58.5	36.0	43.9
76	1581.0	1446.2	1527.5	1810.1	1647.2	1735.3	58.0	36.0	49.0
77	1577.0	1432.1	1511.9	1816.9	1627.6	1728.4	58.5	41.0	50.7
78	1555.3	1415.3	1499.2	1802.2	1653.7	1736.8	65.0	41.0	56.1
84	1453.1	1265.2	1382.2	1604.7	1414.1	1534.4	39.5	17.5	25.0
90	1416.5	1119.4	1317.3	1619.9	1315.2	1511.4	53.0	26.0	37.4
96	1269.4	701.3	1136.6	1516.0	1091.3	1408.5	118.0	41.0	65.6
102	1065.0	809.7	963.6	1314.2	1060.4	1214.9	71.5	26.0	47.4
111	953.1	706.5	860.9	1180.6	986.2	1090.3	87.5	41.0	60.3
120	797.7	596.6	691.2	1031.5	888.2	967.5	115.0	69.0	86.7
132	625.2	494.0	546.9	802.3	664.7	734.3	94.5	59.0	73.5
136	594.6	267.7	457.1	769.0	616.2	698.8	107.0	70.0	89.7

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	14.4	10.4	12.1	566.5	539.0	549.9	8.0	7.0	7.5
24	37.9	27.4	32.1	774.2	725.3	742.1	29.0	24.6	26.2
39	65.3	65.7	76.3	864.5	749.5	813.5	74.9	72.9	73.7
48	130.6	97.6	106.7	922.5	821.5	863.8	113.9	101.0	106.1
60	142.9	124.7	134.5	854.2	709.1	762.4	170.8	161.9	166.8
67	176.4	164.1	170.0	924.3	698.5	911.0	202.1	200.5	201.0
70	194.6	169.1	177.6	941.4	826.2	892.4	229.1	212.8	219.0
71	211.6	156.6	181.6	986.5	821.5	891.0	232.8	216.0	224.6
72	206.2	147.1	173.6	1037.6	778.6	918.8	240.3	216.0	227.0
74	210.2	143.7	188.0	1042.3	843.0	911.8	246.4	230.8	238.0
75	219.9	167.1	201.3	939.5	801.0	885.5	255.4	236.8	247.1
76	229.5	160.3	207.7	1029.3	892.4	953.8	259.3	242.6	246.7
77	239.9	192.9	216.5	994.3	870.6	924.8	266.4	236.0	255.5
78	252.2	219.7	237.0	998.8	881.3	934.9	271.7	255.0	262.3
84	171.9	134.1	152.2	767.9	625.7	701.6	301.0	263.0	291.2
90	219.4	143.0	194.1	930.1	647.8	757.8	322.0	255.9	306.5
96	390.0	226.6	271.7	795.7	585.5	703.9	338.7	319.0	328.8
102	326.3	176.2	251.3	742.6	541.4	602.2	354.9	302.6	333.1
111	338.8	167.1	229.4	721.2	450.5	591.1	363.0	249.0	325.0
120	375.9	212.8	276.2	679.5	414.1	572.7	366.9	250.9	321.8
132	177.1	131.9	155.4	632.8	283.4	525.0	311.0	166.3	213.6
136	328.5	161.4	241.7	647.8	283.4	414.0	326.0	144.0	246.8

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41808B
Test Date: 6/17/80
Test Type: Forced Reflood
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.273 MPa (39.6 psia)
Initial peak clad temperature and location	873°C (1603°F), 3C 1.96 m (77 in.)
Initial peak rod power	2.3 kw/m (0.70 kw/ft)
Flow rate	37.3 mm/sec (1.47 in./sec)
Coolant temperature	49°C (121°F)
Average and range of initial 1.83 m (72 in.) housing temperature	537°C (534°C - 539°C) [999°F (994°F - 1003°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: -1.5% to 120 seconds, sharp decrease to +1% at 140 seconds, and linearly increasing to -2.5% by 300 seconds[a]

a. Relative to run 43208A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER418088

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1104.	1189.	85.	22.0	804.	78.4
4C 3- 3	11	1227.	1301.	74.	19.0	801.	76.3
1C 4- 0	14	1317.	1406.	89.	20.5	267.	118.0
2A 5- 0	17	1365.	1537.	171.	45.5	862.	170.4
2A 5- 7	21	1458.	1624.	167.	42.5	917.	205.9
1D 6- 2	50	1447.	1594.	146.	38.0	944.	248.9
2D 6- 2	53	1519.	1673.	155.	35.0	706.	268.0
3D 6- 2	58	1548.	1689.	140.	22.0	847.	252.0
5C 6- 2	61	1496.	1645.	149.	33.5	892.	246.5
1D 6- 3	63	1446.	1598.	150.	38.5	846.	230.4
4B 6- 3	68	1532.	1682.	150.	35.0	826.	270.9
5D 6- 3	69	1462.	1646.	184.	53.5	791.	268.5
2A 6- 4	70	1439.	1610.	171.	35.0	866.	272.7
2D 6- 4	72	1546.	1713.	167.	37.5	856.	277.4
3B 6- 4	75	1562.	1724.	162.	35.0	838.	276.9
3C 6- 5	85	1603.	1775.	173.	37.0	897.	272.1
3E 6- 5	86	1484.	1634.	150.	36.0	866.	266.8
3C 6- 6	95	1583.	1780.	197.	38.0	904.	278.0
3D 6- 6	96	1545.	1746.	201.	38.0	895.	270.9
4A 6- 6	97	1408.	1625.	217.	71.0	813.	289.7
4C 6- 6	98	1557.	1754.	197.	38.0	930.	270.8
5C 6- 6	101	1488.	1644.	157.	39.0	870.	277.7
1C 7- 0	110	1451.	1593.	142.	22.0	706.	305.0
2B 7- 0	111	1477.	1611.	134.	19.5	655.	322.0
3D 7- 0	115	1505.	1649.	144.	21.5	726.	293.0
5B 7- 0	117	1365.	1498.	133.	22.0	860.	305.0
2B 7- 6	120	1451.	1624.	173.	32.5	706.	337.0
2C 7- 6	121	1457.	1642.	185.	32.0	866.	346.0
2E 7- 6	122	1241.	1456.	215.	40.5	646.	331.0
3A 7- 6	123	1428.	1603.	175.	34.5	746.	318.7
3B 7- 6	124	1463.	1647.	184.	33.5	773.	316.9
4B 7- 6	127	1474.	1647.	173.	35.5	752.	323.7
5C 7- 6	128	1436.	1597.	161.	39.5	742.	322.9
1C 8- 0	131	1254.	1485.	231.	51.5	757.	338.0
2E 8- 0	133	1063.	1311.	248.	51.0	674.	345.0
3D 8- 0	136	1305.	1536.	231.	42.0	802.	321.9
5B 8- 0	138	1274.	1472.	198.	45.5	692.	338.6
5C 8- 0	139	1334.	1539.	205.	57.0	740.	343.0
1C 8- 6	141	1062.	1266.	204.	35.0	828.	355.0
1D 8- 6	142	870.	1091.	222.	64.0	830.	348.0
2C 8- 6	143	1158.	1368.	210.	33.0	820.	376.0
4B 8- 6	145	1235.	1455.	219.	40.5	700.	360.5
5D 8- 6	148	1033.	1200.	167.	25.0	554.	371.9
3D 9- 3	154	957.	1194.	237.	59.5	874.	346.0
4C 9- 3	156	1074.	1255.	181.	45.5	634.	364.0
1D10- 0	161	605.	920.	315.	96.5	570.	375.0
4B10- 0	164	911.	1095.	184.	59.5	596.	383.0
5D10- 0	167	713.	991.	279.	98.0	725.	324.8
2A11- 0	168	549.	664.	115.	72.0	573.	269.0
4C11- 0	170	662.	829.	167.	57.5	577.	315.0
1D11- 6	172	313.	674.	361.	124.0	495.	336.3

RUN 418088 HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	508.0	481.5	489.9	519.4	496.9	503.6	5.5	5.0	5.1
24	824.2	757.4	782.8	855.1	789.8	815.7	11.0	10.0	10.5
39	1227.0	1103.8	1139.8	1300.6	1188.9	1225.9	23.0	19.0	21.0
48	1370.3	1266.6	1307.2	1476.2	1359.3	1410.5	29.5	20.0	23.0
60	1488.9	1365.1	1396.3	1653.7	1521.4	1568.0	45.5	35.5	39.9
67	1565.6	1439.3	1485.6	1718.5	1618.8	1651.4	42.5	34.0	38.5
70	1600.2	1396.1	1507.6	1772.0	1596.0	1687.8	51.5	33.0	40.3
71	1588.7	1437.1	1517.5	1770.9	1586.3	1682.9	46.0	35.0	37.4
72	1488.5	1375.1	1458.0	1642.8	1566.8	1617.6	50.5	34.0	38.5
74	1554.8	1447.4	1509.6	1699.5	1593.8	1662.1	57.0	22.0	34.2
75	1587.9	1447.8	1523.5	1737.4	1598.1	1678.7	53.5	21.0	36.6
76	1599.1	1427.5	1514.7	1749.7	1610.1	1677.7	85.0	32.0	43.0
77	1602.7	1422.1	1519.7	1775.4	1603.6	1694.5	47.5	36.0	39.4
78	1582.9	1460.2	1495.9	1779.8	1625.4	1696.1	83.5	37.0	50.7
84	1505.0	1365.1	1444.3	1649.4	1497.6	1585.7	22.0	19.5	21.5
90	1473.9	1230.1	1394.8	1647.2	1455.9	1577.7	43.0	31.0	36.2
96	1347.2	1062.9	1260.2	1563.6	1311.0	1494.6	57.0	36.0	45.9
102	1235.3	869.7	1080.4	1454.8	1091.3	1279.5	64.0	25.0	36.4
111	1073.9	662.7	950.6	1254.6	906.8	1140.2	68.0	32.5	50.2
120	911.1	605.4	742.3	1095.4	920.2	1010.8	98.0	59.5	81.4
132	661.9	495.6	556.8	829.2	647.8	704.7	73.0	57.5	66.5
138	642.3	313.1	472.8	798.2	673.1	720.0	124.0	69.5	93.8

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	15.4	11.4	13.7	507.4	491.4	496.4	8.1	6.9	7.5
24	38.3	29.9	32.9	723.5	682.9	699.4	30.0	26.8	28.0
39	94.4	73.6	88.1	820.0	792.4	804.2	78.8	76.3	78.0
48	126.2	88.7	103.4	858.5	284.5	564.2	118.0	111.0	113.4
60	188.1	156.3	169.6	948.7	860.8	884.6	170.4	163.7	168.4
67	179.5	152.9	165.8	951.3	837.8	892.9	210.9	194.0	202.9
70	217.0	144.4	180.3	916.0	849.5	886.2	224.6	218.8	220.7
71	185.4	149.0	165.4	989.8	835.8	917.8	258.4	221.3	231.7
72	191.7	139.0	159.6	953.5	830.2	872.6	238.8	228.9	232.5
74	185.0	139.6	152.5	1028.7	606.7	851.4	306.0	243.7	259.6
75	183.9	132.8	155.2	948.7	675.3	832.2	308.7	230.4	269.5
76	190.3	142.2	162.9	940.1	775.4	874.8	293.0	255.5	269.0
77	189.8	149.8	174.8	896.9	710.9	848.3	312.0	266.8	279.7
78	218.4	157.5	200.2	929.8	808.6	864.4	301.0	270.9	281.7
84	152.3	132.5	141.4	726.4	655.1	689.5	322.0	293.0	306.1
90	234.3	160.6	182.9	799.1	612.1	714.7	346.0	307.0	325.4
96	248.1	195.9	214.4	801.7	674.0	740.0	353.0	321.9	337.9
102	221.6	167.4	199.1	700.4	553.7	618.2	376.0	348.0	360.5
111	244.1	146.2	189.7	716.0	283.4	588.8	380.6	304.0	351.9
120	356.7	184.3	268.8	724.6	557.8	633.5	395.0	324.0	366.3
132	182.7	114.6	147.9	594.8	572.7	581.7	315.0	136.2	256.9
138	361.0	155.9	247.2	552.5	386.6	492.2	356.8	266.3	318.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42008C
Test Date: 8/19/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.275 MPa (39.9 psia)
Initial peak clad temperature and location	882°C (1620°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.3 kw/m (0.69 kw/ft)
Flow rate	37.8 mm/sec (1.49 in./sec)
Coolant temperature	49°C (121°F)
Average and range of initial 1.83 m (72 in.) housing temperature	514°C (504°C - 521°C) [958°F (940°F - 969°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: +1% increasing linearly to -2.5% by 140 seconds, and +1% thereafter[a]

Total power: -0.25% constant[a]

a. Relative to run 43208A

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42009C

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1164.	1194.	90.	26.0	853.	73.5
4C 3- 3	11	1262.	1332.	70.	21.5	814.	81.0
1C 4- 0	14	1373.	1461.	88.	24.0	851.	116.9
2A 5- 0	17	1409.	1591.	182.	39.5	911.	167.9
2A 5- 7	21	1512.	1672.	161.	37.5	907.	203.6
1D 6- 2	50	1482.	1584.	103.	25.0	1040.	198.9
2D 6- 2	53	1510.	1599.	90.	24.0	556.	265.6
3D 6- 2	58	1566.	1642.	76.	13.5	667.	269.4
4B 6- 2	60	1558.	1671.	113.	25.0	1095.	213.8
5C 6- 2	61	1485.	1621.	136.	36.5	1009.	235.1
1D 6- 3	63	1470.	1598.	128.	36.5	1075.	207.8
5D 6- 3	69	1460.	1587.	127.	28.0	1127.	209.8
2A 6- 4	70	1477.	1612.	135.	26.0	1033.	211.7
3B 6- 4	75	1590.	1713.	123.	25.5	753.	274.0
2D 6- 5	84	1558.	1689.	130.	25.0	700.	290.0
3C 6- 5	85	1595.	1740.	145.	25.5	692.	262.6
3E 6- 5	86	1531.	1631.	100.	23.5	742.	279.0
3C 6- 6	95	1577.	1740.	163.	26.0	893.	267.9
3D 6- 6	96	1561.	1724.	163.	33.5	786.	285.8
4A 6- 6	97	1459.	1639.	179.	45.5	1085.	191.5
4C 6- 6	98	1578.	1741.	163.	35.5	775.	288.8
5C 6- 6	101	1556.	1683.	127.	26.0	745.	293.0
1C 7- 0	110	1425.	1557.	132.	23.5	621.	320.0
2B 7- 0	111	1458.	1568.	110.	13.5	694.	302.8
3D 7- 0	115	1461.	1574.	113.	17.5	846.	311.0
5B 7- 0	117	1372.	1499.	127.	23.5	660.	286.0
2B 7- 6	120	1432.	1587.	155.	25.0	687.	316.9
2C 7- 6	121	1403.	1587.	184.	36.5	759.	307.0
2E 7- 6	122	1043.	1347.	304.	50.0	757.	304.0
3A 7- 6	123	1427.	1579.	152.	26.5	626.	346.0
3B 7- 6	124	1449.	1611.	162.	25.5	679.	322.0
4B 7- 6	127	1444.	1601.	157.	25.5	753.	288.0
5C 7- 6	128	1430.	1575.	145.	26.0	645.	329.9
1C 8- 0	131	1218.	1441.	223.	48.5	600.	344.0
2E 8- 0	133	915.	1302.	387.	72.0	752.	324.7
3D 8- 0	136	1283.	1506.	224.	47.5	684.	340.8
5B 8- 0	138	1205.	1380.	176.	38.5	674.	290.3
5C 8- 0	139	1345.	1519.	175.	38.5	621.	347.6
1C 8- 6	141	1021.	1249.	228.	39.0	571.	358.0
1D 8- 6	142	752.	1054.	302.	61.5	607.	319.0
2C 8- 6	143	1113.	1332.	219.	39.0	700.	338.9
4B 8- 6	145	1154.	1323.	169.	25.5	676.	337.0
5D 8- 6	148	1044.	1222.	178.	27.5	668.	311.1
3D 9- 3	154	946.	1186.	240.	65.5	561.	366.3
4C 9- 3	156	1043.	1208.	165.	31.5	564.	363.4
1D10- 0	161	572.	855.	284.	105.0	746.	297.0
4B10- 0	164	864.	1058.	194.	70.5	647.	362.0
5D10- 0	167	707.	921.	215.	73.5	713.	293.7
2B11- 0	168	558.	704.	146.	75.0	575.	259.8
4D11- 0	170	654.	822.	168.	52.0	406.	329.7
1D11- 6	172	466.	691.	225.	98.5	548.	286.0

RUN 42008C HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	634.1	565.2	588.8	639.4	571.6	594.4	3.5	1.0	2.4
24	896.5	818.9	861.0	918.1	844.7	881.9	9.0	7.0	7.8
39	1261.9	1103.7	1162.7	1332.0	1192.0	1241.1	26.0	17.5	22.0
48	1404.4	1324.7	1360.3	1503.0	1440.9	1462.8	26.5	22.5	24.6
60	1423.7	1408.7	1415.9	1634.1	1581.9	1602.2	49.5	39.5	45.7
67	1619.9	1497.8	1533.0	1772.0	1635.2	1687.7	44.5	36.0	38.6
70	1598.1	1413.0	1539.0	1779.8	1541.9	1707.8	49.5	27.5	38.3
71	1553.8	1464.4	1529.6	1728.5	1618.8	1683.3	38.5	29.0	35.6
72	1528.8	1514.9	1520.8	1688.6	1677.7	1683.1	38.5	37.0	37.8
74	1560.9	1463.4	1524.9	1671.2	1550.6	1614.2	25.0	12.5	21.3
75	1598.1	1480.2	1536.2	1715.1	1587.3	1649.9	36.5	17.0	25.5
76	1600.3	1458.0	1542.1	1735.2	1593.8	1663.4	38.5	21.0	26.5
77	1594.9	1444.1	1529.9	1739.7	1610.1	1673.0	48.0	23.5	32.1
78	1580.9	1415.2	1525.2	1746.4	1605.8	1684.6	48.0	25.5	35.9
84	1473.0	1200.6	1402.7	1599.2	1331.0	1532.7	36.5	13.5	23.3
90	1449.4	1042.8	1370.3	1611.2	1346.7	1544.7	50.0	24.5	31.4
96	1365.6	913.1	1249.9	1554.9	1301.6	1461.6	72.0	35.5	43.9
102	1153.6	752.4	1028.1	1332.0	1054.2	1237.5	61.5	25.5	37.9
111	1042.8	660.4	937.3	1218.1	932.6	1129.3	87.5	31.5	50.9
120	867.5	571.6	750.6	1091.3	855.1	984.3	105.0	31.5	72.9
132	654.1	481.8	562.9	822.0	615.2	707.9	75.0	52.0	65.9
138	624.6	465.8	511.2	785.7	653.1	712.3	98.5	71.5	79.8

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	7.5	3.2	5.6	596.7	562.6	574.9	11.1	6.3	8.4
24	25.8	15.5	21.0	729.6	710.2	722.0	35.0	30.9	33.3
39	90.4	70.1	78.4	852.6	769.2	818.9	81.0	73.5	78.1
48	116.2	88.3	102.0	880.4	851.1	865.5	117.0	114.7	116.4
60	210.4	180.7	188.3	918.5	838.0	889.0	175.8	167.9	170.8
67	173.6	132.2	154.6	926.5	824.7	882.7	213.6	200.1	206.7
70	195.4	128.9	168.8	984.5	888.2	890.2	234.6	220.8	226.4
71	174.7	140.2	153.8	994.4	794.0	927.4	229.9	221.3	227.2
72	173.7	150.9	162.3	1048.0	871.2	959.6	235.8	228.7	232.3
74	113.0	78.0	89.2	1094.9	556.4	803.3	311.0	196.8	247.4
75	142.4	67.0	113.0	1127.5	637.2	918.7	287.0	207.8	243.9
76	135.8	74.9	121.3	1130.7	648.8	831.9	314.0	158.5	257.5
77	173.3	99.7	143.1	1081.5	700.4	913.2	290.0	220.7	252.6
78	190.6	128.1	159.4	1084.7	678.3	825.7	319.0	191.5	272.1
84	157.1	109.9	130.0	708.9	608.0	664.9	334.9	270.0	302.5
90	303.9	122.2	174.4	758.9	627.9	702.5	346.0	260.0	311.3
96	386.5	174.6	211.7	780.4	607.9	685.3	358.0	290.3	329.6
102	301.8	169.0	209.4	699.8	570.5	642.5	358.0	311.1	335.7
111	272.2	157.8	192.0	706.7	501.6	585.3	383.9	289.0	350.7
120	208.0	172.3	227.7	746.2	494.7	644.7	381.0	270.5	330.5
132	107.9	133.2	145.1	575.0	405.7	519.0	329.7	203.0	250.3
138	277.3	161.1	201.0	575.6	283.4	495.6	306.0	121.6	248.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41808D
Test Date: 10/14/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.278 MPa (40.3 psia)
Initial peak clad temperature and location	880°C (1616°F), 3C 1.80 m (71 in.)
Initial peak rod power	2.3 kw/m (0.70 kw/ft)
Flow rate	37.8 mm/sec (1.49 in./sec)
Coolant temperature	52°C (126°F)
Average and range of initial 1.83 m (72 in.) housing temperature	503°C (494°C - 511°C) [937°F (921°F - 952°F)]
Initial bundle water level	22 mm (0.85 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-0.5% increasing linearly to -2.5% by 120 seconds; decreased to -0.5% thereafter[a]
Total power:	-0.25% constant[a]
Housing initial temperature at midplane:	approximately -4%[a]
Inlet subcooling:	+9.5% decreasing to +3% by 150 seconds[a]

a. Relative to run 43208A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER41808D

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPRERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1099.	1189.	90.	26.0	801.	88.4
4C 3- 3	9	1230.	1297.	68.	21.0	815.	85.4
1C 4- 0	10	1325.	1404.	80.	21.0	865.	114.9
2A 5- 0	13	1417.	1634.	217.	54.5	919.	164.8
2A 5- 7	16	1482.	1643.	161.	40.0	836.	225.8
2D 6- 2	50	1551.	1679.	128.	29.5	748.	269.7
3D 6- 2	55	1513.	1697.	185.	35.0	264.	520.0
5C 6- 2	59	1536.	1660.	125.	29.5	692.	249.9
1D 6- 3	61	1441.	1608.	167.	43.0	994.	238.9
4B 6- 3	66	1539.	1685.	147.	42.5	857.	272.7
5D 6- 3	68	1446.	1594.	148.	41.5	1014.	233.7
2A 6- 4	70	1451.	1653.	202.	53.0	997.	253.8
3B 6- 4	75	1593.	1741.	148.	32.0	841.	287.9
1D 6- 5	82	1413.	1590.	177.	52.0	952.	251.7
2D 6- 5	84	1534.	1679.	144.	32.0	785.	301.8
3C 6- 5	85	1585.	1740.	155.	41.0	989.	288.8
3E 6- 5	86	1454.	1584.	130.	40.0	910.	270.9
3C 6- 6	97	1573.	1761.	188.	42.5	967.	277.8
3D 6- 6	98	1551.	1722.	171.	43.0	752.	308.8
4A 6- 6	100	1444.	1647.	203.	55.5	817.	305.3
4C 6- 6	101	1558.	1743.	185.	44.5	888.	288.2
5C 6- 6	103	1512.	1655.	143.	43.0	931.	273.9
1C 7- 0	110	1330.	1491.	161.	42.5	709.	305.0
2B 7- 0	111	1412.	1577.	165.	31.0	854.	372.9
3D 7- 0	115	1419.	1567.	147.	23.0	850.	333.7
5B 7- 0	117	1326.	1461.	136.	31.0	705.	291.4
2B 7- 6	121	1400.	1608.	208.	43.5	818.	388.0
2C 7- 6	122	1329.	1575.	236.	43.0	792.	341.0
2E 7- 6	123	1159.	1346.	187.	57.0	678.	337.0
3A 7- 6	124	1404.	1582.	178.	43.5	732.	334.8
3B 7- 6	125	1429.	1616.	187.	34.0	719.	341.0
4B 7- 6	128	1421.	1591.	170.	31.0	746.	339.0
5C 7- 6	129	1408.	1566.	158.	31.5	759.	322.0
1C 8- 0	132	1141.	1429.	288.	84.5	781.	357.9
2E 8- 0	134	1075.	1348.	273.	75.5	737.	355.0
3D 8- 0	137	1287.	1530.	243.	55.5	725.	388.8
5B 8- 0	139	1249.	1459.	210.	56.0	788.	348.0
5C 8- 0	140	1317.	1506.	189.	46.0	788.	348.9
1C 8- 6	141	986.	1290.	304.	76.0	852.	387.0
1D 8- 6	142	805.	1260.	454.	96.0	795.	358.9
2C 8- 6	143	1022.	1291.	269.	53.5	599.	384.0
4B 9- 6	145	1134.	1327.	193.	42.5	870.	389.9
5D 8- 6	148	974.	1288.	314.	75.5	702.	355.7
3D 9- 3	155	908.	1199.	292.	76.0	536.	404.0
4C 9- 3	157	982.	1204.	222.	54.0	542.	401.0
1D10- 0	160	598.	860.	262.	76.0	644.	326.8
4310- 0	163	819.	1042.	223.	76.0	540.	411.0
5D10- 0	166	670.	916.	240.	86.0	665.	305.9
2A11- 0	167	547.	676.	129.	76.5	521.	309.8
4C11- 0	169	617.	805.	188.	76.0	435.	377.9
1D11- 6	170	288.	603.	315.	131.0	560.	308.2

RUN 41806D HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	659.4	605.7	626.4	664.7	612.0	632.0	3.0	2.5	2.7
24	858.2	823.0	842.3	874.7	845.8	863.0	8.5	7.5	8.2
39	1229.6	1095.4	1141.2	1297.4	1179.6	1222.0	26.0	21.0	24.3
48	1334.1	1324.7	1329.4	1416.2	1404.4	1410.3	24.0	21.0	22.5
60	1519.2	1404.4	1447.0	1691.9	1594.9	1640.3	54.5	44.5	50.3
67	1611.2	1481.6	1527.7	1758.6	1641.7	1681.0	40.0	33.0	35.7
70	1623.2	1450.5	1531.0	1766.4	1598.1	1682.2	43.5	26.5	37.7
71	1615.6	1485.9	1543.3	1746.4	1604.7	1685.4	43.0	29.5	34.0
72	1604.7	1354.0	1528.5	1746.4	1498.7	1680.6	56.0	26.5	36.3
74	1564.6	1435.5	1519.7	1729.6	1578.7	1665.2	55.5	28.0	35.1
75	1543.0	1440.9	1497.7	1731.9	1569.0	1648.6	43.5	29.5	37.1
76	1592.7	1450.5	1525.6	1750.8	1610.1	1691.7	65.5	30.5	43.6
77	1565.2	1413.0	1495.7	1739.7	1584.1	1662.0	53.0	32.0	43.4
78	1576.5	1435.5	1513.4	1765.3	1647.2	1701.5	71.5	31.5	46.2
84	1446.2	1225.4	1350.1	1598.1	1399.1	1519.7	43.0	23.0	33.1
90	1429.1	1158.8	1335.3	1615.6	1345.6	1514.3	57.0	26.5	39.4
96	1357.2	1074.8	1237.0	1586.3	1347.7	1465.4	84.5	37.5	57.0
102	1133.8	805.4	973.9	1326.8	1024.3	1236.7	96.0	32.5	63.2
111	982.0	814.7	899.5	1203.5	953.2	1096.7	85.0	34.5	52.0
120	818.9	566.6	687.6	1041.8	860.3	934.9	86.5	76.0	80.1
132	617.3	547.1	572.3	805.4	669.9	717.2	76.5	49.0	67.2
138	606.8	287.7	473.7	777.4	602.5	675.2	131.0	74.5	96.5

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	6.3	5.3	5.6	606.9	572.1	589.8	13.4	8.8	11.2
24	22.8	16.5	20.7	699.7	670.7	687.7	38.8	36.0	37.6
39	90.4	67.8	80.8	815.1	752.9	789.6	88.9	85.4	87.6
48	82.1	79.7	80.9	870.9	864.7	867.8	123.7	114.9	119.3
60	216.8	172.7	193.3	919.1	846.2	883.1	185.9	184.8	185.5
67	161.2	147.4	153.4	892.4	825.2	851.2	228.4	223.9	226.0
70	162.9	143.2	151.2	947.8	841.3	907.6	245.9	231.3	236.7
71	160.0	118.8	142.0	944.1	584.4	831.1	277.0	229.7	251.5
72	199.4	135.0	152.1	910.4	619.4	807.7	280.0	180.6	246.6
74	191.6	119.3	145.4	968.8	565.3	772.5	350.0	219.9	273.7
75	168.9	114.2	150.9	1014.1	757.7	870.4	295.9	233.7	268.7
76	202.1	133.6	166.1	996.6	538.6	808.5	353.0	253.8	288.1
77	221.3	130.4	166.3	990.0	785.3	902.3	301.8	243.7	274.7
78	264.0	143.1	188.1	967.2	727.8	846.7	309.0	273.8	291.6
84	190.6	135.5	161.6	732.2	650.1	687.6	372.9	291.4	318.1
90	236.0	137.5	179.1	823.9	616.2	720.1	386.0	293.0	331.1
96	288.0	171.5	228.4	812.2	612.0	739.5	400.0	345.5	359.5
102	454.5	142.3	262.8	795.5	411.3	655.6	399.9	316.1	363.6
111	291.5	134.3	197.3	623.6	474.2	544.9	428.0	291.7	370.6
120	294.4	208.4	247.2	715.3	477.2	597.6	411.0	255.9	348.2
132	188.1	117.5	144.9	520.8	435.5	476.9	377.9	309.6	335.5
138	314.8	150.8	201.5	559.7	275.9	457.9	361.0	240.0	309.8

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41008E
Test Date: 12/2/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.281 MPa (40.8 psia)
Initial peak clad temperature and location	873°C (1603°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.3 kw/m (0.70 kw/ft)
Flow rate	37.8 mm/sec (1.49 in./sec)
Coolant temperature	49°C (120°F)
Average and range of initial 1.83 m (72 in.) housing temperature	511°C (502°C - 518°C) [952°F (935°F - 965°F)]
Initial bundle water level	36.1 mm (1.42 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: 0% increasing linearly to -2% by 70 seconds and approximately -0.5% thereafter with ±1% oscillations[a]

a. Relative to run 43208A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER41008E

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1202.	1285.	83.	21.0	820.	86.4
4C 3- 3	10	1275.	1340.	65.	18.0	828.	85.6
1C 4- 0	12	1381.	1488.	107.	31.5	900.	114.9
2A 5- 0	16	1524.	1709.	185.	41.0	914.	177.9
2A 5- 7	19	1524.	1671.	147.	32.5	845.	218.9
5C 6- 0	36	1426.	1581.	154.	38.0	1118.	196.0
2D 6- 2	39	1505.	1617.	112.	20.0	714.	241.9
1D 6- 4	47	1464.	1585.	121.	38.5	966.	177.9
3D 6- 4	50	1448.	1654.	206.	39.0	252.	445.0
4B 6- 4	52	1525.	1642.	116.	32.0	740.	159.0
5C 6- 4	54	1474.	1628.	154.	35.0	286.	398.0
5D 6- 4	55	1482.	1592.	110.	32.5	863.	212.9
1D 6- 5	58	1471.	1605.	133.	41.0	1010.	165.9
2A 6- 5	59	1474.	1645.	171.	47.5	872.	197.7
2D 6- 5	61	1522.	1634.	112.	31.5	748.	249.6
3B 6- 5	63	1540.	1668.	128.	31.5	704.	226.0
3C 6- 6	72	1557.	1711.	154.	34.0	694.	204.9
4C 6- 6	75	1571.	1722.	151.	32.5	935.	168.2
3C 6- 7	** B A D T H E R M O C O U P L E D A T A *						
3E 6- 7	83	1479.	1630.	151.	40.0	824.	243.0
3D 6- 8	86	1518.	1694.	176.	41.0	814.	253.3
4A 6- 8	87	1441.	1598.	157.	41.0	799.	258.3
1C 7- 0	93	1405.	1524.	118.	20.0	753.	244.0
2B 7- 0	94	1457.	1561.	105.	17.5	747.	258.9
3D 7- 0	98	1459.	1579.	120.	17.5	732.	272.0
5B 7- 0	103	1395.	1510.	115.	20.5	834.	205.8
2B 7- 6	110	1408.	1568.	160.	31.0	778.	279.0
2C 7- 6	111	1435.	1578.	143.	24.5	973.	217.2
2E 7- 6	113	1231.	1402.	171.	34.0	739.	290.9
3A 7- 6	** B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	115	1165.	1373.	208.	38.0	691.	313.8
4B 7- 6	120	1451.	1611.	160.	32.5	657.	258.0
5C 7- 6	122	1422.	1566.	143.	32.5	831.	257.0
1C 8- 0	124	1225.	1421.	196.	42.0	777.	297.9
2E 3- 0	126	1068.	1288.	220.	58.5	713.	307.0
3D 8- 0	129	1246.	1459.	213.	44.0	767.	301.0
5B 8- 0	133	1247.	1407.	160.	36.5	812.	273.7
5C 8- 0	134	1298.	1487.	189.	41.5	800.	278.9
1C 8- 6	135	1035.	1261.	226.	44.5	889.	321.5
1D 8- 6	136	965.	1189.	224.	56.5	724.	316.3
2C 8- 6	138	1180.	1428.	248.	54.0	841.	288.1
4B 8- 6	143	1156.	1327.	171.	32.5	709.	313.9
5D 8- 6	145	960.	1174.	215.	79.5	654.	318.9
3D 9- 3	150	936.	1163.	227.	55.5	830.	330.2
4C 9- 3	152	1031.	1222.	191.	54.5	833.	328.0
1D10- 0	157	682.	913.	231.	92.0	568.	348.0
4B10- 0	164	864.	1044.	180.	62.0	602.	346.2
5D10- 0	166	696.	906.	210.	88.0	712.	266.9
2A11- 0	168	558.	672.	114.	75.5	539.	236.0
4C11- 0	169	660.	814.	154.	75.5	500.	301.8
1D11- 6	171	380.	632.	252.	92.5	535.	233.6

RUN 41008E HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	645.9	615.5	635.1	655.2	626.8	645.0	4.0	3.5	3.7
24	932.9	857.4	893.6	955.2	882.0	915.7	8.5	7.0	7.5
39	1275.0	1181.1	1211.0	1340.4	1265.1	1290.7	23.5	18.0	20.8
48	1434.9	1354.3	1390.1	1529.0	1444.1	1487.0	31.5	20.5	24.2
60	1554.5	1506.8	1528.4	1722.9	1682.1	1704.5	45.5	40.0	42.2
67	1603.2	1492.8	1551.5	1737.4	1635.2	1691.8	40.0	26.0	32.8
70	1586.0	1539.2	1563.1	1718.5	1669.0	1694.2	31.0	21.0	27.7
73	1486.2	1486.2	1486.2	1612.3	1612.3	1612.3	31.5	31.5	31.5
74	1509.1	1504.6	1506.9	1637.4	1616.7	1627.0	31.0	20.0	25.5
75	1485.3	1447.8	1464.7	1622.1	1573.3	1591.7	43.5	31.0	35.3
76	1538.1	1463.9	1492.4	1655.9	1563.6	1610.9	38.5	20.0	31.8
77	1540.1	1471.4	1495.1	1667.9	1604.7	1629.9	47.5	31.5	37.2
78	1570.7	1424.2	1506.6	1721.8	1593.8	1653.9	44.0	32.0	36.4
79	1541.6	1476.9	1518.2	1700.6	1629.7	1661.1	40.0	20.5	33.0
80	1523.0	1405.1	1474.9	1706.2	1598.1	1653.4	53.0	31.0	43.5
81	1501.6	1501.6	1501.6	1697.4	1697.4	1697.4	42.0	42.0	42.0
82	1441.6	1441.6	1441.6	1634.1	1634.1	1634.1	43.5	43.5	43.5
84	1491.9	1394.6	1438.4	1610.1	1507.4	1558.9	20.5	14.5	18.3
90	1494.9	1164.7	1359.0	1629.7	1346.7	1518.9	41.5	20.0	30.0
96	1335.9	1066.1	1247.7	1529.0	1288.0	1443.0	58.5	33.5	41.9
102	1450.1	761.0	1057.2	1605.8	927.4	1268.9	79.5	31.0	50.1
111	1046.4	721.7	893.5	1240.0	947.0	1100.6	74.5	50.0	57.9
120	1089.9	588.1	793.8	1246.3	905.8	1005.0	117.0	32.0	71.9
132	659.7	469.2	543.0	813.7	611.0	684.8	93.0	46.0	70.0
138	582.5	379.9	461.2	700.4	632.0	666.2	92.5	61.5	77.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	11.3	9.3	10.0	598.8	577.2	587.9	15.5	13.1	14.2
24	24.6	19.3	22.1	726.5	695.3	713.5	37.4	36.9	37.1
39	91.3	65.4	79.6	843.9	814.2	826.4	97.4	81.1	85.1
48	107.1	69.7	97.0	906.0	893.9	899.9	114.9	113.0	114.2
60	184.6	168.4	176.1	963.4	914.4	938.7	177.9	168.8	174.8
67	157.0	123.0	140.3	904.0	802.8	861.0	218.9	199.8	209.9
70	133.3	129.8	131.2	879.9	808.8	842.2	225.0	222.0	223.1
73	126.1	126.1	126.1	683.6	683.6	683.6	226.0	226.0	226.0
74	128.3	112.0	120.2	713.6	687.2	700.4	241.9	235.9	238.9
75	148.2	99.8	127.0	802.6	650.0	728.4	239.0	173.0	214.0
76	154.1	92.2	118.5	967.9	285.6	712.0	398.0	159.0	238.9
77	171.5	112.0	134.8	1010.4	703.6	829.4	249.6	164.9	214.7
78	182.6	108.7	147.3	1062.0	694.0	841.5	250.0	168.2	217.0
79	159.0	111.0	142.9	896.7	764.9	830.5	258.0	173.0	223.2
80	220.3	136.2	178.5	1061.5	798.8	907.8	258.3	168.7	225.0
81	195.8	195.8	195.8	832.3	832.3	832.3	256.8	256.8	256.8
82	192.5	192.5	192.5	876.5	876.5	876.5	251.0	251.0	251.0
84	138.7	104.8	120.6	955.5	664.6	767.3	284.6	196.4	250.3
90	208.2	134.8	159.8	972.7	690.9	789.3	313.8	217.2	275.1
96	219.9	159.8	195.3	824.1	713.0	776.5	318.9	273.7	294.5
102	350.8	132.4	211.7	840.7	654.3	726.0	335.4	212.5	299.4
111	244.4	146.2	207.2	647.9	539.6	594.5	355.6	268.3	324.3
120	328.0	156.4	211.2	712.4	517.3	619.7	348.0	208.6	316.7
132	171.2	114.0	141.3	588.4	499.8	535.4	301.8	51.2	205.6
138	252.1	117.9	185.0	535.4	520.5	528.0	268.0	233.6	250.8

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41608F
Test Date: 6/25/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.279 MPa (40.4 psia)
Initial peak clad temperature and location	875°C (1607°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.27 kw/m (0.692 kw/ft)
Flow rate	38.1 mm/sec (1.50 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	526°C (518°C - 537°C) [979°F (964°F - 999°F)]
Initial bundle water level	-25 mm (-1.0 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: approximately -0.5%[a]
Total power: -1% increasing linearly to -1.5%[a]

a. Relative to run 43208A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER41608F

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1173.	1286.	113.	34.0	826.	89.9
4C 3- 3	6	1270.	1327.	57.	24.5	811.	87.4
1C 4- 0	7	1411.	1491.	80.	21.0	863.	129.0
2A 5- 0	12	1509.	1705.	196.	49.0	903.	179.8
2A 5- 7	14	1528.	1656.	128.	27.5	650.	211.8
5C 6- 2	33	1459.	1595.	136.	39.0	272.	464.0
2D 6- 3	39	1510.	1586.	76.	12.5	665.	257.0
1D 6- 4	46	1494.	1577.	83.	27.0	902.	194.4
3D 6- 4	50	1501.	1690.	189.	39.0	241.	527.0
4B 6- 4	51	1555.	1621.	66.	14.0	695.	262.9
5D 6- 4	56	1478.	1550.	71.	25.5	872.	215.0
1D 6- 5	58	1476.	1579.	103.	27.0	936.	200.8
2A 6- 5	59	1476.	1605.	129.	38.0	1026.	141.7
2D 6- 5	62	1528.	1613.	86.	27.0	687.	262.9
3B 6- 5	63	1566.	1672.	106.	28.0	571.	265.9
3C 6- 6	69	1549.	1706.	158.	38.5	260.	262.0
3E 6- 6	70	1487.	1625.	139.	37.5	287.	272.0
4C 6- 6	73	1590.	1683.	94.	28.0	742.	249.8
5C 6- 6	76	1533.	1629.	95.	27.0	714.	270.0
3D 6- 7	85	1559.	1681.	122.	37.5	734.	258.0
3C 6- 8	93	1579.	1712.	133.	37.5	830.	249.0
4A 6- 8	95	1447.	1601.	154.	37.5	1025.	210.5
1C 7- 0	109	1442.	1533.	91.	16.5	600.	275.0
2B 7- 0	110	1506.	1586.	80.	10.5	724.	266.0
3D 7- 0	113	1518.	1596.	78.	11.5	661.	271.0
5B 7- 0	117	1373.	1455.	82.	13.0	643.	290.1
2B 7- 6	120	1454.	1582.	128.	37.0	765.	280.2
2C 7- 6	121	1453.	1586.	136.	29.0	735.	266.0
2E 7- 6	123	1168.	1318.	130.	26.0	765.	252.7
3A 7- 6	124	1452.	1567.	115.	27.5	765.	277.8
3B 7- 6	125	1509.	1630.	121.	25.5	694.	303.0
4B 7- 6	129	1477.	1601.	124.	27.5	682.	303.0
5C 7- 6	132	1436.	1550.	113.	29.0	710.	303.4
1C 8- 0	133	1250.	1413.	163.	37.5	704.	309.0
2E 8- 0	136	1059.	1206.	146.	40.5	632.	271.0
3D 8- 0	138	1342.	1508.	166.	37.5	603.	301.0
5B 8- 0	143	1283.	1418.	136.	38.5	665.	302.8
5C 8- 0	144	1319.	1471.	152.	37.0	711.	319.0
1C 8- 6	145	1060.	1247.	187.	42.0	627.	332.4
1D 8- 6	146	928.	1072.	144.	38.5	666.	296.7
2C 8- 6	148	1174.	1379.	205.	39.0	724.	319.0
4B 8- 6	153	1190.	1357.	167.	37.5	660.	334.0
5D 8- 6	155	1077.	1216.	139.	29.0	701.	298.0
3D 9- 3	159	994.	1185.	191.	46.0	590.	336.0
4C 9- 3	161	1065.	1247.	182.	46.0	601.	332.0
1D10- 0	164	652.	931.	279.	85.0	640.	269.1
4B10- 0	168	875.	1059.	184.	56.0	559.	350.0
5D10- 0	169	729.	928.	199.	65.5	661.	276.8
2A11- 0	171	516.	659.	143.	62.0	613.	158.0
4C11- 0	172	670.	832.	162.	60.5	525.	267.9
1D11- 6	174	397.	671.	274.	89.5	582.	156.9

RUN 41608F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	748.9	692.6	720.7	757.6	705.6	731.6	5.0	3.5	4.3
24	935.2	935.2	935.2	951.1	951.1	951.1	6.5	6.5	6.5
39	1270.1	1159.7	1200.9	1326.8	1257.8	1290.2	34.0	24.5	30.6
48	1463.5	1351.5	1407.5	1536.5	1422.7	1480.0	21.0	16.0	19.8
60	1509.3	1453.9	1474.4	1705.1	1616.7	1647.2	49.0	39.5	43.3
67	1600.4	1490.0	1553.1	1736.3	1623.2	1672.7	37.5	27.5	31.6
70	1607.0	1374.5	1462.6	1710.7	1506.3	1568.2	37.0	10.5	22.6
71	1573.1	1516.3	1545.7	1683.2	1607.9	1645.5	25.5	14.0	19.8
72	1450.6	1363.0	1406.6	1612.3	1516.0	1564.1	42.5	36.0	40.3
73	1478.2	1416.2	1446.2	1629.7	1580.9	1605.3	45.5	36.0	41.6
74	1505.0	1375.6	1460.3	1633.0	1513.8	1592.4	41.5	25.0	33.1
75	1526.6	1410.4	1464.1	1672.3	1531.1	1593.4	51.0	12.5	33.8
76	1554.7	1403.2	1490.7	1689.7	1511.7	1604.8	42.0	11.5	26.9
77	1565.9	1470.1	1507.4	1672.3	1570.0	1615.7	46.0	27.0	34.6
78	1569.6	1446.2	1520.0	1706.2	1575.4	1630.2	38.5	25.5	31.6
79	1575.6	1394.5	1506.1	1687.5	1514.9	1627.0	38.0	27.5	32.6
80	1576.8	1441.8	1498.3	1711.8	1584.1	1641.4	43.5	29.0	37.3
81	1467.1	1467.1	1467.1	1606.8	1606.8	1606.8	29.0	26.0	26.0
84	1520.4	1372.8	1461.5	1619.9	1454.8	1547.3	18.0	10.5	13.6
90	1508.6	1186.0	1411.9	1629.7	1313.4	1539.5	37.5	25.5	29.1
96	1375.1	1059.5	1287.8	1548.4	1205.6	1447.2	46.0	37.0	38.7
102	1203.3	869.1	1090.1	1381.2	983.1	1246.5	42.0	19.5	33.7
111	1065.4	805.0	930.8	1253.6	934.8	1099.9	56.0	29.0	43.3
120	878.8	651.6	783.2	1100.6	916.1	991.8	85.0	54.0	63.9
132	670.2	460.5	535.8	832.3	557.8	681.7	79.0	34.5	59.0
138	599.7	396.7	524.6	808.5	671.0	727.7	89.5	62.5	74.5

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	13.0	8.7	10.9	645.9	607.4	626.6	19.9	18.5	19.2
24	15.9	15.9	15.9	721.7	721.7	721.7	43.5	43.5	43.5
39	113.0	56.7	89.3	836.7	810.8	824.6	90.6	87.4	89.3
48	80.5	65.5	72.5	872.5	838.5	858.0	129.0	118.0	123.4
60	195.6	156.7	172.8	902.5	895.1	898.4	185.4	179.8	182.9
67	135.9	99.1	119.8	927.9	722.1	835.1	218.8	208.9	212.9
70	166.4	88.5	105.6	939.1	242.5	520.8	522.0	213.8	350.1
71	110.1	89.6	99.8	864.8	281.3	573.1	460.0	222.5	341.3
72	161.7	153.0	157.3	249.0	246.8	247.9	513.0	509.0	511.0
73	162.7	151.5	157.1	279.1	256.5	267.8	488.0	459.0	473.5
74	151.6	111.7	132.1	866.5	247.9	445.2	513.0	176.7	376.9
75	190.9	71.4	129.3	1416.1	243.6	683.9	520.0	105.3	309.1
76	186.7	64.6	114.1	1259.7	241.4	679.5	527.0	182.1	314.1
77	157.0	85.7	108.2	1026.1	259.7	681.8	484.0	141.7	269.4
78	157.0	66.1	110.2	1050.7	280.6	768.1	282.0	157.5	240.1
79	140.6	91.7	118.8	1013.9	624.5	763.2	293.0	200.7	259.8
80	162.7	120.8	143.1	1024.6	723.3	857.0	297.0	210.5	251.4
81	119.7	119.7	119.7	785.8	785.8	785.8	256.0	256.0	256.0
84	99.4	70.2	85.8	794.1	643.1	708.1	290.5	234.0	269.9
90	140.3	113.1	127.8	823.4	602.9	735.4	303.4	252.7	284.2
96	173.3	135.7	159.4	836.5	684.8	759.4	319.8	271.0	301.2
102	205.0	114.0	156.4	723.7	597.4	665.6	336.0	296.7	319.5
111	196.5	107.3	161.0	672.2	583.0	622.2	336.0	253.0	291.8
120	278.9	163.1	206.6	661.3	558.8	594.5	353.0	276.0	324.1
132	181.1	97.3	145.9	613.0	284.5	487.4	287.9	81.0	193.6
138	274.3	120.3	203.1	582.3	474.5	529.3	332.0	166.9	266.3

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41909A
Test Date: 3/24/80
Test Type: Forced Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.270 MPa (39.2 psia)
Initial peak clad temperature and location	872°C (1601°F), 3C 1.96 m (77 in.)
Initial peak rod power	2.3 kw/m (0.69 kw/ft)
Flow rate	147 mm/sec (5.8 in./sec)
Coolant temperature	54°C (130°F)
Average and range of initial 1.83 m (72 in.) housing temperature	217°C (214°C - 219°C) [423°F (418°F - 427°F)]
Initial bundle water level	40.67 mm (1.601 in.)

B. Summary Results:

C. Comments:

Total power: linearly increasing from -0.9% to -1.4% by 90 seconds[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER41909A

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1087.	1099.	11.	2.5	928.	21.9
4C 3- 3	11	1165.	1176.	13.	2.0	909.	23.9
1C 4- 0	14	1295.	1307.	12.	2.0	892.	34.9
2A 5- 0	17	1311.	1335.	25.	3.5	887.	47.7
2A 5- 7	21	1381.	1400.	19.	3.5	869.	55.4
1D 6- 2	50	1423.	1441.	18.	2.5	846.	67.4
2D 6- 2	53	1562.	1582.	20.	2.5	888.	64.9
3D 6- 2	58	1584.	1604.	19.	2.5	850.	67.3
5C 6- 2	61	1489.	1505.	17.	2.5	743.	65.4
1D 6- 3	63	1414.	1436.	22.	3.0	864.	68.8
4B 6- 3	68	1558.	1578.	19.	3.0	856.	67.2
5D 6- 3	69	1433.	1456.	23.	3.0	874.	67.7
2A 6- 4	70	1416.	1434.	18.	3.0	857.	67.4
3B 6- 4	75	1589.	1609.	20.	3.0	854.	69.4
3D 6- 6	79	1551.	1574.	24.	3.0	815.	72.9
2D 6- 5	84	1559.	1580.	21.	3.0	871.	68.9
3C 6- 5	85	1601.	1622.	21.	2.5	855.	71.5
3E 6- 5	86	1502.	1520.	18.	3.0	869.	69.9
3C 6- 6	95	1586.	1609.	23.	2.5	854.	73.0
4A 6- 6	97	1387.	1406.	18.	2.5	813.	71.1
3D 8- 0	98	1303.	1325.	22.	2.5	724.	92.3
5C 6- 6	101	1469.	1485.	16.	2.0	276.	74.0
1C 7- 0	110	1396.	1414.	18.	2.0	754.	79.3
2B 7- 0	111	1398.	1415.	18.	2.0	719.	77.8
3D 7- 0	115	1455.	1473.	18.	2.0	669.	78.5
5B 7- 0	117	1295.	1314.	19.	3.0	696.	76.5
2B 7- 6	120	1427.	1445.	18.	2.5	734.	84.4
2C 7- 6	121	1441.	1462.	21.	2.5	701.	85.9
2F 7- 6	122	1300.	1321.	20.	3.0	851.	83.5
3A 7- 6	123	1309.	1322.	16.	2.5	716.	85.0
3B 7- 6	124	1452.	1472.	20.	2.5	698.	85.4
4B 7- 6	127	1418.	1434.	20.	2.5	747.	85.9
5C 7- 6	128	1275.	1292.	17.	2.5	884.	84.3
1C 8- 0	131	1252.	1271.	19.	2.5	713.	92.3
2E 8- 0	133	937.	952.	16.	3.0	624.	75.0
4C 8- 6	136	1587.	1588.	22.	2.5	814.	72.8
5B 8- 0	138	1167.	1187.	20.	3.0	641.	91.5
5C 8- 0	139	1152.	1169.	17.	3.0	621.	90.8
1C 8- 6	141	1110.	1128.	18.	2.5	505.	99.5
1D 8- 6	142	1018.	1031.	12.	2.5	618.	75.8
2C 8- 6	143	1156.	1174.	18.	2.5	888.	97.8
4B 8- 6	145	1115.	1137.	22.	3.0	859.	98.9
5D 8- 6	148	999.	1021.	22.	3.0	579.	94.2
3D 9- 3	154	1035.	1054.	20.	3.0	576.	103.0
4C 9- 3	156	1033.	1051.	18.	3.0	803.	96.0
1D10- 0	161	755.	772.	17.	3.5	590.	18.1
4B10- 0	164	843.	860.	18.	3.5	287.	70.0
5D10- 0	167	788.	803.	16.	3.5	483.	62.0
2A11- 0	168	618.	626.	9.	3.5	557.	18.0
4C11- 0	170	682.	695.	13.	3.5	596.	16.4
1D11- 6	172	389.	469.	80.	11.5	347.	19.2

RUN 41909A HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	665.9	615.3	632.3	667.8	617.3	634.4	1.0	1.0	1.0
24	834.1	751.1	793.9	839.6	757.6	799.9	2.0	1.5	1.9
39	1164.9	1035.5	1096.0	1177.5	1050.1	1108.7	2.5	2.0	2.3
48	1317.2	1180.5	1251.7	1329.9	1198.3	1265.9	3.0	2.0	2.6
60	1456.0	1266.0	1332.6	1475.2	1288.0	1353.4	3.5	2.5	3.1
67	1547.4	1372.4	1422.8	1564.6	1393.9	1442.6	3.5	2.5	3.3
70	1593.3	1396.9	1510.5	1612.3	1413.0	1528.4	3.0	2.5	2.6
71	1594.5	1403.3	1515.8	1614.5	1421.6	1535.2	3.0	2.5	2.7
72	1600.4	1382.4	1503.7	1622.1	1401.2	1521.9	3.0	2.0	2.6
74	1595.0	1396.5	1524.5	1614.5	1416.2	1543.8	3.0	2.5	2.6
75	1596.1	1414.0	1521.5	1617.8	1435.5	1542.8	3.0	2.5	2.8
76	1599.3	1360.4	1501.6	1619.9	1382.3	1521.8	3.5	2.5	3.0
77	1601.1	1403.9	1517.3	1622.1	1430.2	1540.0	4.0	2.5	3.1
78	1586.3	1357.1	1493.6	1609.0	1375.0	1513.8	3.0	2.0	2.7
84	1455.3	1203.0	1349.6	1473.0	1227.5	1368.2	3.0	2.0	2.4
90	1451.7	1275.0	1366.5	1471.9	1292.2	1385.0	3.0	2.5	2.5
96	1314.7	936.6	1203.6	1337.3	952.2	1223.1	3.0	2.5	2.9
102	1155.2	996.4	1066.2	1174.4	1016.1	1087.3	3.5	2.5	2.7
111	1146.2	914.4	969.7	1164.0	930.5	1006.3	3.5	2.5	3.1
120	856.9	755.3	809.2	873.7	772.2	826.5	4.0	3.5	3.8
132	682.3	616.4	641.6	695.2	625.7	652.6	3.5	2.5	3.3
136	667.6	389.1	571.3	678.3	468.8	601.3	11.5	2.5	5.8

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	2.6	1.9	2.1	607.9	524.8	562.4	4.9	4.5	4.6
24	6.5	5.4	6.0	710.0	676.9	695.2	11.0	9.9	10.6
39	14.6	11.0	12.7	927.5	840.3	892.5	23.9	21.9	23.1
48	17.6	11.7	14.2	901.1	827.4	878.5	34.9	32.6	33.9
60	24.7	17.2	20.6	911.4	787.7	862.2	48.4	47.4	48.0
67	21.7	17.2	19.9	889.2	860.6	877.6	56.9	55.4	56.3
70	19.0	16.1	17.6	876.3	852.1	864.1	61.9	59.7	60.6
71	20.5	16.2	19.4	896.9	819.2	853.5	63.4	60.9	62.2
72	21.7	13.4	16.2	878.3	692.2	815.8	64.5	61.0	63.5
74	20.5	16.7	19.3	887.6	742.5	833.1	67.5	62.4	66.1
75	23.1	16.9	20.7	874.5	826.4	854.6	68.8	67.2	67.9
76	23.5	16.1	20.2	887.3	725.7	835.1	70.5	64.6	68.4
77	26.3	16.5	22.6	873.1	821.8	851.3	71.8	66.9	70.7
78	23.7	15.6	20.1	854.1	275.0	769.7	74.0	69.2	71.8
84	24.5	15.1	16.4	753.6	670.5	706.6	80.0	74.0	78.3
90	20.9	14.6	18.5	750.0	650.6	708.1	86.9	83.5	85.4
96	22.6	15.6	19.5	724.3	598.2	663.5	92.5	75.0	90.2
102	22.3	12.5	19.1	694.0	523.2	608.8	99.5	75.8	91.6
111	19.7	13.7	16.6	612.2	406.6	544.5	103.0	56.5	89.3
120	22.0	14.6	17.3	596.4	282.3	407.1	78.0	16.1	61.7
132	12.9	9.1	10.8	598.5	555.6	577.5	19.0	16.4	17.7
136	79.7	9.4	30.1	579.9	397.5	514.3	21.2	19.2	20.2

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41709B
Test Date: 6/16/80
Test Type: Forced Reflood
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.273 MPa (39.6 psia)
Initial peak clad temperature and location	877°C (1610°F), 3C 1.96 m (77 in.)
Initial peak rod power	2.3 kw/m (0.69 kw/ft)
Flow rate	147 mm/sec (5.79 in./sec)
Coolant temperature	51°C (124°F)
Average and range of initial 1.83 m (72 in.) housing temperature	333°C (308°C - 354°C) [631°F (586°F - 670°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+2.5% linearly increasing to -4.0% by 100 seconds[a]
Total power:	-0.5% constant[a]
Inlet subcooling:	-12.5% linearly decreasing to -3% by 100 seconds[a]

a. Relative to run 41909A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER417098

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1029.	1043.	14.	3.5	795.	22.9
4C 3- 3	11	1205.	1219.	14.	2.5	897.	22.9
1C 4- 0	14	1299.	1316.	17.	3.5	804.	33.0
2A 5- 0	17	1318.	1345.	27.	4.0	870.	46.9
2A 5- 7	21	1394.	1418.	24.	4.0	818.	56.8
1D 6- 2	50	1277.	1304.	27.	4.0	828.	64.0
2D 6- 2	53	1427.	1452.	25.	3.5	678.	60.5
3D 6- 2	58	1486.	1511.	25.	3.5	860.	43.6
5C 6- 2	61	1463.	1487.	24.	3.5	807.	66.5
1D 6- 3	63	1301.	1330.	29.	4.0	804.	63.0
4B 6- 3	68	1512.	1533.	21.	3.5	800.	65.0
5D 6- 3	69	1420.	1449.	29.	4.0	815.	71.4
2A 6- 4	70	1390.	1413.	23.	4.0	758.	68.9
2D 6- 4	** B A D T H E R M O C O U P L E D A T A *						
3B 6- 4	75	1561.	1586.	25.	3.5	764.	68.7
3C 6- 5	85	1610.	1633.	23.	3.5	1045.	45.4
3E 6- 5	86	1401.	1428.	27.	4.0	813.	69.9
3C 6- 6	95	1595.	1621.	26.	3.5	999.	51.4
3D 6- 6	96	1522.	1551.	29.	3.5	931.	58.5
4A 6- 6	97	1343.	1368.	25.	4.0	791.	69.8
4C 6- 6	98	1573.	1599.	26.	3.5	944.	60.4
5C 6- 6	101	1478.	1500.	22.	3.5	804.	71.4
1C 7- 0	110	1385.	1410.	25.	3.5	707.	78.3
2B 7- 0	111	1431.	1455.	24.	3.5	698.	78.9
3D 7- 0	115	1452.	1477.	25.	2.5	761.	76.5
5B 7- 0	117	1319.	1338.	20.	2.5	719.	78.9
2B 7- 6	120	1416.	1442.	26.	3.5	710.	89.0
2C 7- 6	121	1436.	1463.	27.	3.5	699.	88.6
2E 7- 6	122	1152.	1184.	32.	4.5	683.	87.0
3A 7- 6	123	1396.	1422.	26.	3.5	708.	88.7
3B 7- 6	124	1445.	1473.	28.	3.5	701.	88.3
4B 7- 6	127	1464.	1490.	26.	3.5	723.	86.0
5C 7- 6	128	1408.	1433.	25.	3.5	740.	86.4
1C 8- 0	131	1216.	1245.	30.	4.0	675.	96.4
2E 8- 0	133	1030.	1060.	30.	4.5	620.	95.3
3D 8- 0	136	1287.	1316.	30.	4.0	662.	94.0
5B 8- 0	138	1230.	1257.	27.	4.0	671.	96.5
5C 8- 0	139	1311.	1333.	23.	3.5	681.	95.1
1C 8- 6	141	1039.	1065.	25.	3.5	624.	102.9
1D 8- 6	142	920.	943.	23.	3.5	584.	103.0
2C 8- 6	143	1142.	1171.	29.	3.5	653.	103.0
4B 8- 6	145	1202.	1234.	32.	4.0	655.	101.5
5D 8- 6	148	934.	961.	27.	3.5	593.	102.0
3D 9- 3	154	983.	1008.	25.	4.0	540.	100.0
4C 9- 3	156	1049.	1071.	22.	3.5	558.	109.8
1D10- 0	161	736.	758.	22.	5.0	382.	58.4
4B10- 0	164	869.	889.	20.	4.0	550.	90.1
5D10- 0	167	723.	745.	22.	5.0	471.	53.1
2A11- 0	168	572.	586.	14.	4.0	503.	23.5
4C11- 0	170	657.	674.	17.	4.5	560.	19.8
1D11- 6	172	288.	363.	75.	12.0	296.	16.0

RUN 417098 HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	636.4	582.6	602.1	638.3	585.5	604.5	1.5	1.0	1.1
24	793.2	730.8	757.6	801.3	736.8	764.9	2.0	2.0	2.0
39	1204.8	1028.6	1100.1	1219.1	1042.8	1115.2	3.5	2.5	3.1
48	1371.1	1225.7	1281.4	1388.6	1246.3	1300.4	4.5	3.5	3.8
60	1504.5	1304.4	1371.1	1530.1	1329.9	1398.8	4.0	3.5	3.9
67	1581.6	1364.0	1447.5	1604.7	1396.0	1473.6	4.5	3.5	4.0
70	1599.7	1317.6	1473.3	1625.4	1345.6	1499.1	4.5	3.5	3.8
71	1575.1	1270.8	1452.3	1602.5	1297.4	1480.3	4.0	3.5	3.8
72	1456.4	1294.8	1389.8	1481.6	1320.5	1416.4	4.0	3.5	3.7
74	1520.8	1277.1	1442.3	1543.0	1303.7	1467.5	4.0	2.5	3.5
75	1567.3	1301.1	1466.1	1590.6	1329.9	1491.4	4.0	3.5	3.7
76	1594.3	1336.7	1475.3	1616.7	1366.6	1499.9	4.5	3.5	3.7
77	1609.5	1267.7	1473.3	1633.0	1297.4	1498.7	4.0	3.5	3.9
78	1594.5	1333.6	1466.2	1621.0	1363.5	1493.6	4.5	3.5	3.8
84	1481.2	1284.4	1392.1	1505.2	1307.9	1415.2	3.5	2.5	3.1
90	1463.9	1152.0	1351.4	1490.2	1183.7	1377.4	4.5	3.5	3.6
96	1326.4	1030.0	1243.7	1356.1	1060.4	1272.0	4.5	3.5	4.0
102	1201.9	919.7	1047.8	1233.8	942.9	1075.4	4.0	3.5	3.6
111	1048.5	823.3	955.3	1070.7	843.7	976.9	4.0	3.5	3.8
120	868.8	723.5	784.5	889.2	745.1	806.0	5.0	4.0	4.4
132	657.5	541.0	596.4	674.1	555.6	610.7	4.5	4.0	4.3
138	646.0	288.1	549.5	660.4	363.3	575.7	12.0	3.5	5.7

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	3.0	1.9	2.4	594.8	563.2	572.5	5.0	4.5	4.8
24	8.1	6.0	7.3	710.8	653.4	675.4	10.8	10.0	10.2
39	18.2	13.9	15.2	897.2	795.4	849.5	23.0	22.0	22.7
48	24.8	16.4	19.0	915.1	804.0	850.5	33.3	32.8	33.1
60	32.8	25.5	27.7	901.1	860.8	873.6	48.5	45.9	47.3
67	32.0	23.1	26.1	864.4	817.6	843.5	57.3	56.4	56.9
70	28.6	22.1	25.8	851.4	706.2	795.6	62.3	60.9	61.5
71	32.5	24.1	28.0	882.0	715.8	795.3	64.8	61.1	62.5
72	29.7	25.2	26.5	831.0	765.6	809.4	64.0	61.9	63.3
74	29.5	22.0	25.2	1262.6	628.9	829.7	67.0	20.3	60.0
75	29.5	21.1	25.3	1106.0	800.0	863.5	71.4	34.9	61.9
76	29.9	20.0	24.5	1083.8	757.6	848.7	69.2	39.4	62.6
77	29.7	23.5	25.4	1044.7	739.5	834.0	70.4	45.4	66.3
78	32.0	22.0	27.4	999.2	762.7	828.9	72.0	51.4	67.7
84	25.0	19.6	23.0	760.6	697.6	722.0	80.0	76.5	78.5
90	31.7	21.7	25.9	740.0	659.0	699.8	89.0	86.0	87.6
96	30.4	22.6	28.3	681.7	620.2	663.4	96.5	94.0	95.6
102	32.6	23.2	27.6	676.8	570.1	623.9	103.9	101.5	102.7
111	25.3	19.3	21.5	637.6	539.8	575.6	110.2	76.9	97.5
120	27.4	18.4	21.5	607.9	286.6	487.5	90.1	53.1	72.7
132	16.6	12.6	14.3	559.7	485.8	522.4	23.5	19.8	21.6
138	75.2	11.4	26.2	555.6	296.3	477.9	30.5	16.0	23.6

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41909C
Test Date: 8/18/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.275 MPa (39.9 psia)
Initial peak clad temperature and location	881°C (1618°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.3 kw/m (0.69 kw/ft)
Flow rate	152 mm/sec (5.98 in./sec)
Coolant temperature	51°C (123°F)
Average and range of initial 1.83 m (72 in.) housing temperature	208°C (203°C - 215°C) [407°F (398°F - 419°F)]
Initial bundle water level	14 mm (0.57 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+9.5% decreasing linearly to 0% by 40 seconds and then increasing to +2.5%[a]
Total power:	+1% constant[a]
Inlet subcooling:	-12% decreasing linearly to -3% by 75 seconds[a]

a. Relative to run 41909A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER41909C

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1027.	1042.	15.	3.5	843.	21.9
4C 3- 3	11	1206.	1222.	17.	3.5	894.	24.9
1C 4- 0	14	1323.	1340.	18.	3.5	924.	34.0
2A 5- 0	17	1338.	1367.	28.	4.5	858.	49.1
2A 5- 7	21	1442.	1466.	24.	4.0	844.	58.6
1D 6- 2	50	1390.	1406.	16.	3.5	1013.	35.9
2D 6- 2	53	1400.	1422.	22.	2.5	638.	64.5
3D 6- 2	58	1487.	1510.	22.	2.5	715.	64.6
4B 6- 2	60	1506.	1526.	19.	2.5	810.	65.9
5C 6- 2	61	1382.	1413.	31.	4.0	677.	66.3
1D 6- 3	63	1405.	1418.	13.	2.5	1026.	40.9
5D 6- 3	69	1390.	1412.	22.	3.5	896.	58.9
2A 6- 4	70	1399.	1421.	21.	3.5	878.	60.4
3B 6- 4	75	1569.	1591.	21.	3.5	785.	67.4
2D 6- 5	84	1536.	1558.	22.	3.5	781.	68.0
3C 6- 5	85	1600.	1627.	26.	3.5	1055.	42.9
3E 6- 5	86	1505.	1519.	14.	2.5	785.	67.3
3C 6- 6	95	1589.	1617.	27.	3.5	992.	48.9
3D 6- 6	96	1574.	1599.	25.	3.5	781.	71.0
4A 6- 6	97	1393.	1419.	26.	4.0	862.	64.4
4C 6- 6	98	1596.	1622.	26.	3.5	757.	70.8
5C 6- 6	101	1561.	1579.	17.	3.5	773.	70.2
1C 7- 0	110	1445.	1468.	23.	2.5	727.	75.9
2B 7- 0	111	1440.	1467.	26.	3.5	715.	76.0
3D 7- 0	115	1460.	1486.	26.	3.0	678.	76.9
5B 7- 0	117	1285.	1308.	23.	3.5	702.	78.0
2B 7- 6	120	1470.	1496.	25.	3.5	741.	83.5
2C 7- 6	121	1484.	1510.	25.	3.5	753.	84.9
2E 7- 6	122	1344.	1369.	25.	4.0	731.	87.4
3A 7- 6	123	1427.	1453.	25.	3.5	725.	83.4
3B 7- 6	124	1471.	1499.	28.	3.5	707.	84.9
4B 7- 6	127	1461.	1489.	28.	3.5	715.	85.8
5C 7- 6	128	1442.	1468.	26.	3.5	698.	82.5
1C 8- 0	131	1320.	1348.	27.	4.0	647.	93.3
2E 8- 0	133	1258.	1285.	27.	4.0	703.	94.0
3D 8- 0	136	1376.	1406.	29.	3.5	691.	92.5
5B 8- 0	138	1137.	1169.	32.	4.5	628.	94.0
5C 8- 0	139	1369.	1396.	27.	3.5	648.	91.1
1C 8- 6	141	1149.	1180.	31.	4.0	643.	100.4
1D 8- 6	142	1015.	1045.	30.	4.0	591.	100.7
2C 8- 6	143	1203.	1235.	31.	4.0	674.	99.9
4B 8- 6	145	1155.	1184.	29.	3.5	627.	100.6
5D 8- 6	148	1049.	1080.	31.	4.0	538.	97.4
3D 9- 3	154	1048.	1076.	27.	4.0	585.	106.7
4C 9- 3	156	1077.	1103.	25.	4.0	559.	105.8
1D10- 0	161	771.	793.	22.	6.0	593.	52.3
4B10- 0	164	871.	897.	25.	5.0	499.	81.0
5D10- 0	167	788.	812.	24.	5.5	560.	65.4
2A11- 0	168	655.	668.	13.	5.5	551.	31.1
4C11- 0	170	699.	717.	18.	4.0	587.	20.6
1D11- 6	172	349.	480.	131.	13.5	287.	34.5

RUN 41909C HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	667.8	572.7	620.4	673.1	577.0	624.3	2.0	1.5	1.6
24	853.5	779.9	822.6	862.3	788.8	831.3	3.0	2.5	2.7
39	1205.6	1026.8	1096.8	1222.3	1041.8	1113.5	4.0	3.5	3.6
48	1355.6	1239.0	1296.3	1376.0	1263.0	1317.1	4.0	3.5	3.8
60	1356.6	1338.3	1347.6	1386.5	1366.6	1376.7	4.5	4.5	4.5
67	1518.3	1424.2	1480.5	1643.9	1454.8	1506.9	4.5	4.0	4.1
70	1549.5	1329.4	1471.6	1581.9	1354.0	1501.4	5.0	4.0	4.2
71	1483.2	1348.2	1446.5	1513.8	1379.2	1477.5	4.5	3.5	4.0
72	1455.8	1451.6	1453.7	1485.9	1485.9	1485.9	4.5	4.0	4.3
74	1510.1	1347.7	1442.5	1532.2	1367.7	1463.2	3.5	2.5	2.7
75	1566.3	1390.2	1485.7	1589.5	1411.9	1505.3	3.5	2.5	3.1
76	1591.1	1369.8	1500.1	1614.5	1392.8	1520.7	4.0	2.5	3.5
77	1600.3	1405.0	1507.9	1626.5	1428.0	1530.3	4.0	2.5	3.4
78	1596.5	1393.3	1515.4	1622.1	1419.4	1540.1	4.0	3.5	3.7
94	1492.8	1207.6	1392.0	1514.9	1229.6	1416.1	3.5	2.5	3.3
90	1484.2	1313.1	1429.8	1509.5	1336.2	1455.3	4.0	3.5	3.6
96	1395.4	1136.9	1317.1	1425.9	1169.2	1345.5	4.5	3.5	3.9
102	1203.5	1015.0	1128.0	1234.8	1044.9	1157.9	4.0	3.5	3.9
111	1077.4	937.2	1020.0	1102.6	957.3	1043.5	4.0	4.0	4.0
120	941.8	770.6	845.9	966.6	793.0	871.4	5.0	4.0	5.5
132	699.3	635.1	657.6	717.1	649.9	672.0	6.0	4.0	4.9
138	636.7	349.0	585.4	705.6	479.6	624.9	13.5	4.0	6.9

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	5.2	2.6	4.0	622.3	511.6	572.3	6.0	5.5	5.7
24	8.8	8.3	8.6	742.5	701.9	726.6	11.9	11.3	11.5
39	20.0	15.0	16.7	898.6	831.9	867.1	25.7	21.3	23.5
48	24.0	17.3	20.8	923.9	892.3	905.4	34.9	34.0	34.5
60	29.9	28.3	29.2	865.0	849.1	857.3	49.5	49.0	49.2
67	30.6	23.6	26.4	864.8	831.4	846.9	59.0	57.5	58.5
70	35.4	24.6	29.7	860.5	578.2	770.1	64.5	62.2	63.4
71	33.3	29.0	31.0	787.8	654.5	717.8	65.0	61.9	63.8
72	34.3	30.0	32.2	748.6	619.4	684.0	64.6	64.2	64.4
74	24.3	12.0	20.7	1038.2	638.4	825.2	65.9	27.8	53.8
75	23.2	12.9	19.6	1097.1	746.2	909.4	68.5	33.9	53.5
76	25.0	12.0	20.7	1051.7	769.4	856.4	68.1	38.4	60.7
77	26.2	14.0	22.4	1069.0	781.0	906.2	69.4	40.9	57.6
78	28.3	17.3	24.8	992.4	724.2	819.1	71.0	48.9	67.7
94	28.4	18.8	24.1	741.2	661.5	708.2	78.0	75.5	76.7
90	27.9	22.0	25.5	752.5	697.1	718.9	87.4	78.0	83.9
96	32.2	24.5	28.4	704.8	628.3	676.0	94.0	91.1	92.7
102	31.3	27.5	29.9	674.0	538.2	616.1	101.0	95.6	99.4
111	27.3	19.0	23.5	603.5	558.5	576.9	106.7	84.0	99.9
120	30.5	22.4	25.5	593.1	377.2	512.9	92.9	52.3	77.0
132	17.7	11.6	14.3	586.9	547.1	564.3	31.1	20.0	24.5
138	130.6	11.5	39.5	570.1	286.6	493.7	34.5	23.0	26.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43009D
Test Date: 10/21/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.279 MPa (40.4 psia)
Initial peak clad temperature and location	872°C (1602°F), 3C 1.98 m (78 in.)
Initial peak rod power	2.3 kw/m (0.69 kw/ft)
Flow rate	147 mm/sec (5.78 in./sec)
Coolant temperature	52°C (125°F)
Average and range of initial 1.83 m (72 in.) housing temperature	294°C (287°C - 302°C) [561°F (549°F - 576°F)]
Initial bundle water level	86.6 mm (3.41 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+2.5% increasing to -7% by 10 seconds; decreased to -2.5% by 20 seconds[a]
Total power:	+0.75%[a]
Inlet subcooling:	-12% linearly decreasing to -2.5% by 75 seconds[a]

a. Relative to run 41909A

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER430090

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1045.	1054.	9.	2.5	785.	24.0
4C 3- 3	9	1202.	1212.	10.	2.5	659.	24.5
1C 4- 0	10	1269.	1279.	10.	2.5	801.	35.4
2A 5- 0	13	1365.	1389.	23.	4.0	881.	50.9
2A 5- 7	16	1405.	1424.	18.	3.0	882.	59.0
2D 6- 2	50	1490.	1507.	17.	2.5	985.	37.0
3D 6- 2	55	1484.	1515.	31.	4.0	911.	73.5
5C 6- 2	59	1480.	1497.	17.	2.5	907.	64.4
1D 6- 3	61	1402.	1416.	16.	2.5	962.	39.4
4B 6- 3	66	1507.	1523.	15.	2.5	1023.	36.4
5D 6- 3	68	1397.	1415.	19.	3.0	951.	44.9
2A 6- 4	70	1392.	1409.	17.	2.5	1056.	24.9
3B 6- 4	* * B A D	T H E R M O C O U P L E	D A T A *				
1D 6- 5	82	1399.	1416.	22.	3.5	936.	47.9
2D 6- 5	* * B A D	T H E R M O C O U P L E	D A T A *				
3C 6- 5	85	1600.	1617.	17.	2.5	1099.	27.4
3E 6- 5	86	1449.	1463.	14.	2.5	925.	45.3
3C 6- 6	97	1602.	1619.	16.	2.5	1076.	33.0
3D 6- 6	98	1566.	1583.	17.	2.5	1059.	31.9
4A 6- 6	100	1435.	1452.	16.	2.5	916.	59.9
4C 6- 6	101	1579.	1594.	15.	2.5	1046.	39.4
5C 6- 6	103	1507.	1519.	12.	2.5	824.	68.2
1C 7- 0	* * B A D	T H E R M O C O U P L E	D A T A *				
2B 7- 0	111	1441.	1461.	20.	2.5	772.	69.6
3D 7- 0	115	1464.	1482.	17.	2.5	807.	51.8
5B 7- 0	117	1301.	1317.	16.	2.5	687.	71.2
2B 7- 6	121	1437.	1456.	19.	2.5	725.	79.0
2C 7- 6	122	1402.	1402.	19.	2.5	722.	82.6
2E 7- 6	123	1235.	1256.	21.	3.0	656.	79.4
3A 7- 6	124	1414.	1430.	16.	2.5	716.	80.0
3B 7- 6	125	1400.	1499.	19.	2.5	701.	79.2
4B 7- 6	126	1453.	1472.	19.	2.5	746.	79.3
5C 7- 6	129	1408.	1427.	19.	2.5	713.	77.9
1C 8- 0	132	1266.	1284.	18.	3.0	660.	89.4
2E 8- 0	134	1133.	1157.	24.	3.5	647.	86.0
3D 8- 0	137	1390.	1410.	20.	2.5	787.	82.8
5B 8- 0	139	1240.	1260.	20.	3.0	666.	87.8
5C 8- 0	140	1350.	1369.	19.	3.0	606.	86.5
1C 8- 6	141	1140.	1163.	23.	3.0	649.	96.8
1D 8- 6	142	1085.	1108.	23.	3.0	621.	96.3
2C 8- 6	143	1196.	1217.	21.	2.5	569.	97.9
4B 8- 6	145	1221.	1243.	22.	2.5	665.	96.9
5D 8- 6	146	1131.	1154.	23.	3.0	602.	95.9
3D 9- 3	155	1104.	1123.	20.	3.0	566.	102.0
4C 9- 3	157	1095.	1115.	20.	3.0	565.	103.0
1D10- 0	160	686.	712.	26.	5.0	591.	64.2
4B10- 0	163	904.	922.	19.	3.5	531.	84.0
5D10- 0	166	817.	834.	18.	4.0	609.	72.9
2A11- 0	167	638.	649.	11.	3.0	563.	20.0
4C11- 0	169	717.	731.	14.	3.5	574.	24.5
1D11- 6	170	407.	456.	49.	12.0	449.	17.1

RUN 43009D HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	699.4	631.3	654.3	699.4	632.0	655.2	1.0	0.0	.5
24	815.0	784.9	797.4	818.9	789.8	801.9	2.0	2.0	2.0
36	1202.3	1040.4	1095.8	1211.8	1054.2	1106.7	3.5	2.5	2.8
48	1268.8	1230.2	1249.5	1276.6	1240.0	1259.3	3.0	2.5	2.8
60	1501.0	1332.9	1399.8	1516.0	1351.9	1418.8	4.0	3.0	3.7
67	1588.2	1405.3	1460.3	1604.7	1423.7	1486.2	4.0	2.5	3.2
70	1595.0	1462.1	1528.6	1612.3	1479.4	1545.8	3.0	2.5	2.8
71	1514.7	1514.7	1514.7	1533.3	1533.3	1533.3	2.5	2.5	2.5
72	1571.3	1260.5	1469.2	1584.1	1279.7	1485.2	3.5	2.0	2.6
74	1543.1	1323.8	1450.6	1559.2	1345.5	1458.8	3.0	2.5	2.6
75	1507.2	1396.6	1442.7	1522.5	1415.2	1459.1	3.0	2.5	2.6
76	1566.6	1391.9	1490.9	1580.9	1408.7	1506.9	3.5	2.5	2.7
77	1600.1	1394.0	1489.3	1616.7	1416.2	1506.6	3.5	2.5	2.8
78	1602.3	1412.6	1512.5	1618.8	1431.2	1528.3	3.0	2.5	2.6
84	1475.3	1260.0	1384.9	1494.4	1287.0	1403.7	3.0	2.5	2.6
90	1479.6	1234.7	1378.3	1496.7	1255.7	1396.6	3.5	2.5	2.6
96	1421.7	1133.0	1288.4	1443.0	1156.7	1308.8	4.0	2.5	3.0
102	1221.4	1052.7	1136.4	1243.2	1065.5	1157.4	3.0	2.5	2.8
111	1103.8	906.4	1020.7	1123.4	923.3	1044.8	3.5	2.5	2.9
120	903.6	665.6	821.2	922.3	711.9	840.4	5.0	2.5	3.9
132	716.6	637.0	665.6	730.6	643.9	678.6	3.5	3.0	3.3
136	704.2	406.7	560.0	718.1	455.9	591.5	12.0	3.0	6.1

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	1.8	0.0	.0	649.2	599.3	617.4	4.0	3.8	3.9
24	4.9	3.9	4.6	711.0	687.9	696.0	10.8	10.0	10.4
36	13.8	9.4	10.9	858.9	785.3	820.6	24.5	22.8	23.7
48	9.8	9.0	9.6	822.6	800.7	811.6	35.4	35.3	35.3
60	23.2	15.0	19.0	880.5	866.5	873.8	50.9	49.9	50.3
67	24.9	16.4	19.9	881.9	814.1	846.6	59.9	59.0	59.5
70	17.3	17.3	17.3	852.7	825.8	839.2	63.5	62.0	62.7
71	16.6	16.6	16.6	719.0	719.0	719.0	64.5	64.5	64.5
72	19.2	10.9	16.0	1077.1	789.7	911.5	63.9	27.4	49.8
74	21.8	12.2	17.7	1149.8	809.6	934.9	64.7	17.8	37.3
75	19.2	13.0	16.5	1022.7	951.3	979.9	44.9	35.4	39.7
76	23.6	13.3	16.1	1333.5	837.0	1015.2	65.7	12.8	39.4
77	22.2	14.1	17.3	1099.2	924.7	990.6	51.4	27.4	42.2
78	18.4	11.9	15.7	1078.2	823.6	962.1	68.2	31.9	48.7
84	21.3	15.8	16.9	806.5	684.4	736.5	73.1	51.8	68.5
90	21.0	14.8	16.2	747.8	658.2	700.1	82.6	72.5	78.5
96	24.1	17.6	20.4	787.1	630.6	684.4	90.9	82.8	87.5
102	23.8	12.8	21.0	865.3	569.1	616.3	98.5	95.9	97.0
111	20.0	15.6	16.1	597.0	535.3	567.7	103.0	71.3	94.2
120	26.3	16.7	19.2	711.5	530.5	583.9	108.0	15.0	74.2
132	14.0	11.3	12.8	573.8	550.2	562.4	28.0	20.0	24.2
136	49.2	12.4	24.8	549.2	437.6	493.4	48.5	17.1	29.3

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42509E
Test Date: 12/11/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.279 MPa (40.4 psia)
Initial peak clad temperature and location	879°C (1615°F), 2C 1.70 m (67 in.)
Initial peak rod power	2.3 kw/m (0.70 kw/ft)
Flow rate	142 mm/sec (5.6 in./sec)
Coolant temperature	51°C (124°F)
Average and range of initial 1.83 m (72 in.) housing temperature	261°C (255°C - 269°C) [501°F (491°F - 516°F)]
Initial bundle water level	7.1 mm (0.28 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+4% decreasing to -3% by 10 seconds and -4.5% thereafter[a]
Total power:	+1% increasing linearly to +1.5%[a]
Inlet subcooling:	-12% decreasing to -3% by 60 seconds[a]

a. Relative to run 41909A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42509E

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1136.	1152.	15.	3.5	862.	25.5
4C 3- 3	10	1252.	1266.	14.	2.5	869.	26.9
1C 4- 0	12	1345.	1366.	21.	4.0	855.	36.9
2A 5- 0	16	1475.	1506.	31.	4.5	972.	49.7
2A 5- 7	19	1484.	1511.	27.	4.0	882.	61.8
5C 6- 0	36	1305.	1351.	46.	6.5	593.	74.4
2D 6- 2	39	1444.	1468.	23.	3.0	807.	55.4
1D 6- 4	47	1396.	1413.	17.	2.5	847.	55.4
3D 6- 4	50	1393.	1434.	41.	5.0	1346.	14.7
4B 6- 4	52	1489.	1515.	26.	3.5	1212.	17.8
5C 6- 4	54	1373.	1408.	35.	5.0	1003.	36.8
5D 6- 4	55	1422.	1439.	16.	3.0	869.	51.1
1D 6- 5	58	1424.	1444.	21.	3.5	866.	58.8
2A 6- 5	59	1433.	1455.	22.	3.5	731.	67.0
2D 6- 5	61	1497.	1517.	20.	3.0	866.	62.4
3B 6- 5	63	1545.	1566.	20.	2.5	879.	37.5
3C 6- 6	72	1591.	1621.	30.	4.0	1277.	21.1
4C 6- 6	75	1601.	1624.	24.	3.5	976.	30.3
3C 6- 7	* * B A D T H E R M O C O U P L E D A T A *						
3E 6- 7	83	1489.	1508.	20.	3.0	902.	45.3
3D 6- 8	86	1585.	1610.	25.	3.5	972.	41.9
4A 6- 8	87	1430.	1452.	22.	3.5	755.	72.7
1C 7- 0	93	1476.	1494.	18.	2.5	763.	65.1
2B 7- 0	94	1507.	1529.	22.	2.5	775.	67.6
3D 7- 0	98	1568.	1591.	23.	2.5	853.	61.0
5B 7- 0	103	1407.	1427.	19.	2.5	745.	73.3
2B 7- 6	110	1470.	1493.	24.	3.5	666.	84.0
2C 7- 6	111	1518.	1539.	21.	2.5	862.	61.2
2E 7- 6	113	1305.	1330.	25.	3.5	673.	62.5
3A 7- 6	* * B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	115	1224.	1253.	29.	3.5	592.	99.5
4B 7- 6	120	1492.	1517.	25.	3.5	775.	81.5
5C 7- 6	122	1466.	1490.	24.	3.5	726.	63.5
1C 8- 0	124	1287.	1311.	24.	4.0	671.	91.4
2E 8- 0	126	1124.	1153.	28.	4.0	621.	89.5
3D 8- 0	129	1356.	1383.	28.	3.5	677.	92.6
5B 8- 0	133	1234.	1259.	25.	4.0	659.	93.6
5C 8- 0	134	1355.	1379.	24.	3.5	680.	91.1
1C 8- 6	135	1126.	1155.	28.	4.0	634.	101.0
1D 8- 6	136	1053.	1080.	27.	4.0	643.	99.6
2C 8- 6	138	1269.	1297.	28.	4.0	630.	98.5
4B 8- 6	143	1192.	1218.	26.	3.5	676.	100.0
5D 8- 6	145	1100.	1131.	30.	4.5	601.	99.6
3D 9- 3	150	1055.	1079.	24.	3.5	572.	106.9
4C 9- 3	152	1103.	1128.	24.	4.0	573.	106.9
1D10- 0	157	740.	765.	25.	4.5	563.	84.7
4B10- 0	164	888.	911.	23.	4.5	516.	91.7
5D10- 0	166	781.	800.	19.	4.5	613.	66.0
2A11- 0	168	633.	645.	12.	4.0	532.	28.3
4C11- 0	169	719.	734.	15.	4.0	569.	22.5
1D11- 6	171	290.	363.	73.	13.0	299.	16.0

RUN 42509E HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	662.4	622.4	644.7	665.7	626.8	648.5	1.5	1.5	1.5
24	924.2	814.6	869.1	930.5	823.0	876.1	2.5	2.0	2.3
39	1252.3	1114.9	1157.4	1266.1	1130.7	1173.6	4.0	2.5	3.4
48	1433.1	1298.3	1358.7	1452.7	1316.4	1378.9	4.0	3.5	3.6
60	1532.5	1450.3	1465.9	1554.9	1474.1	1511.8	4.5	2.5	3.3
67	1615.3	1439.6	1524.9	1637.4	1469.8	1552.5	4.0	3.5	3.8
70	1572.4	1466.3	1521.7	1596.0	1500.9	1549.5	4.0	3.0	3.5
73	1375.6	1375.6	1375.6	1399.1	1399.1	1399.1	3.5	3.5	3.5
74	1450.3	1444.3	1447.3	1476.2	1467.7	1471.9	3.5	3.0	3.3
75	1405.3	1354.9	1362.4	1425.9	1373.9	1403.3	3.5	2.5	3.0
76	1514.7	1372.7	1436.7	1535.5	1407.7	1459.2	5.0	2.5	3.2
77	1545.4	1423.5	1467.6	1565.7	1443.0	1486.8	3.5	2.5	3.0
78	1600.5	1405.3	1506.3	1624.3	1424.8	1527.1	4.0	2.5	3.2
79	1549.2	1486.6	1517.4	1572.2	1506.4	1538.4	3.5	2.5	3.1
80	1585.4	1422.4	1498.0	1610.1	1447.3	1520.1	3.5	3.0	3.3
81	1581.6	1581.6	1581.6	1610.1	1610.1	1610.1	3.5	3.5	3.5
82	1493.6	1493.6	1493.6	1516.0	1516.0	1516.0	3.5	3.5	3.5
84	1571.4	1394.7	1502.4	1594.9	1414.1	1523.4	3.0	2.5	2.5
90	1588.2	1223.5	1425.4	1612.3	1252.5	1450.5	3.5	2.5	3.4
96	1406.3	1124.3	1312.6	1434.4	1152.5	1338.5	4.0	3.5	3.6
102	1523.3	793.9	1132.9	1547.3	812.6	1159.4	4.5	3.0	4.0
111	1119.6	871.0	1010.8	1143.2	893.4	1033.3	4.0	3.0	3.6
120	1098.3	739.6	854.9	1124.5	764.9	877.2	4.5	3.0	4.1
132	719.0	561.9	626.0	733.7	577.0	639.7	4.5	4.0	4.1
138	656.7	290.5	473.6	669.9	363.3	516.6	13.0	4.0	8.5

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	4.4	3.3	3.8	624.1	570.7	603.7	5.6	4.9	5.3
24	8.4	6.3	7.0	791.3	714.7	754.8	12.0	11.5	11.8
39	20.0	13.8	16.2	892.9	854.2	874.6	27.4	24.3	26.0
48	20.8	19.6	20.2	863.9	855.2	859.4	37.5	36.9	37.1
60	31.4	22.4	25.9	971.8	880.6	924.4	52.9	49.7	51.6
67	31.3	22.0	27.5	882.4	795.2	853.6	64.0	59.4	61.9
70	34.6	23.6	27.8	856.0	812.2	839.7	63.9	46.6	57.7
73	23.3	23.3	23.3	719.0	719.0	719.0	53.3	53.3	53.3
74	25.9	23.4	24.6	806.8	708.5	757.7	57.9	55.4	56.7
75	22.2	19.0	20.9	838.0	694.4	750.0	66.9	46.9	56.7
76	35.0	16.3	22.5	1212.3	733.3	917.7	66.4	17.6	46.6
77	21.8	16.4	19.2	908.2	731.2	843.4	67.0	37.5	54.1
78	30.2	14.7	20.8	1277.1	770.4	908.0	69.4	21.1	49.2
79	22.9	18.7	21.0	913.6	812.3	880.2	68.5	45.3	56.2
80	24.9	17.5	22.1	971.8	754.6	883.4	72.7	41.9	58.3
81	28.5	28.5	28.5	930.3	930.3	930.3	45.7	45.7	45.7
82	22.4	22.4	22.4	932.2	932.2	932.2	51.9	51.9	51.9
84	24.2	17.5	21.0	894.1	699.9	773.9	75.9	45.0	65.8
90	29.0	20.8	25.1	879.5	591.6	729.3	99.5	61.2	81.0
96	28.2	23.2	25.9	715.2	620.6	666.7	93.6	88.5	91.2
102	32.1	18.7	26.5	734.8	600.6	637.5	101.0	56.6	93.6
111	24.1	16.6	22.4	581.3	560.7	568.6	107.6	89.6	102.3
120	26.2	16.2	22.3	630.9	494.7	555.8	98.8	64.9	85.8
132	15.1	11.8	13.7	588.8	532.3	548.0	28.3	19.9	24.1
138	72.8	13.2	43.0	515.0	298.5	406.7	33.0	16.0	24.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41509F
Test Date: 6/25/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.276 MPa (40.0 psia)
Initial peak clad temperature and location	878°C (1613°F), 3C 2.03 m (80 in.)
Initial peak rod power	2.27 kw/m (0.693 kw/ft)
Flow rate	146 mm/sec (5.73 in./sec)
Coolant temperature	52°C (125°F)
Average and range of initial 1.83 m (72 in.) housing temperature	352°C (332°C - 368°C) [665°F (630°F - 695°F)]
Initial bundle water level	0 mm (0 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-1.5% average[a]
Total power:	+0.25%[a]
Inlet subcooling:	-12% decreasing linearly to -1%[a]

a. Relative to run 41909A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 41509F

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1155.	1174.	20.	4.0	919.	24.3
4C 3- 3	6	1311.	1322.	10.	2.0	922.	26.1
1C 4- 0	7	1381.	1396.	15.	2.5	938.	37.5
2A 5- 0	12	1509.	1529.	20.	3.5	866.	53.5
2A 5- 7	14	1490.	1507.	18.	3.0	875.	61.4
5C 6- 2	33	1387.	1421.	33.	5.0	287.	80.5
2D 6- 3	39	1446.	1464.	19.	2.0	777.	87.4
1D 6- 4	46	1405.	1421.	15.	2.0	796.	51.4
3D 6- 4	50	1457.	1504.	47.	10.5	466.	114.8
4B 6- 4	51	1542.	1555.	13.	2.0	731.	88.8
5D 6- 4	56	1431.	1443.	12.	2.0	714.	66.2
1D 6- 5	58	1406.	1423.	16.	2.5	834.	55.9
2A 6- 5	59	1413.	1432.	20.	3.0	787.	47.9
2D 6- 5	62	1497.	1512.	15.	2.5	746.	69.9
3B 6- 5	63	1559.	1577.	18.	2.5	830.	67.3
3C 6- 6	69	1362.	1390.	27.	4.0	1343.	21.8
3E 6- 6	70	1437.	1469.	31.	4.5	1213.	24.2
4C 6- 6	73	1606.	1622.	16.	2.0	772.	37.9
5C 6- 6	76	1532.	1547.	15.	2.5	790.	68.4
3D 6- 7	85	1593.	1610.	17.	2.0	764.	54.3
3C 6- 8	93	1613.	1631.	18.	2.5	819.	46.5
4A 6- 8	95	1419.	1438.	19.	3.0	869.	61.4
1C 7- 0	109	1487.	1503.	16.	2.5	716.	77.0
2B 7- 0	110	1544.	1561.	17.	2.0	776.	74.0
3D 7- 0	113	1571.	1590.	18.	2.0	776.	71.0
5B 7- 0	117	1362.	1381.	19.	2.5	804.	76.7
2B 7- 6	120	1491.	1508.	18.	2.5	704.	85.4
2C 7- 6	121	1512.	1530.	18.	2.5	880.	84.3
2E 7- 6	123	1149.	1171.	22.	3.0	736.	73.2
3A 7- 6	124	1483.	1482.	19.	2.5	709.	85.5
3B 7- 6	125	1556.	1575.	19.	2.5	892.	85.0
4B 7- 6	129	1504.	1523.	18.	2.5	808.	85.4
5C 7- 6	132	1451.	1469.	17.	2.5	713.	80.0
1C 8- 0	133	1285.	1305.	20.	3.0	888.	94.6
2E 8- 0	136	1051.	1072.	21.	3.0	896.	89.2
3D 8- 0	138	1391.	1414.	23.	3.0	874.	94.0
5B 8- 0	143	1254.	1272.	19.	3.0	869.	92.2
5C 8- 0	144	1325.	1345.	19.	2.5	805.	94.5
1C 8- 6	145	1082.	1103.	21.	3.0	804.	103.0
1D 8- 6	146	966.	987.	22.	3.0	553.	78.9
2C 8- 6	148	1208.	1233.	25.	3.0	815.	99.7
4B 8- 6	153	1201.	1222.	21.	2.5	891.	101.2
5D 8- 6	155	1041.	1059.	18.	2.5	891.	100.7
3D 9- 3	159	1039.	1058.	19.	3.0	556.	108.0
4C 9- 3	161	1098.	1117.	19.	3.0	551.	108.9
1D10- 0	164	695.	714.	19.	4.0	526.	60.5
4B10- 0	168	879.	899.	19.	3.5	487.	88.7
5D10- 0	169	767.	783.	15.	3.0	569.	61.0
2A11- 0	171	560.	572.	11.	4.0	518.	19.4
4C11- 0	172	698.	710.	12.	3.5	561.	22.5
1D11- 6	174	336.	427.	91.	14.5	413.	21.3

RUN 41509F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	741.9	677.5	709.7	745.1	682.6	713.8	1.5	1.5	1.5
24	937.6	937.6	937.6	942.9	942.9	942.9	2.0	2.0	2.0
39	1311.1	1146.4	1204.1	1321.5	1162.9	1219.6	4.0	2.0	3.2
48	1485.5	1309.0	1391.2	1500.9	1325.7	1406.7	3.0	2.5	2.6
60	1508.5	1405.2	1452.8	1529.0	1426.9	1475.8	4.0	3.5	3.7
67	1600.0	1419.1	1525.4	1622.1	1441.9	1545.8	3.5	2.5	3.0
70	1598.5	1210.0	1374.1	1617.8	1248.4	1399.3	5.5	2.0	3.7
71	1541.6	1464.1	1502.9	1565.7	1484.8	1525.2	3.0	2.5	2.7
72	1385.2	1236.3	1310.7	1424.8	1280.7	1352.7	7.0	5.5	6.2
73	1381.0	1260.6	1320.8	1416.2	1302.7	1359.4	6.5	5.0	5.7
74	1458.7	1178.6	1377.6	1492.3	1217.1	1412.0	7.0	3.0	5.1
75	1484.9	1287.1	1388.8	1503.0	1317.3	1419.5	11.5	2.0	4.8
76	1541.6	1304.5	1437.2	1554.9	1325.7	1463.5	10.5	2.0	4.1
77	1559.3	1406.2	1471.3	1576.5	1422.7	1489.4	5.0	2.0	2.7
78	1606.1	1406.7	1506.0	1622.1	1422.7	1523.8	4.5	2.0	2.7
79	1605.4	1344.7	1510.8	1623.2	1360.3	1527.7	3.0	2.0	2.5
80	1613.1	1419.1	1513.3	1630.8	1437.7	1529.9	3.0	2.0	2.5
81	1504.5	1504.5	1504.5	1521.4	1521.4	1521.4	2.5	2.5	2.5
84	1571.5	1362.5	1490.0	1589.5	1381.3	1507.2	2.5	2.0	2.2
90	1556.3	1149.1	1439.1	1575.4	1171.2	1458.1	3.0	2.5	2.6
96	1422.3	1050.8	1306.4	1445.2	1071.7	1326.9	3.0	2.5	2.9
102	1215.7	860.0	1099.4	1239.0	902.7	1120.8	3.0	2.5	2.8
111	1097.9	873.6	967.7	1117.2	892.3	985.8	3.5	3.0	3.1
120	895.3	695.0	809.9	913.0	714.0	827.2	4.0	3.0	3.4
132	698.2	520.7	588.0	709.8	530.0	598.8	4.0	3.5	3.6
138	627.7	336.1	526.4	642.5	426.7	564.6	14.5	3.0	7.3

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	5.1	3.2	4.2	683.7	635.5	659.6	6.0	5.2	5.6
24	5.3	5.3	5.3	805.7	805.7	805.7	12.5	12.5	12.5
39	19.7	10.4	15.5	922.3	882.7	908.0	26.1	24.3	25.2
48	16.7	15.0	15.5	938.4	855.5	896.3	38.0	36.5	37.4
60	27.1	20.5	23.1	892.0	846.5	874.7	54.9	53.5	54.1
67	22.8	17.6	20.4	875.4	727.0	788.8	63.1	61.4	62.3
70	38.4	17.1	25.2	780.7	428.0	582.3	85.7	65.4	70.8
71	24.1	20.7	22.4	684.8	544.1	614.4	71.4	66.4	68.9
72	44.4	39.6	42.0	1252.3	427.4	839.9	93.2	24.0	58.6
73	42.1	35.2	36.7	486.8	472.9	480.8	86.7	64.6	85.6
74	47.9	22.9	34.3	1154.0	284.5	591.7	84.7	14.9	64.0
75	67.6	12.7	30.7	777.4	286.6	561.3	91.4	49.7	75.5
76	47.5	11.7	26.3	867.3	402.0	618.4	114.8	26.3	71.6
77	36.6	11.7	18.1	1351.3	629.9	822.8	69.9	16.2	55.5
78	31.4	11.1	17.9	1343.4	740.7	885.2	71.0	21.6	51.1
79	19.7	11.8	16.9	915.3	590.7	769.1	72.5	33.9	63.7
80	18.6	12.2	16.5	945.7	736.6	849.0	72.5	36.4	58.9
81	16.9	16.9	16.9	878.9	878.9	878.8	46.9	46.9	46.9
84	19.5	15.4	17.1	822.4	664.2	739.9	79.0	56.8	72.6
90	22.1	17.5	19.0	841.7	675.4	712.3	88.0	72.0	83.7
96	22.9	18.7	20.5	762.8	668.1	690.4	96.3	85.5	92.1
102	24.7	17.9	21.4	691.3	552.6	622.6	103.0	78.9	97.6
111	20.6	15.7	18.1	609.9	514.0	562.9	108.9	56.7	83.9
120	19.2	15.2	17.4	570.9	472.3	517.9	96.0	60.5	78.5
132	11.6	9.3	10.9	561.1	410.2	502.6	22.5	19.4	20.6
138	90.6	9.2	36.2	507.6	413.3	474.4	28.5	21.3	24.2

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43610A
Test Date: 4/29/80
Test Type: Forced Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.142 MPa (20.6 psia)
Initial peak clad temperature and location	872°C (1601°F), 3C 1.83 m (72 in.)
Initial peak rod power	0.89 kw/m (0.27 kw/ft)
Flow rate	10 mm/sec (0.4 in./sec)
Coolant temperature	31°C (88°F)
Average and range of initial 1.83 m (72 in.) housing temperature	552°C (544°C - 556°C) [1026°F (1012°F - 1033°F)]
Initial bundle water level	35.15 mm (1.384 in.)

B. Summary Results:

C. Comments:

Total power: exponentially increasing from -0.2% to -4.8% by 670 seconds[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43610A

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1090.	1151.	60.	43.5	661.	156.9
4C 3- 3	11	1172.	1222.	51.	41.5	712.	157.9
1C 4- 0	14	1301.	1359.	58.	50.0	747.	227.9
2A 5- 0	17	1340.	1459.	119.	84.0	691.	317.8
2A 5- 7	21	1456.	1595.	139.	120.0	836.	392.7
1D 6- 2	50	1435.	1617.	182.	177.0	880.	464.7
2D 6- 2	53	1556.	1736.	179.	120.0	804.	460.8
3D 6- 2	58	1580.	1779.	199.	120.0	776.	472.6
5C 6- 2	61	1473.	1603.	130.	82.5	872.	450.8
1D 6- 3	63	1422.	1612.	190.	189.0	627.	477.7
4B 6- 3	68	1527.	1721.	193.	119.0	756.	482.6
5D 6- 3	69	1439.	1639.	200.	179.0	760.	472.8
2A 6- 4	70	1426.	1622.	196.	188.0	846.	486.6
3B 6- 4	75	1564.	1770.	206.	120.0	797.	493.5
3D 6- 6	79	1526.	1758.	232.	123.0	707.	521.6
2D 6- 5	84	1544.	1736.	193.	120.0	764.	492.4
3C 6- 5	85	1572.	1801.	229.	118.0	769.	493.6
3E 6- 5	86	1460.	1649.	190.	183.0	829.	500.4
3C 6- 6	95	1555.	1794.	239.	120.0	816.	504.8
4A 6- 6	97	1393.	1631.	238.	194.0	625.	513.3
3D 8- 0	98	1307.	1629.	321.	214.0	679.	657.7
5C 6- 6	* * B A D	T H E R M O C O U P L E	D A T A *				
1C 7- 0	110	1403.	1607.	203.	169.0	654.	553.7
2B 7- 0	111	1424.	1652.	228.	120.0	551.	554.6
3D 7- 0	115	1460.	1695.	235.	121.0	628.	560.2
5B 7- 0	117	1312.	1534.	223.	192.0	664.	547.7
2B 7- 6	* * B A D	T H E R M O C O U P L E	D A T A *				
2C 7- 6	121	1431.	1672.	241.	171.0	712.	606.4
2E 7- 6	122	1310.	1489.	179.	172.0	749.	572.2
3A 7- 6	123	1324.	1568.	243.	238.0	708.	608.7
3B 7- 6	124	1445.	1697.	252.	174.0	677.	614.6
4B 7- 6	127	1412.	1675.	262.	184.0	666.	608.7
5C 7- 6	128	1281.	1512.	231.	208.0	719.	585.7
1C 8- 0	131	1251.	1551.	300.	224.0	708.	656.4
2E 8- 0	133	988.	1362.	374.	287.0	676.	682.8
4C 8- 6	136	1531.	1754.	223.	120.0	809.	506.8
5B 8- 0	138	1210.	1559.	350.	285.0	659.	652.6
5C 8- 0	139	1149.	1462.	313.	270.0	672.	641.1
1C 8- 6	141	1128.	1473.	345.	242.0	513.	688.5
1D 8- 6	142	1069.	1383.	314.	280.0	496.	683.0
2C 8- 6	143	1177.	1559.	382.	246.0	551.	690.0
4B 8- 6	145	1149.	1545.	396.	271.0	501.	699.1
5D 8- 6	148	1062.	1471.	409.	232.0	462.	682.8
3D 9- 3	154	1031.	1447.	416.	281.0	609.	714.0
4C 9- 3	156	1045.	1438.	393.	271.0	639.	705.6
1D10- 0	161	577.	1110.	533.	377.0	689.	630.4
4B10- 0	164	836.	1249.	413.	271.0	567.	740.0
5D10- 0	167	748.	1126.	377.	301.0	726.	601.5
2A11- 0	168	541.	761.	219.	296.0	655.	575.6
4C11- 0	170	650.	1064.	413.	320.0	486.	743.0
1D11- 6	172	268.	693.	425.	257.0	246.	395.0

RUN 43610A HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	619.0	560.6	579.8	622.5	570.6	587.8	16.5	6.0	12.9
24	858.0	754.3	803.9	872.7	783.6	825.8	37.5	18.5	28.4
39	1171.7	1050.1	1106.6	1222.3	1124.5	1165.8	54.5	41.5	46.5
48	1322.0	1221.7	1270.2	1396.0	1302.7	1342.5	78.5	50.0	65.7
60	1451.0	1297.9	1353.3	1589.5	1433.4	1483.7	86.5	73.5	81.1
67	1566.9	1455.3	1486.4	1720.7	1594.9	1634.8	120.0	85.5	110.4
70	1600.4	1458.5	1527.8	1778.7	1606.8	1683.4	120.0	111.0	116.2
71	1598.9	1450.4	1529.4	1787.6	1607.9	1695.6	120.0	85.5	111.6
72	1600.8	1429.5	1523.2	1792.1	1593.8	1691.0	167.0	84.0	125.9
74	1588.5	1434.9	1519.0	1796.6	1586.3	1699.6	180.0	82.5	130.7
75	1582.0	1422.5	1510.5	1796.6	1612.3	1705.4	189.0	116.0	145.9
76	1578.8	1425.3	1509.9	1799.9	1622.1	1709.2	196.0	119.0	146.5
77	1572.3	1404.9	1494.0	1801.0	1619.9	1704.1	204.0	118.0	151.1
78	1555.0	1392.7	1484.4	1794.3	1630.8	1712.9	205.0	120.0	154.9
84	1460.2	1269.7	1380.9	1695.2	1533.3	1610.9	192.0	120.0	155.1
90	1445.2	1260.7	1362.0	1697.4	1489.1	1595.5	238.0	171.0	190.5
96	1325.2	980.1	1228.5	1661.4	1362.4	1556.4	287.0	201.0	245.1
102	1177.3	1052.0	1109.3	1575.4	1383.4	1430.0	280.0	232.0	258.3
111	1137.8	890.4	994.8	1447.3	1257.8	1351.2	289.0	199.0	262.8
120	836.3	578.8	748.8	1334.1	1073.8	1196.0	377.0	202.0	288.2
132	650.2	508.3	562.4	1063.5	760.7	848.1	382.0	296.0	327.0
138	593.2	267.7	455.7	996.5	693.1	849.5	419.0	237.0	344.4

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	10.4	3.5	6.1	591.1	553.9	568.1	26.2	25.7	25.9
24	29.3	14.7	21.9	737.7	662.1	688.7	73.9	65.6	68.5
39	66.4	50.6	59.1	712.1	629.5	674.1	157.9	155.8	156.9
48	90.4	57.8	72.3	857.2	746.7	789.0	227.9	208.7	215.8
60	138.5	118.8	130.4	694.2	667.3	685.2	330.8	317.8	323.3
67	153.8	138.5	148.4	836.4	775.8	813.1	397.8	391.7	394.9
70	178.3	143.2	155.6	876.5	797.3	842.6	427.6	416.5	423.0
71	168.7	152.7	166.2	966.5	751.0	822.8	441.7	427.6	433.8
72	191.3	124.6	167.8	938.3	764.8	839.8	451.5	430.8	442.9
74	208.1	129.6	180.6	908.9	760.0	828.0	473.5	443.6	463.1
75	214.6	183.7	194.9	841.9	732.0	783.4	487.4	472.8	478.7
76	221.1	174.3	199.2	875.9	731.4	807.6	497.8	463.7	485.6
77	228.7	189.9	210.2	828.6	750.4	780.3	507.4	491.6	497.6
78	239.3	201.4	228.5	842.2	707.0	789.6	521.6	504.6	511.0
84	271.2	191.4	230.0	663.5	538.4	625.8	560.8	530.3	551.8
90	262.1	176.6	233.5	776.5	666.2	717.6	614.6	572.2	601.2
96	374.3	299.7	327.8	708.2	658.5	679.1	682.8	641.1	656.4
102	417.2	313.9	370.7	551.3	457.3	495.0	700.6	630.6	680.2
111	416.0	294.5	356.4	740.7	532.2	619.7	715.0	627.8	686.8
120	540.4	312.0	447.2	728.4	540.9	609.4	742.0	601.5	696.3
132	413.3	219.1	285.7	660.1	488.3	608.2	743.0	442.7	583.2
138	516.7	259.8	393.7	634.3	245.7	425.9	752.8	326.0	585.3

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42810B
Test Date: 6/23/80
Test Type: Forced Reflood
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.137 MPa (19.9 psia)
Initial peak clad temperature and location	878°C (1612°F), 3C 1.78 m (70 in.)
Initial peak rod power	0.89 kw/m (0.27 kw/ft)
Flow rate	10 mm/sec (0.40 in./sec)
Coolant temperature	32°C (89°F)
Average and range of initial 1.83 m (72 in.) housing temperature	568°C (558°C - 572°C) [1054°F (1037°F - 1061°F)]
Initial bundle water level	43.4 mm (1.71 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-2% constant[a]
Total power:	-1% linearly increasing to -2% by 500 seconds[a]
Inlet subcooling:	+7% linearly decreasing to +3% by 500 seconds[a]

a. Relative to run 43610A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42810B

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1074.	1126.	52.	46.5	567.	165.9
4C 3- 3	11	1220.	1245.	25.	21.5	660.	164.6
1C 4- 0	14	1300.	1345.	45.	47.0	694.	226.0
2A 5- 0	17	1370.	1500.	130.	80.5	667.	340.7
2A 5- 7	21	1484.	1616.	132.	82.5	613.	415.4
1D 6- 2	50	1419.	1621.	202.	187.0	797.	490.7
2D 6- 2	53	1512.	1713.	201.	153.0	633.	514.7
3D 6- 2	58	1555.	1742.	187.	148.0	696.	506.0
5C 6- 2	61	1479.	1655.	175.	196.0	667.	487.6
1D 6- 3	63	1433.	1609.	176.	118.0	760.	462.6
4B 6- 3	68	1529.	1690.	161.	150.0	737.	513.7
5D 6- 3	69	1416.	1641.	225.	219.0	734.	536.2
2A 6- 4	70	1439.	1603.	164.	197.0	760.	517.7
2D 6- 4	72	1529.	1698.	169.	153.0	665.	531.6
3B 6- 4	75	1565.	1720.	155.	117.0	722.	526.7
3C 6- 5	85	1598.	1761.	163.	116.0	734.	529.5
3E 6- 5	86	1463.	1642.	178.	192.0	760.	531.6
3C 6- 6	95	1580.	1765.	186.	120.0	665.	544.0
3D 6- 6	96	1543.	1740.	197.	143.0	661.	544.7
4A 6- 6	97	1422.	1633.	211.	228.0	754.	539.6
4C 6- 6	98	1552.	1737.	186.	119.0	764.	538.5
5C 6- 6	101	1452.	1639.	187.	192.0	624.	532.6
1C 7- 0	110	1424.	1593.	169.	143.0	596.	553.8
2B 7- 0	111	1469.	1653.	184.	120.0	590.	590.1
3D 7- 0	115	1492.	1692.	200.	118.0	631.	560.6
5B 7- 0	117	1367.	1539.	172.	188.0	640.	566.0
2B 7- 6	120	1457.	1655.	198.	143.0	640.	641.6
2C 7- 6	121	1475.	1687.	211.	143.0	656.	641.6
2E 7- 6	122	1279.	1527.	248.	281.0	665.	645.7
3A 7- 6	123	1425.	1617.	192.	192.0	663.	625.7
3B 7- 6	124	1476.	1687.	210.	151.0	665.	635.4
4B 7- 6	127	1466.	1665.	199.	148.0	639.	631.5
5C 7- 6	128	1415.	1621.	206.	189.0	749.	624.7
1C 8- 0	131	1312.	1579.	267.	229.0	673.	651.2
2E 8- 0	133	1198.	1528.	330.	325.0	618.	669.7
3D 8- 0	136	1357.	1642.	285.	191.0	714.	675.9
5B 8- 0	138	1163.	1505.	323.	298.0	664.	696.7
5C 8- 0	139	1313.	1595.	282.	280.0	653.	677.4
1C 8- 6	141	1160.	1487.	327.	194.0	513.	715.0
1D 8- 6	142	1090.	1400.	310.	233.0	511.	707.9
2C 8- 6	143	1231.	1571.	341.	189.0	529.	722.0
4B 8- 6	145	1238.	1586.	348.	233.0	562.	718.4
5D 8- 6	148	1115.	1499.	384.	281.0	503.	663.3
3D 9- 3	154	1065.	1440.	375.	281.0	616.	727.0
4C 9- 3	156	1092.	1440.	348.	282.0	616.	724.8
1D10- 0	161	599.	1094.	495.	314.0	596.	690.7
4B10- 0	164	906.	1290.	384.	293.0	566.	759.0
5D10- 0	167	758.	1076.	318.	196.0	575.	730.0
2A11- 0	168	556.	805.	250.	383.0	696.	595.8
4C11- 0	* * B A D	T H E R M O C O U P L E	D A T A *				
1D11- 6	172	237.	705.	467.	218.0	312.	459.0

RUN 428108 HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	626.9	540.7	571.8	632.0	551.4	580.8	16.5	6.5	13.4
24	871.6	766.0	806.6	888.2	797.1	828.9	43.0	20.5	30.4
39	1220.2	1073.6	1118.6	1245.2	1125.5	1165.6	50.5	21.5	40.9
48	1366.6	1246.4	1297.0	1431.2	1319.4	1363.3	77.0	47.0	59.5
60	1491.2	1343.5	1392.0	1614.5	1463.4	1515.1	83.0	54.5	74.3
67	1584.1	1473.0	1506.9	1720.7	1607.9	1640.7	115.0	76.0	96.9
70	1612.3	1470.4	1538.6	1765.3	1618.8	1685.3	117.0	81.0	94.9
71	1597.1	1404.4	1503.7	1764.2	1607.9	1681.3	193.0	81.5	131.1
72	1473.0	1413.0	1453.9	1650.5	1584.1	1632.6	151.0	117.0	136.8
74	1554.9	1419.4	1500.1	1775.4	1621.0	1687.2	200.0	120.0	164.5
75	1589.5	1416.2	1509.4	1751.9	1609.0	1682.5	219.0	116.0	152.4
76	1600.3	1430.6	1506.6	1754.2	1602.5	1674.2	208.0	117.0	159.3
77	1598.1	1379.2	1500.6	1760.9	1597.1	1682.8	209.0	116.0	164.6
78	1579.8	1410.9	1485.7	1765.3	1607.9	1679.1	228.0	119.0	166.3
84	1499.6	1336.3	1426.3	1694.1	1469.8	1608.3	192.0	85.5	145.4
90	1476.2	1278.6	1408.4	1686.5	1526.8	1622.4	281.0	143.0	190.6
96	1362.4	1182.7	1298.4	1649.4	1505.2	1587.2	325.0	190.0	244.6
102	1237.9	1086.1	1154.9	1586.3	1400.2	1497.8	299.0	189.0	237.1
111	1092.3	932.6	1025.0	1439.8	1247.3	1351.7	283.0	197.0	236.0
120	905.8	599.4	779.7	1345.6	1075.8	1199.4	317.0	196.0	264.6
132	584.4	516.2	552.1	805.4	748.3	771.8	383.0	154.0	255.3
138	629.9	237.1	433.3	995.4	704.6	851.7	443.0	216.0	352.2

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	11.7	3.1	9.0	604.8	545.0	566.3	26.5	25.5	25.9
24	32.2	14.4	22.3	634.5	604.3	624.6	77.8	72.3	74.7
39	62.3	25.0	46.9	679.8	587.0	617.6	172.0	164.8	166.1
48	84.8	45.1	66.4	757.0	694.1	725.5	232.8	228.6	231.0
60	130.0	119.2	123.1	678.0	659.2	669.9	345.8	339.6	342.5
67	145.8	121.0	133.8	838.7	779.0	814.4	415.6	409.7	412.9
70	154.8	135.2	146.7	848.1	749.6	782.4	453.7	440.6	448.1
71	203.5	167.1	177.6	908.0	762.1	819.8	502.5	456.7	467.0
72	198.7	166.5	176.7	885.1	766.2	820.2	476.4	461.6	470.0
74	238.9	150.2	187.1	991.4	550.1	761.4	514.7	477.4	500.9
75	224.5	153.0	173.1	880.1	732.6	767.7	538.2	462.6	511.6
76	188.1	143.4	165.6	821.0	685.0	755.3	531.6	510.6	521.0
77	217.9	162.8	161.7	839.2	707.4	752.8	542.6	514.6	530.5
78	214.7	174.6	193.4	823.7	681.1	755.1	550.7	532.6	542.9
84	204.7	131.5	182.0	644.4	590.4	615.5	594.6	570.7	583.5
90	259.0	191.9	214.0	750.8	638.6	680.3	645.7	624.7	635.1
96	329.6	266.6	288.9	713.8	611.3	662.5	696.7	673.9	682.0
102	383.6	309.9	342.9	562.4	436.9	511.4	722.0	659.3	702.0
111	375.3	266.3	325.8	644.0	519.4	592.2	733.9	687.6	722.5
120	495.7	318.2	419.7	612.8	527.4	566.8	765.8	690.7	743.0
132	249.8	177.4	219.8	695.8	547.0	620.9	598.9	529.3	574.7
138	510.4	268.7	416.4	672.0	311.6	475.6	774.7	459.0	650.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43110C
Test Date: 8/29/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.137 MPa (19.9 psia)
Initial peak clad temperature and location	871°C (1600°F), 4C 1.70 m (67 in.)
Initial peak rod power	0.89 kw/m (0.27 kw/ft)
Flow rate	10.3 mm/sec (0.405 in./sec)
Coolant temperature	29°C (84°F)
Average and range of initial 1.83 m (72 in.) housing temperature	526°C (517°C - 535°C) [979°F (952°F - 995°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+2.5% for 80 seconds, linearly changing to -2.5% by 440 seconds, and +2.5% thereafter[a]
Total power:	+1% constant[a]
Housing initial temperature at midplane:	approximately -5%[a]

a. Relative to run 43610A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43110C

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1058.	1108.	50.	64.0	725.	150.6
4C 3- 3	11	1206.	1246.	41.	35.0	702.	166.6
1C 4- 0	14	1342.	1406.	64.	63.5	719.	229.8
2A 5- 0	17	1371.	1504.	133.	80.0	724.	335.6
2A 5- 7	21	1488.	1600.	112.	86.5	624.	399.7
1D 6- 2	50	1459.	1585.	126.	171.0	772.	502.7
2D 6- 2	53	1492.	1691.	199.	147.0	553.	511.5
3D 6- 2	58	1551.	1711.	160.	116.0	654.	509.6
4B 6- 2	60	1560.	1673.	113.	68.5	672.	511.7
5C 6- 2	61	1460.	1634.	174.	148.0	1036.	471.5
1D 6- 3	63	1447.	1587.	140.	164.0	760.	514.6
5D 6- 3	69	1469.	1587.	119.	201.0	733.	515.7
2A 6- 4	70	1448.	1579.	130.	136.0	768.	495.7
3B 6- 4	75	1573.	1697.	124.	71.5	707.	513.7
2D 6- 5	84	1544.	1684.	140.	121.0	706.	529.7
3C 6- 5	85	1594.	1755.	162.	115.0	723.	524.7
3E 6- 5	86	1504.	1597.	93.	197.0	626.	513.9
3C 6- 6	95	1574.	1763.	189.	117.0	713.	535.3
3D 6- 6	96	1547.	1723.	176.	115.0	716.	540.7
4A 6- 6	97	1452.	1615.	163.	131.0	715.	536.3
4C 6- 6	98	1568.	1735.	167.	115.0	766.	531.8
5C 6- 6	101	1523.	1620.	97.	79.0	786.	524.7
1C 7- 0	110	1432.	1604.	171.	148.0	593.	565.8
2B 7- 0	111	1439.	1657.	218.	129.0	522.	573.7
3D 7- 0	115	1469.	1695.	227.	120.0	535.	573.0
5B 7- 0	117	1359.	1552.	192.	192.0	674.	546.0
2B 7- 6	120	1454.	1659.	206.	131.0	658.	609.7
2C 7- 6	121	1478.	1692.	214.	135.0	621.	625.3
2E 7- 6	122	1321.	1518.	198.	259.0	593.	617.4
3A 7- 6	123	1427.	1617.	190.	135.0	649.	591.4
3B 7- 6	124	1470.	1693.	223.	132.0	666.	610.8
4B 7- 6	127	1461.	1678.	217.	127.0	618.	625.2
5C 7- 6	128	1439.	1610.	171.	122.0	657.	586.7
1C 8- 0	131	1300.	1570.	271.	189.0	633.	652.7
2E 8- 0	133	1237.	1531.	294.	277.0	636.	664.5
3D 8- 0	136	1355.	1647.	292.	194.0	671.	658.9
5B 8- 0	138	1217.	1499.	282.	212.0	602.	639.8
5C 8- 0	139	1362.	1592.	229.	228.0	656.	631.7
1C 8- 6	141	1121.	1512.	390.	172.0	512.	671.6
1D 8- 6	142	1040.	1432.	393.	196.0	461.	650.1
2C 8- 6	* * B A D	T H E R M O C O U P L E	D A T A *				
4B 8- 6	145	1145.	1487.	342.	136.0	462.	676.7
5D 8- 6	148	1083.	1478.	395.	292.0	576.	647.9
3D 9- 3	154	932.	1432.	501.	285.0	547.	700.3
4C 9- 3	156	969.	1379.	390.	230.0	550.	689.0
1D10- 0	161	595.	1026.	431.	394.0	650.	641.3
4B10- 0	164	795.	1231.	436.	229.0	536.	718.7
5D10- 0	167	662.	1035.	373.	292.0	630.	614.6
2A11- 0	168	520.	720.	200.	195.0	582.	600.0
4C11- 0	170	530.	981.	451.	217.0	441.	714.9
1D11- 6	172	455.	692.	237.	311.0	546.	600.0

RUN 43110C HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	624.6	546.2	575.5	629.9	557.8	582.7	17.0	5.0	11.5
24	881.0	803.3	845.4	898.6	830.2	865.4	36.0	27.5	30.5
39	1205.6	1056.3	1119.7	1246.3	1107.8	1172.1	67.0	35.0	51.6
48	1368.7	1287.0	1323.1	1444.1	1367.7	1402.8	70.0	63.0	66.5
60	1375.0	1364.5	1370.1	1532.2	1492.3	1509.5	87.5	80.0	83.0
67	1600.3	1458.0	1504.0	1725.2	1576.5	1623.7	110.0	70.0	92.6
70	1590.6	1462.3	1541.6	1759.8	1615.6	1689.5	120.0	97.0	104.9
71	1541.9	1439.8	1508.6	1751.9	1607.9	1674.5	124.0	105.0	113.0
72	1493.4	1483.7	1488.5	1662.5	1637.4	1649.9	119.0	86.0	102.5
74	1575.4	1436.7	1507.3	1737.4	1575.4	1656.8	227.0	68.5	147.9
75	1598.1	1447.3	1528.1	1730.8	1584.1	1650.0	201.0	67.5	132.9
76	1600.3	1437.7	1523.8	1739.7	1578.7	1648.3	221.0	70.5	119.1
77	1593.8	1416.2	1520.8	1755.3	1590.6	1662.9	197.0	70.5	144.2
78	1574.4	1400.2	1505.0	1763.1	1594.9	1658.6	219.0	79.0	137.3
84	1476.2	1221.2	1402.3	1702.9	1420.5	1612.1	192.0	117.0	144.0
90	1478.4	1320.5	1430.4	1693.0	1518.2	1633.9	259.0	122.0	154.8
96	1370.8	1217.1	1312.5	1662.5	1498.7	1589.2	278.0	141.0	204.4
102	1155.7	1039.8	1113.2	1558.2	1432.3	1499.0	292.0	136.0	226.5
111	1010.9	869.6	961.2	1432.3	1177.5	1340.1	285.0	195.0	232.8
120	922.3	595.1	723.4	1287.0	1026.4	1173.9	394.0	193.0	282.9
132	530.0	471.0	510.4	981.0	680.4	790.0	217.0	195.0	207.0
138	534.3	454.8	479.8	886.1	666.8	772.3	311.0	186.0	252.8

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	9.6	5.3	7.2	589.1	546.5	564.8	29.9	25.2	26.8
24	26.9	15.5	20.0	659.4	628.6	646.4	78.9	74.4	77.1
39	73.7	40.7	52.4	724.9	633.8	690.6	166.8	150.6	160.0
48	96.5	64.0	79.1	719.2	698.6	709.6	231.8	224.7	229.4
60	157.2	127.8	139.4	773.6	720.6	739.5	335.6	328.8	333.1
67	124.9	112.3	119.6	907.4	789.2	836.1	399.7	392.7	397.4
70	169.2	123.6	147.9	899.1	814.6	848.5	446.6	429.7	440.0
71	210.0	120.2	165.6	897.3	705.5	816.4	456.7	440.6	451.4
72	178.8	144.0	161.4	919.1	886.7	902.8	447.8	441.4	444.4
74	198.5	113.1	149.5	795.6	553.0	687.1	511.7	492.0	502.6
75	140.0	81.1	121.9	779.6	676.3	725.9	524.7	498.4	513.8
76	158.3	71.4	124.5	787.7	693.7	728.8	523.7	495.7	514.4
77	174.4	93.0	142.1	825.6	690.1	728.7	544.3	513.9	528.0
78	209.9	97.4	163.6	788.3	643.3	727.1	550.7	523.6	534.4
84	250.2	171.3	209.8	674.1	521.6	584.7	578.9	546.0	565.4
90	223.2	171.4	203.4	701.9	593.5	647.9	625.3	545.9	602.7
96	301.2	229.3	276.7	676.6	602.0	637.6	666.7	631.7	651.1
102	402.5	341.0	385.9	576.4	460.6	495.7	692.3	647.9	670.1
111	500.8	266.6	378.9	634.3	524.7	574.5	700.3	635.6	671.3
120	551.1	349.0	450.0	650.1	359.2	549.0	721.0	602.6	670.5
132	451.0	199.8	279.5	582.4	441.0	538.2	714.9	486.4	572.8
138	387.6	206.6	292.8	547.8	242.5	363.2	704.0	340.0	554.4

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42910D
Test Date: 10/21/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.143 MPa (20.7 psia)
Initial peak clad temperature and location	877°C (1611°F), 3C 1.78 m (70 in.)
Initial peak rod power	0.89 kw/m (0.27 kw/ft)
Flow rate	10 mm/sec (0.40 in./sec)
Coolant temperature	31°C (88°F)
Average and range of initial 1.83 m (72 in.) housing temperature	538°C (529°C - 547°C) [1001°F (984°F - 1061°F)]
Initial bundle water level	79.5 mm (3.13 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: +3% decreasing to -2% by 40 seconds and constant to 280 seconds; ±0.5% thereafter[a]

Total power: +0.5% increasing linearly to +1%[a]

a. Relative to run 43610A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 42910D

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1065.	1116.	51.	51.5	711.	150.8
4C 3- 3	9	1185.	1231.	45.	46.0	706.	151.5
1C 4- 0	10	1303.	1360.	57.	54.5	773.	205.8
2A 5- 0	13	1379.	1521.	143.	92.5	759.	322.8
2A 5- 7	16	1462.	1574.	112.	111.0	881.	385.6
2D 6- 2	50	1526.	1671.	145.	69.0	791.	460.7
3D 6- 2	55	1532.	1729.	196.	107.0	249.	629.0
5C 6- 2	59	1526.	1639.	113.	98.5	801.	464.9
1D 6- 3	61	1469.	1631.	151.	136.0	849.	460.8
4B 6- 3	66	1548.	1689.	141.	101.0	782.	475.2
5D 6- 3	68	1464.	1592.	128.	167.0	780.	472.8
2A 6- 4	70	1460.	1617.	156.	134.0	773.	480.4
3B 6- 4	* * B A D T H E R M O C O U P L E D A T A *						
1D 6- 5	82	1455.	1619.	164.	169.0	807.	476.7
2D 6- 5	* * B A D T H E R M O C O U P L E D A T A *						
3C 6- 5	85	1600.	1763.	153.	104.0	823.	481.8
3E 6- 5	86	1495.	1621.	126.	134.0	735.	494.8
3C 6- 6	97	1589.	1763.	174.	104.0	802.	492.8
3D 6- 6	98	1566.	1732.	166.	103.0	728.	501.8
4A 6- 6	100	1466.	1635.	169.	134.0	778.	507.7
4C 6- 6	101	1570.	1737.	167.	101.0	833.	495.7
5C 6- 6	103	1521.	1632.	111.	77.5	815.	494.8
1C 7- 0	* * B A D T H E R M O C O U P L E D A T A *						
2B 7- 0	111	1437.	1675.	237.	122.0	565.	523.9
3D 7- 0	115	1466.	1682.	216.	112.0	579.	528.0
5B 7- 0	117	1340.	1527.	187.	144.0	580.	530.0
2B 7- 6	121	1459.	1668.	209.	138.0	679.	561.8
2C 7- 6	122	1475.	1690.	214.	137.0	669.	594.4
2E 7- 6	123	1331.	1500.	169.	175.0	715.	569.6
3A 7- 6	124	1445.	1620.	175.	167.0	723.	555.7
3B 7- 6	125	1488.	1697.	209.	126.0	721.	559.9
4B 7- 6	128	1472.	1673.	201.	138.0	656.	585.0
5C 7- 6	129	1440.	1598.	158.	136.0	730.	556.6
1C 8- 0	132	1292.	1540.	247.	176.0	642.	629.2
2E 8- 0	134	1264.	1484.	220.	244.0	663.	620.6
3D 8- 0	137	1396.	1647.	252.	141.0	731.	607.1
5B 8- 0	139	1288.	1538.	250.	213.0	621.	630.3
5C 8- 0	140	1369.	1586.	217.	174.0	733.	600.8
1C 8- 6	141	1153.	1507.	355.	169.0	511.	655.8
1D 8- 6	142	1143.	1502.	359.	204.0	586.	649.8
2C 8- 6	143	1197.	1555.	357.	174.0	480.	664.0
4B 8- 6	145	1208.	1539.	330.	138.0	531.	667.1
5D 8- 6	148	1152.	1477.	325.	200.0	572.	653.9
3D 9- 3	155	1058.	1469.	411.	249.0	589.	670.9
4C 9- 3	157	1057.	1431.	374.	253.0	609.	671.1
1010- 0	160	615.	1075.	460.	310.0	722.	583.9
4310- 0	163	850.	1276.	426.	280.0	554.	706.9
5010- 0	166	791.	1147.	357.	280.0	649.	619.0
2A11- 0	167	548.	803.	256.	196.0	576.	617.7
4C11- 0	169	629.	1012.	383.	288.0	505.	706.7
1011- 6	170	368.	664.	295.	312.0	565.	456.6

RUN 42910D HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	610.5	544.5	567.2	611.0	550.3	571.6	12.0	.5	7.7
24	791.4	761.8	776.6	808.5	789.8	800.5	35.0	29.0	31.8
39	1185.4	1063.1	1104.6	1230.6	1114.1	1153.6	52.5	46.0	50.0
48	1303.3	1284.5	1293.9	1360.3	1338.3	1349.3	55.5	54.5	55.0
60	1492.5	1364.1	1411.8	1601.4	1497.6	1540.1	92.5	58.5	78.5
67	1598.9	1462.5	1510.3	1706.2	1574.4	1620.1	111.0	64.0	94.0
70	1611.4	1517.7	1564.6	1743.0	1655.9	1699.4	121.0	65.5	93.3
71	1555.1	1555.1	1555.1	1722.9	1722.9	1722.9	110.0	110.0	110.0
72	1595.1	1385.1	1525.2	1735.2	1564.6	1674.2	144.0	73.5	101.5
74	1569.7	1430.2	1508.2	1741.9	1592.7	1662.6	168.0	69.0	116.7
75	1547.5	1464.0	1500.5	1689.7	1591.7	1645.7	169.0	101.0	135.2
76	1585.3	1460.3	1528.3	1759.8	1611.2	1678.7	169.0	96.5	122.4
77	1600.5	1455.0	1517.2	1763.1	1598.1	1672.8	178.0	104.0	135.3
78	1589.6	1447.9	1525.7	1763.1	1617.8	1684.8	169.0	77.5	118.3
84	1465.7	1313.8	1402.9	1705.1	1502.0	1606.1	144.0	71.5	118.2
90	1488.2	1330.6	1419.0	1697.4	1470.9	1598.2	175.0	65.0	139.5
96	1412.1	1245.9	1329.7	1674.5	1483.7	1574.3	282.0	137.0	191.3
102	1208.3	1107.9	1156.6	1554.9	1399.1	1488.3	247.0	138.0	183.9
111	1070.3	925.4	1016.0	1468.7	1177.5	1351.1	290.0	202.0	233.5
120	850.0	615.2	740.0	1275.5	1074.8	1172.8	330.0	156.0	278.1
132	628.9	547.7	584.7	1011.9	803.3	884.9	288.0	196.0	233.3
138	579.7	368.4	479.4	950.1	663.6	779.4	361.0	284.0	311.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	6.9	0.0	4.2	566.7	541.2	551.1	22.7	19.4	20.6
24	28.0	17.1	24.0	647.1	631.6	639.0	65.8	64.5	65.2
39	51.0	45.2	49.1	711.4	641.3	686.1	153.5	150.8	151.9
48	57.0	53.8	55.4	773.4	713.6	743.5	217.7	205.8	211.7
60	142.6	108.9	128.3	765.9	719.9	748.2	322.8	316.3	320.6
67	111.9	107.2	109.8	881.0	861.4	871.1	385.6	379.8	383.4
70	138.2	131.6	134.9	874.9	859.1	867.0	412.6	405.6	409.1
71	167.8	167.9	167.8	782.7	782.7	782.7	444.8	444.8	444.8
72	179.5	135.8	148.9	863.7	696.3	793.3	447.0	426.6	438.2
74	186.5	112.7	154.4	850.4	578.9	749.8	481.0	422.6	461.2
75	161.4	127.6	145.2	848.8	729.9	777.2	478.2	460.8	470.9
76	187.7	122.1	150.4	860.6	546.4	761.0	492.6	468.8	482.8
77	192.0	125.9	155.6	823.3	735.4	793.4	503.8	476.7	488.6
78	136.2	110.9	159.1	874.4	728.3	797.5	507.7	474.1	493.5
84	239.4	116.9	203.2	678.6	545.7	592.1	542.7	517.9	525.9
90	214.3	117.3	179.2	730.0	622.9	584.0	594.4	525.6	562.1
96	262.4	216.9	244.6	733.4	604.3	564.6	648.9	598.8	614.4
102	358.6	291.2	331.7	586.0	473.2	518.9	667.1	649.8	659.3
111	410.8	243.4	335.1	609.3	476.4	561.8	687.0	641.8	666.0
120	488.3	366.8	432.8	721.9	475.4	586.3	716.9	583.9	662.9
132	383.0	255.6	300.2	576.3	505.0	549.6	706.7	597.8	640.7
138	370.4	250.6	299.9	565.3	247.9	434.7	730.0	456.6	586.4

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41810E
Test Date: 12/6/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.141 MPa (20.4 psia)
Initial peak clad temperature and location	872°C (1601°F), 2C 1.70 m (67 in.)
Initial peak rod power	0.89 kw/m (0.27 kw/ft)
Flow rate	10 mm/sec (0.41 in./sec)
Coolant temperature	31°C (88°F)
Average and range of initial 1.83 m (72 in.) housing temperature	538°C (529°C - 544°C) [1001°F (985°F - 1011°F)]
Initial bundle water level	43.4 mm (1.71 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	approximately +1.0%[a]
Total power:	0% increasing linearly to +2%[a]

a. Relative to run 43610A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER41810E

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1174.	1230.	55.	56.5	600.	166.8
4C 3- 3	10	1258.	1288.	30.	30.5	703.	175.7
1C 4- 0	12	1364.	1431.	67.	69.0	782.	226.7
2A 5- 0	16	1498.	1601.	103.	73.5	845.	335.7
2A 5- 7	19	1524.	1630.	106.	95.0	743.	407.5
5C 6- 0	36	1436.	1635.	199.	135.0	232.	794.0
2D 6- 2	39	1518.	1729.	211.	141.0	650.	526.4
1D 6- 4	47	1472.	1634.	162.	196.0	736.	525.6
3D 6- 4	50	1491.	1758.	267.	151.0	236.	758.0
4B 6- 4	52	1537.	1723.	186.	142.0	556.	515.9
5C 6- 4	54	1464.	1652.	188.	203.0	982.	507.5
5D 6- 4	55	1488.	1648.	161.	218.0	757.	536.8
1D 6- 5	58	1489.	1642.	152.	196.0	752.	534.2
2A 6- 5	59	1485.	1654.	169.	211.0	704.	558.0
2D 6- 5	61	1537.	1709.	172.	149.0	750.	544.6
3B 6- 5	63	1569.	1749.	179.	135.0	649.	542.9
3C 6- 6	72	1590.	1771.	181.	130.0	591.	547.8
4C 6- 6	75	1592.	1752.	160.	136.0	731.	559.6
3C 6- 7	* * B A D T H E R M O C O U P L E D A T A *						
3E 6- 7	83	1514.	1687.	173.	196.0	761.	559.5
3D 6- 8	86	1576.	1770.	193.	140.0	744.	573.0
4A 6- 8	87	1459.	1630.	171.	198.0	705.	573.8
1C 7- 0	93	1482.	1605.	123.	93.0	563.	576.2
2B 7- 0	94	1502.	1672.	171.	89.5	564.	569.9
3D 7- 0	98	1553.	1741.	188.	130.0	666.	564.6
5B 7- 0	103	1426.	1599.	173.	127.0	556.	596.8
2B 7- 6	110	1466.	1669.	183.	137.0	663.	632.8
2C 7- 6	111	1516.	1694.	178.	137.0	653.	601.7
2E 7- 6	113	1408.	1603.	194.	194.0	663.	620.8
3A 7- 6	* * B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	115	1251.	1621.	370.	149.0	559.	706.8
4B 7- 6	120	1503.	1711.	208.	136.0	675.	622.6
5C 7- 6	122	1485.	1656.	171.	131.0	697.	620.8
1C 8- 0	124	1339.	1574.	235.	200.0	679.	670.6
2E 8- 0	126	1271.	1539.	268.	216.0	651.	677.7
3D 8- 0	129	1381.	1675.	293.	152.0	697.	663.6
5B 8- 0	133	1308.	1577.	269.	210.0	570.	672.7
5C 8- 0	134	1386.	1635.	249.	169.0	648.	661.7
1C 8- 6	135	1177.	1514.	337.	194.0	566.	712.9
1D 8- 6	136	1150.	1490.	340.	199.0	513.	726.0
2C 8- 6	138	1290.	1640.	349.	191.0	605.	710.6
4B 8- 6	143	1223.	1592.	369.	140.0	537.	713.7
5D 8- 6	145	1175.	1557.	382.	223.0	572.	702.9
3D 9- 3	150	1012.	1437.	425.	210.0	612.	718.0
4C 9- 3	152	1065.	1472.	407.	223.0	591.	720.8
1D10- 0	157	669.	1112.	443.	225.0	506.	753.8
4B10- 0	164	853.	1310.	457.	233.0	549.	752.9
5D10- 0	166	687.	1019.	332.	244.0	571.	641.2
2A11- 0	168	554.	777.	224.	450.0	559.	623.7
4C11- 0	169	654.	1084.	430.	323.0	491.	752.0
1D11- 6	171	330.	774.	444.	278.0	496.	704.9

RUN 41810E HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	643.1	609.9	632.1	652.0	617.3	639.4	15.5	11.5	13.0
24	925.1	843.9	880.9	936.7	866.5	896.4	30.5	18.5	24.5
39	1258.1	1153.7	1187.2	1288.0	1195.2	1234.8	65.5	30.5	48.9
48	1428.8	1342.2	1378.4	1499.8	1429.1	1453.4	72.0	61.5	67.5
60	1545.0	1489.4	1510.8	1658.1	1601.4	1622.5	73.5	65.5	69.7
67	1605.0	1492.1	1549.8	1746.4	1629.7	1685.5	143.0	69.5	99.4
70	1595.8	1542.3	1568.9	1764.2	1736.3	1750.8	139.0	91.0	107.2
73	1466.3	1466.3	1466.3	1647.2	1647.2	1647.2	167.0	167.0	167.0
74	1517.9	1516.8	1517.3	1729.6	1728.5	1729.0	142.0	141.0	141.5
75	1480.3	1460.3	1470.0	1654.8	1630.8	1643.9	216.0	191.0	199.3
76	1550.3	1463.5	1498.6	1736.3	1634.1	1674.1	218.0	142.0	184.8
77	1569.3	1482.4	1511.4	1748.6	1619.9	1665.7	219.0	135.0	192.0
78	1592.0	1466.9	1532.3	1770.9	1640.7	1695.5	222.0	130.0	168.5
79	1583.4	1513.6	1543.9	1751.9	1655.9	1697.7	218.0	139.0	172.0
80	1576.4	1458.8	1508.7	1769.8	1629.7	1683.5	223.0	140.0	189.8
81	1571.0	1571.0	1571.0	1773.1	1773.1	1773.1	141.0	141.0	141.0
82	1507.7	1507.7	1507.7	1694.1	1694.1	1694.1	197.0	197.0	197.0
84	1557.4	1416.0	1501.9	1751.9	1597.1	1675.6	143.0	88.5	113.3
90	1569.3	1251.2	1459.6	1766.4	1575.4	1666.1	194.0	130.0	150.1
96	1416.0	1271.1	1361.6	1701.8	1538.7	1632.8	216.0	152.0	178.9
102	1523.3	794.2	1187.4	1728.5	1150.5	1524.3	227.0	137.0	191.4
111	1090.0	904.5	999.8	1503.0	1257.8	1389.2	258.0	177.0	214.7
120	1157.5	599.1	805.5	1497.6	1019.1	1248.7	314.0	210.0	256.6
132	654.3	451.7	540.0	1084.1	686.8	820.0	450.0	227.0	329.8
138	573.3	330.5	451.9	838.5	774.2	806.3	366.0	278.0	322.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	8.9	5.8	7.3	592.4	535.6	571.6	32.7	30.9	31.7
24	22.6	11.6	15.5	663.5	620.3	639.1	80.7	79.4	80.0
39	63.6	29.9	47.7	737.1	599.9	666.5	186.8	164.9	177.0
48	86.9	66.9	74.9	782.0	714.8	752.2	235.5	226.7	230.9
60	118.5	103.4	111.6	844.9	776.1	799.0	345.7	334.7	336.7
67	165.6	102.8	135.7	881.0	743.2	815.1	429.8	401.6	414.9
70	221.9	156.0	181.9	883.5	829.6	855.4	470.8	449.7	459.9
73	180.9	180.9	180.9	767.7	767.7	767.7	460.2	460.2	460.2
74	212.8	210.6	211.7	649.9	529.0	589.5	528.4	520.2	524.3
75	189.5	150.5	173.9	830.8	564.8	683.0	528.1	495.5	512.8
76	188.1	160.5	175.5	982.1	555.6	745.2	537.0	507.5	526.2
77	179.3	129.6	154.3	784.2	629.6	717.8	562.9	524.7	543.9
78	198.8	110.9	163.2	824.2	591.0	728.0	561.1	528.6	547.5
79	172.9	120.7	153.8	780.1	740.0	759.2	560.8	542.9	553.9
80	209.1	128.6	174.6	776.8	682.8	734.2	586.2	560.7	570.6
81	202.0	202.0	202.0	746.5	746.5	746.5	569.6	569.6	569.6
82	186.4	186.4	186.4	710.5	710.5	710.5	574.7	574.7	574.7
84	201.8	122.8	173.8	668.2	556.2	589.2	599.1	564.6	567.0
90	369.8	170.6	206.5	696.8	559.0	648.4	706.8	601.7	629.0
96	293.5	235.3	271.2	697.0	570.3	636.0	688.9	661.7	672.9
102	382.0	205.2	336.9	695.3	513.5	591.2	726.0	626.6	691.5
111	424.9	346.9	389.5	612.3	537.8	569.0	734.4	669.1	715.3
120	505.7	332.2	443.2	673.9	505.8	557.0	756.2	636.7	723.4
132	429.8	223.7	280.0	588.4	490.6	545.1	752.0	576.0	634.3
138	443.7	265.2	354.4	496.2	481.7	489.0	750.0	704.9	727.4

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42810F
Test Date: 7/8/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.139 MPa (20.2 psia)
Initial peak clad temperature and location	876°C (1609°F), 3C 1.78 m (70 in.)
Initial peak rod power	0.883 kw/m (0.269 kw/ft)
Flow rate	10 mm/sec (0.40 in./sec)
Coolant temperature	31°C (88°F)
Average and range of initial 1.83 m (72 in.) housing temperature	543°C (523°C - 553°C) [1010°F (973°F - 1027°F)]
Initial bundle water level	43.4 mm (1.71 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: -1.5% average[a]
Total power: -0.5% increasing linearly to -3%[a]

a. Relative to run 43610A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42810F

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1147.	1183.	35.	44.0	646.	171.8
4C 3- 3	6	1255.	1269.	14.	23.5	733.	164.9
1C 4- 0	7	1367.	1401.	34.	54.0	812.	230.7
2A 5- 0	12	1493.	1588.	96.	68.5	724.	321.8
2A 5- 7	14	1525.	1609.	84.	78.0	817.	376.7
5C 6- 2	33	1448.	1606.	158.	174.0	247.	525.0
2D 6- 3	39	1494.	1665.	171.	127.0	667.	487.1
1D 6- 4	46	1466.	1605.	139.	176.0	767.	490.2
3D 6- 4	50	1510.	1725.	215.	142.0	271.	794.0
4B 6- 4	51	1544.	1652.	107.	124.0	757.	500.7
5D 6- 4	56	1466.	1575.	110.	210.0	713.	516.9
1D 6- 5	58	1464.	1598.	135.	204.0	795.	499.8
2A 6- 5	59	1468.	1574.	106.	171.0	707.	498.8
2D 6- 5	62	1528.	1671.	143.	141.0	682.	505.6
3B 6- 5	63	1565.	1694.	129.	124.0	542.	505.0
3C 6- 6	69	1574.	1734.	160.	124.0	243.	507.0
3E 6- 6	70	1484.	1634.	150.	131.0	425.	517.1
4C 6- 6	73	1590.	1709.	119.	85.0	707.	514.7
5C 6- 6	76	1530.	1625.	95.	90.0	727.	524.8
3D 6- 7	85	1584.	1726.	142.	118.0	659.	540.3
3C 6- 8	93	1604.	1745.	141.	122.0	779.	504.4
4A 6- 8	95	1446.	1578.	132.	133.0	772.	540.6
1C 7- 0	109	1500.	1637.	137.	124.0	580.	559.8
2B 7- 0	110	1526.	1664.	138.	79.5	546.	554.5
3D 7- 0	113	1566.	1712.	146.	77.5	510.	557.8
5B 7- 0	117	1416.	1567.	150.	95.0	490.	559.0
2B 7- 6	120	1511.	1669.	158.	123.0	672.	595.7
2C 7- 6	121	1539.	1704.	165.	123.0	655.	584.4
2E 7- 6	123	1402.	1571.	170.	144.0	677.	590.9
3A 7- 6	124	1469.	1563.	93.	114.0	711.	583.3
3B 7- 6	125	1548.	1685.	138.	84.5	672.	589.1
4B 7- 6	129	1509.	1655.	146.	87.5	671.	597.7
5C 7- 6	132	1469.	1607.	138.	105.0	710.	596.7
1C 8- 0	133	1371.	1596.	225.	154.0	673.	634.6
2E 8- 0	136	1302.	1536.	234.	177.0	634.	637.6
3D 8- 0	138	1439.	1682.	243.	142.0	692.	628.8
5B 8- 0	143	1255.	1479.	224.	259.0	691.	650.7
5C 8- 0	144	1355.	1559.	204.	174.0	677.	646.6
1C 8- 6	145	1179.	1502.	323.	145.0	518.	666.4
1D 8- 6	146	1131.	1436.	305.	162.0	500.	655.8
2C 8- 6	148	1288.	1620.	332.	145.0	610.	666.9
4B 8- 6	153	1242.	1556.	314.	132.0	527.	684.0
5D 8- 6	155	1169.	1483.	313.	273.0	585.	647.1
3D 9- 3	159	1084.	1415.	331.	208.0	611.	694.9
4C 9- 3	161	1112.	1460.	348.	220.0	592.	701.9
1D10- 0	164	701.	1136.	435.	352.0	607.	709.7
4B10- 0	168	899.	1348.	449.	230.0	561.	727.0
5D10- 0	169	805.	1148.	344.	303.0	665.	674.9
2A11- 0	171	522.	794.	272.	253.0	471.	665.8
4C11- 0	172	704.	1119.	416.	310.0	514.	733.9
1D11- 6	** BAD THERMOCOUPLE DATA *						

RUN 42810F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	740.1	668.0	704.0	742.0	673.1	707.5	14.0	1.5	7.8
24	908.0	908.0	908.0	914.0	914.0	914.0	16.5	16.5	16.5
39	1254.9	1144.4	1182.3	1269.2	1182.7	1218.8	66.0	23.5	44.5
48	1442.3	1325.9	1376.5	1481.6	1380.2	1417.1	55.0	34.0	46.6
60	1492.6	1429.4	1456.2	1588.4	1550.6	1567.9	73.5	65.0	69.0
67	1599.6	1486.2	1549.6	1718.5	1609.0	1654.9	84.5	67.0	75.6
70	1609.4	1407.9	1472.4	1746.4	1572.2	1622.8	124.0	76.0	100.5
71	1553.1	1517.4	1535.2	1726.3	1704.0	1715.1	124.0	115.0	119.5
72	1474.3	1374.1	1424.2	1691.9	1585.2	1638.5	128.0	125.0	126.5
73	1460.4	1395.1	1427.7	1671.2	1607.9	1639.5	186.0	142.0	164.0
74	1503.4	1376.2	1458.8	1720.7	1581.9	1651.2	208.0	124.0	153.4
75	1500.2	1401.4	1459.2	1710.7	1565.7	1632.4	192.0	124.0	159.7
76	1544.3	1423.9	1487.1	1728.5	1575.4	1638.2	227.0	96.0	157.5
77	1565.0	1463.6	1506.1	1701.8	1570.0	1631.3	204.0	124.0	164.4
78	1589.7	1464.6	1521.8	1734.1	1565.7	1634.0	212.0	85.0	134.0
79	1592.0	1443.4	1524.9	1726.3	1580.9	1645.4	229.0	87.5	143.1
80	1604.1	1445.5	1520.1	1745.3	1577.6	1659.4	175.0	122.0	146.1
81	1505.6	1505.6	1505.6	1643.9	1643.9	1643.9	143.0	143.0	143.0
84	1567.2	1416.4	1503.7	1729.6	1563.6	1652.1	125.0	69.5	104.8
90	1565.0	1394.1	1489.3	1737.4	1529.0	1640.3	144.0	84.5	116.0
96	1454.1	1242.3	1369.6	1698.4	1456.9	1598.4	266.0	132.0	168.8
102	1288.3	1097.7	1202.5	1619.9	1407.7	1513.8	273.0	128.0	169.4
111	1114.4	962.7	1045.1	1480.5	1287.0	1372.4	347.0	184.0	249.3
120	904.9	700.6	829.7	1371.9	1135.9	1253.9	362.0	280.0	310.8
132	703.8	487.4	552.0	1119.3	665.7	859.0	399.0	263.0	341.8
138	595.3	578.4	586.8	1080.0	913.0	996.5	406.0	356.0	381.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	5.1	1.9	3.5	660.1	637.5	648.8	29.8	27.9	28.9
24	6.0	6.0	6.0	669.1	669.1	669.1	79.8	79.8	79.8
39	60.1	14.2	36.5	733.3	645.8	678.2	171.8	164.9	168.8
48	54.3	34.4	40.6	833.7	704.0	785.5	230.7	223.3	227.6
60	121.2	95.7	111.7	723.6	665.6	691.9	330.7	321.8	327.6
67	126.1	84.2	105.3	956.5	816.8	862.5	401.7	376.7	391.4
70	170.8	137.0	150.4	959.2	246.8	573.6	542.0	419.4	479.5
71	186.6	173.2	179.9	837.5	247.9	542.7	535.0	442.7	473.9
72	217.6	211.1	214.4	247.9	230.7	239.3	792.0	537.0	664.5
73	212.8	210.8	211.8	949.3	246.8	598.0	531.0	459.8	495.4
74	217.3	158.2	192.4	764.6	237.1	348.0	794.0	471.2	578.4
75	218.0	127.8	173.2	759.5	243.6	395.0	794.0	427.8	579.7
75	215.3	91.6	151.1	923.6	244.7	557.0	794.0	481.5	561.1
77	185.4	99.5	125.2	794.8	247.9	611.1	560.0	466.7	509.3
78	160.4	70.1	112.2	791.1	242.5	680.2	535.3	507.0	519.3
79	153.7	84.0	120.5	807.7	507.0	713.9	540.3	498.5	524.1
80	160.7	118.3	139.3	779.4	645.5	718.0	546.8	504.4	533.4
81	138.3	138.3	138.3	713.6	713.6	713.6	532.7	532.7	532.7
84	170.1	118.1	148.4	595.4	489.5	554.4	565.3	534.5	555.4
90	181.9	93.4	151.1	723.1	634.6	681.5	609.2	571.8	591.6
96	252.5	203.7	228.8	712.8	612.1	668.0	651.7	622.8	637.0
102	331.5	281.0	311.3	610.5	424.9	528.9	684.0	642.1	663.1
111	366.1	269.6	327.4	611.4	481.3	572.2	701.9	676.2	687.9
120	467.0	343.8	424.3	664.9	556.0	593.6	727.0	674.9	713.4
132	415.5	178.3	307.1	662.9	448.5	524.3	733.9	619.8	668.3
138	484.7	334.6	409.7	530.4	514.1	522.3	759.9	753.0	756.4

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43511A
Test Date: 4/29/80
Test Type: Forced Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.142 MPa (20.6 psia)
Initial peak clad temperature and location	873°C (1603°F), 3C 1.78 m (70 in.)
Initial peak rod power	1.3 kw/m (0.40 kw/ft)
Flow rate	15 mm/sec (0.6 in./sec)
Coolant temperature	33°C (89°F)
Average and range of initial 1.83 m (72 in.) housing temperature	523°C (516°C - 527°C) [974°F (961°F - 980°F)]
Initial bundle water level	38.28 mm (1.507 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: approximately 1.3% increase at 110 seconds[a]
Total power: exponentially increasing from -1% to -3.1% by 570 seconds[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43511A

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1126.	1208.	81.	49.5	696.	143.1
4C 3- 3	11	1187.	1248.	62.	30.0	743.	142.8
1C 4- 0	14	1346.	1443.	97.	64.0	714.	212.7
2A 5- 0	17	1375.	1531.	156.	74.5	705.	300.7
2A 5- 7	21	1486.	1673.	188.	109.0	865.	376.6
1D 6- 2	50	1455.	1700.	245.	157.0	833.	447.7
2D 6- 2	53	1566.	1825.	259.	115.0	804.	444.2
3D 6- 2	58	1580.	1861.	281.	114.0	875.	451.8
5C 6- 2	61	1499.	1678.	179.	78.5	856.	435.5
1D 6- 3	63	1442.	1688.	246.	193.0	879.	459.9
4B 6- 3	68	1532.	1797.	265.	109.0	812.	468.8
5D 6- 3	69	1456.	1717.	262.	134.0	811.	460.7
2A 6- 4	70	1447.	1701.	254.	181.0	832.	477.8
3B 6- 4	75	1560.	1850.	290.	118.0	854.	476.7
3D 6- 6	79	1522.	1843.	321.	118.0	775.	499.6
2D 6- 5	84	1549.	1832.	283.	121.0	828.	475.4
3C 6- 5	85	1563.	1886.	323.	117.0	841.	475.4
3E 6- 5	86	1478.	1727.	250.	166.0	805.	486.6
3C 6- 6	95	1543.	1873.	331.	115.0	835.	487.8
4A 6- 6	97	1411.	1709.	298.	183.0	823.	499.5
3D 8- 0	98	1280.	1630.	350.	159.0	678.	612.3
5C 6- 6	** BAD THERMOCOUPLE DATA *						
1C 7- 0	110	1398.	1636.	238.	120.0	656.	537.9
2B 7- 0	111	1412.	1629.	216.	78.0	558.	537.4
3D 7- 0	115	1442.	1696.	254.	114.0	653.	535.4
5B 7- 0	117	1321.	1566.	245.	140.0	653.	517.0
2B 7- 6	** BAD THERMOCOUPLE DATA *						
2C 7- 6	121	1411.	1703.	292.	111.0	689.	579.7
2E 7- 6	122	1293.	1510.	216.	115.0	702.	545.8
3A 7- 6	123	1316.	1580.	264.	157.0	634.	590.6
3B 7- 6	124	1426.	1724.	298.	114.0	696.	580.8
4B 7- 6	127	1394.	1700.	305.	114.0	674.	583.8
5C 7- 6	128	1276.	1520.	244.	157.0	637.	562.7
1C 8- 0	131	1238.	1560.	322.	159.0	651.	612.0
2E 8- 0	133	943.	1271.	328.	131.0	625.	569.0
4C 6- 6	136	1529.	1836.	308.	117.0	802.	491.5
5B 8- 0	138	1202.	1533.	331.	133.0	636.	586.0
5C 8- 0	139	1137.	1452.	314.	157.0	569.	601.9
1C 8- 6	141	1114.	1436.	322.	124.0	445.	612.9
1D 8- 6	142	1067.	1241.	174.	57.5	463.	585.0
2C 8- 6	143	1148.	1517.	369.	124.0	514.	632.5
4B 8- 6	145	1127.	1464.	337.	104.0	390.	620.6
5D 8- 6	148	1056.	1395.	339.	129.0	564.	573.5
3D 9- 3	154	985.	1373.	388.	156.0	509.	644.0
4C 9- 3	156	1015.	1354.	339.	115.0	551.	623.0
1D10- 0	161	582.	1028.	447.	192.0	562.	503.5
4B10- 0	164	819.	1161.	342.	154.0	543.	629.9
5D10- 0	167	749.	1078.	329.	244.0	627.	472.6
2A11- 0	168	537.	721.	184.	153.0	582.	434.0
4C11- 0	170	633.	923.	290.	158.0	397.	584.9
1D11- 6	172	377.	687.	310.	157.0	574.	165.8

RUN 43511A HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	613.5	567.2	583.6	619.4	581.2	595.0	12.5	7.5	11.0
24	880.8	795.9	836.2	902.7	832.3	864.4	25.5	19.5	23.4
39	1186.6	1087.5	1133.5	1248.4	1170.2	1208.8	49.5	30.0	42.2
48	1360.5	1262.8	1313.6	1466.6	1380.2	1420.9	72.0	60.5	66.3
60	1465.1	1332.9	1382.2	1634.1	1499.8	1545.2	74.5	59.0	69.3
67	1579.4	1475.4	1507.7	1795.4	1673.4	1709.3	117.0	91.5	105.4
70	1602.6	1492.5	1549.7	1864.4	1690.8	1770.0	169.0	98.5	122.6
71	1598.9	1477.5	1546.4	1873.4	1676.6	1779.1	161.0	102.0	122.4
72	1600.0	1457.8	1534.0	1876.8	1663.6	1760.9	176.0	79.0	120.3
74	1580.5	1454.6	1529.7	1877.9	1657.0	1780.0	173.0	78.5	123.6
75	1572.3	1441.7	1518.1	1879.1	1687.5	1787.2	193.0	109.0	141.7
76	1568.0	1439.6	1516.3	1884.7	1700.6	1791.7	181.0	114.0	140.5
77	1563.2	1422.4	1500.6	1885.9	1694.1	1787.0	195.0	117.0	152.6
78	1542.7	1410.6	1487.8	1873.4	1706.5	1794.8	209.0	115.0	153.3
84	1442.2	1258.6	1373.7	1702.9	1548.4	1623.6	165.0	78.0	126.4
90	1426.1	1249.2	1347.3	1724.1	1485.9	1612.1	157.0	98.5	125.4
96	1300.8	943.2	1209.5	1670.1	1271.3	1544.6	159.0	131.0	145.9
102	1148.2	1055.6	1096.0	1519.2	1241.1	1407.7	129.0	67.5	110.4
111	1106.6	878.2	968.0	1372.9	1139.0	1256.5	156.0	90.0	121.0
120	818.7	581.6	740.6	1245.2	1013.0	1120.8	244.0	148.0	181.0
132	632.9	508.6	557.4	923.3	721.2	776.4	217.0	153.0	173.3
138	577.9	376.6	476.8	912.0	686.8	787.0	216.0	145.0	185.2

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	14.0	5.9	11.4	605.8	569.5	583.9	19.1	18.7	18.9
24	36.4	21.9	28.2	756.8	674.1	711.9	61.9	52.4	56.4
39	82.7	61.8	75.3	743.0	642.2	693.9	143.1	141.8	142.6
48	131.1	94.9	107.3	879.6	713.6	798.7	212.7	188.5	197.5
60	169.0	156.3	163.1	709.6	677.3	694.2	313.7	299.9	305.6
67	216.0	187.8	201.6	865.4	808.0	831.3	382.6	374.7	378.4
70	261.8	196.0	220.4	925.9	779.6	846.6	414.7	402.7	408.8
71	274.5	199.0	232.6	958.6	777.0	830.2	429.7	413.6	419.1
72	276.8	166.8	226.9	977.6	742.2	871.2	438.6	407.7	425.3
74	299.0	179.2	250.2	917.7	764.5	839.6	458.8	429.8	447.7
75	306.8	245.8	269.0	879.3	770.0	815.6	471.7	457.8	463.6
76	316.7	232.1	275.4	870.9	809.3	844.4	477.8	448.4	469.2
77	322.7	249.8	286.5	841.2	764.8	804.8	493.8	475.4	482.9
78	330.7	289.7	307.1	851.3	760.0	808.7	501.8	487.8	495.9
84	289.8	210.6	249.9	658.3	511.9	616.7	545.0	517.0	533.4
90	305.4	216.5	264.8	759.9	634.0	696.2	590.6	545.8	574.3
96	369.3	313.3	335.3	838.6	568.9	662.9	517.9	536.8	595.0
102	388.7	174.2	311.7	610.8	389.5	500.9	642.0	488.8	591.9
111	388.0	213.3	288.5	673.0	435.3	538.5	644.0	491.0	585.5
120	471.6	255.5	380.2	753.1	389.6	574.1	553.0	353.5	556.9
132	290.4	184.3	219.0	582.3	244.7	450.7	584.9	233.0	399.5
138	435.2	222.2	310.2	626.9	245.7	478.8	610.0	155.3	410.4

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42711B
Test Date: 6/23/80
Test Type: Forced Reflood
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.138 MPa (20.0 psia)
Initial peak clad temperature and location	875°C (1608°F), 3C 1.78 m (70 in.)
Initial peak rod power	1.3 kw/m (0.40 kw/ft)
Flow rate	15 mm/sec (0.60 in./sec)
Coolant temperature	31°C (88°F)
Average and range of initial 1.83 m (72 in.) housing temperature	528°C (519°C - 533°C) [982°F (967°F - 992°F)]
Initial bundle water level	36.1 mm (1.42 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: -1.5% with ±5% oscillation for 50 seconds at 220 seconds[a]
Total power: -0.5% linearly increasing to -1%[a]

a. Relative to run 43511A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42711B

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1061.	1138.	77.	58.0	602.	149.9
4C 3- 3	11	1199.	1246.	47.	27.5	709.	148.6
1C 4- 0	14	1301.	1373.	72.	52.0	669.	210.4
2A 5- 0	17	1360.	1518.	158.	66.5	657.	312.7
2A 5- 7	21	1491.	1649.	158.	98.5	849.	302.5
1D 6- 2	50	1431.	1649.	218.	154.0	811.	452.8
2D 6- 2	53	1508.	1761.	253.	154.0	625.	400.9
3D 6- 2	58	1552.	1780.	228.	120.0	765.	460.9
5C 6- 2	61	1491.	1690.	199.	150.0	820.	453.4
1D 6- 3	63	1445.	1648.	203.	154.0	762.	426.8
4B 6- 3	68	1536.	1734.	199.	130.0	733.	473.7
5D 6- 3	69	1422.	1646.	225.	117.0	732.	506.8
2A 6- 4	70	1449.	1646.	197.	174.0	773.	452.8
2D 6- 4	72	1531.	1751.	220.	122.0	691.	498.5
3B 6- 4	75	1566.	1770.	204.	113.0	723.	492.4
3C 6- 5	85	1597.	1809.	212.	121.0	736.	493.7
3E 6- 5	86	1472.	1671.	199.	143.0	796.	500.7
3C 6- 6	95	1573.	1820.	247.	115.0	750.	506.8
3D 6- 6	96	1538.	1794.	257.	120.0	778.	499.7
4A 6- 6	97	1429.	1684.	255.	190.0	752.	506.5
4C 6- 6	98	1546.	1793.	247.	115.0	700.	507.7
5C 6- 6	101	1458.	1677.	219.	168.0	624.	498.8
1C 7- 0	110	1423.	1612.	190.	99.0	602.	552.6
2B 7- 0	111	1454.	1647.	194.	95.0	549.	553.8
3D 7- 0	115	1483.	1694.	211.	80.5	649.	537.2
5B 7- 0	117	1359.	1544.	185.	168.0	625.	555.0
2B 7- 6	120	1440.	1671.	231.	115.0	657.	569.1
2C 7- 6	121	1457.	1706.	249.	116.0	647.	590.9
2E 7- 6	122	1292.	1517.	225.	120.0	532.	585.8
3A 7- 6	123	1413.	1624.	211.	140.0	687.	578.0
3B 7- 6	124	1454.	1704.	250.	112.0	669.	583.1
4B 7- 6	127	1451.	1681.	231.	99.0	681.	585.0
5C 7- 6	128	1408.	1632.	224.	124.0	704.	580.8
1C 8- 0	131	1297.	1581.	284.	125.0	613.	610.9
2E 8- 0	133	1200.	1464.	264.	126.0	550.	591.0
3D 8- 0	136	1333.	1653.	320.	140.0	697.	602.0
5B 8- 0	138	1159.	1449.	291.	141.0	644.	589.9
5C 8- 0	139	1301.	1592.	291.	150.0	634.	612.9
1C 8- 6	141	1133.	1428.	295.	126.0	471.	629.6
1D 8- 6	142	1069.	1303.	234.	107.0	520.	605.9
2C 8- 6	143	1189.	1527.	338.	126.0	520.	636.7
4B 8- 6	145	1207.	1565.	358.	139.0	509.	634.8
5D 8- 6	148	1091.	1399.	308.	106.0	529.	576.3
3D 9- 3	154	993.	1352.	358.	129.0	566.	632.4
4C 9- 3	156	1046.	1373.	327.	116.0	550.	632.0
1D10- 0	161	582.	973.	391.	134.0	474.	594.8
4B10- 0	164	870.	1193.	324.	173.0	551.	647.0
5D10- 0	167	703.	1026.	324.	222.0	667.	479.3
2A11- 0	168	545.	728.	183.	197.0	544.	434.5
4C11- 0	** B A D T H E R M O C O U P L E D A T A *						
1D11- 6	172	243.	734.	491.	255.0	554.	456.9

RUN 42711B HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	657.3	581.2	608.6	661.5	595.1	619.6	13.0	7.5	11.1
24	889.2	803.3	834.9	917.1	838.5	865.4	26.0	20.0	24.1
39	1199.3	1061.4	1110.8	1246.3	1138.0	1180.6	58.0	27.5	44.3
48	1359.3	1255.7	1297.0	1461.2	1353.0	1395.0	64.5	52.0	56.3
60	1461.2	1334.1	1380.0	1614.5	1466.6	1524.8	66.5	54.5	60.0
67	1575.4	1477.3	1509.6	1758.6	1648.3	1679.1	98.5	80.5	89.6
70	1607.9	1489.1	1543.5	1814.6	1667.9	1735.1	144.0	84.0	107.9
71	1593.6	1414.1	1507.8	1815.7	1625.4	1719.9	174.0	95.0	125.9
72	1481.6	1422.7	1463.4	1689.7	1607.9	1662.9	169.0	116.0	139.8
74	1553.8	1431.2	1503.6	1823.7	1649.4	1728.5	172.0	116.0	144.8
75	1589.5	1421.6	1515.7	1787.6	1646.1	1720.3	154.0	115.0	131.7
76	1600.3	1444.1	1514.5	1794.3	1646.1	1717.2	196.0	113.0	139.2
77	1597.1	1385.5	1504.4	1809.0	1614.5	1724.3	153.0	121.0	132.9
78	1573.3	1416.4	1487.7	1820.3	1636.3	1726.2	190.0	115.0	141.8
84	1485.9	1350.9	1419.9	1696.3	1493.4	1616.1	168.0	80.5	107.5
90	1456.9	1292.2	1399.5	1706.2	1517.1	1629.5	150.0	99.0	121.4
96	1334.1	1158.8	1280.0	1657.0	1449.4	1574.8	150.0	124.0	135.1
102	1206.6	1068.6	1129.6	1564.6	1302.7	1433.7	139.0	106.0	119.1
111	1045.9	723.3	969.9	1372.9	1074.8	1262.6	149.0	97.5	120.1
120	869.6	582.3	734.5	1255.7	972.8	1113.3	226.0	134.0	186.1
132	565.2	506.6	538.9	741.0	688.9	719.8	249.0	101.0	182.3
138	599.4	242.5	451.6	910.9	686.8	795.9	262.0	166.0	214.6

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	13.9	4.2	10.9	610.3	573.2	587.6	22.1	19.9	20.9
24	38.3	23.6	30.5	651.6	605.1	626.8	68.4	62.6	65.6
39	84.2	47.0	69.8	708.9	602.4	646.1	154.9	148.6	151.9
48	120.4	72.3	98.0	760.1	668.7	706.0	211.8	206.5	209.8
60	157.9	132.5	144.8	688.6	657.2	673.8	318.2	309.7	314.4
67	183.2	153.9	169.6	853.0	772.5	818.3	384.7	376.7	382.1
70	206.7	170.3	191.6	822.9	763.7	788.5	424.8	413.7	419.3
71	224.5	199.9	212.1	889.8	737.1	814.5	463.6	423.7	435.0
72	210.9	185.2	199.5	832.5	704.1	778.4	445.4	428.7	439.0
74	310.9	181.0	224.9	978.4	589.7	764.6	480.9	442.3	464.5
75	224.5	185.6	204.6	826.8	708.3	758.1	506.6	426.8	477.0
76	223.9	189.6	202.7	825.6	691.1	763.8	498.5	474.7	485.7
77	236.5	199.3	219.9	795.8	735.7	763.0	508.6	480.6	495.1
78	256.7	217.9	238.4	824.2	697.7	760.2	517.6	496.6	507.7
84	223.1	142.5	196.2	649.1	584.5	614.7	561.6	537.2	546.6
90	250.3	203.1	230.0	707.4	531.9	648.8	598.7	564.9	583.1
96	322.9	264.0	294.9	696.7	550.5	632.5	616.0	569.9	604.8
102	358.0	234.1	304.1	569.0	470.9	514.9	638.7	552.6	612.1
111	358.5	221.0	292.8	695.2	501.2	573.4	632.4	520.7	609.9
120	491.5	291.1	378.6	667.2	463.4	527.0	658.0	475.3	615.6
132	234.4	123.7	180.2	568.2	497.5	543.4	453.7	219.4	369.2
138	491.2	208.2	344.3	554.4	242.5	431.7	629.0	332.0	529.6

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43211C
Test Date: 8/29/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.138 MPa (20.0 psia)
Initial peak clad temperature and location	874°C (1606°F), 4C 1.70 m (67 in.)
Initial peak rod power	1.3 kw/m (0.40 kw/ft)
Flow rate	15 mm/sec (0.61 in./sec)
Coolant temperature	32°C (90°F)
Average and range of initial 1.83 m (72 in.) housing temperature	513°C (501°C - 521°C) [955°F (933°F - 969°F)]
Initial bundle water level	36.1 mm (1.42 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: +3% for 70 seconds, linearly decreasing to 0% by 200 seconds, and -0.5% thereafter[a]

Total power: +0.25%[a]

a. Relative to run 43511A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43211C

ROD/ELEV	CHAN. No	TINITIAL AT FLELD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1072.	1141.	69.	50.0	706.	129.6
4C 3- 3	11	1227.	1278.	50.	27.0	707.	147.8
1C 4- 0	14	1347.	1436.	88.	54.0	701.	210.8
2A 5- 0	17	1396.	1541.	145.	69.0	732.	311.9
2A 5- 7	21	1504.	1658.	154.	98.5	790.	384.6
1D 6- 2	50	1476.	1598.	122.	139.0	806.	466.7
2D 6- 2	53	1498.	1696.	198.	149.0	566.	481.6
3D 6- 2	58	1555.	1701.	145.	69.0	626.	488.9
4B 6- 2	60	1566.	1698.	133.	69.0	716.	484.5
5C 6- 2	61	1468.	1663.	194.	175.0	1024.	444.5
1D 6- 3	63	1463.	1608.	145.	138.0	775.	479.5
5D 6- 3	69	1462.	1612.	130.	70.0	733.	466.7
2A 6- 4	70	1465.	1620.	155.	111.0	791.	370.5
3B 6- 4	75	1575.	1729.	154.	72.5	763.	482.6
2D 6- 5	84	1555.	1711.	155.	108.0	734.	499.6
3C 6- 5	85	1596.	1790.	194.	69.0	801.	496.8
3E 6- 5	86	1527.	1630.	103.	180.0	765.	488.3
3C 6- 6	95	1580.	1799.	219.	84.5	754.	507.6
3D 6- 6	96	1556.	1756.	201.	80.0	751.	514.9
4A 6- 6	97	1472.	1654.	181.	111.0	794.	496.7
4C 6- 6	98	1581.	1780.	199.	70.5	836.	502.8
5C 6- 6	101	1543.	1659.	116.	68.5	704.	499.8
1C 7- 0	110	1458.	1591.	133.	51.0	605.	539.7
2B 7- 0	111	1458.	1609.	151.	43.5	570.	534.6
3D 7- 0	115	1484.	1670.	186.	69.0	561.	549.0
5B 7- 0	117	1394.	1543.	149.	85.0	642.	531.6
2B 7- 6	120	1467.	1648.	181.	91.0	635.	575.7
2C 7- 6	121	1465.	1687.	201.	91.0	595.	598.3
2E 7- 6	122	1345.	1490.	145.	56.5	565.	544.7
3A 7- 6	123	1444.	1624.	180.	84.0	640.	567.6
3B 7- 6	124	1478.	1689.	211.	84.5	653.	580.2
4B 7- 6	127	1473.	1685.	212.	84.0	610.	597.0
5C 7- 6	128	1457.	1619.	162.	70.0	650.	561.6
1C 8- 0	131	1322.	1566.	244.	115.0	586.	615.9
2E 8- 0	133	1267.	1467.	199.	108.0	600.	564.5
3D 8- 0	136	1372.	1637.	265.	107.0	664.	616.9
5B 8- 0	138	1243.	1484.	240.	134.0	641.	579.9
5C 8- 0	139	1383.	1593.	210.	92.5	669.	596.0
1C 8- 6	141	1163.	1455.	292.	111.0	430.	608.1
1D 8- 6	142	1082.	1329.	247.	85.0	478.	596.7
2C 8- 6	* * B A D	T H E R M O C O U P L E	D A T A *				
4B 8- 6	145	1182.	1436.	253.	77.5	244.	621.0
5D 8- 6	148	1127.	1395.	268.	97.5	566.	591.8
3D 9- 3	154	1017.	1352.	335.	111.0	469.	648.0
4C 9- 3	156	1060.	1346.	286.	98.0	493.	626.0
1D10- 0	161	577.	910.	333.	192.0	616.	514.7
4B10- 0	164	860.	1188.	328.	122.0	574.	622.3
5D10- 0	167	708.	972.	263.	136.0	609.	497.6
2A11- 0	168	556.	743.	187.	218.0	572.	386.8
4C11- 0	170	637.	939.	302.	128.0	364.	616.0
1D11- 6	172	449.	723.	274.	213.0	500.	521.6

RUN 432110 HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	621.1	544.0	570.7	625.7	555.6	579.3	11.5	5.5	8.8
24	895.6	861.9	851.4	922.3	835.4	879.2	21.5	16.5	19.3
36	1227.2	1071.9	1136.8	1277.6	1141.1	1206.9	53.5	27.0	42.4
48	1372.6	1296.2	1330.2	1478.4	1399.1	1434.7	74.5	50.5	59.4
60	1401.0	1392.5	1396.4	1575.4	1523.6	1546.6	76.0	66.5	70.5
67	1606.0	1461.3	1519.7	1777.6	1613.4	1674.6	105.0	71.5	86.1
70	1589.3	1477.6	1549.7	1813.5	1667.9	1743.6	115.0	83.5	101.5
71	1548.7	1452.3	1518.1	1774.3	1634.1	1710.1	168.0	83.5	118.9
72	1505.9	1494.7	1500.3	1706.2	1677.7	1691.9	111.0	76.5	93.7
74	1576.8	1452.3	1517.1	1725.2	1584.1	1664.8	230.0	66.5	129.4
75	1596.2	1463.1	1537.6	1746.4	1600.3	1669.8	179.0	66.5	103.4
76	1600.1	1452.9	1535.2	1772.0	1609.0	1676.6	188.0	65.5	101.0
77	1595.8	1437.9	1533.2	1789.9	1615.6	1694.2	180.0	69.0	104.9
78	1580.6	1426.6	1521.8	1796.8	1633.0	1705.3	175.0	66.5	102.9
84	1503.5	1251.2	1425.5	1661.0	1388.6	1592.2	108.0	43.5	69.0
90	1485.1	1345.3	1446.2	1688.6	1490.2	1628.5	91.0	56.5	79.2
96	1386.8	1243.3	1333.9	1664.6	1466.6	1576.7	134.0	92.5	112.1
102	1196.0	1082.2	1153.6	1483.7	1328.9	1419.7	111.0	77.5	92.3
111	1070.8	975.5	1031.1	1369.8	1174.4	1294.8	116.0	89.0	102.6
120	966.7	577.1	775.0	1233.8	909.9	1101.9	201.0	106.0	151.6
132	636.9	466.3	502.3	936.8	667.8	776.8	218.0	113.0	164.0
136	584.0	449.5	464.1	869.2	662.6	770.5	213.0	116.0	171.6

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	11.6	4.6	8.5	585.7	549.3	563.3	20.0	15.5	17.0
24	33.5	23.1	27.8	664.9	632.4	651.5	65.4	58.4	62.7
36	91.6	50.4	68.1	739.0	661.3	703.4	147.8	129.6	140.0
48	123.5	86.1	104.6	703.1	699.8	701.2	211.7	204.9	209.1
60	174.4	131.1	150.2	779.1	713.5	741.7	314.7	307.7	311.4
67	171.5	132.1	154.9	897.9	790.0	847.6	384.6	375.3	380.1
70	224.2	170.5	193.9	879.4	775.0	835.1	427.7	411.6	420.7
71	238.6	143.1	191.9	904.8	729.8	830.6	439.7	422.6	430.1
72	211.5	171.7	191.6	911.9	850.9	881.4	429.7	421.5	425.6
74	196.5	122.2	147.8	806.0	565.7	692.4	488.9	453.5	470.4
75	159.1	75.4	132.2	774.8	685.2	734.8	497.5	471.7	484.2
76	171.9	80.9	141.4	833.5	724.4	774.6	499.7	370.5	469.5
77	197.2	102.5	160.9	801.1	680.7	743.8	516.5	487.7	496.7
78	218.6	115.8	183.5	856.9	699.0	757.8	514.9	428.5	494.0
84	206.6	124.3	166.7	683.8	543.2	607.2	557.4	481.8	531.6
90	212.1	144.0	182.3	694.4	584.6	632.2	598.3	512.9	569.2
96	277.6	199.3	242.8	696.5	585.7	643.1	624.0	554.8	600.0
102	292.2	246.7	265.9	587.9	243.6	452.3	640.5	591.8	613.3
111	335.1	196.8	263.7	654.5	468.9	540.7	648.0	477.6	586.4
120	432.9	234.9	326.9	618.0	241.4	490.2	659.7	428.0	567.1
132	301.9	167.3	214.5	571.6	240.4	416.2	616.0	258.1	388.2
136	426.2	196.3	286.4	500.4	246.8	388.5	596.0	151.0	452.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42711D
Test Date: 10/20/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.144 MPa (20.9 psia)
Initial peak clad temperature and location	875°C (1607°F), 3C 1.78 m (70 in.)
Initial peak rod power	1.3 kw/m (0.40 kw/ft)
Flow rate	15 mm/sec (0.61 in./sec)
Coolant temperature	31°C (88°F)
Average and range of initial 1.83 m (72 in.) housing temperature	511°C (502°C - 519°C) [952°F (935°F - 966°F)]
Initial bundle water level	14 mm (0.57 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: +2.5% for 30 seconds, ±1.5% to 400 seconds, and -2.5% thereafter[a]

Total power: +1.0% increasing linearly to +2.0%[a]

a. Relative to run 43511A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42711)

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1063.	1147.	85.	50.0	698.	137.9
4C 3- 3	9	1173.	1260.	37.	48.5	734.	137.8
1C 4- 0	10	1301.	1395.	93.	49.0	762.	188.3
2A 5- 0	13	1378.	1587.	209.	105.0	750.	303.2
2A 5- 7	16	1475.	1641.	166.	115.0	842.	362.8
2D 6- 2	50	1531.	1713.	182.	81.0	789.	428.0
3D 6- 2	55	1512.	1761.	249.	103.0	236.	655.0
5C 6- 2	59	1545.	1702.	157.	96.0	829.	433.9
1D 6- 3	61	1485.	1680.	195.	118.0	921.	381.7
4B 6- 3	66	1550.	1739.	189.	84.5	805.	444.7
5D 6- 3	68	1476.	1641.	165.	151.0	801.	441.6
2A 6- 4	70	1474.	1682.	208.	151.0	833.	438.8
3B 6- 4	* * B A D T H E R M O C O U P L E D A T A *						
1D 6- 5	82	1465.	1666.	200.	117.0	906.	404.4
2D 6- 5	* * B A D T H E R M O C O U P L E D A T A *						
3C 6- 5	85	1597.	1808.	211.	88.0	758.	457.8
3E 6- 5	86	1502.	1670.	168.	152.0	731.	466.8
3C 6- 6	97	1579.	1814.	235.	87.5	756.	468.7
3D 6- 6	98	1563.	1780.	216.	104.0	762.	467.2
4A 6- 6	100	1470.	1688.	217.	140.0	788.	479.6
4C 6- 6	101	1563.	1789.	225.	85.0	894.	463.8
5C 6- 6	103	1534.	1687.	153.	136.0	849.	465.8
1C 7- 0	* * B A D T H E R M O C O U P L E D A T A *						
2B 7- 0	111	1424.	1653.	229.	72.5	601.	498.5
3D 7- 0	115	1460.	1677.	217.	82.5	622.	500.5
5B 7- 0	117	1337.	1524.	186.	82.0	572.	505.9
2B 7- 6	121	1457.	1695.	238.	107.0	717.	533.9
2C 7- 6	122	1468.	1715.	247.	104.0	684.	569.5
2E 7- 6	123	1347.	1506.	160.	78.0	687.	540.7
3A 7- 6	124	1455.	1657.	202.	115.0	708.	526.7
3B 7- 6	125	1480.	1719.	238.	98.0	733.	529.9
4B 7- 6	128	1469.	1700.	231.	85.0	688.	560.8
5C 7- 6	129	1446.	1617.	171.	72.5	725.	531.9
1C 8- 0	132	1295.	1540.	254.	117.0	599.	608.6
2E 8- 0	134	1282.	1448.	167.	92.5	654.	590.6
3D 8- 0	137	1387.	1659.	272.	102.0	726.	574.9
5B 8- 0	139	1286.	1530.	244.	102.0	640.	602.7
5C 8- 0	140	1370.	1596.	226.	104.0	731.	571.4
1C 8- 6	141	1105.	1455.	350.	115.0	449.	610.3
1D 8- 6	142	1108.	1440.	332.	98.0	674.	556.6
2C 8- 6	143	1119.	1502.	383.	117.0	452.	619.9
4B 8- 6	145	1179.	1491.	312.	80.0	517.	628.0
5D 8- 6	148	1136.	1428.	292.	103.0	537.	581.3
3D 9- 3	155	957.	1354.	397.	119.0	473.	612.0
4C 9- 3	157	1034.	1358.	354.	127.0	494.	613.0
1D10- 0	160	602.	1008.	406.	226.0	610.	460.4
4B10- 0	163	824.	1172.	349.	131.0	519.	625.9
5D10- 0	166	739.	1034.	294.	170.0	543.	514.7
2A11- 0	167	531.	749.	218.	174.0	584.	425.6
4C11- 0	169	591.	935.	343.	217.0	443.	592.0
1D11- 6	170	416.	691.	275.	227.0	555.	445.9

RUN 427110 HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	594.0	537.5	556.4	602.5	552.4	569.8	14.5	9.5	12.2
24	787.3	761.3	775.9	820.9	804.4	814.7	26.0	25.0	25.5
39	1173.2	1062.6	1099.7	1259.9	1147.3	1187.3	50.0	47.0	48.5
48	1301.4	1294.1	1297.8	1394.9	1381.3	1388.1	51.0	49.0	50.0
60	1481.7	1365.4	1408.4	1652.6	1553.8	1597.9	105.0	63.0	85.3
67	1600.5	1475.0	1518.6	1762.0	1634.1	1678.9	115.0	56.0	84.8
70	1607.0	1529.5	1568.2	1796.6	1729.6	1763.1	118.0	83.5	100.8
71	1547.5	1547.5	1547.5	1770.9	1770.9	1770.9	102.0	102.0	102.0
72	1590.7	1377.3	1528.6	1779.8	1593.8	1723.8	117.0	73.5	93.3
74	1563.7	1429.6	1517.9	1798.8	1633.0	1714.8	180.0	81.0	115.4
75	1549.6	1476.1	1508.5	1738.6	1640.7	1694.2	166.0	84.5	121.7
76	1582.1	1474.2	1534.9	1809.0	1663.6	1734.7	151.0	87.5	117.5
77	1596.8	1465.4	1518.7	1807.8	1649.4	1723.6	152.0	80.0	116.7
78	1582.1	1455.3	1528.9	1813.5	1678.8	1739.6	151.0	85.0	114.9
84	1459.6	1321.3	1401.3	1697.4	1511.7	1611.3	105.0	50.0	83.3
90	1480.0	1345.5	1423.8	1718.5	1506.3	1620.3	118.0	50.0	90.2
96	1401.8	1242.3	1328.9	1704.0	1448.4	1577.8	117.0	92.5	108.5
102	1179.0	1090.5	1121.7	1502.0	1324.7	1426.9	117.0	76.5	97.3
111	1021.4	857.7	960.5	1359.3	1103.7	1267.3	130.0	97.0	114.0
120	823.6	602.1	692.3	1172.3	991.3	1078.6	226.0	118.0	179.3
132	591.5	531.1	555.1	934.6	749.3	811.1	217.0	131.0	174.0
138	563.1	415.8	480.4	877.9	683.6	743.4	231.0	132.0	200.5

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	16.8	8.5	13.4	560.0	540.0	548.0	21.5	18.5	19.6
24	43.1	31.6	38.9	652.3	626.6	639.0	57.9	56.4	57.3
39	91.3	84.7	87.6	734.3	646.6	693.0	140.6	137.8	138.8
48	93.5	87.2	90.3	762.4	731.4	746.9	201.8	188.3	195.1
60	209.4	170.9	189.5	820.4	739.0	769.8	304.1	296.3	301.2
67	165.7	153.7	160.3	846.2	842.2	844.5	362.8	355.6	360.4
70	200.1	189.6	194.9	888.8	816.9	852.8	384.7	374.7	379.7
71	223.4	223.4	223.4	807.6	807.6	807.6	409.6	409.6	409.6
72	216.5	184.6	195.2	917.7	747.7	811.5	415.4	391.9	405.5
74	240.5	142.3	196.9	913.0	606.2	766.2	447.9	317.6	421.2
75	202.8	164.6	185.7	920.6	764.5	820.1	448.5	381.7	430.1
76	248.9	159.0	199.8	857.3	517.4	774.4	462.7	436.2	450.2
77	265.3	168.3	204.9	906.2	730.9	812.2	470.8	404.4	452.2
78	246.5	152.7	210.7	894.4	756.1	823.0	479.6	440.7	462.2
84	246.4	135.6	210.0	674.1	571.9	615.6	523.6	490.4	500.4
90	247.3	151.3	196.6	732.5	633.3	689.2	569.5	487.6	534.4
96	302.2	166.7	248.9	737.1	599.1	674.3	608.6	564.9	579.4
102	382.9	225.0	305.2	674.5	449.4	524.7	628.0	533.3	585.9
111	396.8	228.7	306.8	625.3	473.1	502.1	613.0	504.9	574.8
120	475.7	284.2	386.2	610.3	433.3	535.2	625.9	423.6	539.3
132	343.1	206.5	256.0	583.7	443.0	505.7	592.0	425.6	508.5
138	314.8	204.0	263.0	554.8	432.0	486.9	616.0	285.6	476.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41711E
Test Date: 12/5/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.142 MPa (20.6 psia)
Initial peak clad temperature and location	876°C (1609°F), 4C 1.70 m (67 in.)
Initial peak rod power	1.3 kw/m (0.40 kw/ft)
Flow rate	15 mm/sec (0.60 in./sec)
Coolant temperature	32°C (90°F)
Average and range of initial 1.83 m (72 in.) housing temperature	517°C (509°C - 522°C) [963°F (949°F - 971°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: +0.5% to 100 seconds and -1.5% thereafter[a]
Total power: -0.25% increasing linearly to +0.5%[a]

a. Relative to run 43511A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER41711E

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1177.	1263.	96.	55.5	646.	164.8
4C 3- 3	10	1250.	1302.	52.	42.0	738.	155.9
1C 4- 0	12	1368.	1479.	112.	65.5	812.	205.8
2A 5- 0	16	1516.	1658.	142.	73.5	828.	312.7
2A 5- 7	19	1534.	1678.	143.	79.5	776.	377.7
5C 6- 0	36	1429.	1660.	231.	106.0	234.	713.0
2D 6- 2	39	1522.	1758.	235.	128.0	656.	462.3
1D 6- 4	47	1493.	1678.	185.	163.0	732.	467.4
3D 6- 4	50	1469.	1795.	326.	155.0	238.	704.0
4B 6- 4	52	1541.	1758.	217.	130.0	571.	468.6
5C 6- 4	54	1477.	1689.	211.	181.0	939.	462.3
5D 6- 4	55	1511.	1676.	165.	183.0	751.	466.4
1D 6- 5	58	1508.	1689.	181.	166.0	786.	477.5
2A 6- 5	59	1498.	1693.	195.	169.0	656.	508.3
2D 6- 5	61	1546.	1756.	211.	190.0	766.	497.7
3B 6- 5	63	1567.	1784.	217.	127.0	675.	493.0
3C 6- 6	72	1586.	1816.	229.	174.0	522.	508.9
4C 6- 6	75	1595.	1795.	200.	130.0	748.	515.1
3C 6- 7	* * B A D T H E R M O C O U P L E D A T A *						
3E 6- 7	83	1524.	1736.	212.	187.0	797.	506.3
3D 6- 8	86	1572.	1818.	246.	182.0	750.	525.6
4A 6- 8	87	1466.	1666.	199.	169.0	739.	520.8
1C 7- 0	93	1467.	1621.	134.	59.0	640.	524.9
2B 7- 0	94	1499.	1664.	165.	56.0	602.	544.8
3D 7- 0	98	1547.	1733.	186.	79.5	649.	553.8
5B 7- 0	103	1428.	1596.	168.	80.0	591.	550.5
2B 7- 6	110	1479.	1689.	210.	104.0	622.	594.6
2C 7- 6	111	1509.	1701.	192.	103.0	683.	560.7
2E 7- 6	113	1416.	1592.	176.	122.0	721.	553.8
3A 7- 6	* * B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	115	1228.	1603.	374.	116.0	569.	643.0
4B 7- 6	120	1499.	1727.	228.	98.5	699.	576.7
5C 7- 6	122	1492.	1669.	177.	89.5	671.	583.6
1C 8- 0	124	1323.	1570.	237.	116.0	667.	620.3
2E 8- 0	126	1265.	1512.	227.	105.0	636.	606.2
3D 8- 0	129	1369.	1682.	313.	122.0	672.	625.0
5B 8- 0	133	1311.	1573.	262.	114.0	776.	574.8
5C 8- 0	134	1387.	1642.	255.	122.0	618.	618.8
1C 8- 6	135	1158.	1478.	321.	112.0	574.	651.0
1D 8- 6	136	1139.	1421.	281.	86.5	539.	662.9
2C 8- 6	138	1275.	1635.	360.	119.0	624.	651.0
4B 8- 6	143	1205.	1555.	349.	104.0	476.	644.0
5D 8- 6	145	1170.	1516.	346.	133.0	592.	605.6
3D 9- 3	150	976.	1376.	400.	130.0	501.	651.0
4C 9- 3	152	1046.	1414.	368.	121.0	502.	641.8
1D10- 0	157	574.	1071.	497.	220.0	360.	635.9
4B10- 0	164	836.	1197.	361.	134.0	573.	638.0
5D10- 0	166	695.	1008.	313.	182.0	616.	516.5
2A11- 0	168	546.	722.	177.	227.0	247.	455.0
4C11- 0	169	636.	977.	341.	180.0	455.	629.0
1D11- 6	171	317.	714.	397.	229.0	484.	542.5

RUN 41711E HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	642.7	612.6	632.6	653.1	623.6	643.3	10.5	8.5	9.8
24	919.9	847.1	879.8	941.8	873.7	902.3	18.5	15.0	17.0
39	1249.9	1158.7	1186.5	1301.6	1233.8	1261.2	55.5	42.0	50.3
48	1424.2	1343.4	1378.4	1533.3	1464.4	1492.4	76.0	55.5	65.7
60	1536.0	1503.6	1518.5	1679.9	1658.1	1667.2	73.5	55.5	65.7
67	1608.5	1510.1	1556.4	1789.9	1663.6	1728.2	129.0	63.0	91.9
70	1596.1	1546.8	1572.1	1798.8	1772.0	1787.6	127.0	83.0	104.3
73	1490.0	1490.0	1490.0	1694.1	1694.1	1694.1	166.0	166.0	166.0
74	1526.3	1522.3	1524.3	1760.9	1757.5	1759.2	128.0	128.0	128.0
75	1500.7	1476.1	1490.3	1693.0	1672.3	1681.8	195.0	162.0	176.3
76	1562.3	1477.2	1513.4	1774.3	1675.5	1708.5	183.0	136.0	156.5
77	1567.3	1497.5	1523.3	1784.3	1655.9	1705.5	193.0	127.0	170.7
78	1595.0	1477.2	1539.9	1815.7	1669.0	1735.5	193.0	117.0	162.9
79	1580.9	1524.1	1552.8	1799.9	1693.0	1743.8	188.0	128.0	164.8
80	1572.3	1466.5	1514.0	1818.0	1665.7	1727.2	196.0	130.0	175.2
81	1562.6	1562.6	1562.6	1819.1	1819.1	1819.1	129.0	129.0	129.0
82	1513.3	1513.3	1513.3	1738.6	1738.6	1738.6	185.0	185.0	185.0
84	1547.0	1424.2	1500.9	1733.0	1589.5	1670.4	80.0	56.0	67.4
90	1566.3	1228.4	1457.5	1772.0	1578.7	1670.0	122.0	81.0	105.1
96	1403.9	1284.0	1357.4	1716.3	1511.7	1634.5	130.0	105.0	116.5
102	1517.2	781.3	1176.2	1745.3	1005.7	1477.0	139.0	86.5	110.7
111	1061.3	888.1	970.4	1458.0	1155.7	1304.7	161.0	96.5	123.9
120	1148.3	574.1	774.9	1436.6	1001.6	1172.5	220.0	103.0	170.6
132	636.0	453.9	525.2	976.9	666.8	771.5	236.0	180.0	210.8
138	565.4	317.1	441.3	772.2	714.0	743.1	229.0	171.0	200.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	10.8	10.4	10.7	577.2	552.0	568.1	27.0	25.9	26.3
24	26.5	16.9	22.4	657.5	650.1	653.1	66.9	64.8	66.1
39	86.2	51.7	74.6	756.9	645.9	702.1	164.8	144.8	156.8
48	121.0	109.1	113.9	827.8	762.1	800.6	212.7	205.8	208.1
60	160.0	142.2	148.7	828.1	782.6	799.4	319.1	307.6	313.2
67	190.3	141.7	171.7	932.1	776.3	847.3	400.6	368.7	383.5
70	252.0	196.0	215.6	889.3	834.4	870.5	434.7	415.7	424.4
73	204.0	204.0	204.0	824.3	824.3	824.8	358.3	358.3	358.3
74	235.2	234.6	234.9	655.7	611.3	633.5	482.3	475.5	478.9
75	210.4	174.6	191.5	1003.3	595.7	760.3	476.8	377.6	424.5
76	216.8	165.0	195.1	939.2	571.1	743.3	490.9	462.3	476.3
77	217.0	158.3	182.2	907.0	629.6	746.3	509.8	419.4	485.4
78	234.6	151.6	195.6	871.9	521.5	757.0	515.1	409.8	493.3
79	219.0	138.6	190.5	819.7	727.4	773.7	515.9	498.9	505.8
80	248.8	154.3	213.3	804.1	718.5	749.2	535.7	513.6	523.3
81	256.5	256.5	256.5	707.6	707.6	707.6	532.6	532.6	532.6
82	225.3	225.3	225.3	796.7	796.7	796.7	521.7	521.7	521.7
84	198.8	133.9	169.5	655.2	591.4	627.1	559.3	524.9	545.7
90	374.1	175.5	212.5	743.2	568.5	656.8	643.0	553.8	586.6
96	312.8	226.9	277.1	776.2	612.1	654.6	639.3	574.6	617.9
102	360.2	224.4	300.8	623.7	475.8	582.9	662.9	428.6	607.0
111	406.5	214.8	334.3	629.8	448.2	513.7	668.8	530.8	624.0
120	496.6	232.8	397.6	667.9	359.7	540.3	672.0	402.3	603.0
132	340.9	176.5	246.3	521.1	246.8	431.8	629.0	347.6	487.8
138	396.9	266.8	301.8	484.3	473.2	478.8	576.3	542.5	559.4

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42711F
Test Date: 7/7/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.141 MPa (20.5 psia)
Initial peak clad temperature and location	876°C (1609°F), 3C 1.78 m (70 in.)
Initial peak rod power	1.31 kw/m (0.399 kw/ft)
Flow rate	15.2 mm/sec (0.597 in./sec)
Coolant temperature	31°C (88°F)
Average and range of initial 1.83 m (72 in.) housing temperature	513°C (494°C - 522°C) [956°F (922°F - 972°F)]
Initial bundle water level	43.4 mm (1.71 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+0.5% increasing linearly -3.5% by 200 seconds and -2% thereafter[a]
Total power:	-0.5% increasing linearly to -2%[a]

a. Relative to run 43511A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42711F

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1146.	1204.	55.	42.5	646.	152.2
4C 3- 3	6	1242.	1276.	33.	26.0	746.	144.9
1C 4- 0	7	1370.	1441.	71.	54.0	796.	209.6
2A 5- 0	12	1500.	1625.	126.	55.5	736.	291.9
2A 5- 7	14	1536.	1657.	122.	73.0	656.	342.6
5C 6- 2	33	1451.	1632.	181.	144.0	249.	490.0
2D 6- 3	39	1494.	1668.	174.	139.0	909.	366.5
1D 6- 4	46	1464.	1620.	136.	150.0	603.	377.4
3D 6- 4	50	1493.	1750.	256.	128.0	293.	660.0
4B 6- 4	51	1553.	1672.	120.	75.0	779.	455.6
5D 6- 4	56	1486.	1583.	97.	143.0	706.	472.6
1D 6- 5	58	1481.	1613.	133.	151.0	659.	394.5
2A 6- 5	59	1481.	1596.	116.	150.0	776.	430.9
2D 6- 5	62	1530.	1681.	151.	139.0	634.	394.5
3B 6- 5	63	1565.	1717.	153.	111.0	566.	459.0
3C 6- 6	69	1555.	1766.	212.	108.0	976.	450.4
3E 6- 6	70	1485.	1656.	171.	156.0	249.	474.0
4C 6- 6	73	1590.	1735.	146.	73.5	732.	467.0
5C 6- 6	76	1542.	1657.	115.	65.5	756.	479.3
3D 6- 7	85	1562.	1752.	170.	111.0	676.	492.6
3C 6- 8	93	1598.	1783.	185.	104.0	615.	471.6
4A 6- 8	95	1456.	1601.	143.	91.0	779.	464.7
1C 7- 0	109	1566.	1643.	137.	59.0	616.	515.7
2B 7- 0	110	1529.	1655.	126.	47.0	566.	513.0
3D 7- 0	113	1564.	1694.	131.	64.0	562.	515.1
5B 7- 0	117	1411.	1554.	143.	65.5	541.	513.9
2B 7- 6	120	1511.	1677.	166.	76.5	656.	549.6
2C 7- 6	121	1533.	1703.	170.	74.0	706.	533.1
2E 7- 6	123	1404.	1536.	133.	72.5	645.	535.5
3A 7- 6	124	1483.	1578.	95.	65.5	706.	529.9
3B 7- 6	125	1551.	1707.	157.	68.0	704.	544.6
4B 7- 6	129	1508.	1673.	165.	71.0	649.	550.6
5C 7- 6	132	1474.	1620.	146.	70.5	716.	552.6
1C 8- 0	133	1365.	1586.	222.	104.0	653.	563.3
2E 8- 0	136	1296.	1485.	188.	78.5	626.	573.0
3D 8- 0	138	1427.	1679.	252.	109.0	716.	572.9
5B 8- 0	143	1255.	1411.	156.	110.0	664.	566.0
5C 8- 0	144	1352.	1561.	210.	92.0	622.	569.1
1C 8- 6	145	1151.	1446.	296.	105.0	505.	593.8
1D 8- 6	146	1114.	1334.	220.	76.5	549.	560.2
2C 8- 6	148	1257.	1591.	334.	109.0	616.	597.5
4B 8- 6	153	1219.	1514.	295.	89.0	532.	611.0
5D 8- 6	155	1149.	1417.	268.	143.0	551.	579.9
3D 9- 3	159	1054.	1370.	316.	131.0	575.	605.9
4C 9- 3	161	1087.	1414.	327.	127.0	544.	614.0
1D10- 0	164	604.	991.	388.	229.0	575.	597.5
4B10- 0	168	881.	1252.	371.	192.0	560.	620.0
5D10- 0	169	772.	1073.	300.	199.0	515.	527.4
2A11- 0	171	525.	764.	239.	210.0	247.	464.0
4C11- 0	172	684.	1039.	355.	205.0	491.	600.0
1D11- 6	**BAD THERMOCOUPLE DATA*						

RUN 42711F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	724.4	661.5	692.9	728.5	668.9	698.7	6.5	4.0	5.3
24	900.6	900.6	900.6	912.0	912.0	912.0	11.5	11.5	11.5
39	1242.1	1143.2	1177.9	1275.5	1203.5	1235.2	54.0	26.0	40.8
48	1440.9	1326.8	1378.1	1510.6	1401.2	1445.7	54.0	51.5	52.5
60	1499.8	1426.0	1457.3	1625.4	1573.3	1596.1	66.5	55.5	62.5
67	1600.3	1497.6	1555.6	1758.6	1645.0	1695.8	87.0	62.0	73.5
70	1609.0	1415.2	1477.3	1776.7	1576.5	1638.4	149.0	62.0	93.5
71	1554.9	1509.5	1532.2	1755.3	1725.2	1740.2	112.0	102.0	107.0
72	1460.2	1370.8	1415.5	1720.7	1605.8	1663.2	138.0	112.0	125.0
73	1450.5	1396.0	1423.3	1685.4	1622.1	1653.7	151.0	141.0	146.0
74	1490.2	1378.1	1454.5	1729.6	1584.1	1665.9	175.0	112.0	134.6
75	1504.1	1405.5	1460.5	1734.1	1576.5	1652.8	152.0	110.0	131.5
76	1552.7	1423.7	1489.0	1750.8	1583.0	1654.7	156.0	65.5	127.5
77	1564.6	1460.5	1511.9	1727.4	1573.3	1649.3	151.0	109.0	134.8
78	1589.5	1473.0	1528.5	1766.4	1589.5	1657.3	156.0	65.5	109.7
79	1591.7	1450.5	1529.4	1751.9	1597.1	1667.9	153.0	65.5	107.9
80	1598.1	1458.0	1524.2	1783.2	1601.4	1686.4	139.0	91.0	110.6
81	1511.7	1511.7	1511.7	1663.6	1663.6	1663.6	139.0	139.0	139.0
84	1563.6	1410.9	1502.6	1704.0	1553.8	1641.6	67.0	47.0	60.8
90	1554.9	1394.9	1490.3	1745.3	1525.7	1642.8	85.0	65.5	73.2
96	1439.8	1254.6	1364.1	1704.0	1410.9	1582.4	110.0	62.5	95.8
102	1256.7	1086.1	1176.8	1590.6	1291.2	1452.8	143.0	71.5	100.5
111	1087.2	928.4	1020.3	1440.9	1164.0	1289.6	151.0	66.5	124.1
120	881.0	603.6	793.7	1289.1	991.3	1157.5	229.0	181.0	192.8
132	683.6	479.6	545.1	1038.7	651.0	811.6	220.0	205.0	211.5
138	581.2	568.4	574.8	1004.7	858.2	931.4	218.0	216.0	217.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	7.4	4.1	5.8	632.4	617.0	624.7	24.2	21.8	23.0
24	11.4	11.4	11.4	669.5	669.5	669.5	66.2	66.2	66.2
39	83.3	33.4	57.3	745.7	647.6	690.9	152.2	144.9	149.2
48	74.4	55.2	67.6	821.8	705.6	780.3	209.8	199.4	204.2
60	145.4	125.6	138.8	737.5	669.8	702.2	302.8	291.9	296.2
67	158.3	121.5	140.2	880.6	817.9	851.1	365.7	342.6	356.5
70	182.9	141.0	161.1	904.9	243.6	535.3	631.0	376.6	509.5
71	215.7	200.4	208.0	860.8	244.7	552.7	625.0	400.6	512.6
72	260.5	235.0	247.8	264.0	243.6	253.8	660.0	627.0	643.5
73	234.9	226.1	230.5	1134.3	249.0	691.7	488.0	342.2	415.1
74	248.0	161.4	211.4	984.5	244.7	532.3	660.0	423.4	526.0
75	257.8	124.9	192.3	1054.3	237.1	498.5	660.0	366.5	501.7
76	256.3	93.0	165.7	992.4	233.9	570.9	660.0	377.4	509.3
77	233.0	66.5	137.4	858.7	239.3	675.8	629.0	394.5	458.6
78	211.5	76.9	128.8	978.1	249.0	746.2	488.9	441.5	469.2
79	187.0	96.4	138.5	800.7	528.2	742.3	494.2	430.7	469.2
80	185.1	139.9	162.2	829.8	706.0	760.7	501.4	447.6	481.0
81	151.9	151.9	151.9	778.5	778.5	778.5	483.7	483.7	483.7
84	160.7	122.6	138.9	696.4	540.9	610.7	524.0	491.5	509.1
90	190.4	94.9	152.5	718.1	645.1	689.5	552.8	526.2	541.4
96	264.2	156.3	218.3	729.7	595.1	667.0	589.1	566.0	576.0
102	333.9	205.1	274.0	618.5	473.6	534.6	611.0	560.2	591.3
111	362.0	181.9	269.3	621.5	543.8	579.0	614.0	509.2	561.7
120	410.2	300.5	363.8	584.6	514.8	557.8	623.0	527.4	599.9
132	355.1	171.4	266.5	577.8	246.8	459.4	608.0	427.1	490.5
138	423.5	269.6	356.6	510.9	504.6	507.7	620.0	606.0	613.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43112A
Test Date: 4/7/80
Test Type: Forced Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.139 MPa (20.2 psia)
Initial peak clad temperature and location	874°C (1605°F), 3C 1.83 m (72 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	32°C (90°F)
Average and range of initial 1.83 m (72 in.) housing temperature	528°C (522°C - 533°C) [982°F (972°F - 991°F)]
Initial bundle water level	38.51 mm (1.516 in.)

B. Summary Results:

C. Comments:

Total power: exponentially increasing from -0.1% to -1.6% by 770 seconds[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43112A

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	940.	1094.	155.	26.5	820.	96.3
4C 3- 3	11	1016.	1149.	133.	23.5	852.	102.7
1C 4- 0	14	1262.	1466.	204.	58.5	766.	187.6
2A 5- 0	17	1332.	1595.	263.	78.0	763.	286.8
2A 5- 7	21	1463.	1798.	334.	81.5	955.	375.6
1D 6- 2	50	1463.	1860.	377.	89.5	977.	479.5
2D 6- 2	53	1577.	1968.	392.	88.0	883.	483.5
3D 6- 2	56	1590.	2011.	421.	91.0	976.	488.7
5C 6- 2	61	1513.	1838.	326.	67.0	951.	464.6
1D 6- 3	63	1466.	1832.	366.	89.0	996.	496.6
4B 6- 3	68	1545.	1966.	421.	94.0	896.	514.6
5D 6- 3	69	1481.	1886.	405.	98.0	897.	498.6
2A 6- 4	70	1472.	1862.	390.	102.0	948.	516.6
3B 6- 4	75	1567.	2025.	458.	91.5	1011.	509.6
3D 6- 6	79	1529.	2002.	473.	98.0	897.	547.6
2D 6- 5	84	1556.	1990.	434.	98.0	844.	528.5
3C 6- 5	85	1568.	2048.	480.	99.5	927.	529.6
3E 6- 5	86	1500.	1910.	410.	95.5	950.	525.4
3C 6- 6	95	1546.	2027.	481.	101.0	916.	545.6
4A 6- 6	97	1428.	1866.	438.	104.0	914.	534.6
3D 8- 0	98	1278.	1630.	352.	82.5	754.	681.0
5C 5- 6	101	1447.	1780.	333.	71.5	882.	520.7
1C 7- 0	110	1386.	1660.	273.	54.0	732.	617.5
2B 7- 0	111	1410.	1635.	225.	25.5	676.	608.9
3D 7- 0	115	1437.	1682.	246.	32.5	785.	602.9
5B 7- 0	117	1328.	1649.	322.	95.5	772.	562.3
2B 7- 6	* * B A D	T H E R M O C O U P L E	D A T A *				
2C 7- 6	121	1406.	1721.	315.	53.0	816.	633.0
2E 7- 6	122	1264.	1560.	276.	55.0	812.	617.7
3A 7- 6	123	1304.	1617.	313.	68.5	701.	664.6
3B 7- 6	124	1423.	1752.	329.	53.0	786.	639.8
4B 7- 6	127	1396.	1749.	353.	70.0	759.	646.6
5C 7- 6	128	1259.	1560.	302.	66.0	714.	619.9
1C 8- 0	131	1225.	1597.	372.	81.5	712.	686.7
2E 8- 0	133	870.	1198.	329.	90.5	664.	697.3
4C 8- 6	136	1536.	2011.	475.	96.5	967.	536.7
5B 8- 0	138	1218.	1609.	391.	97.0	779.	645.4
5C 8- 0	139	1123.	1471.	348.	96.5	647.	657.9
1C 8- 6	141	1070.	1357.	288.	53.5	556.	720.0
1D 8- 6	142	1019.	1245.	226.	45.0	581.	676.1
2C 8- 6	143	1117.	1397.	280.	45.0	662.	698.0
4B 8- 6	145	1108.	1374.	266.	36.5	604.	720.3
5D 8- 6	148	1038.	1380.	343.	95.5	576.	729.1
3D 9- 3	154	922.	1290.	368.	91.0	651.	739.0
4C 9- 3	156	952.	1260.	308.	67.0	661.	724.0
1D10- 0	161	510.	938.	428.	120.0	247.	723.0
4D10- 0	164	731.	1054.	324.	87.5	576.	768.0
5D10- 0	167	639.	1017.	378.	131.0	505.	752.0
2A11- 0	168	479.	680.	202.	107.0	604.	284.0
4C11- 0	170	559.	802.	244.	96.5	249.	573.0
1D11- 6	172	367.	707.	340.	137.0	247.	298.0

RUN 43112A HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	494.8	459.1	471.0	511.9	485.0	493.9	7.5	6.0	7.0
24	674.1	584.4	628.3	742.0	663.6	701.6	18.0	16.0	17.4
39	1016.1	893.4	949.8	1149.4	1038.7	1094.2	26.5	23.5	24.8
48	1208.2	1178.5	1224.9	1481.6	1389.7	1435.8	60.0	47.0	55.3
60	1428.0	1304.6	1343.9	1654.8	1529.0	1580.1	78.0	36.0	59.9
67	1559.2	1463.4	1489.2	1908.6	1797.7	1829.6	81.5	70.5	75.9
70	1598.1	1496.7	1551.1	2003.8	1854.2	1922.9	85.5	82.0	83.6
71	1599.2	1499.8	1555.5	2028.4	1840.6	1936.4	94.0	80.5	85.4
72	1604.7	1485.9	1546.3	2027.2	1823.7	1914.8	100.0	70.0	87.3
74	1589.5	1482.7	1545.3	2017.9	1813.5	1939.2	97.5	87.0	90.1
75	1579.8	1465.5	1534.1	2034.2	1831.6	1950.3	98.0	89.0	94.8
76	1575.4	1464.4	1531.9	2045.9	1862.1	1959.7	102.0	91.5	95.8
77	1567.9	1433.4	1512.0	2048.3	1824.8	1948.9	101.0	91.0	97.0
78	1546.3	1428.0	1493.0	2027.2	1779.8	1936.8	107.0	71.5	97.0
84	1438.6	1252.5	1368.1	1697.4	1510.6	1634.7	95.5	25.5	52.1
90	1422.7	1240.0	1341.0	1751.9	1519.2	1654.3	70.0	44.5	59.9
96	1298.5	869.6	1197.6	1672.3	1198.3	1562.4	97.0	69.0	84.3
102	1117.2	1018.1	1065.1	1422.7	1245.2	1342.2	95.5	36.5	50.7
111	1108.9	795.0	897.4	1396.0	1076.9	1199.7	107.0	54.0	71.0
120	730.8	509.8	651.5	1106.8	937.7	1033.8	148.0	87.5	112.2
132	558.8	478.4	498.1	802.3	680.4	719.0	145.0	96.5	114.1
138	523.6	366.6	444.2	774.2	701.5	733.5	145.0	97.0	125.6

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	25.9	17.1	22.9	504.5	483.0	491.1	9.0	8.9	9.0
24	79.2	67.9	73.3	702.0	635.7	662.6	32.9	24.9	27.9
39	154.6	133.3	144.4	852.1	761.6	811.4	106.8	96.3	102.0
48	213.4	203.6	210.4	914.6	757.0	837.1	187.6	151.7	165.4
60	262.9	218.0	236.2	827.2	695.5	748.3	299.6	286.5	292.5
67	349.4	333.5	340.5	958.2	911.1	938.5	384.6	375.6	380.0
70	405.7	354.3	371.8	971.9	842.5	898.2	443.4	411.8	426.3
71	429.2	340.6	380.9	1066.7	792.3	906.5	455.4	431.6	442.7
72	422.5	312.0	368.0	998.3	808.8	923.2	473.4	423.5	450.4
74	433.8	325.6	393.9	1042.1	859.2	940.0	500.4	455.8	480.5
75	454.4	366.1	416.2	996.0	853.4	925.8	514.6	496.6	502.3
76	470.5	340.2	427.7	1011.0	860.3	931.0	528.6	482.6	511.0
77	480.4	391.4	436.9	999.2	844.3	919.9	539.7	523.6	528.2
78	480.9	332.5	443.8	988.6	862.6	913.9	559.6	520.7	541.7
84	321.6	225.4	266.6	785.0	640.9	718.4	621.1	562.3	601.9
90	352.6	276.4	313.3	839.7	701.1	768.8	664.6	617.7	637.5
96	390.9	328.7	364.7	803.9	646.2	722.5	697.3	645.4	677.6
102	342.5	226.1	277.1	651.5	552.7	595.8	729.1	673.9	707.2
111	367.8	259.0	302.3	717.5	472.2	614.0	755.0	548.6	698.0
120	427.9	305.3	381.9	631.8	246.8	521.3	771.0	641.7	729.6
132	243.5	201.8	220.9	603.6	249.0	483.4	573.0	264.0	435.0
138	340.1	229.4	289.3	599.3	246.8	318.2	555.0	296.0	439.8

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43412B
Test Date: 6/26/80
Test Type: Forced Reflood
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.140 MPa (20.3 psia)
Initial peak clad temperature and location	877°C (1610°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28.2 mm/sec (1.11 in./sec)
Coolant temperature	31°C (88°F)
Average and range of initial 1.83 m (72 in.) housing temperature	528°C (519°C - 533°C) [982°F (967°F - 991°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: -0.5% with step to -1% at 150 seconds for 100 seconds, and -0.5% thereafter[a]

a. Relative to run 43112A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 43412B

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1103.	1267.	164.	35.0	709.	137.9
4C 3- 3	11	1197.	1315.	118.	28.0	779.	133.8
1C 4- 0	14	1301.	1482.	181.	47.0	716.	204.5
2A 5- 0	17	1374.	1681.	307.	112.0	734.	324.1
2A 5- 7	21	1484.	1840.	356.	122.0	899.	423.5
1D 6- 2	50	1429.	1763.	334.	126.0	832.	519.6
2D 6- 2	53	1510.	1862.	352.	126.0	635.	570.9
3D 6- 2	58	1556.	1870.	314.	153.0	780.	527.6
5C 6- 2	61	1493.	1830.	337.	154.0	937.	523.8
1D 6- 3	63	1445.	1771.	326.	126.0	851.	484.8
4B 6- 3	68	1539.	1852.	313.	149.0	807.	548.7
5D 6- 3	69	1424.	1843.	419.	170.0	826.	593.6
2A 6- 4	70	1446.	1788.	342.	148.0	843.	553.5
2D 6- 4	72	1530.	1888.	359.	123.0	793.	586.7
3B 6- 4	75	1563.	1910.	346.	124.0	885.	552.6
3C 6- 5	85	1595.	1942.	347.	126.0	897.	569.7
3E 6- 5	86	1471.	1804.	333.	147.0	878.	571.7
3C 6- 6	95	1571.	1963.	391.	123.0	886.	584.7
3D 6- 6	96	1536.	1935.	399.	122.0	911.	570.7
4A 6- 6	97	1430.	1807.	376.	153.0	794.	585.6
4C 6- 6	98	1547.	1948.	400.	151.0	979.	574.6
5C 6- 6	101	1459.	1836.	378.	173.0	862.	584.6
1C 7- 0	110	1429.	1635.	207.	49.5	722.	536.9
2B 7- 0	111	1458.	1632.	174.	32.0	728.	650.9
3D 7- 0	115	1493.	1695.	202.	33.0	811.	618.9
5B 7- 0	117	1378.	1584.	207.	153.0	708.	667.0
2B 7- 6	120	1446.	1706.	260.	51.5	745.	693.7
2C 7- 6	121	1464.	1739.	274.	56.0	765.	691.9
2E 7- 6	122	1313.	1547.	235.	43.5	631.	706.6
3A 7- 6	123	1420.	1685.	265.	53.0	800.	673.8
3B 7- 6	124	1463.	1746.	284.	52.5	797.	662.3
4B 7- 6	127	1462.	1732.	270.	51.5	754.	687.5
5C 7- 6	128	1421.	1722.	300.	76.5	734.	694.7
1C 8- 0	131	1303.	1617.	314.	84.0	726.	724.2
2E 8- 0	133	1206.	1553.	347.	128.0	622.	738.8
3D 8- 0	136	1341.	1682.	341.	82.0	811.	702.6
5B 8- 0	138	1219.	1541.	322.	89.0	601.	750.1
5C 8- 0	139	1317.	1663.	346.	99.5	733.	740.9
1C 8- 6	141	1134.	1336.	202.	47.5	593.	759.0
1D 8- 6	142	1072.	1283.	211.	46.0	636.	751.6
2C 8- 6	143	1194.	1416.	223.	44.0	638.	762.0
4B 8- 6	145	1214.	1534.	320.	80.5	695.	754.9
5D 8- 6	148	1096.	1324.	228.	66.5	552.	796.9
3D 9- 3	154	988.	1302.	313.	79.0	669.	760.0
4C 9- 3	156	1045.	1322.	276.	67.0	678.	755.0
1D10- 0	161	628.	1043.	415.	125.0	499.	817.9
4B10- 0	164	872.	1159.	287.	90.5	593.	814.9
5D10- 0	167	686.	1012.	325.	125.0	588.	735.9
2A11- 0	168	532.	697.	165.	81.0	454.	727.0
4C11- 0	** BAD THERMOCOUPLE DATA *						
1D11- 6	** BAD THERMOCOUPLE DATA *						

RUN 434128 HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	600.2	535.1	557.9	614.1	556.7	576.6	7.5	6.5	7.3
24	879.7	791.0	823.7	931.5	848.9	879.9	17.5	15.0	16.4
39	1196.7	1095.6	1125.3	1315.2	1253.6	1273.4	35.0	27.5	31.0
48	1365.1	1261.4	1299.0	1592.7	1464.4	1516.1	53.0	47.0	55.1
60	1471.4	1354.9	1392.3	1685.4	1583.0	1641.5	112.0	48.0	68.9
67	1582.5	1472.9	1507.7	1910.9	1779.8	1839.0	122.0	84.5	102.3
70	1610.0	1496.0	1545.3	1975.1	1832.7	1901.5	125.0	86.5	101.1
71	1595.4	1408.2	1506.4	1961.3	1748.6	1854.4	171.0	96.0	128.0
72	1478.9	1424.3	1461.1	1837.2	1729.6	1788.9	155.0	122.0	135.6
74	1555.8	1429.2	1505.1	1910.9	1756.4	1847.4	174.0	122.0	138.5
75	1590.4	1424.3	1516.8	1922.3	1770.9	1854.4	170.0	121.0	139.9
76	1600.2	1445.7	1514.0	1916.6	1776.5	1855.6	167.0	123.0	139.1
77	1594.7	1381.4	1503.2	1954.5	1751.9	1870.6	174.0	123.0	140.7
78	1571.4	1418.9	1486.6	1962.5	1777.6	1871.6	173.0	121.0	136.7
84	1493.2	1359.8	1429.3	1695.2	1558.2	1632.5	174.0	32.0	66.9
90	1464.3	1312.6	1414.3	1746.4	1547.3	1684.6	124.0	42.0	64.3
96	1346.2	1206.1	1294.6	1687.5	1540.9	1624.2	129.0	78.5	92.6
102	1214.5	1071.9	1133.0	1534.4	1282.8	1367.4	80.5	44.0	53.2
111	1045.1	723.8	969.5	1321.5	1123.4	1236.6	153.0	52.5	75.5
120	871.8	610.7	740.3	1169.2	1011.9	1087.8	126.0	88.5	113.1
132	552.6	511.2	531.9	756.6	697.3	719.8	155.0	80.5	105.8
138	505.4	456.7	505.2	843.7	720.2	780.2	163.0	114.0	128.3

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	21.6	13.9	18.8	579.4	549.3	558.8	14.3	11.5	12.9
24	68.2	49.5	56.2	689.8	650.1	670.1	51.9	50.3	51.4
39	164.4	118.5	148.1	779.0	708.5	731.9	138.4	133.8	136.7
48	257.0	180.9	217.1	854.4	716.3	780.4	204.7	199.6	202.7
60	307.2	214.0	249.3	786.8	733.6	761.4	335.6	317.7	325.5
67	355.9	288.0	331.3	940.5	863.6	897.4	434.6	407.3	422.3
70	371.6	335.6	356.2	1000.5	882.3	943.8	471.7	449.5	462.4
71	365.9	318.0	348.0	1002.3	838.6	909.8	532.7	462.6	489.5
72	363.3	305.3	327.8	920.8	760.8	836.9	505.8	492.7	499.8
74	395.1	298.3	342.3	1152.4	611.8	825.5	570.9	503.3	535.4
75	418.6	293.2	337.7	925.9	782.1	844.1	593.6	484.8	552.1
76	374.3	316.4	341.6	950.9	793.0	885.4	585.7	543.6	559.0
77	394.1	333.0	367.5	906.4	800.2	853.3	596.8	556.6	572.8
78	400.9	354.4	385.0	979.2	793.8	860.7	505.7	570.7	585.4
84	242.5	174.4	203.2	811.1	682.8	729.4	567.0	618.9	642.9
90	308.0	234.7	270.2	854.4	631.2	758.0	718.9	666.8	689.1
96	362.3	300.0	329.6	811.4	601.1	721.0	750.1	702.5	725.2
102	319.9	200.0	234.5	694.6	552.5	605.5	795.9	749.9	763.6
111	406.9	203.5	267.1	678.4	511.9	605.9	804.8	755.0	779.7
120	447.6	284.8	347.4	593.3	499.5	566.1	824.5	735.9	804.0
132	245.4	153.0	187.9	561.2	454.0	493.1	727.0	372.4	605.6
138	324.2	236.5	275.0	506.7	246.8	312.3	789.0	585.0	691.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42912C
Test Date: 8/28/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.137 MPa (19.9 psia)
Initial peak clad temperature and location	878°C (1613°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	32°C (90°F)
Average and range of initial 1.83 m (72 in.) housing temperature	547°C (532°C - 556°C) [1016°F (989°F - 1033°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+9% for 10 seconds, and approximately 1.5% thereafter with ±1% oscillations[a]
Total power:	-0.25% constant[a]
Housing initial temperature at midplane:	approximately +3%[a]

a. Relative to run 43112A

FLOCHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42912C

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1066.	1234.	168.	42.0	946.	117.5
4C 3- 3	11	1222.	1333.	111.	39.0	780.	136.8
1C 4- 0	14	1353.	1565.	212.	58.0	730.	215.7
2A 5- 0	17	1409.	1704.	295.	97.0	785.	335.8
2A 5- 7	21	1518.	1830.	313.	89.5	822.	439.8
1D 6- 2	50	1492.	1693.	201.	112.0	699.	558.6
2D 6- 2	53	1511.	1751.	240.	120.0	567.	590.5
3D 6- 2	58	1565.	1736.	172.	118.0	666.	598.0
4B 6- 2	60	1571.	1778.	206.	54.0	843.	569.5
5C 6- 2	61	1485.	1788.	302.	137.0	1105.	522.5
1D 6- 3	63	1479.	1712.	233.	115.0	693.	574.7
5D 6- 3	69	1495.	1725.	230.	65.0	672.	577.5
2A 6- 4	70	1475.	1727.	253.	68.0	1021.	457.4
3B 6- 4	75	1577.	1817.	239.	56.5	851.	575.7
2D 6- 5	84	1555.	1815.	260.	69.0	781.	613.5
3C 6- 5	85	1594.	1878.	284.	68.0	935.	587.6
3E 6- 5	86	1530.	1744.	214.	61.5	916.	581.6
3C 6- 6	95	1577.	1888.	311.	88.5	840.	605.8
3D 6- 6	96	1556.	1858.	302.	66.5	820.	639.6
4A 6- 6	97	1479.	1768.	289.	67.5	814.	606.6
4C 6- 6	98	1576.	1886.	310.	66.0	877.	616.6
5C 6- 6	101	1548.	1781.	233.	65.5	835.	600.7
1C 7- 0	110	1456.	1620.	163.	38.0	675.	660.3
2B 7- 0	111	1457.	1583.	126.	15.5	629.	689.4
3D 7- 0	115	1481.	1635.	155.	32.5	678.	695.9
5B 7- 0	117	1377.	1558.	181.	50.5	759.	667.9
2B 7- 6	120	1461.	1673.	213.	40.5	746.	732.8
2C 7- 6	121	1482.	1727.	245.	53.0	741.	742.8
2E 7- 6	122	1335.	1596.	261.	69.5	650.	721.6
3A 7- 6	123	1436.	1665.	229.	50.0	720.	707.7
3B 7- 6	124	1468.	1700.	232.	50.0	784.	723.8
4B 7- 6	127	1454.	1710.	256.	52.5	733.	742.6
5C 7- 6	128	1443.	1670.	227.	54.0	759.	700.2
1C 8- 0	131	1316.	1612.	297.	79.0	685.	781.7
2E 8- 0	133	1277.	1559.	282.	118.0	695.	756.8
3D 8- 0	136	1365.	1660.	296.	67.5	736.	776.1
5B 8- 0	138	1216.	1525.	309.	92.0	655.	759.7
5C 8- 0	139	1368.	1640.	272.	65.0	772.	739.9
1C 8- 6	141	1154.	1379.	225.	51.5	565.	819.0
1D 8- 6	142	1085.	1309.	224.	55.5	561.	804.5
2C 8- 6	**BAD THERMOCOUPLE DATA*						
4B 8- 6	145	1169.	1355.	186.	38.5	596.	825.6
5D 8- 6	148	1114.	1376.	262.	66.0	562.	821.9
3D 9- 3	154	1028.	1334.	306.	69.0	598.	839.0
4C 9- 3	156	1048.	1299.	250.	55.5	594.	826.0
1D10- 0	161	646.	983.	337.	126.0	627.	683.8
4B10- 0	164	843.	1128.	284.	68.5	554.	886.0
5D10- 0	167	694.	1013.	319.	101.0	245.	733.0
2A11- 0	168	547.	742.	195.	93.0	466.	559.3
4C11- 0	170	634.	877.	243.	75.0	241.	834.0
1D11- 6	172	416.	722.	306.	142.0	466.	633.0

RUN 42912C HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	633.7	536.4	569.6	640.4	549.2	579.7	5.5	4.0	4.8
24	872.2	775.9	826.3	915.1	829.2	870.3	16.5	14.0	15.2
39	1221.0	1065.7	1132.0	1333.1	1233.8	1286.8	42.0	36.0	39.8
48	1379.3	1310.9	1339.5	1600.3	1535.5	1572.7	77.5	55.5	64.3
60	1415.6	1400.8	1406.4	1786.5	1704.0	1757.1	114.0	97.0	103.0
67	1612.5	1493.9	1532.2	1961.3	1810.1	1854.4	107.0	87.0	95.9
70	1599.0	1498.2	1562.1	1985.4	1876.8	1936.6	130.0	106.0	116.4
71	1557.2	1476.7	1533.1	1914.3	1814.6	1868.1	129.0	106.0	116.8
72	1525.9	1514.0	1519.9	1856.4	1828.2	1842.3	130.0	66.5	99.3
74	1586.4	1466.0	1529.5	1777.6	1662.5	1725.8	134.0	54.0	101.0
75	1600.1	1476.9	1545.4	1831.6	1679.9	1760.8	117.0	56.0	76.2
76	1601.2	1463.4	1540.9	1858.7	1712.9	1774.7	115.0	56.5	68.1
77	1594.0	1453.6	1537.6	1877.9	1717.4	1799.1	117.0	55.5	72.1
78	1577.4	1435.7	1525.1	1888.1	1740.8	1813.2	120.0	65.5	77.7
84	1491.7	1251.0	1422.0	1665.4	1409.8	1594.7	50.5	15.5	36.2
90	1482.4	1334.7	1436.3	1727.4	1539.9	1671.5	69.5	40.5	52.6
96	1374.5	1215.8	1324.6	1664.6	1524.6	1614.2	118.0	54.0	75.0
102	1186.7	1085.3	1145.1	1422.7	1309.0	1369.7	66.0	38.5	53.4
111	1063.3	953.4	1023.3	1334.1	1164.0	1271.9	69.0	54.0	60.1
120	960.3	846.3	775.2	1206.6	983.1	1106.3	126.0	56.5	100.2
132	833.7	434.5	550.0	876.8	710.8	775.2	115.0	75.0	90.3
138	577.2	415.8	482.4	843.7	703.6	769.0	142.0	93.5	117.7

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	12.8	6.7	10.2	587.2	544.3	561.2	15.4	8.9	11.1
24	53.3	35.7	43.9	694.1	648.5	675.2	53.9	45.4	50.0
39	170.7	111.3	154.3	947.8	677.6	800.2	136.8	117.5	130.4
48	275.5	211.7	233.2	792.3	729.6	759.9	215.7	207.7	212.2
60	360.1	293.1	346.7	855.5	736.2	792.2	346.6	335.8	341.7
67	346.8	305.4	322.2	964.5	822.4	884.3	446.4	433.4	440.0
70	386.4	357.9	374.5	981.4	841.5	876.6	502.7	481.4	493.8
71	357.1	319.4	334.9	915.6	805.4	861.2	515.6	494.6	505.4
72	330.5	314.2	322.4	945.0	908.7	926.8	501.4	497.5	499.4
74	239.7	162.2	197.3	929.9	560.2	747.6	598.0	527.6	564.9
75	264.5	146.1	215.4	922.1	745.1	857.8	595.7	560.7	577.1
76	257.5	176.4	233.9	1020.7	773.9	863.5	613.5	457.4	572.1
77	306.9	213.9	261.5	934.7	781.4	862.0	619.4	579.5	597.5
78	310.7	232.7	288.1	877.1	747.9	827.3	639.6	515.5	605.1
84	209.1	125.9	172.7	759.5	629.2	697.9	696.9	642.7	672.4
90	261.3	197.0	235.2	763.9	655.6	735.6	742.8	675.4	720.5
96	309.7	271.0	289.5	772.4	654.8	726.0	784.4	739.9	764.4
102	262.1	185.7	224.6	615.3	561.1	585.1	825.6	792.6	814.8
111	306.5	210.6	240.0	609.1	557.1	589.6	846.8	759.3	815.2
120	407.2	215.1	331.1	629.9	244.7	502.4	886.0	627.1	788.3
132	276.2	186.7	225.2	521.5	241.4	428.7	834.0	386.4	545.9
138	390.4	250.6	306.6	488.4	240.4	293.4	718.0	286.0	567.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42512D
Test Date: 10/18/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.143 MPa (20.7 psia)
Initial peak clad temperature and location	877°C (1611°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	31°C (88°F)
Average and range of initial 1.83 m (72 in.) housing temperature	536°C (525°C - 545°C) [996°F (977°F - 1013°F)]
Initial bundle water level	36.1 mm (1.42 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: ±2.5% for 40 seconds and decreasing to ±1% for remainder of test[a]

Total power: -0.5%[a]

a. Relative to run 43112A

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42512D

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1029.	1204.	175.	38.0	754.	131.9
4C 3- 3	9	1136.	1308.	171.	40.5	734.	127.7
1C 4- 0	10	1270.	1460.	190.	51.0	785.	184.5
2A 5- 0	13	1386.	1755.	369.	96.0	866.	326.7
2A 5- 7	16	1489.	1761.	272.	65.0	896.	408.7
2D 6- 2	50	1542.	1772.	230.	50.5	818.	496.3
3D 6- 2	55	1523.	1789.	266.	59.5	1139.	473.7
5C 6- 2	59	1553.	1798.	244.	71.0	862.	505.8
1D 6- 3	61	1496.	1746.	250.	52.5	915.	501.6
4B 6- 3	66	1557.	1816.	259.	73.0	939.	513.7
5D 6- 3	68	1486.	1752.	265.	99.5	806.	527.8
2A 6- 4	70	1491.	1763.	272.	65.0	866.	525.7
3B 6- 4	** BAD THERMOCOUPLE DATA *						
1D 6- 5	82	1477.	1736.	259.	56.5	910.	522.5
2D 6- 5	** BAD THERMOCOUPLE DATA *						
3C 6- 5	85	1599.	1895.	296.	71.5	934.	520.7
3E 6- 5	86	1506.	1760.	254.	73.0	822.	546.6
3C 6- 6	97	1584.	1910.	326.	73.0	915.	534.8
3D 6- 6	98	1566.	1868.	302.	67.5	827.	558.8
4A 6- 6	100	1481.	1787.	305.	76.0	854.	566.7
4C 6- 6	101	1568.	1909.	341.	76.5	967.	537.7
5C 6- 6	103	1540.	1826.	286.	105.0	898.	545.7
1C 7- 0	** BAD THERMOCOUPLE DATA *						
2B 7- 0	111	1437.	1591.	153.	32.5	703.	598.8
3D 7- 0	115	1457.	1664.	207.	37.0	707.	602.9
5B 7- 0	117	1343.	1560.	217.	39.5	647.	620.8
2B 7- 6	121	1464.	1707.	243.	46.0	826.	627.0
2C 7- 6	122	1472.	1752.	279.	57.5	803.	645.9
2E 7- 6	123	1377.	1586.	210.	39.0	737.	628.3
3A 7- 6	124	1460.	1704.	244.	56.5	760.	638.9
3B 7- 6	125	1485.	1730.	244.	52.0	800.	625.0
4B 7- 6	128	1476.	1731.	255.	52.0	761.	653.9
5C 7- 6	129	1457.	1690.	232.	59.0	795.	628.0
1C 8- 0	132	1289.	1580.	291.	76.5	707.	704.8
2E 8- 0	134	1326.	1536.	209.	33.5	770.	671.9
3D 8- 0	137	1395.	1710.	314.	57.0	821.	662.0
5B 8- 0	139	1311.	1581.	270.	56.5	651.	702.6
5C 8- 0	140	1382.	1658.	276.	51.5	770.	659.7
1C 8- 6	141	1135.	1396.	261.	57.0	575.	747.0
1D 8- 6	142	1140.	1426.	285.	74.0	639.	737.8
2C 8- 6	143	1181.	1419.	238.	53.5	606.	717.0
4B 8- 6	145	1193.	1414.	221.	39.5	647.	731.5
5D 8- 6	148	1150.	1421.	271.	59.0	623.	723.1
3D 9- 3	155	1049.	1370.	320.	73.5	643.	727.7
4C 9- 3	157	1044.	1323.	283.	61.5	651.	722.0
1D10- 0	160	624.	1068.	444.	139.0	503.	631.7
4B10- 0	163	838.	1125.	287.	74.5	568.	794.0
5D10- 0	166	785.	1032.	247.	37.0	570.	676.8
2A11- 0	167	534.	736.	201.	108.0	439.	701.1
4C11- 0	169	596.	883.	287.	91.0	406.	760.9
1D11- 6	170	428.	714.	286.	141.0	548.	577.0

RUN 42512D HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	595.4	536.8	557.1	609.9	554.6	574.4	7.0	5.0	6.2
24	762.1	738.2	751.4	809.5	791.9	803.3	18.5	16.0	16.8
39	1136.4	1026.9	1064.0	1307.9	1203.5	1239.7	40.5	38.0	38.8
48	1269.7	1260.4	1265.1	1470.9	1460.2	1465.5	57.0	51.0	54.0
60	1473.9	1363.1	1407.7	1822.5	1715.1	1764.3	105.0	96.0	101.0
67	1597.8	1486.4	1524.3	1873.4	1740.8	1791.7	65.0	56.5	60.7
70	1610.8	1535.1	1573.0	1871.1	1850.8	1860.9	77.0	52.5	64.7
71	1555.6	1555.6	1555.6	1820.3	1820.3	1820.3	57.5	57.5	57.5
72	1596.7	1392.0	1537.5	1867.8	1659.2	1804.2	110.0	51.5	72.3
74	1566.2	1448.0	1525.8	1872.3	1714.0	1790.1	103.0	50.5	66.6
75	1556.7	1486.4	1516.5	1815.7	1746.4	1774.3	99.5	52.5	70.4
76	1585.9	1490.7	1541.5	1881.3	1757.5	1822.4	74.0	58.0	70.8
77	1599.2	1476.9	1525.0	1894.9	1736.3	1815.7	104.0	56.5	75.5
78	1589.1	1473.5	1536.6	1909.7	1783.2	1842.4	105.0	59.5	73.6
84	1457.4	1332.3	1407.8	1681.0	1540.9	1617.0	59.0	32.5	39.9
90	1485.3	1354.3	1432.2	1751.9	1512.8	1661.9	59.0	29.0	49.9
96	1408.4	1261.2	1341.3	1726.3	1531.1	1620.0	76.5	33.5	58.8
102	1193.4	1119.8	1149.8	1425.9	1266.1	1384.8	74.0	23.5	50.3
111	1057.1	926.6	1012.5	1369.8	1090.3	1246.3	73.5	39.5	55.1
120	837.8	623.9	727.4	1146.3	1030.5	1079.7	139.0	74.0	100.6
132	596.4	534.5	564.3	883.0	735.8	788.7	108.0	83.5	94.2
138	550.6	428.1	474.9	835.4	714.0	755.0	141.0	94.0	116.3

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	19.9	14.5	17.4	554.0	529.5	542.5	15.0	11.5	13.2
24	54.7	47.4	51.9	645.1	623.2	636.5	49.9	46.8	48.8
39	180.8	171.5	175.7	753.8	722.6	736.8	131.9	127.7	130.1
48	210.5	190.5	200.5	784.8	757.8	771.3	203.9	184.5	196.7
60	359.3	348.5	356.6	969.7	771.3	869.1	332.7	307.7	322.3
67	275.6	254.4	267.4	984.7	887.7	922.7	410.5	390.6	403.3
70	315.7	260.3	288.0	998.0	920.3	959.1	431.6	417.8	424.7
71	264.7	264.7	264.7	908.9	908.9	908.9	462.6	462.6	462.6
72	298.3	239.4	266.7	934.4	745.0	840.0	482.4	442.7	467.5
74	307.0	230.4	264.4	881.0	639.8	790.9	539.7	460.5	499.7
75	274.0	240.7	257.8	938.7	789.4	866.6	527.8	501.6	515.7
76	320.5	250.7	280.9	930.7	540.1	833.4	552.7	509.6	528.8
77	354.6	254.1	290.6	953.6	821.7	900.9	546.6	520.7	534.6
78	341.1	282.2	305.8	967.1	826.6	878.8	563.5	519.5	547.2
84	242.8	153.5	209.2	719.6	646.6	693.8	537.8	585.7	605.1
90	279.5	158.4	229.7	826.3	660.4	751.5	567.6	611.0	635.5
96	317.9	209.3	278.7	821.2	625.8	733.7	733.7	653.8	679.5
102	285.5	146.3	235.1	646.9	575.0	612.1	757.7	717.0	737.3
111	320.4	163.6	233.9	651.1	490.5	592.9	782.8	722.0	742.6
120	447.6	246.6	352.3	569.8	425.2	525.8	806.7	491.3	719.9
132	286.6	185.0	224.3	438.9	406.4	421.2	760.9	676.0	712.7
138	297.4	252.2	280.1	548.2	241.4	357.4	742.0	414.0	608.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41612E
Test Date: 12/5/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.140 MPa (20.3 psia)
Initial peak clad temperature and location	878°C (1613°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	32°C (90°F)
Average and range of initial 1.83 m (72 in.) housing temperature	524°C (518°C - 529°C) [975°F (964°F - 984°F)]
Initial bundle water level	43.4 mm (1.71 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: -1.5% with ±0.5% oscillations[a]

a. Relative to run 43112A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER41612E

ROD/ELEV	CHAN. NU	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1184.	1368.	184.	44.5	725.	152.7
4C 3- 3	10	1254.	1395.	141.	42.0	807.	148.9
1C 4- 0	12	1373.	1620.	246.	63.5	850.	206.8
2A 5- 0	16	1520.	1859.	339.	91.0	850.	352.6
2A 5- 7	19	1538.	1811.	273.	75.5	839.	442.6
5C 6- 0	36	1441.	1753.	312.	148.0	1092.	473.3
2D 6- 2	39	1528.	1749.	220.	136.0	716.	546.7
1D 6- 4	47	1498.	1727.	229.	135.0	812.	532.6
3D 6- 4	50	1475.	1821.	347.	129.0	232.	902.0
4B 6- 4	52	1547.	1808.	261.	112.0	572.	551.8
5C 6- 4	54	1485.	1779.	293.	127.0	1046.	511.2
5D 6- 4	55	1520.	1724.	204.	64.0	770.	561.3
1D 6- 5	58	1514.	1749.	235.	98.5	844.	544.6
2A 6- 5	59	1504.	1775.	272.	128.0	654.	599.1
2D 6- 5	61	1552.	1804.	253.	102.0	829.	570.7
3B 6- 5	63	1571.	1834.	263.	131.0	665.	570.9
3C 6- 6	72	1589.	1878.	289.	144.0	504.	592.9
4C 6- 6	75	1600.	1877.	277.	107.0	734.	609.6
3C 6- 7	** B A D	T H E R M O C O U P L E	D A T A *				
3E 6- 7	83	1520.	1802.	273.	143.0	861.	567.7
3D 6- 8	86	1575.	1888.	313.	130.0	816.	617.7
4A 6- 8	87	1469.	1748.	278.	98.0	719.	675.7
1C 7- 0	93	1490.	1634.	144.	28.5	684.	625.5
2B 7- 0	94	1499.	1624.	125.	17.0	668.	648.5
3D 7- 0	98	1548.	1685.	137.	26.5	787.	664.8
5B 7- 0	103	1426.	1592.	165.	49.5	707.	659.8
2B 7- 6	110	1489.	1712.	223.	49.0	735.	717.7
2C 7- 6	111	1515.	1695.	180.	41.0	776.	674.6
2E 7- 6	113	1424.	1628.	203.	48.5	707.	765.7
3A 7- 6	** B A D	T H E R M O C O U P L E	D A T A *				
3B 7- 6	115	1226.	1538.	312.	76.5	686.	701.9
4B 7- 6	120	1501.	1742.	240.	51.0	766.	699.6
5C 7- 6	122	1493.	1704.	211.	54.0	808.	694.6
1C 8- 0	124	1342.	1611.	269.	75.0	752.	754.7
2E 8- 0	126	1293.	1552.	258.	64.0	593.	805.3
3D 8- 0	129	1369.	1668.	299.	76.0	811.	754.8
5B 8- 0	133	1309.	1605.	296.	95.0	671.	766.6
5C 8- 0	134	1388.	1661.	273.	74.5	753.	741.0
1C 8- 6	135	1135.	1422.	287.	66.5	641.	801.3
1D 8- 6	136	1069.	1375.	306.	98.0	599.	831.7
2C 8- 6	138	1257.	1611.	354.	85.0	704.	800.7
4B 8- 6	143	1201.	1455.	254.	67.0	655.	789.9
5D 8- 6	145	1161.	1441.	280.	89.0	581.	812.5
3D 9- 3	150	972.	1324.	351.	97.0	614.	806.0
4C 9- 3	152	1040.	1377.	337.	88.5	562.	818.2
1D10- 0	157	667.	1059.	392.	144.0	248.	849.0
4B10- 0	164	840.	1197.	358.	91.0	567.	827.6
5D10- 0	166	689.	935.	246.	76.0	247.	816.0
2A11- 0	168	549.	755.	206.	99.0	526.	476.0
4C11- 0	169	641.	923.	282.	109.0	472.	758.0
1D11- 6	171	271.	735.	464.	144.0	486.	492.8

RUN 41612E HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	645.5	614.9	634.9	657.3	629.9	647.8	6.0	4.5	5.5
24	922.0	850.1	882.5	962.5	897.5	923.6	16.0	15.0	15.5
39	1253.7	1167.3	1193.3	1394.9	1334.1	1362.9	48.5	36.5	42.9
48	1426.8	1348.3	1382.8	1654.8	1580.9	1618.5	75.0	63.5	67.5
60	1541.1	1507.9	1522.9	1858.7	1823.7	1846.7	108.0	91.0	98.2
67	1612.8	1512.2	1559.3	1892.6	1759.8	1839.2	131.0	51.5	82.7
70	1599.1	1552.6	1576.3	1861.0	1814.6	1835.3	115.0	52.5	75.8
73	1497.1	1497.1	1497.1	1775.4	1775.4	1775.4	136.0	136.0	136.0
74	1530.6	1528.4	1529.5	1791.0	1748.6	1769.8	136.0	98.5	117.3
75	1509.0	1482.1	1497.7	1748.6	1719.6	1734.9	143.0	75.0	121.0
76	1568.4	1485.3	1520.0	1813.5	1724.1	1763.0	135.0	64.0	113.8
77	1571.0	1503.6	1529.9	1833.8	1736.3	1773.7	142.0	73.0	118.7
78	1599.7	1484.3	1545.0	1877.9	1737.4	1800.3	144.0	68.5	123.1
79	1583.5	1529.5	1557.7	1868.9	1769.8	1811.6	143.0	66.5	123.7
80	1575.3	1469.3	1513.7	1888.1	1747.5	1810.3	146.0	98.0	113.6
81	1566.6	1566.6	1566.6	1889.2	1889.2	1889.2	134.0	134.0	134.0
82	1518.7	1518.7	1518.7	1809.0	1809.0	1809.0	130.0	130.0	130.0
84	1547.9	1420.6	1500.8	1686.5	1572.2	1645.6	49.5	15.5	32.0
90	1566.8	1225.9	1462.0	1751.9	1537.6	1681.7	76.5	39.5	51.9
96	1407.6	1293.4	1360.1	1701.8	1551.7	1648.8	95.0	53.5	75.4
102	1521.2	789.0	1157.0	1750.8	1098.5	1435.5	98.0	49.0	75.5
111	1059.8	855.2	968.3	1384.4	1138.0	1276.7	99.0	77.5	88.9
120	1147.9	585.2	793.5	1394.9	934.6	1144.6	144.0	75.0	105.8
132	641.2	458.8	537.2	923.3	706.7	774.9	178.0	99.0	121.5
138	566.0	271.2	418.6	791.9	734.7	763.3	144.0	98.5	121.3

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	15.0	11.8	12.9	580.8	558.8	568.5	24.6	21.9	22.9
24	47.4	35.4	41.1	681.0	657.3	665.6	61.8	59.3	60.3
39	186.8	141.2	169.7	809.8	725.1	768.0	154.6	142.8	149.7
48	246.5	228.0	235.7	849.9	822.0	840.1	212.7	204.6	208.0
60	349.7	282.6	323.7	904.6	850.3	872.8	352.6	335.8	344.7
67	307.3	235.3	279.8	957.5	839.4	886.1	461.6	412.4	434.7
70	262.0	253.3	259.1	981.4	858.0	912.9	489.5	474.4	482.9
73	278.3	278.3	278.3	726.7	726.7	726.7	515.8	515.8	515.8
74	260.4	220.2	240.3	715.7	626.8	671.2	546.7	540.8	543.8
75	252.0	213.9	237.2	823.8	591.3	666.3	676.8	528.7	574.0
76	293.4	204.3	243.0	1047.6	572.1	784.8	640.7	511.2	559.4
77	271.8	215.5	243.7	844.1	647.8	758.7	599.1	544.6	572.0
78	290.0	210.2	255.3	897.6	504.5	757.7	685.8	564.7	597.6
79	285.3	208.6	253.9	904.6	747.6	833.6	596.5	563.6	585.1
80	314.2	237.7	291.6	909.7	719.4	807.8	675.7	588.8	621.3
81	322.6	322.6	322.6	786.0	786.0	786.0	626.7	626.7	626.7
82	290.3	290.3	290.3	850.1	850.1	850.1	608.6	608.6	608.6
84	165.3	114.1	144.9	796.2	652.0	725.0	712.7	625.5	652.4
90	311.7	179.7	219.7	877.6	682.7	756.2	781.9	674.6	717.5
96	324.0	258.3	288.7	810.6	593.2	743.4	905.3	740.6	759.1
102	353.9	184.3	278.6	804.2	563.1	640.8	854.5	472.6	755.8
111	351.4	241.2	308.4	614.2	511.8	565.2	857.6	708.3	805.5
120	398.9	245.6	351.1	604.8	246.8	480.8	855.0	449.2	767.8
132	282.1	205.5	237.7	525.8	399.7	473.6	758.0	455.4	566.6
138	463.5	225.9	344.7	486.3	466.8	476.6	599.0	492.8	545.9

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42612F
Test Date: 7/7/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.139 MPa (20.2 psia)
Initial peak clad temperature and location	877°C (1610°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.56 kw/m (0.779 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	32°C (89°F)
Average and range of initial 1.83 m (72 in.) housing temperature	524°C (507°C - 532°C) [975°F (944°F - 989°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: -1.5% with ±0.5% oscillations[a]

a. Relative to run 43112A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42612F

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1171.	1308.	137.	36.0	769.	151.7
4C 3- 3	6	1264.	1368.	104.	33.0	786.	144.8
1C 4- 0	7	1386.	1595.	209.	65.0	836.	219.6
2A 5- 0	12	1511.	1809.	298.	93.5	811.	332.7
2A 5- 7	14	1538.	1815.	276.	62.5	850.	410.6
5C 6- 2	33	1459.	1697.	238.	74.0	245.	792.0
2D 6- 3	39	1503.	1639.	136.	46.5	822.	477.8
1D 6- 4	46	1492.	1659.	167.	62.0	932.	465.7
3D 6- 4	50	1499.	1788.	288.	58.5	368.	820.0
4B 6- 4	51	1559.	1693.	134.	46.5	821.	527.7
5D 6- 4	56	1493.	1632.	139.	46.0	710.	558.2
1D 6- 5	58	1489.	1675.	185.	62.0	960.	477.7
2A 6- 5	59	1489.	1670.	181.	50.5	788.	447.4
2D 6- 5	62	1539.	1693.	154.	49.0	864.	498.5
3B 6- 5	63	1571.	1750.	179.	48.5	554.	537.9
3C 6- 6	69	1563.	1814.	250.	70.0	1134.	516.4
3E 6- 6	70	1493.	1706.	213.	66.5	1038.	511.5
4C 6- 6	73	1594.	1769.	174.	46.0	751.	546.9
5C 6- 6	76	1548.	1716.	168.	46.0	798.	572.7
3D 6- 7	85	1587.	1793.	206.	50.0	703.	581.6
3C 6- 8	93	1603.	1824.	221.	47.0	890.	543.6
4A 6- 8	95	1466.	1687.	220.	58.5	847.	568.5
1C 7- 0	109	1509.	1639.	130.	30.0	672.	630.0
2B 7- 0	110	1532.	1632.	100.	16.0	701.	600.9
3D 7- 0	113	1565.	1655.	90.	13.5	666.	608.0
5B 7- 0	117	1415.	1525.	110.	18.5	634.	636.8
2B 7- 6	120	1507.	1680.	173.	45.5	787.	628.9
2C 7- 6	121	1530.	1704.	174.	44.0	811.	609.7
2E 7- 6	123	1402.	1547.	146.	51.5	701.	609.5
3A 7- 6	124	1481.	1616.	135.	43.5	757.	626.6
3B 7- 6	125	1545.	1720.	175.	43.5	811.	623.8
4B 7- 6	129	1507.	1683.	176.	45.0	772.	632.4
5C 7- 6	132	1469.	1645.	176.	46.5	732.	655.9
1C 8- 0	133	1349.	1592.	242.	64.0	702.	685.8
2E 8- 0	136	1281.	1481.	199.	50.0	700.	640.8
3D 8- 0	138	1411.	1673.	262.	60.5	798.	654.0
5B 8- 0	143	1234.	1394.	160.	46.5	573.	685.9
5C 8- 0	144	1338.	1573.	235.	59.5	677.	694.0
1C 8- 6	145	1141.	1358.	218.	62.0	584.	717.9
1D 8- 6	146	1106.	1237.	131.	30.5	627.	655.6
2C 8- 6	148	1246.	1516.	270.	62.0	740.	674.9
4B 8- 6	153	1206.	1416.	210.	45.5	627.	711.1
5D 8- 6	155	1135.	1319.	184.	61.0	562.	720.9
3D 9- 3	159	1057.	1314.	258.	58.0	661.	706.9
4C 9- 3	161	1078.	1373.	294.	74.0	623.	731.9
1D10- 0	164	588.	915.	327.	107.0	630.	690.5
4B10- 0	168	872.	1202.	330.	93.0	561.	753.0
5D10- 0	169	759.	1054.	295.	81.0	521.	666.1
2A11- 0	171	517.	768.	251.	106.0	492.	587.0
4C11- 0	172	685.	960.	276.	95.5	456.	737.8
1D11- 6	** B A D T H E R M O C O U P L E D A T A *						

RUN 42612F HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	748.5	677.5	713.0	758.7	691.0	724.8	6.5	5.0	5.8
24	926.6	926.6	926.6	955.2	955.2	955.2	15.5	15.5	15.5
39	1263.5	1164.3	1199.5	1367.7	1307.9	1327.8	36.0	33.0	35.0
48	1455.3	1343.8	1394.1	1642.8	1543.0	1587.9	65.0	59.0	61.9
60	1511.1	1439.2	1467.1	1809.0	1691.9	1739.4	93.5	76.0	81.8
67	1599.9	1500.3	1557.4	1879.1	1763.1	1812.3	71.5	61.5	66.1
70	1609.7	1414.3	1478.0	1841.7	1599.2	1674.8	61.5	46.5	56.9
71	1556.5	1514.3	1535.4	1791.0	1725.2	1758.1	63.0	62.0	62.5
72	1467.1	1379.7	1423.4	1747.5	1639.6	1693.5	78.0	68.5	73.2
73	1458.5	1403.9	1431.2	1686.5	1657.0	1671.8	96.5	68.5	82.5
74	1497.1	1392.3	1464.1	1739.7	1617.8	1689.5	137.0	60.0	80.3
75	1511.0	1414.6	1469.1	1789.9	1625.4	1689.0	76.5	46.5	63.2
76	1558.7	1434.9	1497.0	1787.6	1609.0	1692.9	85.5	45.5	59.8
77	1570.7	1489.4	1520.0	1764.2	1643.9	1701.1	72.0	48.5	59.6
78	1594.3	1479.8	1534.9	1813.5	1673.4	1717.4	70.0	45.0	53.3
79	1594.5	1459.4	1536.0	1793.2	1628.7	1728.8	68.5	45.5	56.2
80	1603.0	1466.0	1530.2	1823.7	1686.5	1753.5	66.0	47.0	59.1
81	1515.4	1515.4	1515.4	1702.9	1702.9	1702.9	58.5	58.5	58.5
84	1565.1	1414.6	1504.9	1661.4	1524.6	1614.7	30.0	13.5	20.9
90	1551.1	1396.5	1487.1	1727.4	1547.3	1654.2	51.5	38.5	44.4
96	1426.4	1234.1	1350.8	1686.5	1393.9	1577.4	64.0	31.0	55.7
102	1245.7	1073.0	1166.8	1516.0	1201.4	1358.4	62.0	27.5	48.6
111	1078.4	916.4	1010.0	1372.9	1131.8	1258.7	85.0	61.0	73.8
120	874.0	588.0	783.3	1235.8	915.1	1096.0	107.0	81.0	92.2
132	684.9	479.8	544.5	960.4	607.8	774.7	106.0	73.5	94.5
138	570.8	559.0	564.9	939.8	794.0	866.9	109.0	104.0	106.5

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	13.5	10.2	11.9	626.2	624.8	625.5	23.9	21.2	22.6
24	28.6	28.6	28.6	694.0	694.0	694.0	65.8	65.8	65.8
39	143.5	104.2	128.4	785.9	768.6	775.5	151.7	144.8	149.4
48	208.9	180.1	193.9	857.1	756.6	817.2	219.6	207.2	214.5
60	297.9	252.7	272.3	810.6	751.2	771.2	347.3	332.7	342.2
67	279.2	213.8	254.8	989.6	824.8	901.7	441.5	410.6	422.0
70	235.1	155.8	196.8	967.5	232.8	549.0	816.0	437.7	633.1
71	234.5	210.8	222.7	1044.5	935.8	990.1	484.3	460.7	472.5
72	280.4	259.9	270.1	322.6	231.8	277.2	820.0	812.0	816.0
73	253.1	228.0	240.5	244.7	235.0	239.8	810.0	794.0	802.0
74	248.1	201.3	225.4	1052.4	244.7	571.0	820.0	488.3	680.8
75	303.3	136.0	219.9	1134.5	229.6	566.7	320.0	460.6	637.1
76	288.4	126.4	195.9	1055.9	240.4	602.5	820.0	465.7	639.0
77	259.5	150.1	181.1	960.4	243.6	688.1	804.0	447.4	557.3
78	250.3	147.3	182.5	1134.0	733.8	860.1	579.8	458.6	543.4
79	230.0	167.1	192.8	992.7	703.4	831.5	508.6	497.7	559.7
80	229.7	216.5	223.3	890.3	762.6	816.2	598.7	540.5	572.6
81	187.5	187.5	187.5	792.6	792.6	792.6	562.5	562.5	562.5
84	136.5	89.7	109.7	780.9	633.9	706.5	636.8	574.9	603.6
90	187.2	134.7	167.1	845.7	648.2	770.9	561.9	595.6	625.1
96	262.0	159.8	226.5	841.4	573.1	730.9	694.0	638.9	660.4
102	270.3	128.4	191.5	739.8	562.4	620.9	729.4	655.6	695.3
111	296.7	159.8	248.7	670.3	536.5	621.1	731.9	609.1	686.5
120	361.8	244.4	312.7	629.7	520.5	581.0	753.0	666.1	719.6
132	283.0	111.7	230.2	591.0	456.0	508.2	737.8	191.1	475.0
138	369.0	235.0	302.0	511.8	246.8	379.3	731.0	658.0	694.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43013A
Test Date: 4/3/80
Test Type: Forced Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.273 MPa (39.6 psia)
Initial peak clad temperature and location	872°C (1601°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	107°C (225°F)
Average and range of initial 1.83 m (72 in.) housing temperature	437°C (432°C - 441°C) [818°F (809°F - 825°F)]
Initial bundle water level	31.37 mm (1.235 in.)

B. Summary Results:

C. Comments:

Total power: exponentially increasing from -0.2% to -1.6% by 570 seconds[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43013A

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1092.	1182.	89.	20.5	821.	104.8
4C 3- 3	11	1165.	1239.	74.	19.5	850.	95.4
1C 4- 0	14	1343.	1481.	137.	38.5	896.	173.8
2A 5- 0	17	1346.	1555.	209.	58.0	772.	276.9
2A 5- 7	21	1466.	1719.	252.	61.5	966.	336.8
1D 5- 2	50	1446.	1775.	330.	75.5	911.	426.7
2D 6- 2	53	1559.	1892.	332.	59.5	843.	414.7
3D 6- 2	58	1577.	1932.	354.	61.0	950.	416.5
5C 6- 2	61	1510.	1789.	279.	58.0	936.	396.3
1D 6- 3	63	1420.	1748.	328.	80.5	866.	440.8
4B 6- 3	66	1539.	1894.	355.	78.5	854.	437.7
5D 6- 3	69	1444.	1809.	365.	83.0	779.	440.7
2A 6- 4	70	1457.	1793.	336.	78.0	891.	436.8
3B 6- 4	75	1566.	1950.	383.	80.0	974.	423.6
3D 6- 6	79	1493.	1926.	433.	80.5	909.	456.7
2D 6- 5	84	1531.	1903.	372.	74.5	849.	445.6
3C 6- 5	85	1556.	1965.	409.	78.5	904.	442.7
3E 6- 5	86	1468.	1819.	351.	76.5	922.	440.8
3C 6- 6	95	1530.	1956.	425.	80.5	900.	452.8
4A 6- 6	97	1417.	1790.	373.	103.0	870.	452.8
3D 8- 0	98	1119.	1583.	464.	81.0	794.	534.0
5C 6- 6	101	1451.	1734.	283.	60.0	875.	435.6
1C 7- 0	110	1305.	1610.	305.	53.0	714.	493.0
2B 7- 0	111	1360.	1577.	216.	25.0	665.	486.0
3D 7- 0	115	1350.	1657.	307.	54.5	723.	488.0
5B 7- 0	117	1294.	1612.	318.	84.0	675.	481.0
2B 7- 6	* * B A D	T H E R M O C O U P L E	D A T A *				
2C 7- 6	121	1283.	1659.	376.	59.5	796.	495.0
2E 7- 6	122	1068.	1400.	332.	61.0	724.	506.3
3A 7- 6	123	1251.	1579.	328.	79.0	712.	522.0
3B 7- 6	124	1356.	1714.	358.	61.0	764.	498.0
4B 7- 6	127	1339.	1724.	385.	79.5	744.	511.0
5C 7- 6	128	1225.	1534.	310.	79.0	761.	490.0
1C 8- 0	131	1024.	1497.	472.	81.5	737.	536.0
2E 8- 0	133	775.	1143.	368.	104.0	662.	554.7
4C 6- 6	136	1528.	1938.	411.	79.0	915.	453.7
5B 8- 0	138	1107.	1457.	350.	80.0	742.	518.9
5C 8- 0	139	1062.	1430.	368.	81.5	682.	511.9
1C 8- 6	141	908.	1283.	374.	78.0	562.	557.0
1D 8- 6	142	848.	1134.	286.	58.0	590.	541.0
2C 8- 6	143	969.	1367.	397.	59.5	666.	531.0
4B 8- 6	145	1012.	1321.	309.	43.0	606.	555.5
5D 8- 6	146	908.	1367.	458.	105.0	574.	575.8
3D 9- 3	154	843.	1303.	459.	105.0	667.	574.1
4C 9- 3	156	902.	1269.	368.	80.5	660.	560.0
1D10- 0	161	644.	957.	323.	124.0	532.	578.8
4B10- 0	164	696.	1084.	388.	105.0	611.	590.0
5D10- 0	167	660.	1021.	361.	128.0	275.	604.0
2A11- 0	168	536.	721.	186.	105.0	645.	266.0
4C11- 0	170	562.	880.	317.	128.0	512.	563.0
1D11- 6	172	294.	707.	413.	147.0	286.	479.0

RUN 43013A HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	592.7	549.0	564.6	605.7	564.2	578.8	6.0	5.5	5.6
24	763.1	683.4	722.9	810.6	736.8	772.7	16.5	13.0	15.0
39	1164.9	1039.1	1098.7	1239.0	1136.9	1185.8	20.5	19.5	20.0
48	1366.6	1251.4	1311.0	1509.5	1421.6	1458.8	44.5	36.0	38.8
60	1452.3	1316.6	1358.4	1643.9	1496.6	1555.0	58.0	31.5	41.6
67	1575.5	1459.6	1493.0	1855.3	1718.5	1759.1	61.5	55.0	56.1
70	1601.1	1489.6	1547.7	1932.7	1780.9	1851.3	76.0	58.0	64.0
71	1598.9	1470.5	1546.9	1952.2	1765.3	1851.1	74.5	59.0	62.1
72	1600.4	1469.2	1539.0	1951.0	1749.7	1841.1	79.5	56.0	67.3
74	1582.7	1445.7	1529.6	1939.5	1738.6	1862.0	79.0	56.0	69.3
75	1569.7	1420.0	1513.0	1954.5	1747.5	1868.9	83.0	61.0	76.6
76	1565.4	1436.2	1515.6	1961.3	1793.2	1878.6	86.0	64.5	78.1
77	1556.3	1367.3	1485.0	1964.8	1712.9	1962.2	82.0	69.0	76.9
78	1530.3	1400.7	1474.4	1955.6	1734.1	1863.5	103.0	60.0	78.3
84	1396.1	1071.8	1301.3	1681.0	1447.3	1599.0	84.0	25.0	56.6
90	1355.8	1012.0	1220.2	1724.1	1382.3	1581.9	81.5	59.5	69.9
96	1203.0	775.2	1063.2	1624.3	1143.2	1470.6	104.0	61.0	79.2
102	1011.6	643.6	921.7	1443.0	1116.2	1275.4	105.0	32.5	64.2
111	901.6	747.5	814.0	1302.7	979.0	1154.9	105.0	56.5	91.0
120	708.0	643.9	671.5	1144.2	952.2	1051.3	148.0	105.0	121.1
132	562.4	535.5	543.4	879.9	721.2	765.3	128.0	104.0	116.3
138	559.7	243.7	479.5	875.8	706.7	784.1	147.0	125.0	132.4

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	15.2	13.0	14.2	581.2	553.9	565.5	9.5	8.6	9.1
24	53.4	46.0	49.8	757.4	681.3	716.7	31.4	26.4	28.1
39	97.8	74.1	87.1	849.6	727.5	799.6	105.4	95.4	101.6
48	170.2	137.1	147.8	1033.3	886.3	929.1	173.8	147.6	160.5
60	208.7	176.3	196.6	804.9	705.9	755.5	285.9	276.9	280.9
67	279.8	252.5	266.1	965.8	852.7	909.9	346.5	336.8	343.1
70	331.6	269.5	303.5	925.3	791.5	871.8	390.8	369.5	378.2
71	353.3	266.4	314.2	1004.7	789.2	899.0	402.5	369.5	387.6
72	351.0	261.0	302.2	978.2	815.3	900.0	409.6	375.9	392.2
74	360.1	277.3	332.2	1017.6	827.3	906.2	428.7	396.3	412.8
75	364.8	327.5	355.8	955.8	779.3	875.2	440.8	417.9	430.4
76	397.0	326.2	362.8	974.1	838.0	892.3	444.8	419.6	432.4
77	408.5	345.6	377.2	925.0	795.1	877.7	458.7	435.8	446.0
78	432.8	263.1	389.0	986.7	812.4	889.5	464.8	435.6	452.9
84	375.5	216.1	297.7	758.0	641.0	690.2	506.0	476.0	490.1
90	419.6	309.5	361.8	825.2	621.7	752.1	522.0	490.0	506.6
96	472.2	349.6	407.5	819.0	659.9	736.9	554.7	511.9	531.4
102	460.6	234.2	353.6	685.8	534.7	597.5	575.8	531.0	552.8
111	459.5	226.3	340.9	717.1	509.7	636.2	580.0	484.0	543.2
120	471.8	299.6	379.8	672.1	274.8	548.4	604.0	469.0	570.7
132	317.5	184.5	221.9	644.6	480.7	548.5	593.0	266.0	420.4
138	413.0	202.6	304.6	596.2	285.6	479.1	573.0	377.7	506.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43513B
Test Date: 6/27/80
Test Type: Forced Reflood
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.274 MPa (39.8 psia)
Initial peak clad temperature and location	874°C (1606°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28.4 mm/sec (1.12 in./sec)
Coolant temperature	110°C (230°F)
Average and range of initial 1.83 m (72 in.) housing temperature	443°C (437°C - 450°C) [830°F (818°F - 842°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: -0.5% to 120 seconds and 0% thereafter[a]

Inlet subcooling: -6% to 175 seconds and linearly decreasing to -3% by 400 seconds[a]

a. Relative to run 43013A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER435138

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1080.	1221.	141.	29.5	742.	110.9
4C 3- 3	11	1204.	1303.	99.	25.0	832.	103.6
1C 4- 0	14	1283.	1424.	140.	36.0	889.	164.3
2A 5- 0	17	1357.	1609.	252.	58.0	752.	282.9
2A 5- 7	21	1452.	1745.	293.	96.5	852.	359.7
1D 6- 2	50	1377.	1700.	322.	77.0	769.	427.7
2D 6- 2	53	1482.	1803.	321.	77.5	1002.	218.9
3D 6- 2	58	1534.	1811.	277.	77.5	1012.	341.9
5C 6- 2	61	1457.	1766.	309.	77.5	854.	427.7
1D 6- 3	63	1405.	1714.	309.	77.5	731.	407.5
4B 6- 3	68	1514.	1801.	287.	78.5	892.	408.2
5D 6- 3	69	1396.	1729.	332.	97.0	777.	475.2
2A 6- 4	70	1419.	1701.	281.	99.5	812.	440.8
2D 6- 4	72	1516.	1837.	321.	76.0	1255.	243.6
3B 6- 4	75	1558.	1867.	309.	77.0	893.	421.7
3C 6- 5	85	1600.	1910.	310.	77.5	902.	403.6
3E 6- 5	86	1451.	1746.	295.	78.5	805.	459.5
3C 6- 6	95	1583.	1929.	346.	77.0	912.	415.8
3D 6- 6	96	1543.	1897.	354.	77.5	1017.	384.7
4A 6- 6	97	1406.	1746.	340.	97.5	805.	462.6
4C 6- 6	98	1550.	1906.	356.	94.0	876.	438.3
5C 6- 6	101	1445.	1765.	320.	96.0	842.	461.6
1C 7- 0	110	1424.	1645.	221.	41.5	672.	484.0
2B 7- 0	111	1463.	1661.	199.	41.5	739.	467.6
3D 7- 0	115	1500.	1731.	231.	41.5	803.	431.0
5B 7- 0	117	1353.	1581.	227.	76.5	672.	511.5
2B 7- 6	120	1445.	1726.	282.	58.0	832.	497.9
2C 7- 6	121	1468.	1763.	296.	59.0	824.	484.0
2E 7- 6	122	1276.	1536.	259.	47.0	737.	535.0
3A 7- 6	123	1408.	1679.	271.	60.5	794.	516.8
3B 7- 6	124	1464.	1770.	305.	59.5	817.	502.8
4B 7- 6	127	1453.	1750.	297.	60.5	820.	506.8
5C 7- 6	128	1397.	1721.	324.	81.0	816.	523.4
1C 8- 0	131	1272.	1616.	344.	76.5	721.	541.9
2E 8- 0	133	1037.	1454.	417.	72.0	662.	548.0
3D 8- 0	136	1317.	1695.	378.	77.5	868.	490.9
5B 8- 0	138	1167.	1532.	365.	110.0	843.	514.9
5C 8- 0	139	1299.	1666.	367.	96.0	746.	556.3
1C 8- 6	141	1080.	1397.	317.	59.5	554.	554.3
1D 8- 6	142	901.	1271.	371.	57.0	588.	561.0
2C 8- 6	143	1162.	1489.	327.	50.5	668.	535.0
4B 8- 6	145	1222.	1584.	362.	76.0	715.	560.0
5D 8- 6	148	1082.	1386.	303.	56.5	540.	611.0
3D 9- 3	154	1000.	1371.	371.	95.5	734.	529.2
4C 9- 3	156	1073.	1391.	318.	77.5	690.	566.0
1D10- 0	161	659.	1096.	437.	137.0	533.	616.0
4B10- 0	164	919.	1225.	307.	96.5	602.	607.0
5D10- 0	167	746.	1118.	372.	138.0	617.	603.2
2A11- 0	168	592.	776.	185.	96.5	543.	542.9
4C11- 0	** BAD THERMOCOUPLE DATA *						
1D11- 6	** BAD THERMOCOUPLE DATA *						

RUN 43513B HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	613.5	561.8	580.8	627.8	582.3	599.0	7.5	6.0	6.9
24	878.0	786.5	822.5	924.3	840.6	871.3	14.5	12.5	13.8
39	1203.6	1080.4	1117.1	1302.7	1221.2	1244.7	29.5	25.0	26.6
48	1353.5	1220.3	1271.4	1530.1	1398.1	1450.1	49.0	36.0	41.9
60	1468.6	1319.3	1373.4	1657.0	1537.6	1593.9	58.0	41.5	46.7
67	1574.9	1440.7	1480.2	1865.5	1730.8	1774.2	96.5	60.5	77.1
70	1605.6	1466.0	1526.3	1923.5	1777.6	1841.7	96.5	74.5	80.1
71	1586.1	1355.2	1476.6	1916.6	1689.7	1797.6	96.5	74.5	81.0
72	1446.5	1371.0	1423.4	1769.8	1671.2	1735.8	97.5	76.5	84.6
74	1535.3	1377.2	1474.0	1853.1	1699.5	1782.0	97.5	77.0	83.0
75	1579.6	1396.5	1493.9	1874.5	1714.0	1794.0	97.0	76.5	80.4
76	1596.9	1415.3	1496.0	1880.2	1700.6	1797.6	99.5	76.0	82.3
77	1600.2	1339.5	1487.5	1909.7	1688.6	1811.4	89.5	73.5	78.2
78	1582.9	1399.3	1480.2	1929.2	1701.8	1815.8	99.5	75.5	85.1
84	1501.0	1347.2	1423.7	1730.8	1557.1	1647.7	76.5	41.5	50.2
90	1467.5	1276.0	1398.4	1769.8	1535.5	1691.9	96.5	41.5	63.8
96	1348.3	1037.2	1260.6	1705.1	1453.7	1618.8	110.0	72.0	81.7
102	1222.1	900.8	1088.6	1584.1	1271.3	1417.3	76.5	56.5	62.9
111	1072.9	749.8	982.4	1390.7	1179.6	1285.8	137.0	46.0	80.6
120	918.9	659.5	779.9	1260.9	1096.4	1169.4	138.0	96.5	119.7
132	603.3	539.4	578.1	813.7	763.9	784.6	155.0	96.5	116.2
138	696.0	418.8	559.8	935.7	787.8	875.2	156.0	98.0	126.8

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	20.5	14.3	18.2	606.1	578.0	587.4	11.5	10.0	10.9
24	57.2	43.3	48.9	770.7	706.4	742.6	37.9	34.3	36.6
39	140.8	99.1	127.7	832.3	741.7	768.5	119.9	103.6	111.8
48	228.1	140.4	178.6	933.2	828.8	874.8	168.7	164.3	166.1
60	252.3	188.4	220.6	754.7	744.4	751.2	290.8	273.4	283.6
67	314.6	277.6	294.0	906.2	846.9	864.6	364.7	335.8	356.2
70	328.5	305.1	315.4	914.7	835.4	881.3	385.7	371.7	381.7
71	334.5	286.7	321.0	906.5	734.1	822.7	435.7	382.6	402.1
72	323.3	300.2	312.4	844.4	755.5	798.7	421.7	404.8	413.6
74	358.8	277.0	308.0	1115.3	725.0	869.9	445.8	218.9	391.2
75	332.0	257.6	300.1	1187.8	731.5	907.6	475.2	232.7	390.7
76	321.4	281.3	301.6	1255.3	746.1	905.7	452.7	243.6	409.1
77	349.1	295.4	323.9	1270.9	758.5	914.4	459.5	260.6	407.9
78	355.9	296.8	335.6	1207.2	784.9	890.2	471.5	275.6	428.9
84	270.2	198.6	224.1	803.4	662.5	707.4	511.9	431.0	483.2
90	333.2	259.5	293.5	914.6	712.7	797.5	550.7	464.0	510.1
96	416.5	321.3	358.2	868.4	662.5	763.8	556.3	490.9	533.4
102	370.5	296.7	328.8	715.0	539.6	621.0	511.0	430.3	551.3
111	429.8	219.4	303.4	820.6	580.2	666.8	609.9	469.8	555.7
120	474.9	306.5	389.6	719.2	530.2	598.9	523.9	492.5	590.3
132	274.3	160.6	206.5	648.6	543.2	591.8	542.9	314.2	463.0
138	438.4	224.2	315.5	619.5	282.3	479.7	595.5	507.0	553.2

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42413C
Test Date: 8/21/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.281 MPa (40.8 psia)
Initial peak clad temperature and location	882°C (1619°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	98°C (208°F)
Average and range of initial 1.83 m (72 in.) housing temperature	403°C (392°C - 412°C) [757°F (738°F - 773°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+0.5% for 60 seconds, increasing linearly to -3% by 190 seconds, and -1% thereafter[a]
Inlet subcooling:	-10% constant[a]
Housing initial temperature at midplane:	approximately -8%[a]

a. Relative to run 43013A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42413C

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1094.	1221.	128.	36.0	801.	96.7
4C 3- 3	11	1259.	1355.	96.	24.5	889.	109.8
1C 4- 0	14	1352.	1504.	152.	41.0	938.	172.9
2A 5- 0	17	1404.	1639.	235.	58.0	794.	278.8
2A 5- 7	21	1502.	1752.	250.	62.0	806.	347.9
1D 5- 2	50	1393.	1637.	244.	67.0	972.	366.8
2D 5- 2	53	1428.	1690.	262.	85.0	860.	392.9
3D 6- 2	58	1522.	1715.	194.	48.5	889.	427.0
4B 6- 2	60	1555.	1761.	206.	47.0	920.	396.9
5C 6- 2	61	1440.	1739.	298.	85.5	593.	412.2
1D 6- 3	63	1387.	1656.	269.	84.5	955.	376.5
5D 6- 3	69	1482.	1675.	213.	48.5	968.	393.8
2A 6- 4	70	1449.	1693.	244.	66.0	1048.	256.6
3B 6- 4	75	1576.	1801.	225.	50.0	865.	407.6
2D 6- 5	84	1515.	1784.	270.	68.0	934.	406.9
3C 6- 5	85	1599.	1870.	271.	51.0	936.	418.6
3E 6- 5	86	1515.	1715.	200.	69.5	926.	416.0
3C 6- 6	95	1586.	1884.	298.	65.5	862.	428.7
3D 6- 6	96	1550.	1849.	299.	69.0	842.	449.5
4A 6- 6	97	1461.	1739.	278.	67.5	946.	388.7
4C 6- 6	98	1591.	1873.	283.	68.0	855.	439.4
5C 6- 6	101	1557.	1749.	191.	47.0	875.	425.6
1C 7- 0	110	1393.	1608.	215.	48.5	729.	468.0
2B 7- 0	111	1434.	1625.	192.	31.0	703.	455.6
3D 7- 0	115	1430.	1665.	234.	47.0	668.	483.0
5B 7- 0	117	1360.	1585.	225.	48.5	700.	449.4
2B 7- 6	120	1419.	1694.	276.	60.5	812.	491.8
2C 7- 6	121	1410.	1725.	315.	64.5	770.	509.1
2F 7- 6	122	1132.	1466.	334.	71.0	700.	481.5
3A 7- 6	123	1415.	1672.	258.	52.0	809.	489.8
3B 7- 6	124	1441.	1715.	274.	48.5	783.	501.9
4B 7- 6	127	1444.	1724.	281.	48.5	790.	502.0
5C 7- 6	128	1427.	1671.	244.	48.5	760.	485.4
1C 8- 0	131	1165.	1572.	387.	86.5	706.	534.4
2E 8- 0	133	1042.	1457.	415.	86.5	783.	511.0
3D 8- 0	136	1259.	1670.	411.	85.5	763.	534.6
5B 8- 0	138	1191.	1521.	331.	86.5	748.	503.7
5C 8- 0	139	1337.	1630.	293.	69.0	750.	512.0
1C 8- 6	141	1020.	1399.	379.	69.5	577.	558.0
1D 8- 6	142	879.	1252.	373.	86.5	607.	534.0
2C 8- 6	**BAD THERMOCOUPLE DATA*						
4B 8- 6	145	1138.	1423.	287.	46.0	625.	557.9
5D 8- 6	148	975.	1370.	395.	81.0	637.	541.7
3D 9- 3	154	940.	1368.	428.	87.0	617.	574.0
4C 9- 3	156	1024.	1331.	307.	69.5	630.	562.0
1010- 0	161	687.	1043.	356.	137.0	692.	538.3
4310- 0	164	860.	1189.	329.	87.5	622.	590.9
5010- 0	167	738.	1074.	335.	123.0	648.	551.6
2A11- 0	168	593.	786.	193.	136.0	590.	429.8
4C11- 0	170	669.	956.	288.	87.5	474.	586.0
1011- 6	172	520.	827.	307.	140.0	559.	526.6

RUN 42413C HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	690.9	617.2	644.7	698.3	626.8	653.1	5.0	3.0	4.0
24	911.1	822.5	870.8	942.9	859.2	901.9	12.0	9.5	11.2
39	1250.6	1093.6	1159.7	1355.1	1221.2	1278.4	36.0	24.5	32.1
46	1382.1	1293.1	1331.6	1546.3	1481.6	1510.4	56.0	38.5	46.0
60	1403.6	1392.3	1396.6	1691.9	1636.5	1658.5	82.5	58.0	70.3
67	1619.0	1464.3	1513.0	1868.1	1728.5	1778.4	69.5	62.0	66.2
70	1567.1	1380.6	1517.3	1921.2	1612.3	1822.8	84.5	48.5	69.7
71	1523.7	1426.4	1495.4	1855.3	1753.1	1813.1	85.5	66.0	79.6
72	1502.9	1490.3	1496.6	1793.2	1789.9	1791.5	83.0	62.0	72.5
74	1554.8	1309.6	1474.1	1760.9	1609.0	1689.9	86.5	47.0	62.8
75	1583.6	1307.0	1509.9	1812.3	1641.7	1729.8	84.5	46.5	58.1
76	1600.5	1374.5	1516.6	1851.9	1666.8	1748.2	85.5	48.0	60.2
77	1599.0	1350.8	1512.4	1870.0	1676.6	1772.5	85.0	48.5	64.9
78	1590.7	1349.3	1514.8	1853.6	1706.2	1791.3	86.0	47.0	67.5
84	1408.0	1190.8	1303.4	1704.0	1417.3	1611.1	68.0	31.0	45.9
90	1443.5	1131.9	1374.3	1725.2	1465.5	1661.5	82.5	48.5	59.3
96	1341.6	1042.0	1230.8	1676.6	1456.9	1596.8	86.5	65.0	76.4
102	1130.1	878.7	1010.2	1453.7	1251.5	1384.2	86.5	46.0	73.2
111	1035.5	840.5	970.2	1367.7	1172.3	1296.4	102.0	56.0	77.8
120	859.6	687.0	765.4	1261.9	1042.8	1137.8	137.0	49.5	106.7
132	668.6	552.4	596.0	956.3	771.1	826.0	136.0	86.5	103.5
136	650.5	473.6	555.0	957.3	780.5	861.8	140.0	107.0	132.6

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	9.6	7.4	8.4	638.4	613.6	629.4	14.0	8.6	11.3
24	30.7	24.9	31.1	768.4	738.5	753.2	41.9	36.4	39.4
39	137.2	96.5	116.6	931.9	784.2	851.5	116.6	96.7	106.2
46	210.2	152.3	176.6	937.8	859.0	903.2	182.7	167.7	173.5
60	297.9	234.9	261.9	823.4	759.7	792.4	283.7	276.8	281.7
67	261.0	250.1	265.4	911.5	806.2	849.6	351.0	339.9	345.6
70	334.1	231.5	309.5	937.4	746.7	866.7	390.7	374.5	383.2
71	336.1	266.6	317.6	950.0	713.8	859.3	404.5	379.6	388.9
72	299.6	290.3	294.9	906.4	899.0	902.7	388.6	365.7	387.2
74	262.2	191.2	215.7	975.0	612.1	786.6	427.0	322.7	390.0
75	266.8	144.2	219.4	968.5	787.6	888.7	412.7	376.5	400.1
76	292.3	149.4	231.5	1048.0	807.2	901.1	435.9	256.6	388.4
77	317.6	199.6	260.1	1013.4	856.3	934.2	423.6	395.7	411.0
78	355.9	191.4	276.5	1027.9	841.6	909.5	449.5	299.6	410.7
84	246.7	191.9	227.7	807.1	667.9	739.9	484.9	410.0	457.5
90	336.6	226.2	267.2	830.3	699.9	779.8	509.1	455.0	491.2
96	430.7	292.9	366.0	821.7	706.0	761.6	538.9	496.9	520.1
102	432.0	266.5	374.1	636.8	576.9	617.9	567.7	534.0	550.1
111	426.1	251.9	316.3	639.9	602.6	623.6	578.0	534.3	559.4
120	507.5	309.7	372.4	692.3	513.2	630.0	600.5	446.7	554.8
132	267.5	192.6	226.0	595.6	377.3	507.6	586.0	291.5	402.7
136	376.1	231.3	306.9	558.6	234.5	434.7	577.0	240.0	401.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43813D
Test Date: 10/29/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.277 MPa (40.2 psia)
Initial peak clad temperature and location	873°C (1604°F), 3C 1.96 m (77 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	98°C (208°F)
Average and range of initial 1.83 m (72 in.) housing temperature	423°C (415°C - 431°C) [794°F (779°F - 807°F)]
Initial bundle water level	7.1 mm (0.28 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+1.5% for 40 seconds, -1.5% to 120 seconds, and -0.5% thereafter[a]
Total power:	0% increasing linearly to +0.5%[a]
Inlet subcooling:	-9.5% constant[a]

a. Relative to run 43013A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43813D

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1069.	1179.	110.	27.5	861.	99.9
4C 3- 3	9	1200.	1311.	111.	28.5	889.	98.4
1C 4- 0	10	1298.	1445.	147.	39.0	933.	144.6
2A 5- 0	13	1360.	1591.	230.	63.5	770.	272.7
2A 5- 7	16	1445.	1695.	251.	60.5	933.	328.7
2D 6- 2	50	1509.	1726.	217.	43.5	917.	330.0
3D 6- 2	55	1491.	1744.	253.	44.5	273.	587.0
5C 6- 2	59	1514.	1725.	212.	44.5	824.	381.9
1D 6- 3	61	1449.	1681.	232.	46.5	893.	340.9
4B 6- 3	66	1536.	1759.	223.	44.5	902.	350.0
5D 6- 3	68	1438.	1682.	245.	54.5	774.	389.5
2A 6- 4	70	1428.	1691.	263.	53.0	1100.	220.8
3B 6- 4	* * B A D T H E R M O C O U P L E D A T A *						
1D 6- 5	82	1440.	1688.	248.	60.5	908.	350.6
2D 6- 5	* * B A D T H E R M O C O U P L E D A T A *						
3C 6- 5	85	1604.	1837.	233.	43.5	997.	307.6
3E 6- 5	86	1489.	1685.	197.	44.5	1045.	253.8
3C 6- 6	97	1599.	1864.	265.	44.5	1003.	315.8
3D 6- 6	98	1573.	1819.	246.	43.5	1009.	310.9
4A 6- 6	100	1456.	1726.	270.	60.5	791.	413.6
4C 6- 6	101	1580.	1850.	270.	53.0	996.	336.8
5C 6- 6	103	1527.	1749.	221.	65.0	842.	402.0
1C 7- 0	* * B A D T H E R M O C O U P L E D A T A *						
2B 7- 0	111	1460.	1667.	207.	27.5	838.	292.8
3D 7- 0	115	1480.	1689.	209.	43.5	779.	348.0
5B 7- 0	117	1337.	1532.	195.	43.5	651.	447.0
2B 7- 6	121	1439.	1702.	263.	44.5	997.	323.3
2C 7- 6	122	1426.	1734.	308.	53.0	789.	440.9
2E 7- 6	123	1236.	1497.	260.	45.5	972.	296.8
3A 7- 6	124	1436.	1679.	242.	45.0	761.	426.3
3B 7- 6	125	1474.	1736.	263.	43.5	943.	341.7
4B 7- 6	128	1460.	1729.	268.	43.5	789.	438.6
5C 7- 6	129	1431.	1672.	242.	45.5	805.	449.0
1C 8- 0	132	1211.	1533.	322.	80.5	776.	462.9
2E 8- 0	134	1154.	1436.	281.	48.0	972.	338.9
3D 8- 0	137	1350.	1688.	337.	62.0	855.	408.6
5B 8- 0	139	1266.	1561.	295.	56.5	689.	496.9
5C 8- 0	140	1357.	1637.	281.	53.0	765.	471.9
1C 8- 6	141	1050.	1368.	318.	55.0	590.	496.0
1D 8- 6	142	935.	1342.	406.	71.0	586.	483.8
2C 8- 6	143	1121.	1443.	322.	53.0	569.	481.0
4B 8- 6	145	1198.	1488.	290.	44.5	673.	490.0
5D 8- 6	148	1129.	1470.	341.	56.5	652.	507.9
3D 9- 3	155	977.	1376.	399.	92.0	696.	457.5
4C 9- 3	157	1046.	1384.	339.	56.5	691.	474.0
1D10- 0	160	671.	1002.	330.	105.0	665.	395.8
4B10- 0	163	897.	1209.	312.	82.0	605.	524.0
5D10- 0	166	796.	1107.	311.	105.0	641.	482.7
2A11- 0	167	607.	820.	213.	96.0	523.	480.0
4C11- 0	169	685.	987.	302.	97.5	533.	501.0
1D11- 6	170	275.	782.	507.	156.0	667.	317.0

RUN 439130 HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	585.5	582.3	583.9	599.4	596.2	597.8	6.5	5.5	6.0
24	817.4	790.4	805.0	855.1	835.4	847.8	14.0	12.0	13.2
39	1199.8	1068.3	1114.8	1311.0	1178.5	1228.6	33.0	27.5	28.7
48	1298.3	1276.4	1287.4	1445.2	1438.7	1441.9	42.5	39.0	40.7
60	1488.2	1351.7	1400.0	1686.5	1571.1	1610.1	63.5	44.5	51.0
67	1599.8	1444.6	1498.8	1832.7	1683.2	1737.0	60.5	44.5	49.8
70	1600.5	1501.4	1551.0	1841.7	1763.1	1802.4	46.0	42.0	44.0
71	1520.5	1520.5	1520.5	1769.8	1769.8	1769.8	43.5	43.5	43.5
72	1576.7	1333.7	1499.0	1807.8	1612.3	1733.0	84.0	42.5	50.5
74	1560.1	1374.8	1483.0	1799.9	1646.1	1712.6	63.5	42.5	48.6
75	1535.6	1437.5	1481.1	1758.6	1663.6	1707.0	64.5	43.5	48.7
76	1577.8	1427.5	1514.8	1802.2	1665.7	1745.4	64.0	43.5	50.9
77	1603.7	1438.6	1511.9	1840.6	1685.4	1758.0	66.5	43.5	53.7
78	1599.4	1429.6	1526.1	1864.4	1669.0	1779.3	65.0	43.5	53.9
84	1483.9	1330.8	1417.5	1694.1	1532.2	1634.6	60.0	27.5	41.2
90	1473.5	1236.4	1393.9	1736.3	1496.6	1647.6	64.0	43.5	47.8
96	1397.2	1154.1	1286.0	1701.8	1435.5	1587.5	80.5	45.0	61.7
102	1198.4	935.1	1084.7	1488.0	1283.9	1401.2	71.0	44.5	62.0
111	1045.8	859.4	979.9	1384.4	1171.2	1291.6	82.0	63.0	69.1
120	896.7	671.2	756.0	1208.7	1001.6	1106.7	119.0	82.0	102.4
132	584.9	607.0	633.2	987.2	819.9	877.7	97.5	75.5	89.7
138	673.0	274.8	505.7	950.1	761.5	837.4	156.0	95.0	118.5

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	13.9	13.9	13.9	590.8	582.6	586.7	10.5	10.0	10.2
24	46.0	37.7	42.9	748.1	735.6	740.2	35.1	32.9	34.1
39	120.5	109.7	113.8	889.1	785.7	845.4	105.3	98.4	101.2
48	162.3	146.8	154.6	932.8	880.5	906.6	158.9	144.6	151.7
60	230.5	198.3	216.0	957.4	770.2	835.5	275.5	241.8	263.7
67	250.6	231.1	238.2	1011.6	840.6	928.5	334.7	298.6	320.7
70	261.7	241.2	251.4	998.9	808.2	903.6	344.7	311.7	328.2
71	249.3	249.3	249.3	834.5	834.5	834.5	348.8	348.8	348.8
72	278.6	199.4	234.0	982.4	813.4	897.8	376.4	248.9	325.1
74	274.5	201.2	229.6	1008.9	766.4	862.7	381.9	141.7	312.5
75	244.6	190.1	225.9	1115.5	774.4	933.7	389.5	240.4	317.8
76	263.3	199.3	230.6	1150.0	743.7	941.8	399.9	220.8	311.4
77	286.2	196.9	246.1	1044.8	813.0	924.1	396.9	253.8	339.4
78	303.4	206.9	253.2	1126.4	791.2	965.2	413.6	237.9	332.1
84	237.8	195.0	217.1	868.6	650.9	762.8	447.0	250.7	366.1
90	308.5	210.5	253.7	997.0	689.4	830.8	449.0	296.8	396.6
96	337.1	280.7	301.4	989.6	669.5	812.5	499.1	338.9	432.4
102	406.4	239.5	316.5	673.2	568.5	609.5	531.5	447.0	492.9
111	399.2	237.2	311.7	766.9	552.1	656.2	544.7	421.4	472.4
120	420.8	305.7	350.8	665.4	506.0	583.1	559.0	395.8	491.4
132	302.3	212.9	244.5	533.2	479.6	511.8	504.0	480.0	495.0
138	506.7	250.7	331.7	666.7	487.3	542.4	535.0	317.0	423.3

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41913E
Test Date: 12/6/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.280 MPa (40.6 psia)
Initial peak clad temperature and location	873°C (1604°F), 2C 1.70 m (67 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	100°C (212°F)
Average and range of initial 1.83 m (72 in.) housing temperature	432°C (423°C - 438°C) [810°F (793°F - 821°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-1% increasing linearly to -2% with ±1% oscillations[a]
Total power:	-0.25% increasing linearly to +0.5%[a]
Inlet subcooling:	-6% increasing linearly to -9.5%[a]

a. Relative to run 43013A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER41913E

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1176.	1308.	131.	32.0	777.	129.7
4C 3- 3	10	1269.	1352.	83.	22.5	887.	112.6
1C 4- 0	12	1356.	1539.	183.	46.0	939.	163.4
2A 5- 0	16	1509.	1782.	273.	65.0	847.	292.3
2A 5- 7	19	1514.	1762.	249.	56.0	806.	350.6
5C 6- 0	36	1384.	1696.	313.	80.0	1141.	361.5
2D 6- 2	39	1488.	1730.	242.	68.0	804.	394.6
1D 6- 4	47	1441.	1670.	230.	69.0	791.	388.0
3D 6- 4	50	1436.	1784.	348.	75.5	269.	674.0
4B 6- 4	52	1513.	1760.	247.	67.0	881.	379.9
5C 6- 4	54	1425.	1729.	304.	80.5	780.	377.8
5D 6- 4	55	1463.	1673.	210.	70.5	866.	387.9
1D 6- 5	58	1462.	1700.	238.	67.5	859.	392.1
2A 6- 5	59	1465.	1706.	241.	65.0	763.	419.3
2D 6- 5	61	1522.	1763.	241.	67.5	865.	406.7
3B 6- 5	63	1551.	1793.	242.	66.5	829.	400.6
3C 6- 6	72	1582.	1864.	282.	67.0	700.	422.9
4C 6- 6	75	1591.	1847.	256.	63.5	952.	387.6
3C 6- 7	* * B A D T H E R M O C O U P L E D A T A *						
3E 6- 7	83	1500.	1736.	236.	66.5	872.	417.9
3D 6- 8	86	1574.	1861.	287.	68.5	813.	450.8
4A 6- 8	87	1451.	1700.	248.	64.5	822.	424.6
1C 7- 0	93	1472.	1625.	154.	36.0	737.	428.5
2B 7- 0	94	1501.	1667.	166.	35.0	679.	466.2
3D 7- 0	98	1546.	1735.	190.	36.0	739.	475.0
5B 7- 0	103	1428.	1620.	192.	37.0	678.	469.9
2B 7- 6	110	1454.	1715.	261.	53.0	783.	497.6
2C 7- 6	111	1501.	1725.	225.	49.5	807.	470.8
2E 7- 6	113	1307.	1535.	279.	66.0	887.	426.6
3A 7- 6	* * B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	115	1232.	1596.	364.	69.5	699.	528.7
4B 7- 6	120	1465.	1762.	277.	52.5	869.	470.9
5C 7- 6	122	1464.	1710.	246.	53.5	825.	482.9
1C 8- 0	124	1265.	1565.	300.	69.5	801.	513.9
2E 8- 0	126	1044.	1402.	359.	83.0	830.	484.8
3D 8- 0	129	1310.	1666.	355.	69.0	786.	522.0
5B 8- 0	133	1260.	1593.	333.	91.0	769.	505.6
5C 8- 0	134	1344.	1656.	312.	69.5	756.	509.8
1C 8- 6	135	1118.	1438.	319.	54.5	674.	545.2
1D 8- 6	136	1029.	1360.	331.	69.0	632.	560.9
2C 8- 6	138	1249.	1627.	377.	67.0	723.	543.6
4B 8- 6	143	1201.	1523.	321.	69.0	701.	521.8
5D 8- 6	145	1076.	1490.	415.	90.0	635.	550.4
3D 9- 3	150	1003.	1387.	384.	92.0	646.	556.0
4C 9- 3	152	1077.	1428.	351.	79.0	677.	533.0
1D10- 0	157	656.	1066.	410.	149.0	528.	608.8
4B10- 0	164	910.	1264.	354.	90.0	646.	546.0
5D10- 0	166	763.	1043.	280.	113.0	579.	484.1
2A11- 0	168	604.	768.	164.	91.5	614.	370.9
4C11- 0	169	714.	1026.	313.	96.0	513.	553.0
1D11- 6	171	287.	790.	503.	144.0	519.	484.6

RUN 41913E HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	667.7	627.0	652.8	677.3	639.4	663.6	5.0	4.0	4.3
24	922.7	835.3	876.1	955.2	875.8	909.8	14.0	10.5	12.0
39	1269.3	1157.8	1193.1	1351.9	1284.9	1307.6	35.0	22.5	29.3
48	1427.3	1325.4	1369.5	1594.9	1494.4	1542.7	46.0	37.5	42.0
60	1546.6	1495.1	1516.8	1782.1	1727.4	1752.7	65.0	38.0	56.0
67	1603.9	1475.9	1541.0	1851.9	1733.0	1799.2	67.0	50.5	55.8
70	1586.2	1510.9	1550.4	1840.6	1810.1	1820.3	54.5	51.0	52.5
73	1435.2	1435.2	1435.2	1696.3	1696.3	1696.3	71.0	71.0	71.0
74	1489.2	1467.7	1468.4	1762.0	1729.6	1745.8	68.0	66.5	67.2
75	1450.6	1422.3	1437.4	1683.2	1667.9	1673.9	112.0	68.0	79.2
76	1535.1	1424.9	1472.2	1769.8	1667.9	1711.6	80.5	65.0	69.8
77	1550.9	1457.0	1491.0	1793.2	1679.9	1720.8	91.0	52.0	68.9
78	1590.9	1444.8	1518.6	1864.4	1686.5	1760.9	109.0	52.5	69.9
79	1578.0	1499.9	1536.4	1839.5	1717.4	1772.8	68.0	66.5	67.5
80	1574.3	1446.9	1505.0	1861.0	1699.5	1767.5	76.0	64.5	71.0
81	1571.0	1571.0	1571.0	1875.7	1875.7	1875.7	68.5	68.5	68.5
82	1499.5	1499.5	1499.5	1766.4	1766.4	1766.4	66.5	66.5	66.5
84	1552.7	1424.4	1500.2	1736.3	1619.9	1682.2	37.0	34.0	36.0
90	1560.7	1231.8	1418.2	1798.8	1567.9	1690.0	68.5	38.0	55.8
96	1376.8	1043.5	1285.7	1721.8	1402.3	1622.8	91.0	46.0	70.5
102	1501.9	818.7	1128.8	1776.5	1121.4	1461.0	108.0	52.0	70.3
111	1086.8	796.8	958.6	1444.1	1171.2	1322.1	113.0	56.0	90.4
120	1138.1	655.7	840.1	1437.7	1042.8	1193.8	149.0	66.5	105.0
132	713.8	519.2	591.4	1026.4	721.2	821.4	151.0	91.5	108.3
138	637.1	287.0	462.1	833.3	789.8	811.5	144.0	65.5	104.8

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	12.4	9.6	10.7	616.3	590.1	605.8	18.5	16.0	17.5
24	40.5	28.2	33.7	771.1	743.7	756.7	41.8	40.9	41.5
39	131.4	82.6	114.6	892.6	777.5	834.7	129.7	109.8	120.0
48	182.9	167.6	173.2	980.9	887.5	935.9	172.6	161.8	166.0
60	273.3	180.8	235.9	879.7	845.5	857.5	292.3	278.4	285.5
67	298.6	234.1	258.2	960.3	785.4	879.3	371.7	322.4	346.8
70	299.2	254.4	269.8	945.9	905.3	927.4	376.6	366.9	371.7
73	261.1	261.1	261.1	800.4	800.4	800.4	353.0	353.0	353.0
74	272.8	241.9	257.4	803.7	653.4	728.5	400.0	394.6	397.3
75	260.9	222.8	236.5	939.0	641.0	801.6	385.9	283.9	354.3
76	303.6	209.9	239.4	865.6	681.3	784.3	410.0	377.6	388.8
77	242.3	209.7	229.7	964.0	676.8	828.3	428.1	378.7	402.6
78	282.1	197.6	242.3	1065.0	688.3	869.7	424.0	300.6	398.5
79	261.5	190.2	236.4	887.2	782.1	852.2	426.8	404.8	419.1
80	288.3	206.7	262.6	858.6	774.0	825.0	451.2	419.5	434.7
81	304.6	304.6	304.6	805.8	805.8	805.8	455.8	455.8	455.8
82	266.9	266.9	266.9	886.2	886.2	886.2	431.8	431.8	431.8
84	209.6	153.8	182.0	779.6	677.6	734.2	475.0	428.5	456.7
90	364.2	224.7	271.8	887.3	698.8	807.7	528.7	428.6	485.3
96	358.8	299.8	337.1	836.5	745.9	786.6	530.5	484.8	510.4
102	450.3	255.1	332.2	834.6	631.6	698.8	580.9	370.4	513.8
111	390.1	283.0	363.4	676.6	538.4	620.2	585.1	533.0	553.7
120	442.8	280.1	353.7	743.4	528.2	618.3	608.8	320.4	530.9
132	312.6	164.2	230.0	614.4	513.0	550.4	553.0	370.9	448.9
138	502.8	196.2	349.5	518.5	501.3	509.9	514.0	484.8	499.3

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43813F
Test Date: 7/17/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.277 MPa (40.2 psia)
Initial peak clad temperature and location	880°C (1616°F), 3C 2.03 m (80 in.)
Initial peak rod power	2.55 kw/m (0.777 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	99°C (210°F)
Average and range of initial 1.83 m (72 in.) housing temperature	446°C (422°C - 462°C) [835°F (792°F - 864°F)]
Initial bundle water level	22 mm (0.85 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-0.5% average[a]
Total power:	0% increasing linearly to -0.5%[a]
Inlet subcooling:	approximately -9% constant[a]

a. Relative to run 43013A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 43813F

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1151.	1257.	106.	22.5	754.	118.2
4C 3- 3	6	1246.	1314.	68.	18.0	844.	107.4
1C 4- 0	7	1366.	1511.	145.	40.0	931.	174.8
2A 5- 0	12	1459.	1622.	164.	33.0	786.	270.8
2A 5- 7	14	1503.	1691.	188.	45.0	873.	327.7
5C 6- 2	33	1404.	1618.	213.	73.5	283.	568.0
2D 6- 3	39	1468.	1621.	153.	33.5	816.	317.0
1D 6- 4	46	1461.	1590.	128.	44.5	1015.	267.9
3D 6- 4	50	1465.	1734.	269.	52.0	234.	656.0
4B 6- 4	51	1541.	1666.	125.	32.0	766.	368.7
5D 6- 4	56	1453.	1610.	157.	41.0	1120.	258.8
1D 6- 5	58	1457.	1603.	146.	44.5	1084.	274.9
2A 6- 5	59	1463.	1604.	140.	38.5	933.	216.1
2D 6- 5	62	1519.	1671.	152.	36.0	857.	326.7
3B 6- 5	63	1561.	1722.	160.	35.0	656.	354.8
3C 6- 6	69	1565.	1799.	234.	49.5	527.	301.9
3E 6- 6	70	1459.	1664.	205.	53.0	1061.	328.3
4C 6- 6	73	1599.	1753.	154.	33.5	812.	371.5
5C 6- 6	** BAD THERMOCOUPLE DATA *						
3D 6- 7	85	1596.	1783.	187.	43.5	957.	316.9
3C 6- 8	93	1617.	1809.	192.	47.5	969.	302.7
4A 6- 8	95	1452.	1639.	187.	43.5	999.	314.5
1C 7- 0	109	1518.	1659.	141.	25.5	710.	407.0
2B 7- 0	110	1550.	1690.	140.	16.5	708.	396.0
3D 7- 0	113	1587.	1717.	131.	15.5	790.	344.7
5B 7- 0	117	1412.	1565.	152.	26.0	778.	361.6
2B 7- 6	120	1504.	1689.	185.	31.0	798.	416.0
2C 7- 6	121	1520.	1720.	200.	34.5	928.	364.9
2E 7- 6	123	1311.	1539.	228.	49.0	972.	333.8
3A 7- 6	124	1470.	1598.	128.	33.5	845.	378.9
3B 7- 6	125	1554.	1737.	183.	33.5	826.	407.0
4B 7- 6	129	1506.	1692.	186.	39.5	733.	423.9
5C 7- 6	132	1457.	1648.	191.	48.0	763.	435.8
1C 8- 0	133	1288.	1566.	278.	52.0	726.	446.6
2E 8- 0	136	1117.	1431.	314.	63.0	872.	373.9
3D 8- 0	138	1386.	1663.	277.	48.0	905.	397.8
5B 8- 0	143	1246.	1434.	189.	55.5	785.	429.5
5C 8- 0	144	1335.	1566.	230.	60.5	717.	462.7
1C 8- 6	145	1086.	1375.	289.	49.0	597.	467.0
1D 8- 6	146	937.	1145.	208.	21.5	614.	438.0
2C 8- 6	148	1229.	1540.	311.	49.0	793.	418.3
4B 8- 6	153	1218.	1467.	249.	60.0	613.	484.8
5D 8- 6	155	1128.	1378.	251.	66.5	654.	430.9
3D 9- 3	159	1003.	1328.	325.	71.5	715.	443.0
4C 9- 3	161	1090.	1398.	308.	57.0	633.	488.0
1D10- 0	164	666.	958.	292.	112.0	638.	466.9
4B10- 0	168	918.	1248.	330.	90.0	584.	511.6
5D10- 0	169	800.	1126.	325.	92.0	648.	462.9
2A11- 0	171	580.	849.	269.	121.0	599.	322.4
4C11- 0	172	729.	1045.	316.	102.0	518.	503.9
1D11- 6	** BAD THERMOCOUPLE DATA *						

RUN 43813F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	665.7	627.8	646.8	679.4	643.6	661.5	7.0	5.0	6.0
24	917.6	917.6	917.6	946.0	946.0	946.0	12.0	12.0	12.0
39	1246.3	1150.9	1187.8	1314.2	1256.7	1287.7	26.0	18.0	22.2
48	1459.0	1296.9	1371.4	1594.9	1452.7	1516.1	44.5	32.5	39.9
60	1458.5	1429.6	1446.2	1651.6	1622.1	1633.4	43.5	33.0	38.3
67	1593.3	1465.0	1536.2	1807.8	1670.1	1736.1	45.0	39.5	42.7
70	1600.3	1338.8	1435.2	1813.5	1558.2	1629.8	42.0	37.5	40.5
71	1527.3	1478.9	1503.1	1760.9	1704.0	1732.4	49.0	43.5	46.3
72	1422.1	1297.4	1359.7	1704.0	1558.2	1631.1	86.0	57.5	71.8
73	1407.1	1343.5	1375.3	1622.1	1566.8	1594.4	64.5	46.5	55.5
74	1465.0	1255.7	1405.1	1722.9	1534.4	1638.3	93.5	46.0	61.4
75	1478.3	1358.2	1426.4	1740.8	1544.1	1627.7	87.5	33.5	50.4
76	1540.8	1383.4	1462.1	1754.2	1560.3	1645.5	82.5	32.0	48.0
77	1561.4	1436.9	1496.6	1721.8	1570.0	1648.8	53.0	32.5	40.2
78	1598.7	1456.9	1521.0	1798.8	1619.9	1684.6	53.0	30.0	40.5
79	1506.3	1416.8	1528.8	1783.2	1590.6	1698.2	47.5	34.5	41.5
80	1616.6	1451.5	1524.9	1809.0	1638.5	1715.9	48.0	43.5	45.8
81	1518.7	1518.7	1518.7	1702.9	1702.9	1702.9	41.0	41.0	41.0
84	1586.8	1412.5	1517.5	1720.7	1564.6	1660.1	27.5	15.5	19.9
90	1563.0	1311.0	1466.0	1767.6	1538.7	1660.4	49.0	31.0	38.8
96	1427.5	1116.7	1315.5	1707.3	1404.4	1567.2	63.0	26.5	50.1
102	1241.6	890.2	1125.3	1539.8	1139.0	1378.6	66.5	21.5	46.3
111	1089.7	842.6	975.9	1398.1	1090.3	1258.7	111.0	48.0	73.2
120	918.1	666.2	816.6	1253.6	958.3	1132.3	112.0	85.0	92.8
132	728.5	539.6	603.0	1044.9	706.7	865.7	121.0	85.5	104.4
138	673.0	652.0	662.5	1006.8	860.3	933.5	109.0	99.5	104.3

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	15.7	13.7	14.7	648.0	624.1	636.1	12.0	11.7	11.9
24	28.4	28.4	28.4	803.6	803.6	803.6	40.5	40.5	40.5
39	126.1	67.9	99.9	844.4	753.6	787.9	122.9	107.4	116.1
48	155.8	135.9	144.7	931.1	815.4	892.1	174.9	164.7	171.8
60	201.1	163.6	187.2	786.3	760.1	769.7	284.4	270.8	276.7
67	214.5	187.8	199.9	915.9	701.2	851.7	341.7	319.8	332.7
70	219.3	171.7	194.6	845.9	269.4	493.4	596.0	342.5	472.9
71	233.5	225.1	229.3	866.1	285.6	575.8	576.0	360.7	468.3
72	281.9	260.8	271.3	1151.8	1005.3	1078.6	355.6	291.7	323.6
73	223.3	215.0	219.1	944.1	278.0	611.1	572.0	294.0	433.0
74	278.7	204.1	233.1	952.7	244.7	410.2	523.0	363.1	530.8
75	287.1	126.8	201.3	1129.5	238.2	712.9	645.0	204.1	382.0
76	269.1	116.3	183.4	1300.6	233.9	797.5	656.0	215.7	384.2
77	236.4	109.9	152.2	1210.3	655.6	892.8	371.8	216.1	315.3
78	234.2	128.7	163.6	1162.4	527.5	885.7	391.0	223.8	333.8
79	201.2	146.0	169.4	1161.3	795.8	925.4	385.9	234.6	340.2
80	202.0	176.4	191.1	1019.1	821.1	904.5	391.7	302.7	349.9
81	184.2	184.2	184.2	918.2	918.2	918.2	349.6	349.6	349.6
84	160.1	130.6	142.5	888.6	671.5	773.0	412.5	324.8	365.3
90	240.7	128.3	194.4	975.7	733.2	849.5	435.8	333.8	389.6
96	314.5	165.4	251.7	959.8	717.5	808.6	462.7	373.9	420.8
102	311.3	208.1	253.3	793.1	570.6	644.1	489.0	400.7	448.2
111	351.4	167.6	282.7	726.4	545.0	634.4	488.0	403.4	454.9
120	337.0	289.7	315.6	648.0	584.0	629.0	511.6	462.9	478.8
132	316.3	167.1	262.7	599.0	517.6	553.2	503.9	275.7	398.9
138	333.8	208.3	271.0	535.8	534.2	535.0	501.9	486.0	493.9

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42514A
Test Date: 3/31/80
Test Type: Forced Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.281 MPa (40.8 psia)
Initial peak clad temperature and location	872°C (1601°F), 3C 1.83 m (72 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate (stepped)	160 mm/sec (6.3 in./sec) 5 sec 23 mm/sec (0.89 in./sec) onward
Coolant temperature	49°C (120°F)
Average and range of initial 1.83 m (72 in.) housing temperature	486°C (481°C - 489°C) [906°F (897°F - 912°F)]
Initial bundle water level	28.91 mm (1.138 in.)

B. Summary Results:

C. Comments:

Total power: linearly increasing from +0.1% to -1.1% by 470 seconds[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42514A

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	989.	1006.	17.	16.5	859.	47.4
4C 3- 3	11	1053.	1058.	5.	1.0	881.	46.8
1C 4- 0	14	1242.	1322.	80.	37.5	909.	109.7
2A 5- 0	17	1332.	1487.	155.	52.5	858.	205.7
2A 5- 7	21	1455.	1599.	144.	52.0	923.	266.6
1D 6- 2	50	1469.	1727.	259.	83.5	1007.	344.5
2D 6- 2	53	1576.	1803.	228.	68.0	908.	335.5
3D 6- 2	58	1592.	1855.	263.	83.5	985.	341.6
5C 6- 2	61	1505.	1647.	142.	71.0	1011.	322.7
1D 6- 3	63	1456.	1740.	284.	89.0	990.	359.7
4B 6- 3	68	1553.	1833.	279.	85.0	902.	362.7
5D 6- 3	69	1481.	1773.	292.	100.0	930.	355.7
2A 6- 4	70	1485.	1763.	279.	97.5	959.	368.8
3B 6- 4	75	1582.	1886.	304.	99.0	1001.	352.7
3D 6- 6	79	1544.	1917.	373.	102.0	946.	367.8
2D 6- 5	84	1566.	1867.	301.	85.0	921.	370.4
3C 6- 5	85	1584.	1919.	335.	102.0	930.	372.7
3E 6- 5	86	1512.	1817.	305.	101.0	981.	362.8
3C 6- 6	95	1566.	1914.	348.	103.0	887.	385.7
4A 6- 6	97	1436.	1770.	333.	133.0	943.	383.6
3D 8- 0	98	1148.	1631.	483.	102.0	840.	481.0
5C 6- 6	101	1465.	1657.	192.	152.0	996.	365.8
1C 7- 0	110	1395.	1565.	169.	54.0	774.	427.8
2B 7- 0	111	1423.	1434.	11.	1.5	710.	427.1
3D 7- 0	115	1445.	1551.	105.	39.0	762.	426.0
5B 7- 0	117	1313.	1598.	285.	104.0	719.	419.0
2B 7- 6	120	1388.	1594.	206.	54.0	813.	452.8
2C 7- 6	121	1350.	1618.	267.	70.0	872.	440.0
2E 7- 6	122	1197.	1532.	335.	63.0	756.	446.7
3A 7- 6	123	1277.	1557.	280.	86.0	809.	456.9
3B 7- 6	124	1403.	1658.	256.	54.5	830.	442.9
4B 7- 6	127	1373.	1694.	321.	70.0	781.	455.0
5C 7- 6	128	1237.	1547.	311.	98.0	834.	435.3
1C 8- 0	131	1115.	1561.	447.	100.0	800.	480.0
2E 8- 0	133	706.	1122.	416.	114.0	696.	509.0
4C 6- 6	136	1555.	1903.	348.	99.0	906.	384.6
5B 8- 0	138	1143.	1500.	356.	82.0	788.	462.9
5C 8- 0	139	1086.	1478.	392.	120.0	805.	467.9
1C 8- 6	141	852.	1359.	507.	104.0	616.	501.0
1D 8- 6	142	788.	1080.	294.	103.0	572.	502.0
2C 8- 6	143	972.	1404.	432.	103.0	722.	487.0
4B 8- 6	145	1065.	1368.	303.	85.0	642.	519.0
5D 8- 6	148	861.	1255.	394.	105.0	575.	520.0
3D 9- 3	154	848.	1378.	530.	149.0	719.	526.1
4C 9- 3	156	930.	1358.	428.	133.0	718.	524.0
1D10- 0	161	590.	1037.	447.	131.0	646.	532.5
4B10- 0	164	788.	1199.	413.	164.0	627.	556.0
5D10- 0	167	697.	1164.	467.	165.0	593.	517.1
2A11- 0	168	504.	773.	269.	148.0	676.	326.0
4C11- 0	170	604.	950.	346.	180.0	503.	555.0
1D11- 6	172	456.	843.	386.	182.0	385.	417.3

RUN 42514A HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	509.0	491.4	498.1	510.8	493.7	500.4	1.0	.5	.9
24	651.3	602.9	628.1	656.2	607.8	633.1	1.5	1.0	1.4
39	1052.9	946.6	996.8	1058.3	959.4	1007.8	16.5	1.0	6.3
48	1251.3	1144.0	1201.4	1321.5	1253.6	1285.2	38.0	20.0	33.4
60	1423.9	1307.1	1342.7	1492.3	1315.2	1413.4	53.0	1.5	34.4
67	1550.2	1446.4	1474.6	1675.5	1598.1	1619.1	54.5	39.5	49.8
70	1592.4	1476.4	1541.5	1776.5	1681.0	1731.6	70.0	54.0	63.9
71	1595.1	1472.2	1543.6	1803.3	1665.7	1746.2	70.5	67.0	69.3
72	1601.6	1462.5	1532.1	1824.8	1615.6	1725.0	100.0	53.0	70.6
74	1591.9	1447.5	1541.4	1855.3	1563.6	1773.3	98.0	36.5	79.0
75	1588.1	1456.1	1537.4	1874.5	1739.7	1817.3	100.0	84.5	88.1
76	1585.9	1443.5	1526.8	1897.2	1576.5	1806.0	125.0	56.0	96.3
77	1584.2	1435.7	1524.2	1918.9	1770.9	1846.6	117.0	85.0	99.2
78	1566.4	1436.3	1506.1	1916.6	1657.0	1831.1	152.0	83.5	110.3
84	1445.4	1260.6	1375.4	1598.1	1408.7	1520.7	104.0	1.5	50.2
90	1402.5	1152.2	1297.6	1694.1	1506.3	1601.8	98.0	54.0	74.6
96	1253.3	706.5	1115.3	1630.8	1122.4	1519.0	120.0	80.0	96.8
102	1064.7	785.9	913.3	1473.0	1080.0	1310.8	118.0	39.0	97.8
111	936.5	715.8	858.0	1383.4	1087.2	1253.1	166.0	114.0	130.7
120	786.0	590.1	682.9	1226.5	1026.4	1139.9	165.0	131.0	153.1
132	604.4	503.7	537.4	950.1	773.2	828.3	180.0	148.0	156.0
138	561.3	456.3	500.3	957.3	838.5	883.4	182.0	150.0	166.2

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	2.8	1.8	2.3	498.0	294.2	445.5	3.5	1.1	2.3
24	5.0	4.9	4.9	646.7	597.1	614.8	8.0	4.0	5.3
39	17.1	5.4	11.0	880.9	766.3	835.4	48.8	46.8	47.7
48	109.6	56.6	83.8	1008.5	905.7	951.5	109.7	88.9	96.9
60	154.6	7.5	70.7	899.2	780.5	832.3	209.6	194.7	203.2
67	157.1	125.3	144.3	958.5	915.2	934.8	273.7	261.7	265.9
70	215.2	166.8	190.1	1000.6	915.2	951.8	303.7	288.4	296.3
71	213.2	193.5	202.6	1053.1	824.1	940.3	316.7	292.5	305.4
72	224.3	130.5	192.9	1060.6	824.9	933.9	326.5	302.6	315.0
74	263.4	116.0	232.0	1052.1	831.4	960.8	350.6	322.7	335.0
75	292.3	264.3	279.9	990.3	900.8	939.2	362.7	338.7	351.9
76	326.3	133.0	279.2	1000.9	912.1	951.4	368.6	343.8	357.9
77	335.1	300.6	322.3	980.6	915.3	939.5	384.5	359.8	372.7
78	372.9	191.7	325.0	995.7	886.5	929.0	390.8	365.8	382.0
84	284.7	11.5	145.3	787.8	698.6	730.8	439.7	419.0	427.0
90	363.9	206.0	304.2	884.2	755.8	823.2	458.0	435.3	449.2
96	482.7	353.0	403.7	874.6	696.4	795.2	509.0	462.9	460.4
102	553.3	256.3	397.0	722.0	558.0	627.8	520.0	487.0	504.1
111	530.0	273.7	395.1	771.5	550.4	696.8	535.0	453.9	503.4
120	522.2	379.0	457.0	712.1	593.2	656.2	556.0	440.3	526.0
132	345.7	254.1	290.9	739.9	503.3	625.9	555.0	176.5	386.6
138	453.0	329.9	383.1	592.0	285.6	476.7	547.7	414.0	491.2

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42014B
Test Date: 6/19/80
Test Type: Forced Reflood
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.275 MPa (39.9 psia)
Initial peak clad temperature and location	873°C (1603°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate (stepped)	147 mm/sec (5.8 in./sec) 5 sec 23 mm/sec (0.91 in./sec) onward
Coolant temperature	49°C (120°F)
Average and range of initial 1.83 m (72 in.) housing temperature	519°C (512°C - 523°C) [967°F (953°F - 974°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+5% to 80 seconds and decreased to +1% thereafter[a]
Total power:	-0.25% constant[a]
Housing initial temperature at midplane:	+6%[a]

a. Relative to run 42514A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER420148

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1073.	1080.	7.	2.0	803.	79.0
4C 3- 3	11	1222.	1251.	29.	20.0	854.	78.4
1C 4- 0	14	1301.	1350.	49.	35.0	865.	128.2
2A 5- 0	17	1367.	1558.	191.	64.5	749.	238.8
2A 5- 7	21	1475.	1680.	205.	66.5	925.	305.5
1D 6- 2	50	1419.	1666.	247.	91.0	866.	378.7
2D 6- 2	53	1506.	1761.	255.	107.0	774.	383.8
3D 6- 2	58	1542.	1750.	207.	92.5	851.	374.9
5C 6- 2	61	1477.	1692.	215.	90.5	904.	370.6
1D 6- 3	63	1431.	1654.	223.	81.0	812.	349.2
4B 6- 3	68	1528.	1761.	232.	106.0	861.	392.4
5D 6- 3	69	1411.	1742.	330.	125.0	786.	427.8
2A 6- 4	70	1431.	1723.	292.	136.0	819.	409.8
2D 6- 4	72	1535.	1788.	252.	90.5	877.	402.8
3B 6- 4	75	1563.	1816.	253.	108.0	873.	402.5
3C 6- 5	85	1600.	1866.	266.	104.0	910.	402.8
3E 6- 5	** B A D	T H E R M O C O U P L E	D A T A *				
3C 6- 6	95	1581.	1895.	314.	106.0	897.	414.8
3D 6- 6	96	1544.	1851.	307.	92.0	894.	412.5
4A 6- 6	97	1417.	1766.	350.	154.0	822.	433.4
4C 6- 6	98	1551.	1859.	307.	106.0	961.	457.5
5C 6- 6	101	1459.	1716.	257.	122.0	893.	420.5
1C 7- 0	110	1432.	1621.	189.	67.5	724.	467.1
2B 7- 0	111	1460.	1526.	66.	51.5	728.	476.5
3D 7- 0	115	1494.	1660.	166.	57.5	751.	457.9
5B 7- 0	117	1352.	1616.	264.	123.0	701.	480.0
2B 7- 6	120	1427.	1678.	250.	67.0	796.	506.8
2C 7- 6	121	1437.	1704.	267.	57.0	801.	498.9
2E 7- 6	122	1259.	1524.	264.	83.0	713.	503.8
3A 7- 6	123	1402.	1664.	262.	58.5	792.	492.7
3B 7- 6	124	1447.	1735.	288.	81.0	860.	491.0
4B 7- 6	127	1452.	1775.	323.	106.0	820.	493.6
5C 7- 6	128	1409.	1716.	307.	94.0	795.	497.2
1C 8- 0	131	1198.	1605.	407.	104.0	773.	524.9
2E 8- 0	133	961.	1444.	483.	149.0	685.	531.3
3D 8- 0	136	1262.	1694.	433.	106.0	841.	510.8
5B 8- 0	138	1207.	1608.	401.	104.0	678.	527.5
5C 8- 0	139	1298.	1687.	388.	121.0	761.	530.2
1C 8- 6	141	1025.	1409.	384.	106.0	634.	548.0
1D 8- 6	142	832.	1278.	446.	104.0	607.	556.0
2C 8- 6	143	1113.	1486.	373.	92.5	674.	553.0
4B 8- 6	145	1201.	1642.	441.	105.0	738.	548.1
5D 8- 6	148	1040.	1409.	368.	92.0	561.	575.0
3D 9- 3	154	953.	1424.	471.	136.0	758.	554.0
4C 9- 3	156	1053.	1433.	381.	107.0	722.	560.9
1D10- 0	161	624.	1043.	419.	148.0	534.	615.0
4B10- 0	164	905.	1276.	370.	135.0	640.	598.0
5D10- 0	167	742.	1195.	453.	155.0	770.	550.9
2A11- 0	168	562.	798.	236.	159.0	652.	485.4
4C11- 0	170	670.	1049.	379.	139.0	565.	601.0
1D11- 6	172	287.	888.	602.	200.0	282.	596.0

RUN 42014B HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	588.7	543.2	559.3	588.7	546.0	560.4	1.0	0.0	.5
24	875.0	798.4	826.4	878.9	802.3	831.0	2.0	1.5	1.6
39	1221.7	1073.0	1129.3	1250.5	1080.0	1146.9	20.0	2.0	14.3
48	1358.7	1247.6	1291.2	1452.7	1342.5	1386.8	51.5	35.0	40.6
60	1482.3	1352.8	1390.5	1588.4	1371.9	1485.8	64.5	2.0	39.4
67	1573.8	1451.0	1495.1	1702.9	1645.0	1669.0	68.0	51.5	62.9
70	1603.2	1423.2	1516.1	1788.8	1647.2	1728.1	80.5	66.5	71.2
71	1589.1	1409.1	1503.4	1802.2	1653.7	1723.0	90.5	67.0	77.8
72	1473.5	1403.9	1446.4	1706.2	1618.8	1660.7	107.0	79.0	87.1
74	1547.0	1418.9	1492.7	1803.3	1665.7	1735.0	136.0	82.0	100.9
75	1582.6	1411.4	1508.3	1822.5	1653.7	1747.2	125.0	81.0	101.2
76	1597.6	1426.4	1507.0	1830.4	1693.0	1762.8	135.0	90.5	108.0
77	1599.9	1395.2	1510.3	1868.9	1684.3	1798.9	131.0	92.5	105.9
78	1580.5	1407.1	1487.8	1894.9	1716.3	1805.4	154.0	92.0	115.5
84	1493.9	1351.6	1426.6	1710.7	1525.7	1612.1	123.0	51.5	75.1
90	1452.3	1259.3	1382.4	1775.4	1523.6	1668.6	106.0	67.0	81.6
96	1318.0	961.1	1228.6	1702.9	1444.1	1616.8	149.0	68.0	108.8
102	1200.9	831.8	1049.4	1641.7	1224.4	1430.8	168.0	67.5	105.4
111	1052.6	706.1	946.5	1433.4	1104.7	1301.0	185.0	79.0	115.2
120	905.0	623.9	751.3	1316.3	1042.8	1206.8	185.0	119.0	147.8
132	670.1	512.1	571.7	1049.0	787.8	873.3	159.0	139.0	147.8
138	649.2	286.6	485.1	1037.7	825.1	935.2	200.0	138.0	171.6

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	2.8	0.0	.7	565.3	537.5	545.8	4.0	3.0	3.6
24	6.9	3.9	4.6	799.8	692.7	730.4	24.5	21.1	22.9
39	28.8	7.0	17.6	854.4	785.8	821.1	84.4	78.4	81.5
48	145.1	48.7	95.6	926.8	860.9	887.4	130.7	126.7	128.5
60	191.1	12.1	95.3	895.3	733.8	794.5	240.4	225.6	235.2
67	205.3	129.1	173.9	1004.8	843.8	911.5	305.5	282.9	299.4
70	253.8	185.6	212.0	981.9	837.5	891.9	341.7	316.6	330.4
71	244.6	174.1	219.5	1003.7	787.4	914.0	390.7	327.5	344.9
72	232.7	191.1	214.3	923.6	781.0	855.4	358.5	346.7	352.2
74	296.5	203.3	242.4	1064.0	774.0	879.8	397.9	361.7	378.1
75	330.5	193.9	238.9	960.6	786.2	870.0	427.8	349.2	389.5
76	303.7	221.1	255.8	951.2	710.5	868.6	413.5	387.8	398.9
77	303.4	265.6	288.6	926.9	760.5	878.5	417.8	402.7	409.8
78	349.7	256.9	317.6	960.7	804.0	874.2	434.7	407.5	421.2
84	255.0	66.1	185.5	784.1	677.2	728.3	484.5	457.9	469.4
90	323.1	250.2	286.1	859.7	712.7	794.9	515.9	484.0	497.4
96	483.0	310.7	388.2	851.1	677.6	764.3	534.0	510.8	525.7
102	449.3	208.7	381.4	738.2	561.1	634.3	575.0	542.8	555.0
111	488.0	231.7	354.5	759.3	598.5	680.8	588.9	548.9	571.3
120	612.6	370.5	457.5	770.3	534.2	647.4	519.7	550.9	596.8
132	378.9	235.8	301.6	672.4	565.3	618.7	601.0	366.7	481.7
138	601.6	325.8	450.1	550.8	282.3	484.7	519.0	443.3	577.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42314C
Test Date: 8/21/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.274 MPa (39.8 psia)
Initial peak clad temperature and location	876°C (1609°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate (stepped)	153 mm/sec (6.01 in./sec) 5 sec 22 mm/sec (0.87 in./sec) onward
Coolant temperature	49°C (120°F)
Average and range of initial 1.83 m (72 in.) housing temperature	501°C (485°C - 513°C) [934°F (905°F - 955°F)]
Initial bundle water level	43.4 mm (1.71 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+2.5% for 90 seconds and -2.5% thereafter[a]
Total power:	-0.25% constant[a]

a. Relative to run 42514A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42314C

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1102.	1149.	47.	21.0	850.	71.9
4C 3- 3	11	1251.	1285.	34.	21.0	851.	86.7
1C 4- 0	14	1353.	1448.	96.	46.5	897.	142.8
2A 5- 0	17	1416.	1645.	229.	76.0	853.	240.7
2A 5- 7	21	1508.	1734.	226.	76.0	899.	312.6
1D 6- 2	50	1470.	1658.	189.	88.5	916.	385.8
2D 6- 2	53	1490.	1705.	215.	89.5	631.	402.0
3D 6- 2	58	1550.	1681.	131.	88.5	709.	409.0
4B 6- 2	60	1562.	1734.	173.	76.5	943.	384.6
5C 6- 2	61	1472.	1733.	261.	89.0	282.	664.0
1D 6- 3	63	1459.	1680.	221.	88.5	987.	393.9
5D 6- 3	69	1476.	1690.	213.	99.0	1018.	376.5
2A 6- 4	70	1474.	1678.	203.	73.0	1034.	293.5
3B 6- 4	75	1576.	1766.	190.	75.5	865.	404.5
2D 6- 5	84	1551.	1789.	237.	89.0	884.	416.7
3C 6- 5	85	1597.	1856.	250.	88.5	963.	407.8
3E 6- 5	86	1536.	1730.	193.	89.5	908.	417.8
3C 6- 6	95	1582.	1876.	294.	88.5	944.	419.6
3D 6- 6	96	1558.	1861.	303.	103.0	795.	437.8
4A 6- 6	97	1471.	1727.	257.	88.5	1014.	348.3
4C 6- 6	98	1583.	1871.	288.	88.5	868.	432.3
5C 6- 6	101	1557.	1763.	206.	88.5	906.	417.8
1C 7- 0	110	1428.	1599.	171.	76.0	760.	470.6
2B 7- 0	111	1445.	1550.	104.	50.0	705.	471.2
3D 7- 0	115	1457.	1656.	199.	76.0	701.	477.9
5B 7- 0	117	1369.	1592.	223.	136.0	795.	457.9
2B 7- 6	120	1428.	1648.	220.	63.0	811.	515.6
2C 7- 6	121	1418.	1723.	305.	76.0	794.	524.5
2E 7- 6	122	1087.	1553.	466.	101.0	745.	509.8
3A 7- 6	123	1415.	1631.	216.	63.0	756.	502.6
3B 7- 6	124	1439.	1676.	237.	62.5	817.	514.9
4B 7- 6	127	1436.	1711.	274.	75.0	816.	520.5
5C 7- 6	128	1429.	1692.	264.	89.0	790.	493.9
1C 8- 0	131	1229.	1594.	365.	99.0	723.	559.2
2E 8- 0	133	957.	1516.	559.	118.0	741.	554.7
3D 8- 0	136	1275.	1722.	447.	116.0	803.	550.2
5B 8- 0	138	1192.	1430.	238.	179.0	734.	539.6
5C 8- 0	139	1338.	1657.	320.	102.0	774.	531.0
1C 8- 6	141	1036.	1432.	396.	89.0	587.	586.0
1D 8- 6	142	792.	1227.	435.	129.0	573.	583.0
2C 8- 6	** B A D T H E R M O C O U P L E D A T A *						
4B 8- 6	145	1138.	1417.	279.	75.5	645.	587.0
5D 8- 6	148	1043.	1350.	307.	104.0	640.	569.8
3D 9- 3	154	901.	1449.	548.	131.0	670.	595.0
4C 9- 3	156	1010.	1410.	400.	116.0	668.	588.0
1010- 0	161	595.	1119.	524.	165.0	742.	590.0
4310- 0	164	865.	1270.	406.	162.0	605.	635.9
5010- 0	167	714.	1194.	480.	198.0	750.	551.3
2A11- 0	168	564.	841.	277.	208.0	603.	459.2
4C11- 0	170	662.	1082.	420.	147.0	510.	622.0
1011- 6	172	417.	944.	527.	175.0	595.	597.8

RUN 423140 HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	657.7	586.4	610.4	658.3	587.6	611.4	.5	.5	.5
24	908.2	822.9	868.2	909.9	827.1	870.6	2.0	.5	1.0
39	1251.3	1102.0	1161.2	1284.9	1149.4	1207.7	31.5	21.0	26.0
48	1381.1	1308.1	1339.2	1490.2	1434.4	1460.7	60.0	44.5	49.6
60	1415.8	1400.4	1410.4	1688.6	1577.6	1537.1	76.0	39.0	63.0
67	1609.2	1479.2	1520.2	1795.4	1660.3	1726.5	76.0	62.5	72.0
70	1593.5	1408.9	1535.4	1861.0	1552.7	1778.9	86.5	48.5	72.8
71	1547.6	1457.8	1522.6	1818.0	1724.1	1781.3	89.5	86.5	88.4
72	1521.6	1512.4	1517.0	1775.4	1773.1	1774.2	88.5	75.5	82.0
74	1571.4	1443.8	1512.7	1734.1	1633.0	1683.2	100.0	75.5	86.0
75	1594.6	1458.8	1535.8	1793.2	1643.9	1723.7	99.0	87.0	89.9
76	1600.5	1444.3	1536.9	1828.2	1664.6	1737.4	114.0	73.0	88.0
77	1596.7	1432.1	1532.8	1856.4	1711.8	1777.6	98.0	87.0	89.9
78	1583.3	1414.9	1527.1	1875.7	1715.1	1798.4	118.0	74.0	90.9
84	1475.4	1207.9	1404.6	1727.4	1339.4	1586.6	136.0	50.0	77.9
90	1438.9	1086.7	1377.7	1757.5	1552.7	1673.5	145.0	62.5	89.0
96	1341.7	957.4	1246.8	1721.8	1430.2	1505.8	179.0	76.0	103.4
102	1138.3	791.6	1014.9	1535.5	1226.5	1405.0	129.0	75.5	102.3
111	1029.2	695.0	925.1	1449.4	1158.8	1327.1	164.0	101.0	130.9
120	891.1	595.4	735.1	1336.2	1119.3	1219.9	198.0	131.0	165.8
132	662.4	499.0	573.7	1082.0	837.5	902.5	208.0	147.0	171.3
138	638.7	416.8	501.9	1048.0	864.4	953.6	179.0	165.0	173.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	1.2	0.0	.9	621.5	568.4	584.5	3.9	3.4	3.6
24	4.2	1.1	2.3	740.0	717.2	730.4	26.6	20.5	24.2
39	58.4	33.6	46.5	887.8	833.7	855.5	86.9	71.9	81.1
48	161.7	95.6	121.5	942.3	875.7	898.2	145.8	138.5	141.7
60	273.8	177.1	226.7	886.6	778.8	839.5	249.6	240.7	245.2
67	232.3	181.1	206.4	921.4	857.4	893.0	321.4	308.7	313.5
70	279.7	143.7	243.4	987.1	833.0	923.5	358.7	344.9	351.3
71	270.4	237.6	258.7	1027.8	850.4	944.8	365.6	347.7	356.9
72	260.7	253.8	257.3	946.3	937.8	942.1	357.7	355.6	356.6
74	215.2	130.4	170.4	950.9	610.2	790.6	409.0	312.8	383.7
75	227.2	114.1	187.9	1017.6	792.9	910.4	407.0	376.5	396.0
76	255.2	118.6	200.5	1115.6	801.0	917.8	432.0	293.5	383.8
77	279.7	193.3	244.8	1024.6	883.8	934.3	421.1	391.8	410.1
78	348.2	193.3	271.3	1013.8	794.9	897.2	446.4	341.6	411.1
84	252.0	104.1	182.0	836.1	700.6	764.1	480.5	433.3	463.5
90	466.0	215.9	295.7	863.5	744.8	799.4	524.5	458.0	506.2
96	558.6	238.4	359.0	811.3	722.8	773.6	559.2	528.7	546.3
102	480.8	279.0	390.1	644.7	572.8	518.8	587.0	566.3	579.8
111	548.0	305.6	402.0	795.6	626.7	574.6	610.0	472.8	575.9
120	620.4	295.7	484.8	775.1	440.6	554.2	635.9	475.7	587.5
132	419.6	267.7	328.8	690.9	509.8	519.8	622.0	290.8	421.7
138	527.2	345.4	451.7	594.6	283.4	509.7	624.8	249.0	537.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42014D
Test Date: 10/15/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.274 MPa (39.8 psia)
Initial peak clad temperature and location	878°C (1613°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate (stepped)	153 mm/sec (6.04 in./sec) 5 sec 22 mm/sec (0.88 in./sec) onward
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	499°C (490°C-509°C) [931°F (914°F - 948°F)]
Initial bundle water level	86.6 mm (3.41 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: +0.5% constant to 80 seconds, -3.5% for 50 seconds, and +1% thereafter[a]

Total power: -0.5% constant[a]

a. Relative to run 42514A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 420140

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1092.	1145.	54.	32.0	824.	85.3
4C 3- 3	9	1216.	1259.	42.	20.0	877.	80.9
1C 4- 0	10	1303.	1380.	77.	35.0	986.	120.8
2A 5- 0	13	1414.	1685.	272.	82.0	834.	241.7
2A 5- 7	16	1476.	1654.	178.	70.0	804.	308.6
2D 6- 2	50	1549.	1739.	190.	92.0	869.	381.7
3D 6- 2	55	1520.	1784.	264.	87.0	246.	726.0
5C 6- 2	59	1544.	1765.	222.	34.5	848.	382.9
1D 6- 3	61	1481.	1734.	254.	101.0	926.	389.8
4B 6- 3	66	1552.	1792.	240.	97.0	853.	394.7
5D 6- 3	68	1464.	1712.	248.	100.0	953.	368.6
2A 6- 4	70	1476.	1744.	268.	111.0	870.	412.4
3B 6- 4	75	1600.	1818.	218.	84.5	928.	397.4
1D 6- 5	82	1463.	1737.	275.	112.0	914.	405.8
2D 6- 5	84	1557.	1806.	249.	128.0	916.	408.6
3C 6- 5	85	1605.	1871.	266.	97.0	1024.	390.7
3E 6- 5	86	1493.	1726.	233.	99.0	882.	402.5
3C 6- 6	97	1598.	1898.	300.	97.5	1018.	401.8
3D 6- 6	98	1574.	1849.	275.	97.0	876.	412.8
4A 6- 6	100	1475.	1760.	285.	99.0	834.	435.6
4C 6- 6	101	1580.	1880.	300.	96.0	959.	413.8
5C 6- 6	103	1540.	1784.	245.	87.0	869.	414.5
1C 7- 0	110	1384.	1568.	184.	73.5	736.	456.0
2B 7- 0	111	1456.	1640.	184.	62.0	746.	462.8
3D 7- 0	115	1464.	1635.	171.	62.5	750.	457.9
5B 7- 0	117	1344.	1593.	249.	86.5	718.	451.9
2B 7- 6	121	1446.	1663.	217.	73.0	748.	507.5
2C 7- 6	122	1418.	1741.	322.	75.0	818.	520.7
2E 7- 6	123	1313.	1489.	177.	75.0	739.	514.6
3A 7- 6	124	1435.	1677.	241.	75.0	790.	499.6
3B 7- 6	125	1472.	1714.	242.	63.0	830.	494.0
4B 7- 6	128	1458.	1710.	252.	61.5	773.	517.6
5C 7- 6	129	1440.	1683.	243.	77.5	796.	492.8
1C 8- 0	132	1176.	1584.	408.	115.0	764.	550.9
2E 8- 0	134	1152.	1486.	336.	159.0	770.	547.0
3D 8- 0	137	1345.	1715.	370.	100.0	817.	537.5
5B 8- 0	139	1278.	1539.	261.	85.5	728.	553.7
5C 8- 0	140	1363.	1660.	297.	86.0	811.	530.3
1C 8- 6	141	1034.	1474.	441.	114.0	594.	583.0
1D 8- 6	142	887.	1477.	591.	115.0	580.	546.2
2C 8- 6	143	1096.	1500.	403.	99.5	610.	576.0
4B 8- 6	145	1196.	1467.	270.	87.5	682.	583.0
5D 8- 6	148	1118.	1476.	358.	128.0	750.	552.6
3D 9- 3	155	975.	1475.	500.	128.0	663.	585.0
4C 9- 3	157	1044.	1461.	417.	128.0	655.	591.0
1D10- 0	160	625.	1118.	494.	177.0	777.	330.2
4B10- 0	163	897.	1299.	402.	143.0	620.	625.0
5D10- 0	166	773.	1187.	414.	150.0	695.	571.0
2A11- 0	167	584.	878.	293.	161.0	607.	534.0
4C11- 0	169	676.	1098.	421.	146.0	496.	623.0
1D11- 6	170	291.	649.	357.	93.5	586.	99.7

RUN 420140 HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	646.2	600.9	618.0	646.8	601.5	618.7	.5	.5	.5
24	838.5	818.8	828.7	839.6	820.9	830.6	1.0	.5	.8
39	1216.5	1091.8	1137.0	1258.8	1145.3	1189.7	32.5	20.0	28.2
48	1302.7	1289.1	1295.9	1394.9	1380.2	1387.5	48.5	35.0	41.8
60	1509.0	1389.1	1437.2	1731.9	1637.4	1684.9	86.0	74.5	80.8
67	1599.3	1475.7	1516.9	1760.9	1628.7	1681.1	70.0	49.0	56.3
70	1612.8	1434.4	1524.5	1776.5	1683.6	1732.2	84.5	74.0	77.8
71	1592.7	1515.5	1554.2	1778.7	1710.7	1749.0	91.5	72.5	83.3
72	1599.8	1398.1	1532.0	1811.2	1647.2	1759.6	113.0	74.5	86.8
74	1564.1	1426.4	1517.3	1845.1	1673.4	1756.6	99.0	75.0	90.6
75	1573.8	1463.9	1518.2	1858.7	1707.3	1755.1	132.0	87.5	101.9
76	1600.3	1476.2	1540.8	1858.7	1714.0	1797.0	111.0	84.5	96.0
77	1604.6	1461.7	1527.1	1881.3	1722.9	1796.1	128.0	97.0	104.9
78	1599.3	1468.2	1538.5	1898.3	1759.8	1822.1	115.0	86.0	97.5
84	1478.4	1306.3	1403.5	1699.5	1406.6	1598.7	86.5	50.5	68.7
90	1471.9	1312.6	1400.2	1740.8	1388.6	1622.7	84.5	49.5	71.9
96	1384.4	1152.0	1278.8	1715.1	1455.9	1588.2	159.0	75.0	98.7
102	1196.2	886.6	1072.5	1499.8	1216.0	1431.1	128.0	75.0	104.3
111	1044.4	867.5	965.4	1475.2	1114.1	1334.6	252.0	116.0	147.6
120	897.0	624.6	724.3	1305.8	1118.2	1212.9	195.0	130.0	159.5
132	676.2	583.3	614.7	1097.5	877.9	955.6	161.0	146.0	154.7
138	658.3	291.4	491.0	1054.2	648.9	859.8	161.0	93.5	143.1

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	1.1	0.0	.4	618.0	588.5	599.3	3.4	3.4	3.4
24	2.7	1.0	1.9	723.2	662.7	695.8	27.4	21.9	24.7
39	62.4	42.3	52.7	877.1	815.2	838.6	89.9	80.9	85.4
48	105.8	77.5	91.6	985.6	920.9	953.3	133.8	120.8	127.3
60	271.9	222.9	247.7	942.3	814.6	863.7	241.8	229.7	237.7
67	178.0	153.0	164.2	972.9	864.3	902.9	310.6	295.8	305.0
70	230.1	163.7	207.6	1010.3	781.6	909.5	350.7	308.7	327.4
71	242.0	117.9	194.8	1028.2	634.3	864.8	359.0	317.8	342.8
72	297.1	156.6	227.6	980.8	769.1	889.1	365.8	320.7	347.4
74	302.5	171.3	239.2	966.6	654.4	823.3	409.0	347.5	380.7
75	284.9	171.3	236.9	952.6	851.3	899.0	397.8	366.6	387.9
76	296.3	190.0	256.2	942.5	511.7	845.6	420.9	382.7	404.2
77	328.0	233.5	269.0	1023.7	882.0	945.8	415.4	380.7	402.2
78	338.5	244.6	283.5	1017.5	834.1	905.0	435.6	393.7	416.2
84	265.6	100.3	195.2	783.9	680.6	728.8	466.0	450.5	458.2
90	322.4	56.1	222.5	830.4	723.4	778.8	520.7	445.0	498.4
96	407.6	248.2	309.4	839.1	674.7	764.5	553.7	529.8	541.4
102	590.6	158.2	358.6	750.3	580.0	634.8	595.0	546.2	573.8
111	500.4	232.6	369.2	733.4	531.1	627.3	604.0	532.4	581.6
120	591.1	390.3	488.7	776.8	422.9	593.1	625.0	330.2	547.1
132	421.3	293.4	340.9	606.7	496.0	536.8	623.0	534.0	580.0
138	395.8	353.4	368.8	585.8	437.3	513.3	537.0	99.7	414.6

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42014E
Test Date: 12/8/80
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.279 MPa (40.5 psia)
Initial peak clad temperature and location	871°C (1600°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate (stepped)	142 mm/sec (5.6 in./sec) 5 sec 23 mm/sec (0.89 in./sec) onward
Coolant temperature	49°C (121°F)
Average and range of initial 1.83 m (72 in.) housing temperature	491°C (482°C - 497°C) [915°F (900°F - 927°F)]
Initial bundle water level	0 mm (0 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+3% for 90 seconds and -0.5% thereafter[a]
Total power:	-0.25% constant[a]

a. Relative to run 42514A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42014E

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1196.	1247.	51.	20.5	802.	107.8
4C 3- 3	10	1276.	1289.	13.	22.5	857.	97.9
1C 4- 0	12	1381.	1514.	133.	51.0	939.	138.6
2A 5- 0	16	1511.	1777.	265.	78.0	871.	250.8
2A 5- 7	19	1525.	1749.	224.	80.5	882.	314.3
5C 6- 0	36	1410.	1698.	289.	100.0	233.	687.0
2D 6- 2	39	1498.	1792.	294.	96.5	763.	365.7
1D 6- 4	47	1462.	1683.	221.	82.5	849.	354.6
3D 6- 4	50	1445.	1842.	397.	104.0	238.	676.0
4B 6- 4	52	1523.	1784.	261.	96.5	669.	375.0
5C 6- 4	54	1449.	1753.	304.	106.0	1076.	363.5
5D 6- 4	55	1482.	1707.	226.	119.0	883.	370.5
1D 6- 5	58	1477.	1701.	224.	67.5	934.	360.8
2A 6- 5	59	1476.	1648.	173.	52.0	768.	407.2
2D 6- 5	61	1524.	1789.	265.	95.0	832.	398.5
3B 6- 5	63	1550.	1804.	254.	92.5	768.	389.7
3C 6- 6	72	1569.	1892.	322.	106.0	658.	407.4
4C 6- 6	75	1580.	1872.	292.	103.0	873.	403.7
3C 6- 7	* * B A D T H E R M O C O U P L E D A T A *						
3E 6- 7	83	1492.	1753.	261.	97.5	895.	400.2
3D 6- 8	86	1543.	1894.	351.	99.5	849.	433.9
4A 6- 8	87	1446.	1705.	259.	91.5	787.	437.8
1C 7- 0	93	1416.	1552.	136.	62.5	747.	417.9
2B 7- 0	94	1463.	1478.	16.	2.0	683.	446.6
3D 7- 0	98	1490.	1572.	92.	61.5	763.	464.0
5B 7- 0	103	1407.	1637.	231.	153.0	725.	446.0
2B 7- 6	110	1406.	1653.	247.	76.5	796.	485.0
2C 7- 6	111	1434.	1645.	211.	70.0	840.	455.9
2E 7- 6	113	1235.	1485.	250.	103.0	897.	426.5
3A 7- 6	* * B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	115	1176.	1620.	443.	97.5	708.	532.0
4B 7- 6	120	1449.	1762.	313.	92.0	865.	471.7
5C 7- 6	122	1435.	1734.	299.	98.0	811.	483.1
1C 8- 0	124	1209.	1564.	355.	109.0	805.	509.8
2E 8- 0	126	974.	1428.	454.	169.0	807.	482.6
3D 8- 0	129	1248.	1682.	434.	106.0	808.	516.0
5B 8- 0	133	1244.	1545.	301.	65.0	732.	513.9
5C 8- 0	134	1318.	1677.	359.	92.5	754.	510.6
1C 8- 6	135	1058.	1459.	401.	109.0	665.	543.9
1D 8- 6	136	961.	1346.	385.	111.0	663.	560.9
2C 8- 6	138	1183.	1639.	456.	110.0	752.	538.0
4B 8- 6	143	1154.	1539.	385.	81.0	719.	527.9
5D 8- 6	145	1027.	1526.	499.	141.0	652.	544.1
3D 9- 3	150	924.	1440.	516.	135.0	700.	553.0
4C 9- 3	152	1014.	1469.	455.	124.0	696.	548.0
1D10- 0	157	645.	1217.	572.	168.0	586.	601.0
4B10- 0	164	846.	1269.	423.	154.0	680.	564.3
5D10- 0	166	709.	1143.	434.	153.0	712.	507.1
2A11- 0	168	565.	805.	241.	206.0	529.	476.3
4C11- 0	169	667.	1104.	436.	147.0	534.	582.0
1D11- 6	171	304.	859.	555.	149.0	561.	573.3

RUN 42014E HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	693.6	648.3	671.5	685.7	652.0	574.1	1.5	1.0	1.2
24	955.2	878.3	913.3	960.4	883.0	917.8	2.0	1.0	1.5
39	1276.0	1174.3	1207.6	1289.1	1196.2	1235.3	22.5	2.0	16.3
48	1441.4	1353.0	1391.9	1557.1	1463.4	1511.4	53.5	43.5	49.3
60	1533.3	1496.0	1513.5	1776.5	1638.5	1722.3	78.0	54.5	68.7
67	1600.3	1497.6	1549.1	1850.8	1677.7	1761.8	80.5	49.5	66.1
70	1595.7	1517.0	1553.8	1814.6	1807.8	1811.6	94.0	67.5	83.3
73	1463.3	1463.3	1463.3	1738.6	1738.6	1738.6	92.5	92.5	92.5
74	1504.7	1498.2	1501.4	1792.1	1792.1	1792.1	99.0	96.5	97.8
75	1473.0	1448.9	1461.0	1716.3	1689.7	1704.3	105.0	65.5	85.3
76	1541.9	1448.9	1489.1	1804.4	1683.2	1736.5	119.0	82.5	100.6
77	1550.0	1470.8	1499.5	1804.4	1634.1	1721.5	110.0	43.5	81.7
78	1580.3	1448.9	1517.7	1891.5	1681.0	1771.0	124.0	52.5	90.9
79	1560.3	1492.3	1528.4	1858.7	1750.8	1788.8	106.0	82.0	94.4
80	1543.0	1430.1	1489.7	1893.8	1705.1	1786.6	134.0	83.0	104.3
81	1525.8	1525.8	1525.8	1906.3	1906.3	1906.3	102.0	102.0	102.0
82	1461.2	1461.2	1461.2	1779.8	1779.8	1779.8	99.5	99.5	99.5
84	1499.8	1402.8	1450.2	1702.9	1478.4	1594.9	153.0	2.0	77.8
90	1504.7	1176.4	1365.7	1767.6	1484.8	1657.1	138.0	70.0	94.8
96	1329.4	974.3	1236.0	1730.8	1428.0	1623.9	169.0	65.0	106.4
102	1456.9	757.1	1068.7	1725.2	1090.3	1458.3	168.0	80.0	117.5
111	1023.2	744.1	893.8	1499.8	1139.0	1360.7	148.0	121.0	130.8
120	1101.1	615.7	790.6	1407.7	1023.3	1238.2	169.0	65.5	142.1
132	667.3	471.5	552.9	1103.7	805.4	898.9	206.0	136.0	162.8
138	585.5	304.4	445.0	859.2	857.2	858.2	154.0	149.0	151.5

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	3.7	2.1	2.6	657.7	601.5	531.4	7.5	5.0	6.0
24	5.2	3.7	4.5	751.5	726.8	741.9	33.0	31.9	32.3
39	51.1	12.5	27.8	908.4	787.9	838.8	107.8	88.4	99.9
48	132.5	110.4	119.5	959.8	885.1	927.8	143.6	138.6	140.3
60	265.4	105.2	208.8	917.8	826.2	871.5	250.8	241.8	246.7
67	272.6	158.4	212.7	1023.3	834.0	921.8	331.7	292.8	311.7
70	295.3	222.1	257.8	987.4	914.4	947.1	350.6	334.4	342.5
73	275.3	275.3	275.3	951.8	951.8	951.8	261.6	261.6	261.6
74	293.9	287.4	290.6	763.4	682.4	722.9	385.7	370.0	377.8
75	267.4	216.6	243.4	1078.9	660.1	865.9	363.1	216.8	362.7
76	304.2	209.8	247.4	1075.8	666.6	840.8	406.9	354.6	375.5
77	264.7	163.3	222.0	1159.4	720.3	860.1	407.2	296.8	377.5
78	322.0	189.9	253.3	1155.9	658.2	875.0	418.5	240.6	385.1
79	298.3	222.6	260.3	1229.6	838.9	950.4	411.8	383.0	401.4
80	350.8	258.0	296.9	894.3	786.9	851.5	437.8	411.7	424.7
81	380.5	380.5	380.5	813.9	813.9	813.9	440.6	440.6	440.6
82	318.6	318.6	318.6	876.6	876.6	876.6	419.8	418.8	418.8
84	234.2	15.5	144.8	812.8	672.3	746.5	465.9	417.9	446.2
90	443.4	210.6	291.3	896.7	707.8	814.5	532.0	426.5	479.7
96	453.7	301.5	387.8	834.7	731.7	788.3	523.9	482.6	507.9
102	523.5	265.1	389.6	827.6	652.1	728.6	560.9	417.6	515.4
111	543.1	394.9	466.9	700.5	578.7	655.3	577.5	548.0	557.2
120	586.7	270.3	447.6	834.8	585.6	671.2	601.0	385.7	547.2
132	436.4	240.7	345.9	597.3	529.5	561.0	582.0	460.8	511.2
138	554.7	271.7	413.2	562.1	561.0	561.6	573.3	567.0	570.1

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 41914F
Test Date: 6/29/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.278 MPa (40.3 psia)
Initial peak clad temperature and location	872°C (1602°F), 2B 1.70 m (67 in.)
Initial peak rod power	2.55 kw/m (0.777 kw/ft)
Flow rate	143 mm/sec (5.64 in./sec) 5 sec 24 mm/sec (0.95 in./sec) onward
Coolant temperature	49°C (121°F)
Average and range of initial 1.83 m (72 in.) housing temperature	503°C (490°C - 508°C) [937°F (914°F - 947°F)]
Initial bundle water level	29.0 mm (1.14 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+5.5% for 90 seconds and +1.5% thereafter[a]
Total power:	-0.5%[a]
Housing initial temperature at midplane:	approximately +4%[a]

a. Relative to run 42514A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER41914F

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1180.	1248.	68.	32.5	622.	90.9
4C 3- 3	6	1269.	1295.	27.	23.0	657.	64.4
1C 4- 0	7	1389.	1461.	72.	47.0	919.	138.5
2A 5- 0	12	1521.	1758.	237.	59.5	941.	222.6
2A 5- 7	14	1535.	1642.	107.	37.5	662.	278.6
5C 6- 2	33	1439.	1634.	195.	95.5	260.	572.0
2D 6- 3	39	1476.	1596.	120.	76.5	783.	326.0
1D 6- 4	46	1444.	1609.	165.	93.0	964.	272.3
3D 6- 4	50	1476.	1744.	268.	90.0	232.	663.0
4B 6- 4	51	1538.	1621.	83.	82.5	766.	353.8
5D 6- 4	56	1464.	1493.	30.	80.5	912.	307.9
1D 6- 5	58	1439.	1632.	193.	97.5	1016.	281.8
2A 6- 5	59	1451.	1625.	174.	84.5	872.	275.6
2D 6- 5	62	1510.	1655.	145.	83.5	860.	338.7
3B 6- 5	63	1546.	1711.	165.	90.0	557.	371.0
3C 6- 6	69	1536.	1778.	241.	98.5	1157.	337.4
3E 6- 6	70	1460.	1634.	174.	91.5	287.	383.0
4C 6- 6	73	1570.	1714.	144.	90.0	750.	362.0
5C 6- 6	76	1521.	1652.	131.	91.0	797.	378.9
3D 6- 7	85	1557.	1751.	194.	95.0	789.	369.4
3C 6- 8	93	1575.	1784.	209.	91.0	900.	359.3
4A 6- 8	95	1421.	1633.	212.	95.0	983.	306.4
1C 7- 0	109	1454.	1538.	83.	67.0	664.	420.0
2B 7- 0	110	1492.	1505.	13.	1.5	722.	402.0
3D 7- 0	113	1527.	1542.	15.	1.5	712.	391.9
5B 7- 0	117	1361.	1501.	140.	95.5	626.	460.7
2B 7- 6	120	1438.	1585.	147.	61.5	645.	421.0
2C 7- 6	121	1444.	1620.	176.	70.5	673.	408.5
2E 7- 6	123	1242.	1393.	151.	76.5	641.	391.8
3A 7- 6	124	1436.	1529.	93.	70.5	641.	410.9
3B 7- 6	125	1496.	1647.	151.	68.5	786.	428.9
4B 7- 6	129	1461.	1618.	157.	67.5	776.	423.0
5C 7- 6	132	1422.	1607.	185.	94.0	790.	435.9
1C 8- 0	133	1264.	1525.	261.	93.0	755.	456.8
2E 8- 0	136	1121.	1360.	239.	90.5	762.	426.4
3D 8- 0	138	1336.	1616.	280.	93.0	679.	429.9
5B 8- 0	143	1197.	1472.	275.	154.0	561.	502.0
5C 8- 0	144	1303.	1577.	273.	119.0	734.	466.0
1C 8- 6	145	1074.	1331.	257.	96.0	624.	462.0
1D 8- 6	146	961.	1093.	132.	77.0	655.	445.8
2C 8- 6	148	1180.	1513.	332.	97.5	767.	460.7
4B 8- 6	153	1185.	1507.	322.	92.5	681.	483.0
5D 8- 6	155	1097.	1392.	295.	80.5	679.	461.2
3D 9- 3	159	1002.	1326.	324.	97.5	737.	478.9
4C 9- 3	161	1061.	1422.	361.	97.5	660.	495.5
1D10- 0	164	620.	1001.	381.	178.0	726.	479.9
4B10- 0	168	895.	1302.	407.	121.0	626.	519.0
5D10- 0	169	753.	1102.	349.	117.0	704.	467.1
2A11- 0	171	536.	810.	274.	127.0	560.	486.0
4C11- 0	172	696.	1058.	363.	125.0	531.	526.0
1D11- 6	174	301.	834.	534.	149.0	567.	504.6

RUN 41914F HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	727.7	678.5	703.1	730.6	681.5	706.0	1.0	1.0	1.0
24	925.6	925.6	925.6	929.5	929.5	929.5	1.5	1.5	1.5
39	1268.7	1159.1	1202.7	1295.3	1193.1	1245.6	32.5	23.0	26.3
48	1455.3	1343.6	1394.8	1509.5	1390.7	1454.0	47.0	35.0	38.7
60	1520.7	1451.0	1478.2	1757.5	1553.8	1633.6	59.5	50.0	55.2
67	1602.1	1497.3	1556.4	1725.2	1633.0	1667.6	70.5	37.5	54.3
70	1599.9	1362.6	1454.5	1711.8	1432.3	1559.7	77.0	3.5	51.5
71	1549.1	1503.5	1526.3	1675.5	1641.7	1658.6	78.5	73.5	76.0
72	1447.6	1353.3	1400.6	1652.6	1562.5	1607.5	97.5	81.5	89.5
73	1431.7	1354.5	1393.1	1643.9	1604.7	1624.3	106.0	83.5	94.7
74	1475.7	1361.9	1439.6	1678.8	1579.8	1625.4	98.5	70.0	86.7
75	1466.2	1384.7	1437.9	1739.7	1553.8	1623.9	119.0	76.5	92.6
76	1538.1	1392.3	1467.8	1744.1	1483.7	1613.0	101.0	26.5	83.7
77	1545.7	1439.2	1485.6	1718.5	1596.0	1657.1	97.5	83.0	90.1
78	1569.5	1439.1	1503.4	1777.6	1549.5	1647.0	98.5	50.0	83.7
79	1566.2	1434.6	1504.5	1750.8	1606.8	1682.8	112.0	69.0	89.7
80	1574.9	1421.0	1495.2	1784.3	1610.1	1696.2	95.0	59.0	80.4
81	1491.7	1491.7	1491.7	1657.0	1657.0	1657.0	93.5	93.5	93.5
84	1527.3	1360.8	1462.0	1563.6	1474.1	1521.7	95.5	1.5	52.8
90	1496.2	1241.8	1407.0	1657.0	1392.8	1564.7	94.0	61.5	75.1
96	1366.3	1120.8	1279.7	1648.3	1360.3	1549.1	155.0	79.0	103.7
102	1198.8	848.5	1095.7	1512.8	1005.7	1349.0	123.0	77.0	90.5
111	1060.9	874.2	968.0	1421.6	1066.6	1277.4	121.0	75.0	103.3
120	894.9	619.7	793.7	1309.0	1000.6	1156.7	178.0	117.0	129.5
132	695.5	479.8	556.4	1056.3	781.5	872.7	131.0	125.0	127.8
138	628.1	300.6	509.5	1025.3	830.2	896.6	149.0	125.0	137.7

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	3.0	2.9	3.0	697.8	639.8	668.8	5.0	4.4	4.7
24	3.9	3.9	3.9	731.8	731.8	731.8	30.0	30.0	30.0
39	66.3	26.6	42.9	857.3	821.8	842.5	90.9	84.4	88.0
48	72.2	46.6	59.3	921.2	840.9	900.0	138.5	125.6	133.4
60	236.8	102.8	155.4	941.1	840.6	886.0	234.8	222.8	230.1
67	135.7	94.8	111.1	1004.1	869.0	943.0	293.8	275.6	283.2
70	173.4	20.9	105.2	1415.0	256.5	793.7	613.0	6.2	308.1
71	138.1	126.4	132.3	1003.3	282.3	642.8	574.0	303.6	438.8
72	209.2	204.6	207.0	261.9	247.9	254.9	624.0	606.0	615.0
73	250.2	212.2	231.2	284.5	271.6	278.0	601.0	578.0	589.5
74	218.1	132.2	185.8	775.7	236.1	371.8	646.0	336.6	510.3
75	281.2	89.1	186.0	1456.1	231.8	608.2	658.0	216.5	441.0
76	268.4	29.6	145.3	1034.9	231.8	625.4	663.0	270.7	441.3
77	246.9	136.9	171.3	1124.1	557.1	817.6	459.0	275.6	350.3
78	241.4	80.7	143.6	1157.1	286.6	850.6	386.7	274.7	346.7
79	218.0	132.9	178.3	1029.6	705.9	854.9	464.9	289.7	373.0
80	232.1	166.6	201.0	982.8	798.4	883.3	398.9	306.4	364.4
81	165.3	165.3	165.3	838.6	838.6	838.6	370.9	370.9	370.9
84	140.1	13.5	59.6	853.0	627.8	734.7	480.7	347.0	396.0
90	209.1	93.0	157.7	968.7	615.1	827.2	492.0	386.2	416.8
96	301.1	239.5	269.4	879.3	560.9	781.3	502.0	416.6	444.9
102	332.3	132.5	253.3	766.7	605.9	667.5	493.0	445.8	470.0
111	360.7	169.9	309.4	778.5	540.8	666.3	519.0	428.8	479.8
120	418.4	305.4	363.0	726.1	621.7	662.7	519.0	467.1	501.0
132	362.8	273.6	316.4	644.1	281.3	504.1	526.0	301.0	444.0
138	533.8	230.4	387.1	586.7	551.4	574.3	535.0	504.6	517.8

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42907A
Test Date: 4/2/80
Test Type: Forced Reflood (second repeat)
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.274 MPa (39.8 psia)
Initial peak clad temperature and location	872°C (1601°F), 3C 1.83 m (72 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	27.9 mm/sec (1.10 in./sec)
Coolant temperature	51°C (124°F)
Average and range of initial 1.83 m (72 in.) housing temperature	490°C (482°C - 496°C) [914°F (900°F - 924°F)]
Initial bundle water level	49.0 mm (1.93 in.)

B. Summary Results:

C. Comments:

This test was misnumbered; it should be 42915A.

Total power: exponentially increasing to -1.6% by 470 seconds[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42907A

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1104.	1212.	108.	28.5	873.	87.4
4C 3- 3	11	1166.	1270.	104.	23.0	907.	85.4
1C 4- 0	14	1319.	1490.	171.	40.5	878.	140.9
2A 5- 0	17	1346.	1579.	233.1	59.5	808.	216.4
2A 5- 7	21	1475.	1748.	272.	59.5	1024.	265.7
1D 6- 2	50	1439.	1810.	371.	79.5	951.	334.7
2D 6- 2	53	1567.	1940.	373.	75.5	875.	332.7
3D 6- 2	58	1579.	1974.	395.	75.5	969.	335.7
5C 6- 2	61	1520.	1811.	291.	56.0	974.	314.3
1D 6- 3	63	1401.	1782.	381.	90.5	994.	345.8
4B 6- 3	68	1543.	1928.	385.	89.0	919.	352.8
5D 6- 3	69	1471.	1840.	368.	87.5	881.	341.6
2A 6- 4	70	1472.	1836.	364.	83.5	954.	355.7
3B 6- 4	75	1566.	1984.	418.	86.5	1004.	350.7
3D 6- 6	79	1500.	1967.	467.	86.0	943.	374.7
2D 6- 5	84	1522.	1948.	426.	79.5	869.	361.6
3C 6- 5	85	1558.	2006.	449.	79.5	947.	362.7
3E 6- 5	86	1472.	1867.	394.	82.5	1013.	353.8
3C 6- 6	95	1535.	1996.	461.	84.5	922.	373.7
4A 6- 6	97	1428.	1825.	397.	88.5	967.	364.6
3D 8- 0	98	1105.	1649.	544.	105.0	607.	459.4
5C 6- 6	101	1458.	1754.	296.1	60.0	991.	349.8
1C 7- 0	110	1312.	1648.	336.	61.5	751.	410.0
2B 7- 0	111	1372.	1627.	254.	33.5	692.	413.2
3D 7- 0	115	1366.	1692.	326.	59.5	744.	410.0
5B 7- 0	117	1301.	1643.	341.	90.0	686.	403.7
2B 7- 6	* * B A D	T H E R M O C O U P L E	D A T A *				
2C 7- 6	121	1290.	1707.	417.	75.5	620.	423.0
2E 7- 6	122	1097.	1452.	355.	80.0	735.	425.0
3A 7- 6	123	1264.	1612.	348.	84.5	741.	444.0
3B 7- 6	124	1360.	1758.	398.	70.0	793.	431.0
4B 7- 6	127	1338.	1758.	420.	76.5	777.	435.0
5C 7- 6	128	1234.	1581.	347.	82.5	742.	415.9
1C 8- 0	131	1025.	1564.	539.	103.0	766.	459.7
2E 8- 0	133	715.	1151.	436.	132.0	674.	401.0
4C 6- 6	136	1531.	1975.	444.	83.0	986.	366.7
5B 8- 0	138	1113.	1490.	377.	101.0	804.	451.0
5C 8- 0	139	1074.	1485.	411.	109.0	715.	444.0
1C 8- 6	141	840.	1339.	500.	83.0	585.	482.8
1D 8- 6	142	789.	1109.	320.	47.0	577.	467.0
2C 8- 6	143	941.	1416.	475.	79.5	692.	468.0
4B 8- 6	145	1037.	1409.	371.	59.0	626.	491.0
5D 8- 6	148	879.	1413.	534.	115.0	601.	493.0
3D 9- 3	154	820.	1342.	522.	130.0	669.	499.0
4C 9- 3	156	900.	1333.	433.	108.0	686.	491.0
1D10- 0	161	599.	1032.	433.	134.0	706.	437.8
4B10- 0	164	762.	1159.	396.	109.0	619.	517.0
5D10- 0	167	687.	1041.	353.	121.0	759.	389.5
2A11- 0	168	503.	740.	237.	104.0	656.	264.0
4C11- 0	170	568.	934.	345.	116.0	454.	503.6
1D11- 6	172	318.	786.	467.	144.0	286.	358.0

RUN 42907A HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	541.3	515.4	525.3	562.0	539.6	548.4	8.0	7.0	7.5
24	845.6	780.0	812.5	896.5	839.6	865.7	17.0	14.5	16.0
39	1166.2	1066.4	1112.0	1270.3	1188.9	1223.7	28.5	23.0	25.0
48	1337.4	1235.7	1288.9	1521.4	1438.7	1474.4	51.0	40.0	43.6
60	1435.6	1293.1	1350.6	1664.6	1525.7	1578.3	59.5	36.5	47.1
67	1565.1	1465.9	1495.4	1877.9	1747.5	1784.5	63.0	54.0	60.8
70	1598.6	1495.6	1551.4	1964.8	1809.0	1885.1	77.0	67.0	71.5
71	1597.5	1466.3	1551.6	1988.9	1805.6	1898.8	79.5	62.0	73.1
72	1601.1	1482.6	1544.9	1986.6	1774.3	1875.5	79.5	56.5	73.2
74	1583.4	1438.9	1536.0	1978.5	1779.8	1899.4	87.0	56.0	76.9
75	1571.5	1401.4	1515.6	1992.3	1782.1	1937.4	90.5	76.5	82.6
76	1565.9	1450.6	1520.3	2002.7	1836.1	1920.4	90.5	77.5	82.6
77	1557.5	1350.3	1485.2	2006.2	1775.4	1908.0	105.0	79.5	88.2
78	1534.8	1415.3	1480.5	1995.7	1754.2	1902.3	89.5	60.0	82.6
84	1400.6	1117.4	1315.5	1715.1	1537.6	1639.3	90.0	33.5	64.5
90	1359.7	1036.1	1240.1	1757.5	1451.6	1640.0	114.0	70.0	86.1
96	1215.1	714.9	1071.7	1698.4	1150.5	1543.3	132.0	79.5	103.2
102	1037.3	789.0	899.9	1509.5	1108.9	1329.8	144.0	35.5	84.2
111	904.9	786.6	831.0	1379.2	1032.5	1224.1	130.0	74.5	103.5
120	762.4	598.9	667.2	1196.2	1031.5	1102.8	143.0	105.0	129.6
132	588.2	500.0	532.8	933.6	739.9	803.4	145.0	104.0	118.0
138	565.1	316.2	477.4	899.6	776.3	830.0	144.0	126.0	135.0

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	24.2	20.7	23.1	560.0	540.1	547.8	8.5	7.9	8.4
24	59.6	46.1	53.2	800.6	753.2	758.8	32.4	28.7	29.9
39	122.5	104.1	111.6	907.2	761.3	847.2	88.8	85.4	87.2
48	211.6	170.9	185.5	1012.6	877.8	931.4	140.9	121.3	129.9
60	251.0	197.7	227.6	865.3	775.4	808.8	219.7	213.6	216.8
67	312.8	272.2	289.1	1023.5	909.1	957.2	270.6	265.7	268.4
70	366.2	313.4	333.7	954.8	892.4	933.0	303.8	294.6	298.9
71	391.4	312.1	347.2	1041.5	877.7	946.2	313.7	293.7	305.2
72	385.5	277.2	330.6	1049.0	880.9	948.6	320.6	298.1	311.7
74	397.2	291.5	363.4	1058.9	873.9	955.3	342.7	314.3	329.5
75	420.8	368.5	391.7	1000.2	880.7	938.0	352.8	336.6	344.0
76	436.8	364.0	400.1	1004.1	903.7	950.6	358.7	336.7	350.6
77	448.6	394.2	422.8	1013.1	888.6	946.1	368.8	353.8	360.6
78	467.2	296.4	421.7	991.2	900.7	950.5	379.6	349.8	369.8
84	420.2	254.2	323.9	765.9	671.0	712.5	421.0	403.7	411.4
90	441.9	347.0	399.9	855.3	721.3	781.5	444.0	415.9	429.5
96	544.2	377.3	471.6	837.6	674.2	763.0	481.0	444.0	456.4
102	553.7	269.5	429.9	692.1	577.0	617.0	493.0	467.0	480.3
111	521.7	313.6	393.1	780.5	507.6	659.0	506.0	403.9	468.4
120	554.9	350.9	435.5	758.9	287.7	600.9	517.0	389.5	475.3
132	345.4	237.3	270.6	656.2	454.2	585.4	503.6	264.0	353.5
138	467.5	271.2	352.6	635.2	287.7	497.7	511.0	341.0	426.1

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43715A
Test Date: 4/30/80
Test Type: Forced Reflood (third repeat)
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.279 MPa (40.5 psia)
Initial peak clad temperature and location	872°C (1601°F), 3C 1.83 m (72 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	29.0 mm/sec (1.14 in./sec)
Coolant temperature	52°C (125°F)
Average and range of initial 1.83 m (72 in.) housing temperature	534°C (527°C - 538°C) [994°F (980°F - 1001°F)]
Initial bundle water level	29.5 mm (1.16 in.)

B. Summary Results:

C. Comments:

Total power: less than ±0.4% variation[a]

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43715A

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1112.	1253.	141.	26.0	810.	89.6
4C 3- 3	11	1189.	1297.	109.	22.5	852.	87.4
1C 4- 0	14	1316.	1491.	175.	43.0	876.	141.9
2A 5- 0	17	1363.	1601.	238.	45.0	821.	216.8
2A 5- 7	21	1474.	1750.	276.	73.5	1025.	270.7
1D 6- 2	50	1450.	1789.	338.	74.5	975.	331.8
2D 6- 2	53	1565.	1922.	357.	71.0	880.	331.6
3D 6- 2	58	1585.	1969.	384.	83.0	978.	338.7
5C 6- 2	61	1492.	1777.	284.	57.0	958.	319.4
1D 6- 3	63	1440.	1770.	330.	89.5	989.	342.6
4B 6- 3	68	1535.	1898.	364.	83.5	917.	349.8
5D 6- 3	69	1457.	1793.	336.	83.0	884.	351.7
2A 6- 4	70	1444.	1777.	333.	107.0	890.	357.8
3B 6- 4	75	1571.	1972.	401.	80.5	1016.	354.6
3D 6- 6	79	1537.	1960.	423.	86.0	941.	377.8
2D 6- 5	84	1554.	1942.	388.	84.0	954.	357.7
3C 6- 5	85	1578.	2012.	434.	84.0	958.	363.8
3E 6- 5	86	1476.	1641.	364.	84.0	903.	368.7
3C 6- 6	95	1560.	1992.	432.	86.5	950.	373.5
4A 6- 6	97	1417.	1801.	384.	105.0	957.	373.6
3D 8- 0	98	1272.	1690.	417.	83.0	807.	465.0
5C 6- 6	** BAD THERMOCOUPLE DATA *						
1C 7- 0	110	1421.	1689.	267.	49.0	727.	423.0
2B 7- 0	111	1439.	1659.	220.	32.0	707.	404.0
3D 7- 0	115	1474.	1725.	251.	45.5	766.	414.3
5B 7- 0	117	1340.	1630.	289.	32.0	771.	401.0
2B 7- 6	** BAD THERMOCOUPLE DATA *						
2C 7- 6	121	1440.	1760.	320.	52.0	827.	432.0
2E 7- 6	122	1334.	1616.	281.	64.5	825.	419.3
3A 7- 6	123	1336.	1649.	313.	73.5	728.	452.5
3B 7- 6	124	1453.	1784.	331.	52.5	765.	440.4
4B 7- 6	127	1419.	1785.	367.	77.5	784.	440.0
5C 7- 6	128	1299.	1605.	306.	74.5	730.	428.0
1C 8- 0	131	1236.	1633.	397.	84.5	752.	468.2
2E 8- 0	133	718.	1249.	531.	118.0	637.	469.0
4C 6- 6	136	1543.	1965.	422.	83.0	998.	365.8
5B 8- 0	138	1211.	1581.	370.	82.5	754.	449.6
5C 8- 0	139	1156.	1518.	362.	83.5	679.	455.0
1C 8- 6	141	1067.	1426.	358.	72.0	565.	489.0
1D 8- 6	142	932.	1215.	283.	111.0	596.	467.5
2C 8- 6	143	1121.	1477.	356.	53.0	681.	476.0
4B 8- 6	145	1141.	1468.	327.	46.5	623.	497.0
5D 8- 6	148	1040.	1442.	402.	114.0	579.	501.0
3D 9- 3	154	959.	1406.	446.	107.0	652.	502.0
4C 9- 3	156	1030.	1388.	357.	83.0	692.	487.0
1D10- 0	161	585.	1095.	510.	147.0	688.	477.0
4B10- 0	164	865.	1210.	344.	85.0	578.	519.1
5D10- 0	167	732.	1146.	414.	136.0	655.	482.7
2A11- 0	168	562.	776.	214.	105.0	665.	300.0
4C11- 0	170	676.	980.	304.	136.0	494.	493.0
1D11- 6	172	343.	825.	482.	152.0	288.	329.0

RUN 43715A HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	598.2	548.8	563.3	605.7	572.7	584.9	7.5	7.0	7.4
24	872.2	772.8	821.0	920.2	834.4	873.7	17.0	14.0	15.8
39	1188.8	1086.7	1129.1	1297.4	1223.3	1257.7	27.0	22.5	25.2
48	1336.4	1234.7	1285.7	1524.6	1433.4	1473.8	52.0	41.0	44.6
60	1466.7	1320.3	1375.6	1662.5	1570.0	1603.7	63.5	31.0	43.0
67	1575.6	1469.9	1501.1	1892.6	1749.7	1799.1	73.5	58.0	65.9
70	1599.7	1476.4	1539.4	1972.8	1779.8	1871.4	75.5	65.0	70.8
71	1597.5	1465.6	1537.4	1992.3	1762.0	1876.7	80.5	68.5	72.8
72	1600.8	1448.2	1533.3	1990.0	1749.7	1870.6	83.0	55.0	73.4
74	1585.3	1450.3	1528.9	1982.0	1738.6	1881.3	84.0	57.0	76.5
75	1581.3	1439.9	1520.5	1993.4	1769.8	1888.9	89.5	83.0	84.4
76	1579.1	1439.6	1520.4	2006.2	1770.5	1897.6	107.0	80.5	88.2
77	1577.8	1425.2	1506.8	2012.0	1773.1	1893.2	113.0	84.0	90.2
78	1560.4	1417.4	1498.7	1992.3	1801.0	1903.3	106.0	83.0	91.6
84	1474.2	1267.3	1397.2	1738.6	1538.7	1659.2	82.0	32.0	54.7
90	1452.8	1298.6	1377.8	1785.4	1563.6	1690.4	77.5	38.0	64.6
96	1323.8	718.0	1179.6	1722.9	1249.4	1588.0	118.0	75.0	86.2
102	1141.0	931.7	1057.1	1520.3	1215.0	1407.6	114.0	42.5	78.1
111	1119.4	886.7	976.3	1435.5	1173.3	1299.3	107.0	67.0	81.8
120	865.3	585.0	726.1	1258.8	1095.4	1173.1	156.0	84.5	121.1
132	675.8	487.8	573.6	980.0	776.3	843.1	135.0	105.0	115.0
138	537.9	343.0	501.0	952.2	815.8	875.7	152.0	109.0	130.6

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	23.9	17.5	21.7	598.4	562.2	576.8	10.0	9.5	9.7
24	61.6	47.0	52.7	804.3	746.1	770.0	35.0	30.3	32.0
39	140.6	108.6	128.6	852.0	787.9	816.6	89.9	87.4	89.0
48	211.5	175.1	188.2	1004.3	855.7	918.8	141.9	122.9	130.4
60	260.6	195.8	228.1	821.2	769.3	800.9	220.7	209.0	215.1
67	317.0	275.8	298.0	1024.6	964.4	982.6	274.8	270.7	273.0
70	373.1	303.4	331.9	967.2	913.6	940.3	308.8	295.8	301.2
71	394.8	296.4	339.3	1029.1	870.1	936.4	317.9	303.6	308.9
72	389.2	264.8	337.3	1053.8	853.8	933.5	328.5	303.5	316.4
74	396.7	283.7	352.4	991.8	880.4	945.9	340.8	319.4	333.1
75	412.1	329.9	368.4	1009.3	884.4	941.1	351.7	342.6	346.9
76	427.0	331.4	377.2	1016.0	889.6	947.8	357.9	336.7	351.4
77	434.2	347.9	386.5	983.5	878.6	944.6	369.2	357.7	364.1
78	431.9	374.3	404.7	997.9	908.5	949.7	377.8	365.8	373.3
84	289.4	220.3	262.0	770.9	654.2	724.5	423.0	399.0	412.3
90	366.6	254.8	312.6	849.0	728.5	785.1	452.5	419.3	437.0
96	531.4	362.4	408.4	813.9	637.3	746.8	469.0	449.6	461.8
102	405.7	280.3	350.5	685.0	565.2	607.3	501.0	467.5	484.3
111	446.3	249.3	322.9	762.0	480.7	639.2	514.0	411.7	472.6
120	593.7	322.6	447.0	687.9	522.7	632.7	520.0	407.4	486.5
132	323.8	214.0	269.5	680.1	493.8	616.9	493.0	300.0	371.1
138	482.1	271.3	374.7	585.4	285.6	434.4	517.0	329.0	426.6

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42415B
Test Date: 6/21/80
Test Type: Forced Reflood (second repeat)
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.274 MPa (39.7 psia)
Initial peak clad temperature and location	875°C (1608°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28.2 mm/sec (1.11 in./sec)
Coolant temperature	49°C (120°F)
Average and range of initial 1.83 m (72 in.) housing temperature	531°C (524°C - 536°C) [988°F (975°F - 996°F)]
Initial bundle water level	35.43 mm (1.395 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+0.5%[a]
Housing temperature at midplane:	approximately 0% increasing to -1.0% by 250 seconds[a]

a. Relative to run 42915B

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 42415B

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1057.	1192.	135.	28.5	805.	94.9
4C 3- 3	11	1198.	1311.	113.	25.5	848.	91.9
1C 4- 0	14	1303.	1451.	148.	33.5	836.	135.2
2A 5- 0	17	1349.	1608.	259.	77.0	796.	221.9
2A 5- 7	21	1482.	1780.	298.	82.5	916.	280.6
1D 6- 2	50	1441.	1739.	298.	86.0	918.	341.6
2D 6- 2	53	1513.	1849.	336.	89.0	754.	356.0
3D 6- 2	58	1554.	1867.	313.	92.0	924.	342.9
5C 6- 2	61	1494.	1800.	306.	88.5	1011.	333.8
1D 6- 3	63	1447.	1749.	302.	90.0	885.	319.8
4B 6- 3	68	1540.	1855.	315.	97.0	893.	363.5
5D 6- 3	69	1428.	1797.	369.	125.0	835.	395.8
2A 6- 4	70	1432.	1762.	330.	93.5	847.	368.8
2D 6- 4	72	1531.	1872.	341.	89.0	924.	370.9
3B 6- 4	75	1564.	1909.	344.	88.0	923.	369.7
3C 6- 5	85	1595.	1953.	358.	93.5	962.	370.7
3E 6- 5	86	1475.	1808.	333.	96.0	893.	377.7
3C 6- 6	95	1569.	1968.	399.	91.0	948.	380.8
3D 6- 6	96	1533.	1942.	408.	90.5	961.	376.8
4A 6- 6	97	1423.	1810.	387.	113.0	850.	391.8
4C 6- 6	98	1544.	1951.	407.	91.0	918.	382.7
5C 6- 6	101	1457.	1804.	347.	98.5	980.	372.7
1C 7- 0	110	1406.	1668.	262.	76.5	702.	429.0
2B 7- 0	111	1431.	1683.	252.	38.5	740.	427.0
3D 7- 0	115	1475.	1758.	283.	73.0	781.	415.0
5B 7- 0	117	1347.	1641.	294.	112.0	693.	441.4
2B 7- 6	120	1393.	1752.	359.	83.0	809.	454.9
2C 7- 6	121	1405.	1787.	381.	80.0	764.	456.8
2E 7- 6	122	1238.	1571.	333.	53.0	650.	465.9
3A 7- 6	123	1377.	1731.	354.	99.0	810.	444.8
3B 7- 6	124	1420.	1807.	387.	90.0	822.	450.2
4B 7- 6	127	1429.	1801.	372.	112.0	793.	454.0
5C 7- 6	128	1392.	1765.	373.	111.0	842.	445.8
1C 8- 0	131	1155.	1616.	461.	96.0	749.	480.1
2E 8- 0	133	870.	1392.	522.	75.0	596.	481.0
3D 8- 0	136	1226.	1722.	496.	96.0	840.	462.9
5B 8- 0	138	1148.	1590.	441.	116.0	656.	483.7
5C 8- 0	139	1269.	1706.	437.	113.0	786.	475.8
1C 8- 6	141	974.	1400.	426.	91.0	615.	505.0
1D 8- 6	142	778.	1165.	387.	88.0	649.	490.7
2C 8- 6	143	1059.	1499.	440.	88.0	650.	508.0
4B 8- 6	145	1156.	1652.	496.	112.0	724.	504.0
5D 8- 6	148	1014.	1381.	367.	58.0	560.	518.0
3D 9- 3	154	897.	1348.	450.	118.0	698.	500.0
4C 9- 3	156	985.	1390.	405.	95.0	661.	510.5
1D10- 0	161	605.	1139.	534.	182.0	651.	526.9
4B10- 0	164	864.	1242.	378.	124.0	623.	539.0
5D10- 0	167	693.	1056.	363.	127.0	756.	466.8
2A11- 0	168	554.	739.	185.	88.5	602.	456.0
4C11- 0	** BAD THERMOCOUPLE DATA *						
1D11- 6	172	303.	814.	510.	175.0	279.	526.0

RUN 424158 HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	622.3	555.4	578.9	638.3	578.0	599.5	8.0	7.0	7.6
24	857.9	780.2	809.7	909.9	832.3	862.8	15.5	13.0	14.0
39	1198.2	1056.6	1105.3	1311.0	1192.0	1233.0	28.5	24.5	26.5
48	1359.8	1255.6	1294.9	1544.1	1424.8	1475.0	49.5	33.5	39.4
60	1457.1	1313.9	1368.4	1683.2	1567.9	1607.5	81.0	38.5	59.8
67	1574.4	1468.2	1503.8	1879.1	1775.4	1806.3	82.5	76.0	78.9
70	1608.0	1488.5	1543.8	1949.9	1788.8	1871.1	93.5	76.0	85.0
71	1594.5	1425.3	1513.9	1952.2	1725.2	1844.8	96.0	76.5	87.4
72	1484.2	1427.5	1462.7	1798.8	1719.6	1768.2	99.0	83.0	89.5
74	1557.1	1440.8	1507.0	1905.1	1738.6	1831.1	107.0	78.0	91.3
75	1590.7	1427.9	1518.4	1914.3	1748.6	1841.4	125.0	90.0	96.4
76	1600.4	1432.2	1512.5	1921.2	1762.0	1847.1	115.0	88.0	94.1
77	1595.0	1394.8	1506.7	1953.3	1738.6	1862.8	112.0	88.5	95.2
78	1569.0	1401.8	1482.8	1968.2	1751.9	1868.6	118.0	90.0	98.4
84	1474.8	1327.3	1407.3	1757.5	1599.2	1685.5	112.0	38.5	75.2
90	1429.2	1238.5	1360.9	1806.7	1571.1	1727.3	139.0	63.0	91.0
96	1280.2	870.2	1183.1	1734.2	1391.8	1639.2	123.0	75.0	99.8
102	1155.8	778.3	1005.2	1651.6	1165.0	1422.4	112.0	52.0	84.8
111	988.1	682.5	893.6	1389.7	1010.9	1262.2	171.0	73.0	107.3
120	863.7	605.0	716.8	1278.6	1050.2	1157.9	182.0	96.0	140.2
132	553.8	500.3	530.5	811.6	710.8	753.8	149.0	88.5	112.2
138	631.1	303.4	470.1	931.5	781.5	855.0	175.0	118.0	147.6

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	22.6	16.0	20.6	610.9	571.1	584.4	12.0	10.4	11.1
24	61.4	47.2	53.2	752.2	707.8	727.2	37.4	35.3	36.3
39	135.5	112.8	127.7	847.5	791.9	814.3	96.9	91.9	94.8
48	218.7	147.9	180.0	981.2	836.1	904.5	136.8	131.0	134.9
60	259.2	217.2	239.1	891.7	796.5	823.9	227.6	218.6	223.0
67	322.8	285.1	302.5	951.7	916.1	940.8	287.7	271.6	280.4
70	341.9	291.3	327.3	1003.4	878.6	929.5	313.1	296.8	307.3
71	357.7	299.9	330.9	1035.0	861.0	958.1	351.7	304.7	321.1
72	320.1	292.1	305.5	955.1	816.0	883.6	335.9	315.8	326.4
74	388.6	285.6	324.2	1130.4	669.5	904.9	359.5	332.7	347.3
75	368.7	290.6	323.0	1015.2	834.7	912.5	395.8	319.8	360.3
76	352.2	302.0	334.6	1025.8	847.2	931.3	374.7	351.7	365.2
77	389.9	333.0	356.1	961.6	837.0	900.8	380.8	370.6	376.0
78	415.9	346.9	385.8	979.8	810.7	906.6	395.8	372.7	385.1
84	326.7	251.9	278.2	782.5	676.1	728.2	442.7	414.5	428.3
90	389.7	332.6	366.4	859.4	650.4	776.7	472.0	440.0	452.9
96	521.6	386.3	456.1	839.5	596.2	747.4	488.4	462.9	477.1
102	495.8	367.4	417.2	723.5	560.0	629.9	518.0	490.7	506.2
111	450.3	276.3	368.7	735.0	560.0	639.0	530.0	470.9	508.9
120	557.6	312.1	441.2	756.3	600.5	645.4	545.0	466.8	528.4
132	311.3	173.5	223.3	695.6	594.2	630.5	456.0	102.5	329.6
138	510.3	266.4	384.9	562.0	279.1	484.4	547.0	380.9	502.1

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42915B
Test Date: 6/24/80
Test Type: Forced Reflood (third repeat)
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.275 MPa (39.9 psia)
Initial peak clad temperature and location	875°C (1608°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	529°C (520°C - 533°C) [985°F (968°F - 992°F)]
Initial bundle water level	39.1 mm (1.54 in.)

B. Summary Results:

C. Comments:

Inlet mass flow: approximately -1.5%[a]

Housing temperature at midplane: -1% linearly increasing to approximately +5% by 250 seconds[a]

a. Relative to run 41907B

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42915B

ROD/ELEV	CHAN.I NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1075.	1212.	137.	31.5	765.	98.4
4C 3- 3	11	1217.	1315.	98.	25.0	866.	95.4
1C 4- 0	14	1300.	1448.	149.	32.0	811.	141.0
2A 5- 0	17	1370.	1625.	255.	59.0	794.	228.9
2A 5- 7	21	1483.	1790.	306.	86.5	938.	291.6
1D 6- 2	50	1424.	1740.	315.	78.0	911.	354.7
2D 6- 2	53	1509.	1844.	335.	87.0	693.	380.1
3D 6- 2	58	1552.	1856.	304.	86.5	878.	350.5
5C 6- 2	61	1485.	1801.	316.	87.0	983.	347.0
1D 6- 3	63	1436.	1751.	315.	87.0	863.	331.3
4B 6- 3	68	1530.	1847.	317.	87.0	874.	369.7
5D 6- 3	69	1421.	1802.	381.	122.0	848.	403.7
2A 6- 4	70	1446.	1762.	316.	93.0	824.	381.8
2D 6- 4	72	1530.	1870.	340.	79.5	848.	391.6
3B 6- 4	75	1563.	1909.	345.	86.5	917.	378.9
3C 6- 5	85	1599.	1942.	343.	87.0	884.	385.6
3E 6- 5	86	1470.	1798.	328.	89.5	894.	391.8
3C 6- 6	95	1580.	1966.	386.	89.0	930.	395.7
3D 6- 6	96	1544.	1938.	395.	87.0	947.	384.6
4A 6- 6	97	1430.	1800.	370.	96.0	818.	402.6
4C 6- 6	98	1552.	1946.	394.	96.0	961.	391.8
5C 6- 6	101	1460.	1809.	349.	109.0	951.	386.7
1C 7- 0	110	1431.	1681.	250.	56.5	724.	442.9
2B 7- 0	111	1470.	1690.	220.	35.5	775.	437.0
3D 7- 0	115	1497.	1752.	255.	38.0	817.	422.0
5B 7- 0	117	1369.	1634.	265.	75.0	744.	449.0
2B 7- 6	120	1454.	1774.	320.	80.0	818.	472.7
2C 7- 6	121	1471.	1804.	334.	72.5	775.	477.9
2E 7- 6	122	1288.	1572.	294.	57.5	665.	485.5
3A 7- 6	123	1422.	1737.	316.	83.0	799.	469.6
3B 7- 6	124	1471.	1817.	346.	74.5	844.	466.9
4B 7- 6	127	1464.	1798.	334.	74.5	810.	471.2
5C 7- 6	128	1413.	1753.	340.	86.5	887.	468.9
1C 8- 0	131	1286.	1665.	378.	85.5	742.	505.8
2E 8- 0	133	1172.	1526.	354.	65.0	685.	498.0
3D 8- 0	136	1337.	1759.	422.	96.5	854.	483.9
5B 8- 0	138	1194.	1599.	405.	117.0	683.	512.3
5C 8- 0	139	1309.	1707.	398.	115.0	786.	504.9
1C 8- 6	141	1054.	1437.	392.	80.0	607.	530.0
1D 8- 6	142	806.	1261.	455.	54.5	627.	519.0
2C 8- 6	143	1143.	1525.	382.	77.0	648.	531.0
4B 8- 6	145	1227.	1645.	418.	87.0	730.	522.9
5D 8- 6	148	1090.	1429.	339.	66.5	617.	525.8
3D 9- 3	154	985.	1425.	439.	117.0	693.	522.0
4C 9- 3	156	1066.	1438.	372.	89.5	662.	532.0
1D10- 0	161	579.	1118.	539.	151.0	633.	550.0
4B10- 0	164	921.	1275.	353.	97.5	634.	554.0
5D10- 0	167	732.	1142.	410.	124.0	745.	477.0
2A11- 0	168	582.	802.	220.	116.0	637.	469.0
4C11- 0	* * B A D T H E R M O C O U P L E D A T A *						
1D11- 6	172	281.	849.	568.	166.0	498.	539.9

RUN 42915B HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	638.4	577.0	600.3	653.1	597.2	618.0	7.0	7.0	7.0
24	896.1	804.0	838.8	941.8	857.2	888.4	15.0	12.5	14.0
39	1216.7	1075.0	1124.4	1315.2	1211.8	1253.1	31.5	25.0	27.9
48	1361.1	1248.1	1295.3	1550.6	1420.5	1473.9	53.0	32.0	40.1
60	1474.4	1338.1	1385.8	1685.4	1564.6	1614.9	59.0	35.5	46.9
67	1577.4	1470.1	1503.6	1882.5	1757.5	1806.9	86.5	57.5	72.4
70	1607.7	1486.2	1539.7	1949.9	1804.4	1873.3	93.0	74.5	80.4
71	1594.7	1410.1	1504.3	1948.7	1729.6	1837.5	96.0	74.5	82.6
72	1474.8	1411.6	1457.0	1812.3	1707.3	1772.9	95.0	77.5	84.4
74	1554.1	1424.5	1501.1	1900.6	1739.7	1826.8	95.0	78.0	88.1
75	1589.3	1421.3	1512.2	1910.9	1750.8	1837.8	122.0	79.5	91.2
76	1600.1	1443.3	1512.1	1914.3	1762.0	1842.6	96.5	79.5	88.8
77	1599.0	1386.7	1503.9	1946.4	1735.2	1856.0	96.5	79.5	86.8
78	1580.0	1422.3	1491.1	1965.9	1762.0	1864.1	109.0	76.5	90.5
84	1501.6	1356.9	1430.9	1753.1	1586.3	1685.8	87.0	35.5	61.5
90	1470.7	1287.7	1409.0	1816.9	1572.2	1733.3	89.5	48.5	75.5
96	1352.2	1172.0	1285.5	1765.3	1525.7	1680.5	117.0	65.0	95.1
102	1226.7	806.2	1076.9	1645.0	1260.9	1461.9	115.0	54.5	80.8
111	1065.7	660.2	968.5	1437.7	1205.6	1329.1	170.0	51.0	92.2
120	921.4	579.3	750.4	1311.0	1118.2	1212.3	163.0	97.5	130.1
132	607.4	484.0	557.8	831.3	798.2	810.6	156.0	85.0	119.0
138	696.3	280.8	474.6	984.1	808.5	896.6	166.0	117.0	141.6

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	20.2	14.7	17.8	626.1	590.9	603.7	11.5	10.0	10.7
24	60.4	42.3	49.6	763.1	713.2	736.4	39.5	36.9	38.3
39	142.9	98.5	128.7	865.6	764.8	805.7	100.9	95.4	98.4
48	204.1	148.6	178.6	938.2	810.7	880.1	142.9	137.4	140.9
60	255.4	211.0	229.1	864.7	764.3	803.5	238.8	228.8	231.8
67	327.6	274.1	303.3	957.4	871.5	922.1	300.8	281.7	291.4
70	346.5	312.9	333.6	993.3	889.7	944.5	320.7	308.8	317.5
71	354.0	316.9	333.2	1006.7	870.9	953.2	365.8	317.7	332.8
72	337.5	295.7	315.9	930.4	841.9	890.6	347.8	328.5	338.1
74	380.5	293.0	325.8	1126.0	692.5	877.7	380.1	343.2	360.1
75	380.9	283.0	325.6	934.9	837.4	885.7	403.7	331.3	372.8
76	355.0	314.2	330.6	1011.5	823.7	907.1	391.6	365.7	378.2
77	380.8	327.6	352.0	937.0	823.6	884.5	399.9	381.8	388.9
78	401.0	335.8	373.0	961.1	818.2	895.0	408.6	384.6	397.7
84	306.3	219.6	254.9	817.1	707.0	754.6	454.6	422.0	439.3
90	348.7	284.5	324.3	887.5	665.5	796.7	492.8	457.8	473.5
96	432.0	353.7	395.0	854.5	682.5	761.1	512.3	483.9	500.4
102	454.7	336.6	384.9	730.3	588.8	529.1	539.0	519.0	528.1
111	574.6	248.1	360.6	745.1	562.1	644.5	549.0	481.0	526.6
120	592.2	353.1	461.9	745.1	611.0	538.0	565.0	477.0	547.5
132	347.3	190.8	252.8	689.2	599.6	642.0	469.0	273.2	399.7
138	568.1	267.2	422.0	539.6	468.6	500.7	569.0	377.7	519.4

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42715C
Test Date: 8/27/80
Test Type: Forced Reflood (second repeat)
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.275 MPa (39.9 psia)
Initial peak clad temperature and location	874°C (1606°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28.2 mm/sec (1.11 in./sec)
Coolant temperature	49°C (121°F)
Average and range of initial 1.83 m (72 in.) housing temperature	503°C (491°C - 511°C) [938°F (916°F - 951°F)]
Initial bundle water level	36.1 mm (1.42 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-5% for 20 seconds, +3.5% to 50 seconds, +0.5% to 150 seconds, +3% to 175 seconds, and +1% thereafter[a]
Total power:	+0.5% linearly increasing to +1%[a]
Housing temperature at midplane:	-2% linearly increasing to -5% by 250 seconds[a]

a. Relative to run 43315C

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42715C

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1072.	1222.	151.	39.0	813.	86.7
4C 3- 3	11	1236.	1361.	125.	27.5	846.	96.8
1C 4- 0	14	1350.	1525.	175.	40.0	878.	146.6
2A 5- 0	17	1390.	1656.	266.	56.0	881.	218.7
2A 5- 7	21	1506.	1798.	292.	62.0	970.	277.7
1D 6- 2	50	1476.	1704.	228.	55.5	976.	340.7
2D 6- 2	53	1497.	1748.	250.	80.5	636.	367.9
3D 6- 2	58	1556.	1761.	205.	30.0	751.	363.0
4B 6- 2	60	1565.	1792.	227.	43.0	927.	354.3
5C 6- 2	61	1471.	1780.	309.	89.0	1156.	324.6
1D 6- 3	63	1463.	1717.	254.	78.5	987.	350.3
5D 6- 3	69	1483.	1721.	237.	45.5	1009.	353.7
2A 6- 4	70	1465.	1736.	271.	58.5	1118.	283.5
3B 6- 4	75	1574.	1833.	258.	48.5	904.	359.8
2D 6- 5	84	1548.	1837.	289.	79.0	856.	383.7
3C 6- 5	85	1593.	1901.	307.	69.5	976.	366.9
3E 6- 5	86	1527.	1753.	226.	78.5	963.	365.7
3C 6- 6	95	1576.	1914.	338.	77.5	933.	377.7
3D 6- 6	96	1551.	1885.	334.	80.0	882.	392.4
4A 6- 6	97	1465.	1770.	304.	57.0	950.	362.7
4C 6- 6	98	1574.	1903.	329.	79.5	958.	383.8
5C 6- 6	101	1544.	1787.	243.	42.0	947.	375.9
1C 7- 0	110	1428.	1664.	236.	40.0	744.	421.6
2B 7- 0	111	1438.	1681.	243.	29.0	714.	419.4
3D 7- 0	115	1459.	1721.	262.	36.5	696.	431.4
5B 7- 0	117	1357.	1590.	233.	41.0	768.	418.2
2B 7- 6	120	1428.	1730.	302.	53.0	832.	450.9
2C 7- 6	121	1444.	1777.	332.	57.0	812.	463.9
2E 7- 6	122	1292.	1566.	274.	48.5	741.	450.9
3A 7- 6	123	1410.	1703.	293.	53.5	770.	447.5
3B 7- 6	124	1441.	1755.	314.	54.5	795.	455.0
4B 7- 6	127	1431.	1748.	317.	51.5	770.	463.0
5C 7- 6	128	1414.	1694.	281.	53.0	794.	442.9
1C 8- 0	131	1237.	1621.	384.	89.5	722.	490.0
2E 8- 0	133	1000.	1501.	501.	81.0	736.	478.9
3D 8- 0	136	1294.	1713.	419.	86.5	788.	486.5
5B 8- 0	138	1197.	1542.	345.	92.0	730.	473.0
5C 8- 0	139	1336.	1661.	326.	79.5	786.	470.9
1C 8- 6	141	1035.	1440.	405.	88.5	587.	512.1
1D 8- 6	142	773.	1249.	477.	112.0	606.	492.0
2C 8- 6	** BAD THERMOCOUPLE DATA *						
4B 8- 6	145	1154.	1457.	303.	43.0	612.	523.0
5D 8- 6	148	1058.	1424.	365.	92.0	624.	513.8
3D 9- 3	154	924.	1398.	474.	115.0	614.	524.0
4C 9- 3	156	1030.	1358.	328.	57.5	611.	518.4
1D10- 0	161	586.	1061.	475.	163.0	722.	446.1
4B10- 0	164	887.	1228.	341.	88.5	600.	550.9
5D10- 0	167	720.	1142.	422.	138.0	681.	455.6
2A11- 0	168	573.	788.	215.	93.0	620.	375.1
4C11- 0	170	680.	984.	304.	93.0	447.	538.0
1D11- 6	172	321.	823.	502.	152.0	575.	426.0

RUN 42715C HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	673.0	588.7	616.6	685.7	604.6	630.9	6.5	5.5	6.0
24	888.2	795.5	845.8	939.8	853.0	895.7	17.5	13.5	15.5
39	1236.4	1071.7	1141.7	1361.4	1222.3	1284.7	39.0	27.5	32.8
48	1379.1	1301.6	1333.4	1572.2	1499.8	1531.9	55.0	38.0	44.6
60	1400.2	1390.2	1394.4	1716.3	1655.9	1689.1	80.5	56.0	71.8
67	1606.3	1483.7	1520.1	1923.5	1778.7	1819.9	77.5	62.0	69.6
70	1590.5	1400.2	1528.2	1960.2	1653.7	1864.6	84.5	45.5	73.6
71	1547.3	1452.1	1518.1	1899.4	1783.2	1850.0	86.0	79.5	81.5
72	1509.0	1497.6	1503.3	1825.9	1825.9	1825.9	87.5	67.0	77.3
74	1579.8	1455.3	1518.4	1792.1	1677.7	1737.3	87.5	30.0	56.2
75	1598.1	1463.3	1538.7	1857.6	1696.3	1776.8	78.5	29.0	50.4
76	1500.3	1452.6	1534.6	1883.6	1722.9	1788.7	87.5	41.5	56.8
77	1593.3	1436.0	1531.3	1900.6	1728.5	1812.2	79.0	45.5	67.7
78	1576.0	1421.0	1518.6	1914.3	1760.9	1828.4	93.0	42.0	70.9
84	1475.1	1216.0	1399.4	1743.0	1450.5	1655.5	71.5	29.0	42.9
90	1444.1	1291.7	1404.5	1776.5	1565.7	1705.7	80.0	45.5	55.2
96	1345.1	1000.1	1255.6	1712.9	1500.9	1637.3	93.0	58.5	79.9
102	1154.1	772.7	1029.1	1494.4	1249.4	1419.8	115.0	43.0	86.5
111	1050.6	850.9	984.7	1398.1	1228.5	1328.8	120.0	57.0	80.2
120	899.1	586.0	757.3	1283.9	1061.4	1184.5	163.0	61.0	119.5
132	630.4	480.7	578.9	984.1	783.6	840.7	134.0	82.5	100.6
138	656.7	321.5	474.7	971.7	795.0	870.5	152.0	116.0	134.2

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	17.3	11.7	14.4	633.1	589.8	604.9	14.5	9.7	12.0
24	57.5	40.9	50.0	771.5	741.1	751.8	40.0	35.8	38.4
39	155.1	125.0	143.0	874.2	812.8	838.9	97.4	86.7	92.8
48	227.9	174.8	198.5	934.3	864.2	893.9	147.8	139.8	143.8
60	316.1	265.7	294.7	939.4	823.7	881.4	227.4	218.7	222.3
67	317.2	292.0	299.8	970.6	942.6	958.0	280.7	272.7	277.4
70	359.5	253.5	336.4	1022.9	898.7	943.4	315.7	303.7	309.1
71	352.0	310.8	331.9	1062.6	854.2	964.0	320.8	307.7	314.2
72	328.3	316.9	322.6	1032.7	983.4	1008.1	313.7	310.7	312.2
74	250.4	200.9	218.9	1065.0	623.3	832.6	367.9	303.4	346.4
75	278.1	165.7	238.1	1009.2	783.5	936.4	371.6	350.3	357.4
76	283.3	181.5	254.1	1117.8	810.2	934.0	377.6	283.5	352.0
77	319.9	226.3	280.9	979.5	855.7	948.3	385.6	356.8	370.6
78	341.0	242.9	309.8	1065.5	831.4	922.7	393.4	321.7	374.6
84	291.9	232.9	256.1	792.4	696.0	744.9	435.0	402.0	419.5
90	347.2	251.2	301.2	832.0	740.7	789.6	463.9	416.9	450.2
96	500.8	325.7	381.7	788.4	722.4	766.8	493.0	469.8	480.2
102	476.7	302.8	390.7	640.5	587.3	616.9	523.0	492.0	510.5
111	474.3	286.5	344.1	640.5	285.6	566.1	529.0	408.0	501.3
120	576.8	316.9	427.2	771.0	484.5	641.7	550.9	372.6	491.2
132	303.6	214.6	261.8	664.0	447.3	593.8	588.0	244.9	357.0
138	501.5	261.3	395.8	574.9	286.6	490.9	515.9	201.3	408.4

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43315C
Test Date: 8/29/80
Test Type: Forced Reflood (third repeat)
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.274 MPa (39.8 psia)
Initial peak clad temperature and location	874°C (1606°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.54 kw/m (0.775 kw/ft)
Flow rate	28.2 mm/sec (1.11 in./sec)
Coolant temperature	49°C (121°F)
Average and range of initial 1.83 m (72 in.) housing temperature	514°C (501°C - 521°C) [957°F (934°F - 970°F)]
Initial bundle water level	35.43 mm (1.395 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+4.5% for 50 seconds, 0% to 220 seconds, and +1% thereafter[a]
Total power:	-0.3% constant[a]
Housing temperature at midplane:	+3% linearly increasing to +5% by 250 seconds[a]

a. Relative to run 42107C

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER433150

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1031.	1215.	134.	36.5	870.	87.0
4C 3- 3	11	1245.	1346.	100.	25.5	841.	99.4
1C 4- 0	14	1351.	1520.	159.	44.5	868.	151.8
2A 5- 0	17	1403.	1644.	241.	54.0	852.	229.9
2A 5- 7	21	1499.	1785.	287.	64.0	925.	288.7
1D 6- 2	50	1467.	1693.	226.	79.0	962.	359.9
2D 6- 2	53	1496.	1756.	260.	86.0	651.	373.0
3D 6- 2	58	1553.	1754.	201.	64.0	695.	380.7
4B 6- 2	60	1559.	1784.	225.	64.0	935.	366.8
5C 6- 2	61	1461.	1763.	332.	93.0	588.	369.8
1D 6- 3	63	1455.	1711.	256.	86.0	985.	368.9
5D 6- 3	69	1475.	1706.	232.	49.5	938.	371.7
2A 6- 4	70	1453.	1723.	270.	62.5	1011.	301.6
3B 6- 4	75	1572.	1826.	254.	54.0	903.	370.7
2D 6- 5	84	1552.	1836.	284.	82.0	859.	389.1
3C 6- 5	85	1597.	1901.	304.	64.0	972.	376.7
3E 6- 5	86	1519.	1748.	229.	81.5	946.	375.7
3C 6- 6	95	1533.	1913.	330.	81.0	962.	387.7
3D 6- 6	96	1557.	1884.	327.	82.0	818.	408.5
4A 6- 6	97	1465.	1754.	289.	62.5	908.	386.6
4C 6- 6	98	1582.	1897.	315.	78.0	924.	394.6
5C 6- 6	101	1537.	1758.	221.	49.5	925.	387.9
1C 7- 0	110	1438.	1651.	212.	49.0	775.	432.9
2B 7- 0	111	1452.	1659.	208.	28.5	716.	429.7
3D 7- 0	115	1477.	1711.	234.	30.5	699.	445.0
5B 7- 0	117	1384.	1613.	229.	51.5	789.	425.9
2B 7- 6	120	1444.	1722.	278.	52.0	818.	469.4
2C 7- 6	121	1457.	1772.	315.	62.5	797.	483.7
2E 7- 6	122	1295.	1536.	241.	63.5	723.	460.5
3A 7- 6	123	1426.	1709.	282.	52.0	798.	458.7
3B 7- 6	124	1463.	1763.	300.	51.5	812.	471.8
4B 7- 6	127	1457.	1770.	313.	62.5	780.	481.9
5C 7- 6	128	1440.	1711.	270.	56.5	778.	454.1
1C 8- 0	131	1264.	1633.	369.	84.0	746.	516.9
2E 8- 0	133	1089.	1541.	452.	91.0	787.	498.9
3D 8- 0	136	1327.	1730.	402.	82.0	803.	509.8
5B 8- 0	138	1226.	1567.	340.	86.5	719.	495.4
5C 8- 0	139	1351.	1679.	318.	81.5	801.	485.9
1C 8- 6	141	1096.	1448.	352.	62.5	578.	544.6
1D 8- 6	142	897.	1295.	398.	52.0	593.	527.7
2C 8- 6	* * B A D	T H E R M O C O U P L E	D A T A *				
4B 8- 6	145	1170.	1459.	289.	49.5	610.	543.9
5D 8- 6	148	1096.	1460.	364.	93.5	653.	529.9
3D 9- 3	154	952.	1430.	458.	93.5	588.	552.0
4C 9- 3	156	1045.	1376.	331.	64.0	581.	542.0
1D10- 0	161	589.	1078.	489.	155.0	283.	482.0
4B10- 0	164	895.	1235.	340.	95.5	603.	569.0
5D10- 0	167	722.	1073.	351.	97.0	685.	460.2
2A11- 0	168	588.	812.	224.	121.0	618.	387.0
4C11- 0	170	700.	1001.	300.	93.5	435.	558.0
1D11- 6	172	419.	831.	413.	146.0	588.	438.0

RUN 433150 HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	684.6	600.4	629.6	695.2	613.1	541.0	6.0	5.0	5.6
24	906.2	813.6	863.3	950.1	862.3	905.0	15.0	13.0	14.0
39	1245.2	1080.9	1151.6	1345.6	1215.0	1278.9	36.5	25.5	32.6
48	1381.2	1307.9	1346.8	1560.3	1520.3	1537.6	58.5	38.5	47.2
60	1408.1	1398.6	1403.4	1708.5	1643.9	1673.4	84.0	54.0	68.3
67	1609.0	1478.9	1517.5	1921.2	1769.8	1812.9	81.0	64.0	72.5
70	1592.8	1470.3	1547.4	1962.5	1821.4	1899.5	91.0	78.5	85.6
71	1547.9	1447.3	1517.1	1905.1	1764.2	1845.3	91.0	81.0	85.6
72	1501.9	1490.6	1496.3	1810.1	1805.6	1807.8	92.5	63.0	77.8
74	1576.5	1442.5	1511.4	1784.3	1666.8	1730.6	86.0	50.5	70.1
75	1595.9	1454.9	1532.6	1846.3	1683.2	1766.7	86.0	49.5	65.2
76	1600.3	1443.5	1528.9	1879.1	1708.5	1780.9	86.5	51.0	65.9
77	1597.0	1431.2	1529.5	1900.6	1722.9	1807.2	86.5	64.0	77.5
78	1583.0	1417.8	1517.2	1913.2	1747.5	1818.9	90.0	49.5	71.7
84	1491.2	1226.4	1414.6	1739.7	1443.0	1648.2	55.5	28.5	42.5
90	1462.8	1294.8	1423.4	1776.5	1535.5	1709.4	65.0	51.5	57.5
96	1370.8	1088.7	1287.6	1730.8	1540.9	1648.9	91.0	63.5	77.7
102	1169.6	897.0	1075.1	1521.4	1295.3	1448.3	93.5	49.5	70.8
111	1067.5	883.0	1001.3	1430.2	1215.0	1332.4	93.5	56.5	72.1
120	916.0	589.2	772.4	1307.9	1072.7	1190.1	155.0	56.5	116.2
132	700.4	483.4	592.8	1000.6	801.3	862.7	134.0	83.0	107.9
138	672.5	418.6	516.3	988.2	774.2	877.7	146.0	112.0	129.8

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	12.6	9.4	11.3	644.7	607.9	620.8	13.5	8.5	10.7
24	48.7	32.6	41.7	776.4	742.7	754.5	40.5	35.8	38.6
39	149.9	100.4	127.4	976.0	807.1	848.5	99.4	87.0	94.4
48	224.3	168.9	190.7	900.7	868.3	880.7	152.9	146.8	150.5
60	300.4	240.5	270.1	912.6	799.4	854.7	237.3	229.8	232.3
67	312.1	286.5	295.5	979.5	898.4	931.6	291.8	283.7	288.2
70	369.8	333.9	352.1	1030.0	912.5	949.4	328.6	313.8	322.3
71	357.2	315.1	328.2	953.5	850.7	906.3	333.7	322.9	328.2
72	315.0	308.1	311.6	987.7	973.4	980.5	325.5	322.8	324.1
74	260.4	194.3	219.2	1078.9	650.9	825.6	380.7	293.5	355.1
75	270.6	166.7	234.1	985.8	784.9	915.0	378.7	360.8	369.8
76	291.6	183.4	252.0	1014.1	840.5	918.7	390.7	301.6	361.3
77	309.8	228.8	277.8	971.6	858.8	919.4	398.6	369.5	383.1
78	333.0	221.0	301.7	999.2	817.5	913.4	408.5	342.6	384.9
84	271.8	207.6	233.6	836.5	699.5	758.1	445.0	396.9	425.8
90	332.4	240.7	286.0	818.4	723.2	790.0	483.7	423.5	464.8
96	452.2	318.0	361.3	870.6	718.9	792.4	516.9	485.9	501.1
102	454.1	289.5	373.1	653.3	578.4	514.2	546.0	527.7	537.0
111	467.7	263.9	331.1	648.8	561.0	593.0	552.0	422.8	520.6
120	582.6	296.8	417.7	778.2	283.4	581.9	572.5	380.5	510.9
132	317.9	223.9	269.9	642.2	435.3	574.0	558.0	267.2	371.9
138	421.4	271.4	351.4	587.6	285.6	477.0	531.0	180.5	412.1

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43115D
Test Date: 10/22/80
Test Type: Forced Reflood (third repeat)
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.279 MPa (40.4 psia)
Initial peak clad temperature and location	873°C (1603°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	511°C (501°C - 518°C) [951°F (934°F - 965°F)]
Initial bundle water level	42.5 mm (1.67 in.)

B. Summary Results:

C. Comments:

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43115D

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1070.	1205.	134.	31.0	850.	90.3
4C 3- 3	9	1190.	1323.	133.	34.5	847.	90.4
1C 4- 0	10	1305.	1463.	159.	35.5	906.	128.8
2A 5- 0	13	1385.	1680.	295.	70.5	883.	225.8
2A 5- 7	16	1477.	1744.	267.	60.0	908.	281.8
2D 6- 2	50	1527.	1795.	268.	49.0	926.	316.8
3D 6- 2	55	1513.	1828.	315.	58.0	260.	604.0
5C 6- 2	59	1541.	1795.	255.	70.0	879.	338.4
1D 6- 3	61	1481.	1761.	279.	69.5	1052.	291.6
4B 6- 3	66	1549.	1832.	283.	57.5	962.	331.8
5D 6- 3	68	1474.	1758.	283.	71.5	929.	338.8
2A 6- 4	70	1470.	1765.	295.	66.0	1037.	313.6
3B 6- 4	* * B A D T H E R M O C O U P L E D A T A *						
1D 6- 5	82	1467.	1760.	293.	80.5	1059.	306.7
2D 6- 5	* * B A D T H E R M O C O U P L E D A T A *						
3C 6- 5	85	1600.	1904.	304.	57.5	921.	349.7
3E 6- 5	86	1500.	1751.	251.	72.0	896.	343.8
3C 6- 6	97	1588.	1926.	338.	58.5	914.	358.7
3D 6- 6	98	1566.	1879.	313.	58.5	896.	359.4
4A 6- 6	100	1476.	1794.	318.	59.0	893.	374.3
4C 6- 6	101	1571.	1921.	350.	82.5	1020.	353.8
5C 6- 6	103	1538.	1818.	280.	83.0	950.	361.8
1C 7- 0	* * B A D T H E R M O C O U P L E D A T A *						
2B 7- 0	111	1445.	1713.	268.	38.5	781.	371.0
3D 7- 0	115	1471.	1748.	276.	48.5	736.	393.8
5B 7- 0	117	1355.	1606.	251.	47.5	697.	400.8
2B 7- 6	121	1440.	1755.	315.	48.5	697.	405.7
2C 7- 6	122	1424.	1792.	368.	72.0	807.	441.4
2E 7- 6	123	1309.	1568.	259.	49.0	819.	420.6
3A 7- 6	124	1436.	1739.	302.	58.5	809.	421.0
3B 7- 6	125	1468.	1790.	322.	58.5	860.	408.9
4B 7- 6	126	1457.	1789.	331.	57.5	807.	434.9
5C 7- 6	129	1436.	1725.	290.	57.5	844.	416.9
1C 8- 0	132	1205.	1586.	382.	81.0	732.	479.9
2E 8- 0	134	1120.	1443.	323.	62.0	722.	446.9
3D 8- 0	137	1329.	1741.	412.	71.5	837.	445.6
5B 8- 0	139	1271.	1611.	340.	71.5	694.	471.9
5C 8- 0	140	1348.	1684.	336.	72.0	805.	441.9
1C 8- 6	141	1010.	1441.	431.	82.5	595.	510.0
1D 8- 6	142	865.	1422.	557.	92.5	714.	464.7
2C 8- 6	143	1091.	1500.	409.	83.0	586.	490.0
4B 8- 6	145	1179.	1527.	348.	49.0	673.	493.0
5D 8- 6	148	1115.	1490.	375.	80.0	687.	476.6
3D 9- 3	155	980.	1456.	476.	98.0	662.	491.0
4C 9- 3	157	1019.	1426.	407.	84.0	870.	491.9
1D10- 0	160	611.	1126.	515.	138.0	1096.	463.8
4B10- 0	163	872.	1236.	364.	92.5	804.	527.0
5D10- 0	166	744.	1121.	378.	115.0	698.	476.8
2A11- 0	167	576.	832.	256.	121.0	591.	441.5
4C11- 0	169	674.	1041.	366.	114.0	468.	520.0
1D11- 6	170	281.	794.	513.	142.0	597.	480.0

RUN 43115D HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	615.8	555.2	575.4	627.8	571.6	590.8	6.5	5.5	5.8
24	779.3	763.4	771.3	833.3	816.8	825.0	13.5	13.5	13.5
39	1189.8	1064.4	1108.1	1322.6	1204.5	1246.7	34.5	31.0	32.7
48	1304.6	1284.8	1294.7	1463.4	1463.4	1463.4	47.0	35.5	41.3
60	1491.4	1372.0	1416.2	1763.1	1658.1	1700.4	71.0	59.0	66.8
67	1599.4	1477.4	1519.4	1883.6	1744.1	1791.7	60.0	46.5	53.0
70	1602.6	1524.5	1563.0	1900.6	1833.8	1867.2	69.5	48.5	59.0
71	1539.9	1539.9	1539.9	1840.6	1840.6	1840.6	49.0	49.0	49.0
72	1564.5	1374.2	1522.1	1876.8	1673.4	1803.5	81.0	48.5	58.8
74	1564.8	1419.3	1512.1	1877.9	1733.0	1794.1	79.5	49.0	62.0
75	1548.6	1474.2	1505.5	1831.6	1735.2	1781.5	71.5	57.5	65.3
76	1583.1	1469.9	1532.6	1883.6	1744.1	1818.2	70.0	57.5	61.4
77	1600.4	1460.7	1521.3	1909.7	1750.8	1826.4	82.0	57.5	70.4
78	1568.6	1459.2	1532.2	1925.8	1748.6	1846.9	83.0	57.5	65.4
84	1471.0	1339.0	1415.2	1753.1	1605.8	1690.0	71.5	36.0	49.6
90	1467.8	1309.1	1405.6	1792.1	1567.9	1702.4	79.5	47.0	59.0
96	1377.2	1120.2	1275.4	1768.7	1443.0	1629.6	84.0	62.0	73.2
102	1179.1	864.6	1059.5	1526.8	1332.0	1451.8	92.5	49.0	72.7
111	1023.1	862.9	972.7	1455.9	1183.7	1329.6	98.0	66.5	81.3
120	872.2	609.8	715.6	1245.2	1120.3	1173.0	159.0	90.0	122.3
132	674.4	576.5	615.9	1040.8	832.3	908.7	121.0	92.5	109.2
138	653.7	261.3	487.9	977.9	794.0	862.5	142.0	121.0	130.3

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	16.4	12.0	14.9	606.3	560.3	581.4	10.1	7.9	9.0
24	54.0	53.4	53.7	729.8	717.3	723.6	32.9	32.4	32.6
39	146.5	132.8	136.5	850.2	797.6	831.4	93.9	90.3	91.5
48	176.6	156.6	168.7	905.8	858.5	882.1	140.9	128.8	134.8
60	294.6	271.7	284.1	962.7	833.0	893.0	231.8	211.6	223.0
67	264.2	266.1	272.3	1026.3	896.6	943.7	284.7	263.7	276.8
70	309.3	297.9	303.6	1043.7	915.7	979.7	293.7	279.6	286.7
71	300.7	300.7	300.7	966.1	966.1	966.1	307.9	307.9	307.9
72	299.2	250.5	281.4	990.1	834.3	905.6	326.4	295.6	307.6
74	318.1	246.2	282.1	1049.2	776.3	887.3	351.7	246.5	315.0
75	294.5	239.9	276.0	1052.0	901.2	959.8	338.8	291.6	322.9
76	317.7	240.2	285.6	1037.3	658.6	916.4	361.0	313.6	340.2
77	369.0	251.2	305.1	1059.1	895.8	953.3	363.5	306.7	343.4
78	349.9	262.6	314.7	1028.2	875.9	953.3	374.3	331.9	354.4
84	295.5	250.9	274.8	816.3	696.7	751.3	413.7	371.0	390.9
90	368.2	228.0	290.6	897.5	759.2	816.8	441.4	362.8	417.7
96	411.6	307.2	354.2	873.0	670.6	763.8	487.6	431.0	454.3
102	557.0	264.0	392.3	713.9	587.6	631.6	510.0	476.6	492.7
111	476.0	259.5	350.9	678.3	541.8	628.8	521.1	471.0	491.6
120	574.9	334.8	457.4	1098.0	573.8	683.3	537.0	367.9	469.4
132	366.4	255.6	292.8	591.4	488.2	533.0	520.0	441.5	476.8
138	512.7	323.9	374.6	608.3	493.8	559.2	532.0	314.5	458.6

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43215D
Test Date: 10/22/80
Test Type: Forced Reflood (fourth repeat)
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.277 MPa (40.2 psia)
Initial peak clad temperature and location	874°C (1605°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	51°C (123°F)
Average and range of initial 1.83 m (72 in.) housing temperature	516°C (506°C - 523°C) [960°F (943°F - 974°F)]
Initial bundle water level	74.9 mm (2.95 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+1.5% for 70 seconds, -0.5% to 140 seconds, -2% to 210 seconds, and +0.5% thereafter[a]
Total power:	-0.75% constant[a]
Housing temperature at midplane:	±1%[a]

a. Relative to run 43115D

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER432150

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1091.	1222.	131.	34.0	827.	98.7
4C 3- 3	9	1214.	1337.	123.	31.5	832.	97.9
1C 4- 0	10	1310.	1463.	153.	41.0	884.	136.8
2A 5- 0	13	1384.	1675.	290.	76.5	842.	235.6
2A 5- 7	16	1470.	1737.	257.	61.0	895.	289.6
2D 6- 2	50	1533.	1777.	243.	47.0	944.	315.3
3D 6- 2	55	1516.	1809.	293.	59.0	260.	600.0
5C 6- 2	59	1535.	1779.	243.	64.0	891.	344.9
1D 6- 3	61	1481.	1743.	262.	69.5	920.	329.4
4B 6- 3	66	1547.	1816.	259.	68.0	936.	338.4
5D 6- 3	68	1471.	1734.	263.	70.5	874.	353.7
2A 6- 4	70	1463.	1753.	290.	66.5	954.	321.8
3B 6- 4	** B A D T H E R M O C O U P L E D A T A *						
1D 6- 5	82	1464.	1740.	276.	71.0	953.	343.8
2D 6- 5	** B A D T H E R M O C O U P L E D A T A *						
3C 6- 5	85	1600.	1887.	287.	67.0	908.	352.4
3E 6- 5	86	1493.	1731.	238.	69.5	936.	320.8
3C 6- 6	97	1589.	1913.	324.	65.5	925.	361.4
3D 6- 6	98	1568.	1862.	294.	61.5	920.	353.2
4A 6- 6	100	1472.	1785.	313.	67.5	902.	378.9
4C 6- 6	101	1572.	1904.	332.	89.5	1023.	359.9
5C 6- 6	103	1532.	1804.	273.	87.5	930.	368.8
1C 7- 0	** B A D T H E R M O C O U P L E D A T A *						
2B 7- 0	111	1442.	1703.	261.	45.5	826.	352.8
3D 7- 0	115	1463.	1722.	259.	46.5	757.	391.0
5B 7- 0	117	1346.	1585.	239.	45.0	701.	414.0
2B 7- 6	121	1432.	1742.	310.	55.0	939.	398.8
2C 7- 6	122	1414.	1778.	364.	67.5	803.	457.9
2E 7- 6	123	1293.	1531.	238.	45.5	833.	427.5
3A 7- 6	124	1426.	1725.	299.	61.5	848.	425.9
3B 7- 6	125	1460.	1773.	313.	66.5	881.	416.9
4B 7- 6	128	1449.	1774.	325.	66.5	801.	450.9
5C 7- 6	129	1424.	1709.	284.	64.5	870.	427.9
1C 8- 0	132	1201.	1566.	365.	92.0	759.	486.8
2E 8- 0	134	1131.	1447.	316.	92.0	749.	467.0
3D 8- 0	137	1330.	1715.	335.	71.0	856.	456.9
5B 8- 0	139	1266.	1597.	331.	68.0	693.	489.9
5C 8- 0	140	1346.	1667.	321.	67.0	837.	460.0
1C 8- 6	141	1005.	1415.	410.	94.0	605.	519.0
1D 8- 6	142	858.	1390.	531.	101.0	654.	517.5
2C 8- 6	143	1081.	1490.	409.	88.5	585.	505.8
4B 8- 6	145	1174.	1518.	344.	57.0	661.	513.0
5D 8- 6	148	1107.	1446.	339.	68.5	661.	502.3
3D 9- 3	155	935.	1436.	450.	96.5	640.	502.0
4C 9- 3	157	1021.	1422.	400.	89.0	634.	509.6
1D10- 0	160	594.	1112.	518.	161.0	640.	518.9
4B10- 0	163	877.	1235.	358.	89.0	587.	543.9
5D10- 0	166	748.	1112.	364.	119.0	672.	483.7
2A11- 0	167	580.	831.	252.	125.0	573.	457.9
4C11- 0	169	674.	1033.	358.	119.0	489.	531.0
1D11- 6	170	291.	798.	507.	159.0	585.	490.9

RUN 43215D HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	696.7	633.6	656.2	704.6	643.6	665.7	5.5	4.0	4.8
24	848.3	824.0	837.3	881.0	864.4	874.8	12.5	12.0	12.2
39	1213.9	1091.3	1133.4	1337.3	1222.3	1264.8	35.0	31.5	33.5
48	1310.5	1299.5	1305.0	1467.7	1463.4	1465.5	45.5	41.0	43.3
60	1497.1	1378.6	1420.1	1756.4	1650.5	1693.8	76.5	61.0	69.3
67	1595.9	1470.3	1515.1	1862.1	1728.5	1776.0	61.0	46.5	54.8
70	1604.6	1523.0	1563.8	1874.5	1820.3	1847.4	67.0	47.0	57.0
71	1546.3	1546.3	1546.3	1820.3	1820.3	1820.3	57.0	57.0	57.0
72	1589.5	1374.4	1524.6	1854.2	1664.6	1786.0	92.0	47.5	63.3
74	1564.1	1418.9	1511.6	1856.4	1708.5	1774.8	70.0	47.0	59.6
75	1546.8	1471.4	1503.6	1815.7	1716.3	1763.4	70.5	56.5	66.9
76	1579.8	1462.8	1530.3	1861.0	1733.0	1802.1	67.5	55.0	64.4
77	1600.3	1463.9	1519.5	1896.0	1730.8	1809.0	86.5	67.0	72.0
78	1589.5	1453.2	1531.2	1913.2	1731.9	1832.4	89.5	56.0	68.8
84	1466.6	1325.7	1406.3	1731.9	1583.0	1671.1	66.5	45.0	49.3
90	1460.1	1292.7	1393.5	1777.6	1531.1	1682.7	88.0	43.0	61.8
96	1379.1	1131.2	1273.0	1760.9	1447.3	1511.6	92.0	66.5	76.0
102	1174.3	858.2	1050.3	1518.2	1317.3	1429.2	101.0	57.0	78.1
111	1021.2	857.1	965.9	1435.5	1149.4	1317.4	98.0	70.5	84.3
120	876.8	594.0	711.1	1234.8	1092.3	1160.0	161.0	77.5	123.4
132	674.1	579.6	614.5	1032.5	831.3	902.2	125.0	95.5	113.2
138	655.1	291.5	481.6	973.8	798.2	855.3	159.0	122.0	135.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	10.6	7.9	9.5	642.6	610.4	623.9	14.0	12.3	13.1
24	41.5	30.6	37.5	733.3	285.6	577.6	43.0	39.9	41.1
39	139.9	123.4	131.4	832.1	827.1	829.8	99.4	97.9	98.7
48	168.2	152.9	160.5	883.8	832.1	857.9	149.7	136.8	143.3
60	290.1	259.3	273.7	982.7	811.2	878.5	240.0	220.8	232.2
67	267.0	249.6	260.9	1023.2	891.7	936.5	292.7	270.8	284.4
70	297.3	269.9	283.6	999.3	938.9	969.1	301.7	288.5	295.1
71	274.0	274.0	274.0	916.4	916.4	916.4	317.9	317.9	317.9
72	290.1	226.1	261.4	998.6	813.1	899.8	334.5	298.8	313.7
74	305.2	233.5	263.1	996.6	775.4	873.2	352.0	252.6	318.3
75	278.9	226.7	259.8	1022.3	874.1	931.9	353.7	298.4	330.4
76	299.8	230.5	271.8	1160.3	695.7	912.3	363.0	282.8	339.4
77	352.4	238.0	289.5	953.7	904.5	929.8	368.8	320.8	349.9
78	342.2	246.5	301.2	1023.1	871.3	937.8	378.9	338.8	357.9
84	290.7	239.0	264.8	825.6	700.5	758.8	418.6	352.8	390.5
90	363.5	222.5	289.1	939.4	761.2	830.0	457.9	398.8	427.4
96	385.1	278.8	338.6	904.5	674.6	785.2	502.9	436.9	468.2
102	531.5	290.4	379.0	660.8	584.9	628.5	526.9	497.9	511.6
111	450.4	271.0	351.5	670.3	285.6	577.3	535.0	466.5	497.8
120	545.3	318.5	448.9	719.4	572.9	622.7	547.0	390.5	504.6
132	358.4	251.7	287.7	572.9	489.3	526.5	531.0	457.9	495.0
138	506.7	318.7	373.6	584.8	488.9	534.2	544.8	325.8	468.6

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42215E
Test Date: 12/9/80
Test Type: Forced Reflood (third repeat)
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.279 MPa (40.4 psia)
Initial peak clad temperature and location	876°C (1608°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28.2 mm/sec (1.11 in./sec)
Coolant temperature	51°C (124°F)
Average and range of initial 1.83 m (72 in.) housing temperature	515°C (506°C - 519°C) [959°F (942°F - 967°F)]
Initial bundle water level	29.5 mm (1.16 in.)

B. Summary Results:

C. Comments:

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42215E

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1200.	1331.	131.	34.0	808.	112.9
4C 3- 3	10	1277.	1347.	70.	18.0	861.	108.8
1C 4- 0	12	1396.	1599.	204.	48.5	917.	146.6
2A 5- 0	16	1508.	1797.	289.	54.0	921.	238.9
2A 5- 7	19	1530.	1798.	268.	59.5	913.	290.6
5C 6- 0	36	1427.	1737.	311.	101.0	243.	647.0
2D 6- 2	39	1516.	1781.	265.	96.5	788.	355.1
1D 6- 4	47	1481.	1732.	251.	97.5	811.	353.0
3D 6- 4	50	1464.	1850.	385.	109.0	1152.	355.3
4B 6- 4	52	1537.	1826.	289.	98.0	668.	342.8
5C 6- 4	54	1467.	1778.	310.	99.0	1117.	335.7
5D 6- 4	55	1496.	1707.	211.	71.0	880.	344.4
1D 6- 5	58	1495.	1761.	266.	97.0	887.	358.0
2A 6- 5	59	1491.	1758.	267.	97.0	742.	386.0
2D 6- 5	61	1539.	1814.	274.	98.0	881.	367.7
3B 6- 5	63	1564.	1853.	289.	100.0	770.	364.9
3C 6- 6	72	1580.	1914.	334.	104.0	690.	372.6
4C 6- 6	75	1589.	1893.	303.	98.0	908.	373.7
3C 6- 7	* * B A D T H E R M O C O U P L E D A T A *						
3E 6- 7	83	1509.	1783.	274.	105.0	876.	383.7
3D 6- 8	86	1561.	1904.	343.	97.0	867.	402.8
4A 6- 8	87	1460.	1760.	300.	98.0	720.	423.7
1C 7- 0	93	1453.	1653.	200.	48.5	704.	391.6
2B 7- 0	94	1477.	1679.	202.	37.0	728.	411.8
3D 7- 0	98	1505.	1736.	231.	37.5	760.	431.0
5B 7- 0	103	1412.	1622.	210.	47.0	734.	420.0
2B 7- 6	110	1398.	1714.	316.	58.5	787.	440.0
2C 7- 6	111	1453.	1740.	287.	58.0	829.	420.8
2E 7- 6	113	1242.	1530.	288.	42.5	868.	418.8
3A 7- 6	* * B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	115	1087.	1594.	507.	87.0	693.	489.9
4B 7- 6	120	1434.	1778.	344.	72.5	877.	431.8
5C 7- 6	122	1421.	1733.	312.	76.0	812.	443.9
1C 8- 0	124	1096.	1551.	454.	97.0	788.	465.5
2E 8- 0	126	915.	1323.	407.	70.5	750.	450.8
3D 8- 0	129	1173.	1669.	496.	98.0	786.	475.0
5B 8- 0	133	1193.	1556.	363.	70.5	840.	449.7
5C 8- 0	134	1263.	1675.	411.	84.0	742.	470.0
1C 8- 6	135	900.	1390.	489.	97.5	679.	495.6
1D 8- 6	136	804.	1301.	497.	97.5	651.	518.9
2C 8- 6	138	1068.	1615.	547.	98.0	751.	492.9
4B 8- 6	143	1090.	1520.	430.	77.0	694.	484.9
5D 8- 6	145	978.	1490.	513.	138.0	677.	502.9
3D 9- 3	150	868.	1351.	483.	110.0	620.	509.0
4C 9- 3	152	966.	1423.	456.	109.0	634.	500.0
1D10- 0	157	602.	1064.	462.	133.0	531.	543.7
4B10- 0	164	833.	1221.	388.	105.0	650.	508.0
5D10- 0	166	702.	1047.	345.	144.0	665.	404.2
2A11- 0	168	547.	771.	225.	127.0	585.	381.0
4C11- 0	169	648.	1010.	362.	141.0	508.	492.0
1D11- 6	171	356.	761.	404.	150.0	533.	419.6

RUN 42215E HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	697.1	658.6	682.9	707.7	674.1	696.2	6.0	5.0	5.5
24	967.0	897.4	929.2	999.6	937.7	963.2	13.5	12.5	13.2
39	1276.6	1188.0	1213.6	1346.7	1317.3	1330.4	35.5	18.0	28.8
48	1449.1	1366.3	1403.7	1636.3	1549.5	1595.0	48.5	47.5	48.2
60	1531.0	1490.9	1510.0	1796.6	1738.6	1771.7	64.0	46.0	57.5
67	1607.8	1501.6	1554.7	1885.9	1776.5	1834.1	75.0	60.5	68.6
70	1595.2	1539.0	1568.7	1871.1	1837.2	1851.5	83.5	58.0	67.3
73	1480.6	1480.6	1480.6	1750.8	1750.8	1750.8	96.0	96.0	96.0
74	1523.2	1515.7	1519.4	1805.6	1780.9	1793.2	96.5	72.5	84.5
75	1490.9	1469.4	1479.4	1749.7	1707.3	1730.2	101.0	72.0	91.6
76	1556.3	1467.3	1506.1	1825.9	1707.3	1764.7	99.0	71.0	90.8
77	1563.9	1486.6	1514.3	1853.1	1728.5	1774.5	104.0	71.0	95.3
78	1589.4	1466.2	1530.9	1914.3	1738.6	1812.2	109.0	96.0	99.8
79	1560.7	1509.2	1534.8	1861.0	1760.9	1803.5	105.0	100.0	102.0
80	1561.3	1450.2	1503.2	1904.0	1759.8	1816.7	109.0	96.0	101.0
81	1550.5	1550.5	1550.5	1921.2	1921.2	1921.2	98.0	98.0	98.0
82	1492.6	1492.6	1492.6	1816.9	1816.9	1816.9	109.0	109.0	109.0
84	1517.4	1400.9	1473.1	1739.7	1622.1	1692.0	49.5	37.0	42.4
90	1505.1	1086.8	1354.2	1804.4	1511.7	1686.8	87.0	42.5	65.9
96	1270.6	915.3	1167.9	1728.5	1322.6	1609.9	109.0	70.5	87.7
102	1440.8	758.5	993.7	1784.3	1049.0	1427.5	138.0	47.0	93.3
111	966.3	706.8	834.3	1438.7	1034.6	1257.2	143.0	82.5	106.4
120	1036.3	602.0	759.9	1402.3	1047.0	1165.5	149.0	71.0	117.2
132	648.1	453.5	526.6	1009.9	712.9	822.0	155.0	127.0	142.0
138	574.7	356.3	465.5	802.3	760.7	781.5	150.0	102.0	126.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	15.5	10.6	13.3	634.4	612.0	623.3	20.4	17.5	18.8
24	40.3	29.1	34.0	760.8	751.5	755.1	46.4	45.0	45.8
39	138.8	70.1	116.8	879.4	808.1	841.1	113.9	101.9	109.4
48	203.5	183.2	191.3	943.1	895.5	918.7	150.7	145.8	147.7
60	288.9	207.6	261.7	920.5	876.4	905.1	238.9	231.2	234.9
67	307.1	248.3	279.3	1005.0	842.5	941.5	305.7	274.8	289.7
70	298.2	274.4	282.8	949.5	941.8	945.7	326.7	308.7	317.7
73	270.2	270.2	270.2	876.0	876.0	876.0	281.1	281.1	281.1
74	282.4	265.2	273.8	787.8	649.5	718.7	355.1	351.3	353.2
75	280.3	220.7	250.8	1044.7	644.3	862.7	350.0	287.9	317.0
76	310.3	211.1	258.5	1117.3	648.1	839.5	399.2	335.7	356.3
77	289.2	230.8	260.2	1076.7	715.8	862.5	386.0	312.8	359.2
78	334.2	225.1	281.3	1073.2	690.2	885.2	407.8	307.5	366.6
79	300.3	215.4	268.7	899.6	870.4	885.0	383.7	372.7	379.4
80	342.7	254.1	313.5	891.8	720.0	850.5	423.7	378.2	399.0
81	370.7	370.7	370.7	842.7	842.7	842.7	408.6	408.6	408.6
82	324.3	324.3	324.3	857.8	857.8	857.8	397.6	397.6	397.6
84	241.7	199.6	218.9	801.6	664.8	754.5	445.0	391.6	416.7
90	507.0	276.6	332.7	877.3	692.5	801.6	489.9	418.8	445.2
96	496.4	363.2	442.0	839.9	742.3	783.2	483.0	449.7	465.4
102	546.6	290.5	433.9	823.3	651.4	725.8	518.9	338.5	464.3
111	532.4	313.5	422.9	642.5	579.1	605.8	523.0	447.0	496.6
120	502.9	289.8	405.6	786.7	530.7	634.2	543.7	279.2	479.1
132	361.8	224.6	295.4	585.5	507.7	557.6	492.0	326.7	398.9
138	404.4	227.6	316.0	536.5	532.9	534.7	447.0	419.6	433.3

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42315E
Test Date: 12/9/80
Test Type: Forced Reflood (fourth repeat)
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.280 MPa (40.6 psia)
Initial peak clad temperature and location	874°C (1605°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28.2 mm/sec (1.11 in./sec)
Coolant temperature	49°C (120°F)
Average and range of initial 1.83 m (72 in.) housing temperature	509°C (499°C - 514°C) [949°F (931°F - 957°F)]
Initial bundle water level	34.5 mm (1.36 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	± 0.5%[a]
Total power:	+0.4% constant[a]
Housing temperature at midplane:	-1% constant throughout test[a]

a. Relative to run 42215E

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42315E

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1188.	1315.	127.	31.0	800.	110.8
4C 3- 3	10	1269.	1335.	66.	15.5	864.	106.0
1C 4- 0	12	1385.	1590.	205.	45.0	919.	143.6
2A 5- 0	16	1500.	1785.	285.	68.0	913.	233.8
2A 5- 7	19	1527.	1789.	262.	58.5	926.	285.7
5C 6- 0	36	1419.	1737.	319.	100.0	241.	647.0
2D 6- 2	39	1506.	1784.	279.	91.0	810.	347.8
1D 6- 4	47	1468.	1715.	247.	91.0	886.	327.0
3D 6- 4	50	1454.	1847.	394.	101.0	1155.	350.3
4B 6- 4	52	1523.	1818.	295.	92.0	645.	336.0
5C 6- 4	54	1455.	1769.	314.	96.0	1120.	329.0
5D 6- 4	55	1489.	1707.	219.	94.0	920.	334.7
1D 6- 5	58	1481.	1748.	267.	90.5	961.	333.8
2A 6- 5	59	1476.	1748.	271.	93.0	745.	378.0
2D 6- 5	61	1526.	1810.	284.	99.0	873.	361.5
3B 6- 5	63	1549.	1838.	289.	90.5	785.	358.5
3C 6- 6	72	1566.	1910.	344.	103.0	639.	373.8
4C 6- 6	75	1575.	1887.	312.	98.5	905.	368.8
3C 6- 7	** B A D T H E R M O C O U P L E D A T A *						
3E 6- 7	83	1496.	1779.	283.	98.0	871.	381.7
3D 6- 8	86	1549.	1904.	355.	97.5	857.	397.5
4A 6- 8	87	1446.	1748.	301.	91.5	754.	414.0
1C 7- 0	93	1444.	1649.	206.	47.0	754.	388.9
2B 7- 0	94	1472.	1675.	202.	36.0	750.	400.8
3D 7- 0	98	1497.	1739.	242.	46.0	768.	426.0
5B 7- 0	103	1415.	1625.	211.	47.0	734.	412.9
2B 7- 6	110	1395.	1730.	335.	58.0	782.	438.9
2C 7- 6	111	1440.	1739.	299.	58.5	821.	422.9
2E 7- 6	113	1237.	1538.	300.	44.0	884.	409.7
3A 7- 6	** B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	115	1134.	1619.	484.	86.5	699.	477.9
4B 7- 6	120	1439.	1781.	342.	81.5	880.	424.9
5C 7- 6	122	1429.	1730.	301.	70.5	815.	436.9
1C 8- 0	124	1147.	1573.	427.	97.5	775.	462.2
2E 8- 0	126	973.	1383.	411.	91.0	768.	441.9
3D 8- 0	129	1197.	1676.	478.	91.5	777.	468.2
5B 8- 0	133	1220.	1560.	341.	73.5	769.	447.8
5C 8- 0	134	1294.	1670.	376.	88.0	730.	460.0
1C 8- 6	135	982.	1434.	452.	98.0	666.	491.0
1D 8- 6	136	823.	1349.	526.	101.0	674.	503.9
2C 8- 6	138	1117.	1639.	522.	97.5	734.	487.0
4B 8- 6	143	1118.	1518.	400.	69.5	709.	472.0
5D 8- 6	145	1003.	1446.	444.	33.0	669.	486.7
3D 9- 3	150	897.	1369.	472.	103.0	641.	501.0
4C 9- 3	152	989.	1422.	433.	97.5	656.	490.2
1D10- 0	157	588.	1068.	480.	132.0	567.	533.0
4B10- 0	164	836.	1242.	406.	125.0	668.	498.0
5D10- 0	166	705.	1067.	361.	145.0	282.	425.0
2A11- 0	168	553.	775.	222.	131.0	619.	346.0
4C11- 0	169	657.	1021.	364.	136.0	505.	493.0
1D11- 6	171	340.	768.	428.	141.0	286.	439.0

RUN 42315E HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	677.2	638.3	657.8	691.0	654.1	672.5	5.5	5.0	5.3
24	955.7	875.7	912.4	990.3	918.1	948.7	13.5	12.0	12.7
39	1268.7	1174.3	1202.9	1335.2	1300.6	1313.9	33.5	15.5	26.9
48	1443.5	1359.3	1395.9	1631.9	1552.7	1591.4	58.0	45.0	50.0
60	1531.1	1484.2	1505.2	1785.4	1737.4	1759.7	68.0	47.0	57.8
67	1605.2	1503.0	1553.0	1881.3	1765.3	1831.0	77.0	47.0	60.8
70	1590.5	1528.4	1561.4	1872.3	1841.7	1853.8	74.5	58.0	63.7
73	1469.8	1469.8	1469.8	1733.0	1733.0	1733.0	91.0	91.0	91.0
74	1515.5	1505.7	1510.6	1805.6	1784.3	1794.9	91.0	70.5	80.8
75	1479.4	1457.5	1467.8	1737.4	1706.2	1720.7	102.0	58.5	86.4
76	1544.6	1454.8	1494.1	1818.0	1707.3	1757.2	96.0	71.0	89.3
77	1549.0	1469.8	1500.1	1838.4	1707.3	1763.1	99.5	70.5	89.3
78	1575.4	1451.0	1516.9	1909.7	1730.8	1803.2	103.0	77.0	90.4
79	1545.7	1496.0	1520.9	1862.1	1756.4	1798.1	99.5	90.5	94.8
80	1549.0	1439.2	1491.7	1904.0	1747.5	1808.1	105.0	90.5	98.8
81	1540.8	1540.8	1540.8	1920.1	1920.1	1920.1	101.0	101.0	101.0
82	1482.6	1482.6	1482.6	1811.2	1811.2	1811.2	97.5	97.5	97.5
84	1514.4	1403.3	1468.3	1741.9	1625.4	1691.9	47.0	36.0	43.8
90	1499.8	1134.3	1354.2	1806.7	1517.1	1690.7	95.5	44.0	66.4
96	1296.9	972.7	1200.8	1744.1	1383.4	1623.9	97.5	73.5	88.0
102	1440.9	769.0	1024.3	1792.1	1075.8	1446.3	104.0	45.5	85.6
111	988.7	706.7	871.1	1452.7	1101.6	1284.4	156.0	70.5	102.5
120	1074.8	587.6	771.0	1404.4	1066.6	1178.4	151.0	56.0	122.8
132	657.2	473.1	545.2	1021.2	716.0	822.5	146.0	131.0	138.0
138	564.7	339.6	452.2	806.4	768.0	787.2	141.0	125.0	133.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	15.7	13.8	14.8	617.2	605.9	611.5	19.4	15.5	17.4
24	42.3	31.9	36.3	758.3	741.8	751.1	44.5	42.8	43.9
39	127.3	66.5	111.1	863.6	797.3	830.3	111.4	99.4	106.9
48	204.6	188.4	195.4	932.0	887.2	912.7	149.5	142.6	145.2
60	285.1	206.3	254.5	940.5	876.9	910.1	233.8	226.6	230.1
67	301.4	238.0	277.9	1004.2	890.8	950.7	301.7	269.9	284.5
70	319.0	276.5	292.4	967.8	933.5	954.7	321.8	301.8	311.7
73	263.2	263.2	263.2	852.8	852.8	852.8	294.0	294.0	294.0
74	290.1	278.6	284.4	810.2	665.2	737.7	347.8	347.8	347.8
75	279.9	226.7	252.9	1020.7	678.5	861.4	326.7	269.6	306.7
76	313.9	218.8	263.1	1120.1	645.1	853.4	390.0	327.0	346.0
77	289.4	237.3	262.9	1058.0	717.8	867.0	378.0	322.8	352.7
78	343.9	231.0	286.3	1138.5	638.7	888.8	398.9	287.6	358.3
79	316.4	225.3	277.3	924.2	871.4	900.3	381.7	364.9	374.1
80	355.0	264.6	316.4	954.7	753.9	881.7	414.0	369.8	388.3
81	379.3	379.3	379.3	824.1	824.1	824.1	403.7	403.7	403.7
82	328.5	328.5	328.5	867.2	867.2	867.2	395.7	395.7	395.7
84	246.4	202.0	223.6	813.5	669.0	757.9	437.0	388.9	411.8
90	484.5	298.8	336.5	884.4	699.1	799.3	477.9	409.7	438.7
96	478.3	340.6	423.1	829.3	729.6	766.7	475.1	441.9	458.6
102	538.6	280.9	422.0	815.7	666.1	723.1	503.9	335.7	456.5
111	477.2	300.7	413.3	656.3	556.7	616.7	515.0	446.0	493.5
120	490.9	328.4	407.4	730.5	282.3	605.6	533.0	284.8	475.0
132	363.9	221.8	277.3	619.5	505.4	560.5	493.0	346.0	393.1
138	428.4	241.7	335.0	531.0	285.6	408.3	448.0	439.0	443.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42415E
Test Date: 12/10/80
Test Type: Forced Reflood (fifth repeat)
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.279 MPa (40.4 psia)
Initial peak clad temperature and location	872°C (1601°F), 4C 1.98 m (78 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28.2 mm/sec (1.11 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	503°C (494°C - 507°C) [937°F (921°F - 945°F)]
Initial bundle water level	29.4 mm (1.16 in.)

B. Summary Results:

C. Comments:

A heatup power of 2.6 kw/m (0.78 kw/ft) to a nominal initial clad temperature of 871°C (1600°F) was utilized; therefore, no power step at initiation of flood.

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42415E

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1212.	1328.	115.	27.5	775.	112.5
4C 3- 3	10	1281.	1347.	65.	16.0	869.	107.9
1C 4- 0	12	1400.	1601.	201.	47.5	912.	145.2
2A 5- 0	16	1543.	1791.	248.	66.0	900.	235.8
2A 5- 7	19	1553.	1794.	242.	66.5	944.	287.8
5C 6- 0	36	1433.	1734.	301.	103.0	241.	636.0
2D 6- 2	39	1537.	1782.	246.	94.0	781.	356.8
1D 6- 4	47	1516.	1722.	206.	94.0	914.	320.8
3D 6- 4	50	1455.	1852.	397.	103.0	1126.	354.0
4B 6- 4	52	1548.	1821.	273.	85.0	621.	339.6
5C 6- 4	54	1484.	1769.	284.	99.0	288.	361.0
5D 6- 4	55	1533.	1711.	178.	56.5	861.	346.7
1D 6- 5	58	1526.	1755.	229.	94.0	974.	327.2
2A 6- 5	59	1520.	1755.	235.	96.0	713.	384.7
2D 6- 5	61	1558.	1814.	256.	94.0	849.	369.1
3B 6- 5	63	1569.	1843.	273.	83.5	777.	358.3
3C 6- 6	72	1583.	1907.	325.	107.0	630.	373.7
4C 6- 6	75	1601.	1892.	291.	80.5	972.	343.2
3C 6- 7	** B A D T H E R M O C O U P L E D A T A *						
3E 6- 7	83	1533.	1777.	244.	104.0	868.	381.7
3D 6- 8	86	1564.	1904.	340.	95.0	865.	399.9
4A 6- 8	87	1488.	1751.	262.	93.5	796.	406.0
1C 7- 0	93	1466.	1654.	187.	45.5	753.	393.8
2B 7- 0	94	1492.	1679.	187.	36.5	736.	406.9
3D 7- 0	98	1509.	1746.	237.	45.5	777.	427.9
5B 7- 0	103	1441.	1630.	189.	45.5	717.	418.7
2B 7- 6	110	1401.	1724.	323.	68.0	787.	446.6
2C 7- 6	111	1455.	1739.	284.	58.0	816.	421.4
2E 7- 6	113	1273.	1500.	227.	46.5	870.	418.6
3A 7- 6	** B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	115	1147.	1624.	477.	85.5	706.	481.4
4B 7- 6	120	1445.	1787.	341.	73.5	861.	431.7
5C 7- 6	122	1441.	1737.	297.	69.0	820.	438.4
1C 8- 0	124	1141.	1552.	411.	94.0	774.	470.7
2E 8- 0	126	1033.	1300.	267.	53.0	753.	451.8
3D 8- 0	129	1210.	1666.	455.	93.0	780.	474.6
5B 8- 0	133	1229.	1588.	360.	94.5	794.	449.9
5C 8- 0	134	1293.	1685.	392.	102.0	747.	462.0
1C 8- 6	135	976.	1423.	447.	95.5	668.	500.9
1D 8- 6	136	765.	1318.	553.	109.0	668.	512.7
2C 8- 6	138	1130.	1630.	500.	94.0	741.	491.3
4B 8- 6	143	1132.	1553.	420.	83.5	699.	478.0
5D 8- 6	145	1039.	1486.	447.	127.0	655.	497.5
3D 9- 3	150	902.	1358.	456.	102.0	639.	508.9
4C 9- 3	152	998.	1431.	434.	99.0	675.	488.0
1D10- 0	157	579.	1087.	508.	134.0	563.	542.8
4B10- 0	164	846.	1238.	391.	108.0	662.	505.0
5D10- 0	166	715.	1068.	353.	150.0	615.	414.7
2A11- 0	168	556.	771.	215.	125.0	504.	399.8
4C11- 0	169	660.	1015.	355.	136.0	502.	498.6
1D11- 6	171	337.	765.	428.	151.0	520.	449.0

RUN 42415E HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	692.9	660.2	681.5	705.6	674.1	694.8	6.0	4.5	5.5
24	961.7	894.6	923.3	995.4	934.6	958.0	14.5	12.0	13.0
39	1281.3	1200.4	1224.4	1346.7	1317.3	1327.8	32.0	16.0	25.6
48	1453.1	1382.3	1411.9	1636.3	1551.7	1596.5	47.5	44.5	46.5
60	1543.5	1517.0	1529.9	1791.0	1743.0	1762.4	55.0	45.5	56.2
67	1614.3	1537.6	1570.8	1884.7	1772.0	1835.0	74.5	52.0	63.5
70	1599.1	1542.4	1575.9	1874.5	1842.9	1854.2	73.0	58.0	63.5
73	1529.6	1529.6	1529.6	1736.3	1736.3	1736.3	95.5	95.5	95.5
74	1552.1	1536.5	1544.3	1806.7	1782.1	1794.4	94.0	72.0	83.0
75	1531.1	1498.7	1516.4	1743.0	1708.5	1724.3	104.0	56.0	87.0
76	1580.9	1484.3	1532.0	1821.4	1710.7	1760.6	99.0	56.5	83.5
77	1569.4	1520.3	1537.6	1842.9	1715.1	1767.9	96.0	56.5	87.3
78	1600.7	1496.6	1549.6	1907.4	1723.5	1805.5	107.0	68.5	85.6
79	1580.7	1532.7	1556.5	1863.2	1750.8	1797.9	104.0	94.0	98.6
80	1564.5	1484.2	1525.9	1904.0	1750.8	1809.0	104.0	77.0	92.6
81	1554.8	1554.8	1554.8	1922.3	1922.3	1922.3	104.0	104.0	104.0
82	1515.4	1515.4	1515.4	1811.2	1811.2	1811.2	102.0	102.0	102.0
84	1528.4	1438.7	1490.8	1747.5	1629.7	1698.5	47.5	36.5	43.4
90	1518.0	1147.3	1371.7	1811.2	1499.8	1687.8	85.5	46.5	65.1
96	1297.8	1032.5	1210.0	1739.7	1299.5	1614.9	102.0	53.0	89.7
102	1443.4	765.3	1025.4	1793.2	1060.4	1451.1	128.0	67.5	98.5
111	997.6	683.1	871.7	1453.7	1059.3	1279.6	159.0	72.0	104.7
120	1087.7	578.7	778.4	1453.7	1059.3	1187.2	154.0	72.0	119.0
132	550.2	467.5	540.3	1015.0	708.8	824.3	137.0	96.5	123.6
138	578.9	337.4	458.1	802.3	764.9	783.6	151.0	107.0	129.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	13.9	12.7	13.3	629.8	611.1	622.3	20.0	17.5	18.6
24	40.0	30.2	34.7	763.4	751.8	758.2	45.5	44.0	45.0
39	119.0	65.4	103.3	869.1	775.0	825.2	112.9	101.4	108.7
48	201.2	169.4	184.6	948.7	908.8	923.0	151.7	144.8	147.2
60	247.5	213.7	232.4	902.4	890.4	897.7	235.8	226.9	231.7
67	301.3	217.1	264.3	1031.1	848.1	936.8	304.7	272.7	287.8
70	302.7	256.8	278.3	976.0	937.6	955.5	325.7	305.6	315.3
73	206.7	206.7	206.7	825.4	825.4	825.4	300.3	300.3	300.3
74	254.6	245.6	250.1	781.3	667.7	724.5	356.8	350.0	353.4
75	244.3	177.4	208.0	989.2	673.7	832.8	339.2	285.8	313.7
76	284.4	178.0	228.5	914.3	287.7	707.6	379.9	320.8	351.5
77	273.5	193.2	230.3	1074.7	713.2	858.3	384.7	327.2	356.7
78	324.5	198.1	255.9	1069.2	630.5	880.0	390.6	302.6	359.3
79	282.5	180.9	241.3	918.2	851.5	880.6	384.1	359.6	374.5
80	339.5	222.4	283.2	937.9	796.2	886.3	406.0	373.7	389.8
81	367.5	367.5	367.5	833.2	833.2	833.2	405.3	405.3	405.3
82	295.8	295.8	295.8	876.4	876.4	876.4	396.7	396.7	396.7
84	237.0	186.7	207.8	836.8	686.3	760.1	432.9	393.8	412.9
90	477.0	227.0	316.0	870.3	705.6	804.5	481.4	418.6	443.4
96	455.5	267.0	405.0	814.7	739.4	769.4	481.9	449.9	464.4
102	553.1	292.2	425.7	825.2	655.5	724.6	512.7	330.1	461.4
111	473.4	316.1	407.9	675.3	551.4	616.1	523.8	457.0	499.6
120	518.7	292.6	408.8	841.5	562.8	643.6	542.8	272.8	479.0
132	354.8	214.6	284.0	564.5	501.5	547.3	498.6	323.4	407.9
138	427.5	223.4	325.5	533.3	520.4	526.8	454.0	449.0	451.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42215F
Test Date: 7/1/81
Test Type: Forced Reflood (second repeat)
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.276 MPa (40.0 psia)
Initial peak clad temperature and location	873°C (1603°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	51°C (124°F)
Average and range of initial 1.83 m (72 in.) housing temperature	504°C (489°C - 509°C) [939°F (913°F - 948°F)]
Initial bundle water level	4.3 mm (0.17 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	-2% with ±0.5% oscillations[a]
Total power:	+0.5% linearly increasing to 1%[a]
Housing temperature at midplane:	-3.5% to approximately 0% by 250 seconds[a]

a. Relative to run 42915F

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER42215F

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1169.	1331.	162.	36.5	854.	105.1
4C 3- 3	6	1249.	1371.	122.	34.0	865.	100.9
1C 4- 0	7	1374.	1545.	171.	44.0	924.	152.5
2A 5- 0	12	1505.	1803.	298.	55.0	918.	223.5
2A 5- 7	14	1536.	1784.	249.	50.5	943.	271.8
5C 6- 2	33	1446.	1714.	268.	82.0	285.	574.0
2D 6- 3	39	1488.	1692.	204.	67.0	778.	330.7
1D 6- 4	46	1470.	1680.	210.	64.5	999.	307.4
3D 6- 4	50	1485.	1832.	347.	82.0	233.	675.0
4B 6- 4	51	1548.	1733.	185.	37.0	850.	348.3
5D 6- 4	56	1478.	1661.	184.	46.0	755.	367.0
1D 6- 5	58	1465.	1692.	227.	61.5	992.	317.8
2A 6- 5	59	1464.	1698.	234.	64.5	892.	279.4
2D 6- 5	62	1524.	1732.	207.	64.5	852.	344.6
3B 6- 5	63	1557.	1802.	245.	64.0	557.	361.0
3C 6- 6	69	1544.	1852.	308.	66.5	1157.	332.4
3E 6- 6	70	1476.	1737.	261.	92.0	1104.	345.3
4C 6- 6	73	1580.	1812.	232.	48.0	778.	360.9
5C 6- 6	76	1531.	1734.	203.	46.5	853.	376.7
3D 6- 7	85	1569.	1838.	269.	55.5	793.	382.0
3C 6- 8	93	1584.	1871.	287.	67.0	964.	355.2
4A 6- 8	95	1430.	1696.	266.	57.0	960.	354.7
1C 7- 0	109	1476.	1679.	203.	36.5	678.	420.0
2B 7- 0	110	1506.	1688.	181.	36.5	731.	401.0
3D 7- 0	113	1544.	1730.	185.	35.5	699.	402.0
5B 7- 0	117	1371.	1574.	204.	37.5	668.	418.7
2B 7- 6	120	1445.	1721.	275.	49.5	870.	422.9
2C 7- 6	121	1441.	1745.	304.	52.0	911.	408.9
2E 7- 6	123	1250.	1516.	266.	42.5	756.	424.3
3A 7- 6	124	1448.	1649.	202.	47.0	858.	417.9
3B 7- 6	125	1503.	1775.	272.	47.0	824.	427.6
4B 7- 6	129	1471.	1734.	263.	48.5	819.	426.4
5C 7- 6	132	1434.	1685.	251.	62.0	810.	436.8
1C 8- 0	133	1227.	1572.	345.	82.5	757.	462.0
2E 8- 0	136	1073.	1397.	324.	65.0	720.	451.6
3D 8- 0	138	1322.	1691.	369.	57.0	842.	441.9
5B 8- 0	143	1211.	1496.	284.	68.0	679.	455.8
5C 8- 0	144	1312.	1624.	312.	81.5	744.	468.9
1C 8- 6	145	1013.	1387.	374.	54.5	617.	485.8
1D 8- 6	146	860.	1155.	295.	48.0	633.	460.0
2C 8- 6	148	1123.	1567.	444.	72.0	755.	463.6
4B 8- 6	153	1173.	1526.	353.	55.0	651.	490.0
5D 8- 6	155	1052.	1366.	314.	59.5	613.	487.8
3D 9- 3	159	924.	1361.	437.	90.0	684.	479.0
4C 9- 3	161	1023.	1424.	401.	90.5	650.	489.0
1D10- 0	164	629.	1079.	450.	140.0	684.	480.0
4B10- 0	168	880.	1266.	386.	106.0	591.	511.0
5D10- 0	169	740.	1122.	383.	126.0	682.	450.9
2A11- 0	171	539.	774.	235.	123.0	557.	414.9
4C11- 0	172	676.	1037.	361.	123.0	515.	508.0
1D11- 6	** B A D T H E R M O C O U P L E D A T A *						

RUN 42215F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	694.6	654.6	674.6	716.0	678.3	697.1	8.0	7.0	7.5
24	915.4	915.4	915.4	952.2	952.2	952.2	12.0	12.0	12.0
39	1249.2	1144.6	1187.7	1370.8	1288.0	1329.9	37.0	34.0	35.6
48	1444.3	1328.7	1381.7	1610.1	1496.6	1543.6	44.5	37.5	40.9
60	1505.0	1434.2	1457.8	1803.3	1664.6	1714.8	65.0	51.0	57.8
67	1600.5	1497.4	1555.8	1879.1	1764.2	1811.9	62.5	47.0	53.5
70	1602.7	1390.0	1459.7	1866.6	1607.9	1697.9	63.5	48.5	52.8
71	1549.2	1503.9	1526.6	1837.2	1773.1	1805.1	62.0	49.0	55.5
72	1457.2	1355.4	1406.3	1798.8	1645.0	1721.9	97.0	70.5	83.8
73	1441.1	1380.6	1410.8	1735.2	1687.5	1711.3	83.5	69.5	76.5
74	1480.3	1372.7	1447.0	1785.4	1662.5	1729.8	95.5	63.5	75.6
75	1493.7	1392.1	1451.4	1818.0	1635.2	1719.6	84.5	50.5	70.8
76	1548.2	1418.1	1481.6	1831.6	1645.0	1724.3	94.0	36.5	64.8
77	1556.8	1464.2	1500.5	1802.2	1657.0	1730.1	92.0	61.5	72.4
78	1580.5	1461.6	1516.3	1851.9	1689.7	1747.8	92.0	46.5	59.3
79	1575.7	1447.2	1515.8	1838.4	1559.2	1756.4	94.5	47.0	65.0
80	1584.3	1430.4	1505.5	1871.1	1696.3	1785.8	82.0	65.0	70.6
81	1497.4	1497.4	1497.4	1747.5	1747.5	1747.5	67.0	67.0	67.0
84	1544.3	1370.6	1477.6	1743.0	1574.4	1680.3	37.5	35.5	36.5
90	1503.3	1176.1	1408.1	1787.6	1516.0	1681.8	65.5	42.5	51.7
96	1361.6	1073.0	1267.0	1738.6	1397.0	1606.1	82.5	65.0	70.6
102	1176.2	805.8	1049.9	1576.5	1083.0	1398.4	82.5	42.0	62.0
111	1023.0	824.8	933.0	1426.9	1131.8	1275.3	94.0	63.0	76.8
120	879.7	629.2	771.9	1297.4	1078.9	1180.7	140.0	96.0	114.3
132	676.1	486.6	556.5	1036.7	677.3	826.2	130.0	75.0	112.8
138	612.4	594.5	603.4	1006.8	837.5	922.1	126.0	124.0	125.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	23.7	21.4	22.6	655.4	636.1	645.8	17.5	17.4	17.4
24	36.8	36.8	36.8	769.6	769.6	769.6	45.0	45.0	45.0
39	161.5	121.6	142.2	884.2	853.8	867.6	105.1	100.9	103.4
48	170.9	143.1	161.9	924.4	859.2	905.3	152.5	139.8	145.9
60	298.3	230.4	257.0	917.6	816.0	851.0	233.7	223.5	230.3
67	278.6	236.1	256.0	1032.9	920.2	975.9	286.5	270.8	277.7
70	282.3	195.1	238.3	961.9	261.9	529.9	510.0	291.8	449.7
71	287.9	269.2	278.6	1031.3	284.5	657.9	580.0	302.7	441.4
72	341.6	289.6	315.6	1156.8	252.2	704.5	531.0	311.2	471.1
73	306.9	294.1	300.5	1091.7	283.4	687.5	595.0	309.9	452.5
74	315.3	267.3	282.9	1055.5	235.0	562.1	670.0	319.8	494.1
75	350.1	191.4	268.2	1294.2	238.2	529.0	562.0	209.7	471.4
76	346.5	152.2	242.7	1291.5	232.8	715.8	675.0	307.4	428.0
77	312.6	187.4	229.6	1199.7	556.5	845.2	389.0	279.4	342.9
78	307.6	191.9	231.5	1157.2	756.6	926.5	388.9	291.5	354.6
79	282.6	212.0	240.6	1099.6	793.2	893.0	397.9	341.4	372.2
80	291.5	250.5	280.3	963.8	815.7	896.1	400.6	354.7	376.7
81	250.1	250.1	250.1	862.4	862.4	862.4	380.6	380.6	380.6
84	226.4	181.0	202.6	814.5	668.3	733.7	420.0	383.5	402.0
90	339.9	201.8	273.7	922.5	693.1	831.9	436.8	407.3	421.5
96	377.0	284.4	339.1	863.6	678.8	783.3	468.9	434.2	449.7
102	443.7	277.2	348.6	754.8	577.4	646.6	495.9	460.0	477.8
111	437.3	265.8	342.3	719.2	526.1	647.8	493.9	386.5	456.0
120	449.7	367.7	408.8	683.7	590.8	640.0	511.0	450.9	490.4
132	360.6	190.7	269.8	579.8	285.6	484.3	508.0	157.0	387.5
138	394.4	243.0	318.7	577.0	520.2	548.6	515.6	474.0	494.8

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 42915F
Test Date: 7/9/81
Test Type: Forced Reflood (third repeat)
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.276 MPa (40.1 psia)
Initial peak clad temperature and location	878°C (1613°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.55 kw/m (0.777 kw/ft)
Flow rate	28.2 mm/sec (1.11 in./sec)
Coolant temperature	49°C (120°F)
Average and range of initial 1.83 m (72 in.) housing temperature	523°C (506°C - 533°C) [974°F (943°F - 991°F)]
Initial bundle water level	37.3 mm (1.47 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+1% increasing to +1.5% with ±0.5% steps[a]
Total power:	0% linearly increasing to -0.75%[a]
Housing temperature at midplane:	+3.75% decreasing to 2.5% by 250 seconds[a]

a. Relative to run 41807F

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 42915F

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1140.	1254.	113.	29.0	811.	99.3
4C 3- 3	6	1240.	1305.	65.	18.5	867.	94.9
1C 4- 0	7	1369.	1526.	157.	42.5	927.	144.3
2A 5- 0	12	1493.	1700.	207.	54.5	817.	213.1
2A 5- 7	14	1534.	1780.	246.	46.5	927.	262.8
5C 6- 2	33	1450.	1697.	247.	86.5	282.	536.0
2D 6- 3	39	1499.	1680.	181.	43.5	852.	298.8
1D 6- 4	46	1485.	1666.	181.	84.5	1059.	276.8
3D 6- 4	50	1497.	1809.	312.	63.5	236.	623.0
4B 6- 4	51	1551.	1716.	165.	42.5	846.	331.3
5D 6- 4	56	1485.	1640.	155.	42.5	857.	325.8
1D 6- 5	58	1481.	1680.	198.	62.5	1017.	287.8
2A 6- 5	59	1473.	1666.	193.	48.0	954.	259.8
2D 6- 5	62	1533.	1729.	195.	54.5	928.	311.8
3B 6- 5	63	1565.	1771.	206.	56.0	676.	334.0
3C 6- 6	69	1556.	1837.	281.	62.0	1257.	309.5
3E 6- 6	70	1486.	1726.	241.	32.5	1037.	327.4
4C 6- 6	73	1587.	1791.	204.	53.5	819.	337.5
5C 6- 6	76	1538.	1730.	192.	43.5	825.	353.2
3D 6- 7	85	1581.	1827.	246.	56.0	762.	366.0
3C 6- 8	93	1596.	1852.	256.	54.5	990.	328.8
4A 6- 8	95	1447.	1687.	239.	54.5	916.	356.8
1C 7- 0	109	1493.	1677.	184.	42.5	719.	385.0
2B 7- 0	110	1517.	1663.	146.	21.5	708.	379.3
3D 7- 0	113	1557.	1717.	160.	29.0	667.	385.0
5B 7- 0	117	1403.	1595.	192.	42.5	741.	368.9
2B 7- 6	120	1473.	1712.	239.	44.0	828.	399.5
2C 7- 6	121	1493.	1744.	251.	43.5	873.	384.0
2E 7- 6	123	1311.	1556.	245.	49.5	804.	385.6
3A 7- 6	124	1450.	1625.	175.	42.5	881.	385.6
3B 7- 6	125	1520.	1761.	241.	44.0	837.	397.5
4B 7- 6	129	1483.	1703.	220.	41.5	749.	404.8
5C 7- 6	132	1440.	1677.	237.	55.5	772.	412.7
1C 8- 0	133	1263.	1590.	326.	62.0	771.	430.0
2E 8- 0	136	1082.	1392.	310.	50.5	734.	407.9
3D 8- 0	138	1334.	1698.	365.	67.5	828.	418.0
5B 8- 0	143	1229.	1472.	243.	92.0	759.	417.7
5C 8- 0	144	1307.	1619.	312.	88.0	750.	443.8
1C 8- 6	145	1039.	1390.	350.	58.0	610.	455.0
1D 8- 6	146	913.	1176.	264.	44.0	650.	427.0
2C 8- 6	148	1166.	1566.	400.	65.5	762.	436.0
4B 8- 6	153	1181.	1521.	340.	62.0	636.	467.0
5D 8- 6	155	1103.	1428.	325.	88.0	605.	453.2
3D 9- 3	159	922.	1340.	418.	90.5	650.	453.5
4C 9- 3	161	1016.	1431.	415.	88.5	622.	470.0
1D10- 0	164	604.	1024.	420.	131.0	683.	410.3
4B10- 0	168	874.	1311.	437.	113.0	578.	485.0
5D10- 0	169	732.	1086.	354.	115.0	686.	428.8
2A11- 0	171	535.	802.	268.	108.0	701.	166.6
4C11- 0	172	676.	1070.	394.	117.0	513.	479.3
1D11- 6	** BAD THERMOCOUPLE DATA *						

RUN 42915F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	727.4	678.3	702.8	736.8	689.9	713.3	5.0	4.5	4.8
24	911.5	911.5	911.5	936.7	936.7	936.7	9.5	9.5	9.5
39	1239.8	1140.2	1175.1	1304.8	1253.6	1278.7	30.0	18.5	25.8
48	1441.4	1328.0	1378.5	1587.3	1483.7	1526.3	45.5	40.5	42.9
60	1492.8	1427.5	1454.7	1699.5	1636.3	1673.7	57.5	45.0	52.7
67	1599.8	1498.6	1555.8	1855.3	1735.2	1792.5	58.5	45.0	51.7
70	1513.2	1405.8	1478.7	1847.4	1616.7	1689.3	50.5	41.5	45.5
71	1558.0	1512.2	1535.1	1810.1	1764.2	1787.1	54.5	50.5	52.5
72	1467.1	1367.5	1417.3	1774.3	1628.7	1701.5	69.0	52.5	60.8
73	1455.7	1401.1	1428.4	1718.5	1675.5	1697.0	85.5	61.0	73.3
74	1497.1	1381.1	1458.3	1765.3	1640.7	1709.0	86.5	53.0	67.6
75	1508.7	1399.3	1462.1	1804.4	1617.8	1698.6	90.0	43.5	62.2
76	1551.1	1430.0	1490.0	1809.0	1629.7	1708.0	87.0	42.5	62.1
77	1564.8	1472.9	1510.5	1784.3	1649.4	1712.6	81.0	48.0	60.6
78	1587.5	1472.9	1525.4	1837.2	1675.5	1731.6	82.5	42.5	53.5
79	1586.4	1447.9	1525.3	1827.0	1646.1	1745.2	88.0	43.5	57.6
80	1596.1	1447.5	1520.2	1851.9	1686.5	1769.4	74.5	50.0	57.4
81	1511.1	1511.1	1511.1	1734.1	1734.1	1734.1	54.0	54.0	54.0
84	1557.2	1403.2	1493.7	1718.5	1594.9	1669.5	42.5	21.5	34.4
90	1522.6	1310.9	1445.1	1783.2	1556.0	1683.5	55.5	41.5	47.5
96	1377.6	1081.5	1277.6	1731.9	1391.8	1594.8	92.0	56.0	66.8
102	1194.6	805.9	1079.5	1565.7	1103.7	1405.3	93.5	44.0	64.7
111	1016.3	837.7	932.1	1431.2	1148.4	1300.3	117.0	66.5	91.3
120	873.9	604.2	758.4	1311.0	1024.3	1169.3	131.0	95.0	111.3
132	675.8	472.4	546.6	1069.6	683.6	843.1	120.0	103.0	112.0
138	621.0	602.5	611.7	1039.8	872.7	956.2	123.0	113.0	118.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	11.6	9.4	10.5	660.4	642.4	651.4	15.5	14.8	15.2
24	25.2	25.2	25.2	771.4	771.4	771.4	41.4	41.4	41.4
39	132.5	65.0	103.6	867.3	811.1	837.1	99.4	94.9	97.9
48	157.1	132.5	147.8	930.7	903.6	920.8	144.3	133.8	138.5
60	241.5	206.7	219.0	817.0	800.4	808.4	224.9	213.1	220.4
67	255.5	216.7	236.8	999.1	794.3	932.0	277.8	261.8	268.5
70	238.1	179.9	210.7	983.2	285.6	531.3	552.0	277.6	418.3
71	252.1	252.0	252.0	947.0	284.5	615.8	541.0	294.6	417.8
72	307.2	261.1	284.2	1208.9	1115.5	1162.2	294.2	270.5	282.4
73	274.4	262.8	268.6	284.5	282.3	283.4	547.0	537.0	542.0
74	276.4	229.2	250.7	1341.4	238.2	773.6	612.0	241.6	400.6
75	320.2	163.8	236.5	1294.5	233.9	759.8	626.0	202.4	367.3
76	312.3	149.9	218.0	1092.2	236.1	655.0	623.0	276.8	418.0
77	286.1	165.8	202.1	1211.0	676.1	900.3	335.0	259.8	310.9
78	281.1	169.1	206.2	1257.0	816.4	937.5	353.2	271.6	330.5
79	254.5	189.5	219.9	1153.5	761.7	927.3	366.0	298.5	339.8
80	263.7	231.6	249.2	989.8	821.0	916.5	370.9	328.8	350.8
81	223.0	223.0	223.0	855.3	855.3	855.3	355.6	355.6	355.6
84	208.4	146.0	175.8	800.1	666.7	737.3	385.0	356.9	375.2
90	300.7	175.0	238.5	685.8	748.8	827.1	412.7	379.9	394.2
96	364.8	228.8	317.2	880.4	724.5	787.9	443.8	406.1	421.1
102	400.2	263.5	325.8	762.1	579.6	642.6	470.2	427.0	447.4
111	426.5	269.3	368.2	758.7	548.2	645.2	470.0	342.0	424.6
120	441.9	354.3	410.9	686.2	578.1	640.4	485.0	410.3	454.2
132	393.8	211.2	296.5	701.0	281.3	520.9	479.3	166.0	311.1
138	418.8	270.2	344.5	580.2	530.0	555.1	481.0	435.0	458.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43915F
Test Date: 7/20/81
Test Type: Forced Reflood (fourth repeat)
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.278 MPa (40.3 psia)
Initial peak clad temperature and location	878°C (1613°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.56 kw/m (0.778 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	50°C (122°F)
Average and range of initial 1.83 m (72 in.) housing temperature	527°C (510°C - 536°C) [980°F (950°F - 997°F)]
Initial bundle water level	40.1 mm (1.58 in.)

B. Summary Results:

C. Comments:

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43915F

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1185.	1287.	102.	23.0	780.	105.7
4C 3- 3	6	1281.	1339.	58.	14.5	870.	101.6
1C 4- 0	7	1407.	1555.	148.	44.0	953.	151.9
2A 5- 0	12	1482.	1661.	179.	43.5	804.	224.9
2A 5- 7	14	1530.	1755.	226.	52.5	986.	272.8
5C 6- 2	33	1449.	1668.	219.	88.0	1008.	322.9
2D 6- 3	39	1504.	1655.	151.	44.5	794.	306.9
1D 6- 4	46	1491.	1633.	142.	55.0	977.	275.0
3D 6- 4	50	1497.	1781.	284.	64.0	234.	624.0
4B 6- 4	51	1559.	1691.	132.	32.5	821.	335.2
5D 6- 4	56	1489.	1653.	164.	44.5	1020.	286.9
1D 6- 5	58	1481.	1642.	161.	55.0	1017.	282.4
2A 6- 5	59	1487.	1642.	154.	45.0	991.	209.3
2D 6- 5	62	1536.	1700.	163.	44.5	835.	317.6
3B 6- 5	63	1574.	1751.	177.	45.5	650.	319.0
3C 6- 6	69	1564.	1836.	272.	64.5	537.	308.7
3E 6- 6	70	1483.	1705.	222.	65.0	1109.	303.1
4C 6- 6	73	1599.	1777.	178.	45.0	812.	340.9
5C 6- 6	** B A D T H E R M O C O U P L E D A T A *						
3D 6- 7	85	1585.	1811.	227.	55.0	773.	346.0
3C 6- 8	93	1599.	1828.	229.	55.5	912.	308.7
4A 6- 8	95	1455.	1664.	208.	52.5	905.	348.5
1C 7- 0	109	1486.	1652.	165.	44.0	780.	368.0
2B 7- 0	110	1520.	1645.	125.	17.5	725.	373.0
3D 7- 0	113	1551.	1677.	125.	23.5	698.	371.0
5B 7- 0	117	1412.	1598.	186.	44.5	740.	376.6
2B 7- 6	120	1465.	1682.	217.	44.5	824.	396.0
2C 7- 6	121	1475.	1712.	237.	45.0	900.	376.9
2E 7- 6	123	1286.	1534.	248.	47.5	867.	378.7
3A 7- 6	124	1451.	1617.	166.	46.5	883.	369.8
3B 7- 6	125	1517.	1742.	225.	44.5	880.	387.0
4B 7- 6	129	1478.	1695.	217.	45.5	778.	406.9
5C 7- 6	132	1436.	1683.	247.	55.0	793.	414.8
1C 8- 0	133	1221.	1560.	339.	63.5	761.	422.0
2E 8- 0	136	1064.	1393.	329.	63.0	731.	407.0
3D 8- 0	138	1324.	1672.	348.	54.0	826.	410.6
5B 8- 0	143	1258.	1478.	220.	50.5	762.	425.6
5C 8- 0	144	1302.	1592.	289.	66.0	757.	441.9
1C 8- 6	145	1011.	1382.	371.	53.0	602.	446.0
1D 8- 6	146	850.	1123.	273.	46.0	691.	394.3
2C 8- 6	148	1147.	1544.	397.	64.0	778.	423.8
4B 8- 6	153	1166.	1487.	321.	64.0	642.	469.7
5D 8- 6	155	1082.	1418.	337.	89.5	608.	444.0
3D 9- 3	159	918.	1354.	436.	89.5	675.	448.0
4C 9- 3	161	1016.	1416.	401.	88.5	633.	469.9
1010- 0	164	616.	995.	379.	120.0	703.	416.5
4B10- 0	168	856.	1261.	404.	115.0	581.	491.0
5D10- 0	169	747.	1136.	389.	117.0	713.	428.6
2A11- 0	171	537.	873.	336.	140.0	574.	435.7
4C11- 0	172	671.	1080.	409.	119.0	528.	481.0
1D11- 6	** B A D T H E R M O C O U P L E D A T A *						

RUN 43915F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	784.8	784.8	784.8	793.0	793.0	793.0	4.0	4.0	4.0
24	970.0	970.0	970.0	992.3	992.3	992.3	10.5	10.5	10.5
39	1281.2	1185.1	1226.9	1339.4	1287.0	1320.5	25.0	14.5	20.8
48	1484.2	1355.4	1412.8	1622.1	1496.6	1555.8	48.0	33.5	42.5
60	1482.1	1452.1	1464.6	1685.4	1659.2	1668.7	55.5	43.5	48.0
67	1599.9	1490.7	1552.3	1838.4	1693.0	1770.4	55.5	45.0	50.5
70	1613.2	1379.5	1473.7	1839.5	1591.7	1663.7	45.5	44.5	45.1
71	1555.4	1511.1	1533.3	1789.9	1735.2	1762.5	54.5	45.0	49.7
72	1461.9	1365.9	1413.9	1757.5	1602.5	1680.0	68.0	63.0	65.5
73	1455.3	1407.1	1431.2	1674.5	1629.7	1652.1	73.0	56.0	64.5
74	1500.2	1363.8	1458.4	1753.1	1627.6	1691.6	98.0	47.0	68.4
75	1512.2	1409.1	1467.9	1791.0	1584.1	1673.5	91.0	44.5	56.0
76	1558.7	1430.5	1494.5	1791.0	1613.4	1689.3	84.0	32.5	56.0
77	1573.8	1480.9	1516.6	1760.9	1606.8	1684.9	68.0	44.5	50.1
78	1598.6	1478.0	1530.7	1836.1	1653.7	1716.2	65.0	44.5	50.7
79	1593.2	1435.7	1528.5	1811.2	1634.1	1728.1	58.0	44.5	52.3
80	1598.8	1455.1	1515.4	1828.2	1663.6	1742.0	63.0	52.5	56.6
81	1505.6	1505.6	1505.6	1726.3	1726.3	1726.3	54.5	54.5	54.5
84	1551.3	1412.4	1492.5	1684.3	1598.1	1643.7	45.0	17.5	31.4
90	1516.7	1286.2	1433.9	1760.9	1534.4	1663.8	55.0	43.5	47.2
96	1371.3	1064.0	1272.0	1716.3	1392.8	1574.7	66.0	34.5	58.6
102	1175.9	796.6	1053.2	1544.1	1123.4	1388.2	89.5	46.0	62.2
111	1015.5	796.4	903.2	1416.2	1100.6	1265.0	125.0	72.0	94.2
120	856.4	616.4	757.1	1276.6	995.4	1153.2	120.0	97.0	110.7
132	671.2	489.6	553.5	1080.0	727.5	894.4	140.0	100.0	123.3
138	620.7	599.7	610.2	1035.6	886.1	960.8	123.0	123.0	123.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	8.2	8.2	8.2	697.5	697.5	697.5	17.0	17.0	17.0
24	22.3	22.3	22.3	788.2	788.2	788.2	45.4	45.4	45.4
39	120.8	58.2	93.6	869.6	780.1	816.7	108.1	101.6	105.1
48	147.9	137.9	142.9	953.4	841.5	913.2	151.9	143.9	147.3
60	225.8	179.3	204.0	803.7	794.2	799.5	234.8	224.9	230.7
67	238.5	202.3	218.1	1044.3	812.1	967.8	281.8	268.9	276.5
70	226.3	155.8	190.0	1165.6	281.3	750.5	538.0	267.2	351.6
71	234.5	224.1	229.3	1154.2	971.2	1062.7	298.8	294.5	296.7
72	295.6	236.6	266.1	1176.0	1070.7	1123.3	298.4	283.5	291.0
73	222.6	219.2	220.9	1315.0	973.0	1144.0	295.4	226.7	261.6
74	263.7	210.8	233.2	1029.4	246.8	617.3	591.0	312.3	418.6
75	299.3	125.6	205.6	1204.7	236.1	745.4	518.0	182.9	353.5
76	283.8	131.7	194.7	1376.7	233.9	812.1	524.0	256.6	365.2
77	259.3	122.6	168.3	1209.6	649.7	883.4	338.0	209.3	300.1
78	272.0	151.7	185.5	1108.8	537.4	900.6	347.3	218.5	316.8
79	233.1	171.4	199.5	1123.4	603.5	882.6	357.9	273.7	330.4
80	242.1	208.4	226.7	924.4	860.7	898.8	353.2	308.7	341.7
81	220.7	220.7	220.7	967.6	967.6	967.6	330.8	330.8	330.8
84	185.7	125.3	151.2	827.2	697.5	760.4	379.5	334.0	364.5
90	300.1	165.8	229.9	960.6	744.4	840.7	414.8	362.0	390.2
96	354.8	172.9	302.7	923.4	730.6	796.1	441.9	392.0	416.5
102	410.8	273.0	335.0	778.2	570.6	654.8	470.0	394.3	438.0
111	436.4	220.3	361.8	702.7	537.4	612.3	469.9	407.0	445.5
120	421.3	364.5	396.1	712.6	581.2	665.7	491.0	416.5	452.9
132	408.8	237.9	341.0	573.8	524.7	542.1	481.0	400.0	448.4
138	414.8	286.3	350.6	584.4	554.6	569.5	482.0	458.0	470.0

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 44015F
Test Date: 7/30/81
Test Type: Forced Reflood (fifth repeat)
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.278 MPa (40.3 psia)
Initial peak clad temperature and location	875°C (1608°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.6 kw/m (0.78 kw/ft)
Flow rate	28 mm/sec (1.1 in./sec)
Coolant temperature	48°C (119°F)
Average and range of initial 1.83 m (72 in.) housing temperature	529°C (515°C - 537°C) [984°F (959°F - 998°F)]
Initial bundle water level	36.8 mm (1.45 in.)

B. Summary Results:

C. Comments:

Inlet mass flow:	+0.5%[a]
Total power:	+0.2% linearly increasing to +0.8%[a]
Housing temperature at midplane:	approximately 0% for 150 seconds and increasing to -4% by 250 seconds[a]

a. Relative to run 43915F

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES
ROUN NUMBER44015F

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
24 3- 3	5	1156.	1265.	109.	25.0	773.	98.3
42 3- 3	6	1250.	1314.	64.	18.0	862.	94.8
10 4- 1	7	1380.	1534.	154.	42.0	937.	142.8
24 5- 0	12	1482.	1657.	175.	41.5	863.	214.6
24 5- 7	14	1533.	1755.	222.	43.0	983.	261.8
50 5- 2	33	1438.	1665.	226.	74.5	960.	308.8
20 5- 3	39	1497.	1666.	169.	42.0	796.	289.4
10 5- 4	46	1465.	1639.	154.	49.0	975.	260.0
30 5- 4	50	1492.	1792.	300.	61.0	235.	660.6
43 5- 4	51	1548.	1691.	143.	40.5	821.	322.8
50 5- 4	56	1483.	1653.	170.	41.5	1046.	265.8
10 5- 5	58	1477.	1646.	169.	49.0	1053.	266.8
24 5- 5	59	1485.	1647.	162.	41.5	992.	203.8
20 5- 5	62	1533.	1706.	173.	49.5	856.	300.1
30 5- 1	63	1566.	1755.	189.	42.0	847.	308.6
30 5- 6	69	1562.	1843.	281.	62.5	811.	295.1
35 5- 6	70	1483.	1717.	235.	59.5	1083.	301.2
40 5- 6	73	1595.	1783.	188.	42.0	820.	320.0
50 5- 6	** B A D T H E R M O C O U P L E D A T A *						
30 6- 7	85	1587.	1820.	233.	53.5	809.	318.9
30 6- 9	93	1604.	1833.	229.	49.5	862.	294.8
44 6- 8	95	1457.	1671.	214.	49.0	689.	333.8
10 7- 0	109	1509.	1673.	164.	40.0	753.	363.8
23 7- 1	110	1538.	1676.	137.	21.0	726.	361.0
30 7- 5	113	1573.	1712.	139.	28.5	724.	345.5
50 7- 0	117	1427.	1610.	183.	41.5	751.	362.3
23 7- 0	120	1506.	1724.	218.	42.0	820.	386.0
20 7- 0	121	1524.	1750.	226.	42.0	902.	363.8
25 7- 0	123	1349.	1574.	225.	43.0	881.	350.7
30 7- 0	124	1480.	1646.	166.	41.5	880.	350.4
35 7- 0	125	1550.	1777.	227.	42.5	879.	376.0
45 7- 0	129	1507.	1721.	214.	42.5	771.	394.3
50 7- 0	132	1464.	1713.	249.	58.0	810.	399.8
10 8- 1	133	1278.	1601.	323.	59.5	753.	415.5
25 8- 1	136	1124.	1436.	312.	54.5	753.	392.0
30 8- 1	138	1370.	1705.	335.	58.0	856.	393.0
53 8- 0	143	1294.	1508.	215.	40.0	768.	414.7
50 8- 0	144	1334.	1618.	284.	74.0	751.	427.9
10 8- 0	145	1040.	1401.	361.	61.5	866.	442.0
10 8- 0	146	848.	1148.	300.	48.0	835.	409.1
20 8- 0	148	1182.	1577.	395.	62.0	776.	414.0
43 8- 0	153	1207.	1514.	307.	59.0	649.	457.8
50 8- 0	155	1118.	1446.	328.	84.0	631.	424.0
30 9- 3	159	978.	1379.	401.	87.0	696.	434.0
40 9- 3	161	1057.	1440.	383.	85.0	631.	458.9
1010- 1	164	599.	1062.	464.	159.0	729.	391.8
4810- 0	168	882.	1272.	390.	96.0	586.	479.0
5010- 1	169	766.	1189.	423.	112.0	710.	420.9
2411- 0	171	542.	874.	332.	138.0	569.	421.0
4011- 0	172	694.	1089.	395.	112.0	528.	470.0
1011- 0	** B A D T H E R M O C O U P L E D A T A *						

RUN 44015F HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	750.3	685.0	717.0	758.7	696.2	727.4	5.0	3.0	4.0
24	919.0	919.0	919.0	944.9	944.9	944.9	10.0	10.0	10.0
39	1249.9	1139.6	1194.7	1314.2	1265.1	1296.4	28.0	18.0	23.7
48	1450.4	1320.2	1385.0	1606.8	1477.3	1538.2	49.0	42.0	44.8
60	1481.5	1447.8	1463.7	1675.5	1657.0	1664.6	50.0	41.5	44.7
67	1609.3	1491.2	1553.0	1837.2	1689.7	1759.7	52.0	42.0	45.8
70	1607.9	1372.3	1467.0	1838.4	1593.8	1668.8	51.5	42.0	48.1
71	1548.4	1505.7	1527.1	1797.7	1736.3	1767.0	50.0	49.5	49.8
72	1450.4	1359.6	1406.0	1757.5	1594.9	1676.2	63.0	55.5	59.3
73	1446.9	1401.7	1425.3	1684.3	1634.1	1659.2	62.0	54.0	55.8
74	1491.2	1383.5	1450.3	1753.1	1631.9	1694.0	77.0	43.5	59.9
75	1503.0	1405.5	1460.0	1796.6	1587.3	1678.0	85.5	41.5	54.6
76	1547.9	1430.1	1487.3	1794.3	1618.8	1692.9	75.5	40.5	55.2
77	1500.3	1477.3	1512.4	1757.6	1614.5	1689.6	62.5	41.5	46.3
78	1594.9	1478.3	1528.5	1842.9	1661.4	1722.9	62.5	41.5	46.5
79	1592.2	1441.9	1530.0	1820.3	1642.8	1734.2	61.5	41.5	48.9
80	1603.5	1456.9	1525.9	1832.7	1671.2	1751.3	58.5	42.5	51.4
81	1515.5	1515.5	1515.5	1737.4	1737.4	1737.4	49.5	49.5	49.5
84	1573.3	1427.5	1512.2	1712.9	1610.1	1670.7	42.5	21.0	33.0
90	1555.4	1348.6	1481.5	1796.6	1574.4	1705.8	73.0	41.5	48.0
96	1416.2	1124.6	1316.8	1753.1	1435.5	1611.4	74.0	53.0	54.0
102	1216.5	797.1	1087.5	1575.5	1148.4	1413.6	84.0	45.0	57.6
111	1057.2	837.5	960.3	1439.8	1121.4	1288.9	108.0	53.5	80.1
120	882.0	598.8	784.8	1292.2	1062.4	1191.3	159.0	89.0	110.3
132	694.1	480.7	554.5	1089.2	749.3	903.2	138.0	112.0	125.0
138	636.2	622.5	629.4	1047.0	899.6	973.3	118.0	117.0	117.5

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	12.0	8.3	10.4	673.7	647.5	660.6	16.1	14.9	15.5
24	25.3	25.3	25.3	774.5	774.5	774.5	41.4	41.4	41.4
39	131.5	64.3	101.8	862.0	773.2	807.4	99.8	94.8	97.6
48	157.3	150.4	153.2	948.5	875.6	918.9	142.8	134.9	138.1
60	213.8	175.5	200.9	812.0	798.9	804.8	223.3	214.6	219.9
67	236.8	198.4	216.7	1025.5	779.5	944.5	269.4	257.7	265.0
70	230.5	163.6	201.8	1165.9	284.5	750.0	570.0	254.3	350.4
71	249.2	230.6	239.9	1133.0	926.6	1029.8	285.5	273.7	279.6
72	301.1	239.3	270.2	1226.3	1149.9	1188.1	274.7	257.6	266.2
73	235.4	232.4	233.9	1329.8	283.4	806.6	569.0	208.1	388.6
74	272.4	219.9	243.7	979.9	244.7	460.7	632.0	306.6	476.5
75	306.5	135.2	217.2	1299.1	238.2	762.6	649.0	172.6	348.6
76	300.4	136.3	205.5	1388.5	235.0	824.9	660.0	238.8	359.7
77	266.8	134.0	177.2	1243.9	647.3	905.7	325.0	203.8	286.0
78	281.0	156.9	194.4	1131.8	511.1	902.4	333.9	212.6	302.9
79	238.9	181.7	204.2	1165.5	631.0	894.1	341.5	254.8	314.2
80	244.1	212.3	225.4	959.9	71.6	788.5	508.0	294.8	348.1
81	221.9	221.9	221.9	891.4	891.4	891.4	327.2	327.2	327.2
84	187.9	137.3	158.5	837.5	724.4	763.5	363.8	318.0	349.8
90	257.6	100.1	224.3	965.2	748.1	850.3	399.8	347.9	375.3
96	353.1	189.3	294.7	928.8	743.8	797.3	427.9	378.2	405.1
102	394.9	275.2	326.1	777.7	573.0	656.4	457.8	409.1	428.6
111	401.2	203.8	328.6	705.2	558.8	629.7	458.9	405.0	430.0
120	463.6	349.7	406.5	728.8	585.6	669.7	479.0	391.8	441.0
132	399.3	268.6	348.7	568.5	527.8	546.8	470.0	389.0	433.3
138	415.8	277.0	343.9	612.0	553.6	582.8	469.0	420.0	444.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43631F
Test Date: 7/16/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.280 MPa (40.6 psia)
Initial peak clad temperature and location	872°C (1602°F), 2B 1.70 m (67 in.)
Initial peak rod power	2.3 kw/m (0.70 kw/ft)
Flow rate	25 mm/sec (1 in./sec)
Coolant temperature	50°C (120°F)
Average and range of initial 1.83 m (72 in.) housing temperature	519°C (504°C - 526°C) [967°F (939°F - 979°F)]
Initial bundle water level	23 mm (0.91 in.)

B. Summary Results:

C. Comments:

For direct comparison to 161-rod unblocked bundle (run 31504) and 163-rod blocked bundle

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 43631F

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1198.	1290.	92.	28.0	799.	103.2
4C 3- 3	6	1259.	1316.	57.	19.0	847.	98.8
1C 4- 0	7	1402.	1525.	122.	45.0	938.	146.2
2A 5- 0	12	1497.	1653.	156.	46.5	771.	212.9
2A 5- 7	14	1557.	1766.	209.	53.5	982.	258.8
5C 6- 2	33	1449.	1687.	237.	64.0	1003.	311.7
2D 6- 3	39	1491.	1664.	172.	45.5	918.	278.5
1D 6- 4	46	1500.	1620.	120.	54.0	985.	265.1
3D 6- 4	50	1477.	1782.	305.	71.5	253.	574.0
4B 6- 4	51	1553.	1712.	159.	46.5	840.	313.6
5D 6- 4	56	1502.	1645.	143.	46.5	887.	303.9
1D 6- 5	58	1491.	1625.	134.	49.5	975.	274.8
2A 6- 5	59	1496.	1639.	142.	49.5	981.	196.8
2D 6- 5	62	1522.	1697.	175.	51.0	912.	291.2
3B 6- 5	63	1556.	1754.	198.	57.5	647.	317.0
3C 6- 6	69	1519.	1826.	307.	71.5	517.	301.6
3E 6- 6	70	1474.	1709.	235.	66.0	1081.	300.2
4C 6- 6	73	1579.	1780.	201.	47.0	816.	331.0
5C 6- 6	** BAD THERMOCOUPLE DATA *						
3D 6- 7	85	1560.	1812.	252.	60.5	860.	318.0
3C 6- 8	93	1573.	1840.	267.	59.5	954.	301.8
4A 6- 8	95	1478.	1671.	193.	53.0	954.	322.8
1C 7- 0	109	1486.	1664.	178.	46.5	749.	358.0
2B 7- 0	110	1517.	1667.	150.	33.0	711.	355.8
3D 7- 0	113	1539.	1705.	166.	33.5	705.	344.6
5B 7- 0	117	1422.	1606.	184.	47.5	738.	346.6
2B 7- 6	120	1464.	1700.	236.	47.5	836.	379.6
2C 7- 6	121	1476.	1730.	254.	47.0	880.	369.9
2E 7- 6	123	1328.	1568.	240.	53.0	753.	375.5
3A 7- 6	124	1451.	1599.	149.	46.5	862.	362.7
3B 7- 6	125	1509.	1743.	234.	46.5	848.	376.3
4B 7- 6	129	1469.	1677.	208.	47.0	836.	384.1
5C 7- 6	132	1433.	1659.	226.	54.5	801.	395.9
1C 8- 0	133	1260.	1586.	326.	75.0	755.	410.0
2E 8- 0	136	1114.	1414.	300.	53.0	706.	397.8
3D 8- 0	138	1330.	1702.	372.	73.0	858.	388.3
5B 8- 0	143	1260.	1532.	272.	95.5	761.	402.4
5C 8- 0	144	1299.	1608.	309.	94.5	744.	427.6
1C 8- 6	145	1046.	1400.	354.	56.0	586.	435.0
1D 9- 6	146	949.	1155.	206.	29.5	691.	337.5
2C 8- 6	148	1170.	1582.	412.	75.0	745.	418.5
4B 8- 6	153	1171.	1538.	366.	94.0	637.	449.4
5D 9- 6	155	1105.	1428.	323.	116.0	554.	440.2
3D 9- 3	159	983.	1391.	408.	96.5	687.	427.0
4C 9- 3	161	1048.	1463.	415.	95.0	617.	450.0
1D10- 0	164	594.	1071.	477.	164.0	685.	366.1
4B10- 0	168	886.	1327.	441.	118.0	578.	467.3
5D10- 0	169	755.	1164.	409.	128.0	680.	421.9
2A11- 0	171	538.	893.	355.	154.0	579.	413.0
4C11- 0	172	697.	1117.	420.	124.0	530.	458.0
1D11- 6	** BAD THERMOCOUPLE DATA *						

RUN 43631F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	771.1	704.6	737.8	780.5	717.1	748.8	6.0	5.0	5.5
24	946.5	946.5	946.5	969.7	969.7	969.7	11.0	11.0	11.0
39	1259.3	1197.7	1219.7	1316.3	1290.1	1306.9	29.5	19.0	25.5
48	1466.0	1360.8	1409.0	1592.7	1492.3	1532.7	46.5	34.5	42.5
60	1496.6	1460.7	1478.7	1671.2	1648.3	1657.4	46.5	45.0	46.0
67	1601.9	1518.7	1562.9	1830.4	1720.7	1780.9	62.0	50.5	53.6
70	1600.8	1418.4	1489.3	1839.5	1629.7	1688.7	56.0	46.5	50.9
71	1549.5	1500.3	1524.9	1799.9	1760.9	1780.4	56.5	56.0	56.3
72	1446.7	1382.8	1414.8	1764.2	1642.8	1703.5	67.5	62.0	64.8
73	1439.8	1408.7	1424.2	1681.0	1631.9	1656.4	88.0	62.5	75.3
74	1493.9	1375.5	1453.9	1746.4	1607.9	1697.3	93.5	56.0	67.7
75	1511.1	1415.1	1465.9	1779.8	1594.9	1679.5	89.0	45.5	62.9
76	1553.3	1436.6	1488.0	1785.4	1612.3	1690.9	85.5	44.5	61.0
77	1557.6	1466.5	1512.1	1765.3	1609.0	1683.7	75.5	46.0	54.2
78	1578.7	1473.5	1525.3	1825.9	1648.3	1715.2	71.5	46.5	52.6
79	1566.2	1447.8	1518.9	1812.3	1633.0	1724.9	68.0	46.5	54.2
80	1572.7	1473.0	1514.2	1839.5	1671.2	1745.6	62.5	53.0	57.5
81	1499.2	1499.2	1499.2	1727.4	1727.4	1727.4	55.0	55.0	55.0
84	1539.2	1421.6	1490.3	1707.3	1605.8	1665.9	47.5	33.0	40.0
90	1509.5	1328.3	1443.0	1782.1	1513.8	1668.2	62.0	32.0	49.8
96	1363.4	1114.1	1282.1	1738.6	1414.1	1601.4	95.5	63.0	77.5
102	1182.6	897.0	1089.9	1581.9	1154.6	1420.7	116.0	29.5	68.1
111	1048.5	862.3	972.0	1463.4	1132.8	1314.1	139.0	59.5	101.8
120	885.6	594.0	761.0	1334.1	1070.7	1211.7	164.0	115.0	128.8
132	697.3	461.8	545.1	1117.2	672.0	898.9	160.0	99.0	134.3
138	637.3	608.9	623.1	1078.9	914.0	996.4	135.0	131.0	133.5

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	12.5	9.4	11.0	680.7	659.8	670.2	18.6	17.4	18.0
24	23.2	23.2	23.2	781.4	781.4	781.4	45.4	45.4	45.4
39	112.2	57.0	87.2	847.3	787.5	811.3	104.5	98.8	102.2
48	131.5	114.8	123.8	958.4	876.3	924.5	146.2	137.9	141.5
60	192.3	156.0	178.6	778.4	766.1	771.7	223.4	212.9	219.1
67	234.7	202.0	217.9	982.3	803.9	907.5	272.7	257.8	264.2
70	238.7	169.6	199.4	1175.1	284.5	770.1	501.0	262.7	332.3
71	260.5	250.4	255.5	1062.2	959.8	1011.0	291.8	287.6	289.7
72	317.4	260.0	288.7	1239.4	1142.2	1190.8	286.7	248.2	267.5
73	241.2	223.2	232.2	1152.1	991.0	1071.5	271.4	257.8	264.6
74	269.1	230.2	243.4	1060.8	235.0	710.1	564.0	291.6	392.9
75	308.4	118.7	213.7	1130.4	238.2	670.9	574.0	262.4	354.8
76	305.4	119.5	202.9	1361.1	253.3	800.7	574.0	249.4	350.4
77	298.8	113.0	171.6	1139.9	647.0	889.3	317.0	196.8	286.3
78	307.2	140.4	189.9	1141.2	516.8	892.7	336.4	206.6	306.7
79	264.0	170.4	206.0	1093.4	839.1	935.2	344.5	270.4	315.3
80	266.8	193.3	231.4	953.9	884.2	917.6	346.7	301.8	325.5
81	228.1	228.1	228.1	890.5	890.5	890.5	331.7	331.7	331.7
84	192.2	149.7	175.5	801.5	704.6	747.1	360.9	328.0	350.1
90	302.5	124.1	225.2	903.1	752.9	841.4	395.9	353.7	374.0
96	375.2	212.7	319.3	898.0	705.6	783.3	427.6	382.0	402.8
102	412.2	205.5	330.7	745.1	554.3	640.7	455.8	337.5	421.8
111	429.7	231.5	342.2	686.7	535.4	621.2	450.0	405.0	421.7
120	517.0	409.0	450.7	685.5	577.7	644.3	467.3	366.1	433.2
132	429.6	210.2	353.8	626.1	500.1	558.8	458.0	199.1	371.5
138	441.6	305.1	373.3	596.8	561.2	579.0	461.9	441.9	451.9

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43432F
Test Date: 7/15/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.277 MPa (40.2 psia)
Initial peak clad temperature and location	871°C (1600°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.3 kw/m (0.70 kw/ft)
Flow rate	21 mm/sec (0.81 in./sec)
Coolant temperature	49°C (121°F)
Average and range of initial 1.83 m (72 in.) housing temperature	515°C (501°C - 522°C) [959°F (933°F - 971°F)]
Initial bundle water level	34.5 mm (1.36 in.)

B. Summary Results:

C. Comments:

For direct comparison to 161-rod unblocked bundle (run 31805) and 163-rod blocked bundle

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43432F

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1169.	1308.	138.	38.5	798.	112.7
4C 3- 3	6	1227.	1326.	99.	33.5	873.	105.9
1C 4- 0	7	1378.	1550.	172.	49.5	943.	163.5
2A 5- 0	12	1492.	1713.	221.	47.5	729.	246.3
2A 5- 7	14	1557.	1833.	276.	74.5	925.	308.7
5C 6- 2	33	1451.	1780.	329.	102.0	1051.	361.9
2D 6- 3	39	1499.	1795.	296.	83.0	776.	361.8
1D 6- 4	46	1511.	1725.	214.	101.0	1081.	263.6
3D 6- 4	50	1478.	1914.	436.	93.5	264.	704.0
4B 6- 4	51	1555.	1801.	246.	62.5	843.	368.5
5D 6- 4	56	1510.	1716.	207.	92.5	841.	367.6
1D 6- 5	58	1504.	1730.	225.	105.0	1075.	299.8
2A 6- 5	59	1498.	1717.	219.	92.5	866.	371.6
2D 6- 5	62	1532.	1820.	288.	95.0	860.	373.8
3B 6- 5	63	1557.	1856.	300.	76.0	626.	397.0
3C 6- 6	69	1519.	1935.	416.	93.0	449.	396.5
3E 6- 6	70	1464.	1814.	330.	102.0	485.	395.7
4C 6- 6	73	1580.	1888.	308.	76.0	799.	411.9
5C 6- 6	* * B A D T H E R M O C O U P L E D A T A *						
3D 6- 7	85	1565.	1928.	363.	93.0	700.	422.7
3C 6- 8	93	1575.	1960.	385.	92.0	665.	397.5
4A 6- 8	95	1479.	1749.	270.	94.5	861.	419.5
1C 7- 0	109	1497.	1762.	265.	64.5	724.	434.8
2B 7- 0	110	1519.	1779.	260.	48.0	703.	451.0
3D 7- 0	113	1548.	1827.	279.	48.0	655.	447.3
5B 7- 0	117	1422.	1700.	277.	64.0	723.	436.9
2B 7- 6	120	1477.	1815.	338.	64.5	834.	481.9
2C 7- 6	121	1489.	1852.	362.	76.0	878.	462.8
2E 7- 6	123	1338.	1671.	333.	82.5	772.	479.7
3A 7- 6	124	1463.	1680.	217.	62.0	853.	467.8
3B 7- 6	125	1522.	1850.	327.	64.5	844.	476.7
4B 7- 6	129	1486.	1780.	294.	61.0	804.	465.9
5C 7- 6	132	1452.	1763.	311.	73.5	785.	497.8
1C 8- 0	133	1270.	1696.	426.	90.5	771.	519.9
2E 8- 0	136	1118.	1540.	422.	75.5	710.	512.0
3D 8- 0	138	1337.	1835.	498.	92.5	840.	501.0
5B 8- 0	143	1278.	1643.	365.	138.0	721.	517.8
5C 8- 0	144	1319.	1729.	409.	106.0	710.	538.7
1C 8- 6	145	1034.	1532.	498.	90.0	603.	551.0
1D 8- 6	146	886.	1280.	394.	47.5	607.	532.5
2C 8- 6	148	1163.	1726.	564.	93.0	752.	530.9
4B 8- 6	153	1167.	1687.	499.	106.0	832.	563.9
5D 8- 6	155	1121.	1515.	394.	108.0	633.	533.9
3D 9- 3	159	950.	1484.	533.	125.0	711.	546.9
4C 9- 3	161	1031.	1581.	550.	128.0	639.	567.6
1D10- 0	164	590.	1165.	575.	212.0	867.	560.0
4B10- 0	168	878.	1468.	589.	145.0	602.	587.9
5D10- 0	169	737.	1260.	523.	189.0	655.	537.6
2B11- 0	171	538.	912.	374.	173.0	612.	508.7
4C11- 0	172	687.	1244.	557.	158.0	540.	590.0
1D11- 6	* * B A D T H E R M O C O U P L E D A T A *						

RUN 43432F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	735.9	676.5	707.2	750.3	698.3	724.3	9.5	6.5	8.0
24	908.7	908.7	908.7	950.1	950.1	950.1	21.5	21.5	21.5
39	1226.7	1166.4	1188.2	1332.0	1307.9	1321.9	45.5	33.5	39.2
48	1439.4	1336.5	1384.0	1624.3	1511.7	1557.4	61.0	46.0	54.6
60	1491.9	1445.8	1468.3	1730.8	1702.9	1715.5	73.0	47.5	61.2
67	1599.7	1519.2	1561.7	1916.6	1796.6	1857.4	80.5	64.5	72.6
70	1600.4	1419.7	1490.7	1947.6	1699.5	1776.6	93.0	62.5	75.6
71	1551.7	1496.3	1525.0	1924.6	1881.3	1902.9	91.5	77.5	84.5
72	1448.0	1379.5	1413.7	1888.1	1730.8	1809.4	95.5	77.0	86.2
73	1442.6	1413.7	1428.2	1818.0	1744.1	1781.0	104.0	94.0	99.0
74	1496.2	1393.1	1456.9	1873.4	1720.7	1808.1	107.0	78.0	93.6
75	1516.6	1414.3	1468.1	1891.5	1672.3	1780.7	105.0	83.0	94.5
76	1554.9	1443.7	1492.1	1914.3	1716.3	1790.9	109.0	62.5	93.8
77	1561.4	1467.2	1517.1	1874.5	1687.5	1780.5	105.0	76.0	94.2
78	1579.8	1463.7	1530.1	1935.0	1726.3	1806.5	104.0	63.5	83.4
79	1567.9	1461.9	1525.0	1928.1	1741.9	1822.8	102.0	72.5	91.0
80	1574.8	1479.0	1521.1	1960.2	1748.6	1846.6	101.0	83.0	94.5
81	1511.7	1511.7	1511.7	1837.2	1837.2	1837.2	92.5	92.5	92.5
84	1547.7	1422.2	1496.9	1829.3	1699.5	1775.9	65.0	47.5	59.0
90	1522.5	1337.9	1456.8	1904.0	1602.5	1774.9	87.5	46.0	69.7
96	1370.8	1117.8	1293.3	1873.4	1539.8	1727.5	138.0	75.5	99.0
102	1194.4	767.6	1077.1	1726.3	1245.2	1547.4	108.0	47.5	92.8
111	1030.7	659.1	953.8	1589.5	1249.4	1441.3	150.0	94.5	124.1
120	878.4	589.6	754.4	1471.9	1165.0	1330.6	212.0	140.0	166.2
132	686.9	464.6	545.0	1244.2	897.5	1003.0	213.0	158.0	180.8
138	629.4	602.7	616.0	1204.5	990.3	1097.4	181.0	179.0	180.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	19.8	14.4	17.1	684.9	660.7	672.8	18.0	17.0	17.5
24	41.3	41.3	41.3	787.4	787.4	787.4	47.0	47.0	47.0
39	163.6	99.0	133.7	872.5	797.0	822.7	113.9	105.9	110.8
48	184.9	161.5	173.4	976.4	824.8	920.0	163.5	154.6	159.6
60	263.6	221.0	247.2	772.1	728.8	753.0	260.4	246.3	255.4
67	330.0	276.0	295.7	1052.7	839.3	935.4	329.2	306.6	315.4
70	347.2	251.4	285.9	1196.7	283.4	768.3	636.0	315.5	409.8
71	383.0	372.9	378.0	1047.9	981.6	1014.7	362.9	351.6	357.2
72	440.1	351.3	395.7	1032.7	246.8	639.8	672.0	359.6	515.8
73	375.4	330.4	352.9	948.0	281.3	614.7	643.0	349.2	496.1
74	401.9	327.6	351.2	1059.1	232.8	625.0	694.0	362.5	490.6
75	420.4	191.5	312.6	1139.2	242.5	733.0	704.0	277.5	423.3
76	436.3	206.5	298.8	1131.2	253.3	716.1	704.0	283.6	463.5
77	407.3	162.7	263.5	1227.0	626.4	886.3	402.0	299.6	366.6
78	416.5	216.1	276.4	943.4	449.0	805.3	419.6	382.6	401.8
79	379.3	246.5	297.8	997.1	590.7	853.9	425.9	346.6	403.0
80	385.4	269.6	325.5	947.9	784.0	853.9	433.7	397.5	419.9
81	325.5	325.5	325.5	810.4	810.4	810.4	418.6	416.6	416.6
84	311.1	243.3	279.0	763.9	654.8	718.6	454.8	432.4	445.9
90	424.2	191.0	318.1	877.7	772.2	826.9	497.6	456.8	476.4
96	502.6	307.9	434.2	871.4	699.6	774.6	538.7	495.9	513.6
102	563.8	393.6	470.3	752.2	563.1	639.6	570.0	526.0	543.2
111	580.4	376.8	487.5	711.3	522.8	637.8	574.6	526.0	551.2
120	628.7	522.6	576.2	689.2	601.8	654.0	587.9	537.6	567.5
132	557.3	374.4	458.0	672.1	535.7	589.9	590.0	497.9	526.7
138	575.1	387.6	481.4	599.4	567.5	583.4	596.8	577.0	586.9

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43333F
Test Date: 7/15/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.276 MPa (40.1 psia)
Initial peak clad temperature and location	875°C (1607°F), 3C 1.78 m (70 in.)
Initial peak rod power	1.3 kw/m (0.40 kw/ft)
Flow rate	15 mm/sec (0.6 in./sec)
Coolant temperature	48°C (119°F)
Average and range of initial 1.83 m (72 in.) housing temperature	528°C (507°C - 539°C) [982°F (945°F - 1003°F)]
Initial bundle water level	34.0 mm (1.34 in.)

B. Summary Results:

C. Comments:

For direct comparison to 161-rod unblocked bundle (run 34006) and 163-rod blocked bundle

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43333F

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1155.	1224.	69.	39.0	750.	113.7
4C 3- 3	6	1247.	1279.	32.	22.0	826.	109.1
1C 4- 0	7	1374.	1446.	73.	46.0	924.	159.4
2A 5- 0	12	1483.	1615.	131.	53.0	675.	222.0
2A 5- 7	14	1541.	1678.	137.	72.5	954.	263.8
5C 6- 2	33	1444.	1655.	211.	114.0	1076.	326.6
2D 6- 3	39	1489.	1705.	216.	111.0	786.	327.9
1D 6- 4	46	1478.	1627.	148.	110.0	831.	345.0
3D 6- 4	50	1488.	1788.	299.	115.0	244.	609.0
4B 6- 4	51	1546.	1705.	159.	78.5	625.	343.8
5D 6- 4	56	1472.	1610.	138.	114.0	806.	349.0
1D 6- 5	58	1472.	1623.	152.	110.0	842.	351.4
2A 6- 5	59	1475.	1610.	135.	106.0	836.	332.5
2D 6- 5	62	1520.	1714.	194.	113.0	857.	340.6
3B 6- 5	63	1558.	1746.	188.	87.5	663.	348.2
3C 6- 6	69	1545.	1804.	259.	110.0	1182.	317.8
3E 6- 6	70	1473.	1683.	210.	115.0	1041.	336.2
4C 6- 6	73	1580.	1766.	186.	87.0	811.	353.0
5C 6- 6	** BAD THERMOCOUPLE DATA *						
3D 6- 7	85	1567.	1792.	225.	110.0	805.	359.9
3C 6- 8	93	1585.	1819.	234.	92.5	874.	344.7
4A 6- 8	95	1454.	1630.	176.	88.0	896.	365.5
1C 7- 0	109	1480.	1682.	202.	86.0	870.	391.9
2B 7- 0	110	1512.	1721.	209.	74.5	842.	367.0
3D 7- 0	113	1539.	1769.	230.	73.0	820.	382.0
5B 7- 0	117	1406.	1624.	218.	77.0	594.	374.5
2B 7- 6	120	1467.	1722.	255.	90.0	729.	416.8
2C 7- 6	121	1486.	1755.	270.	90.5	807.	404.8
2E 7- 6	123	1326.	1584.	257.	112.0	752.	416.4
3A 7- 6	124	1441.	1590.	149.	73.0	790.	400.7
3B 7- 6	125	1510.	1742.	232.	85.5	704.	411.9
4B 7- 6	129	1475.	1692.	216.	74.5	717.	421.3
5C 7- 6	132	1435.	1644.	209.	87.0	755.	414.9
1C 8- 0	133	1270.	1616.	346.	130.0	746.	452.4
2E 8- 0	136	1140.	1518.	378.	114.0	726.	451.9
3D 8- 0	138	1349.	1730.	381.	129.0	767.	443.8
5B 8- 0	143	1246.	1525.	278.	180.0	809.	452.7
5C 8- 0	144	1311.	1609.	298.	143.0	776.	457.7
1C 8- 6	145	1026.	1493.	468.	129.0	558.	482.0
1D 8- 6	146	870.	1368.	498.	130.0	569.	464.1
2C 8- 6	148	1171.	1652.	481.	131.0	690.	474.8
4B 8- 6	153	1182.	1607.	425.	145.0	591.	491.5
5D 8- 6	155	1108.	1507.	400.	173.0	631.	453.2
3D 9- 3	159	978.	1446.	468.	174.0	685.	495.0
4C 9- 3	161	1047.	1525.	478.	174.0	675.	500.0
1D10- 0	164	596.	1126.	529.	264.0	669.	507.0
4B10- 0	168	883.	1386.	502.	189.0	648.	519.0
5D10- 0	169	746.	1222.	477.	192.0	700.	489.9
2A11- 0	171	532.	852.	320.	196.0	556.	512.0
4C11- 0	172	693.	1181.	487.	214.0	560.	527.8
1D11- 6	** BAD THERMOCOUPLE DATA *						

RUN 43333F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	741.6	679.4	710.5	746.2	691.0	718.6	11.5	4.5	8.0
24	920.9	920.9	920.9	933.6	933.6	933.6	14.0	14.0	14.0
39	1247.0	1155.3	1187.4	1278.6	1224.4	1251.5	45.5	22.0	35.5
48	1446.5	1330.7	1382.7	1519.2	1414.1	1455.9	50.5	39.5	44.6
60	1483.4	1437.3	1458.4	1618.8	1591.7	1608.3	65.5	53.0	58.3
67	1599.5	1497.8	1555.7	1780.9	1663.6	1714.3	74.5	56.0	69.0
70	1606.5	1406.9	1478.6	1810.1	1614.5	1671.0	114.0	70.5	84.1
71	1547.0	1504.9	1526.0	1788.8	1769.8	1779.3	92.5	87.5	90.0
72	1458.8	1367.9	1413.3	1753.1	1635.2	1694.1	112.0	90.5	101.3
73	1444.8	1397.2	1421.0	1714.0	1639.6	1676.8	113.0	112.0	112.5
74	1486.6	1362.6	1449.1	1772.0	1606.8	1696.6	130.0	88.5	103.6
75	1498.4	1402.5	1457.7	1769.8	1591.7	1676.3	116.0	108.0	112.1
76	1545.9	1419.1	1481.4	1787.6	1610.1	1680.1	129.0	73.0	107.3
77	1558.4	1471.6	1504.1	1755.3	1597.1	1672.1	113.0	87.5	105.1
78	1580.0	1465.2	1517.6	1804.4	1612.3	1686.0	115.0	74.0	95.8
79	1577.9	1430.9	1516.2	1792.1	1622.1	1698.2	130.0	79.5	103.4
80	1585.4	1453.9	1510.7	1819.1	1629.7	1716.8	114.0	88.0	103.5
81	1492.0	1492.0	1492.0	1702.9	1702.9	1702.9	113.0	113.0	113.0
84	1539.0	1406.3	1483.6	1776.5	1624.3	1705.3	87.0	73.0	79.4
90	1515.2	1327.5	1443.4	1792.1	1541.9	1677.9	112.0	71.0	88.6
96	1383.6	1139.7	1292.2	1753.1	1462.3	1631.5	205.0	113.0	136.3
102	1193.8	818.6	1077.9	1651.6	1355.1	1526.2	173.0	115.0	139.6
111	1046.7	841.6	957.8	1535.5	1279.7	1396.5	203.0	130.0	176.5
120	883.2	596.3	766.1	1415.2	1125.5	1283.6	264.0	189.0	209.2
132	693.1	467.8	548.2	1180.6	777.4	921.4	259.0	196.0	224.0
138	637.3	606.8	622.1	1145.3	961.4	1053.3	274.0	263.0	268.5

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	11.6	4.6	8.1	694.5	660.6	677.5	20.5	20.4	20.4
24	12.7	12.7	12.7	773.4	773.4	773.4	52.4	52.4	52.4
39	91.5	31.6	64.0	827.6	750.4	780.1	115.3	109.1	112.7
48	83.4	64.2	73.2	934.6	817.7	897.9	159.4	151.8	155.1
60	164.3	131.1	149.9	731.9	675.4	705.6	230.0	222.0	226.6
67	184.7	137.1	158.6	954.2	797.7	897.0	275.0	263.6	270.6
70	205.6	180.0	192.4	1026.0	286.6	625.6	409.0	288.1	339.8
71	264.9	241.8	253.3	1059.9	970.3	1015.1	307.0	304.6	305.9
72	294.3	267.3	280.8	1045.1	244.7	644.9	572.0	310.6	441.3
73	269.2	242.4	255.8	975.3	952.2	963.8	323.8	311.1	317.4
74	289.1	211.0	247.5	1429.2	231.8	936.1	591.0	213.3	352.7
75	292.8	138.8	218.6	1059.5	233.9	722.8	609.0	310.7	375.0
76	299.3	127.1	198.7	994.3	243.6	617.1	609.0	295.3	416.7
77	266.5	118.6	187.9	1135.0	663.0	847.1	351.4	326.4	341.1
78	259.0	113.6	188.4	1182.1	783.7	892.6	369.0	317.8	350.3
79	233.8	136.0	182.0	1063.0	804.5	870.5	372.9	324.5	355.2
80	233.7	175.8	206.0	895.8	808.6	848.7	379.1	344.7	366.6
81	210.9	210.9	210.9	805.0	805.0	805.0	365.5	365.5	365.5
84	254.6	189.2	221.7	715.3	594.5	659.9	391.9	371.6	382.8
90	308.3	140.9	234.5	839.2	716.8	764.8	428.9	397.3	411.7
96	409.2	252.4	334.4	809.1	712.3	758.4	464.8	436.3	450.8
102	536.5	379.9	448.3	689.8	502.5	600.2	491.5	453.2	475.0
111	503.8	375.3	438.7	692.8	597.3	653.5	500.0	470.0	487.0
120	578.4	476.5	517.5	699.8	641.5	664.4	519.0	489.9	510.6
132	487.5	309.6	373.2	671.0	542.8	587.4	527.3	422.3	474.3
138	508.0	354.6	431.3	599.9	587.6	593.7	539.2	535.0	537.1

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43534F
Test Date: 7/16/81
Test Type: Forced Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (44%)

A. As-Run Test Conditions:

Upper plenum pressure	0.142 MPa (20.6 psia)
Initial peak clad temperature and location	873°C (1604°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.3 kw/m (0.70 kw/ft)
Flow rate	25 mm/sec (1 in./sec)
Coolant temperature	31°C (88°F)
Average and range of initial 1.83 m (72 in.) housing temperature	511°C (494°C - 518°C) [951°F (922°F - 964°F)]
Initial bundle water level	26.7 mm (1.05 in.)

B. Summary Results:

C. Comments:

For direct comparison to 161-rod unblocked bundle (run 34209) and 163-rod blocked bundle

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43534F

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	5	1170.	1285.	115.	30.5	727.	145.7
4C 3- 3	6	1225.	1296.	71.	19.0	796.	137.7
1C 4- 0	7	1380.	1543.	163.	61.0	882.	207.7
2A 5- 0	12	1479.	1653.	173.	58.5	730.	305.7
2A 5- 7	14	1554.	1766.	213.	61.0	899.	379.5
5C 6- 2	33	1456.	1658.	202.	61.0	971.	471.2
2D 6- 3	39	1503.	1612.	109.	29.5	857.	412.8
1D 6- 4	46	1519.	1603.	83.	28.5	925.	384.8
3D 6- 4	50	1475.	1746.	271.	69.0	326.	728.0
4B 6- 4	51	1565.	1677.	112.	32.0	780.	400.5
5D 6- 4	56	1514.	1617.	103.	32.5	804.	465.9
1D 6- 5	58	1511.	1608.	97.	57.5	964.	394.6
2A 6- 5	59	1507.	1621.	114.	57.5	857.	352.8
2D 6- 5	62	1539.	1660.	122.	57.5	902.	429.7
3B 6- 5	63	1565.	1717.	153.	58.0	542.	487.0
3C 6- 6	69	1525.	1781.	256.	63.5	425.	478.1
3E 6- 6	70	1490.	1677.	186.	59.5	424.	493.6
4C 6- 6	73	1590.	1736.	147.	34.0	732.	490.9
5C 6- 6	* * B A D T H E R M O C O U P L E D A T A *						
3D 6- 7	85	1574.	1772.	198.	58.5	716.	514.0
3C 6- 8	93	1563.	1802.	219.	59.0	863.	477.9
4A 6- 8	95	1487.	1649.	163.	57.0	846.	511.7
1C 7- 0	109	1514.	1636.	123.	27.0	840.	559.0
2B 7- 0	110	1523.	1642.	108.	16.0	659.	531.9
3D 7- 0	113	1561.	1663.	101.	15.5	619.	538.0
5B 7- 0	117	1428.	1542.	114.	27.5	687.	524.9
2B 7- 6	120	1501.	1663.	162.	34.0	737.	553.9
2C 7- 6	121	1516.	1687.	171.	34.0	796.	530.0
2E 7- 6	123	1406.	1531.	126.	34.5	722.	517.5
3A 7- 6	124	1484.	1578.	94.	24.0	778.	532.9
3B 7- 6	125	1544.	1702.	158.	35.5	764.	550.3
4B 7- 6	129	1504.	1649.	145.	32.5	710.	566.9
5C 7- 6	132	1472.	1631.	159.	43.5	686.	587.0
1C 8- 0	133	1317.	1555.	238.	59.5	663.	606.0
2E 8- 0	136	1241.	1438.	197.	59.5	711.	545.0
3D 8- 0	138	1379.	1647.	268.	59.0	756.	575.8
5B 8- 0	143	1291.	1474.	183.	57.0	676.	570.5
5C 8- 0	144	1333.	1561.	228.	60.0	666.	628.4
1C 8- 6	145	1067.	1319.	253.	59.5	564.	634.4
1D 8- 6	146	1010.	1145.	135.	23.0	609.	564.0
2C 8- 6	148	1184.	1491.	308.	61.5	720.	588.1
4B 8- 6	153	1186.	1439.	253.	59.5	595.	647.9
5D 8- 6	155	1130.	1318.	189.	57.5	536.	636.0
3D 9- 3	159	944.	1257.	313.	76.5	602.	626.0
4C 9- 3	161	1023.	1337.	314.	76.0	582.	654.0
1D10- 0	164	595.	938.	343.	129.0	624.	569.2
4B10- 0	168	865.	1191.	326.	101.0	515.	675.0
5D10- 0	169	744.	1004.	260.	85.5	526.	569.6
2A11- 0	171	524.	775.	252.	132.0	492.	527.7
4C11- 0	172	677.	944.	267.	95.5	469.	625.6
1D11- 6	* * B A D T H E R M O C O U P L E D A T A *						

RUN 43534F HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	731.6	680.4	706.0	743.1	693.1	718.1	5.5	5.5	5.5
24	920.2	920.2	920.2	950.1	950.1	950.1	13.0	13.0	13.0
39	1225.4	1166.1	1187.9	1297.4	1284.9	1292.9	31.5	19.0	27.0
48	1443.0	1338.3	1386.7	1603.6	1505.2	1549.0	64.0	52.5	59.1
60	1479.4	1448.4	1463.0	1678.8	1634.1	1655.2	63.0	57.5	59.7
67	1600.3	1519.2	1562.2	1829.3	1700.6	1770.3	63.5	57.0	59.4
70	1603.6	1420.5	1492.5	1811.2	1590.5	1651.2	59.0	32.0	51.4
71	1553.6	1498.7	1526.2	1755.3	1705.1	1730.2	60.0	57.0	58.5
72	1449.4	1383.4	1416.4	1718.5	1597.1	1657.8	67.5	62.0	64.8
73	1443.0	1416.2	1429.6	1626.5	1589.5	1608.0	69.0	60.5	64.8
74	1500.9	1384.4	1458.5	1699.5	1562.5	1653.8	64.0	58.0	61.1
75	1521.4	1420.5	1472.9	1738.6	1578.7	1647.1	73.5	29.0	57.0
76	1564.6	1447.3	1497.4	1746.4	1579.8	1660.2	69.0	28.5	51.2
77	1571.1	1470.9	1525.2	1729.6	1601.4	1658.9	77.0	29.0	56.6
78	1589.5	1490.2	1538.0	1780.9	1633.0	1685.5	63.5	32.0	44.0
79	1576.5	1467.7	1533.1	1772.0	1597.1	1697.8	61.5	37.5	50.3
80	1583.0	1486.9	1529.1	1802.2	1649.4	1718.1	59.0	43.0	55.9
81	1520.3	1520.3	1520.3	1684.3	1684.3	1684.3	58.0	58.0	58.0
84	1561.4	1426.0	1509.3	1662.5	1541.9	1620.3	27.5	15.5	20.4
90	1544.1	1405.5	1487.7	1725.2	1530.1	1634.6	43.5	23.0	33.5
96	1396.0	1241.1	1333.3	1679.9	1400.2	1559.5	60.0	36.5	57.0
102	1193.1	935.7	1113.2	1491.2	1103.7	1331.5	61.5	23.0	52.3
111	1023.3	838.5	946.1	1337.3	1093.4	1217.0	98.5	61.5	81.2
120	865.4	595.1	755.3	1208.7	937.7	1075.6	129.0	85.5	101.8
132	677.3	475.3	540.6	943.9	596.2	778.6	132.0	59.5	103.3
138	570.6	563.1	566.8	927.4	793.0	860.2	117.0	117.0	117.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	12.7	11.5	12.1	643.6	640.0	641.8	20.9	18.6	19.8
24	29.9	29.9	29.9	702.3	702.3	702.3	62.9	62.9	62.9
39	129.3	71.0	105.0	795.8	727.3	750.3	146.8	137.7	143.4
48	166.9	158.6	162.2	882.2	725.4	815.5	207.7	197.7	203.4
60	217.6	173.2	192.2	753.7	729.5	743.3	320.8	305.7	315.4
67	229.0	181.4	208.1	959.9	745.0	879.5	408.3	376.6	388.4
70	207.6	122.1	158.6	928.2	229.6	502.8	717.0	394.4	561.6
71	206.4	201.5	204.0	1026.2	937.8	982.0	440.3	421.3	430.8
72	269.1	213.7	241.4	1028.3	253.3	640.8	728.0	436.1	582.0
73	183.5	173.3	178.4	869.2	240.4	554.8	706.0	400.9	553.5
74	226.5	174.6	195.3	1026.5	243.6	692.3	728.0	448.1	560.3
75	268.8	90.7	174.2	1009.2	229.6	616.4	728.0	380.6	522.2
76	271.2	83.3	162.8	974.6	229.6	591.4	728.0	367.6	559.6
77	258.7	87.6	133.7	1119.9	541.8	811.1	504.5	352.8	446.4
78	256.3	112.8	147.6	1038.4	424.0	758.4	521.3	362.6	482.9
79	224.2	129.4	164.7	968.8	549.4	801.3	526.9	395.6	490.3
80	219.2	162.5	189.0	863.0	759.1	813.2	534.5	466.7	508.6
81	164.0	164.0	164.0	803.1	803.1	803.1	510.7	510.7	510.7
84	125.8	101.1	111.1	747.1	619.4	682.0	559.0	505.7	529.5
90	189.7	93.9	146.9	832.6	664.8	749.1	587.8	504.6	544.5
96	283.9	123.6	226.2	840.7	614.4	719.0	628.4	545.0	579.6
102	307.5	135.4	218.3	719.6	529.2	597.3	665.4	564.0	614.0
111	330.4	175.2	268.9	651.5	449.9	581.6	654.0	512.7	595.7
120	348.4	259.6	320.4	624.2	515.0	553.3	675.0	569.6	626.6
132	313.1	120.9	238.1	511.1	469.2	494.6	625.6	228.7	498.0
138	356.8	229.9	293.4	522.2	457.0	489.6	634.0	570.1	602.1

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43916A
Test Date: 5/8/80
Test Type: Gravity Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.281 MPa (40.8 psia)
Initial peak clad temperature and location	872°C (1602°F), 3C 1.83 m (72 in.)
Initial peak rod power	2.3 kw/m (0.70 kw/ft)
Flow rate	0.789 kg/sec (1.74 lb/sec) 14 sec 0.09 kg/sec (0.2 lb/sec) onward
Coolant temperature	52°C (126°F)
Average and range of initial 1.83 m (72 in.) housing temperature	543°C (536°C - 549°C) [1010°F (996°F - 1021°F)]
Initial bundle water level	7.1 mm (0.28 in.)
Initial downcomer water level	227 mm (8.93 in.)

B. Summary Results:

C. Comments:

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43916A

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1121.	1130.	9.	2.0	846.	34.9
4C 3- 3	11	1193.	1199.	7.	2.0	604.	36.8
1C 4- 0	14	1320.	1328.	8.	2.0	814.	70.4
2A 5- 0	17	1367.	1376.	9.	2.0	753.	115.3
2A 5- 7	21	1474.	1489.	16.	3.5	919.	143.0
1D 6- 2	50	1452.	1464.	12.	2.0	853.	175.9
2D 6- 2	53	1572.	1585.	13.	2.0	921.	171.0
3D 6- 2	58	1587.	1599.	12.	2.0	974.	173.9
5C 6- 2	61	1498.	1510.	11.	2.0	866.	173.0
1D 6- 3	63	1440.	1456.	16.	3.5	843.	180.9
4B 6- 3	66	1537.	1550.	12.	2.0	876.	180.0
5D 6- 3	69	1462.	1477.	15.	3.5	822.	185.5
2A 6- 4	70	1451.	1466.	14.	3.5	829.	186.9
3B 6- 4	75	1571.	1584.	13.	2.0	947.	186.0
3D 6- 6	79	1535.	1551.	15.	2.0	920.	191.9
2D 6- 5	84	1557.	1570.	13.	2.0	920.	184.0
3C 6- 5	85	1577.	1592.	14.	2.0	933.	185.8
3E 6- 5	86	1478.	1489.	11.	2.0	837.	196.8
3C 6- 6	95	1559.	1573.	14.	2.0	941.	190.6
4A 6- 6	97	1421.	1433.	12.	2.0	833.	195.9
3D 8- 0	98	1268.	1283.	15.	2.0	771.	240.0
5C 6- 6	* * B A D T H E R M O C O U P L E D A T A *						
1C 7- 0	110	1420.	1431.	11.	2.0	672.	225.0
2B 7- 0	111	1438.	1446.	8.	1.0	687.	213.0
3D 7- 0	115	1470.	1479.	9.	2.0	717.	210.0
5B 7- 0	117	1333.	1345.	12.	2.0	627.	206.0
0* 0- 0	* * B A D T H E R M O C O U P L E D A T A *						
2C 7- 6	121	1427.	1440.	13.	2.0	743.	224.7
2E 7- 6	122	1341.	1354.	13.	3.5	650.	219.0
3A 7- 6	123	1327.	1338.	11.	2.0	652.	242.0
3B 7- 6	124	1442.	1455.	13.	2.0	701.	233.0
4B 7- 6	127	1405.	1418.	13.	2.0	716.	226.9
5C 7- 6	128	1288.	1300.	12.	2.0	600.	230.0
1C 8- 0	131	1211.	1228.	16.	3.5	692.	251.0
2E 8- 0	133	698.	743.	45.	62.5	589.	199.5
4C 8- 6	136	1543.	1558.	16.	2.0	935.	188.0
5B 8- 0	138	1181.	1197.	16.	3.5	722.	210.0
5C 8- 0	139	1139.	1151.	12.	2.0	584.	246.0
1C 8- 6	141	1041.	1055.	14.	2.0	535.	265.3
1D 8- 6	142	910.	924.	14.	3.5	667.	207.0
2C 8- 6	143	1097.	1111.	14.	2.0	629.	253.0
4B 8- 6	145	1124.	1138.	14.	2.0	567.	261.5
5D 8- 6	148	1025.	1039.	14.	2.0	596.	253.7
3D 9- 3	154	906.	924.	18.	3.5	590.	265.0
4C 9- 3	156	999.	1012.	13.	2.0	565.	262.0
1D10- 0	161	577.	592.	15.	2.5	287.	171.0
4B10- 0	164	852.	865.	13.	3.5	425.	220.0
5D10- 0	167	720.	736.	16.	3.5	629.	201.0
2A11- 0	168	554.	562.	8.	3.5	516.	16.4
4C11- 0	170	662.	671.	9.	3.5	602.	14.5
1D11- 6	172	339.	359.	20.	18.5	266.	23.0

RUN 43916A HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	686.1	623.6	645.0	689.9	625.7	646.7	1.0	.5	.6
24	885.3	787.2	834.2	889.2	794.0	839.8	2.0	2.0	2.0
39	1192.5	1096.6	1137.3	1199.3	1107.8	1145.6	2.0	2.0	2.0
48	1339.9	1246.9	1292.5	1349.8	1263.0	1303.2	3.5	2.0	2.4
60	1470.3	1326.3	1382.4	1476.2	1338.3	1390.8	2.0	1.0	1.6
67	1573.8	1472.4	1502.1	1585.2	1485.9	1516.6	3.5	2.0	2.6
70	1599.9	1479.9	1540.6	1612.3	1489.1	1551.5	2.0	2.0	2.0
71	1597.8	1464.9	1537.7	1611.2	1474.1	1551.0	6.0	2.0	2.6
72	1602.1	1448.9	1535.0	1615.6	1462.3	1547.6	3.5	2.0	2.6
74	1587.0	1452.1	1532.1	1599.2	1464.4	1544.6	3.5	2.0	2.1
75	1582.6	1440.3	1522.8	1596.0	1455.9	1536.5	3.5	2.0	2.6
76	1579.4	1447.8	1523.5	1593.8	1462.3	1537.0	3.5	2.0	2.5
77	1577.2	1424.4	1506.2	1591.7	1440.9	1522.5	3.5	2.0	2.9
78	1558.9	1421.0	1500.4	1573.3	1433.4	1514.6	3.5	2.0	2.4
84	1470.3	1268.7	1395.1	1479.4	1281.8	1405.6	2.0	1.0	1.9
90	1441.6	1287.7	1367.8	1454.8	1299.5	1380.1	3.5	2.0	2.2
96	1306.3	697.6	1161.8	1320.5	743.1	1180.7	62.5	2.0	10.3
102	1123.9	910.4	1041.1	1138.0	924.3	1055.0	3.5	2.0	2.2
111	1079.6	811.1	946.5	1099.5	830.2	961.1	3.5	2.0	2.9
120	852.3	577.3	713.0	865.4	591.9	735.4	18.0	2.5	6.5
132	661.8	485.4	565.4	671.0	499.1	576.2	3.5	3.5	3.5
138	625.0	338.9	492.0	635.2	358.9	505.6	18.5	3.5	6.1

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	1.9	1.7	1.6	634.0	272.6	514.8	6.0	2.0	3.6
24	6.8	3.9	5.1	832.0	666.9	723.2	13.0	4.6	9.1
39	9.0	6.8	8.3	846.3	754.0	801.4	40.5	34.9	37.4
48	14.1	8.1	10.8	882.1	748.1	812.5	70.4	61.9	66.3
60	10.0	5.9	8.5	756.3	726.5	744.5	119.0	113.0	115.6
67	17.8	11.4	14.5	919.5	869.8	894.7	144.4	143.0	143.5
70	12.4	9.2	10.9	923.6	898.1	911.6	167.9	153.5	157.6
71	23.1	9.2	13.2	972.3	802.8	893.5	168.4	157.7	163.3
72	17.8	7.0	12.6	982.2	871.1	906.5	178.0	162.9	167.1
74	16.6	10.2	12.5	973.7	815.1	896.5	182.9	170.1	175.3
75	15.6	12.3	13.7	933.7	821.7	879.0	188.9	177.0	181.3
76	16.6	10.1	13.4	954.4	828.8	898.5	187.0	178.2	183.1
77	16.5	11.3	14.3	933.4	797.8	880.9	196.8	184.0	188.8
78	15.6	12.4	14.2	942.3	824.1	895.7	195.9	188.0	192.5
84	13.1	8.0	10.5	717.1	626.7	673.3	226.0	206.0	215.1
90	14.0	10.0	12.4	783.6	600.5	688.8	242.0	216.0	228.3
96	45.4	12.0	16.9	771.2	583.6	696.6	251.0	199.5	234.1
102	15.2	12.9	14.0	672.0	534.5	604.7	266.4	191.9	241.4
111	19.9	11.0	14.6	737.2	406.7	566.5	269.2	91.5	218.3
120	43.9	13.1	22.3	628.8	281.3	402.8	252.0	88.8	204.1
132	13.7	8.2	10.8	601.7	483.8	535.9	17.5	9.5	14.5
138	20.0	10.2	13.6	574.8	285.6	466.0	23.0	12.0	17.4

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43816B
Test Date: 7/9/80
Test Type: Gravity Reflood
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.276 MPa (40.1 psia)
Initial peak clad temperature and location	877°C (1611°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.3 kw/m (0.7 kw/ft)
Flow rate	0.839 kg/sec (1.85 lb/sec) 14 sec 0.095 kg/sec (0.21 lb/sec) onward
Coolant temperature	51°C (123°F)
Average and range of initial 1.83 m (72 in.) housing temperature	495°C (489°C - 499°C) [923°F (913°F - 930°F)]
Initial bundle water level	5.7 mm (0.22 in.)
Initial downcomer water level	213 mm (8.37 in.)

B. Summary Results:

C. Comments:

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 43816B

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1166.	1179.	12.	3.0	752.	45.8
4C 3- 3	11	1247.	1255.	8.	1.5	287.	51.0
1C 4- 0	14	1336.	1350.	14.	3.0	287.	78.5
2A 5- 0	17	1408.	1424.	15.	3.0	748.	120.0
2A 5- 7	21	1500.	1516.	16.	3.0	852.	150.0
1D 6- 2	50	1458.	1472.	14.	2.0	761.	175.6
2D 6- 2	53	1516.	1531.	15.	2.0	732.	125.9
3D 6- 2	58	1558.	1572.	14.	2.0	1065.	29.9
5C 6- 2	61	1517.	1531.	14.	2.0	861.	181.1
1D 6- 3	63	1473.	1486.	13.	2.0	815.	166.0
4B 6- 3	68	1541.	1559.	18.	3.0	1006.	88.4
5D 6- 3	69	1446.	1470.	24.	4.5	730.	201.0
2A 6- 4	70	1468.	1484.	15.	3.0	758.	189.0
2D 6- 4	72	1529.	1552.	22.	3.0	941.	136.0
3B 6- 4	75	1560.	1582.	22.	3.0	1119.	55.4
3C 6- 5	85	1590.	1611.	21.	2.0	1093.	43.9
3E 6- 5	86	1478.	1498.	19.	3.0	763.	196.9
3C 6- 6	95	1563.	1586.	23.	3.0	1106.	51.9
3D 6- 6	96	1529.	1555.	25.	3.0	1085.	57.9
4A 6- 6	97	1446.	1464.	18.	3.0	748.	196.8
4C 6- 6	98	1541.	1565.	24.	3.0	1117.	57.9
5C 6- 6	101	1473.	1490.	17.	3.0	763.	196.0
1C 7- 0	110	1406.	1422.	16.	2.0	669.	214.0
2B 7- 0	111	1432.	1447.	16.	2.0	830.	119.5
3D 7- 0	115	1466.	1484.	18.	2.0	908.	94.0
5B 7- 0	117	1370.	1384.	14.	2.0	685.	213.0
2B 7- 6	120	1381.	1400.	20.	3.0	859.	143.9
2C 7- 6	121	1361.	1384.	24.	3.0	862.	129.0
2E 7- 6	122	1232.	1255.	22.	4.5	739.	200.1
3A 7- 6	123	1374.	1395.	21.	3.0	727.	225.2
3B 7- 6	124	1401.	1424.	23.	3.0	885.	129.9
4B 7- 6	127	1418.	1438.	20.	2.0	826.	164.0
5C 7- 6	128	1374.	1396.	22.	3.0	723.	228.0
1C 8- 0	131	1146.	1174.	29.	4.5	666.	242.0
2E 8- 0	133	928.	972.	44.	18.0	756.	174.9
3D 8- 0	136	1214.	1244.	30.	4.5	864.	142.0
5B 8- 0	138	1169.	1189.	20.	4.5	641.	240.7
5C 8- 0	139	1264.	1287.	23.	4.5	702.	245.0
1C 8- 6	141	978.	1000.	22.	3.0	573.	255.0
1D 8- 6	142	791.	820.	28.	3.0	597.	226.0
2C 8- 6	143	1051.	1076.	25.	3.0	711.	172.0
4B 8- 6	145	1161.	1187.	25.	3.5	719.	202.0
5D 8- 6	148	1024.	1042.	17.	2.0	687.	165.7
3D 9- 3	154	889.	912.	23.	3.0	688.	175.0
4C 9- 3	156	992.	1011.	18.	3.0	694.	173.2
1D10- 0	161	610.	634.	24.	4.5	407.	213.1
4B10- 0	164	864.	880.	16.	3.0	547.	226.0
5D10- 0	167	712.	732.	19.	4.5	462.	72.4
2A11- 0	168	558.	567.	10.	3.0	525.	20.0
4C11- 0	** BAD THERMOCOUPLE DATA *						
1D11- 6	** BAD THERMOCOUPLE DATA *						

RUN 438168 HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	745.5	659.2	691.0	747.2	661.5	693.2	1.5	.5	.9
24	965.3	878.7	910.9	968.6	888.2	916.3	3.0	.5	1.9
39	1247.0	1166.1	1188.2	1254.6	1176.5	1199.1	3.0	1.5	2.6
48	1391.3	1295.4	1330.8	1406.6	1307.9	1346.4	4.5	3.0	3.4
60	1485.9	1396.5	1423.9	1496.6	1413.0	1439.0	3.0	1.5	2.6
67	1591.9	1490.7	1520.4	1602.5	1511.7	1538.7	3.0	3.0	3.0
70	1610.6	1509.5	1557.8	1630.8	1527.9	1576.4	3.0	3.0	3.0
71	1600.2	1434.5	1522.3	1622.1	1452.7	1542.0	3.0	2.0	2.9
72	1500.4	1453.2	1486.5	1518.2	1465.5	1501.8	3.0	2.0	2.6
74	1562.5	1458.1	1519.3	1576.5	1471.9	1534.0	3.0	1.5	2.1
75	1591.1	1445.7	1526.6	1605.8	1469.8	1544.5	4.5	2.0	2.9
76	1597.0	1468.2	1522.7	1614.5	1483.7	1541.3	3.0	2.0	2.9
77	1590.0	1403.5	1509.2	1611.2	1422.7	1529.9	4.5	2.0	3.1
78	1563.4	1443.6	1493.4	1586.3	1461.2	1515.1	3.0	3.0	3.0
84	1458.1	1355.6	1411.0	1485.9	1368.7	1426.6	2.0	2.0	2.0
90	1417.8	1097.8	1331.6	1437.7	1143.2	1355.1	4.5	2.0	3.2
96	1282.8	928.0	1193.1	1307.9	971.7	1219.5	18.0	3.0	5.3
102	1161.4	791.5	996.4	1186.8	819.9	1020.8	3.5	2.0	2.9
111	992.5	677.4	896.6	1010.9	716.0	918.4	55.5	3.0	8.6
120	863.6	609.6	713.0	879.9	634.1	736.2	110.0	3.0	16.1
132	557.5	501.0	536.9	567.4	516.2	549.3	4.5	3.0	3.5
138	638.1	494.1	534.0	648.9	509.8	549.4	4.5	3.0	4.1

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	2.8	1.7	2.1	737.7	511.0	637.2	4.5	3.0	3.6
24	9.5	2.9	5.4	951.8	682.0	801.3	15.6	4.5	10.4
39	13.8	7.6	10.9	758.0	286.6	631.3	51.0	45.5	48.0
48	20.8	12.5	15.7	775.3	286.6	629.5	78.5	72.8	74.8
60	17.7	10.7	15.1	772.6	734.8	748.6	123.0	120.0	121.5
67	21.0	15.6	18.3	886.1	837.8	856.3	151.8	144.0	149.1
70	20.2	16.2	18.6	898.4	864.0	878.6	162.2	154.9	159.1
71	21.9	16.8	19.7	966.6	593.2	817.6	179.0	157.9	166.6
72	17.8	12.3	15.4	897.6	826.1	846.9	175.9	170.9	172.3
74	20.5	13.0	14.7	1359.9	731.9	916.2	187.9	16.1	113.8
75	24.1	13.4	17.9	1140.0	735.9	933.5	201.0	32.4	122.2
76	22.3	14.7	18.7	1152.6	767.5	939.0	190.2	37.4	126.0
77	25.0	16.5	20.6	1130.1	731.8	927.3	196.9	43.9	131.2
78	25.5	17.2	21.7	1117.4	748.0	915.0	197.7	51.9	136.6
84	17.7	12.6	15.5	908.0	663.5	751.4	218.9	94.0	173.9
90	45.4	18.8	23.5	912.0	664.6	787.0	239.0	121.0	182.0
96	43.7	19.6	26.4	864.4	641.3	732.2	245.0	142.0	203.0
102	33.1	17.4	24.4	719.2	521.5	633.3	255.5	165.7	213.3
111	38.6	17.4	21.8	693.9	513.0	620.0	254.0	92.9	189.3
120	43.5	16.3	23.2	643.6	280.2	425.3	245.0	72.4	192.7
132	15.2	9.9	12.4	530.0	502.2	519.0	20.0	9.0	15.3
138	19.5	10.8	15.3	580.3	481.9	510.2	21.0	12.5	17.1

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43716C
Test Date: 9/4/80
Test Type: Gravity Reflood
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.279 MPa (40.4 psia)
Initial peak clad temperature and location	871°C (1600°F), 3C 1.93 m (78 in.)
Initial peak rod power	2.3 kw/m (0.7 kw/ft)
Flow rate	0.830 kg/sec (1.83 lb/sec) 14 sec 0.095 kg/sec (0.21 lb/sec) onward
Coolant temperature	52°C (125°F)
Average and range of initial 1.83 m (72 in.) housing temperature	508°C (497°C - 514°C) [947°F (927°F - 957°F)]
Initial bundle water level	63 mm (2.5 in.)
Initial downcomer water level	175 mm (6.9 in.)

B. Summary Results:

C. Comments:

Carryover tank filled up at approximately 270 seconds.

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43716C

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1084.	1092.	8.	2.0	277.	41.5
4C 3- 3	11	1224.	1231.	7.	2.0	745.	41.0
1C 4- 0	14	1352.	1361.	10.	2.0	777.	69.8
2A 5- 0	17	1401.	1413.	12.	2.0	792.	119.9
2A 5- 7	21	1509.	1520.	11.	2.0	660.	149.8
1D 5- 2	50	1478.	1486.	8.	2.0	922.	113.7
2D 5- 2	53	1497.	1506.	10.	2.0	847.	36.3
3D 6- 2	58	1556.	1565.	9.	2.0	600.	109.0
4B 5- 2	60	1565.	1574.	10.	2.0	749.	179.6
5C 6- 2	61	1468.	1482.	13.	2.0	579.	74.5
1D 6- 3	63	1462.	1470.	8.	2.0	937.	119.8
5D 5- 3	69	1478.	1491.	13.	2.0	903.	137.9
2A 5- 4	70	1459.	1472.	13.	2.0	984.	91.8
3B 6- 4	75	1576.	1587.	12.	2.0	1097.	45.4
2D 6- 5	84	1555.	1568.	12.	2.0	1119.	55.3
3C 6- 5	85	1595.	1610.	16.	2.0	1085.	53.2
3E 6- 5	86	1525.	1534.	9.	2.0	639.	156.0
3C 6- 6	95	1575.	1591.	16.	2.0	1081.	60.9
3D 6- 6	96	1554.	1568.	14.	2.0	911.	126.0
4A 6- 6	97	1462.	1476.	14.	2.0	822.	179.0
4C 6- 6	98	1577.	1592.	15.	2.0	1064.	63.4
5C 5- 6	101	1539.	1552.	13.	2.0	1037.	91.7
1C 7- 0	110	1424.	1436.	12.	2.0	775.	140.9
2B 7- 0	111	1431.	1443.	12.	2.0	744.	126.0
3D 7- 0	115	1454.	1468.	14.	2.0	716.	153.0
5B 7- 0	117	1365.	1377.	12.	2.0	706.	180.0
2B 7- 6	120	1417.	1430.	13.	2.0	836.	149.4
2C 7- 6	121	1402.	1418.	16.	2.0	757.	180.7
2E 7- 6	122	1103.	1126.	22.	3.5	749.	168.9
3A 7- 6	123	1416.	1430.	15.	2.0	709.	185.0
3B 7- 6	124	1438.	1453.	15.	2.0	902.	126.7
4B 7- 6	127	1436.	1452.	16.	2.0	657.	219.7
5C 7- 6	128	1425.	1440.	15.	2.0	849.	141.7
1C 8- 0	131	1210.	1229.	18.	3.5	736.	192.9
2E 8- 0	133	964.	1025.	61.	72.0	757.	196.3
3D 8- 0	136	1263.	1281.	18.	3.5	731.	193.0
5B 8- 0	138	1181.	1204.	22.	5.0	672.	193.0
5C 8- 0	139	1340.	1354.	14.	2.0	803.	165.9
1C 8- 6	141	1026.	1044.	18.	2.0	806.	214.2
1D 8- 6	142	803.	831.	28.	3.5	565.	226.0
2C 8- 6	* * B A D	T H E R M O C O U P L E	D A T A *				
4B 8- 6	145	1125.	1139.	14.	2.0	589.	244.0
5D 8- 6	148	1046.	1065.	18.	2.0	647.	149.8
3D 9- 3	154	892.	911.	19.	3.5	584.	221.0
4C 9- 3	156	990.	1004.	14.	2.0	628.	184.0
1D10- 0	161	623.	637.	14.	3.5	427.	87.6
4B10- 0	164	857.	871.	13.	3.5	550.	241.7
5D10- 0	167	713.	728.	15.	3.5	621.	58.3
2A11- 0	168	568.	577.	9.	3.5	535.	20.2
4C11- 0	170	657.	667.	10.	3.5	583.	16.0
1D11- 6	172	479.	489.	11.	3.5	479.	12.0

RUN 43716C HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	655.3	591.7	613.4	656.2	593.0	614.3	.5	.5	.5
24	902.4	623.0	866.2	907.8	828.2	870.9	2.0	2.0	2.0
36	1223.9	1084.4	1143.0	1230.6	1092.3	1151.5	2.0	2.0	2.0
48	1370.6	1305.7	1335.0	1337.6	1315.2	1346.4	2.0	2.0	2.0
60	1402.2	1399.8	1401.1	1417.3	1413.0	1414.4	2.0	2.0	2.0
67	1611.9	1484.2	1524.9	1624.3	1496.7	1537.7	2.0	2.0	2.0
70	1595.0	1482.1	1550.0	1607.9	1497.6	1569.8	2.0	2.0	2.0
71	1556.1	1453.2	1522.1	1570.0	1466.6	1535.6	2.0	2.0	2.0
72	1500.5	1499.9	1504.2	1521.4	1513.8	1517.6	2.0	2.0	2.0
74	1577.7	1449.3	1516.6	1586.3	1459.1	1525.1	2.0	2.0	2.0
75	1597.1	1462.2	1536.9	1609.0	1469.8	1547.1	2.0	2.0	2.0
76	1600.4	1446.7	1534.0	1614.5	1460.2	1546.1	2.0	2.0	2.0
77	1594.5	1430.0	1530.0	1610.1	1441.9	1542.7	2.0	2.0	2.0
78	1576.6	1411.8	1517.2	1591.7	1425.9	1531.8	3.5	2.0	2.1
84	1469.9	1218.6	1394.9	1483.7	1229.6	1407.6	2.0	2.0	2.0
90	1437.0	1103.3	1370.1	1452.7	1125.5	1392.0	3.5	2.0	2.2
96	1339.9	984.2	1239.6	1354.0	1025.3	1260.9	72.0	2.0	10.1
102	1125.4	803.4	993.3	1139.0	831.3	1017.9	3.5	2.0	2.3
111	1011.8	700.7	930.0	1025.3	811.6	952.3	3.5	2.0	3.1
120	884.0	622.8	750.2	897.5	637.3	768.9	120.0	2.0	16.8
132	657.0	504.0	570.5	666.8	520.4	586.6	3.5	3.5	3.5
136	639.7	470.7	525.3	648.9	489.4	535.9	3.5	3.0	3.4

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	1.3	0.0	.3	602.8	575.9	592.4	3.1	1.8	2.4
24	5.4	4.4	4.7	867.0	805.3	838.4	5.1	5.0	5.0
36	10.9	8.7	8.5	772.3	276.9	519.2	41.5	37.8	40.3
48	13.1	9.5	10.8	787.3	770.2	776.4	71.4	67.4	69.2
60	15.1	11.7	13.3	834.5	776.1	801.0	122.7	118.8	120.5
67	14.5	10.9	12.8	887.5	829.3	862.2	151.8	145.0	148.1
70	15.5	12.9	13.8	910.0	857.4	884.10	163.8	149.9	156.3
71	14.8	11.8	13.4	900.9	621.5	766.4	170.0	161.0	164.5
72	13.9	12.9	13.4	697.3	696.5	696.8	168.1	167.0	167.6
74	9.8	7.0	8.5	1066.7	659.7	843.2	179.6	31.9	103.5
75	13.4	5.8	10.1	1105.6	750.3	926.3	183.0	39.9	112.9
76	14.1	7.0	12.2	1109.7	842.3	996.4	170.2	45.4	89.5
77	15.6	9.2	12.7	1119.4	753.5	927.8	188.0	53.2	121.0
78	17.7	12.9	14.6	1095.7	622.0	991.3	179.0	59.9	102.2
84	14.9	11.0	12.7	895.3	707.6	780.2	180.0	96.4	132.7
90	22.2	12.8	19.8	902.3	657.3	769.7	219.7	126.7	168.9
96	21.1	13.7	21.1	867.6	672.1	775.3	200.0	151.8	177.3
102	27.9	13.6	19.6	693.3	565.3	614.3	244.0	149.8	208.0
111	22.9	12.4	15.5	641.5	536.9	586.6	231.0	140.1	197.0
120	30.0	13.1	18.6	620.5	287.7	456.3	245.0	58.3	168.0
132	11.4	8.8	10.1	533.5	507.6	543.0	24.5	8.0	17.2
136	12.0	9.1	10.8	568.4	362.3	472.3	23.5	11.9	14.7

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 44116D
Test Date: 10/31/81
Test Type: Gravity Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.281 MPa (40.7 psia)
Initial peak clad temperature and location	873°C (1604°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.3 kw/m (0.69 kw/ft)
Flow rate	0.839 kg/sec (1.85 lb/sec) 15 sec 0.095 kg/sec (0.21 lb/sec) onward
Coolant temperature	51°C (123°F)
Average and range of initial 1.83 m (72 in.) housing temperature	517°C (508°C - 524°C) [963°F (947°F - 975°F)]
Initial bundle water level	7.8 mm (0.31 in.)
Initial downcomer water level	204 mm (8.04 in.)

B. Summary Results:

C. Comments:

Carryover tank filled up at approximately 270 seconds, upper plenum filled up at approximately 330 seconds, and steam separator drain tank subsequently filled up by 360 seconds.

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER44116D

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1060.	1084.	4.	1.0	729.	40.5
4C 3- 3	9	1202.	1208.	5.	2.5	765.	39.1
1C 4- 0	10	1314.	1323.	9.	2.5	780.	86.4
2A 5- 0	13	1370.	1384.	15.	2.5	784.	119.0
2A 5- 7	16	1470.	1487.	17.	4.0	855.	146.4
2D 6- 2	50	1532.	1540.	8.	1.0	1014.	52.0
3D 6- 2	55	1549.	1557.	8.	2.5	775.	70.2
5C 6- 2	59	1539.	1548.	9.	2.5	805.	170.0
1D 6- 3	61	1483.	1494.	11.	2.5	1047.	53.3
4B 6- 3	66	1552.	1561.	10.	2.5	1096.	49.2
5D 6- 3	68	1472.	1486.	14.	4.0	820.	105.0
2A 6- 4	70	1456.	1468.	12.	4.0	1074.	36.9
3B 6- 4	* * B A D T H E R M O C O U P L E D A T A *						
1D 6- 5	* * B A D T H E R M O C O U P L E D A T A *						
2D 6- 5	* * B A D T H E R M O C O U P L E D A T A *						
3C 6- 5	85	1600.	1613.	13.	2.5	1122.	39.9
3E 6- 5	86	1499.	1510.	11.	2.5	999.	62.9
3C 6- 6	97	1588.	1601.	13.	2.5	1136.	46.9
3D 6- 6	98	1569.	1581.	12.	2.5	935.	89.4
4A 6- 6	100	1470.	1483.	12.	2.5	970.	93.3
4C 6- 6	101	1573.	1585.	12.	2.5	1114.	52.0
5C 6- 6	103	1535.	1546.	12.	2.5	735.	102.0
1C 7- 0	* * B A D T H E R M O C O U P L E D A T A *						
2B 7- 0	111	1445.	1454.	9.	2.5	766.	111.0
3D 7- 0	115	1470.	1479.	9.	2.5	702.	118.0
5B 7- 0	117	1345.	1355.	10.	2.5	694.	171.0
2B 7- 6	121	1438.	1454.	15.	2.5	844.	134.0
2C 7- 6	122	1415.	1431.	16.	2.5	912.	122.0
2E 7- 6	123	1299.	1315.	16.	4.0	884.	127.9
3A 7- 6	* * B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	125	1466.	1478.	13.	2.5	909.	108.9
4B 7- 6	128	1452.	1466.	13.	2.5	884.	136.9
5C 7- 6	129	1432.	1445.	13.	2.5	891.	206.1
1C 8- 0	132	1210.	1230.	19.	4.0	733.	172.9
2E 8- 0	134	1130.	1149.	19.	4.0	765.	151.0
3D 8- 0	137	1326.	1344.	18.	2.5	807.	157.8
5B 8- 0	139	1278.	1295.	17.	4.0	670.	209.0
5C 8- 0	140	1347.	1361.	15.	2.5	850.	219.0
1C 8- 6	141	1013.	1034.	20.	2.5	593.	199.0
1D 8- 6	142	900.	947.	47.	68.5	700.	172.5
2C 8- 6	143	1087.	1105.	18.	2.5	862.	161.0
4B 8- 6	145	1175.	1190.	15.	2.5	712.	162.0
5D 8- 6	148	1122.	1140.	18.	2.5	656.	220.0
3D 9- 3	155	940.	959.	20.	4.0	841.	196.9
4C 9- 3	157	1013.	1031.	18.	4.0	885.	130.9
1D10- 0	160	819.	862.	43.	75.5	619.	82.9
4B10- 0	163	873.	888.	15.	4.0	594.	217.0
5D10- 0	166	757.	773.	16.	4.0	862.	169.8
2A11- 0	167	576.	587.	11.	2.5	541.	20.9
4C11- 0	169	660.	670.	10.	2.5	591.	21.0
1D11- 6	170	287.	297.	10.	2.5	294.	3.0

RUN 44116D HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	620.4	615.1	617.7	621.5	617.3	619.4	1.0	.5	.8
24	853.6	830.2	843.4	856.1	833.3	846.1	1.0	1.0	1.0
39	1202.3	1060.2	1126.4	1207.7	1084.1	1131.5	2.5	1.0	2.0
48	1314.0	1301.4	1307.7	1322.6	1309.0	1315.8	2.5	2.5	2.5
60	1482.8	1369.6	1407.4	1489.1	1377.1	1416.9	2.5	1.0	2.0
67	1600.5	1470.3	1516.7	1611.2	1486.9	1532.6	4.0	2.5	3.5
70	1604.4	1525.9	1565.1	1616.7	1535.5	1576.1	2.5	2.5	2.5
71	1532.4	1532.4	1532.4	1541.9	1541.9	1541.9	2.5	2.5	2.5
72	1560.0	1387.1	1511.7	1587.3	1398.1	1521.6	4.0	1.0	2.5
74	1570.2	1422.1	1511.9	1560.9	1432.3	1521.8	2.5	1.0	2.2
75	1551.8	1471.6	1511.1	1561.4	1485.9	1521.4	4.0	2.5	2.8
76	1565.7	1455.7	1534.2	1592.7	1467.7	1545.0	4.0	1.0	2.5
77	1600.5	1467.1	1529.2	1613.4	1483.7	1542.8	4.0	2.5	2.9
78	1568.6	1436.2	1530.1	1602.5	1454.8	1542.9	4.0	2.5	2.7
84	1469.9	1337.5	1411.8	1479.4	1348.8	1422.5	2.5	2.5	2.5
90	1465.7	1299.3	1398.0	1478.4	1315.2	1411.7	4.0	2.5	2.7
96	1376.3	1130.2	1277.6	1394.9	1149.4	1296.8	6.0	2.5	3.6
102	1175.2	960.4	1064.1	1190.0	947.0	1084.1	68.5	2.5	10.8
111	1017.3	847.0	957.4	1031.5	865.4	974.4	4.0	2.5	3.6
120	873.2	813.3	707.9	888.2	633.1	731.8	83.0	2.5	22.9
132	659.6	575.9	607.0	669.9	586.6	618.3	4.0	2.5	3.0
138	646.7	287.3	479.5	657.3	297.4	492.2	4.0	2.5	3.6

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	2.2	1.1	1.7	618.3	610.8	614.6	2.3	2.0	2.2
24	3.1	2.5	2.7	813.5	231.3	632.4	10.5	5.5	7.2
39	5.9	3.9	5.1	765.5	722.0	738.7	40.5	39.1	39.8
48	8.5	7.6	8.1	781.7	779.8	780.7	68.5	66.4	67.4
60	14.7	6.3	9.5	871.0	733.7	814.9	119.0	113.9	117.3
67	20.5	10.7	15.9	893.3	835.5	861.2	149.0	140.3	145.2
70	12.3	9.6	11.0	901.8	805.5	853.6	159.5	151.0	155.2
71	9.5	9.5	9.5	675.9	675.9	675.9	159.8	159.8	159.8
72	15.4	6.7	9.8	1069.3	343.3	859.6	396.0	38.9	146.2
74	12.5	5.5	9.9	1227.3	780.7	967.3	170.0	25.6	70.0
75	14.1	7.1	10.3	1095.7	628.3	1004.1	165.0	49.2	75.2
76	12.8	7.0	10.8	1150.0	920.8	1020.7	128.9	34.9	66.5
77	16.6	10.9	13.6	1121.6	799.4	999.6	170.0	34.9	83.3
78	16.8	10.2	12.8	1136.0	734.7	991.4	182.0	46.9	83.9
84	13.5	9.1	10.7	875.2	646.8	774.6	196.0	79.6	125.4
90	15.9	11.7	13.7	912.4	686.7	814.1	208.1	108.9	146.9
96	25.1	14.6	18.5	881.4	641.4	745.1	219.0	132.0	173.1
102	46.6	11.5	20.0	712.0	535.5	639.8	233.9	161.0	197.9
111	20.4	14.2	17.0	685.1	531.0	605.4	245.0	180.9	198.3
120	46.2	10.2	24.0	661.8	240.3	468.0	227.0	6.0	136.2
132	12.8	10.3	11.3	590.8	541.2	562.2	28.5	26.9	23.4
138	17.1	10.1	12.7	567.3	294.2	457.6	29.0	3.0	14.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43616E
Test Date: 12/16/80
Test Type: Gravity Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.280 MPa (40.6 psia)
Initial peak clad temperature and location	873°C (1604°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.3 kw/m (0.70 kw/ft)
Flow rate	0.816 kg/sec (1.80 lb/sec) 15 sec 0.095 kg/sec (0.21 lb/sec) onward
Coolant temperature	52°C (125°F)
Average and range of initial 1.83 m (72 in.) housing temperature	518°C (509°C - 523°C) [965°F (948°F - 973°F)]
Initial bundle water level	130 mm (5.1 in.)
Initial downcomer water level	124 mm (4.9 in.)

B. Summary Results:

C. Comments:

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43616E

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1173.	1180.	6.	3.0	795.	52.0
4C 3- 3	10	1254.	1259.	5.	1.0	863.	48.5
1C 4- 0	12	1380.	1398.	18.	4.5	787.	79.4
2A 5- 0	16	1501.	1525.	24.	4.5	871.	138.9
2A 5- 7	19	1531.	1555.	24.	4.5	889.	165.0
5C 6- 0	36	1428.	1468.	40.	8.5	1388.	28.4
2D 6- 2	39	1500.	1514.	14.	3.0	895.	69.4
1D 6- 4	47	1463.	1481.	17.	3.0	939.	76.9
3D 6- 4	50	1456.	1494.	38.	6.5	1377.	25.7
4B 6- 4	52	1518.	1536.	18.	3.0	454.	61.9
5C 6- 4	54	1458.	1479.	21.	4.5	1142.	41.6
5D 6- 4	55	1480.	1493.	13.	3.0	864.	127.1
1D 6- 5	58	1474.	1491.	17.	3.0	977.	82.4
2A 6- 5	59	1472.	1490.	18.	4.5	779.	87.4
2D 6- 5	61	1517.	1534.	17.	3.0	957.	79.9
3B 6- 5	63	1542.	1559.	17.	3.0	288.	127.0
3C 6- 6	72	1554.	1581.	27.	4.5	1320.	35.2
4C 6- 6	75	1566.	1587.	21.	4.5	1058.	48.8
3C 6- 7	** BAD THERMOCOUPLE DATA *						
3E 6- 7	83	1486.	1505.	19.	3.0	972.	71.8
3D 6- 8	86	1537.	1560.	24.	4.5	1049.	58.2
4A 6- 8	87	1444.	1463.	20.	4.5	754.	188.6
1C 7- 0	93	1423.	1438.	15.	3.0	790.	115.7
2B 7- 0	94	1453.	1466.	13.	3.0	787.	95.5
3D 7- 0	98	1483.	1503.	20.	3.0	917.	84.4
5B 7- 0	103	1400.	1417.	18.	3.0	743.	131.9
2B 7- 6	110	1409.	1429.	20.	3.0	851.	132.2
2C 7- 6	111	1438.	1456.	18.	3.0	939.	87.3
2E 7- 6	113	1273.	1296.	23.	4.5	778.	160.7
3A 7- 6	** BAD THERMOCOUPLE DATA *						
3B 7- 6	115	1173.	1195.	22.	4.5	693.	183.9
4B 7- 6	120	1445.	1467.	21.	4.5	894.	136.0
5C 7- 6	122	1430.	1448.	19.	3.0	869.	142.4
1C 8- 0	124	1209.	1233.	23.	4.5	822.	170.8
2E 8- 0	126	1059.	1083.	24.	4.5	682.	182.1
3D 8- 0	129	1256.	1285.	29.	4.5	881.	141.0
5B 8- 0	133	1244.	1267.	23.	4.5	762.	184.6
5C 8- 0	134	1320.	1343.	23.	4.5	821.	165.8
1C 8- 6	135	1023.	1041.	18.	3.0	693.	196.0
1D 8- 6	136	831.	888.	57.	50.5	679.	218.9
2C 8- 6	138	1165.	1197.	32.	9.0	814.	159.0
4B 8- 6	143	1150.	1169.	19.	3.0	736.	178.0
5D 8- 6	145	1063.	1086.	23.	4.5	638.	215.8
3D 9- 3	150	920.	944.	24.	4.5	713.	181.0
4C 9- 3	152	1015.	1036.	21.	4.5	713.	177.0
1D10- 0	157	588.	709.	121.	111.0	288.	225.0
4B10- 0	164	868.	887.	19.	4.5	587.	208.0
5D10- 0	166	716.	736.	20.	10.5	598.	98.8
2A11- 0	168	563.	573.	10.	3.0	546.	21.0
4C11- 0	169	670.	682.	11.	3.0	601.	37.7
1D11- 6	171	313.	325.	12.	3.0	290.	5.5

RUN 43616E HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	650.4	515.1	636.7	652.0	616.2	638.0	1.0	.5	.7
24	942.8	868.5	901.2	947.0	872.7	905.0	2.5	1.0	1.5
39	1254.1	1150.9	1187.8	1258.8	1158.8	1195.0	3.0	1.0	2.5
48	1438.2	1353.0	1390.5	1453.7	1371.9	1407.9	4.5	3.0	4.0
60	1526.8	1479.4	1502.4	1538.7	1494.4	1519.2	4.5	3.0	3.5
67	1604.1	1505.2	1555.9	1622.1	1525.7	1578.3	4.5	3.0	4.1
70	1586.8	1527.3	1559.2	1602.5	1550.6	1577.3	4.5	3.0	3.5
73	1461.2	1461.2	1461.2	1478.4	1478.4	1478.4	3.0	3.0	3.0
74	1513.3	1500.3	1506.8	1530.1	1513.8	1521.9	3.0	3.0	3.0
75	1476.2	1450.5	1461.4	1492.3	1469.8	1478.6	3.0	3.0	3.0
76	1537.1	1458.0	1489.3	1553.8	1479.4	1506.5	4.5	3.0	3.3
77	1541.9	1461.2	1492.6	1559.2	1478.4	1509.4	4.5	3.0	3.2
78	1566.3	1446.7	1508.7	1587.3	1464.4	1527.5	4.5	3.0	3.5
79	1532.8	1486.4	1510.5	1554.9	1505.2	1529.8	4.5	3.0	3.8
80	1536.5	1432.8	1483.0	1560.3	1455.9	1504.3	4.5	3.0	4.3
81	1525.2	1525.2	1525.2	1552.7	1552.7	1552.7	4.5	4.5	4.5
82	1467.1	1467.1	1467.1	1491.2	1491.2	1491.2	4.5	4.5	4.5
84	1496.0	1387.6	1450.9	1508.4	1404.4	1467.1	3.0	3.0	3.0
90	1499.8	1172.8	1373.1	1520.3	1195.2	1394.7	4.5	3.0	3.9
96	1328.8	1059.3	1249.0	1353.0	1083.0	1273.8	4.5	4.5	4.5
102	1450.5	797.1	1052.7	1470.9	815.8	1081.9	50.5	3.0	11.4
111	1017.0	705.6	891.3	1039.8	747.2	916.9	17.0	4.5	6.7
120	1090.8	587.6	791.8	1107.8	699.4	827.8	111.0	3.0	20.6
132	670.4	455.8	544.1	681.5	474.2	559.0	12.0	3.0	6.8
138	591.9	312.7	452.3	601.5	324.8	463.1	3.0	3.0	3.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	1.6	1.1	1.2	642.5	612.4	630.7	2.7	2.5	2.6
24	4.2	3.1	3.8	854.6	760.9	795.9	15.0	11.9	13.9
39	9.9	4.7	7.2	863.5	738.8	786.0	52.4	48.5	51.2
48	18.9	15.5	17.4	788.1	774.3	783.1	83.7	79.4	81.5
60	23.8	11.9	16.9	878.9	847.7	866.0	142.0	137.0	139.3
67	28.0	18.0	22.5	937.2	749.3	864.6	169.2	129.6	160.2
70	23.3	15.1	18.0	938.2	792.2	855.4	179.0	77.5	142.5
73	17.1	17.1	17.1	774.4	774.4	774.4	91.0	91.0	91.0
74	16.8	13.5	15.1	894.8	684.0	789.4	99.3	69.4	84.4
75	19.3	16.1	17.3	906.3	729.9	787.4	122.7	74.0	96.9
76	21.4	13.4	17.2	1141.7	454.2	828.2	173.0	41.6	98.1
77	18.2	14.5	16.8	1004.8	287.7	827.7	131.8	65.6	95.0
78	26.5	15.6	18.8	1320.0	747.3	941.4	179.2	35.2	90.1
79	22.1	16.2	19.3	1025.0	969.3	990.6	93.6	71.8	77.3
80	23.8	18.9	21.2	1061.7	753.7	953.5	188.6	58.2	102.8
81	27.5	27.5	27.5	1009.5	1009.5	1009.5	63.4	63.4	63.4
82	24.1	24.1	24.1	984.8	984.8	984.8	82.5	82.5	82.5
84	20.4	12.4	16.2	930.3	639.4	808.5	203.0	67.4	115.1
90	24.6	18.3	21.6	938.9	672.5	826.2	217.3	87.3	147.0
96	28.7	22.6	24.8	880.5	682.1	796.2	184.6	134.0	165.9
102	60.0	18.1	29.2	817.0	638.2	714.2	213.9	75.3	175.1
111	41.6	20.1	25.6	713.1	556.7	647.5	219.0	148.7	188.1
120	121.1	16.1	36.0	687.5	287.7	562.8	225.0	93.5	181.4
132	20.4	9.6	14.9	600.5	424.6	511.7	37.7	9.3	21.0
138	12.1	9.6	10.9	429.3	289.9	359.6	39.8	5.5	22.7

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 44117A
Test Date: 5/9/80
Test Type: Gravity Reflood
Blockage Configuration: Unblocked

A. As-Run Test Conditions:

Upper plenum pressure	0.142 MPa (20.6 psia)
Initial peak clad temperature and location	872°C (1601°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.3 kw/m (0.70 kw/ft)
Flow rate	0.821 kg/sec (1.81 lb/sec) 14 sec 0.095 kg/sec (0.21 lb/sec) onward
Coolant temperature	32°C (89°F)
Average and range of initial 1.83 m (72 in.) housing temperature	545°C (536°C - 553°C) [1013°F (997°F - 1028°F)]
Initial bundle water level	49.5 mm (1.95 in.)
Initial downcomer water level	276.4 mm (10.88 in.)

B. Summary Results:

C. Comments:

Total power: 0.5% decrease by 420 seconds[a]

Carryover tank filled up at approximately 300 seconds, and upper plenum subsequently filled up by 360 seconds.

a. Relative to specified conditions

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER44117A

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1118.	1134.	15.	3.0	541.	55.6
4C 3- 3	11	1201.	1212.	11.	3.0	747.	54.0
1C 4- 0	14	1316.	1333.	17.	6.0	780.	103.7
2A 5- 0	17	1372.	1390.	17.	6.0	730.	179.8
2A 5- 7	21	1473.	1500.	27.	9.0	782.	228.7
1D 6- 2	50	1439.	1462.	23.	9.0	832.	276.8
2D 6- 2	53	1568.	1588.	21.	3.0	998.	261.3
3D 6- 2	58	1581.	1599.	19.	3.0	1013.	265.9
5C 6- 2	61	1490.	1508.	19.	3.0	812.	273.7
1D 6- 3	63	1431.	1456.	25.	7.5	816.	284.8
4B 6- 3	68	1532.	1552.	19.	6.0	922.	272.4
5D 6- 3	69	1450.	1478.	28.	7.5	825.	277.7
2A 6- 4	70	1441.	1468.	26.	7.5	820.	268.7
3B 6- 4	75	1565.	1596.	31.	80.5	1002.	277.9
3D 6- 6	79	1533.	1556.	23.	9.0	913.	290.0
2D 6- 5	84	1552.	1577.	24.	7.5	967.	279.6
3C 6- 5	85	1575.	1603.	28.	9.0	991.	276.9
3E 6- 5	86	1473.	1494.	22.	7.5	817.	298.7
3C 6- 6	95	1559.	1582.	23.	9.0	969.	283.6
4A 6- 6	97	1422.	1451.	28.	9.0	804.	305.5
3D 8- 0	98	1316.	1333.	17.	3.0	770.	373.1
5C 6- 6	* * B A D T H E R M O C O U P L E D A T A *						
1C 7- 0	110	1426.	1441.	14.	3.0	660.	341.8
2B 7- 0	111	1449.	1459.	11.	2.0	694.	312.9
3D 7- 0	115	1474.	1486.	12.	2.0	723.	317.3
5B 7- 0	117	1323.	1343.	19.	3.0	626.	321.9
0* 0- 0	* * B A D T H E R M O C O U P L E D A T A *						
2C 7- 6	121	1448.	1466.	17.	3.0	745.	354.0
2E 7- 6	122	1339.	1356.	17.	3.0	679.	341.7
3A 7- 6	123	1341.	1358.	17.	3.0	654.	375.1
3B 7- 6	124	1456.	1474.	18.	3.0	732.	352.0
4B 7- 6	127	1415.	1433.	18.	3.0	755.	346.0
5C 7- 6	128	1287.	1303.	15.	3.0	582.	363.9
1C 8- 0	131	1278.	1296.	18.	3.0	680.	400.1
2E 8- 0	133	982.	995.	13.	3.0	601.	293.8
4C 6- 6	136	1540.	1566.	26.	9.0	952.	283.4
5B 8- 0	138	1191.	1211.	20.	6.0	748.	340.8
5C 8- 0	139	1152.	1167.	15.	3.0	549.	393.9
1C 8- 6	141	1142.	1157.	15.	2.0	520.	425.3
1D 8- 6	142	1091.	1104.	13.	3.0	614.	352.8
2C 8- 6	143	1192.	1206.	14.	2.0	615.	410.0
4B 8- 6	145	1165.	1182.	17.	3.0	614.	408.6
5D 8- 6	148	1072.	1089.	18.	3.0	547.	374.5
3D 9- 3	154	1049.	1067.	17.	3.0	563.	422.6
4C 9- 3	156	1064.	1079.	15.	3.0	571.	411.0
1D10- 0	161	571.	592.	21.	3.0	248.	89.5
4B10- 0	164	867.	883.	16.	3.0	247.	255.0
5D10- 0	167	805.	820.	15.	3.0	247.	237.0
2A11- 0	168	564.	575.	10.	3.0	524.	22.5
4C11- 0	170	682.	694.	12.	3.0	604.	22.5
1D11- 6	172	418.	436.	19.	9.0	410.	22.1

RUN 44117A HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	649.9	574.8	599.3	652.0	579.1	602.0	1.5	1.0	1.4
24	872.6	756.1	813.0	877.9	765.9	820.4	3.0	2.0	2.8
39	1200.9	1092.2	1137.2	1211.8	1106.8	1150.8	3.0	3.0	3.0
48	1338.9	1249.2	1289.9	1354.0	1273.4	1308.7	6.0	3.0	5.3
60	1486.0	1339.2	1393.6	1494.4	1354.0	1407.7	6.0	2.0	3.5
67	1579.9	1464.6	1504.0	1598.1	1486.9	1527.6	9.0	3.0	6.0
70	1601.2	1465.0	1534.6	1619.9	1488.0	1555.1	9.0	3.0	6.0
71	1596.8	1442.5	1531.1	1622.1	1461.2	1555.3	13.0	3.0	6.6
72	1600.1	1431.7	1527.2	1628.7	1450.5	1549.7	9.0	3.0	5.1
74	1583.8	1439.2	1524.7	1605.8	1462.3	1546.4	10.5	3.0	5.5
75	1579.5	1430.7	1515.8	1602.5	1455.9	1539.0	9.0	3.0	6.2
76	1576.3	1434.3	1516.4	1602.5	1459.1	1540.9	80.5	3.0	14.2
77	1574.5	1420.7	1503.1	1602.5	1446.2	1529.4	9.0	6.5	8.2
78	1559.0	1417.8	1497.4	1581.9	1448.4	1523.4	87.0	6.0	18.4
84	1473.9	1285.8	1401.3	1485.9	1303.7	1416.1	3.0	2.0	2.6
90	1456.0	1287.5	1374.0	1474.1	1302.7	1391.1	3.0	3.0	3.0
96	1336.8	962.3	1228.7	1355.1	995.4	1246.2	6.0	3.0	3.4
102	1191.9	1071.6	1125.3	1205.6	1089.2	1140.9	3.0	2.0	2.7
111	1174.9	916.0	1014.2	1192.0	932.6	1029.7	3.0	3.0	3.0
120	867.0	570.8	786.4	883.0	591.9	804.6	9.0	3.0	4.5
132	682.1	533.9	596.4	694.1	546.0	607.8	3.0	3.0	3.0
138	633.0	417.6	501.6	644.7	436.4	518.8	10.5	3.0	6.9

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	4.3	1.8	2.8	648.9	247.9	516.9	7.0	3.0	4.0
24	9.8	5.3	7.4	815.8	597.7	700.7	10.5	4.1	7.0
39	15.4	10.9	13.6	747.4	540.7	670.8	55.6	54.0	54.6
48	24.1	15.1	18.8	786.1	667.1	748.3	103.7	92.0	97.1
60	17.3	8.4	14.1	745.8	698.1	724.3	179.9	176.9	178.7
67	27.3	18.2	23.6	816.7	776.4	792.2	229.8	223.9	227.7
70	24.3	18.3	20.6	952.5	808.4	868.4	257.5	233.9	243.4
71	46.3	17.2	24.2	969.0	750.0	871.2	257.9	240.2	249.9
72	39.9	15.6	22.5	1011.1	782.1	888.5	273.6	247.0	256.9
74	30.2	18.2	21.7	1012.7	812.3	905.6	278.6	259.6	268.1
75	28.4	19.3	23.2	981.8	813.7	896.1	287.2	266.3	276.3
76	30.5	17.2	24.4	1003.3	820.4	926.4	292.0	269.0	278.4
77	29.5	21.9	26.4	990.8	798.7	894.7	298.7	276.9	287.4
78	30.6	21.5	26.0	968.8	802.7	897.6	305.5	283.4	292.3
84	19.1	10.6	14.7	722.6	616.4	672.2	341.8	312.9	325.3
90	18.4	15.2	17.1	812.9	581.5	599.2	375.1	341.7	355.2
96	19.6	13.1	17.5	770.4	548.5	696.0	400.1	293.8	366.6
102	19.1	12.5	15.6	645.4	516.0	589.8	425.3	299.4	378.9
111	17.4	14.3	15.5	641.7	245.7	522.6	422.6	133.9	334.1
120	22.7	15.0	18.2	518.7	242.5	302.2	328.0	89.5	223.6
132	12.1	10.4	11.4	603.5	520.3	552.9	27.0	22.5	24.0
138	25.4	11.7	17.1	571.6	410.0	488.1	29.2	21.5	25.1

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43717B
Test Date: 7/9/80
Test Type: Gravity Reflood
Blockage Configuration: 9 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.141 MPa (20.4 psia)
Initial peak clad temperature and location	876°C (1609°F), 3C 1.78 m (70 in.)
Initial peak rod power	2.3 kw/m (0.7 kw/ft)
Flow rate	0.830 kg/sec (1.83 lb/sec) 14 sec 0.10 kg/sec (0.22 lb/sec) onward
Coolant temperature	31°C (88°F)
Average and range of initial 1.83 m (72 in.) housing temperature	502°C (494°C - 508°C) [936°F (922°F - 946°F)]
Initial bundle water level	7.1 mm (0.28 in.)
Initial downcomer water level	-0.414 m (-16.3 in.)

B. Summary Results:

C. Comments:

Carryover tank filled up at approximately 260 seconds, upper plenum filled up by 320 seconds, and steam separator drain tank subsequently filled up by 340 seconds.

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER 437178

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1064.	1076.	12.	4.0	668.	52.8
4C 3- 3	11	1153.	1161.	8.	1.0	739.	51.7
1C 4- 0	14	1270.	1286.	16.	4.0	677.	88.5
2A 5- 0	17	1400.	1417.	17.	4.0	738.	148.8
2A 5- 7	21	1502.	1521.	19.	4.0	849.	196.8
1D 6- 2	50	1469.	1482.	13.	2.5	760.	239.6
2D 6- 2	53	1524.	1541.	17.	4.0	592.	251.9
3D 6- 2	58	1566.	1582.	16.	2.5	1027.	90.3
5C 6- 2	61	1519.	1536.	16.	4.0	883.	243.0
1D 6- 3	63	1471.	1482.	10.	1.0	801.	221.5
4B 6- 3	68	1546.	1567.	21.	5.5	879.	226.9
5D 6- 3	69	1452.	1487.	35.	10.0	749.	274.0
2A 6- 4	70	1477.	1491.	14.	4.0	793.	255.9
2D 6- 4	72	1534.	1561.	28.	6.0	760.	257.8
3B 6- 4	75	1564.	1592.	28.	8.5	927.	229.9
3C 6- 5	85	1593.	1612.	20.	4.0	990.	207.8
3E 6- 5	86	1483.	1503.	20.	6.0	761.	266.8
3C 6- 6	95	1568.	1594.	26.	6.0	1009.	216.9
3D 6- 6	96	1535.	1568.	33.	8.5	1130.	134.6
4A 6- 6	97	1455.	1483.	28.	8.5	768.	269.8
4C 6- 6	98	1546.	1578.	32.	8.5	924.	237.8
5C 6- 6	101	1477.	1503.	26.	8.5	794.	266.9
1C 7- 0	110	1441.	1455.	14.	2.5	696.	236.0
2B 7- 0	111	1463.	1477.	15.	2.5	694.	285.9
3D 7- 0	115	1495.	1508.	13.	2.5	894.	190.6
5B 7- 0	117	1401.	1412.	11.	2.5	663.	311.0
2B 7- 6	120	1442.	1458.	16.	2.5	751.	313.4
2C 7- 6	121	1449.	1467.	18.	2.5	738.	310.2
2E 7- 6	122	1312.	1331.	19.	5.5	627.	329.7
3A 7- 6	123	1417.	1438.	20.	4.0	752.	316.0
3B 7- 6	124	1451.	1469.	18.	2.5	771.	300.0
4B 7- 6	127	1454.	1471.	17.	2.5	743.	310.8
5C 7- 6	128	1412.	1436.	24.	6.0	741.	327.6
1C 8- 0	131	1305.	1326.	21.	6.0	712.	348.5
2E 8- 0	133	1214.	1240.	26.	8.5	663.	311.8
3D 8- 0	136	1339.	1362.	24.	6.0	853.	263.8
5B 8- 0	138	1216.	1241.	25.	8.5	623.	364.9
5C 8- 0	139	1313.	1337.	24.	6.0	706.	363.8
1C 8- 6	141	1145.	1154.	8.	1.0	568.	378.0
1D 8- 6	142	1098.	1107.	9.	2.5	602.	361.8
2C 8- 6	143	1205.	1214.	9.	1.0	636.	367.9
4B 8- 6	145	1216.	1233.	16.	2.5	679.	367.0
5D 8- 6	148	1122.	1130.	8.	1.0	539.	290.4
3D 9- 3	154	1019.	1034.	15.	4.0	630.	316.0
4C 9- 3	156	1074.	1087.	13.	2.5	590.	353.0
1D10- 0	161	572.	625.	53.	21.5	431.	259.8
4B10- 0	164	904.	918.	14.	4.0	307.	312.7
5D10- 0	167	760.	785.	24.	11.0	420.	119.4
2A11- 0	168	568.	577.	9.	2.5	514.	68.1
4C11- 0	** BAD THERMOCOUPLE DATA *						
1D11- 6	** BAD THERMOCOUPLE DATA *						

RUN 43717B HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	532.1	492.6	505.3	536.4	496.9	509.2	1.0	1.0	1.0
24	844.7	752.4	787.7	849.9	758.7	792.9	2.5	1.0	1.4
39	1152.5	1064.0	1088.6	1160.9	1075.8	1098.6	4.0	1.0	2.5
48	1334.1	1228.5	1265.4	1353.0	1244.2	1287.0	9.5	4.0	5.4
60	1473.0	1378.6	1411.0	1483.7	1396.0	1426.4	4.0	1.0	3.3
67	1581.3	1489.6	1520.2	1607.9	1520.3	1545.7	8.5	4.0	6.6
70	1609.0	1506.8	1556.5	1635.2	1534.4	1583.1	8.5	6.0	7.0
71	1599.2	1444.1	1522.0	1625.4	1464.4	1546.3	8.5	1.0	5.9
72	1498.7	1450.0	1485.8	1518.2	1460.2	1501.4	6.0	2.5	4.4
74	1571.6	1468.7	1526.5	1587.3	1481.6	1542.6	5.5	2.5	3.9
75	1597.6	1452.1	1530.7	1613.4	1481.6	1552.6	10.0	1.0	5.6
76	1600.3	1472.5	1527.0	1621.0	1491.2	1550.2	8.5	4.0	6.7
77	1592.7	1411.4	1513.8	1612.3	1435.5	1539.1	8.5	4.0	6.8
78	1567.9	1450.5	1499.8	1593.8	1473.0	1527.7	8.5	5.5	7.8
84	1496.6	1378.1	1440.6	1510.6	1391.8	1453.4	2.5	1.0	2.4
90	1454.3	1311.6	1406.9	1470.9	1331.0	1424.9	6.0	2.5	3.5
96	1347.2	1213.9	1297.3	1368.7	1240.0	1319.8	8.5	4.0	6.3
102	1216.5	1098.0	1149.2	1232.7	1106.8	1159.7	2.5	1.0	2.0
111	1074.3	689.9	990.0	1087.2	803.3	1013.7	32.0	2.5	6.4
120	904.2	571.6	762.3	918.1	624.6	791.6	25.0	4.0	10.2
132	599.9	523.1	563.8	608.9	538.6	574.8	21.5	2.5	8.6
138	628.9	452.6	507.2	639.4	476.4	530.1	23.0	4.5	12.8

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	4.3	2.7	3.9	525.5	490.4	502.8	2.2	2.0	2.1
24	6.3	4.6	5.2	744.5	590.0	681.3	12.9	10.4	11.7
39	12.4	7.7	10.1	738.7	245.7	593.2	58.0	51.7	54.3
48	36.6	15.6	21.7	959.0	677.1	804.2	88.5	84.3	86.9
60	17.4	10.6	15.4	738.5	693.5	718.8	152.0	148.8	150.3
67	30.7	18.9	25.5	885.2	808.3	839.2	196.9	188.9	194.5
70	29.7	21.6	26.5	926.1	870.5	895.6	209.9	206.9	209.0
71	36.3	11.9	24.4	919.3	744.1	813.1	245.9	214.9	223.3
72	19.4	10.2	15.6	903.4	800.6	857.5	232.6	221.8	228.2
74	22.1	12.9	16.1	1238.2	591.5	830.2	254.0	90.3	219.6
75	34.8	10.2	22.0	934.7	728.9	823.1	274.0	191.4	237.3
76	29.7	14.4	23.2	1153.9	755.4	872.2	257.9	110.3	232.9
77	33.5	19.6	25.3	990.1	722.4	829.4	266.8	207.8	248.2
78	32.9	22.5	27.9	1129.7	768.5	861.4	269.8	134.6	245.6
84	14.5	9.5	12.9	893.6	653.5	712.5	311.0	190.6	279.0
90	23.6	16.1	18.1	909.0	626.5	736.6	340.8	229.8	310.3
96	26.1	18.3	22.5	852.7	623.0	718.4	364.9	263.8	334.4
102	16.2	7.8	10.5	678.9	403.7	576.9	379.6	290.4	354.0
111	113.4	11.9	23.8	645.4	449.2	572.0	403.0	181.7	312.2
120	78.5	13.8	29.4	583.0	246.8	338.0	318.0	119.4	261.3
132	15.5	8.6	11.0	554.5	514.4	532.9	68.1	30.6	45.0
138	30.0	10.5	22.8	580.1	474.2	508.8	53.0	18.5	33.2

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43817C
Test Date: 9/5/80
Test Type: Gravity Reflood
Blockage Configuration: 21 rods blocked, coplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.142 MPa (20.6 psia)
Initial peak clad temperature and location	872°C (1601°F), 3C 1.93 m (76 in.)
Initial peak rod power	2.3 kw/m (0.7 kw/ft)
Flow rate	0.880 kg/sec (1.94 lb/sec) 15 sec 0.095 kg/sec (0.21 lb/sec) onward
Coolant temperature	31°C (88°F)
Average and range of initial 1.83 m (72 in.) housing temperature	505°C (494°C - 512°C) [941°F (921°F - 954°F)]
Initial bundle water level	31.8 mm (1.25 in.)
Initial downcomer water level	211 mm (8.3 in.)

B. Summary Results:

C. Comments:

Carryover tank filled up at approximately 260 seconds, upper plenum filled up at approximately 325 seconds, and steam separator drain tank subsequently filled up by 350 seconds.

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43817C

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1082.	1092.	10.	3.0	335.	43.8
4C 3- 3	11	1214.	1221.	7.	1.5	622.	46.4
1C 4- 0	14	1346.	1360.	14.	3.0	831.	85.9
2A 5- 0	17	1394.	1410.	16.	3.0	716.	171.3
2A 5- 7	21	1509.	1524.	15.	3.0	622.	218.7
1D 6- 2	50	1480.	1489.	9.	3.0	798.	237.8
2D 6- 2	53	1500.	1511.	11.	3.0	547.	324.0
3D 6- 2	58	1558.	1566.	7.	1.5	570.	320.0
4B 6- 2	60	1567.	1575.	8.	1.5	749.	272.7
5C 6- 2	61	1472.	1487.	15.	3.0	505.	282.4
1D 6- 3	63	1466.	1476.	10.	3.0	805.	247.7
5D 6- 3	69	1479.	1496.	16.	3.0	861.	214.6
2A 6- 4	70	1461.	1476.	15.	4.5	968.	132.5
3B 6- 4	75	1577.	1590.	13.	3.0	805.	230.7
2D 6- 5	84	1557.	1570.	13.	3.0	654.	330.0
3C 6- 5	85	1595.	1611.	17.	3.0	1146.	84.3
3E 6- 5	86	1527.	1537.	10.	3.0	696.	312.0
3C 6- 6	95	1576.	1594.	18.	3.0	1115.	100.9
3D 6- 6	96	1556.	1570.	14.	3.0	653.	329.0
4A 6- 6	97	1467.	1484.	17.	3.0	777.	279.9
4C 6- 6	98	1577.	1593.	15.	3.0	826.	266.0
5C 6- 6	101	1541.	1553.	12.	3.0	739.	296.0
1C 7- 0	110	1454.	1466.	12.	3.0	736.	275.8
2B 7- 0	111	1452.	1463.	12.	1.5	705.	255.7
3D 7- 0	115	1474.	1486.	12.	1.5	626.	350.0
5B 7- 0	117	1383.	1394.	11.	1.5	691.	297.8
2B 7- 6	120	1467.	1481.	14.	3.0	796.	293.4
2C 7- 6	121	1484.	1499.	15.	3.0	756.	327.9
2E 7- 6	122	1341.	1358.	18.	3.0	705.	300.7
3A 7- 6	123	1447.	1463.	16.	3.0	650.	340.5
3B 7- 6	124	1478.	1492.	15.	3.0	787.	306.0
4B 7- 6	127	1473.	1488.	15.	3.0	679.	355.9
5C 7- 6	128	1454.	1468.	14.	3.0	662.	344.0
1C 8- 0	131	1318.	1335.	18.	3.0	744.	351.9
2E 8- 0	133	1261.	1278.	16.	3.0	772.	339.9
3D 8- 0	136	1366.	1382.	16.	3.0	651.	388.8
5B 8- 0	138	1227.	1249.	22.	4.5	666.	323.2
5C 8- 0	139	1382.	1396.	15.	3.0	684.	370.7
1C 8- 6	141	1147.	1162.	15.	3.0	595.	383.0
1D 8- 6	142	1046.	1062.	16.	3.0	536.	399.0
2C 8- 6	** B A D	T H E R M O C O U P L E	D A T A *				
4B 8- 6	145	1166.	1178.	11.	1.5	580.	406.9
5D 8- 6	148	1120.	1135.	15.	3.0	618.	306.4
3D 9- 3	154	975.	992.	18.	3.0	507.	423.3
4C 9- 3	156	1041.	1054.	14.	3.0	534.	384.0
1D10- 0	161	621.	639.	19.	21.5	541.	59.0
4D10- 0	164	846.	860.	15.	3.0	246.	398.0
5D10- 0	167	717.	735.	17.	6.5	556.	61.0
2A11- 0	168	555.	565.	10.	3.0	522.	23.5
4C11- 0	170	617.	628.	11.	3.0	559.	18.3
1D11- 6	172	471.	483.	12.	3.0	263.	14.0

RUN 43817C HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	589.6	517.1	542.7	590.8	519.4	544.2	1.0	0.0	.6
24	890.6	807.4	852.9	895.4	816.8	857.8	3.0	2.5	2.8
39	1214.2	1081.8	1135.2	1221.2	1092.3	1145.8	3.0	1.5	2.6
48	1371.0	1300.4	1330.8	1384.4	1314.2	1345.8	3.0	3.0	3.0
60	1395.8	1394.0	1394.6	1414.1	1409.8	1411.2	3.0	3.0	3.0
67	1608.2	1483.9	1523.5	1625.4	1503.0	1540.6	3.0	3.0	3.0
70	1590.2	1482.9	1552.8	1606.8	1499.8	1569.4	3.0	3.0	3.0
71	1549.7	1454.6	1516.1	1567.9	1468.7	1533.6	3.0	1.5	2.6
72	1503.9	1496.2	1500.1	1519.2	1508.4	1513.8	3.0	1.5	2.3
74	1578.9	1447.1	1518.0	1587.3	1459.1	1526.8	3.0	1.5	2.0
75	1598.4	1465.9	1538.8	1610.1	1476.2	1550.0	3.0	1.5	2.6
76	1601.0	1444.9	1535.5	1615.6	1464.4	1548.9	4.5	1.5	3.3
77	1594.5	1435.3	1531.8	1611.2	1450.5	1546.5	3.0	3.0	3.0
78	1577.3	1415.4	1519.9	1593.8	1434.4	1537.1	4.5	3.0	3.4
84	1489.3	1247.1	1410.4	1499.8	1257.8	1428.2	3.0	1.5	2.1
90	1483.9	1340.6	1443.3	1498.7	1358.2	1458.1	3.0	1.5	2.8
96	1383.0	1227.3	1328.9	1400.2	1249.4	1346.2	4.5	3.0	3.2
102	1183.0	1046.2	1136.7	1195.2	1062.4	1150.5	3.0	1.5	2.3
111	1046.4	919.0	1007.3	1063.5	931.5	1022.4	3.0	3.0	3.0
120	950.5	620.8	765.7	964.5	639.4	788.6	30.5	3.0	9.9
132	617.1	476.4	558.2	627.8	490.5	568.8	3.0	3.0	3.0
138	582.2	469.8	497.4	594.0	479.6	509.2	3.0	3.0	3.0

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	2.3	0.0	1.4	588.7	512.9	539.0	2.8	2.5	2.6
24	7.4	2.7	5.0	831.4	162.1	598.2	9.0	4.5	6.5
39	14.2	7.0	10.6	863.4	334.6	624.0	46.5	39.0	43.9
48	19.1	13.4	15.0	831.5	738.4	774.0	90.4	81.9	86.0
60	16.3	15.7	16.6	752.7	683.8	718.0	171.3	169.4	170.6
67	19.1	14.9	17.2	877.9	771.9	824.7	218.7	208.7	214.1
70	17.1	16.0	16.6	902.0	808.6	855.1	239.6	227.0	233.4
71	18.2	12.7	15.5	899.6	594.2	752.7	249.9	232.9	239.2
72	15.3	12.2	13.7	732.2	675.7	703.9	246.7	239.6	243.2
74	12.0	7.3	8.8	1017.4	513.6	738.0	324.0	46.9	228.6
75	16.3	4.5	11.2	1137.7	611.2	808.9	325.2	59.2	237.7
76	19.5	6.8	13.4	1120.9	637.3	846.8	325.9	71.2	223.0
77	17.0	9.9	14.7	1147.7	654.1	815.6	330.0	84.3	249.3
78	25.4	11.6	17.2	1114.9	653.0	850.0	333.2	100.9	245.5
84	15.9	10.5	11.8	836.3	627.8	712.5	350.0	191.4	276.6
90	17.6	11.3	14.8	796.4	644.6	710.0	371.0	280.7	324.4
96	22.1	14.5	17.3	820.6	651.4	733.0	388.8	297.4	342.3
102	16.2	11.1	13.8	666.1	537.6	596.3	406.9	306.4	374.0
111	17.8	12.5	15.1	654.9	459.9	540.2	423.3	196.1	347.4
120	59.8	14.0	22.8	555.6	244.7	314.2	398.0	59.0	233.8
132	12.1	9.7	10.7	559.0	259.7	470.5	28.6	11.5	20.5
138	14.1	9.6	11.8	536.1	195.4	341.0	28.6	12.8	16.4

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 44317D
Test Date: 11/1/80
Test Type: Gravity Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, short sleeves

A. As-Run Test Conditions:

Upper plenum pressure	0.143 MPa (20.8 psia)
Initial peak clad temperature and location	873°C (1604°F), 3C 1.70 m (67 in.)
Initial peak rod power	2.3 kw/m (0.7 kw/ft)
Flow rate	0.807 kg/sec (1.78 lb/sec)
	15 sec
	0.095 kg/sec (0.21 lb/sec) onward
Coolant temperature	32°C (90°F)
Average and range of initial 1.83 m (72 in.) housing temperature	506°C (498°C - 513°C) [943°F (928°F - 956°F)]
Initial bundle water level	147 mm (5.8 in.)
Initial downcomer water level	165 mm (6.5 in.)

B. Summary Results:

C. Comments:

Carryover tank filled up at approximately 290 seconds, upper plenum filled up at approximately 350 seconds, and steam separator drain tank filled up by 370 seconds.

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER443170

ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	7	1042.	1053.	11.	2.5	241.	61.5
4C 3- 3	9	1160.	1171.	11.	2.5	777.	53.9
1C 4- 0	10	1290.	1311.	21.	6.0	766.	90.3
2A 5- 0	13	1370.	1394.	24.	4.5	740.	169.9
2A 5- 7	16	1470.	1505.	36.	7.5	854.	214.8
2D 6- 2	50	1540.	1555.	15.	2.5	1032.	70.9
3D 6- 2	55	1571.	1586.	16.	2.5	707.	272.0
5C 6- 2	59	1541.	1556.	15.	2.5	776.	255.0
1D 6- 3	61	1484.	1504.	21.	4.5	1075.	75.9
4B 6- 3	66	1554.	1574.	20.	4.5	1113.	75.2
5D 6- 3	68	1473.	1498.	25.	4.5	764.	257.6
2A 6- 4	70	1454.	1475.	22.	6.0	1103.	51.4
3B 6- 4	* * B A D T H E R M O C O U P L E D A T A *						
1D 6- 5	* * B A D T H E R M O C O U P L E D A T A *						
2D 6- 5	* * B A D T H E R M O C O U P L E D A T A *						
3C 6- 5	85	1604.	1628.	24.	4.5	1104.	68.9
3E 6- 5	86	1500.	1521.	21.	4.5	876.	176.9
3C 6- 6	97	1543.	1619.	26.	4.5	1096.	77.9
3D 6- 6	98	1575.	1596.	21.	4.5	684.	263.0
4A 6- 6	100	1479.	1503.	24.	6.0	824.	243.7
4C 6- 6	101	1560.	1604.	24.	4.5	1150.	85.1
5C 6- 6	103	1538.	1563.	24.	4.5	744.	272.0
1C 7- 0	* * B A D T H E R M O C O U P L E D A T A *						
2B 7- 0	111	1454.	1468.	13.	2.5	764.	166.6
3D 7- 0	115	1482.	1497.	14.	2.5	619.	297.5
5B 7- 0	117	1354.	1369.	15.	4.5	691.	263.9
2B 7- 6	121	1467.	1489.	22.	4.5	844.	216.0
2C 7- 6	122	1481.	1502.	21.	4.5	922.	189.0
2E 7- 6	123	1342.	1365.	22.	4.5	927.	169.7
3A 7- 6	* * B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	125	1495.	1513.	18.	4.5	782.	231.0
4B 7- 6	126	1476.	1498.	22.	4.5	664.	203.6
5C 7- 6	129	1455.	1475.	20.	4.5	690.	318.0
1C 8- 0	132	1301.	1324.	23.	4.5	720.	250.5
2E 8- 0	134	1304.	1325.	21.	4.5	843.	216.6
3D 8- 0	137	1410.	1432.	22.	4.5	637.	322.0
5B 8- 0	139	1312.	1335.	23.	4.5	663.	323.6
5C 8- 0	140	1366.	1410.	22.	4.5	662.	335.0
1C 8- 6	141	1167.	1186.	19.	2.5	612.	288.0
1D 8- 6	142	1162.	1180.	18.	4.5	633.	290.8
2C 8- 6	143	1211.	1227.	15.	2.5	646.	251.0
4B 8- 6	145	1230.	1246.	16.	2.5	697.	277.5
5D 8- 6	148	1187.	1209.	21.	4.5	606.	353.1
3D 9- 3	155	1082.	1102.	19.	4.5	525.	355.0
4C 9- 3	157	1082.	1101.	19.	4.5	687.	265.0
1D10- 0	160	637.	693.	56.	37.0	496.	134.9
4B10- 0	163	880.	899.	19.	4.5	583.	336.0
5D10- 0	166	806.	828.	22.	6.0	626.	244.8
2A11- 0	167	574.	586.	11.	4.5	543.	31.5
4C11- 0	169	648.	662.	13.	6.0	561.	32.0
1D11- 6	170	452.	467.	15.	6.0	549.	9.8

RUN 44317D HEATER ROD STATISTICAL DATA

	INITIAL TEMP (DEG F)			MAX TEMP (DEG F)			TURNAROUND TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	519.6	509.4	514.5	520.4	509.8	515.1	.5	.5	.5
24	752.4	731.6	744.2	757.6	736.8	750.0	2.5	2.5	2.5
39	1160.4	1042.4	1085.5	1171.2	1053.2	1095.6	2.5	2.5	2.5
48	1289.7	1276.6	1284.3	1311.0	1299.5	1305.3	6.0	6.0	6.0
60	1474.6	1362.9	1402.6	1488.0	1379.2	1420.4	4.5	2.5	3.8
67	1600.2	1469.6	1515.6	1626.5	1505.2	1546.7	7.5	6.0	7.0
70	1595.0	1526.3	1560.7	1615.6	1547.3	1581.4	4.5	4.5	4.5
71	1541.4	1541.4	1541.4	1559.2	1559.2	1559.2	4.5	4.5	4.5
72	1588.6	1388.8	1520.6	1602.5	1405.5	1537.0	4.5	2.5	3.8
74	1571.7	1422.5	1513.8	1593.8	1444.1	1532.1	4.5	2.5	4.0
75	1554.4	1472.9	1512.9	1574.4	1497.6	1532.4	4.5	4.5	4.5
76	1588.6	1436.9	1524.2	1604.7	1475.2	1548.1	10.5	4.5	5.3
77	1604.1	1460.6	1532.4	1627.6	1497.6	1556.6	6.0	4.5	4.9
78	1595.0	1437.1	1535.1	1618.8	1465.5	1558.7	6.0	4.5	4.8
84	1482.1	1339.2	1422.7	1496.6	1356.1	1438.8	4.5	2.5	3.4
90	1494.6	1342.3	1429.5	1512.8	1364.5	1449.7	4.5	4.5	4.5
96	1429.2	1257.3	1349.2	1452.7	1289.1	1373.2	7.5	4.5	5.0
102	1230.4	1127.1	1179.9	1246.3	1141.1	1196.5	4.5	2.5	3.3
111	1093.6	956.1	1042.4	1112.0	973.8	1060.4	4.5	4.5	4.5
120	879.8	637.1	759.3	898.6	693.1	788.7	37.0	2.5	12.4
132	648.4	574.4	611.5	661.5	585.5	623.9	6.0	4.5	5.0
138	603.5	452.2	508.4	619.4	466.7	524.0	6.0	4.5	5.6

	TEMP RISE (DEG F)			QUENCH TEMP (DEG F)			QUENCH TIME (SEC)		
ELEV	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
12	0.0	0.0	0.0	513.8	502.4	508.1	2.5	2.1	2.3
24	7.0	5.2	5.8	742.0	243.9	489.9	9.6	4.3	7.6
39	10.6	6.7	10.1	776.5	241.4	565.9	61.5	53.9	57.1
48	21.3	20.7	21.0	769.8	768.3	769.0	94.2	90.3	92.2
60	23.6	13.4	17.7	860.8	716.0	772.3	169.9	163.3	167.6
67	35.6	26.3	30.9	886.4	819.0	853.2	216.7	205.6	212.5
70	21.0	20.6	20.8	904.1	784.8	844.4	230.0	217.9	223.9
71	17.6	17.6	17.8	677.2	677.2	677.2	229.0	229.0	229.0
72	20.7	13.1	16.4	1102.6	567.5	867.1	267.0	56.4	168.6
74	22.3	14.6	18.3	1252.5	718.4	911.7	255.0	37.7	122.0
75	24.7	14.5	19.5	1113.5	751.4	954.4	257.6	75.2	133.9
76	54.5	16.1	24.0	1131.2	680.4	945.3	277.0	51.4	139.6
77	29.0	21.1	24.2	1104.4	757.9	950.2	264.8	66.9	149.7
78	28.4	20.0	23.6	1149.5	683.7	936.7	283.0	65.6	164.3
84	18.8	13.5	16.1	887.2	618.9	749.2	297.5	112.6	212.3
90	22.2	17.0	20.3	927.5	666.7	794.3	318.0	155.2	231.9
96	31.8	20.7	24.0	842.7	624.7	720.4	335.0	216.6	274.6
102	21.3	12.3	16.6	697.2	573.1	617.5	361.0	251.0	308.6
111	20.7	15.6	16.0	686.9	480.2	574.3	379.0	265.0	315.3
120	55.9	12.4	29.4	764.9	246.8	471.4	342.7	2.8	230.7
132	13.1	11.1	12.4	581.3	543.0	554.1	40.6	31.5	34.7
138	16.1	14.5	15.6	555.6	288.8	451.4	411.0	9.8	121.5

FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

Run: 43817E
Test Date: 12/17/30
Test Type: Gravity Reflood
Blockage Configuration: 21 rods blocked, noncoplanar, long sleeves (36%)

A. As-Run Test Conditions:

Upper plenum pressure	0.144 MPa (20.9 psia)
Initial peak clad temperature and location	875°C (1607°F), 4C 1.70 m (67 in.)
Initial peak rod power	2.3 kw/m (0.70 kw/ft)
Flow rate	0.812 kg/sec (1.79 lb/sec) 15 sec 0.095 kg/sec (0.21 lb/sec) onward
Coolant temperature	32°C (89°F)
Average and range of initial 1.83 m (72 in.) housing temperature	521°C (512°C - 525°C) [969°F (953°F - 977°F)]
Initial bundle water level	17 mm (0.68 in.)
Initial downcomer water level	226 mm (8.9 in.)

B. Summary Results:

C. Comments:

Carryover tank filled up at approximately 310 seconds, upper plenum filled up at approximately 380 seconds, and steam separator drain tank subsequently filled up at 390 seconds.

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
RUN NUMBER43817E

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2A 3- 3	9	1170.	1180.	9.	2.5	617.	72.5
4C 3- 3	10	1263.	1272.	9.	2.5	656.	70.6
1C 4- 0	12	1365.	1410.	25.	12.5	766.	121.0
2A 5- 0	16	1501.	1542.	40.	18.0	825.	214.5
2A 5- 7	19	1538.	1577.	39.	11.0	841.	262.7
5C 6- 0	36	1430.	1483.	53.	13.5	266.	447.0
2D 6- 2	39	1517.	1528.	11.	2.5	856.	133.9
1D 6- 4	47	1466.	1506.	20.	4.5	796.	175.9
3D 6- 4	50	1470.	1515.	45.	8.5	1358.	43.7
4B 6- 4	52	1534.	1555.	21.	4.5	507.	169.2
5C 6- 4	54	1471.	1506.	35.	10.5	1183.	113.6
5D 6- 4	55	1501.	1513.	11.	2.5	756.	271.6
1D 6- 5	58	1501.	1517.	16.	4.5	937.	183.9
2A 6- 5	59	1492.	1516.	24.	4.5	250.	251.0
2D 6- 5	61	1540.	1556.	16.	4.5	974.	150.9
3B 6- 5	63	1563.	1578.	14.	2.5	693.	183.6
3C 6- 6	72	1579.	1610.	32.	6.0	649.	100.9
4C 6- 6	75	1569.	1612.	23.	4.5	949.	195.9
3C 6- 7	* * B A D T H E R M O C O U P L E D A T A *						
3E 6- 7	83	1516.	1533.	17.	4.0	869.	160.7
3D 6- 8	86	1567.	1592.	25.	4.5	977.	123.7
4A 6- 8	87	1465.	1489.	25.	6.0	727.	323.9
1C 7- 0	93	1492.	1504.	12.	2.5	736.	235.9
2B 7- 0	94	1505.	1516.	11.	2.5	770.	177.7
3D 7- 0	98	1542.	1560.	18.	4.5	906.	167.6
5B 7- 0	103	1436.	1452.	16.	4.0	723.	245.9
2B 7- 6	110	1472.	1491.	19.	4.5	676.	223.9
2C 7- 6	111	1502.	1518.	16.	4.0	910.	161.7
2E 7- 6	113	1383.	1403.	21.	4.5	685.	285.8
3A 7- 6	* * B A D T H E R M O C O U P L E D A T A *						
3B 7- 6	115	1186.	1200.	14.	2.5	680.	308.9
4B 7- 6	120	1488.	1507.	20.	4.5	862.	257.9
5C 7- 6	122	1472.	1490.	18.	4.5	810.	270.7
1C 8- 0	124	1287.	1312.	25.	6.0	762.	302.7
2E 8- 0	126	1196.	1228.	32.	11.0	620.	308.4
3D 8- 0	129	1316.	1344.	28.	6.5	885.	239.9
5B 8- 0	133	1271.	1295.	25.	9.5	701.	314.0
5C 8- 0	134	1351.	1373.	22.	4.5	766.	300.8
1C 8- 6	135	1079.	1092.	13.	2.5	644.	339.7
1D 8- 6	136	1007.	1025.	18.	4.5	630.	367.8
2C 8- 6	138	1204.	1242.	38.	11.0	799.	264.8
4B 8- 6	143	1164.	1178.	13.	2.5	710.	315.3
5D 8- 6	145	1114.	1133.	19.	4.5	604.	377.9
3D 9- 3	150	933.	957.	25.	9.5	701.	299.9
4C 9- 3	152	1007.	1026.	20.	4.5	679.	317.6
1D10- 0	157	666.	729.	63.	57.5	244.	375.0
4B10- 0	164	822.	843.	21.	9.5	451.	360.0
5D10- 0	166	677.	716.	39.	27.5	247.	128.0
2A11- 0	168	536.	544.	8.	3.0	523.	20.0
4C11- 0	169	631.	639.	9.	2.5	576.	34.5
1D11- 6	171	353.	363.	11.	2.5	254.	24.5

RUN 43817E HEATER ROD STATISTICAL DATA

ELEV	INITIAL TEMP (DEG F) MAX	MIN	MEAN	MAX TEMP (DEG F) MAX	MIN	MEAN	TURNAROUND TIME (SEC) MAX	MIN	MEAN
12	621.9	586.3	608.4	623.6	590.8	611.8	2.0	1.0	1.3
24	950.3	867.3	904.2	956.3	874.7	910.9	2.5	2.5	2.5
39	1263.5	1151.3	1190.4	1272.4	1161.9	1200.7	2.5	2.5	2.5
48	1442.9	1360.5	1396.1	1461.2	1396.0	1422.8	12.5	4.5	9.8
60	1529.9	1476.6	1502.7	1541.9	1494.4	1526.1	18.0	2.5	8.3
67	1606.7	1505.7	1557.5	1628.7	1529.0	1587.0	11.0	2.5	6.4
70	1591.1	1535.3	1564.4	1605.8	1559.2	1582.0	4.5	2.5	3.2
73	1475.3	1475.3	1475.3	1491.2	1491.2	1491.2	4.5	4.5	4.5
74	1525.2	1516.5	1520.9	1540.9	1527.9	1534.4	2.5	2.5	2.5
75	1495.6	1468.9	1480.6	1510.6	1489.1	1497.7	4.5	2.5	3.9
76	1555.8	1471.0	1507.7	1570.0	1506.3	1527.5	10.5	2.5	4.8
77	1563.4	1484.9	1515.3	1577.6	1506.3	1532.9	4.5	2.5	4.1
78	1589.3	1466.7	1531.5	1612.3	1484.8	1551.4	6.0	4.5	4.6
79	1561.9	1516.1	1536.3	1584.1	1533.3	1555.2	4.5	2.5	3.9
80	1566.6	1453.2	1506.7	1591.7	1480.5	1531.2	9.5	4.5	6.4
81	1558.7	1558.7	1558.7	1588.4	1588.4	1588.4	6.5	6.5	6.5
82	1500.3	1500.3	1500.3	1523.6	1523.6	1523.6	6.0	6.0	6.0
84	1545.7	1430.7	1503.0	1560.3	1444.1	1516.1	4.5	2.5	2.8
90	1555.8	1186.0	1438.9	1575.4	1200.4	1458.2	4.5	2.5	4.3
96	1368.2	1195.7	1308.4	1391.8	1227.5	1333.2	11.0	4.5	6.9
102	1503.6	758.4	1105.9	1518.2	780.5	1126.4	20.0	2.5	6.6
111	1020.7	809.3	921.5	1039.8	842.7	944.7	11.0	4.5	7.8
120	1103.8	566.4	773.5	1115.1	716.0	810.9	143.0	2.5	26.7
132	630.7	446.9	518.8	639.4	455.9	530.0	12.5	2.5	5.3
138	551.1	352.7	451.9	559.9	363.3	461.6	2.5	2.5	2.5

ELEV	TEMP RISE (DEG F) MAX	MIN	MEAN	QUENCH TEMP (DEG F) MAX	MIN	MEAN	QUENCH TIME (SEC) MAX	MIN	MEAN
12	4.5	1.7	2.9	559.7	246.8	436.9	6.0	3.0	4.1
24	7.4	6.0	6.7	758.2	540.9	650.6	12.6	11.1	12.1
39	12.3	8.9	10.3	673.2	617.1	644.7	72.5	68.6	70.8
48	35.5	16.3	26.2	765.6	704.6	742.0	127.0	121.0	124.3
60	40.5	12.0	23.4	879.2	803.6	836.1	217.9	214.5	216.0
67	38.8	14.3	29.5	939.0	715.3	867.9	265.5	247.0	256.9
70	23.9	14.3	17.6	846.1	663.9	769.1	274.7	265.9	271.5
73	15.9	15.9	15.9	724.5	724.5	724.5	161.8	161.8	161.8
74	15.7	11.4	13.5	858.1	578.0	718.0	198.1	133.9	166.0
75	20.2	15.0	17.1	912.4	602.8	719.0	265.8	171.8	204.5
76	35.3	11.4	19.8	1183.0	507.0	796.7	299.9	113.6	206.5
77	24.2	13.5	17.6	974.2	250.0	763.2	275.9	150.9	199.4
78	31.6	14.8	19.9	1017.2	648.5	825.7	309.8	100.9	195.9
79	22.2	14.6	18.9	974.9	872.7	924.9	179.0	160.7	167.8
80	27.3	20.7	24.5	999.6	727.3	896.3	323.9	123.7	206.0
81	29.7	29.7	29.7	931.9	931.9	931.9	133.9	133.9	133.9
82	23.3	23.3	23.3	932.4	932.4	932.4	178.8	178.8	178.8
84	18.5	10.3	13.1	923.0	650.2	790.5	346.8	128.7	215.1
90	22.0	14.4	19.3	948.7	651.1	795.3	371.0	161.7	261.0
96	31.8	21.5	24.8	885.4	627.6	771.9	314.0	228.9	285.7
102	38.1	12.9	20.5	798.6	365.0	658.4	377.9	84.3	297.1
111	33.4	19.1	23.2	700.8	529.2	610.8	362.0	245.2	314.0
120	152.8	11.3	37.5	583.3	243.6	460.5	375.0	95.5	296.2
132	19.0	8.1	11.2	576.1	254.4	458.2	34.5	12.0	20.4
138	10.6	6.8	9.7	254.4	254.4	254.4	28.5	24.5	26.5

APPENDIX L
INSTRUMENTATION ERROR ANALYSIS

L-1. INTRODUCTION

The error associated with the measured data from the FLECHT SEASET 21-rod bundle test series was derived from either equipment manufacturer specifications or system calibration data. Component calibrations were performed to verify that the manufacturers' specifications were met and these manufacturers' specifications were used to compute the error estimate for the data path. System calibrations were performed when component calibrations were not expedient or when an accuracy improvement could be accomplished with a system calibration. The system calibration data were used to compute an estimate of error for the system response, and calibration standard equipment specifications were used to compute the error of the calibration data points. The total system error from a system calibration is a function of both equipment response error and calibration data error.

In all cases of error estimate, the standard deviation was computed and presented as the most probable error. The derivation of this error analysis technique was presented in paragraph D-7 of the 161-rod unblocked bundle data report.[1] The manufacturer-specified error is the maximum possible error for the respective component. The standard deviation of the error was calculated from the maximum error by the following, based on a uniform distribution over the error range:

$$\sigma^2 = \sum_{i=1}^{n} \frac{E_i^2}{3} \qquad \text{(L-1)}$$

1. Loftus, M. J., et al., "PWR FLECHT SEASET 161-Rod Unblocked Bundle, Forced and Gravity Reflood Task Data Report," NRC/EPRI/Westinghouse-7, June 1980.

where

σ = data path standard deviation

E_i = component i maximum error

n = number of sources of error

When a system calibration was performed, the standard deviations from the calibration data and the calibration equipment were combined by the following equation to produce the best estimate of error:

$$\sigma = \sqrt{E_d^2 + E_c^2} \tag{L-2}$$

where

σ = data path standard deviation

E_d = calibration data standard deviation

E_c = calibration equipment standard deviation

The calibration data standard deviation is a measure of the error involved in fitting the calibration data. That is,

$$E_d = \left(\frac{\sum_{i=1}^{n} (Y_i - Y_f)^2}{n - 2} \right)^{1/2} \tag{L-3}$$

where

Y_i = calibration point

Y_f = predicted output from the calibration curve

n = number of calibration points

The calibration equipment standard deviation is a measure of the absolute error of the calibration point. If the calibration point in the above equation is calculated from an equation of the form

$$Y = x_i^{r_1} \cdot x_2^{r_2} \cdot x_3^{r_3} \tag{L-4}$$

then,

$$\frac{\sigma_y^2}{y} = \sum_{i=1}^{n} \left(r_i \cdot \frac{\sigma x_i}{x_i} \right)^2 \tag{L-5}$$

and

$$E_c = \sqrt{\sigma_y^2} \tag{L-6}$$

The standard deviation of best estimate of error is presented in table L-1, because it is statistically the most practical estimate of error. The maximum possible error is also presented in table L-1. This is the sum of all the possible component errors and is the upper bound of error.

Table L-1 is a detailed listing of the errors broken down by data channel. (See appendix F for identification of channel location and function.) Application of the information in table L-1 to the recorded data requires an explanation of the analysis.

The data path is broken down into three parts: sensor, conditioner, and readout. The sensor is the device whose electrical output is proportional to a physical quantity (temperature, pressure, flow, power). The conditioner is a device which matches the electrical output of the sensor to the input requirements of the readout device. The readout device measures and records the electrical value of the signal from the conditioner. This recorded electrical value is subsequently used to compute the physical

TABLE L-1

INSTRUMENTATION ERRORS

Computer Channel	Sensor		Conditioner Error	Readout Error	Data Path Error	
	Type	Error			Most Probable	Maximum
1-238[a]	Heater rod bundle thermocouples	±1°C (±2°F) at -17.8°C to 277°C (0°F to 530°F) ±0.375% at 277°C to 1316°C (530°F to 2400°F). Use ±5°C (±9°F) maximum.	±0.3°C (±0.5°F)	±2.03°C (±3.66°F)	±1.32°C (±2.42°F)	±3.33°C (±6.16°F)
			±0.3°C (±0.5°F)	±2.03°C (±3.66°F)	±3.12°C (±5.62°F)	±7.33°C (±13.16°F)
239-324[a]	Loop thermo-couples	±2°C (±4°F) at -17.8°C to 277°C (0°F to 530°F); ±0.75% at 277°C to 1316°C (530°F to 2400°F). Use ±10°C (±18°F) maximum.	±0.3°C (±0.5°F)	±2.03°C (±3.66°F)	±1.74°C (±3.14°F)	±4.53°C (±8.16°F)
					±5.89°C (±10.61°F)	±12.3°C (±22.2°F)
328-330	Spare					
331	3×10^{-4} m^3/sec (5 gal/min) flowmeter	5.2×10^{-7} m^3/sec (0.0083 gal/min)	7.89×10^{-7} m^3/sec (0.0125 gal/min)	4.5×10^{-7} m^3/sec (0.0072 gal/min)	6.1×10^{-7} m^3/sec (0.0096 gal/min)	18.4×10^{-7} m^3/sec (0.292 gal/min)

a. All channels not utilized

TABLE L-1 (cont)

INSTRUMENTATION ERRORS

Computer Channel	Sensor		Conditioner Error	Readout Error	Data Path Error	
	Type	Error			Most Probable	Maximum
332	9.4×10^{-4} m^3/sec (15 gal/min) flowmeter	5.9×10^{-7} m^3/sec (0.0094 gal/min)	2.37×10^{-6} m^3/sec (0.0375 gal/min)	1.36×10^{-6} m^3/sec (0.0216 gal/min)	1.62×10^{-6} m^3/sec (0.0256 gal/min)	4.32×10^{-6} m^3/sec (0.0685 gal/min)
333	3.8×10^{-3} m^3/sec (60 gal/min) flowmeter	4.2×10^{-6} m^3/sec (0.067 gal/min)	9.5×10^{-6} m^3/sec (0.15 gal/min)	5.45×10^{-6} m^3/sec (0.0864 gal/min)	6.76×10^{-6} m^3/sec (0.107 gal/min)	1.91×10^{-5} m^3/sec (0.303 gal/min)
334	9.4×10^{-4} m^3/sec (15 gal/min) flowmeter	1.17×10^{-5} m^3/sec (0.186 gal/min)	9.46×10^{-6} m^3/sec (0.150 gal/min)	2.72×10^{-6} m^3/sec (0.0432 gal/min)	8.85×10^{-6} m^3/sec (0.140 gal/min)	2.39×10^{-5} m^3/sec (0.379 gal/min)
335-347	D/P cell [7.44 kPa (1.08 psi)]	0.015 kPa (0.0022 psi)	0.011 kPa (0.0016 psi)	0.011 kPa (0.0016 psi)	0.012 kPa (0.002 psi)	0.037 kPa (0.0054 psi)
348	D/P cell [74.74 kPa (10.84 psi)]	0.150 kPa (0.0217 psi)	0.112 kPa (0.0163 psi)	0.108 kPa (0.0156 psi)	0.124 kPa (0.018 psi)	0.37 kPa (0.054 psi)
349	D/P cell [99.63 kPa (14.45 psi)]	0.199 kPa (0.0289 psi)	0.149 kPa (0.0217 psi)	0.144 kPa (0.0208 psi)	0.166 kPa (0.024 psi)	0.492 kPa (0.0714 psi)
350	D/P cell [79.71 kPa (11.56 psi)]	0.060 kPa (0.0087 psi)	0.045 kPa (0.0065 psi)	0.043 kPa (0.0062 psi)	0.05 kPa (0.007 psi)	0.148 kPa (0.0214 psi)

TABLE L-1 (cont)

INSTRUMENTATION ERRORS

Computer Channel	Sensor		Conditioner Error	Readout Error	Data Path Error	
	Type	Error			Most Probable	Maximum
351	D/P cell [49.9 kPa (7.23 psi)]	0.100 kPa (0.0145 psi)	0.0744 kPa (0.0108 psi)	0.0718 kPa (0.0104 psi)	0.083 kPa (0.012 psi)	0.246 kPa (0.036 psi)
352	D/P cell [79.71 kPa (11.56 psi)]	0.159 kPa (0.0231 psi)	0.119 kPa (0.0173 psi)	0.114 kPa (0.0166 psi)	0.13 kPa (0.019 psi)	0.39 kPa (0.057 psi)
353	D/P cell [74.60 kPa (10.82 psi)]	0.150 kPa (0.0217 psi)	0.112 kPa (0.0163 psi)	0.108 kPa (0.0156 psi)	0.12 kPa (0.018 psi)	0.37 kPa (0.054 psi)
354	D/P cell [114.6 kPa (16.62 psi)]	0.229 kPa (0.0332 psi)	0.172 kPa (0.0249 psi)	0.164 kPa (0.0239 psi)	0.19 kPa (0.028 psi)	0.57 kPa (0.082 psi)
355	D/P cell [69 kPa (10 psi)]	0.1 kPa (0.02 psi)	0.10 kPa (0.015 psi)	0.099 kPa (0.014 psi)	0.12 kPa (0.017 psi)	0.34 kPa (0.049 psi)
356	Spare					
357	D/P cell [124.5 kPa (18.06 psi)]	0.249 kPa (0.0361 psi)	0.187 kPa (0.0271 psi)	0.179 kPa (0.0260 psi)	0.21 kPa (0.030 psi)	0.62 kPa (0.090 psi)
358-359	D/P cell [87.01 kPa (12.62 psi)]	0.174 kPa (0.0252 psi)	0.130 kPa (0.0189 psi)	0.126 kPa (0.0182 psi)	0.14 kPa (0.021 psi)	0.43 kPa (0.062 psi)

TABLE L-1 (cont)

INSTRUMENTATION ERRORS

Computer Channel	Sensor		Conditioner Error	Readout Error	Data Path Error	
	Type	Error			Most Probable	Maximum
360	PT cell [0.28 MPa (40 psi)]	0.690 kPa (0.100 psi)	0.414 kPa (0.060 psi)	0.40 kPa (0.058 psi)	0.52 kPa (0.075 psi)	1.50 kPa (0.218 psi)
361	PT cell [0.41 MPa (60 psi)]	1.035 kPa (0.150 psi)	0.621 kPa (0.090 psi)	0.59 kPa (0.086 psi)	0.773 kPa (0.112 psi)	2.25 kPa (0.326 psi)
362	PT cell [0.69 MPa (100 psi)]	1.725 kPa (0.250 psi)	1.03 kPa (0.150 psi)	0.994 kPa (0.144 psi)	1.30 kPa (0.188 psi)	3.75 kPa (0.544 psi)
363	PT cell [1.17 MPa (170 psi)]	2.93 kPa (0.425 psi)	1.76 kPa (0.255 psi)	1.69 kPa (0.245 psi)	2.20 kPa (0.319 psi)	6.38 kPa (0.925 psi)
364	Steam flow calculation	(See table L-2)				

	Bundle Power	Equiment Response		Calibration Standard		System Results	
		Most Probable	Maximum	Most Probable	Maximum	Most Probable	Maximum
325	Primary	±2.089 kw	±3.619 kw	±0.488 kw	±0.448 kw	±2.136 kw	±3.646 kw
326	Secondary	±0.825 kw	±1.4304 kw	±0.448 kw	±0.488 kw	±0.9388 kw	±1.499 kw
327	Steam cooling	±0.0512 kw	±0.08872 kw	±0.014 kw	±0.014 kw	±0.0531 kw	±0.08988 kw
328-330	Spare						

quantity it represents. The errors due to the transmission wires between the elements are not included in this analysis. Transmission wire errors were very small (±0.001 percent) in comparison to the element errors, and were considered to be negligible.

The error values listed for sensor, conditioning, and readout are the manufacturers' specifications in engineering units. These numbers were used to compute the most probable and maximum error, as previously described. Where system calibrations were performed, the equipment calibration data lists the standard deviation and maximum error as computed from the calibration data points in fitting the points to a first-order polynomial. The calibration point standard deviation is computed using the method described above. The calibration point maximum error was computed from the calibration equation by assuming that the maximum error occurs simultaneously in each component of the calibration equation.

The overall system standard deviation is calculated using the method described earlier for combining standard deviations (equation L-2).

L-2. TEMPERATURE MEASUREMENTS

The analysis for channels 1 through 324 is for temperature using type K thermocouples for the sensor, a 65°C (150°F) reference junction for signal conditioning, and the computer for readout. In the range of temperatures from 277°C to 1316°C (530°F to 2400°F), the sensor error is a percentage of the magnitude of the temperature. For temperatures below 277°C (530°F), the sensor error is a constant ±1.0°C (±1.8°F).

L-3. POWER MEASUREMENTS

Computer channels 325 and 326 were (respectively) the primary and secondary channels used for the forced and gravity reflood tests. An SCR (silicon-controlled rectifier) regulated the amount of power to the test bundle to a maximum of 160 kilowatts. Channel 327 was used for the steam cooling tests with a manually controlled power supply delivering up to 8 kilowatts. A watt transducer, utilizing the Hall-effect method, was used to record the power delivered to the test bundle. Calibrations were performed on the watt transducer at periodic intervals to meet the manufacturer's

specifications. A system calibration was performed on the power recording systems during the test series, and the combined data were used to compute the equipment response calibration data most probable and maximum errors. The calibration standard data values were derived from the calibration standard (YEW meter) component error. The system results were derived from the system calibration data and the calibration standard error estimates.

L-4. FLOW MEASUREMENTS

Channels 331 through 334 were the injection line turbine meter computer channels. The turbine meters were calibrated by the manufacturer; these data were used to determine the maximum sensor error. Manufacturer-specified errors were used for the signal conditioning and readout. These errors were then combined using equation (L-1) to provide the most probable error.

Steam injection flow for steam cooling tests was calculated by the computer using a special subroutine, and recorded on channel 364. Data measured from the injection line orifice section, temperature (channel 318), pressure (channel 363), and differential pressure (channel 355) were used in conjunction with the general hydraulic equation[1] to calculate flow. The actual mass rate of flow is given by

$$M = 0.52502\ kYd^2Fa\sqrt{\rho_1\ (P_1 - P_2)} \qquad \text{(L-7)}$$

where

M = mass rate of flow (lbm/sec)
d = orifice diameter (in.)
Fa = thermal expansion factor
K = pressure loss coefficient
Y = flow expansion factor

1. Fluid Meters, Their Theory & Application, 6th edition, American Society of Mechanical Engineers, 1971.

ρ_1 = density of upstream fluid (lbm/ft^3)
P_1 = upstream pressure (psi)
P_2 = downstream pressure (psi)

Since the above equation is of the same form as equation (L-4), the overall (most probable) error was determined using equation (L-5). The error associated with each factor in the flow equation is listed in table L-2. The most probable errors for the flow coefficient K, expansion factor Y, and thermal expansion factor Fa were taken from Fluid Meters. The error associated with the measured orifice diameter, d, was estimated. The most probable density (ρ_1) errors were estimated by examining the effect of the errors associated with pressure and temperature measurements on selecting tabulated density values. The error for the pressure drop across the orifice, $P_1 - P_2$, was taken to be the most probable error for the differential pressure cell (channel 355).

L-5. PRESSURE

Channels 335 through 363 were the loop pressure channels. Manufacturer-specified errors were used for the data path component errors. These were combined using equation (L-1) to determine the most probable error associated with these respective channels.

TABLE L-2

MEASUREMENT ERROR ASSOCIATED WITH STEAM INJECTION FLOW[a]

K		Y		d		Fa		P_1		ΔP		Overall Error
σ_K/K (%)	γ_K	σ_y/y (%)	γ_y	σ_d/d (%)	γ_d	σ_{Fa}/Fa (%)	γ_{Fa}	$\sigma_{P1}/P1$ (%)	γ_{P1}	$\sigma_{\Delta P}/\Delta P$ (%)	$\gamma_{\Delta P}$	σ_m/m (%)
±1.0	1	±0.38	1	±0.12	2	±0.006	1	±0.41	1/2	±0.17[b] ±3.4[c]	1/2	±1.12 ±2.03

Flow equation $M = 0.52502\, KYd^2 Fa\sqrt{\rho_1 (P_1 - P_2)}$

Most probable error $\left(\frac{\sigma_m}{m}\right)^2 = \sum_{i=1}^{n} \left[\gamma_i \left(\frac{\sigma_{xi}}{xi}\right)\right]^2$

a. Errors are assumed constant over flow range.

b. Error is based on transmitter full-span measurement of 0.69 MPa (10 psi).

c. Error is based on transmitter measurement of 0.0034 MPa (0.50 psi) (low-flow test measurement).

APPENDIX M
CALCULATION TECHNIQUES

M-1. DATAR PROGRAM

The purpose of the DATAR model is to calculate the heat transfer coefficient for heater rods in the experimental facility. It accomplishes this by using available experimental data (as read from data tapes) and as-built heater rod dimensions, coupled with a mathematical model (paragraph M-2).

The DATAR code consists of 13 overlays, to reduce the computer field length required for code execution. These overlays consist of the following:

-- The main program overlay, together with those subroutines necessary to calculate film coefficients

-- The overlay which controls the reading and checking of input data, from both cards and tape

-- The overlay which checks for restart and, if present, properly positions input and output files and sets internal values

-- The overlay which reads input information from the main data tape header and calculates several internal values based on this information

-- The overlay which checks card input consistency and echoes the information to printed output

-- The overlay which echoes data tape header information to printed output

-- The overlay which reads input from cards and performs miscellaneous operations on the data

The program provides its own dynamic field length management, resulting in minimum operating expense.

The main program generally controls the flow of most input and output data read and generated by the program. A typical run is conducted using the following steps:

(1) Radial node positions are calculated based on built-in radii and interval information. It should be noted that the code performs its calculations in the radial direction only. Axial conduction is ignored.

(2) The appropriate time values are calculated for each data point produced.

(3) Header information (run number, number of data scans, and the like) is written to the output tape, data tapes are read and correctly positioned, and the bundle power is calculated. The sink temperature is assumed to be the saturation temperature corresponding to the specified pressure for the test.

(4) The temperature data for a rod thermocouple are read from the main data tape; miscellaneous information for that thermocouple, such as bundle position and axial and radial power factors, is read from a secondary data tape.

(5) The thermocouple is considered good if the channel is not included in the bad channel list and the first temperature is greater than 66°C (150°F). If these two criteria are not met, a short entry is made on the output tape and data from the next channel are read.

(6) Rod temperature profiles, surface heat flux, and heat transfer coefficients are calculated by successively calling subroutines containing the model described in paragraph M-2.

(7) The data and results of calculations performed in step (6) are written to output.

(8) Steps (4) through (7) are repeated for all bundle thermocouple channels; the run is then terminated.

DATAR uses three principal subroutines. Their functions are as follows:

-- To calculate the coefficient matrix

-- To calculate the temperatures and surface heat flux given the coefficient matrix

-- To invert the tridiagonal coefficient matrix

Several other subroutines perform miscellaneous calculations, such as material property evaluation and data interpolation.

M-2. Calculation Method

A heat conduction problem is termed an "inverse heat conduction problem" if at least one spatial condition is specified at an interior point of a heat-conducting body. Because of this unorthodox condition, the solution to an inverse problem is very complicated. Even if the governing equations are linear, classical methods such as Fourier analysis and Laplace transformation fail to yield a solution. For the Fourier method, the eigenvalues are not readily obtainable from the resulting Strum-Louisvalle system of equations; hence, a Fourier series representation of the solution cannot be determined. Transformation techniques lead to a solution in Laplace variable space, which defies an inverse transform into the real time space. Although the numerical method is not without difficulty, meaningful results can be obtained if due care is exercised.

The mathematical formulations and methods used in DATAR to solve the inverse heat conduction problem are described in the following paragraphs. The governing partial differential equation and the associated difference approximation are outlined below. The key assumption used in the development of the approximation is that the nonlinear coefficients are slowly varying functions of the temperature of the system and may

therefore be treated as constants. The validity of this assumption is addressed in paragraph M-10. When the difference approximation has been obtained, the solution method is described in considerable detail.

M-3. Basic Equations and Geometry

Let $T(r,t)$ denote the temperature at position r and time t in the ranges $0 \leq r \leq b$, $t \geq 0$. The applicable partial differential equation is

$$\frac{\partial}{\partial r}\left(k \frac{\partial T}{\partial r}\right) + \frac{k}{r}\frac{\partial T}{\partial r} + q''' = \rho c\left(\frac{\partial T}{\partial r}\right) \tag{M-1}$$

where k and c depend on T and are thermal conductivity and specific heat, respectively, and ρ is density. Axial heat conduction is neglected, since calculations have shown an insignificant effect unless within approximately 25 mm (1 in.) of the quench front.

The following boundary and initial conditions are given:

$$\frac{\partial T(0,t)}{\partial r} = 0 \tag{M-2}$$

$$T(a,t) = T_D(t) \qquad 0 < a < b \tag{M-3}$$

$$\frac{\partial T(b,t)}{\partial r} = -\phi/k \tag{M-4}$$

$T(r,0)$, the initial temperature distribution, is also given.

Equation (M-2) assures symmetry at $r = 0$. Equation (M-3) represents the measured temperature at an internal point a. Equation (M-4) introduces another unknown, ϕ, the flux to be determined.

Since the measured temperature is given at discrete times, the partial differential equation may be viewed as a system of ordinary differential equations, one equation for

each temperature measurement. The factor ϕ could then be computed at each time step so that the measured temperature is obtained; this approach is not used in DATAR. There are two primary reasons for considering the transient behavior of the system: first, the experimental error in the data, and second, the propagation time effects in the system. As shown below, if ϕ is computed at each time step using only the measured temperature at that time step, then the flux and external temperature will behave erratically. The second reason, the propagation effect, occurs because the flux ϕ reflects the behavior of the rod at the boundary, and the temperature is measured at an internal point of the rod. The temperature propagation time of the rod must be accounted for, since the measured temperature reflects changes in the boundary temperature that have occurred earlier. If the propagation time is greater than 0.5 second, then this transport effect must be allowed for by adjusting ϕ at one time step, given the temperature measurements at future times. A representative propagation time is not known, but rough estimates indicate that it is greater than 0.5 second. A detailed analysis of this phenomenon should prove useful in any future modifications of DATAR.

The spatial aspects of the problem are now considered. The physical region under consideraton ($0 \leq r \leq b$) is composed of n radial regions, each with potentially different physical properties. The result is a set of n partial differential equations, one equation for each region. At the interface points of the regions, temperature and heat transfer are required to be continuous. Let d be an interface point between regions R_{i-1} and R_i; then,

$$\lim_{\substack{r \in R_{i-1} \\ r \to d}} T(r,t) = \lim_{\substack{r \in R_i \\ r \to d}} T(r,t) \tag{M-5}$$

$$\lim_{\substack{r \in R_{i-1} \\ r \to d}} \frac{\partial T(r,t)}{\partial r} k(T) = \lim_{\substack{r \in R_i \\ r \to d}} \frac{\partial T(r,t)}{\partial r} k(T) \tag{M-6}$$

Given equations (M-1) through (M-6), the appropriate difference equation is first derived for each region separately using equation (M-1); then the regions are coupled by imposing equations (M-5) and (M-6). Equations (M-2) and (M-4) supply the boundary values, and equation (M-3) and the initial temperature distribution are used to develop the solution for $t \geq 0$.

M-4. Difference Equations

The following approximations are used for the partial derivatives in equation (M-1):

$$\frac{\partial}{\partial r} k \frac{\partial T}{\partial r} \simeq \frac{k}{(\Delta r)^2}\left[T(r + \Delta r, t) - 2T(r,t) + T(r - \Delta r, t)\right] \tag{M-7}$$

$$\frac{k}{r}\frac{\partial T}{\partial r} \simeq \frac{k}{r}\left[\frac{T(r + \Delta r, t) - T(r - \Delta r, t)}{2\Delta r}\right] \tag{M-8}$$

$$\rho c \frac{\partial T}{\partial t} \simeq \rho c\left[\frac{T(r,t) - T(r, t - \Delta t)}{\Delta t}\right] \tag{M-9}$$

The approximation of equation (M-7) neglects the term $(\partial k/\partial r)(\partial T/\partial r)$. The justification for this omission follows from the fact that $(\partial k/\partial r)(\partial T/\partial r)$ is much smaller than $k/r\,(\partial T/\partial r)$, the term in equation (M-8).

Since $\frac{\partial k}{\partial r} = \frac{\partial k}{\partial T}\frac{\partial T}{\partial r}$,

$$\frac{\frac{\partial k}{\partial r}\frac{\partial T}{\partial r}}{\frac{k}{r}\frac{\partial T}{\partial r}}$$

may be written as

$$\frac{r}{k}\frac{\partial k}{\partial r}\frac{\partial T}{\partial r}$$

Now r is small, less than 0.1. It is shown in paragraph M-10, for each material, $(1/k)(\partial k/\partial r)$ is less than 0.01. In fact, it is less than 0.001 for almost all materials. Finally, $\partial T/\partial r$ is a well-behaved function of r. Therefore the term omitted from equation (M-7) is less than 0.1 percent of the term in equation (M-8).

The approximations of equations (M-7), (M-8), and (M-9) also make use of the fact that k and c are slowly varying functions of T. In paragraph M-10, these assumptions are justified by showing that $\partial k/\partial T$ and $\partial c/\partial T$ are small.

Other approximations that could be used instead of equation (M-7) have been tested; no appreciable difference can be seen between the schemes which keep k constant and those which do not.

Note that k and c are evaluated at $T(r, t - \Delta t)$. Here the assumption is made that T is given at time $t - \Delta t$, and the procedure is advancing to time t. Since t is given at time t = 0, the required initial condition is supplied.

Equations (M-7), (M-8), and (M-9) are only used inside each region; the interface between regions is covered in paragraph M-5.

The approximations in equations (M-7), (M-8), and (M-9) are substituted into equation (M-1). Letting $r_1, \ldots, r_k$ denote the points in a region R and letting $\Delta r_i = r_{i+1} - r_i$ and $T_i = T(r_i, t)$, equation (M-1) may be rewritten as follows:

$$B_i T_{i-1} + A_i T_i + C_i T_{i+1} = D_i \qquad \text{(M-10)}$$

where the coefficients are given by

$$B_i = 1 - (\Delta r)_i/2(r_i) \qquad \text{(M-11)}$$

$$A_i = -2 - (\rho_i c_i/k_i)(\Delta r_i)^2/\Delta t \qquad \text{(M-12)}$$

$$C_i = 1 + (\Delta r)_i/(2r_i) \qquad \text{(M-13)}$$

$$D_i = -q_i''' \left[\frac{(\Delta r_i)^2}{k_i} \right] - (\rho_i c_i / k_i)(\Delta r_i)^2 \, T_i^{old} / \Delta t \qquad \text{(M-14)}$$

In equations (M-11) through (M-14), ρ_i, c_i, k_i, and q_i denote the value at the point r_i, and T_i^{old} is given by $T(r_i, t - \Delta t)$. Note that c_i and k_i are evaluated using the previous temperature T_i^{old}. This assumption is related to the assumption used in deriving equations (M-7), (M-8), and (M-9).

In equations (M-10) through (M-14), the two points r_0 and r_{k+1} were used; these points reside at a distance Δr from the region r. The use of interface and boundary conditions eliminates these fictitious points.

M-5. Interface Conditions

Equations (M-10) through (M-14) hold for each region. The interface conditions in equations (M-5) and (M-6) are now applied and the redundant temperatures are eliminated. Ignoring for a moment the left-hand boundary of region 1 (the origin) and the right-hand boundary of region n (the external surface), equation (M-10) can be written for each of the internal interface points.

For region R_i, the equation for the right-hand boundary may be written

$$B_k T_{k-1} + A_k T_k + C_k T_{k+1} = D_k \qquad \text{(M-15)}$$

Here k denotes the right-hand end point of R_i.

For region R_{i+1}, the equation for the left hand boundary may be written

$$B_1' T_0 + A_1' T_1' + C_1' T_2' = D_1' \qquad \text{(M-16)}$$

Here 1 denotes the left-hand end point of R_{i+1}, and primes are used on the coefficients and temperatures.

Because of the overlap of the regions, the temperatures T_{k-1}, T_k, and T_{k+1} refer to the same spatial points as do T_0', T_1', and T_2', respectively.

The interface conditions, equations (M-5) and (M-6), then lead to the following equations:

$$T_k = T_1' \tag{M-17}$$

$$k_i \left[\frac{T_{k+1} - T_{k-1}}{2(\Delta r)_i} \right] = k_{i+1} \left[\frac{T_2 - T_0}{2(\Delta r)_{i+1}} \right] \tag{M-18}$$

Equation (M-17) requires that the temperatures are in agreement at the interface point. Equation (M-18) is a difference approximation to equation (M-6), which requires that the heat transfer out of region R_1 is the same as the heat transfer into region R_{i+1}.

Equations (M-15) through (M-18) are a set of four equations in six unknowns that may be reduced to one equation in three unknowns: the temperatures at the interface and at the adjacent points on either side. Using T_{k-1}, T_k, and T_{k+1} for these temperatures, and letting

$$\sigma = \frac{k_{i+1}(\Delta r)_i}{k_i(\Delta r)_{i+1}}$$

equations (M-8) through (M-15) may be combined to obtain

$$B_k' T_{k-1} + A_k' T_k + C_k' T_{k+1} = D_k' \tag{M-19}$$

where the primed coefficients are given by

$$B_k' = B_1'(B_k + C_k) \tag{M-20}$$

$$A_k' = B_1' A_k + \sigma A_1' C_k \tag{M-21}$$

$$C_k' = \sigma C_k (B_1' + C_1') \tag{M-22}$$

$$D_k' = B_1' D_k + \sigma D_1' C_k \tag{M-23}$$

Equations (M-10) and (M-19) now provide a tridiagonal system for the temperatures internal to the total region under consideration, $0 \leq r \leq b$. For a point internal to a region R_i, equation (M-10) is used, and for interface points, equation (M-19) is used.

M-6. Boundary Conditions

Derivation of boundary condition equations is given in the following paragraphs.

M-7. External Surface Boundary -- Letting T_N represent the temperature at the external boundary, equation (M-10) may be written

$$B_N T_{N-1} + A_N T_N + C_N T_{N+1} = D_N \tag{M-24}$$

Further, equation (M-4) may be written in difference form as

$$\frac{T_{N+1} - T_{N-1}}{2\Delta r_{N-1}} = -\frac{\phi}{k_N} \tag{M-25}$$

Combining these two equations yields

$$(B_N + C_N) T_{N-1} + A_N T_N = D_N + \frac{2C_N \Delta r_{N-1}}{k_N} \phi \tag{M-26}$$

M-8. Internal Boundary -- For r = 0, equation (M-1) and the condition in equation (M-2) may be used to derive the appropriate equation for T_0. Rewriting equation (M-1) yields

$$\frac{\partial k}{\partial r}\frac{\partial T}{\partial r} + k\frac{\partial^2 T}{\partial r^2} + \frac{k}{r}\frac{\partial T}{\partial r} = \rho c\frac{\partial T}{\partial t} - q''' \tag{M-27}$$

At $r = 0$, $\partial T/\partial r = 0$; moreover the term $(1/r)(\partial T/\partial r)$ may be replaced by $\partial^2 T/\partial r^2$ at $r = 0$, by using L'Hospital's rule, since $\partial T/\partial r = 0$. Using these expressions, equation (M-27) may be rewritten as

$$2\frac{\partial^2 T}{\partial r^2} = \frac{\rho c}{k}\frac{\partial T}{\partial t} - \frac{q'''}{k} \tag{M-28}$$

The term $\partial^2 T/\partial r^2$ in equation (M-28) is approximated using $(2T_1 - 2T_0)/(\Delta r_0)^2$. This expression is the standard three-point difference approximation to the second derivative with the symmetry condition $T_{-1} = T_1$ being used, since $\partial T/\partial r = 0$.

The difference equation may be written

$$A_0 T_0 + C_0 T_1 = D_0 \tag{M-29}$$

where the coefficients are given by

$$A_0 = -4 - \frac{\rho_0 c_0}{k_0}\frac{(\Delta r_0)^2}{\Delta t} \tag{M-30}$$

$$C_0 = 4 \tag{M-31}$$

$$D_0 = \frac{-\rho_0 c_0}{k_0}\frac{(\Delta r_0)^2}{(\Delta t)}\, T\,(0,\ t - \Delta t) - q_0''' \frac{(\Delta r_0)^2}{k_0(\Delta t)} \tag{M-32}$$

Equations (M-10), (M-19), (M-26), and (M-29) form a linear tridiagonal set of N+1 equations in the N+1 unknowns $T_0,\ldots,T_N$. However, equation (M-26) introduced another unknown, ϕ, but equation (M-3) leads to one of the T's. As a result, there remain N+1

equations in N+1 unknowns. Let T_M denote the given internal temperature. Since k and c depend on the temperature at time t - Δt, ϕ is not brought over to the left-hand side of the equations nor is T_M moved to the right-hand side. Instead, ϕ is estimated using the values of T_M at future times. T_M is treated as an unknown, thus keeping the tri-diagonal structure of the equations.

E-9. Method of Solution

Let $\underline{T}^t = (T_0, \ldots, T_N)$; T_i is at time t. $\underline{T}^{t-1}$ is a similar vector at time t - Δt. Now let A be the tridiagonal matrix:

$$\begin{bmatrix} A_0 & C_0 & & & & \\ B_1 & A_1 & C_1 & & & \\ & B_2 & A_2 & C_2 & & \\ & & \ddots & \ddots & \ddots & \\ & & & B_{N-1} & A_{N-1} & C_{N-1} \\ & & & & B_N & A_N \end{bmatrix}$$

Let D be a diagonal matrix with the i-th element given by

$$\frac{\rho_i c_i}{k_i} \frac{(\Delta r_i)^2}{\Delta t}$$

Here c_i and k_i are evaluated at $T_i^{t-\Delta t}$.

Let $\underline{q}$ be the vector with the i-th component given by

$$-q_i''' \left[\frac{(\Delta r_i)^2}{k_i} \right]$$

Finally, let $\underline{\delta}$ be a vector with $\delta_i = 0$, $i = 0, \ldots, N-1$; and $\delta_N = 2C_N \Delta r_{N-1}/k_N$.

Equations (M-10), (M-19), (M-26), and (M-29) may be abbreviated as

$$A\underline{T}^i = D\underline{T}^i + \underline{q} + \phi^i \underline{\delta} \tag{M-33}$$

Again, ϕ^i is unknown, but T_M^i is known.

For simplicity, assume $i = 1$; that is, the initial data for time = 0 are given, and the calculation is proceeding to time Δt.

Let $\underline{P}^k$ denote a particular solution of the following equation:

$$A\underline{P}^k = D\underline{P}^{k-1} + \underline{q} \tag{M-34}$$

with $\underline{P}^{k-1}$ given. Similarly, let $\underline{H}^k$ denote a homogeneous solution of the following:

$$A\underline{H}^k = D\underline{H}^{k-1} \tag{M-35}$$

with $\underline{H}^{k-1}$ given. Begin these sequences as follows:

$$\underline{P}^0 = \underline{T}^0 \tag{M-36}$$

and

$$A\underline{H}^1 = \underline{\delta} \tag{M-37}$$

Define $\underline{T}^1$ by $\underline{T}^1 = \underline{P}^1 + \phi^1 \underline{H}^1$; then $\underline{T}^1$ satisfies equation (M-33) in the form

$$A\underline{T}^1 = D\underline{T}^0 + \underline{q} + \phi^1 \underline{\delta}$$

This may be proved as follows. Multiplying the equation defining $\underline{T}^1$ by A yields

$$A\underline{T}^1 = A(\underline{P}^1 + \phi^1\underline{H}^1)$$

$$= A\underline{P}^1 + \phi^1 A\underline{H}^1$$

$$= D\underline{P}^0 + \underline{q} + \phi^1 \delta$$

using equations (M-34) and (M-37).

Notice, however, that $\underline{P}^0 = T^0$ from equation (M-36); the proof is complete.

Moreover, if

$$\underline{T}^k = \underline{P}^k + \phi^k\underline{H}^1 + \phi^{k-1}\underline{H}^2 + \ldots + \phi^1\underline{H}^k \tag{M-38}$$

then $\underline{T}^k$ satisfies equation (M-33) for all $\phi^1, \phi^2, \ldots, \phi^k$. The proof of this result is easily given by induction.

Therefore, given $\underline{T}^0$, future temperatures may be approximated by $\underline{T}^1, \underline{T}^2, \ldots, \underline{T}^k$, as far as necessary.

Note that the computation of $\underline{P}^i$ and $\underline{H}^i$ requires only the solving of a tridiagonal system with the same matrix A [see equations (M-34), (M-35), and (M-37)].

Given that $T^1, T^2, \ldots, T^k$ have been computed, the values of ϕ^i are chosen so that T^i_m agrees with T^i_{data}. Since there are k conditions and k unknowns, the values of ε may be obtained exactly. However, the experimental error in T_{data} causes ϕ to behave erratically if this procedure is followed.

It is more reasonable to derive a relationship between the ϕ^i values, and then to obtain k equations in the one unknown, ϕ^i. In other implementations it is assumed that either ϕ is constant (that is, $\phi^i = \phi^2 = \ldots = \phi^k$) or that ϕ^{i+1} is a prescribed linear or quadratic function of ϕ^i.

The approach in this study was to use the measured temperature profile to derive a relationship between ϕ^i and ϕ^{i+1}. First, the heat balance for the whole rod may be written as follows:

$$q'''V - \phi A = \frac{\partial T}{\partial t} \times \text{constant} \tag{M-39}$$

where

V = volume of heated region
A = rod surface area

The $\partial T/\partial t$ term in equation (M-39) cannot be computed before ϕ is calculated; however, it may be estimated by

$$\left(\frac{\partial T}{\partial t}\right)^i \simeq \frac{T_D^i - T_D^{i-1}}{\Delta t}$$

Here T_D^i is the measured temperature T_{data}. Therefore equation (M-39) may be approximated, yielding

$$q'''V - \phi^i A = \frac{T_D^i - T_D^{i-1}}{\Delta t^i} \times \text{constant} \tag{M-40}$$

Assuming that the constant is independent of time, and writing equation (M-40) for both i and i+1, the constant may be eliminated. Solve for ϕ^{i+1} in terms of ϕ^i to obtain

$$\phi^{i+1} = E^{i+1}\,\phi^i + F^{i+1} \tag{M-41}$$

where E^{i+1} and F^{i+1} are given by

$$E^{i+1} = \frac{\left(T_D^{i+1} - T_D^i\right)/(\Delta t)^{i+1}}{\left(T_D^i - T_D^{i-1}\right)/(\Delta t)^i}$$

$$F^{i+1} = \left[(q''')^{i+1} \times V - E^{i+1} \times (q''')^{i} \times V\right]/A$$

This relationship predicts the future behavior of ϕ^i more accurately than any of the aforementioned methods.

Moreover, a similar relationship may be derived for $\phi^{i+2}, \phi^{i+3}, \ldots$ in terms of ϕ^i. If these expressions for future ϕ values are substituted into equation (M-38), there results the following expression for $\underline{T}^k$ in terms of $\underline{H}^1, \underline{H}^2, \ldots \underline{H}^k, \underline{P}^k$ and ϕ^1:

$$\underline{T}^k = \alpha^k + \phi^1 \beta^k$$

where α^k and β^k are given by

$$\underline{\alpha}^k = \underline{P}^k + \sum_{j=1}^{k-1} F^{k+1-j} \underline{H}^j$$

$$\underline{\beta}^k = \underline{H}^k + \sum_{j=1}^{i-1} E^{k+1-j} \underline{H}^j$$

Now choose ϕ^1 by the standard least-squares procedure so that $T_m^1, \ldots, T_m^k$ best fits $T_{data}^1, \ldots, T_{data}^k$. Thus,

$$\phi^1 = \frac{\sum_{i=1}^{k} T_{data}^i - \alpha_m^i \times \beta_m^i}{\sum_{i=1}^{k} \beta_m^i \times \beta_m^i}$$

where α_m^i and β_m^i reprsent the m-th components of the temperature vectors $\underline{\alpha}^i$ and $\underline{\beta}^i$. Therefore ϕ^1 is chosen so that the computed temperatures for the next k time steps best fit the measured temperatures for those k time steps.

Experience with this method suggests that k = 3 is an appropriate number of time steps.

M-10. Variation of k and c With Respect to T

In deriving the difference approximations for equations (M-1) and (M-4), it has been assumed that k and c are constants and that they may be evaluated using the temperature of the previous time step. Moreover, it has been assumed that (1/k dk/dT) is less than 0.01. These assumptions are justified by considering the following expressions. For each material, dk/dT, (1/k dk/dT), and dc/dT are listed. The expressions are obtained from the formulas in paragraph M-11. For materials in which c(T) is a linear interpolate of a table, dc/dT has been estimated by computing the maximum $\Delta c/\Delta T$ value, as follows:[1]

-- Boron nitride

$$\frac{dk}{dT} = -8.8889 \times 10^{-4} \text{ Btu/hr-ft-}^{o}\text{F}^{2}$$

$$\frac{1}{k}\frac{dk}{dT} = \frac{-8.8889 \times 10^{-4}}{14.778 - 8.8889 \times 10^{-4} T} \; {}^{o}\text{F}^{-1}$$

$$\frac{dc}{dT} = (0.333492)\; 1.3611 \times 10^{-3} e^{-(1.3611 \times 10^{-3}\; T)} \text{ Btu/lbm-}^{o}\text{F}^{2}$$

-- Kanthal

$$\frac{dk}{dT} = 4.3 \times 10^{-3} \text{ Btu/hr-ft-}^{o}\text{F}^{2}$$

$$\frac{1}{k}\frac{dk}{dT} = \frac{4.3 \times 10^{-3}}{9.7 + 4.3 \times 10^{-3} T} \; {}^{o}\text{F}^{-1}$$

---

1. The results of these computations are given in English engineering units, the form in which the data are analyzed by the code.

$$\frac{dc}{dT} = 0.0003 \text{ Btu/lbm-}^{o}F^{2}$$

-- Magnesium oxide

$$\frac{dk}{dT} = (121.814)\left[0.010722\ e^{-0.010722T}\right] - \frac{2\ (7015.835)}{T^{2}} \text{ Btu/hr-ft-}^{o}F^{2}$$

$$\frac{1}{K}\frac{dk}{dT} = \frac{(121.814)\left[0.010722\ e^{-0.010722T}\right] - \frac{2\ (7015.835)}{T^{2}}}{0.2529 - 121.814\ e^{-0.010722T} + \frac{7015.835}{T}}\ {}^{o}F^{-1}$$

$$\frac{dc}{dT} = (0.111256)\left[1.33715 \times 10^{-3}\ e^{(-1.33715 \times 10^{-3}\ T)}\right] \text{ Btu/lbm-}^{o}F^{2}$$

-- Nichrome V

$$\frac{dk}{dT} = 5.75 \times 10^{-3} \text{ Btu/hr-ft-}^{o}F^{2}$$

$$\frac{1}{k}\frac{dk}{dT} = \frac{5.75 \times 10^{-3}}{5.2 + 5.75 \times 10^{-3}\ T}\ {}^{o}F^{-1}$$

$$\frac{dc}{dT} = 0.0002 \text{ Btu/lbm-}^{o}F^{2}$$

-- Stainless steel 304

$$\frac{dk}{dT} = 4.2 \times 10^{-3} \text{ Btu/hr-ft-}^{o}F^{2}$$

$$\frac{1}{k}\frac{dk}{dT} = \frac{4.2 \times 10^{-3}}{8.4 + 4.2 \times 10^{-3}\ T}\ {}^{o}F^{-1}$$

$$\frac{dc}{dT} = 0.001 \text{ Btu/lbm-}^{o}F^{2}$$

-- Stainless steel 316

$$\frac{dk}{dT} = 4.3 \times 10^{-3} \text{ Btu/hr-ft-}^{o}F^{2}$$

$$\frac{1}{k}\frac{dk}{dT} = \frac{4.3 \times 10^{-3}}{7.5 + 4.3 \times 10^{-3}\ T}\ {}^{o}F^{-1}$$

$$\frac{dc}{dT} = 0.001 \text{ Btu/lbm-}^{o}F^{2}$$

-- Stainless steel 347

$$\frac{dk}{dT} = 4.2 \times 10^{-3} \text{ Btu/hr-ft-}^{o}F^{2}$$

$$\frac{1}{k}\frac{dk}{dT} = \frac{4.2 \times 10^{-3}}{8.3 + 4.2 \times 10^{-3}\ T}\ {}^{o}F^{-1}$$

$$\frac{dc}{dT} = 2.8 \times 10^{-5} \text{ Btu/lbm-}^{o}F^{2}$$

For each material, excluding dk/dT and (1/k dk/dT) for magnesium oxide, it is clear that temperature derivatives and the (1/k) (dk/dt) term are appropriately small. Because of the special form of k(T) for magnesium oxide, the analysis of dk/dT and (1/k) (dk/dT) is more complicated. The interaction of the negative exponential term and the 1/T term makes precise estimates difficult. An alternative approach is to consider the original data. The k(T) function fits the following table:

T(^{o}F)	k[(Btu/hr-ft-^{o}F)]
212	20.8
392	16.33
752	9.53
1112	6.65
1472	4.91
1832	4.04
2192	3.53

The maximum $\Delta k/\Delta T$ for this table is 0.02 in the interval between 212°F and 392°F. The corresponding $(1/k)(\Delta k/\Delta T)$ value is 0.001, as required.

M-11. Material Properties

DATAR contains a built-in library of pertinent material properties which are unalterable by the user, to avoid potential errors and inconsistencies. Thermal conductivity and specific heat versus temperature curves are built in for each of the materials shown in table M-1. A constant density is built in for each of the materials, with the exception of magneisum oxide and boron nitride. In these two cases, the user must supply the density for the appropriate material. The thermal conductivity and specific heat of boron nitride are not a function of the density, since the heater rods are highly swaged, which provides for approximately 95-percent theoretical density. Note that the thermal conductivity of magnesium oxide depends on the density.

Each thermal conductivity or specific heat is calculated by either a least-squares fit to available data or a linear interpolation from a table of available data. Table M-1 gives the source of the data for each material. A summary of the methods used for each material follows:

-- Boron nitride

$$k = 25.571 - 0.0276T \text{ w/m-}^{\circ}\text{C}$$
$$(14.778 - 8.8889 \times 10^{-4}\, T \text{ Btu/hr-ft-}^{\circ}\text{F})$$

$$Cp = 2017.74 - 1396.26e^{-0.00295T} \text{ J/kg-}^{\circ}\text{C}$$
$$(0.48193 - 0.333492e^{-1.3611 \times 10^{-3}T} \text{ Btu/lb-}^{\circ}\text{F})$$

$$\rho = \text{input quantity}\left[\text{kg/m}^3\ (\text{lb/ft}^3)\right]$$

TABLE M-1

MATERIAL PROPERTY DATA SOURCES

Material	Property	Source of Data
Boron nitride	K	(a)
	Cp	Touloukian[b]
	ρ	Supplied by user
Kanthal	K	(c)
	Cp	(c)
	ρ	Supplier[d]
Magnesium oxide	K	Kingery, et al.[e]
	Cp	Touloukian[b]
	ρ	Supplied by user
Nichrome V	K	Touloukian[b]
	Cp	Touloukian[b]
	ρ	Touloukian[b]
Stainless steel 304	K	WCAP-2808[f]
	Cp	Touloukian[b]
	ρ	Touloukian[b]
Stainless steel 316	K	WCAP-2808[f]
	Cp	Touloukian[b]
	ρ	Touloukian[b]
Stainless steel 347	K	WCAP-2808[f]
	Cp	Touloukian[b]
	ρ	Touloukian[b]
Air	K	Baumeister[g]
	Cp	Baumeister[g]
	ρ	Baumeister[g]

a. The thermal conductivity of powdered boron nitride is dependent on several factors. The formula used for this quantity reflects an engineering judgment which considers those factors pertinent to the Westinghouse use of this material.

b. Touloukian, Y. S., Thermophysical Properties of High Temperature Solid Materials, Macmillan, New York, 1967.

c. This quantity has been derived as a function of temperature from data obtained on materials of similar composition.

d. "Physical Properties of Kanthal Alloys," G-45-07, the Kanthal Corporation, Bethel, CT.

e. Kingery, W. D., et al., "Thermal Conductivity X. Data for Pure Oxide Materials Corrected to Zero Porosity," J. Am. Ceram. Soc. 37, 107-110 (1954).

f. Marti Balaguer, L., "MPD Materials Design Manual," WCAP-2808, July 1966.

g. Baumeister, T., Mechanical Engineers Handbook, 6th edition, McGraw-Hill, New York, 1958.

-- Kanthal

$k = 16.789 + 0.0134$ w/m-^oC
$(9.7 + 4.3 \times 10^{-3}\ T$ Btu/hr-ft-$^oF)$

Cp =linear interpolation from the following:

$T\left[^oC(^oF)\right]$		$Cp\left[J/kg\text{-}^oC(Btu/lb\text{-}^oF)\right]$	
-32	(0)	456.4	(0.109)
648	(1200)	753.6	(0.180)
760	(1400)	1172.3	(0.280)
871	(1600)	745.2	(0.178)
1204	(2200)	779.6	(0.185)

$\rho = 7144.2$ kg/m^3 (446.0 lb/ft^3)

-- Magnesium oxide

$$k = \rho_{MgO}\,(0.0273 - 13.15e^{-0.0192T} + 420.9/T)/223 \text{ w/m-}^oC$$
$$\left[\rho_{MgO}\,(0.2529 - 121.814e^{-0.010722T} + 7015.835/T)/223 \text{ Btu/hr-ft-}^oF\right]$$

$$Cp = 1377.353 - 465.805e^{-0.002406T} \text{ J/kg-}^oC$$
$$(0.328976 - 0.111256e^{-1.33715 \times 10^{-3}T} \text{ Btu/lb-}^oF)$$

$\rho =$ input quantity $\left[kg/m^3\ (lb/ft^3)\right]$

-- Nichrome V

$$k = 8.997 + 0.0179T \text{ w/m-}^oC\ (5.2 + 5.75 \times 10^{-3}T \text{ Btu/hr-ft-}^oF)$$

Cp = linear interpolation from the following:

T[°C(°F)]		Cp[J/Kg-°C (Btu/lb-°F)]	
-32	(0)	427.1	(0.102)
260	(500)	502.4	(0.120)
482	(900)	535.9	(0.128)
593	(1100)	577.8	(0.138)
704	(1300)	623.8	(0.149)
816	(1500)	653.1	(0.156)
871	(1600)	661.5	(0.158)
982	(1800)	653.1	(0.156)

ρ = 8361.63 kg/m^3 (522.0 lb/ft^3)

-- Stainless steel 304

k = 14.535 + 0.01308T w/m-°C (8.4 + 4.2 x 10^{-3}T Btu/hr-ft-°F)

Cp = linear interpolation from the following:

T[°C(°F)]		Cp[J/kg-°C(Btu/lb-°F)]	
-32	(0)	372.6	(0.089)
149	(300)	372.6	(0.089)
260	(500)	378.9	(0.0905)
371	(700)	389.4	(0.093)
482	(900)	404.0	(0.0965)
593	(1100)	420.8	(0.1005)
816	(1500)	458.4	(0.1095)
926	(1700)	475.2	(0.1135)
1038	(1900)	483.6	(0.1155)
1093	(2000)	485.7	(0.116)

ρ = 8025.2 kg/m^3 (501.3 lb/ft^3)

-- Stainless steel 316

$k = 12.978 + 0.01339T$ w/m-°C ($7.5 + 4.3 \times 10^{-3}T$ Btu/hr-ft-°F)

Cp = linear interpolation from the following:

T[°C(°F)]		Cp[J/kg-°C (Btu/lb-°F)]	
-32	(0)	439.6	(0.105)
204	(400)	510.8	(0.122)
315	(600)	540.1	(0.129)
427	(800)	561.0	(0.134)
871	(1600)	619.6	(0.148)
1038	(1900)	659.4	(0.1575)
1204	(2200)	703.4	(0.168)

$\rho = 7949.96$ kg/m^3 (496.3 lb/ft^3)

-- Stainless steel 347

$k = 13.064 + 0.0143T$ w/m-°C ($7.55 + 4.58 \times 10^{-3}T$ Btu/hr-ft-°F)

$Cp = 447.99 + 0.211T$ J/kg-°C ($0.107 + 2.8 \times 10^{-5}T$ Btu/lb-°F)

$\rho = 7905.1$ kg/m^3 (493.5 lb/ft^3)

-- Air

$k = 20.91 \times 10^{-5} (T + 273)^{0.846}$ w/m-°C
$\left[7.35 \times 10^{-5} (T + 460)^{0.846} \text{ Btu/hr-ft-°F}\right]$

Cp = 1009.02 J/kg-°C (0.241 Btu/lb-°F)

$\rho = 1.201$ kg/m^3 (0.075 lb/ft^3)

Although the option is generally only used in the heater region, DATAR permits a mixture of any two materials to exist in any radial region. In this instance, the properties at each node in the region must be adjusted to account for the effect of the mixture. This is accomplished as follows:

Let

x = volume fraction of material A

ρ_A, K_A, C_A = properties of material A

ρ_B, K_B, C_B = properties of material B

$\bar{\rho}, \bar{K}, \bar{C}$ = mixture properties

Then

$$\rho = x\rho_A + (1 - x)\rho_B$$

$$K = xK_A + (1 - x)K_B$$

$$\bar{C} = \frac{x\rho_A C_A}{\bar{\rho}} + \frac{(1 - x)\rho_B C_B}{\bar{\rho}}$$

This formulation provides an exact accounting of the mixture heat capacity and a parallel conduction path approximation for the effective thermal conductivity. The approximation to the mixture thermal conductivity is not expected to introduce any significant error, however, since the only mixed region for a normal case is the second radial region, which conducts less heat than any of the more exterior regions.

M-12. Effect of Power Step on Heat Transfer Coefficient

During the self-aspirating steam probe shakedown tests conducted both in the single rod facility and in the 161-rod unblocked bundle (as discussed in appendix J), it was learned that the thermal response could be improved by drying out the steam probe prior to

flood. Therefore, the 21-rod bundle was heated up to a rod temperature of 888°C (1600°F) at a slow rate [1.3 kw/m (0.4 kw/ft) peak] to evaporate water trapped within the steam probe. The power was subsequently stepped up to the specified value [typically 2.58 kw/m (0.785 kw/ft) peak] at time of flood. However, it required approximately 2 seconds after flood for the power to achieve its specified value, as shown in figure M-1 on a expanded time scale. After the specified value had been achieved, the power was decayed according to the ANS + 20 percent curve. This rapid power increase during flood initiation caused the DATAR-code-calculated heat transfer to initially decrease, turn around, and then increase as flooding continued.

To evaluate the effect of this power step on reflood heat transfer, an additional repeat test (run 42415E) was conducted in configuration E without the power step at flood. An example of the heat transfer from both runs is shown in figure M-2, which indicates that the heat transfer is quite different for both runs for approximately 4 to 6 seconds. However, the heat transfer is the same for both tests after 4 to 6 seconds, although there are small differences attributed to variations in test conditions.

It has been concluded that the power step at initiation of flood has a negligible effect on the reflood heat transfer data, especially considering that all the reflood tests in the 21-rod bundle test program utilized the same test procedure.

M-13. QUENCH PROGRAM

The QUENCH program was utilized for reduction of heater rod and housing thermocouple data. This program was designed to determine the following quantities:

-- Initial temperature

-- Maximum temperature

-- Turnaround time

-- Quench time

-- Quench temperature

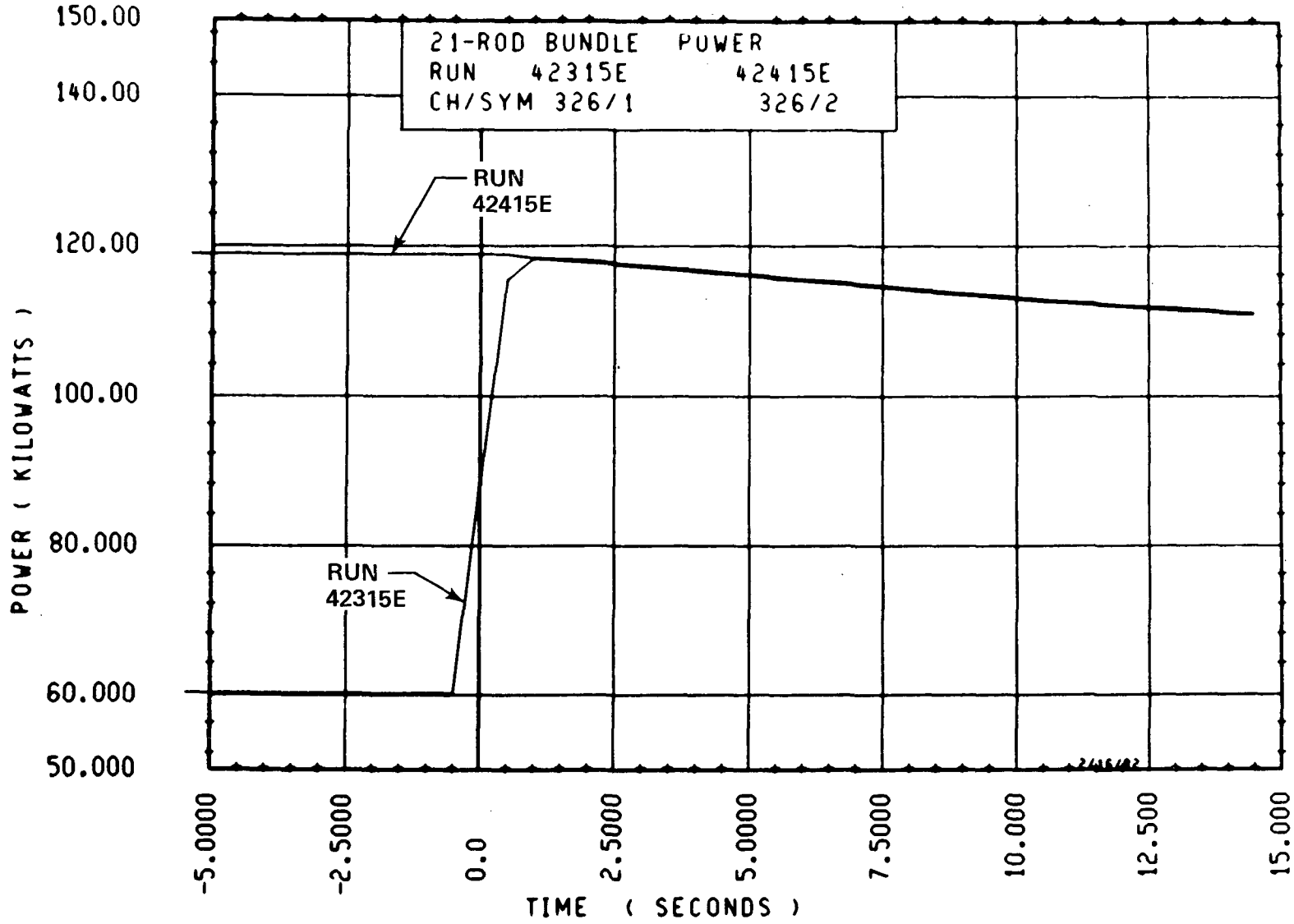


Figure M-1. Power Step at Flood Initiation

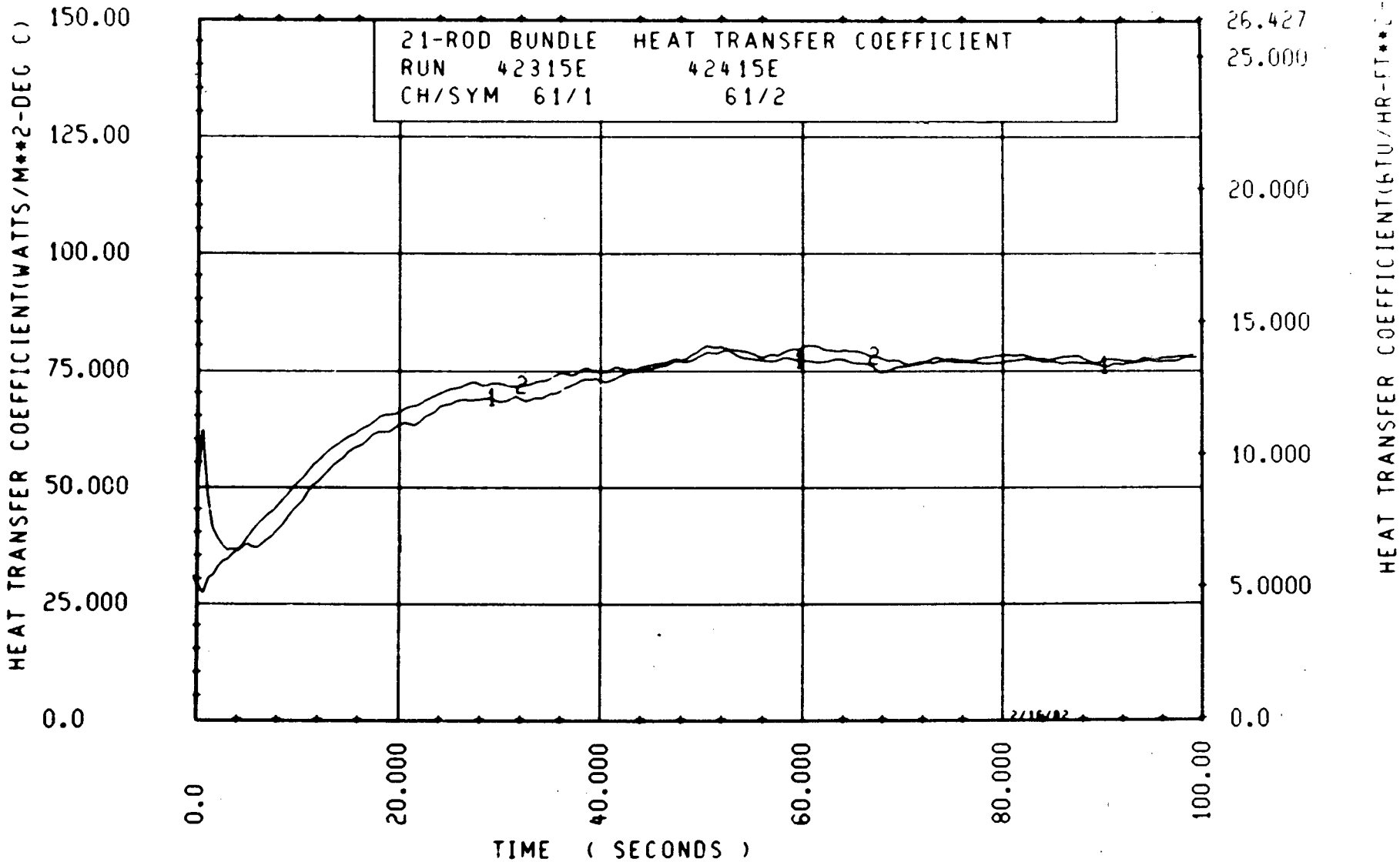


Figure M-2. Heat Transfer Coefficient Variation

The initial temperature or temperature at flood time was determined by interpolating between the temperature recorded at the last negative time (preflood) and the temperature recorded at the first positive time (postreflood). The maximum temperature was determined by simply searching for that temperature and the turnaround time was the time at which the maximum temperature occurred.

To determine the quench time and temperature, the following method was used.

The program advances sequentially through all the data for each thermocouple channel, looking at five points at a time [T(t) at 1 through 1 + 4, figure M-3, sheet 1]. The first criterion applied is that the temperature, T(t), must be greater than 149°C (300°F) to qualify as a potential quench condition. If it is not, the remaining criteria are skipped.

The second criterion checks whether the slope of the temperature-time curve between the third and fourth points is greater than 28°C (50°F) per second, that is, whether

$$\frac{T(1+3) - T(1+2)}{t(1+3) - t(1+2)} < (-50^{\circ}F/sec)$$

The decision whether a quench exists or not is made on this basis. If not, the remaining criteria are skipped and the program advances to the next data point.

The third criterion checks whether the absolute value of the slope between the third and fourth points is two times greater than the absolute value of the slope between the first and second points, that is, whether $S_2 > 2S_1$. If so, a quench condition exists. If not, the program skips out of the search and advances to the next set of data points.

Finally, the program checks the absolute value of the slope between the fourth and fifth data points (S'_2) and compares it to the absolute value of the slope between the third and fourth points (S_2).

If $S'_2 > S_2$, then the quench time and temperature is defined to be the intersection of L'_1 and L'_2 (figure M-3, sheet 2).

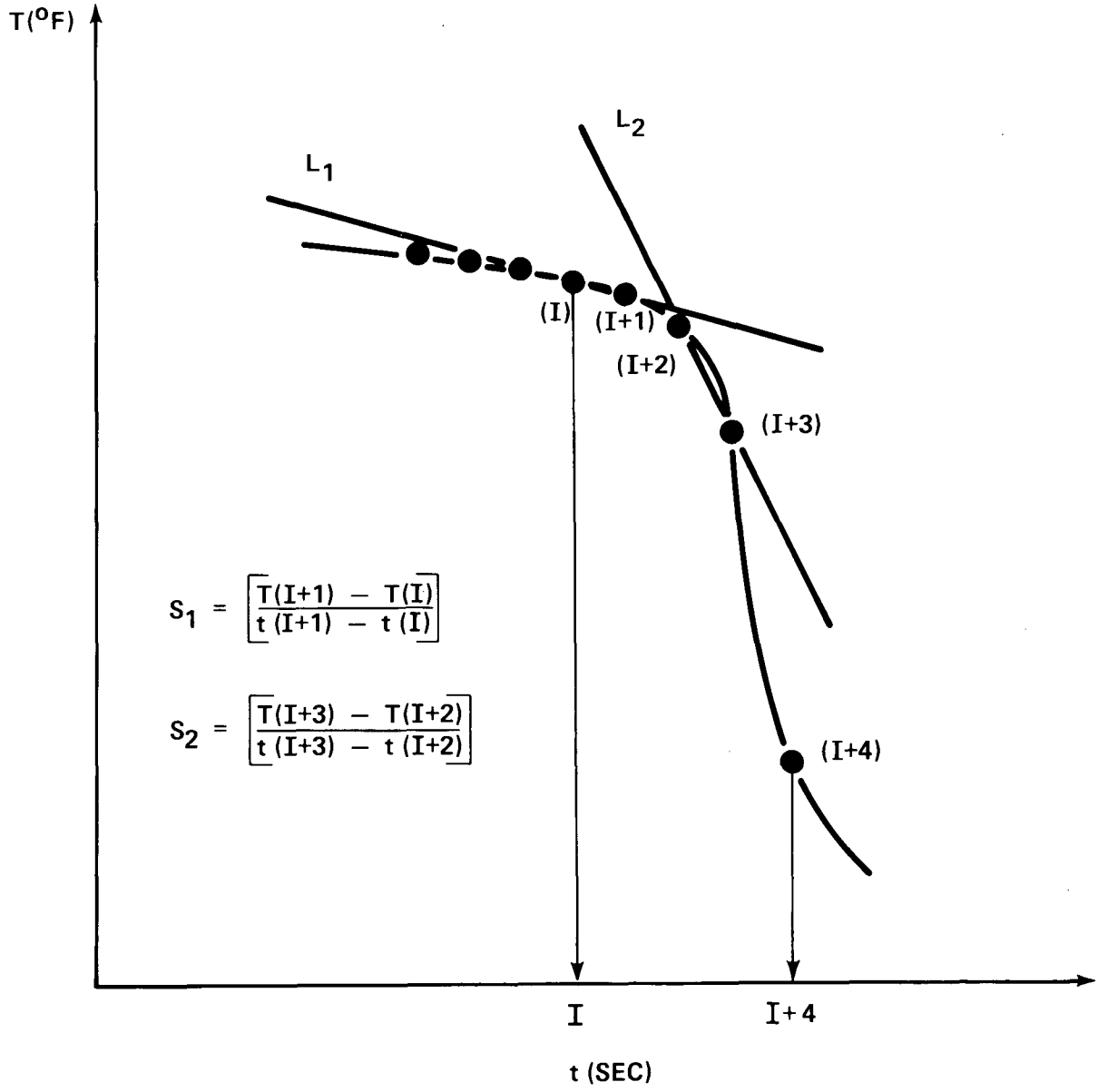


Figure M-3. Determination of Quench Time and Temperature (sheet 1 of 2)

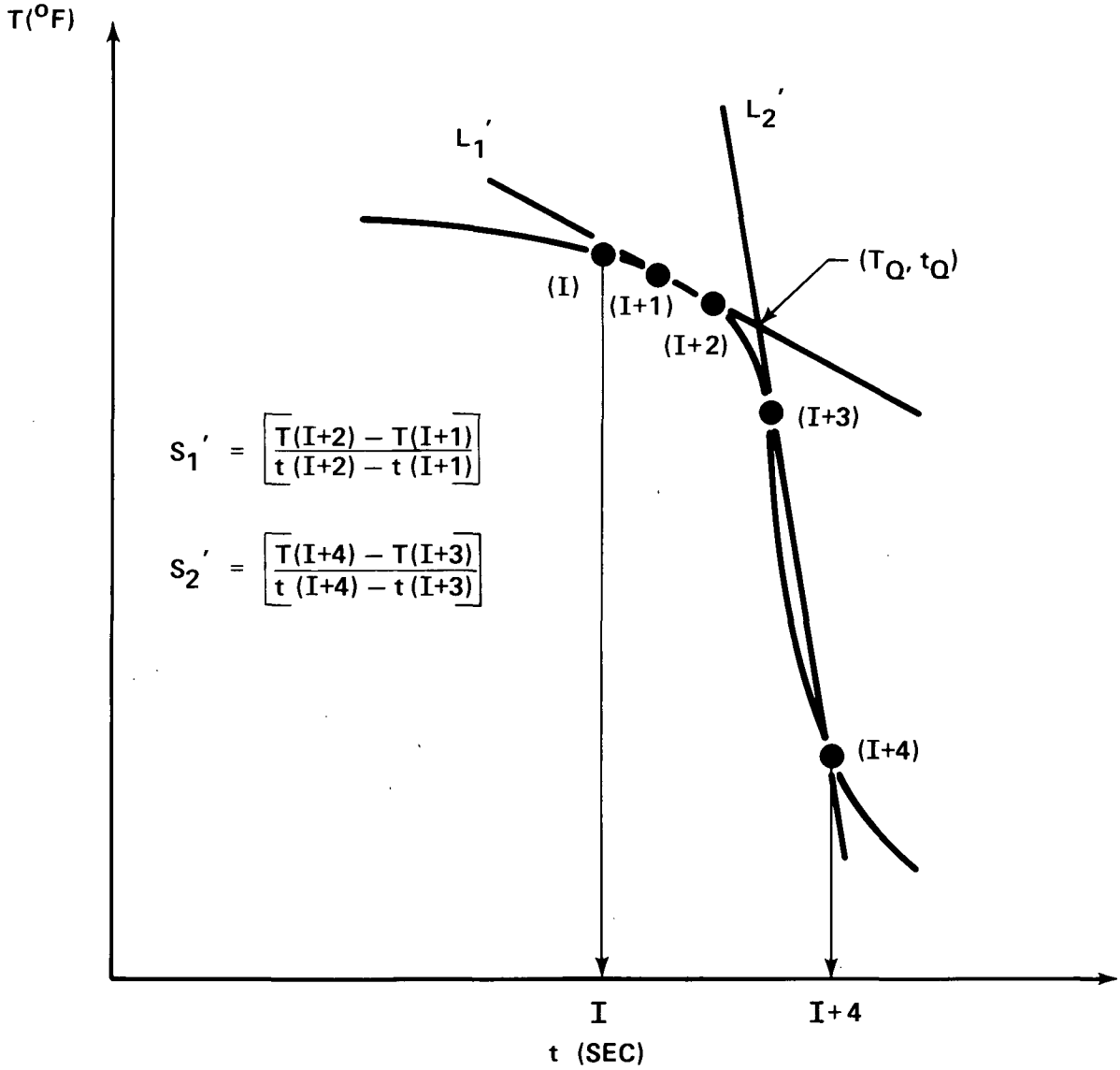


Figure M-3. Determination of Quench Time and Temperature (sheet 2 of 2)

The QUENCH program also calculates a quench front curve based upon a curve fit of the average quench time for each elevation. This quench front curve is subsequently differentiated with respect to time in order to obtain a quench front velocity.

M-14. FFLOWS PROGRAM

The FFLOWS program was utilized to calculate mass balance and void fraction.

A mass balance was calculated for each reflood test using the FFLOWS program, which calculated the flow rates, mass storage, and frictional pressure drop. This program is a modification of the mass balance program used in the FLECHT SEASET 161-rod unblocked bundle test series.

The following calculations were performed:

-- The injected mass was calculated from the inlet turbine meter.

-- The liquid collected was calculated from the differential pressure cells on the carryover tank, upper plenum, and steam separator tanks, assuming that all differential pressure was elevation head with water at the saturation temperature.

-- The steam flow was calculated from the orifice differential pressure cell using the measured steam temperature and local pressure to obtain the steam density.

-- The mass storage in the test bundle was calculated using the 0 to 3.66 m (0 to 144 in.) differential pressure cell reading (corrected for frictional pressure drop).

-- The mass storage in the downcomer was calculated from differential pressure transmitter readings for the gravity reflood tests.

There was between 0.26 and 1.58 kg (0.58 and 3.49 lb) of water collected from the three aspirating steam probes located downstream of the bundle during a reflood test. This mass represents approximately 0.8 to 8.1 percent of the injected mass. When this mass was added to the total mass flow out of the system and the mass collection in the test

system, the forced reflood test mass balance was usually within ±6 percent, with an average of 2.4 percent, and the gravity reflood test mass balance was within ±5 percent, with an average of 1.4 percent.

In addition to calculation of the mass flows through the test system, the space-averaged void fraction was calculated from the measured pressure drop over each of the 0.30 m (12 in.) sections of the bundle. The measured pressure drop consists of three effects: elevation head, frictional pressure drop, and acceleration pressure drop due to liquid vaporization:

$$\Delta P_{measured} = \Delta P_{elevation} + \Delta P_{acceleration} + \Delta P_{friction}$$

The relative magnitude of each of these components was examined in the FLECHT SET Phase A report.[1] It was concluded that the vapor elevation head and the acceleration pressure drop were completely negligible and that the frictional pressure drop was a second-order effect compared to the liquid elevation head. The small frictional pressure drop for a gravity reflooding situation is attributed to the high injection rate, which quickly absorbs the bundle energy. Therefore, the steam generation rate is small during the transient. It was felt that forced low flooding rate tests would result in such substantial evaporation of the injected flow that frictional pressure drop could be important during the transient. Because the 12 axial differential pressure cells on the test bundle were ±3.7 kPa (±15 in. wg) pressure transmitters, the frictional pressure drop could be accurately accounted for in the tests. In this fashion, if the frictional pressure drop was calculated for a test, this value could be subtracted from the measured pressure drop to obtain the liquid elevation head, and therefore, the space-averaged void fraction.

The frictional pressure drop was calculated as

$$\Delta P_{friction} = \left(\frac{fl}{D_e} + K_g\right)\left(\frac{\rho_b V_b^2}{2g_c}\right)$$

1. Blaisdel, J. A., et al., "PWR FLECHT SET Phase A Report," WCAP-8238, December 1973.

where

L = length = 0.30 m (12 in.)

ρ_b = bundle steam density evaluated from the average of the 26 bundle steam probe readings at respective elevations and test section pressure

D_e = bundle hydraulic diameter = 4 (flow area)/wetted perimeter

V_b = bundle steam velocity obtained from the mass flow rate through the exhaust orifice = $M/(\rho_b \times \text{bundle flow area})$

f = friction factor

K_g = grid pressure loss coefficient

The friction factor and grid pressure loss coefficient were determined from a curve fit of the configuration A hydraulic characteristics test data. Both the friction and grid loss coefficient were of the form

$$K_g \text{ (or } f) = A_0 + A_1 Re + A_2 Re^2 + A_3 Re^3 + A_4 Re^4 \quad \text{for } Re < 30{,}000$$

where the coefficients for each of the six grids and the friction are as follows:

	a_0	a_1	a_2	a_3	a_4
0.53 m (21 in.) grid	1.3054	-9.18×10^{-5}	4.54×10^{-9}	-7.43×10^{-14}	0
1.04 m (41 in.) grid	1.817	-1.59×10^{-4}	8.11×10^{-9}	-1.35×10^{-13}	0
1.57 m (62 in.) grid	2.813	-3.73×10^{-4}	3.05×10^{-8}	-1.11×10^{-12}	1.48×10^{-17}
2.11 m (83 in.) grid	2.631	-2.02×10^{-4}	9.48×10^{-9}	-1.53×10^{-13}	0
2.62 m (103 in.) grid	2.311	-2.75×10^{-4}	2.34×10^{-8}	-8.79×10^{-13}	1.17×10^{-17}
3.15 m (124 in.) grid	2.593	-3.76×10^{-4}	3.34×10^{-8}	-1.29×10^{-12}	1.75×10^{-17}
Friction	0.9067	-1.83×10^{-5}	2.306×10^{-9}	-1.27×10^{-13}	2.527×10^{-18}

For $Re \geq 30{,}000$,

K = 0.636 for 0.53 m (21 in.) grid	K = 0.949 for 2.11 m (83 in.) grid
K = 0.696 for 1.04 m (41 in.) grid	K = 0.907 for 2.62 m (103 in.) grid
K = 0.882 for 1.57 m (62 in.) grid	K = 0.832 for 3.15 m (124 in.) grid

In calculating the frictional pressure drop, the criterion used to determine when the frictional pressure drop was important relative to the elevation head within a 0.30 m (12 in.) span was that if the measured axial differential pressure for that span was 0.0014 MPa (0.21 psid) or greater ($\alpha \sim 50$ percent), the span was considered to be full of water or two-phase mixture. In this case, no frictional pressure drop was calculated for that span. It should be noted that the pressure drop across a totally full 0.30 m (12 in.) span is 0.0029 MPa (0.42 psid) for saturated water at 0.28 MPa (40 psia). If the measured differential pressure was less than 0.0014 MPa (0.21 psid) for a given span, then the frictional pressure drop was calculated for the entire span and its value was subtracted from the measured pressure drop to obtain the elevation pressure drop component. The calculated elevation pressure drop was then used to calculate the mass storage and the void fraction within the 0.30 m (12 in.) span.

That is,

$$\alpha = 1 - \frac{\Delta P_{measured} - \Delta P_{friction}}{\rho_{sat\ liquid}\, gL}$$

where L = the distance between differential pressure cells = 0.30 m (12 in.).

Examples of the calculated frictional pressure drop for the entire bundle for three tests are shown in figures M-5 through M-7. These frictional pressure drop values represent the summation of all the individual 0.30 m (12 in.) span frictional pressure drops for the bundle in which the measured pressure drop was less than 0.0014 MPa (0.21 psid) in each span. As these figures show, the calculated frictional pressure drop was less than 10 percent of elevation head for tests 42430A and 43112A, averaging approximately 0.000069 to 0.00029 MPa (0.01 to 0.042 psid) for each 0.30 m (12 in.) span. The calculated frictional pressure drop decreased with time following the steam flow history

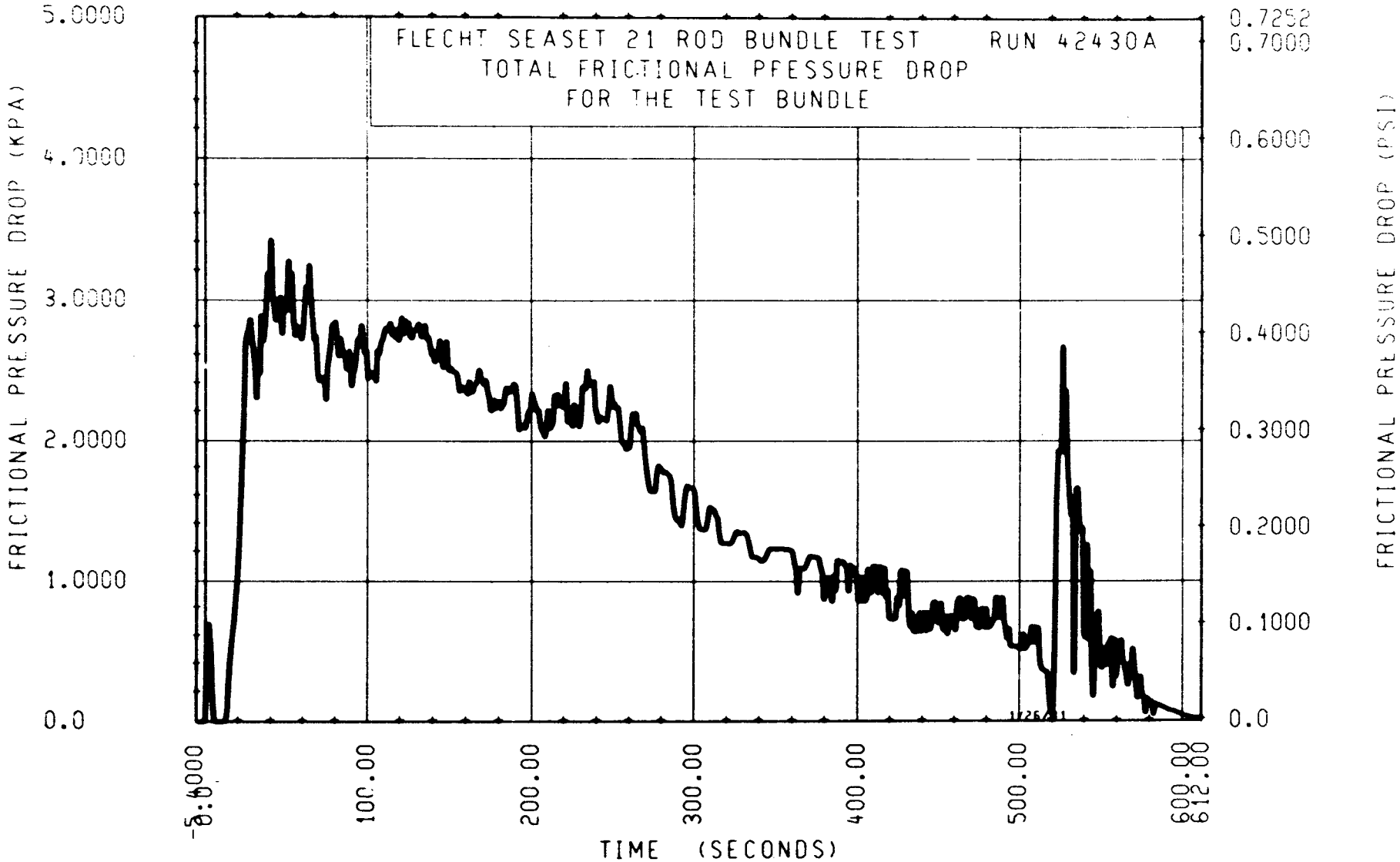


Figure M-5. Calculated Frictional Pressure Drop [Run 42430A, 28 mm/sec (1.1 in./sec) Flooding Rate, 0.28 MPa (40 psia) Pressure]

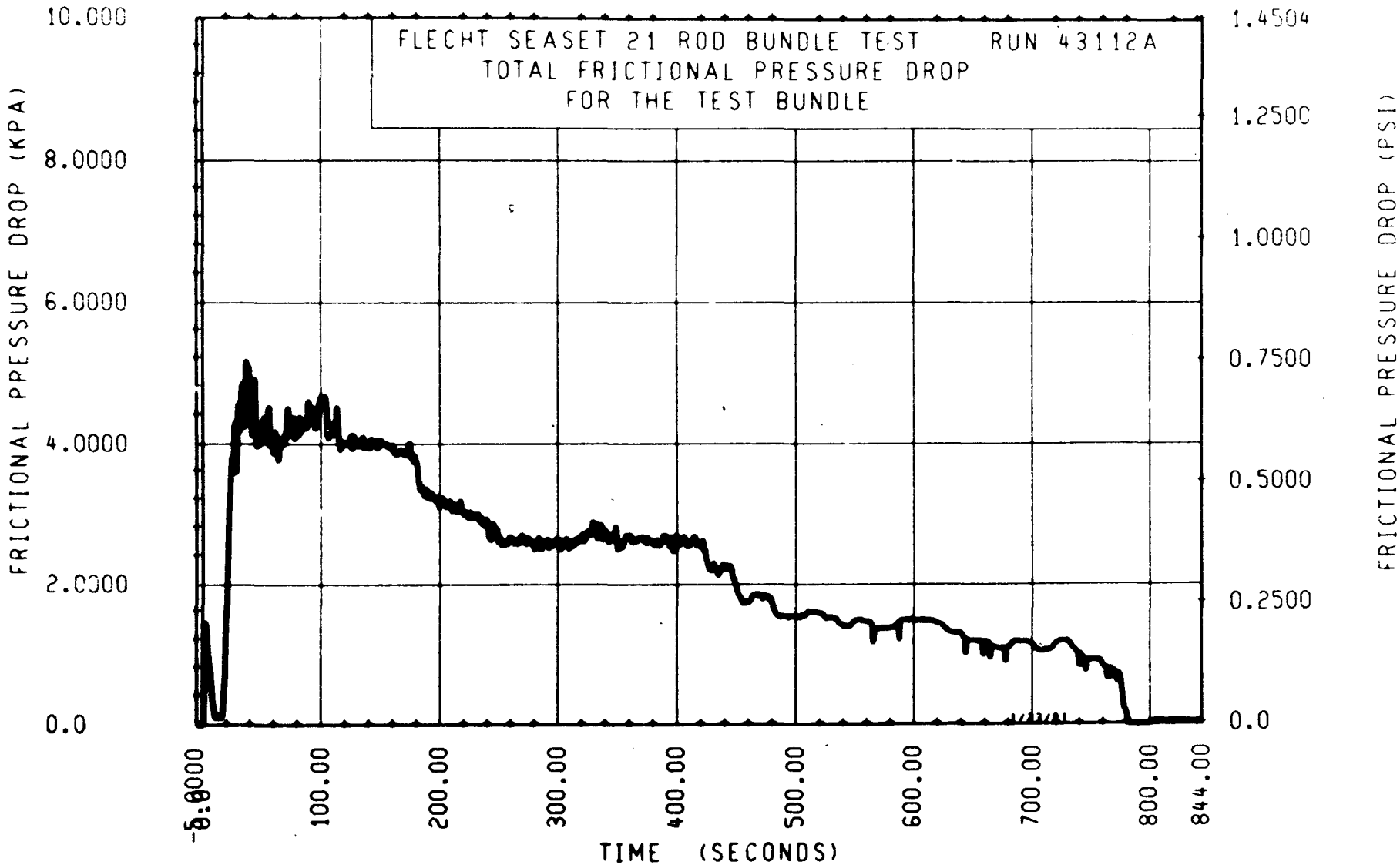


Figure M-6. Calculated Frictional Pressure Drop [Run 43112A, 28 mm/sec (1.1 in./sec) Flooding Rate, 0.14 MPa (20 psia) Pressure]

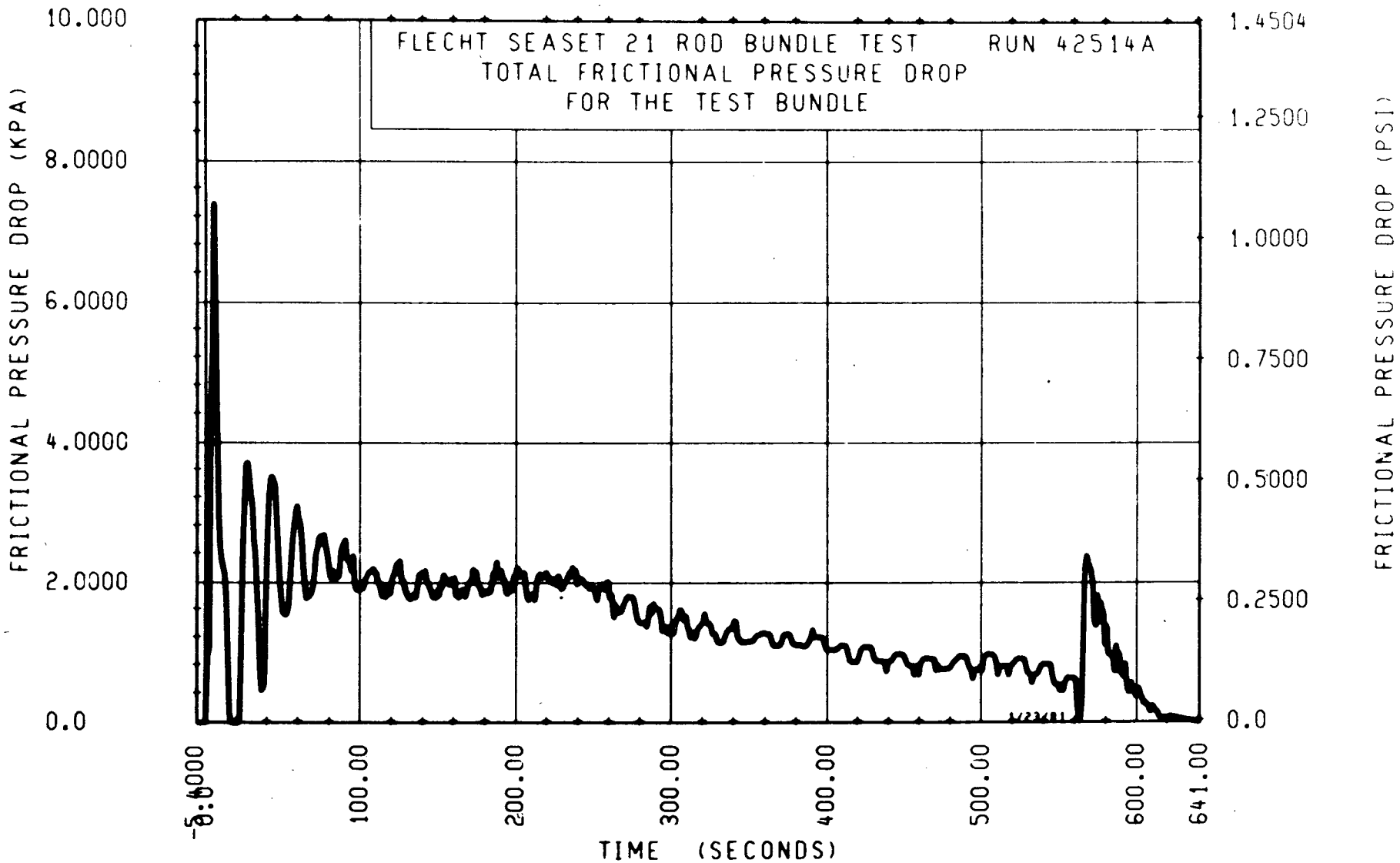


Figure M-7. Calculated Frictional Pressure Drop (Run 42514A, Variable Flooding Rate Test)

from the rod bundle. The oscillations in the calculated frictional pressure drop were due to steam flow oscillations caused by the pressure control valve variations during the test. The maximum calculated frictional pressure drop per 0.30 m (12 in.) span of only 10 percent of the elevation pressure drop for a 50-percent void fraction mixture in that span was considered a small correction to the measured pressure drop.

When the stepped flooding rate test (run 42514A) was conducted, a different trend was observed in the frictional pressure drop, as shown in figure M-7. Initially, the calculated frictional pressure drop was greater than 20 percent of the elevation head, because of the large burst of steam flow generated by the high flooding rate. The steam flow stayed high for an additional 5 seconds after the high injection period ended. The large steam flow was due to the boiloff of the high flow injected mass. Once this mass had been boiled and entrained out of the bundle, the steam flow and resulting frictional pressure drop decreased significantly, to very small values at the end of the test. Therefore, the void fractions calculated at early times in variable flooding rate tests must be evaluated carefully, since the frictional pressure drop is large.

In general, it can be concluded that the frictional pressure drop is small relative to the water elevation head and can be accounted for by the method outlined above. The only case in which the frictional pressure drop becomes large compared to elevation head pressure drop is the very early period of forced stepped injection tests, in which a large amount of boiloff occurs.

In the FFLOWS code, a comparison between the two methods of measuring the mass stored in the bundle was performed. The two methods include the 0-3.66 m (0-144 in.) differential pressure cell and the sum of the twelve 0.30 m (12 in.) differential pressure cells. As shown in figure M-8 for run 42430A, good agreement was achieved for the two measurement methods.

In the gravity reflood tests, a mass balance calculation was performed around the downcomer. The flooding rate into the bundle was calculated using the following equation:

$$M_{input} = \int_0^t \dot{m}_{input}\, dt = \int_0^t \dot{m}_{inj}\, dt - M_D\,(t)$$

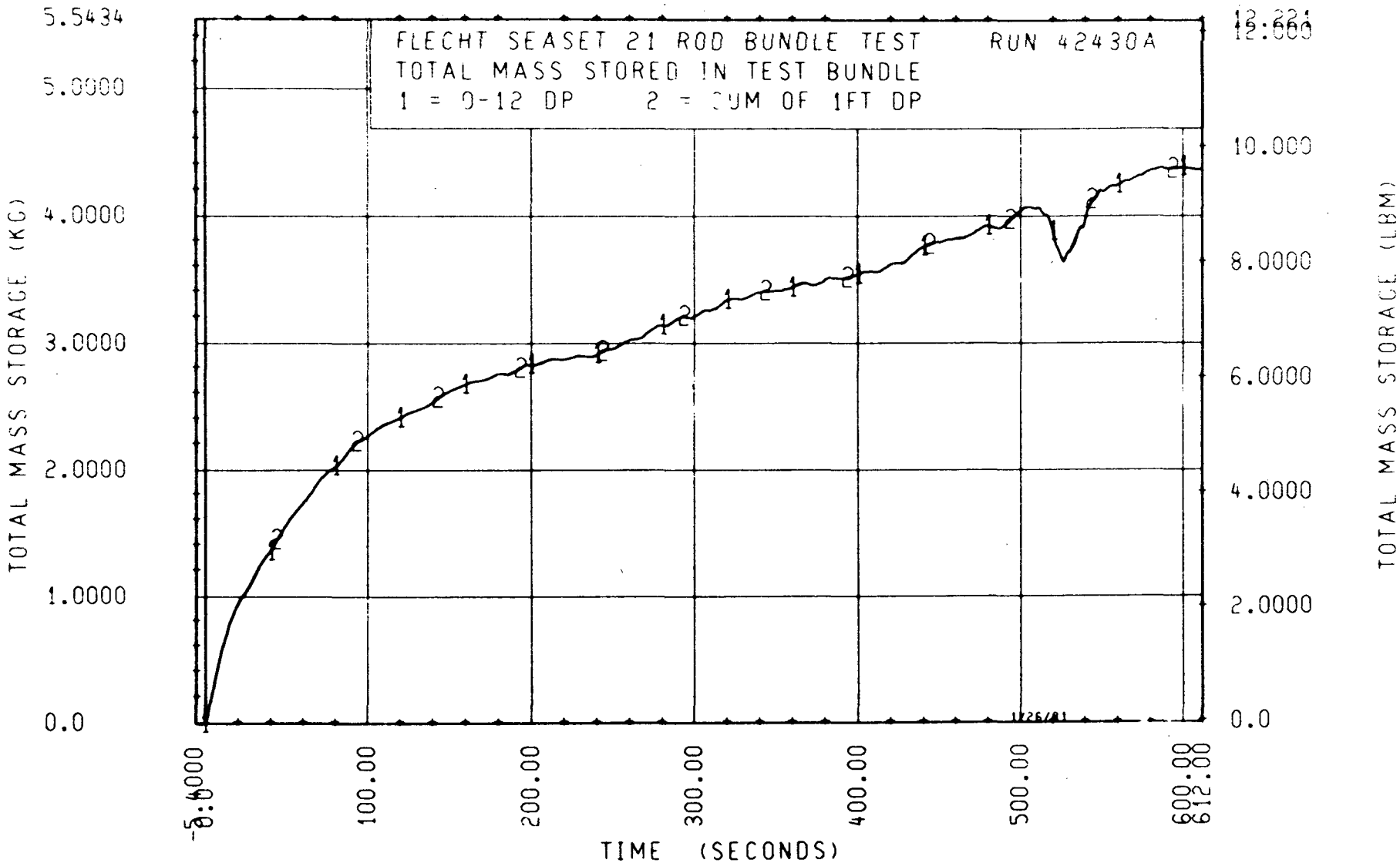


Figure M-8. Mass Stored in Bundle, Run 42430A

where

M_{input} = mass of water in the bundle

$\dot{m}_{input}$ = mass flooding rate into the bundle

$\dot{m}_{inj}$ = mass injection rate into the downcomer

M_D = mass of water in the downcomer

The flooding rate into the bundle, m_{input}, was obtained from the time rate of change of mass put into the test section, M_{input}. The injection rate into the downcomer was measured by the turbine meter. The mass stored in the downcomer was calculated using the output of the differential pressure transducer which measured the liquid level in the downcomer. Bundle flooding rates calculated with this technique were compared to the flooding rates measured by the bidirectional turbo-probe installed in the cross-over pipe.

M-15. DATA AVERAGING

A simple averaging technique was used for reducing much of the data presented in this report. This was done to clarify graphic presentation of results and to obtain average values of oscillating quantities where use of the instantaneous values could result in large errors. The technique used consisted of replacing each data point with the mean value of the original data point and a specified number of points before and after the time of interest. This process is defined by the following equation:

$$x(i) = \frac{1}{t(i + \Delta - 1) - \Delta(i - 1)} \sum_{n=i+\Delta}^{n=i+\Delta-1} \frac{x(n) + x(n+1)}{2}$$

where

$x(n) = f(t)$

Δt = interval between data points

$\Delta = n \times \Delta t$

n = integer

M-16. HYCHAR CODE

The HYCHAR code was written to reduce the data from the hydraulic characteristics tests. The static pressure differentials were measured over 0.30 m (12 in.) increments utilizing a ±3.7 kPa (±15 in. wg) differential pressure transmitter. The pressure measurements were made from just above the first grid at the 0 m (0 in.) elevation to just below the eighth grid at the 3.57 m (140.5 in.) elevation. The pressure losses due to friction, support grids, and blockage sleeves were determined by evaluating the mechanical energy equation between any two points, as follows:

$$\Delta P_{LOST} = (P_a - P_b) + \frac{\rho}{2g_c}\left(V_a^2 - V_b^2\right) + \frac{\rho g}{g_c}(Z_a - Z_b)$$

where

P_a = measured static pressure at upstream point

P_b = measured static pressure at downstream point

$$\Delta P_{LOST} = \frac{K\rho V^2}{2g_c}$$

V = velocity in unblocked portion of bundle

Therefore, since the gravity head can be neglected because of the pressure of a reference leg,

$$K\frac{\rho V^2}{2g_c} = (P_a - P_b) + \frac{\rho}{2g_c}\left(V_a^2 - V_b^2\right)$$

$$K = \frac{(P_a - P_b) + \frac{\rho}{2g_c}\left(V_a^2 - V_b^2\right)}{\frac{\rho V^2}{2g_c}}$$

where

$$K = \begin{cases} \dfrac{fL}{D_h}, & \text{for frictional losses} \\ K_{grid}, & \text{for grid losses} \\ \dfrac{fL}{D_h} + K_{blockage}, & \text{for blockage sleeve losses} \end{cases}$$

The friction factor for the heater rods can be determined by evaluating the data between grid locations. As shown by figure M-9, the differential pressure measurement between 0.61 and 0.91 m (24 and 36 in.), between 2.74 and 3.05 m (108 and 120 in.), and between 3.35 and 3.57 m (132 and 140.5 in.) allows evaluation of the friction factor. The velocity between grid locations along the rod bundle was assumed to be constant. The above relationship for the frictional losses reduces to the following:

$$\frac{fL}{D_h} = \frac{\Delta P_{a-b}}{\dfrac{\rho V^2}{2g_c}}$$

The grid loss coefficient in combination with the rod friction was determined by evaluating the data across the support grids. As shown by figure M-9, the differential pressure measurement between 0.30 and 0.61 m (12 and 24 in.), between 0.91 and 1.22 m (36 and 48 in.), between 2.44 and 2.74 m (96 and 108 in.), and between 3.05 and 3.35 m (120 and 132 in.) allows evaluation of the grid loss coefficient. The grid loss coefficients for the grids at 1.57 m (62 in.) and 2.11 m (83 in.) elevations were determined in configuration A only, since the 1.83 m (72 in.) pressure tap was located in the center of the blockage zone (figure M-9). The velocity was assumed to be the same at the grid entrance and exit. The grid loss coefficient was corrected for the inherent rod friction, as shown below:

$$K_{grid} = \frac{\Delta P_{a-b}}{\dfrac{\rho V^2}{2g_c}} - \frac{fL}{D_h}$$

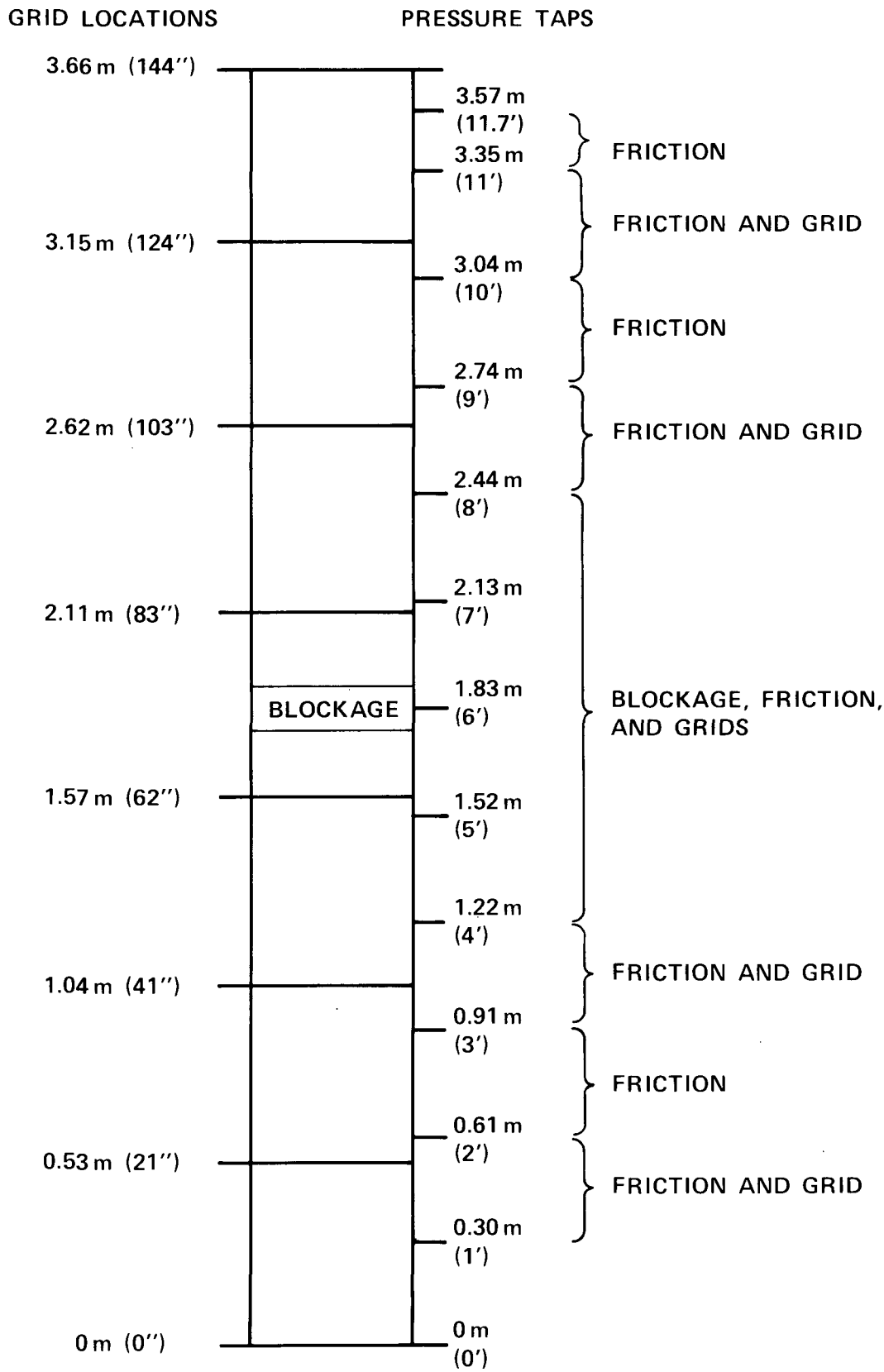


Figure M-9. Grid Location/Pressure Measurement Relationships

The blockage loss coefficient was determined by evaluating the data across the blockage zone for a test configuration with blockage sleeves. Figure M-9 shows that the differential pressure measurement between 1.22 and 2.44 m (48 and 96 in.) allowed evaluation of the blockage sleeve coefficient. Although this 1.22 m (48 in.) span included two grids and 1.22 m (48 in.) of frictional losses, the velocity was assumed to be constant at each of the respective pressure measurement locations. The blockage loss coefficient was corrected for the rod friction and grid as shown below:

$$K_{blockage} = \frac{\Delta P_{a-b}}{\frac{\rho V^2}{2g_c}} - \frac{fL}{D_h} - K_{grid\ at\ 62\ in.} - K_{grid\ at\ 83\ in.}$$

The overall pressure loss across the bundle as measured by the 0-3.66 m (0-144 in.) differential pressure cell was subsequently compared to the overall calculated pressure loss, utilizing the calculated values for the friction factor, grid loss coefficients, and blockage loss coefficient. This comparison is shown in appendix K for each of the hydraulic characteristics tests.

The fluid properties in the HYCHAR code were evaluated from the ASME steam table, utilizing the measured upper plenum pressure and lower plenum fluid temperature. The average measured flow area for each of the six bundles was incorporated into the HYCHAR code calculations, as well as the corresponding calculated hydraulic diameter.

APPENDIX N
HEATER ROD THERMOCOUPLE AS-BUILT LOCATIONS

The heater rod thermocouples were nominally designed to be located at elevations designed to facilitate direct comparisons of data between the six 21-rod bundles. However, because of the swaging process in the manufacturing of the heater rods, the thermocouples moved from their nominal elevations, so that very few direct comparisons of data between bundles were possible. The thermocouples in the blockage zone of 1.70 to 2.03 m (67 to 80 in.) were of primary interest, since the relative location of thermocouples to blockage sleeves was believed to be one of the most significant parameters in the flow blockage test program.

The as-built thermocouple locations were determined from examination of the heater rod X-rays. The as-built locations of blockage zone thermocouples for all six bundles are shown in table N-1, as well as the respective computer channel numbers and nominal elevations.

For assessment of the effect of flow blockage on reflood heat transfer, the heat transfer from the five blocked bundles and one unblocked bundle must be compared to one another. However, with the diversity of the thermocouple locations, only limited comparisons between bundles were possible. The unblocked bundle heat transfer was found to be a relatively weak function of elevation for those thermocouples near the midplane elevation, as shown by figures N-1 through N-5. These figures show that for various rods, the differences in measured heat transfer at thermocouple locations a few inches apart is small for times up through and past the turnaround time. The differences became significant, however, as the quench front approached.

It was concluded that these fairly linear results would allow interpolation and extrapolation of the unblocked bundle heat transfer, to provide direct comparisons of unblocked and blocked bundle heat transfer.

TABLE N-1a[a]

BLOCKAGE ZONE HEATER ROD THERMOCOUPLE LOCATIONS

Rod	Design Elevation (m)	Configuration A		Configuration B		Configuration C		Configuration D		Configuration E		Configuration F	
		Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)
1B	1.78	25	1.798	25	1.796	25	1.803						
1B	1.83	38	1.849	38	1.847	38[b]	1.859						
1B	1.88							33	1.8255				
1B	1.90							46	1.8824	37	1.854		
1B	1.93											34	1.897
1B	1.96							69	1.928	43	1.913		
1B	1.98											57	1.953
1B	2.01							90	1.979	56	1.963		
1B	2.03											78	2.004
												89	1.778
1C	1.78	26	1.811	26	1.793	26	1.798	19	1.801				
1C	1.83	39	1.862	39	1.847	39[b]	1.849						
1C	1.93											45[b]	1.923
1C	1.96									57	1.958		
1C	1.98											65	1.974
1C	2.01									67	1.991	79	2.002
1C	2.03											90	1.778
1D	1.80	31	1.847	31	1.831	31	1.844	25[b]	1.798	32[b]	1.793		
1D	1.85											27[b]	1.847
1D	1.88	50	1.925	50	1.910	50	1.925	47	1.892				
1D	1.90												
1D	1.911	63	1.956	63	1.941	63	1.953	61	1.915	44	1.897	35	1.892
1D	1.93									47	1.920	46	1.925
1D	1.96	82	2.002	82	1.994	82	2.002	82	1.956	58	1.951	58	1.951
2A	1.70	21	1.717	21	1.720	21	1.714	16	1.722	19	1.684	14	1.669
2A	1.88									38[b]	1.862		
2A	1.90											36[b]	1.902
2A	1.93	70	1.951	70	1.953	70	1.948	70	1.948				
2A	1.96											59	1.953
2A	1.98	89	2.002	89	1.996	89	1.999	91	2.004	59	1.963	66	1.981

a. English values are given in table N-1b.
b. Underneath blockage sleeve

TABLE N-1a (cont)

BLOCKAGE ZONE HEATER ROD THERMOCOUPLE LOCATIONS

Rod	Design Elevation (m)	Configuration A		Configuration B		Configuration C		Configuration D		Configuration E		Configuration F	
		Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)
2B	1.70									20	1.694	15	1.697
2B	1.83	40	1.819	40[b]	1.857	40[b]	1.839						
2B	1.88	51	1.875	51	1.913	51	1.895	48	1.890				
2B	1.90											37[b]	1.910
2B	1.93	71	1.923	71	1.958	71	1.941	71	1.938	48[b]	1.928		
2B	1.96											60	1.961
2B	1.98	90	1.974	90	2.012	90	2.017	92	1.984	68	1.976	67	1.981
2B	2.03									85	2.024	91	2.035
2C	1.70									21	1.676		
2C	1.80	32	1.829	32[b]	1.829	32[b]	1.831	26	1.867				
2C	1.85									27	1.788		
2C	1.88	52	1.908	52	1.905	52	1.910	49	1.946				
2C	1.90											38[b]	1.895
2C	1.911	64	1.938	64	1.938	64	1.941	62	1.976				
2C	1.96	83	1.986	83	1.981	83	1.943	83	2.019			61[b]	1.946
2C	1.98									60[b]	1.958		
2C	2.01											80	1.996
2C	2.03									79	2.009		
2D	1.78	27	1.778	27	1.796	27	1.786	20[b]	1.786	28[b]	1.791		
2D	1.80	33	1.798	33	1.819	33	1.808	27	1.814				
2D	1.83	41	1.831	41[b]	1.844	41[b]	1.834	36	1.839				
2D	1.85											28[b]	1.847
2D	1.88	53	1.895	53	1.897	53	1.887	50	1.890	39	1.892		
2D	1.90											39	1.897
2D	1.911	65	1.910	65	1.925	65	1.913	63	1.920				
2D	1.93	72	1.928	72	1.951	72	1.938			61	1.951		
2D	1.96	84	1.951	84	1.976	84	1.958	84	1.966			62	1.953
2D	1.98	91	1.981	91	1.996	91	1.989	93	1.994	80	1.999		
2D	2.01											81	2.004
2D	2.03											92	2.029

b. Underneath blockage sleeve

TABLE N-1a (cont)

BLOCKAGE ZONE HEATER ROD THERMOCOUPLE LOCATIONS

Rod	Design Elevation (m)	Configuration A		Configuration B		Configuration C		Configuration D		Configuration E		Configuration F	
		Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)
2E	1.70									22	1.694		
2E	1.83	42	1.788	42	1.859	42[b]	1.869			33[b]	1.821		
2E	1.88	54	1.839	54	1.913	54	1.928	51	1.880			29[b]	1.890
2E	1.93	73	1.890	73	1.961	73	1.961			45	1.920	47	1.941
2E	1.98	92	1.941	92	2.012	92	2.027			69	1.974		
2E	2.01											82	1.994
3A	1.83	43	1.844	43	1.859	43	1.826	38[b]	1.849				
3A	1.88			55	1.915	55	1.882	52	1.905				
3A	1.90											40[b]	1.902
3A	1.93	74	1.951	74	1.961	74	1.928	74	1.953			48[b]	1.918
3A	1.96									49[b]	1.920		
3A	1.98	93	2.002	93	2.014	93	1.981	95	2.004	62	1.956	68	1.981
3A	2.01									70	1.984	83	2.004
3A	2.03									81	2.012		
3B	1.83	44	1.862	44[b]	1.857	44[b]	1.847	39[b]	1.839				
3B	1.88	56	1.915	56	1.910	56	1.895	53	1.895				
3B	1.90											41[b]	1.897
3B	1.93	75	1.961	75	1.956	75	1.941	75	1.938				
3B	1.96									63	1.958	63	1.948
3B	1.98	94	2.014	94	2.014	94	1.994	96	1.994	71	1.984		
3B	2.01											84	2.004
3C	1.78	28	1.801	28	1.783	28	1.803	21	1.793	29	1.758	19	1.765
3C	1.80	34	1.826	34	1.806	34	1.826	28	1.819				
3C	1.83	45	1.852	45[b]	1.831	45[b]	1.852	40	1.844				
3C	1.88	57	1.902	57	1.885	57	1.905	54[b]	1.895			30[b]	1.887
3C	1.911	66	1.933	66	1.915	66	1.933	64[b]	1.925	40[b]	1.890		
3C	1.93	76	1.956	76	1.935	76	1.956	76	1.951			49[b]	1.938
3C	1.96	85	1.979	85	1.963	85	1.979	85	1.974				
3C	1.98	95	2.004	95	1.994	95	2.004	97	2.002			69[b]	1.991
3C	2.01									72	1.986		
3C	2.03									82	2.017	93	2.022

b. Underneath blockage sleeve

TABLE N-1a (cont)

BLOCKAGE ZONE HEATER ROD THERMOCOUPLE LOCATIONS

Rod	Design Elevation (m)	Configuration A		Configuration B		Configuration C		Configuration D		Configuration E		Configuration F	
		Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)
3D	1.98									30	1.781		
3D	1.80											23	1.796
3D	1.83	46	1.859	46[b]	1.857	46[b]	1.844	41	1.839				
3D	1.88	58	1.915	58	1.910	58	1.902	55[b]	1.895				
3D	1.911									50[b]	1.920		
3D	1.93	77	1.961	77	1.958	77	1.948	77	1.941				
3D	1.98	79	2.014	96	2.012	96	2.004	98	1.994			50[b]	1.923
3D	2.01									86	2.022	85	2.019
3D	2.03									91	2.042	94	2.045
3E	1.80	35	1.816	35	1.831	35	1.808	29	1.819	34[b]	1.814		
3E	1.88	59	1.895	59	1.910	59	1.887	56[b]	1.900				
3E	1.911	67	1.928	67	1.938	67	1.915	65	1.933				
3E	1.93									64[b]	1.948		
3E	1.96	86	1.974	86	1.986	86	1.961	86	1.971				
3E	1.98									83	1.996	70[b]	1.976
3E	2.01									92	2.070		
3E	2.03											97	2.055
4A	1.70	22	1.725	22	1.725	22	1.712	17	1.717	23	1.689		
4A	1.78											20[b]	1.773
4A	1.90											42[b]	1.892
4A	1.93	78	1.953	78	1.956	78	1.943	78	1.948	51	1.930		
4A	1.98	97	2.007	97	2.007	97	1.996	100	1.996	73	1.976	71	1.974
4A	2.03									87	2.027	95	2.024
4B	1.70									24	1.697	16	1.704
4B	1.80	36	1.821	36	1.811	36[b]	1.847	30[b]	1.819				
4B	1.83									35[b]	1.831		
4B	1.88	60	1.900	60	1.890	60	1.925	57	1.897			31[b]	1.882
4B	1.911	68	1.930	68	1.920	68	1.956	66	1.928				
4B	1.93									52	1.971	51	1.935
4B	1.96	87	1.976	87	1.961	87	1.999	87	1.971				
4B	1.98									74	1.984	72	1.991
4B	2.01											86	2.007

b. Underneath blockage sleeve

TABLE N-1a (cont)

BLOCKAGE ZONE HEATER ROD THERMOCOUPLE LOCATIONS

Rod	Design Elevation (m)	Configuration A		Configuration B		Configuration C		Configuration D		Configuration E		Configuration F	
		Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)
4C	1.70	23	1.720	23	1.704	23	1.709	18	1.722	25	1.714		
4C	1.80											24[b]	1.803
4C	1.88									41[b]	1.892		
4C	1.93	96	1.948	79	1.938	79	1.943	79	1.953			52[b]	1.930
4C	1.98	136	2.002	98	1.989	98	1.996	101	2.004	75	1.991	73	1.986
4D	1.78	29	1.781	29	1.791	29	1.798	22[b]	1.775	31[b]	1.781		
4D	1.80							31	1.803				
4D	1.83	47	1.842	47[b]	1.842	47[b]	1.852	42	1.829			25[b]	1.816
4D	1.88							58	1.880	42	1.877	32	1.870
4D	1.90											43	1.890
4D	1.911							67	1.908				
4D	1.93							80	1.930	53	1.930	53	1.918
4D	1.98							102	1.981	76	1.984	74	1.968
4E	1.70	24	1.717	24	1.709	24	1.694			26	1.702		
4E	1.78							23	1.816			21	1.778
4E	1.83							43[b]	1.869				
4E	1.93	80	1.946	80	1.943	80	1.923					54[b]	1.935
4E	1.98	100	1.999	100	1.994	100	1.976			77	1.996	75	1.989
4E	2.03									88	2.042	96	2.035
5B	1.70	30	1.796	30	1.806	30	1.801					22[b]	1.778
5B	1.83	48	1.844	48	1.854	48[b]	1.854	44[b]	1.839			26[b]	1.831
5B	1.90											44[b]	1.905
5B	1.96									65	1.966	64	1.956
5B	2.01											87	2.009
5B	2.03									89	2.050		
5C	1.70											17	1.704
5C	1.80									36[b]	1.880		
5C	1.83	49	1.819	49	1.840	49	1.826	45[b]	1.829				
5C	1.88	61	1.872	61	1.895	61	1.882	59	1.885			33[b]	1.882
5C	1.93	81	1.923	81	1.943	81	1.928			54	1.971	55	1.935
5C	1.98	101	1.974	101	1.996	101	1.981	103	1.984	84	2.052	76	1.989
5C	2.01											88	2.014
5C	2.03									90	2.103		

b. Underneath blockage sleeve

TABLE N-1a (cont)

BLOCKAGE ZONE HEATER ROD THERMOCOUPLE LOCATIONS

Rod	Design Elevation (m)	Configuration A		Configuration B		Configuration C		Configuration D		Configuration E		Configuration F	
		Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)	Channel	Actual Elevation (m)
5D	1.70											18	1.699
5D	1.80	37	1.816	37	1.821	37	1.819						
5D	1.88	62	1.897	62	1.900	62	1.902	60	1.875				
5D	1.911	69	1.925	69	1.933	69	1.943	68	1.925	46	1.900		
5D	1.93									55	1.925	56	1.928
5D	1.96	88	1.974	88	1.984	88	1.974	89	1.956	66	1.943		
5D	2.01									78	1.989		
5D	1.98											77	1.986

b. Underneath blockage sleeve

TABLE N-1b[a]

BLOCKAGE ZONE HEATER ROD THERMOCOUPLE LOCATIONS

Rod	Design Elevation (in.)	Configuration A		Configuration B		Configuration C		Configuration D		Configuration E		Configuration F	
		Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)
1B	70	25	70.8	25	70.7	25	71.0						
1B	72	38	72.8	38	72.7	38[b]	73.2	33	71.87				
1B	74							46	74.11	37	73.0		
1B	75											34	74.7
1B	76							69	75.9	43	75.3		
1B	77											57	76.9
1B	78							90	77.9	56	77.3		
1B	79											78	78.9
1B	80											89	80.0
1C	70	26	71.3	26	70.6	26	70.8	19	70.9				
1C	72	39	73.3	39	72.7	39[b]	72.8						
1C	76											45[b]	75.7
1C	77									57	77.1		
1C	78											65	77.7
1C	79									67	78.4	79	78.8
1C	80											90	80.0
1D	71	31	72.7	31	72.1	31	72.6	25[b]	70.8	32[b]	70.6		
1D	73											27[b]	72.7
1D	74	50	75.8	50	75.2	50	75.8	47	74.5				
1D	75											35	74.5
1D	75.25	63	77.0	63	76.4	63	76.9	61	75.4	44	74.7		
1D	76									47	75.6	46	75.8
1D	77	82	78.8	82	78.5	82	78.8	82	77.0	58	76.8	58	76.8
2A	67	21	67.6	21	67.7	21	67.5	16	67.8	19	66.3	14	65.7
2A	74									38[b]	73.3		
2A	75											36[b]	74.9
2A	76	70	76.8	70	76.9	70	76.7	70	76.7				
2A	77											59	76.9
2A	78	89	78.8	89	78.6	89	78.7	91	78.9	59	77.3	66	78.0

a. Metric values are given in table N-1a.
b. Underneath blockage

TABLE N-1b (cont)

BLOCKAGE ZONE HEATER ROD THERMOCOUPLE LOCATIONS

Rod	Design Elevation (in.)	Configuration A		Configuration B		Configuration C		Configuration D		Configuration E		Configuration F	
		Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)
2B	67									20	66.7	15	66.8
2B	72	40	71.6	40[b]	73.1	40[b]	72.4						
2B	74	51	73.8	51	75.3	51	74.6	48	74.4				
2B	75											37[b]	75.2
2B	76	71	75.7	71	77.1	71	76.4	71	76.3	48[b]	75.9		
2B	77											60	77.2
2B	78	90	77.7	90	79.2	90	79.4	92	78.1	68	77.8	67	78.0
2B	80									85	79.7	91	80.1
2C	67									21	66.0		
2C	71	32	72.0	32[b]	72.0	32[b]	72.1	26	73.5				
2C	73									27	70.4		
2C	74	52	75.1	52	75.0	52	75.2	49	76.6				
2C	75											38[b]	74.6
2C	75.25	64	76.3	64	76.3	64	76.4	62	77.8				
2C	77	83	78.2	83	78.0	83	76.5	83	79.5			61[b]	76.6
2C	78									60[b]	77.1		
2C	79											80	78.6
2C	80									79	79.1		
2D	70	27	70.0	27	70.7	27	70.3	20[b]	70.3	28[b]	70.5		
2D	71	33	70.8	33	71.6	33	71.2	27	71.4				
2D	72	41	72.1	41[b]	72.6	41[b]	72.2	36	72.4				
2D	73											28[b]	72.7
2D	74	53	74.6	53	74.7	53	74.3	50	74.4	39	74.5		
2D	75											39	74.7
2D	75.25	65	75.2	65	75.8	65	75.3	63	75.6				
2D	76	72	75.9	72	76.8	72	76.3			61	76.8		
2D	77	84	76.8	84	77.8	84	77.1	84	77.4			62	76.9
2D	78	91	78.0	91	78.6	91	78.3	93	78.5	80	78.7		
2D	79											81	78.9
2D	80											92	79.9
2E	67									22	66.7		
2E	72	42	70.4	42	73.2	42[b]	73.6			33[b]	71.7		
2E	74	54	72.4	54	75.3	54	75.9	51	74.0			29[b]	74.4

b. Underneath blockage sleeve

TABLE N-1b (cont)

BLOCKAGE ZONE HEATER ROD THERMOCOUPLE LOCATIONS

Rod	Design Elevation (in.)	Configuration A		Configuration B		Configuration C		Configuration D		Configuration E		Configuration F	
		Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)
2E	76	73	74.4	73	77.2	73	77.2			45	75.6	47	76.4
2E	78	92	76.4	92	79.2	92	79.8			69	77.7		
2E	79											82	78.5
3A	72	43	72.6	43	73.2	43	71.9	38[b]	72.8				
3A	74			55	75.4	55	74.1	52	75.0				
3A	75											40[b]	74.9
3A	76	74	76.8	74	77.2	74	75.9	74	76.9			48[b]	75.5
3A	77									49[b]	75.6		
3A	78	93	78.8	93	79.3	93	78.0	95	78.9	62	77.0	68	78.0
3A	79									70	78.1	83	78.9
3A	80									81	79.2		
3B	72	44	73.3	44[b]	73.1	44[b]	72.7	39[b]	72.4				
3B	74	56	75.4	56	75.2	56	74.6	53	74.6				
3B	75											41[b]	74.7
3B	76	75	77.2	75	77.0	75	76.4	75	76.3				
3B	77									63	77.1	63	76.7
3B	78	94	79.3	94	79.3	94	78.5	96	78.5	71	78.1		
3B	79											84	78.9
3C	70	28	70.9	28	70.2	28	71.0	21	70.6	29	69.2	19	69.5
3C	71	34	71.9	34	71.1	34	71.9	28	71.6				
3C	72	45	72.9	45[b]	72.1	45[b]	72.9	40	72.6				
3C	74	57	74.9	57	74.2	57	75.0	54[b]	74.6			30[b]	74.3
3C	75.25	66	76.1	66	75.4	66	76.1	64[b]	75.8	40[b]	74.4	49[b]	76.3
3C	76	76	77.0	76	76.2	76	77.0	76	76.8				
3C	77	85	77.9	85	77.3	85	77.9	85	77.7				
3C	78	95	78.9	95	78.5	95	78.9	97	78.8			69[b]	78.4
3C	79									72	78.2		
3C	80									82	79.4	93	79.6
3D	70									30	70.1		
3D	71											23	70.7
3D	72	46	73.2	46[b]	73.1	46[b]	72.6	41	72.4				
3D	74	58	75.4	58	75.2	58	74.9	55[b]	74.6				

b. Underneath blockage sleeve

TABLE N-1b (cont)

BLOCKAGE ZONE HEATER ROD THERMOCOUPLE LOCATIONS

Rod	Design Elevation (in.)	Configuration A		Configuration B		Configuration C		Configuration D		Configuration E		Configuration F	
		Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)
3D	75.25									50[b]	75.6		
3D	76	77	77.2	77	77.1	77	76.7	77	76.4			50[b]	75.7
3D	78	79	79.3	96	79.2	96	78.9	98	78.5				
3D	79									86	79.6	85	79.5
3D	80									91	80.4	94	80.5
3E	71	35	71.5	35	72.1	35	71.2	29	71.6	34[b]	71.4		
3E	74	59	74.6	59	75.2	59	74.3	56[b]	74.8				
3E	75.25	67	75.9	67	76.3	67	75.4	65	76.1				
3E	76									64[b]	76.7		
3E	77	86	77.7	86	78.2	86	77.2	86	77.6				
3E	78									83	78.6	70[b]	77.8
3E	80									92	81.5		
3E	81											97	80.9
4A	67	22	67.9	22	67.9	22	67.4	17	67.6	23	66.5		
4A	70											20[b]	69.8
4A	75											42[b]	74.5
4A	76	78	76.9	78	77.0	78	76.5	78	76.7	51	76.0		
4A	78	97	79.0	97	79.0	97	78.6	100	78.6	73	77.8	71	77.7
4A	80									87	79.8	95	79.7
4B	67									24	66.8	16	67.1
4B	71	36	71.7	36	71.3	36[b]	72.7	30[b]	71.6				
4B	72									35[b]	72.1		
4B	74	60	74.8	60	74.4	60	75.8	57	74.7			31[b]	74.1
4B	75.25	68	76.0	68	75.6	68	77.0	66	75.9				
4B	76									52	75.9	51	76.2
4B	77	87	77.8	87	77.2	87	78.7	87	77.6				
4B	78									74	78.1	72	78.4
4B	79											86	79.0
4C	67	23	67.7	23	67.1	23	67.3	18	67.8	25	67.5		
4C	71											24[b]	71.0
4C	74									41[b]	74.5		
4C	76	96	76.7	79	76.3	79	76.5	79	76.9			52[b]	76.0
4C	78	136	78.8	98	78.3	98	78.6	101	78.9	75	78.4	73	78.2

b. Underneath blockage sleeve

TABLE N-1b (cont)

BLOCKAGE ZONE HEATER ROD THERMOCOUPLE LOCATIONS

Rod	Design Elevation (in.)	Configuration A		Configuration B		Configuration C		Configuration D		Configuration E		Configuration F	
		Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)
4D	70	29	70.1	29	70.5	29	70.8	22[b]	69.9	31[b]	70.1		
4D	71							31	71.0				
4D	72	47	72.1	47[b]	72.5	47[b]	72.9	42	72.0			25[b]	71.5
4D	74							58	74.0	42	73.9	32	73.6
4D	75											43	74.4
4D	75.25							67	75.1				
4D	76							80	76.0	53	76.0	53	75.5
4D	78							102	78.0	76	78.1	74	77.5
4E	67	24	67.6	24	67.3	24	66.7			26	67.0		
4E	70							23	71.5			21	70.0
4E	72							43[b]	73.6				
4E	76	80	76.6	80	76.5	80	75.7					54[b]	76.2
4E	78	100	78.7	100	78.5	100	77.8			77	78.6	75	78.3
4E	80									88	80.4	96	80.1
5B	70	30	70.7	30	71.1	30	70.9					22[b]	70.0
5B	72	48	72.6	48	73.0	48[b]	73.0	44[b]	72.4			26[b]	72.1
5B	75											44[b]	75.0
5B	77									65	77.4	64	77.0
5B	79											87	79.1
5B	80									89	80.7		
5C	67											17	67.1
5C	71									36[b]	74.0		
5C	72	49	71.6	49	72.4	49	71.9	45[b]	72.0				
5C	74	61	73.7	61	74.6	61	74.1	59	74.2			33[b]	74.1
5C	76	81	75.7	81	76.5	81	75.9			54	77.6	55	76.2
5C	78	101	77.7	101	78.6	101	78.0	103	78.1	84	80.8	76	78.3
5C	79											88	79.3
5C	80									90	82.8		
5D	67											18	66.9
5D	71	37	71.5	37	71.7	37	71.6						
5D	74	62	74.7	62	74.8	62	74.9	60	73.8				

b. Underneath blockage sleeve

TABLE N-1b (cont)

BLOCKAGE ZONE HEATER ROD THERMOCOUPLE LOCATIONS

Rod	Design Elevation (in.)	Configuration A		Configuration B		Configuration C		Configuration D		Configuration E		Configuration F	
		Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)	Channel	Actual Elevation (in.)
5D	75.25	69	75.8	69	76.1	69	76.5	68	75.8	46	74.8		
5D	76									55	75.8	56	75.9
5D	77	88	77.7	88	78.1	88	77.7	89	77.0	66	76.5		
5D	79									78	78.3		
5D	78											77	78.2

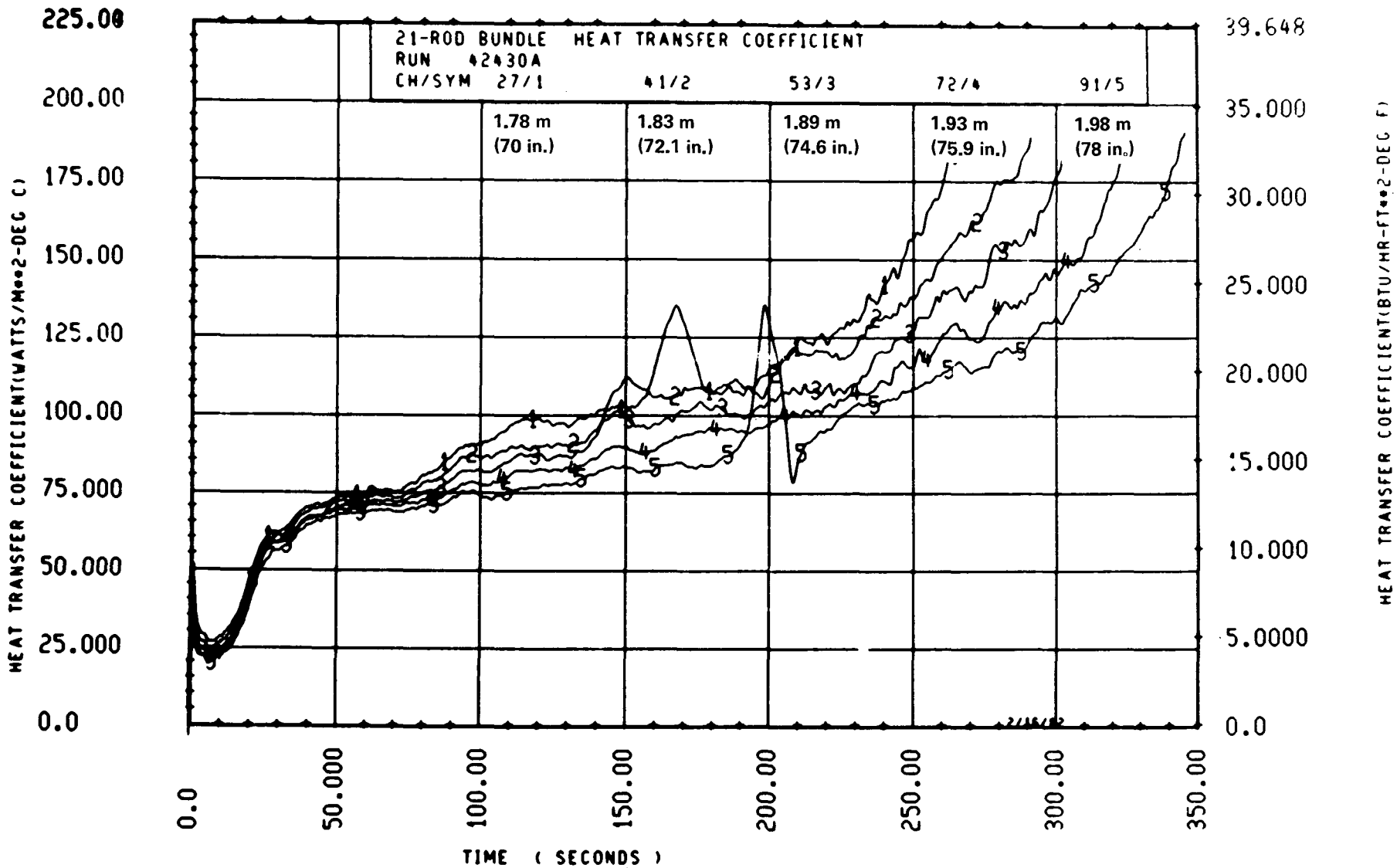


Figure N-1. Heat Transfer Coefficient Versus Time, Run 42430A, Rod 2D

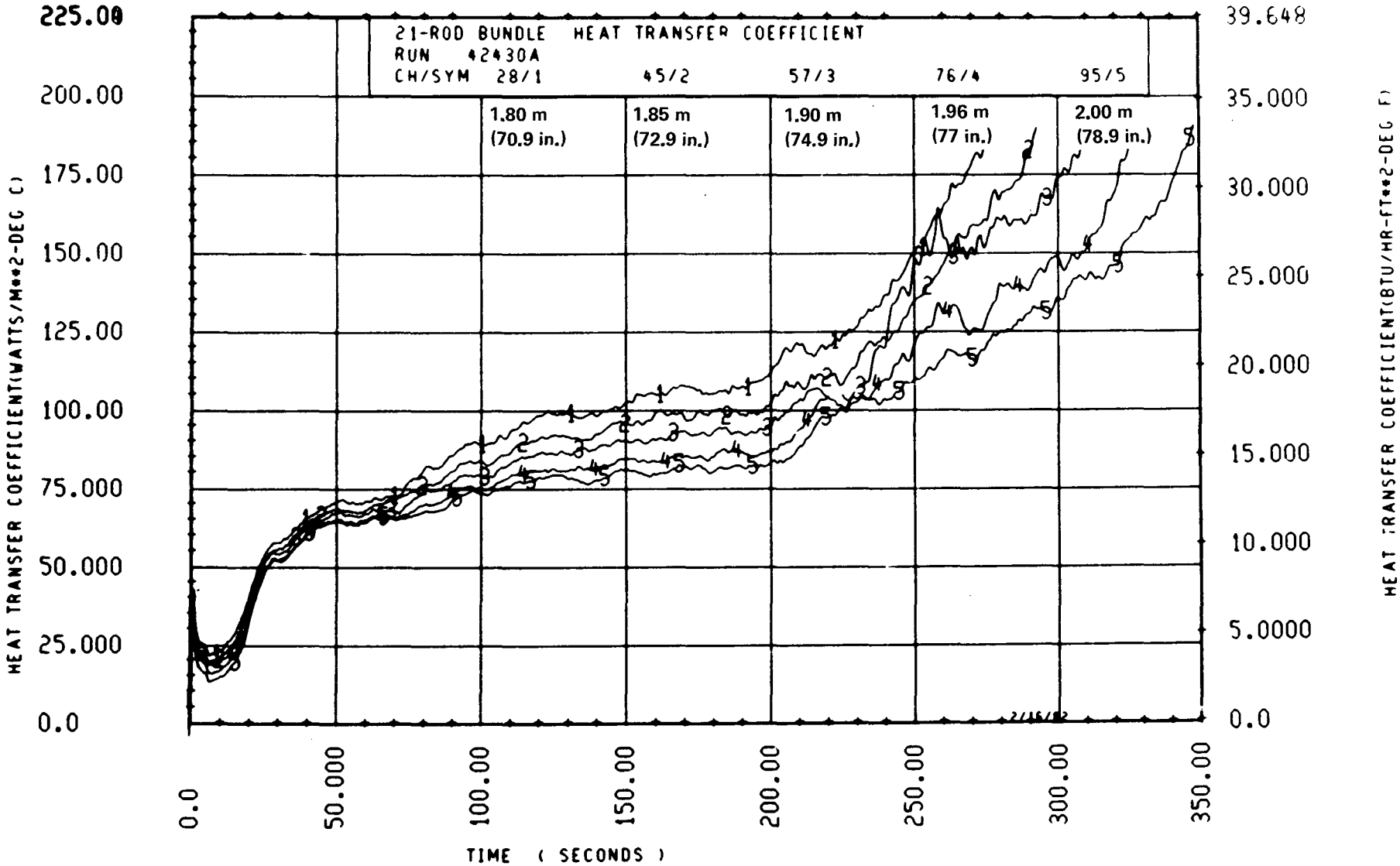


Figure N-2. Heat Transfer Coefficient Versus Time, Run 42430A, Rod 3C

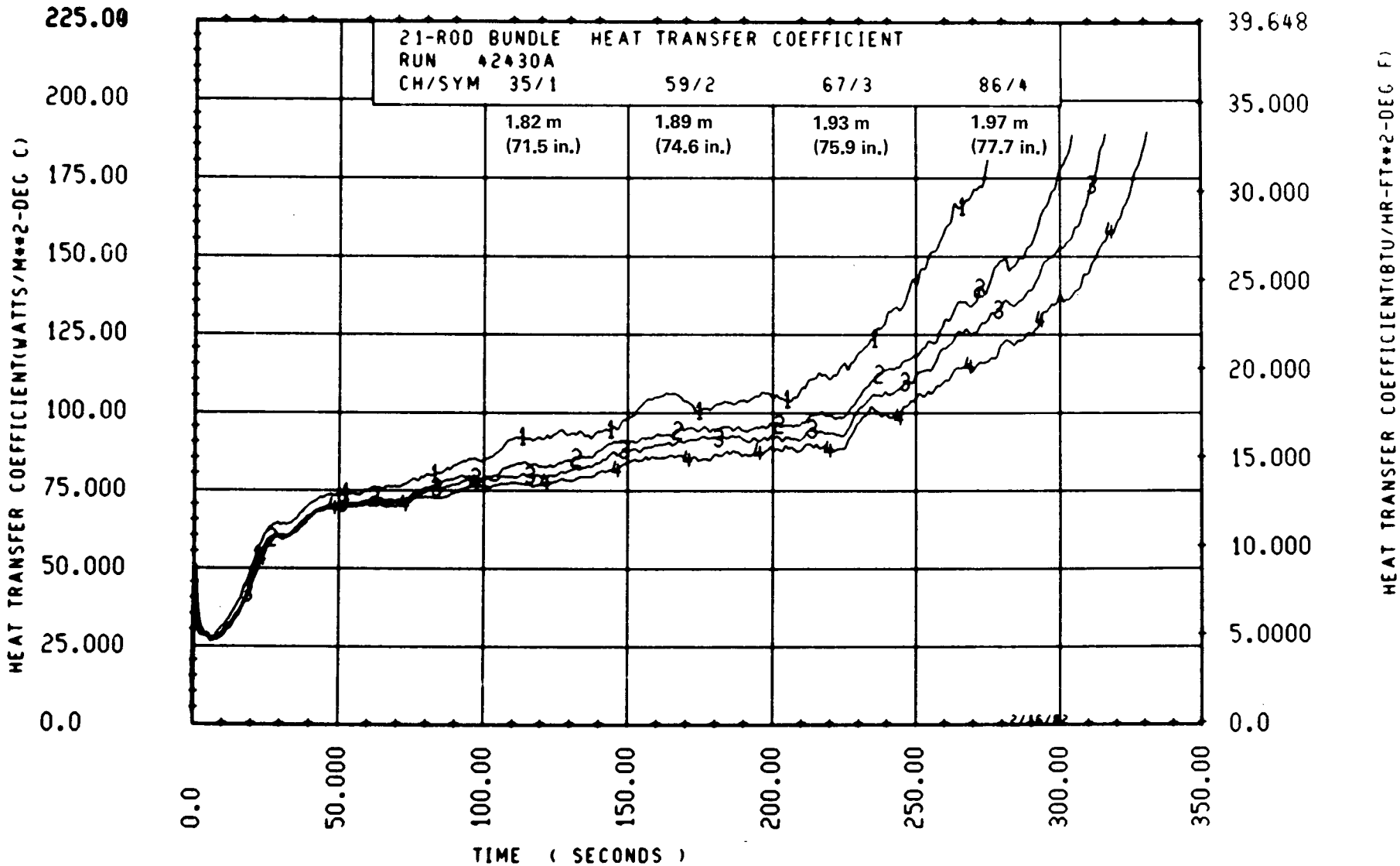


Figure N-3. Heat Transfer Coefficient Versus Time, Run 42430A, Rod 3E

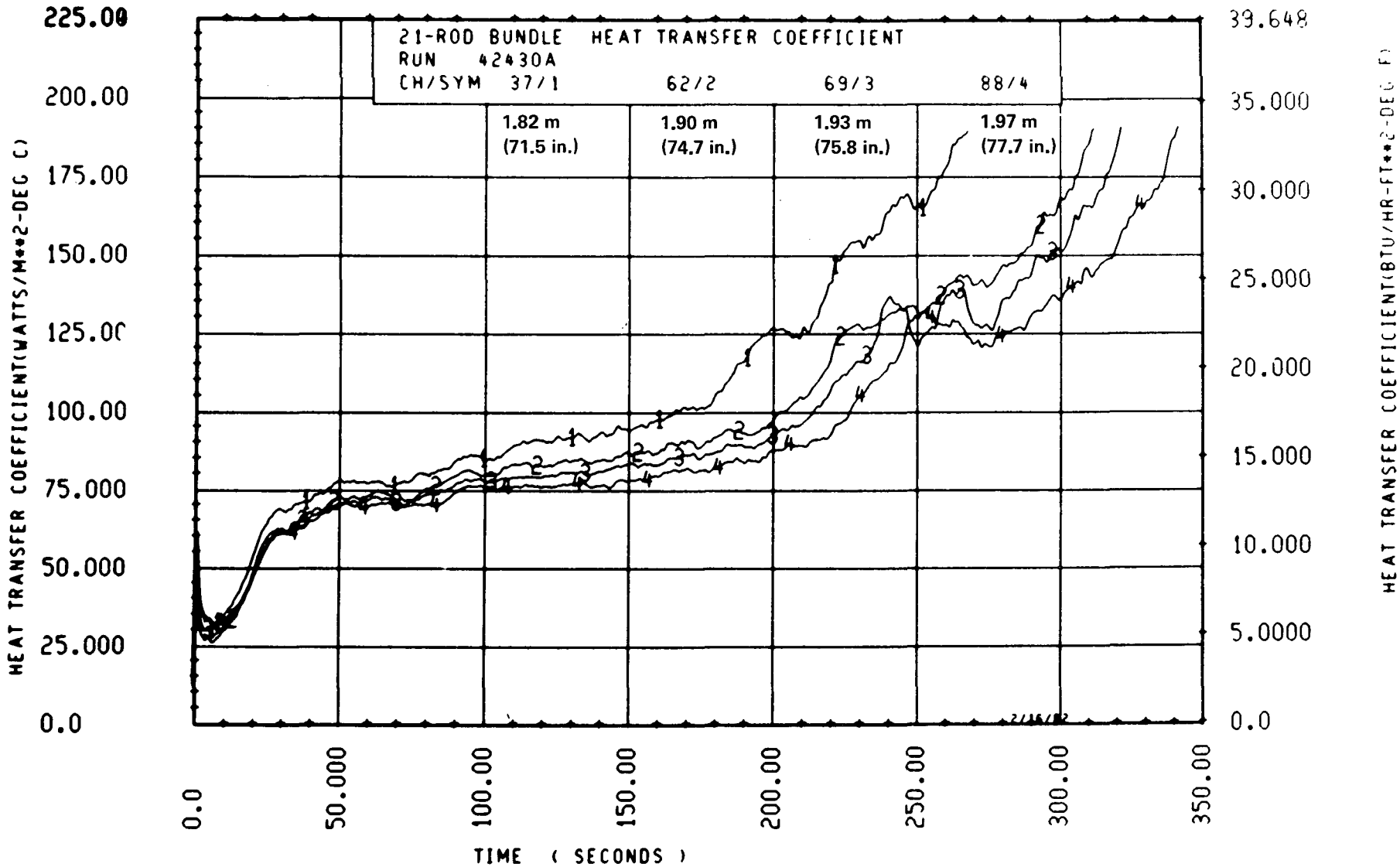


Figure N-4. Heat Transfer Coefficient Versus Time, Run 42430A, Rod 5D

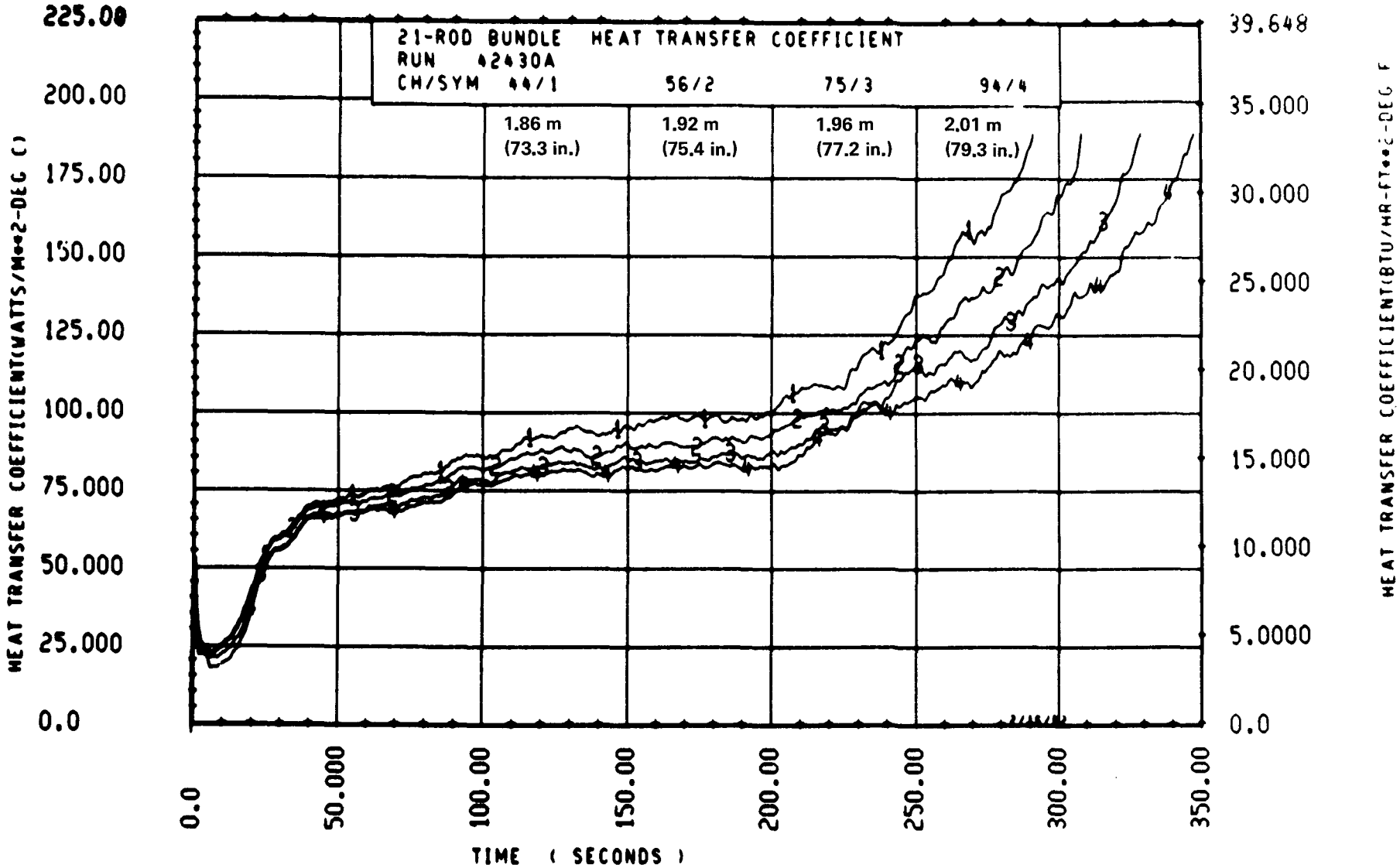


Figure N-5. Heat Transfer Coefficient Versus Time, Run 42430A, Rod 3B

APPENDIX O
ENHANCEMENT FACTORS OF REFLOODING TESTS

Section 6 provides enhancement factors for configurations C, D, and E for the reference run [28 mm/sec (1.1 in./sec) flow rate and 0.28 MPa (40 psia) pressure]. This appendix provides the enhancement factors for configurations B and F for the reference run. In addition, the enhancement factors of another test condition [22 mm/sec (0.9 in./sec) flow rate and 0.28 MPa (40 psia) pressure] are provided for configurations B, C, D, E, and F.

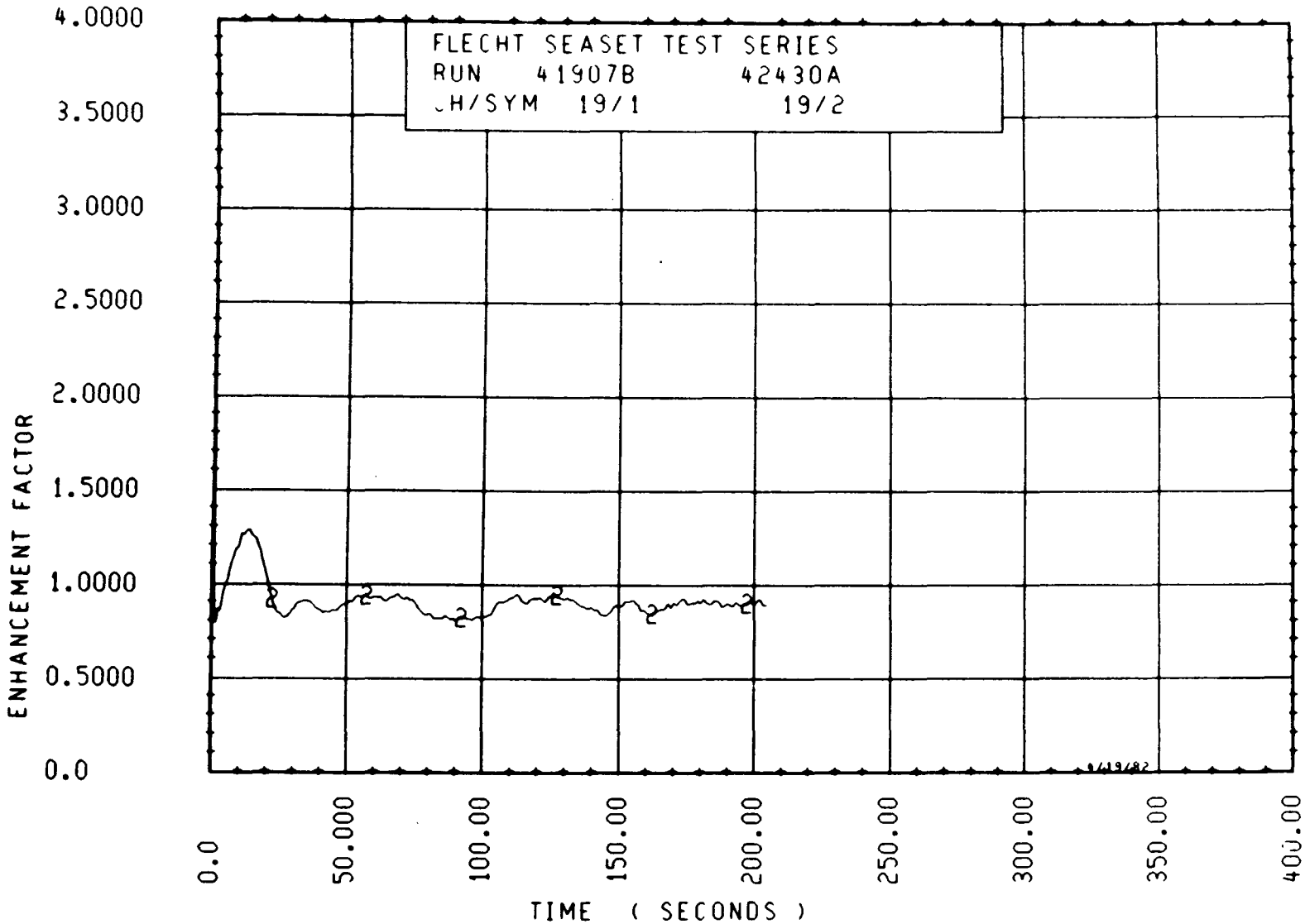


Figure O-1. Enhancement Factor for Run 41907B, Rod 4C, 1.52 m (60 in.) Elevation

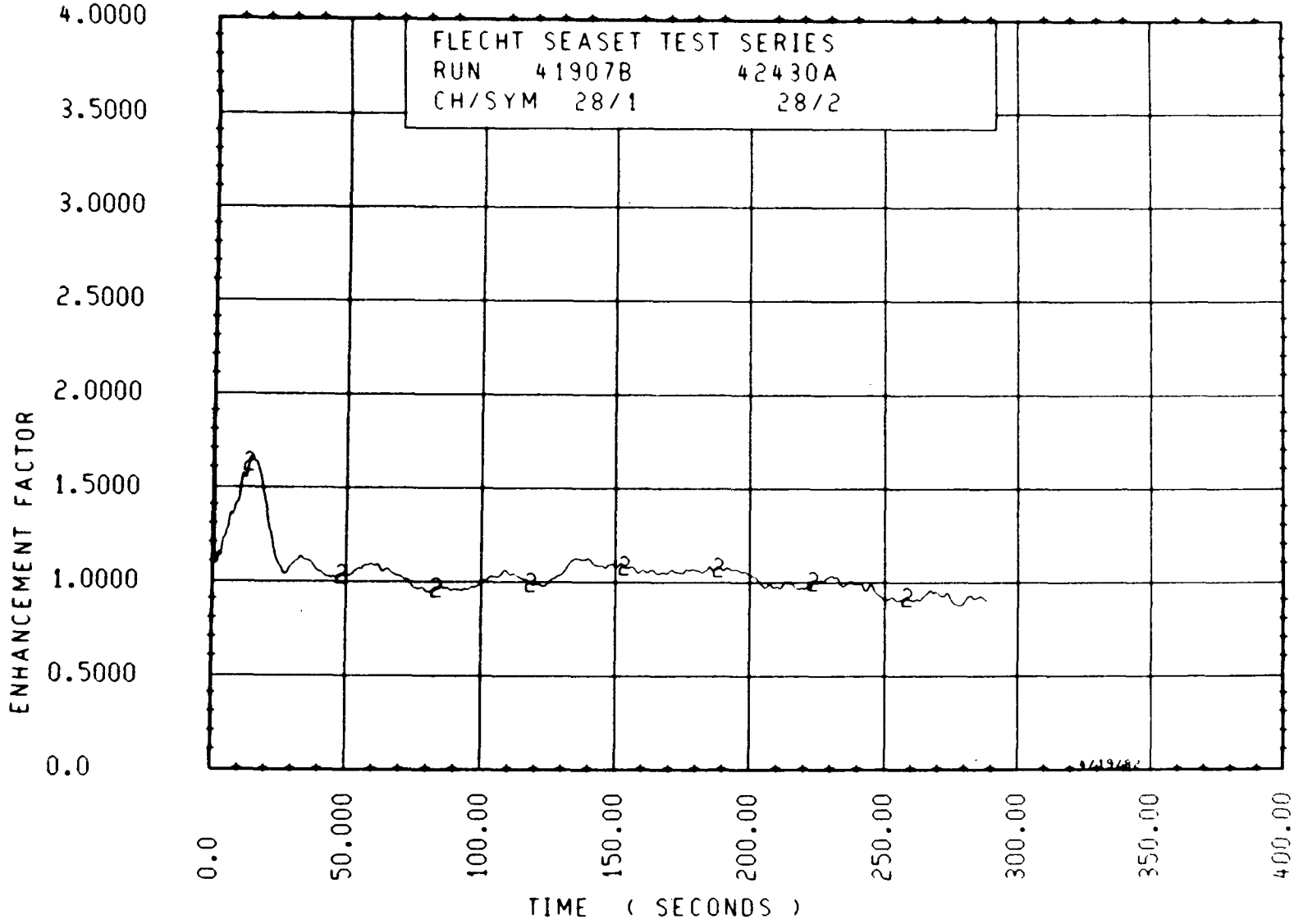


Figure O-2. Enhancement Factor for Run 41907B, Rod 3C, 1.78 m (70.2 in.) Elevation

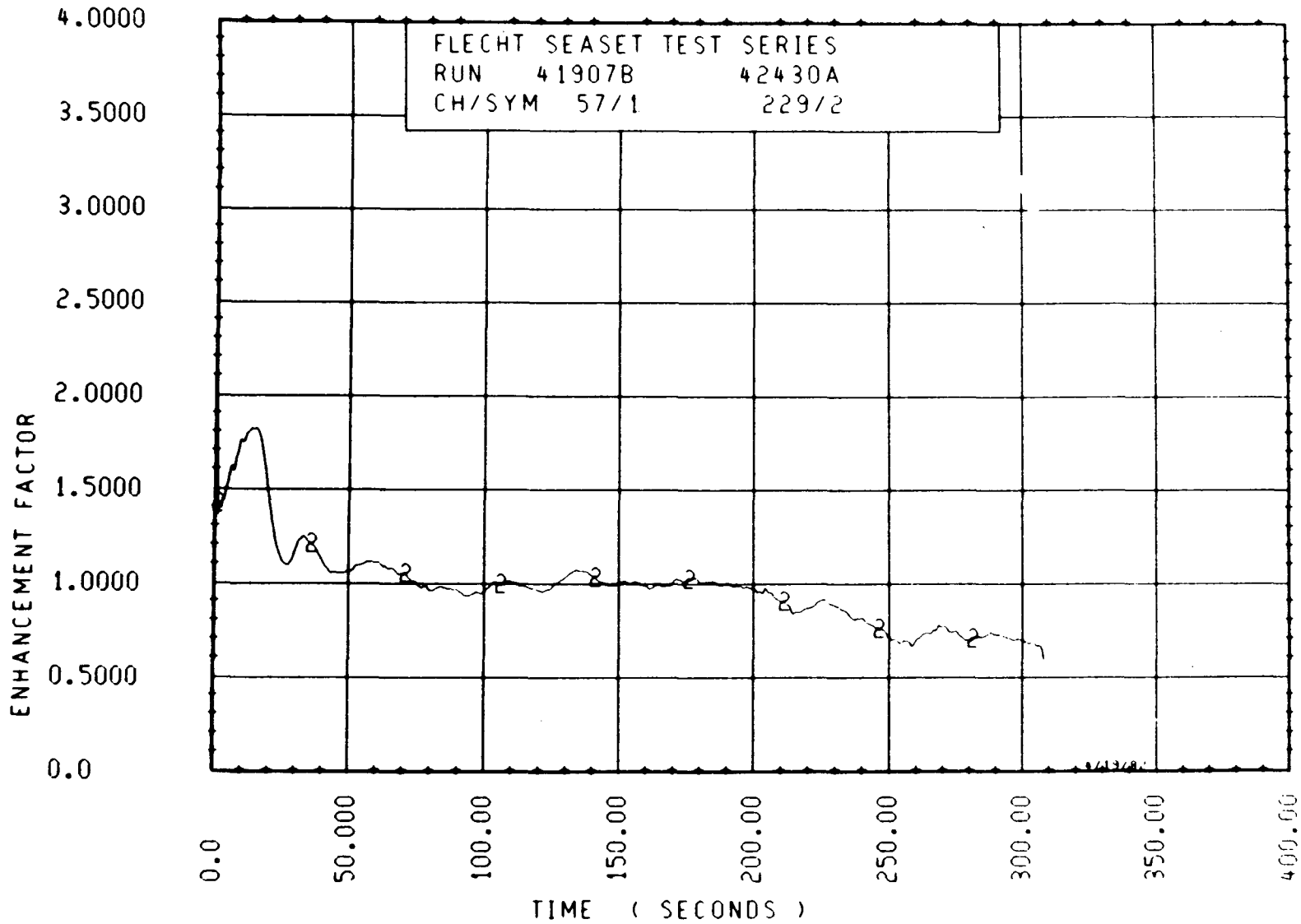


Figure O-3. Enhancement Factor for Run 41907B, Rod 3C, 1.88 m (74.2 in.) Elevation

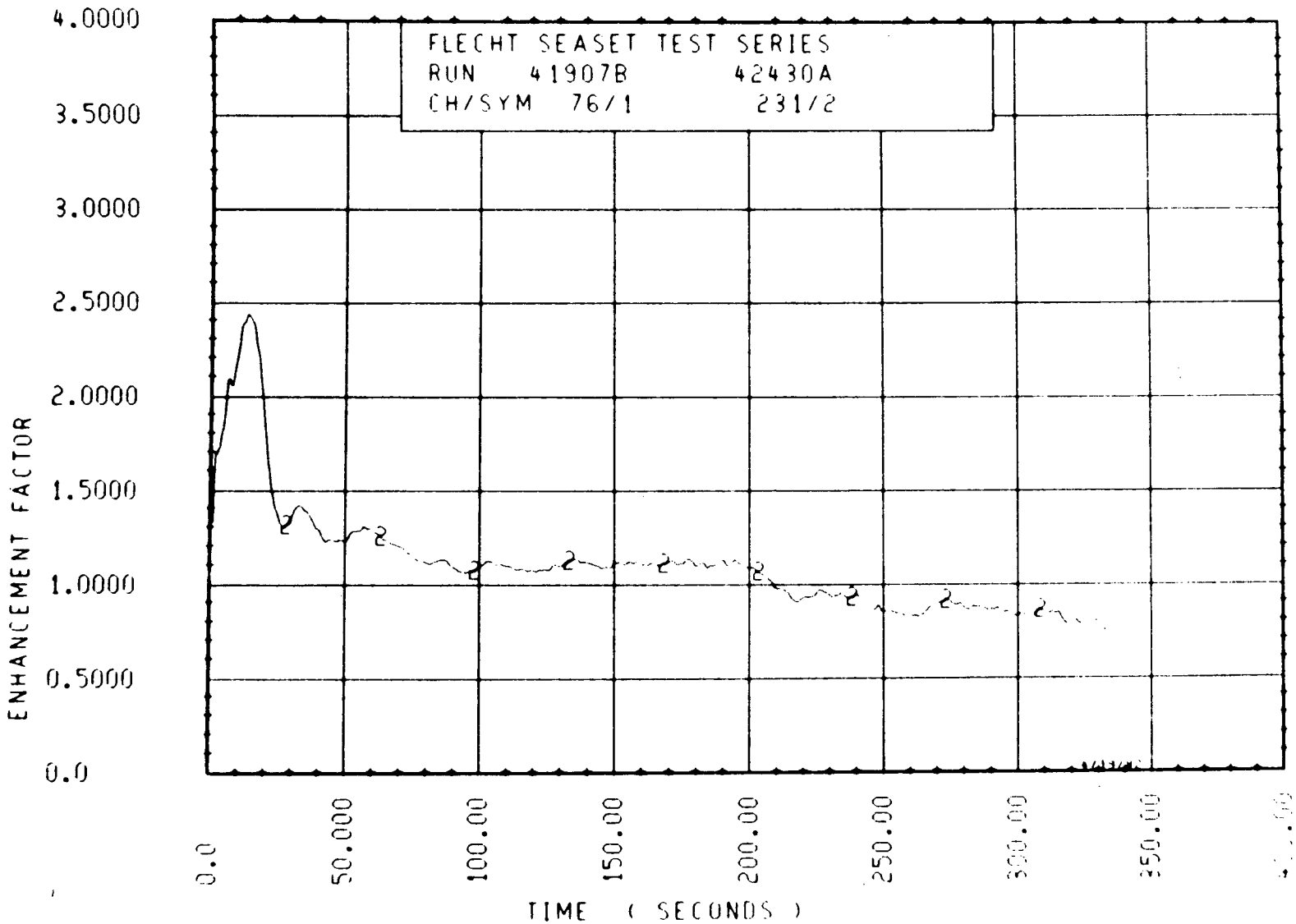


Figure O-4. Enhancement Factor for Run 41907B, Rod 3C, 1.94 m (76.2 in.) Elevation

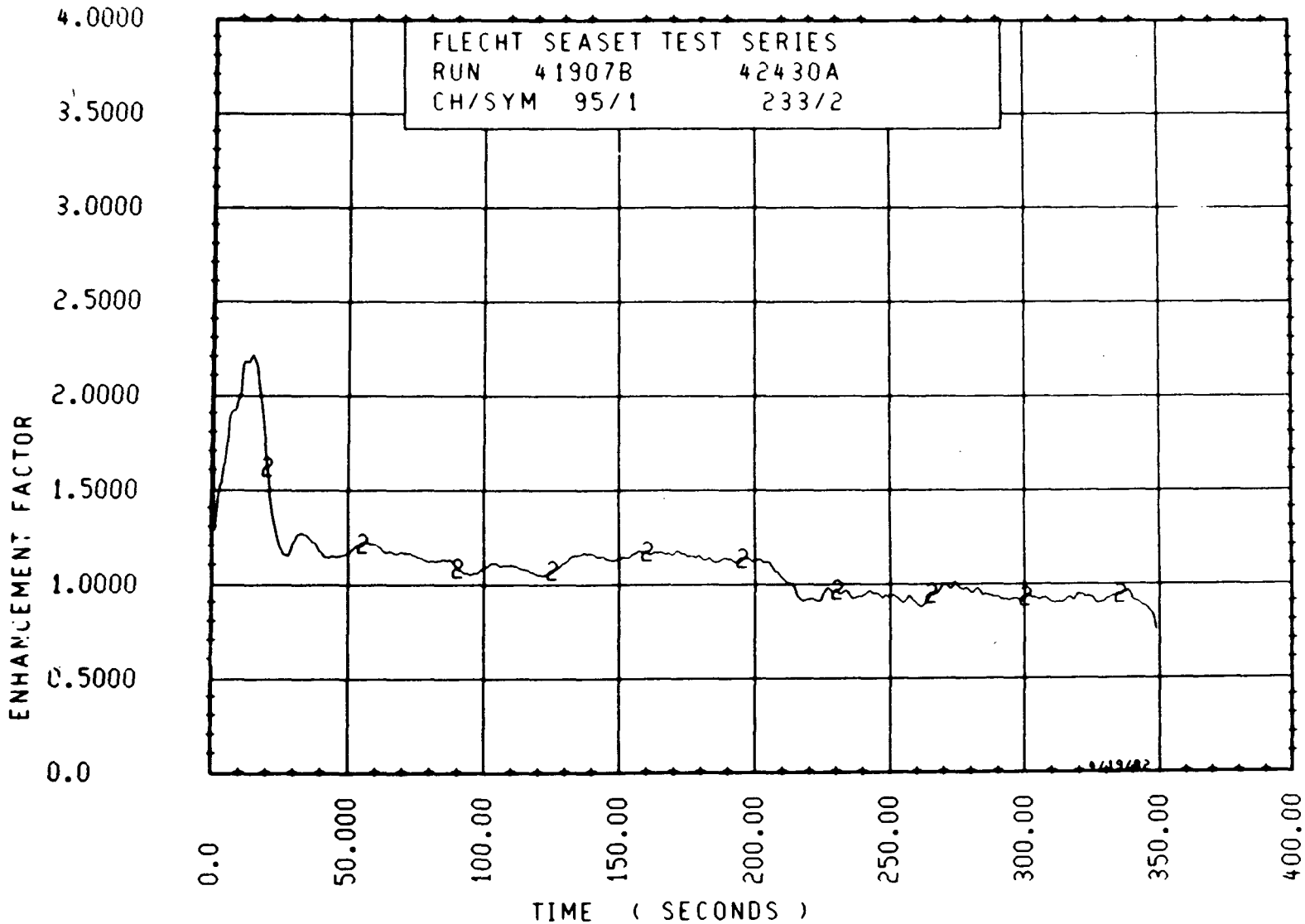


Figure O-5. Enhancement Factor for Run 41907B, Rod 3C, 1.99 m (78.5 in.) Elevation

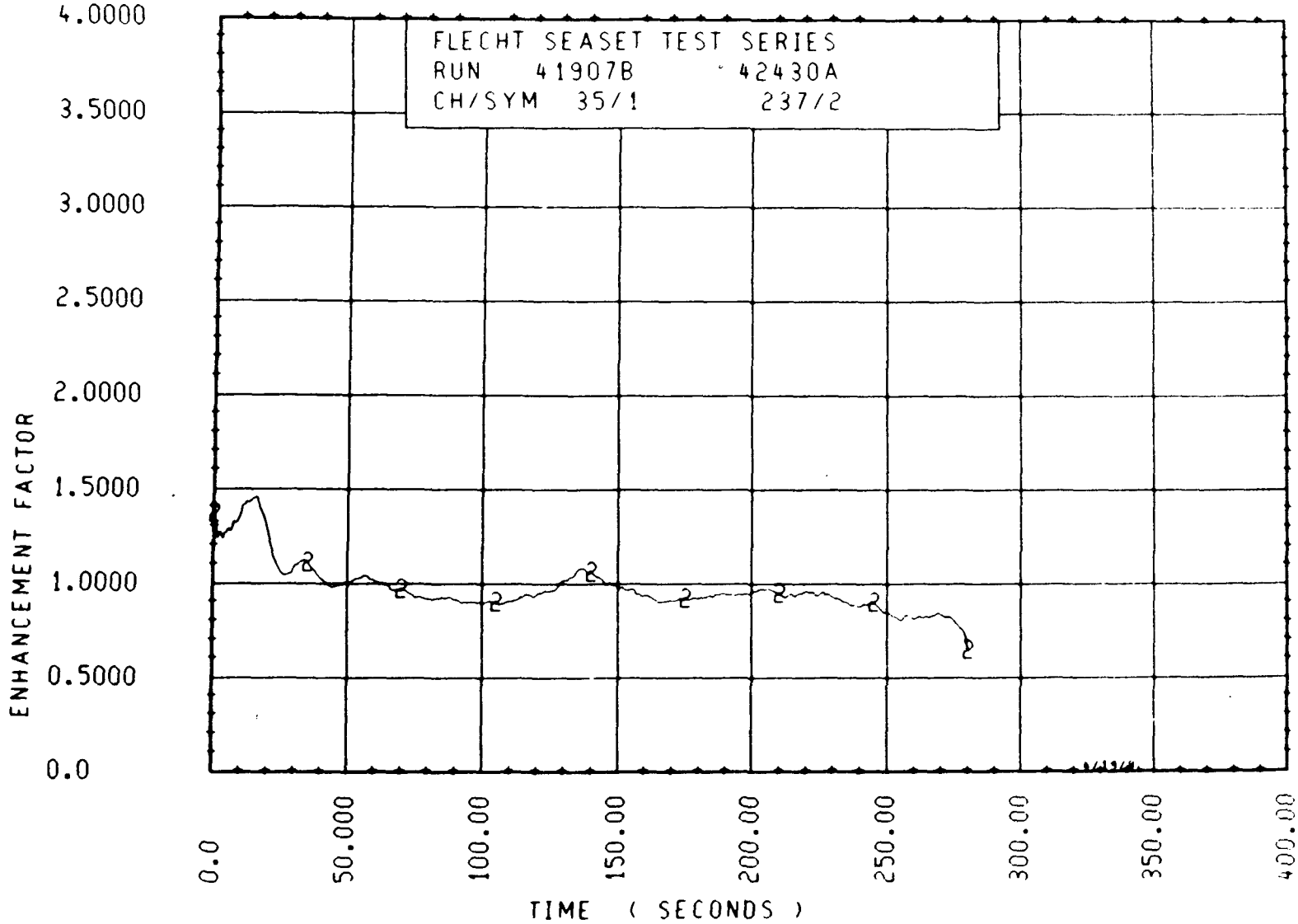


Figure O-6. Enhancement Factor for Run 41907B, Rod 3E, 1.83 m (72.1 in.) Elevation

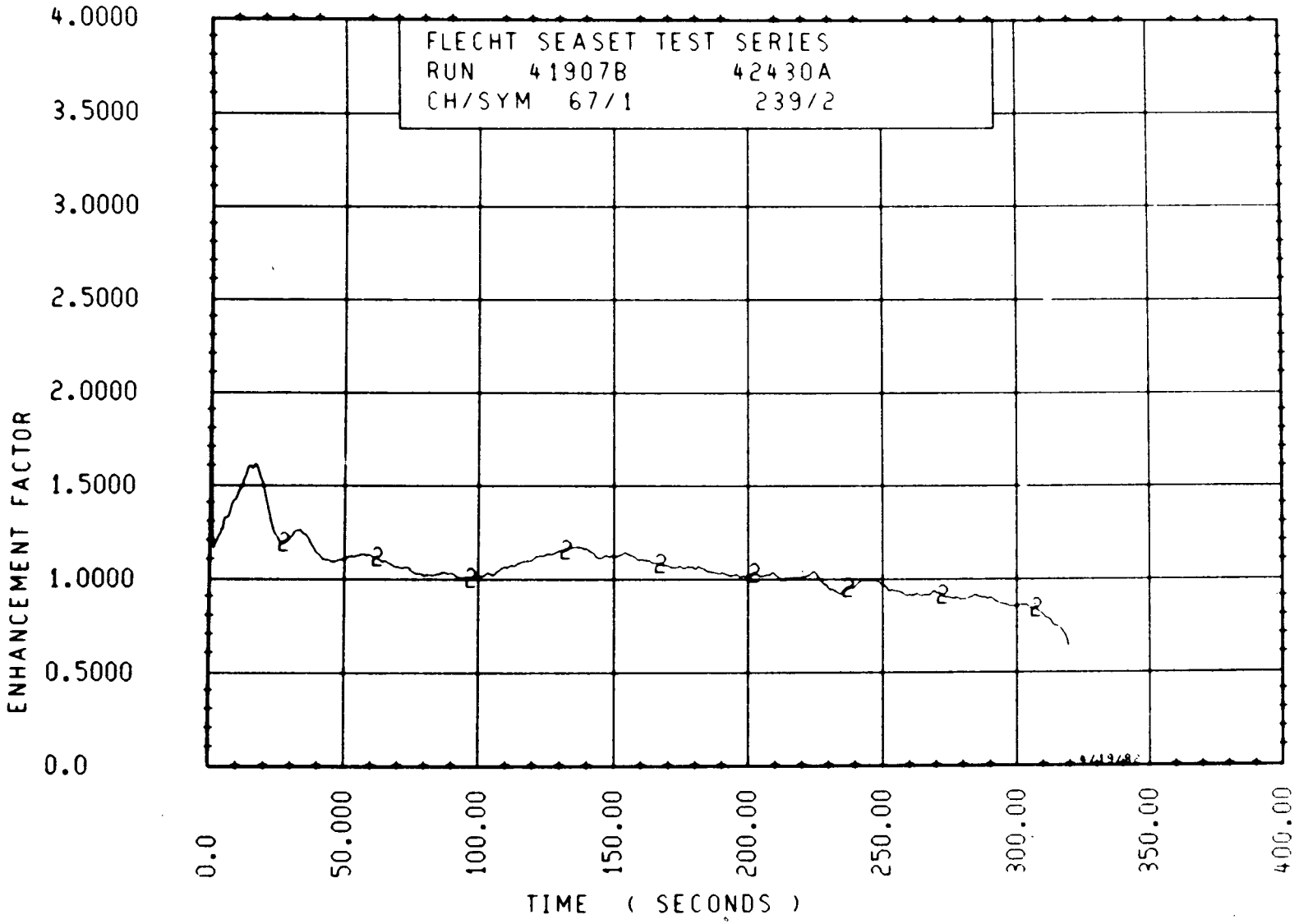


Figure O-7. Enhancement Factor for Run 41907B, Rod 3E, 1.94 m (76.3 in.) Elevation

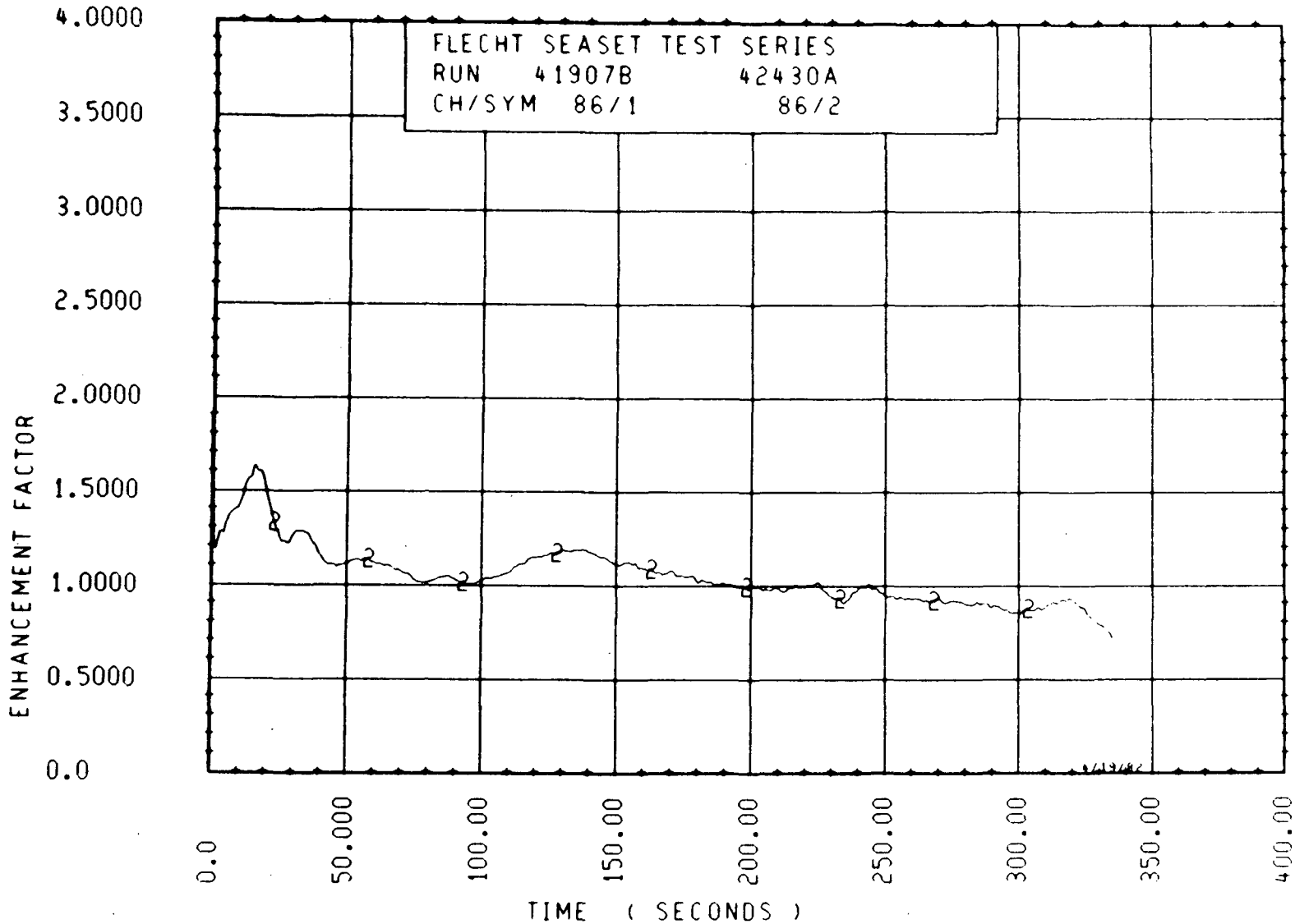


Figure O-8. Enhancement Factor for Run 41907B, Rod 3E, 1.99 m (78.2 in.) Elevation

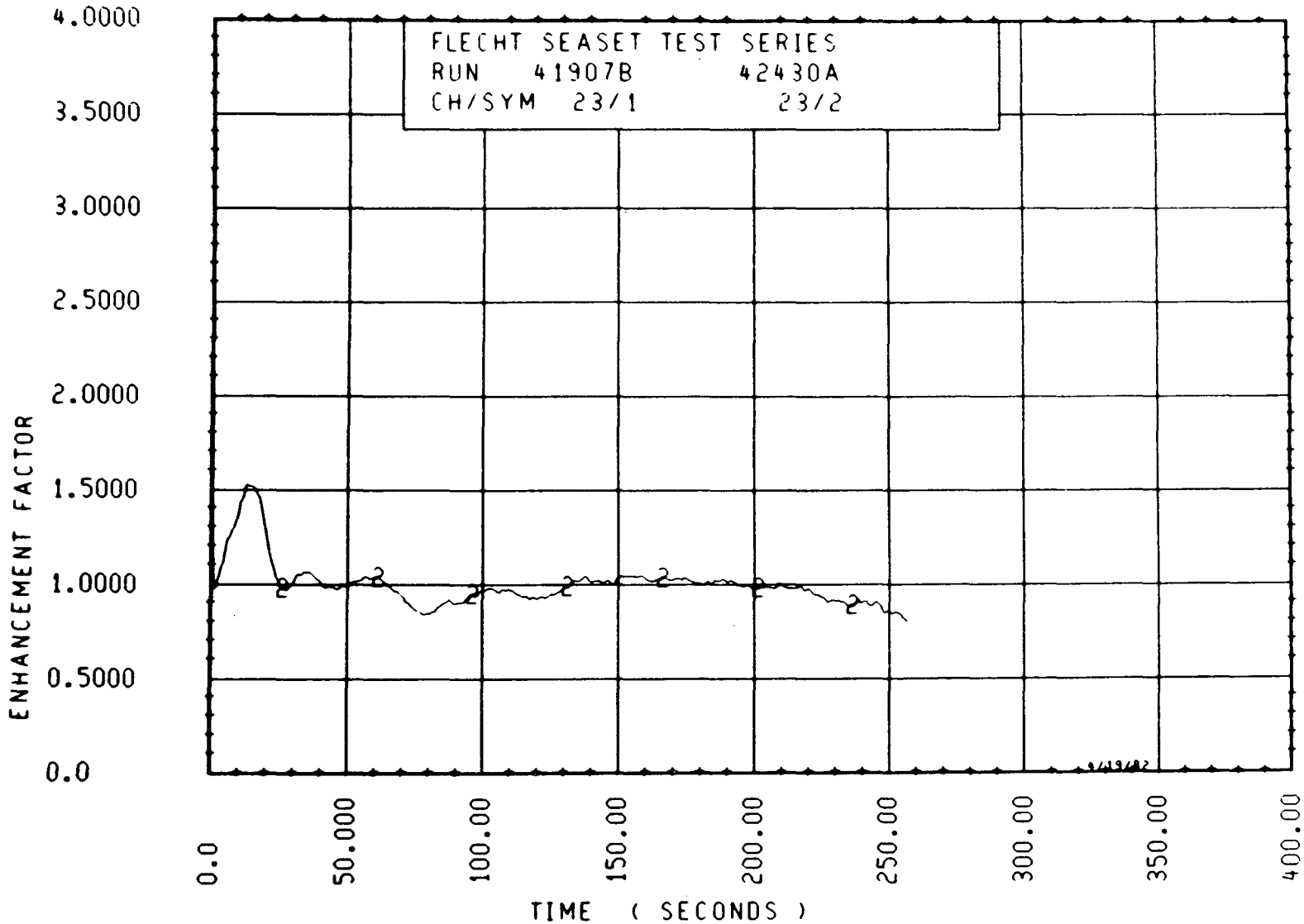


Figure O-9. Enhancement Factor for Run 41907B, Rod 4C, 1.70 m (67.1 in.) Elevation

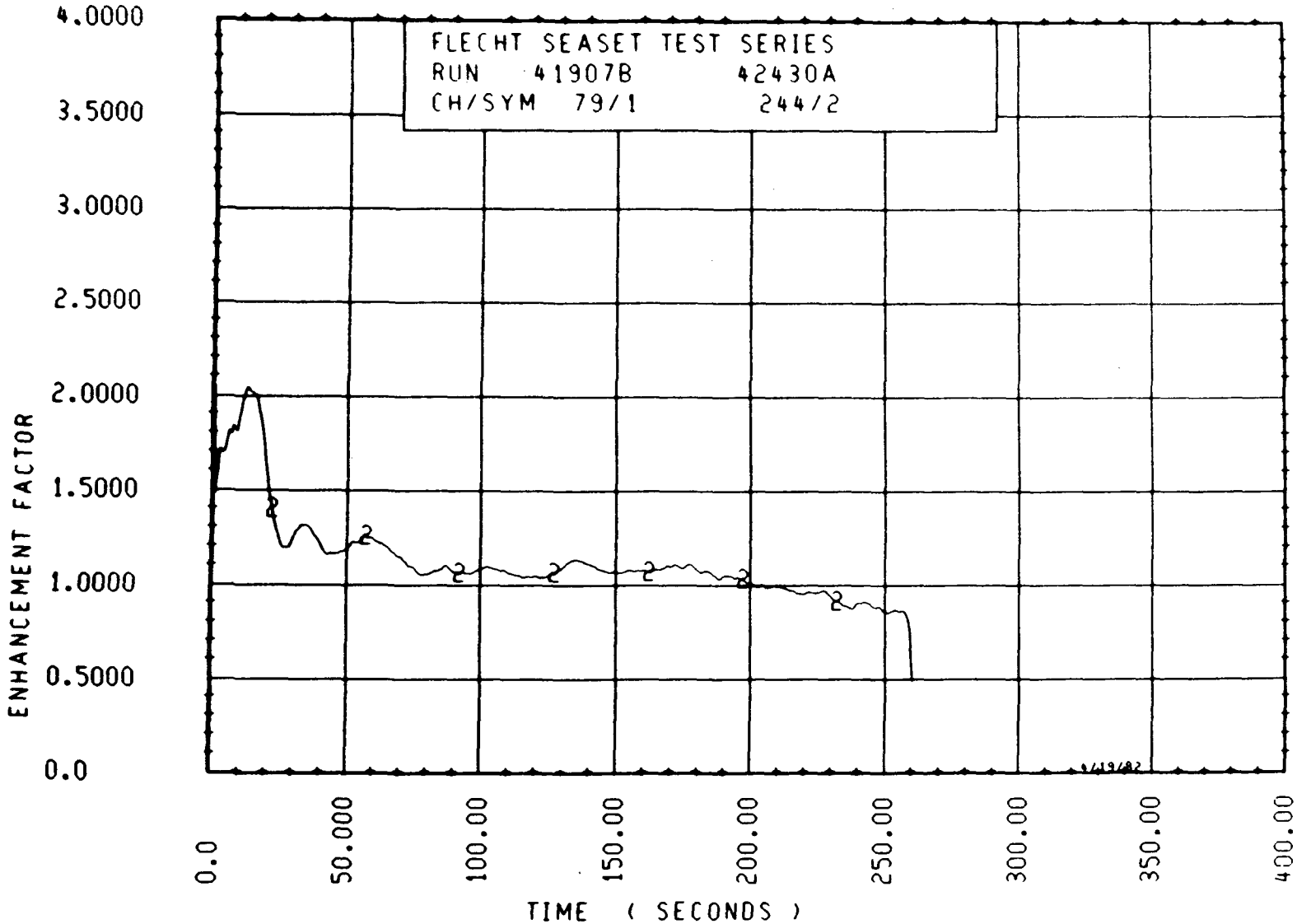


Figure O-10. Enhancement Factor for Run 41907B, Rod 4C, 1.94 m (76.3 in.) Elevation

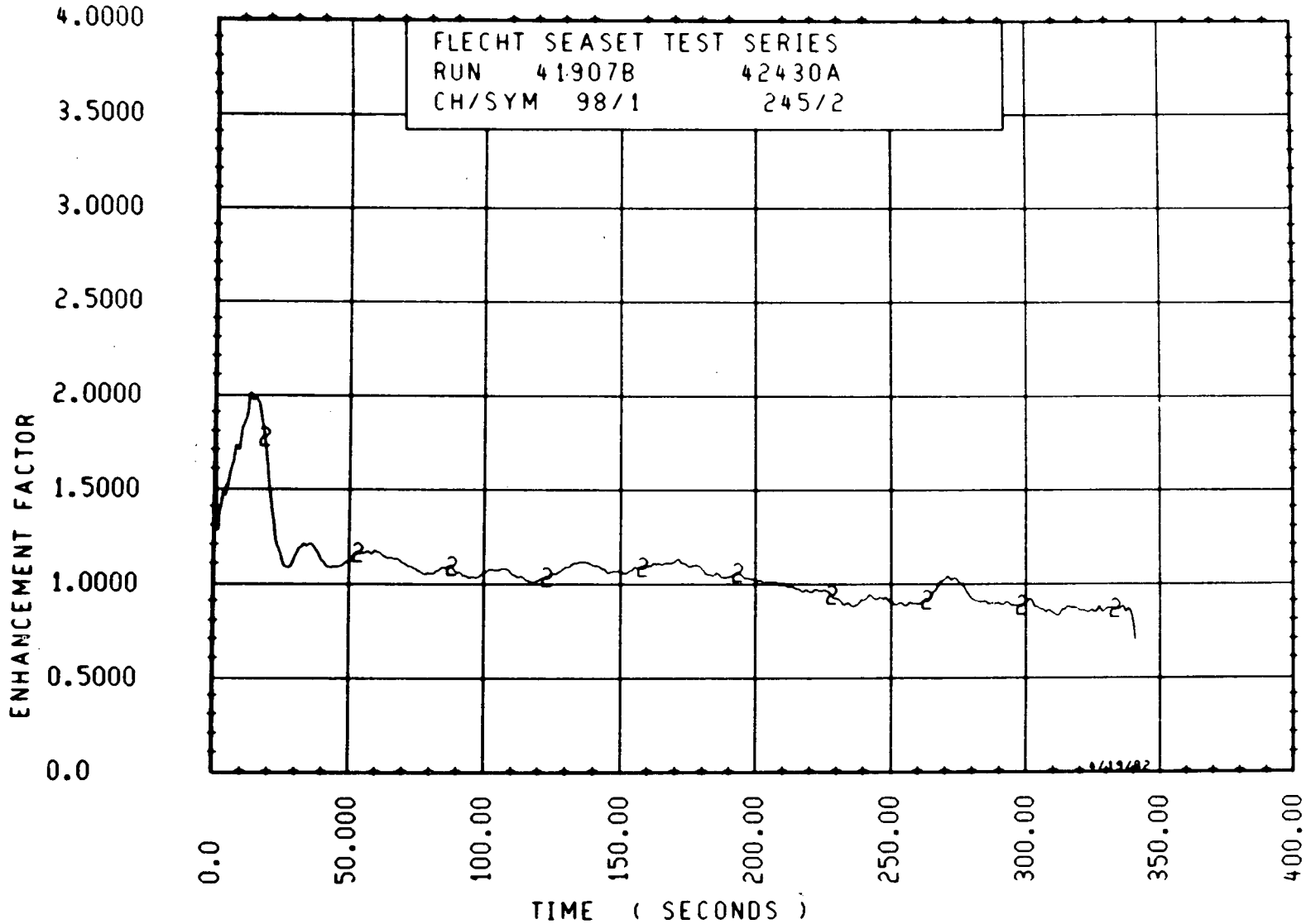


Figure O-11. Enhancement Factor for Run 41907B, Rod 4C, 1.99 m (78.3 in.) Elevation

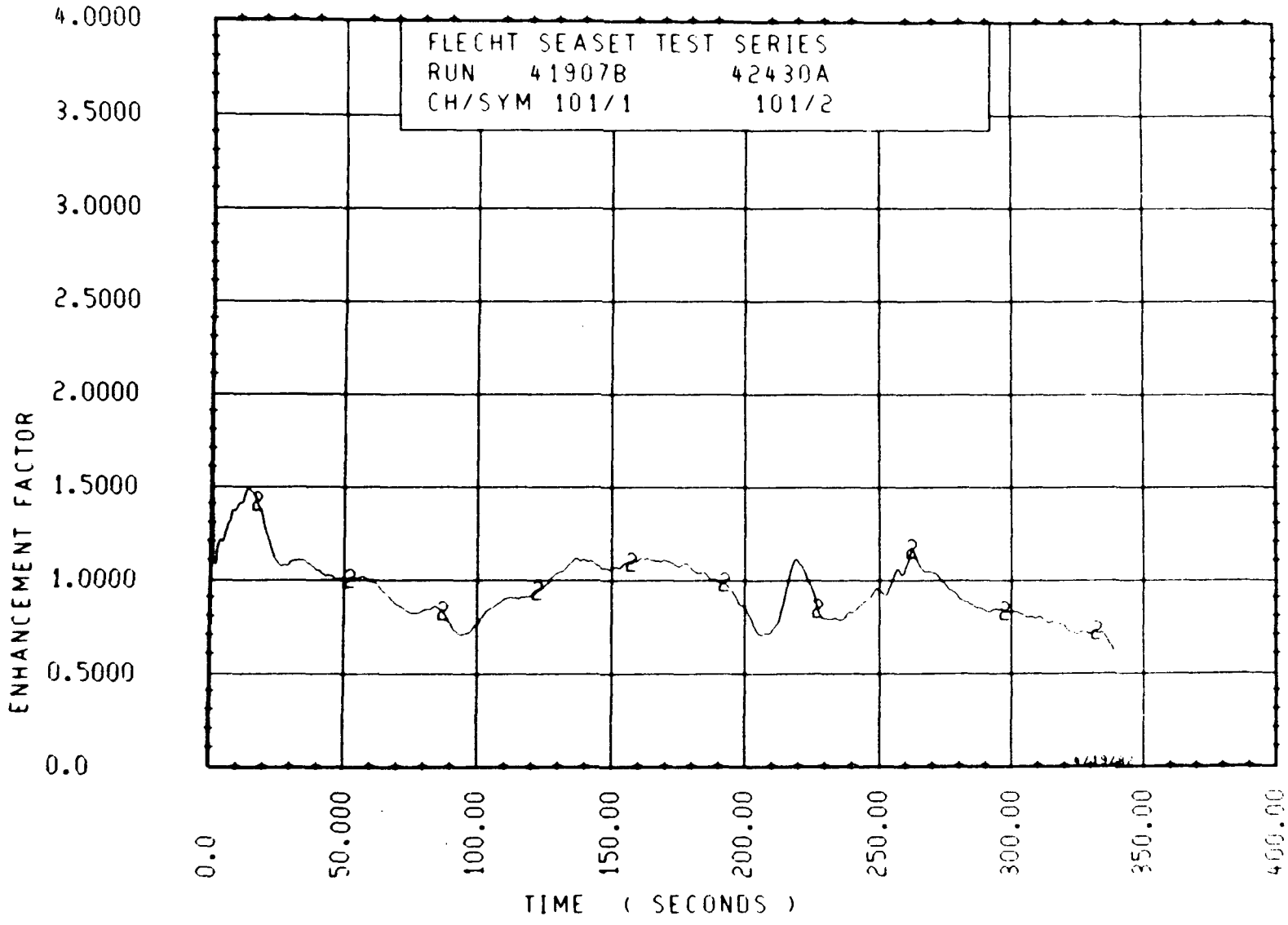


Figure O-12. Enhancement Factor for Run 41907B, Rod 5C, 2.00 m (78.6 in.) Elevation

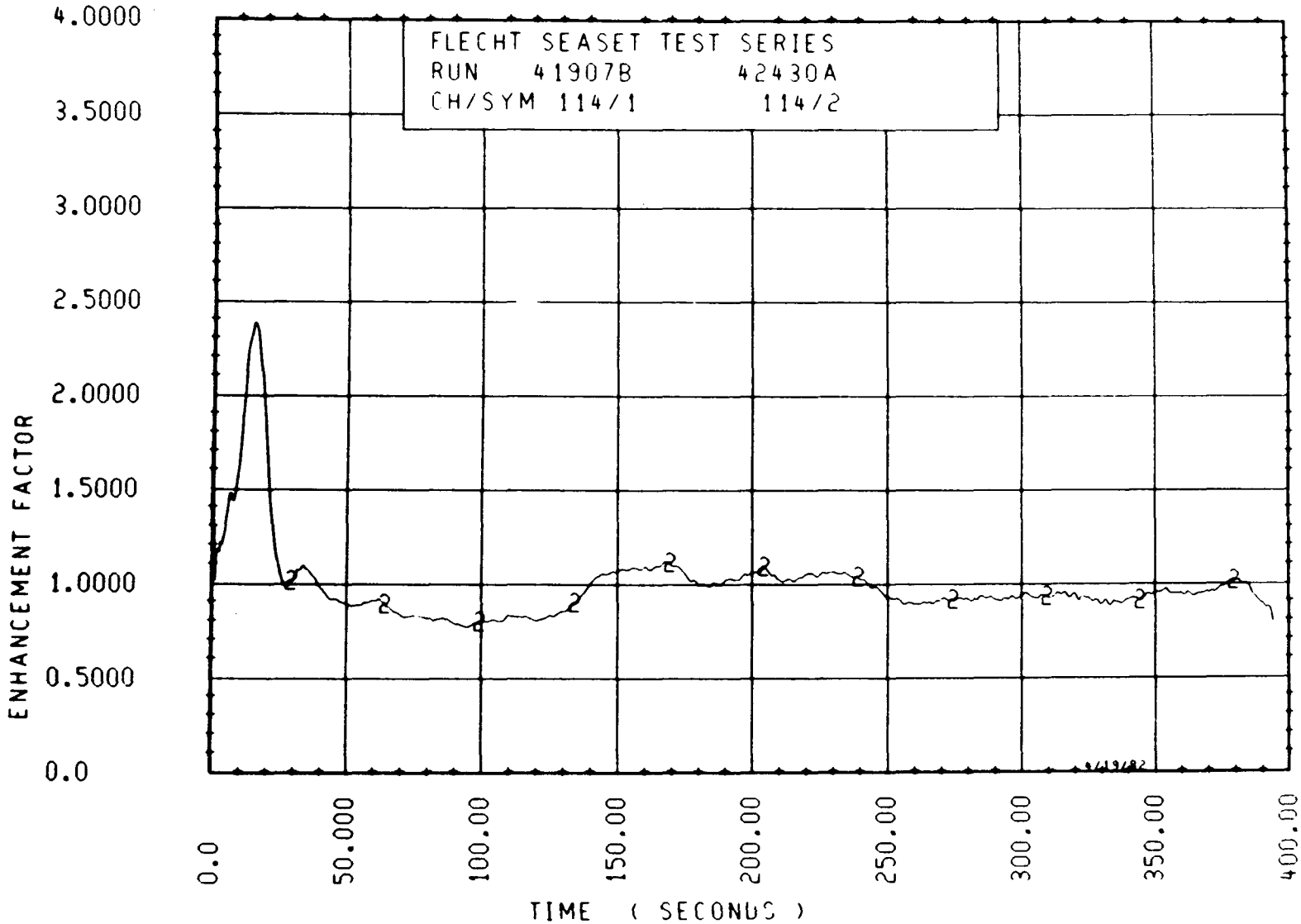


Figure O-13. Enhancement Factor for Run 41907B, Rod 3B, 2.13 m (84 in.) Elevation

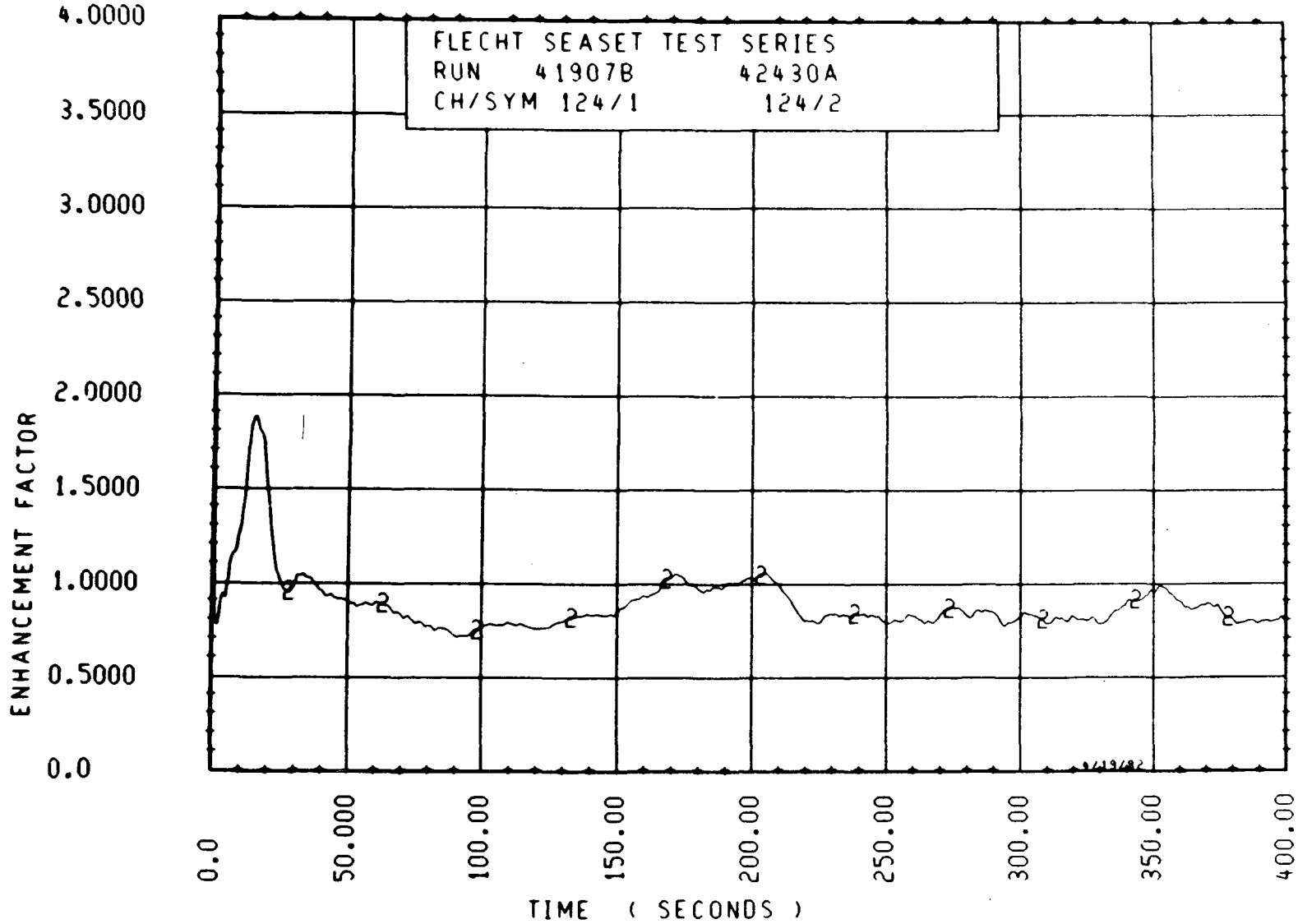


Figure O-14. Enhancement Factor for Run 41907B, Rod 3B, 2.29 m (90 in.) Elevation

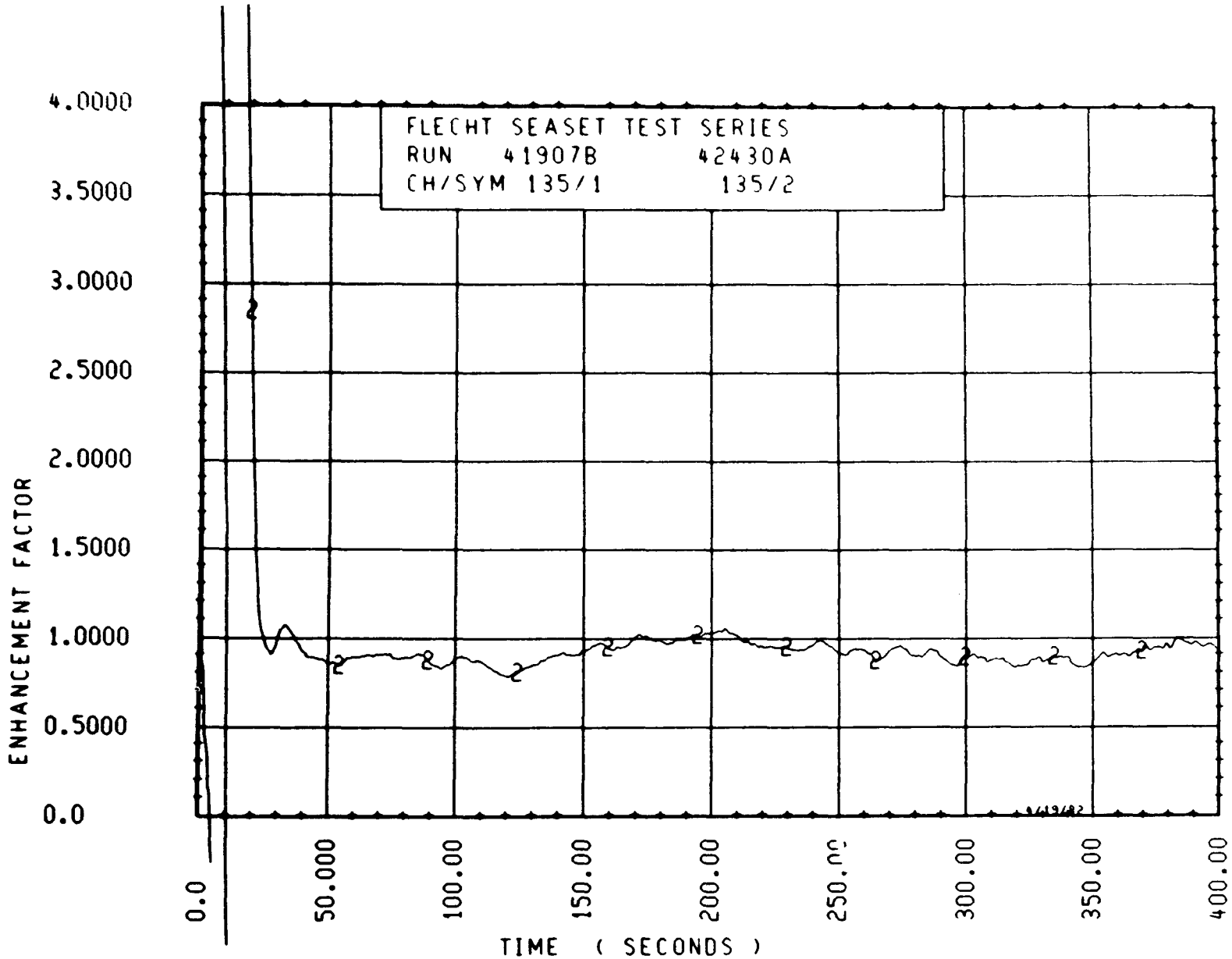


Figure O-15. Enhancement Factor for Run 41907B, Rod 3B, 2.44 m (96 in.) Elevation

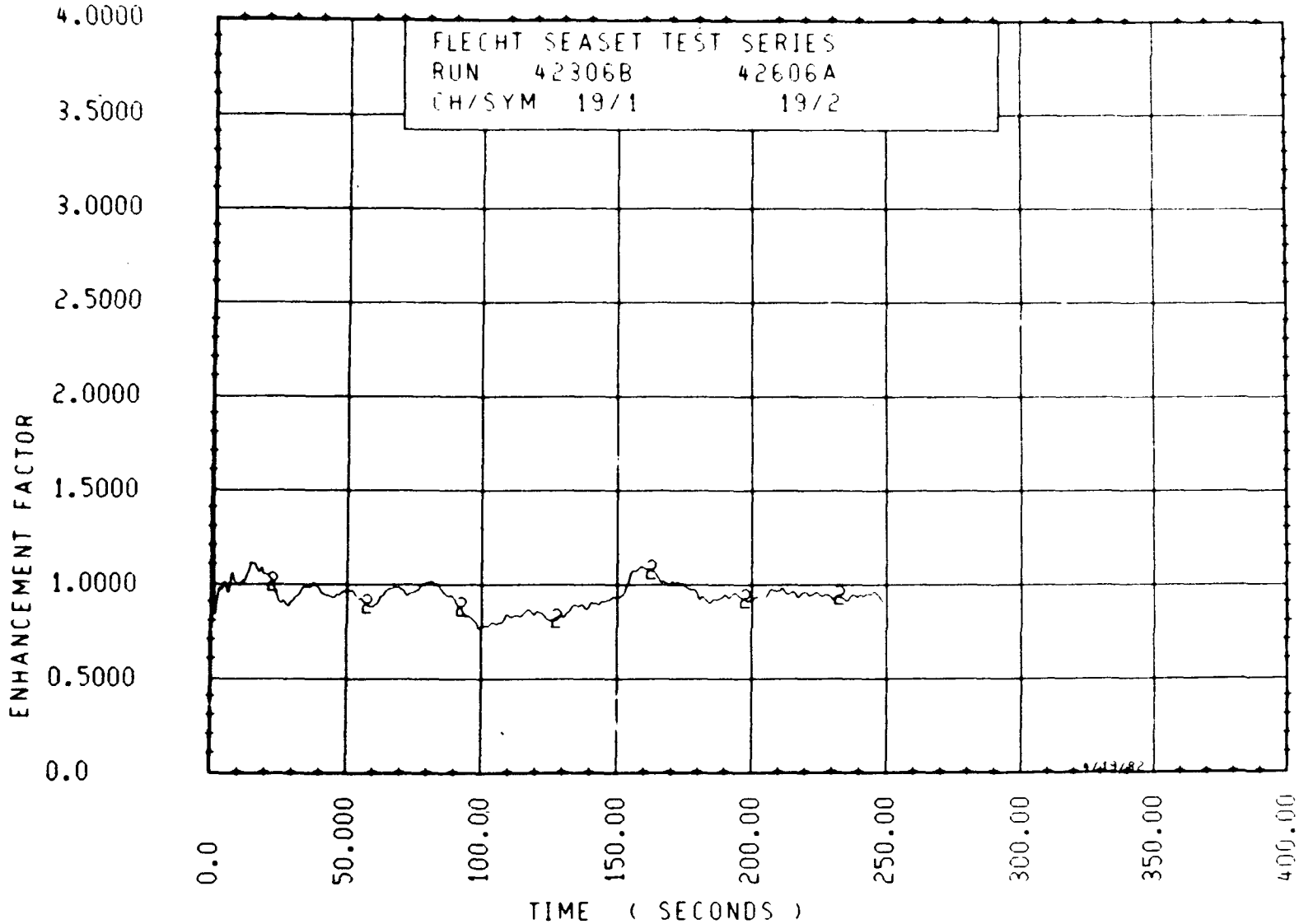


Figure O-16. Enhancement Factor for Run 42306B, Rod 4C, 1.52 m (60 in.) Elevation

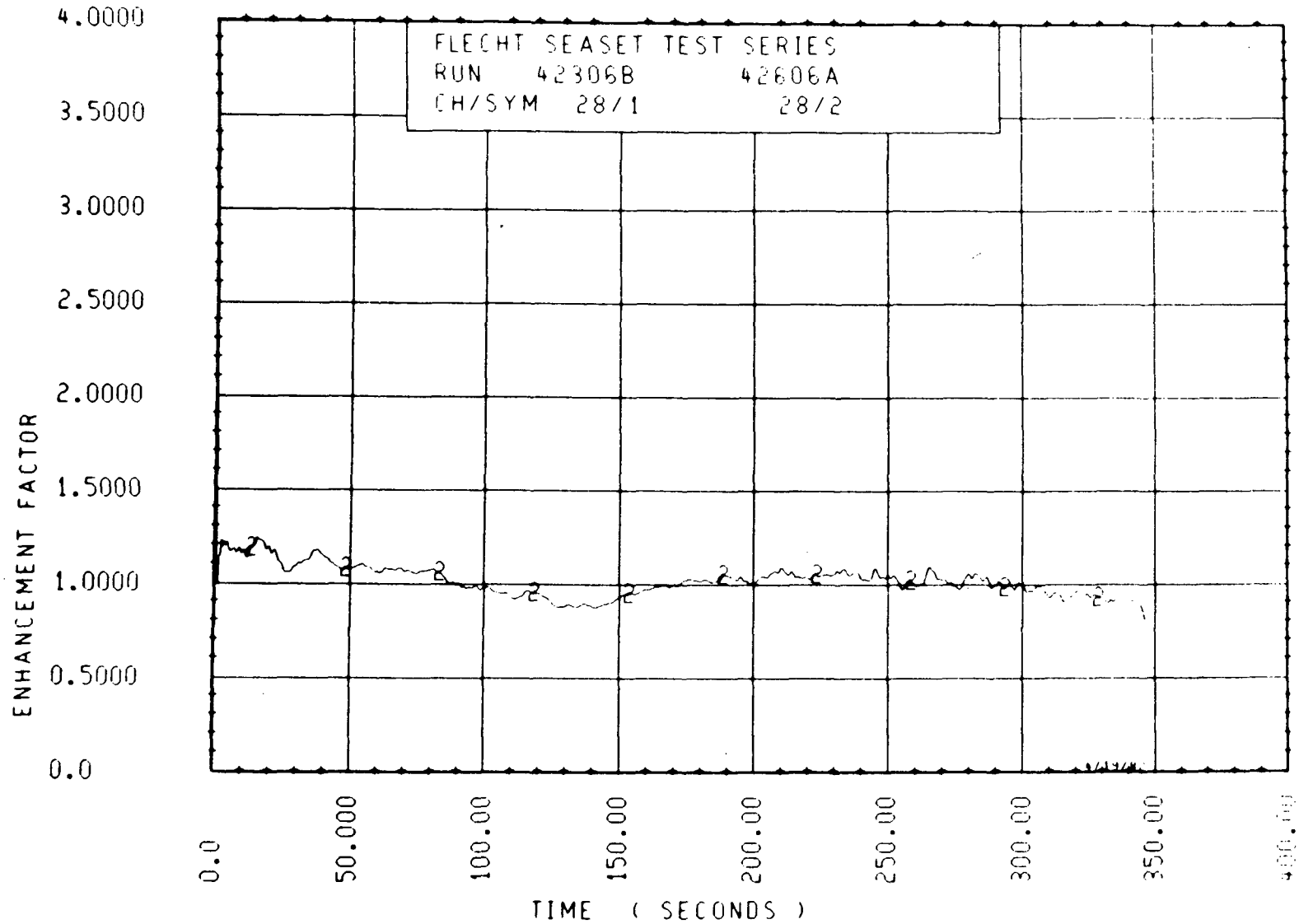


Figure O-17. Enhancement Factor for Run 42306B, Rod 3C, 1.78 m (70.2 in.) Elevation

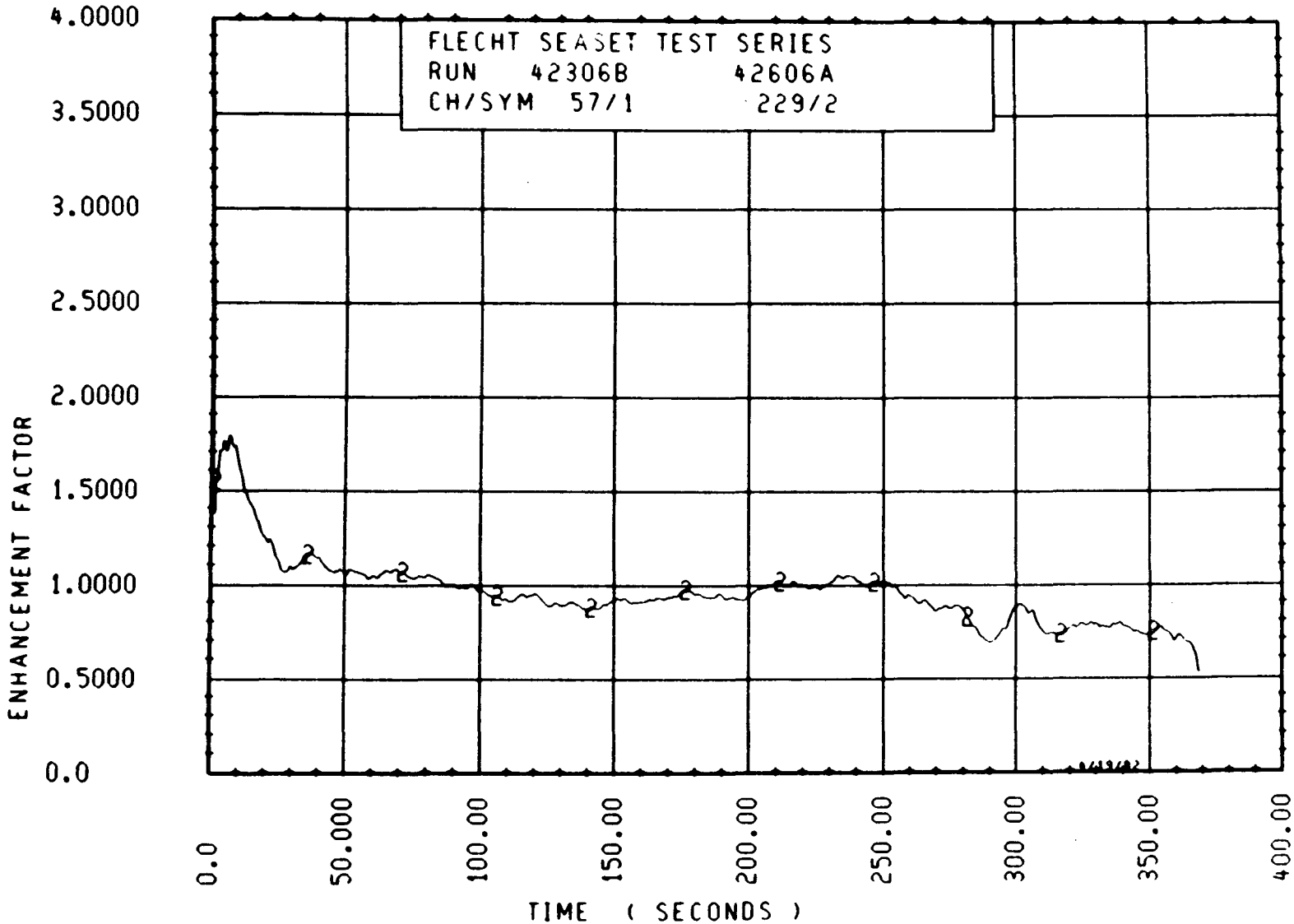


Figure O-18. Enhancement Factor for Run 42306B, Rod 3C, 1.88 m (74.2 in.) Elevation

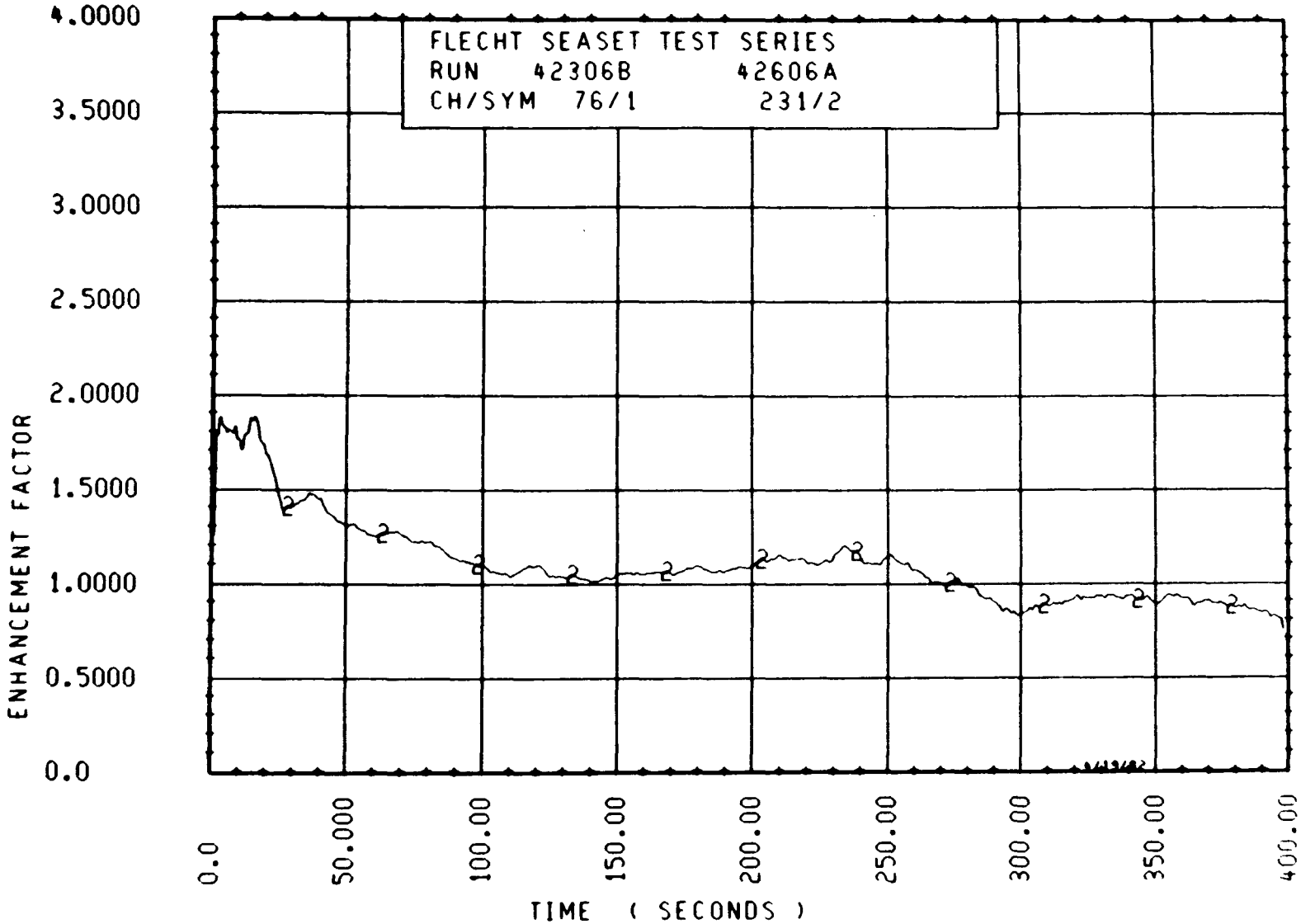


Figure O-19. Enhancement Factor for Run 42306B, Rod 3C, 1.94 m (76.2 in.) Elevation

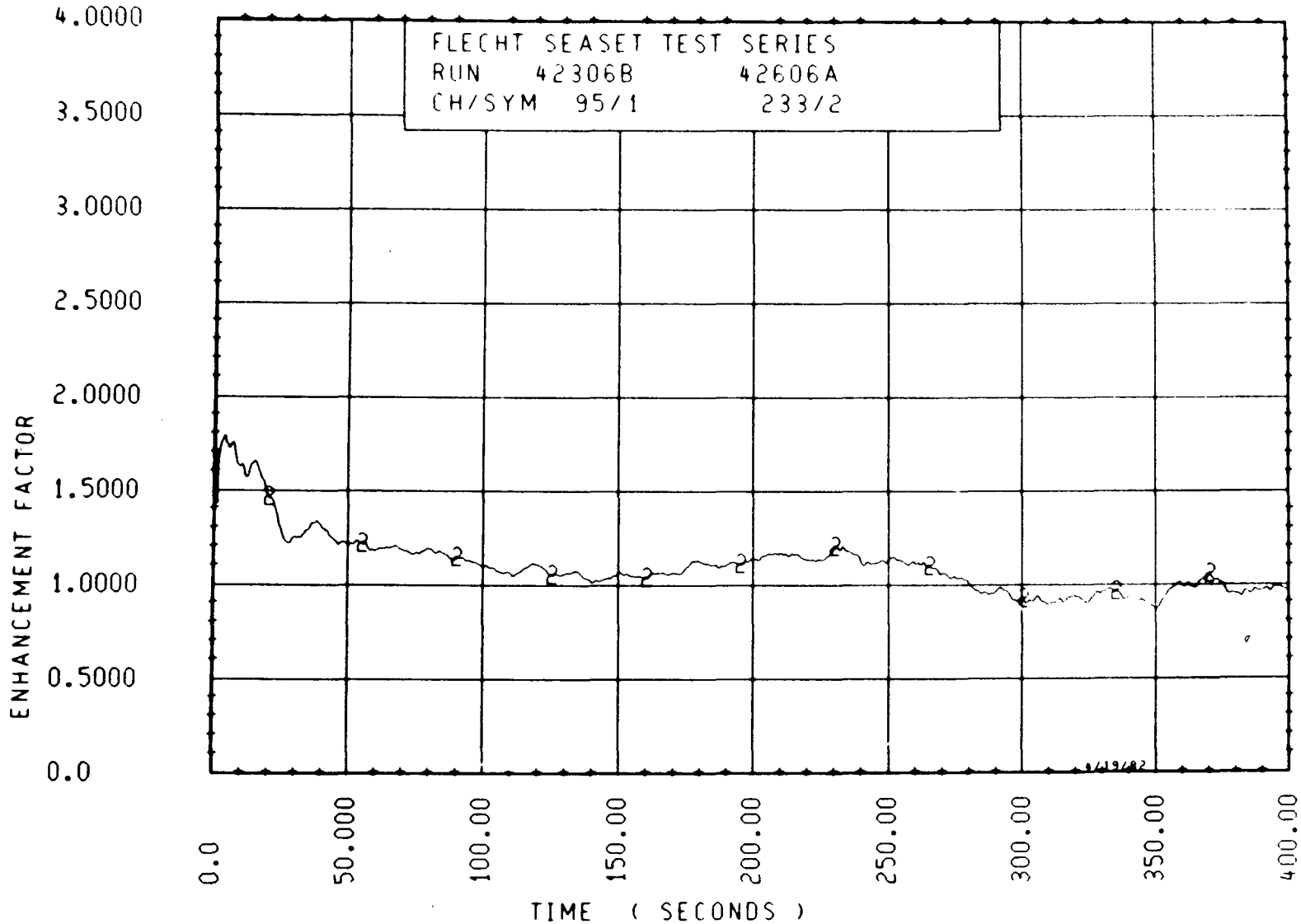


Figure O-20. Enhancement Factor for Run 42306B, Rod 3C, 1.99 m (78.5 in.) Elevation

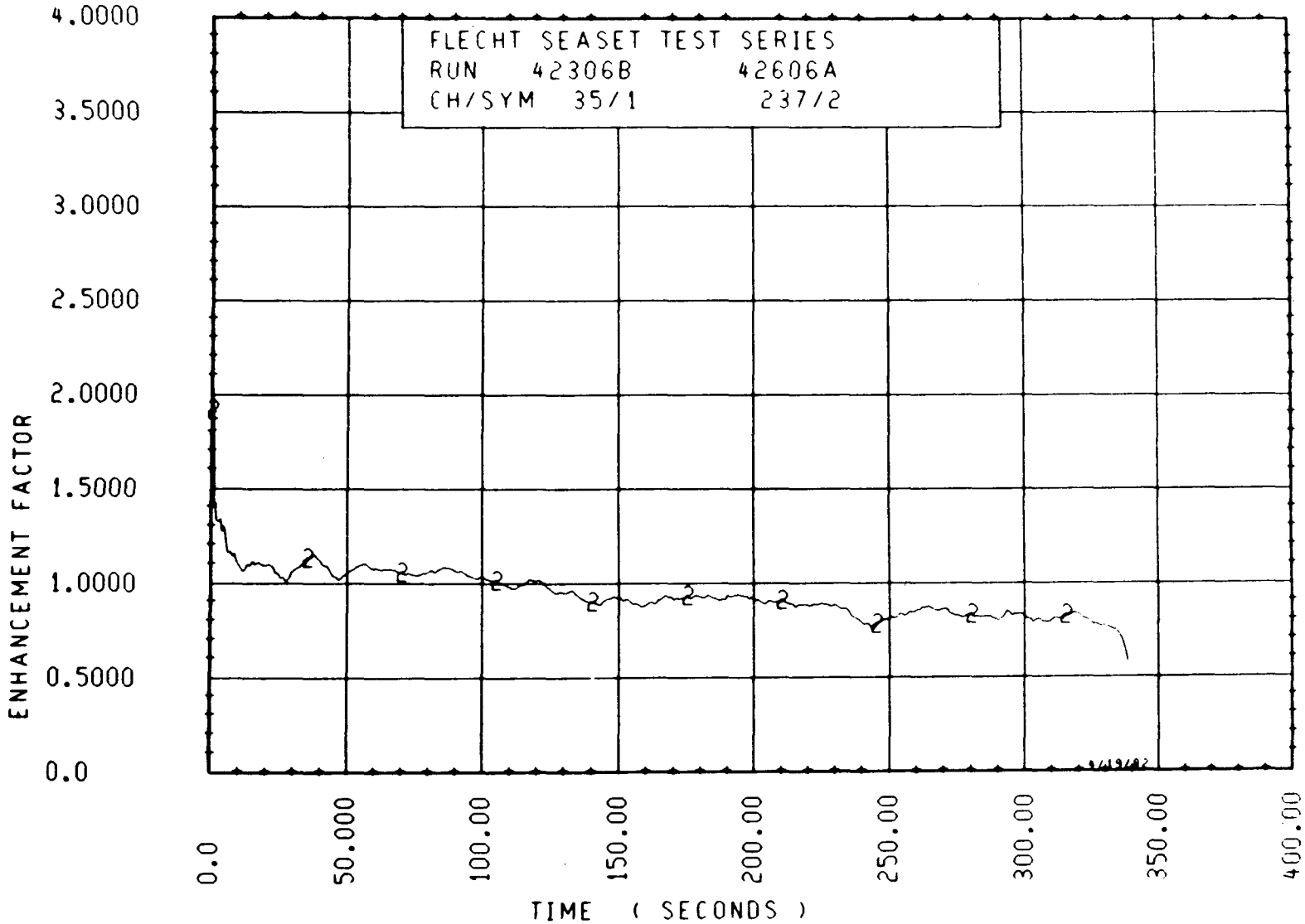


Figure O-21. Enhancement Factor for Run 42306B, Rod 3E, 1.83 m (72.1 in.) Elevation

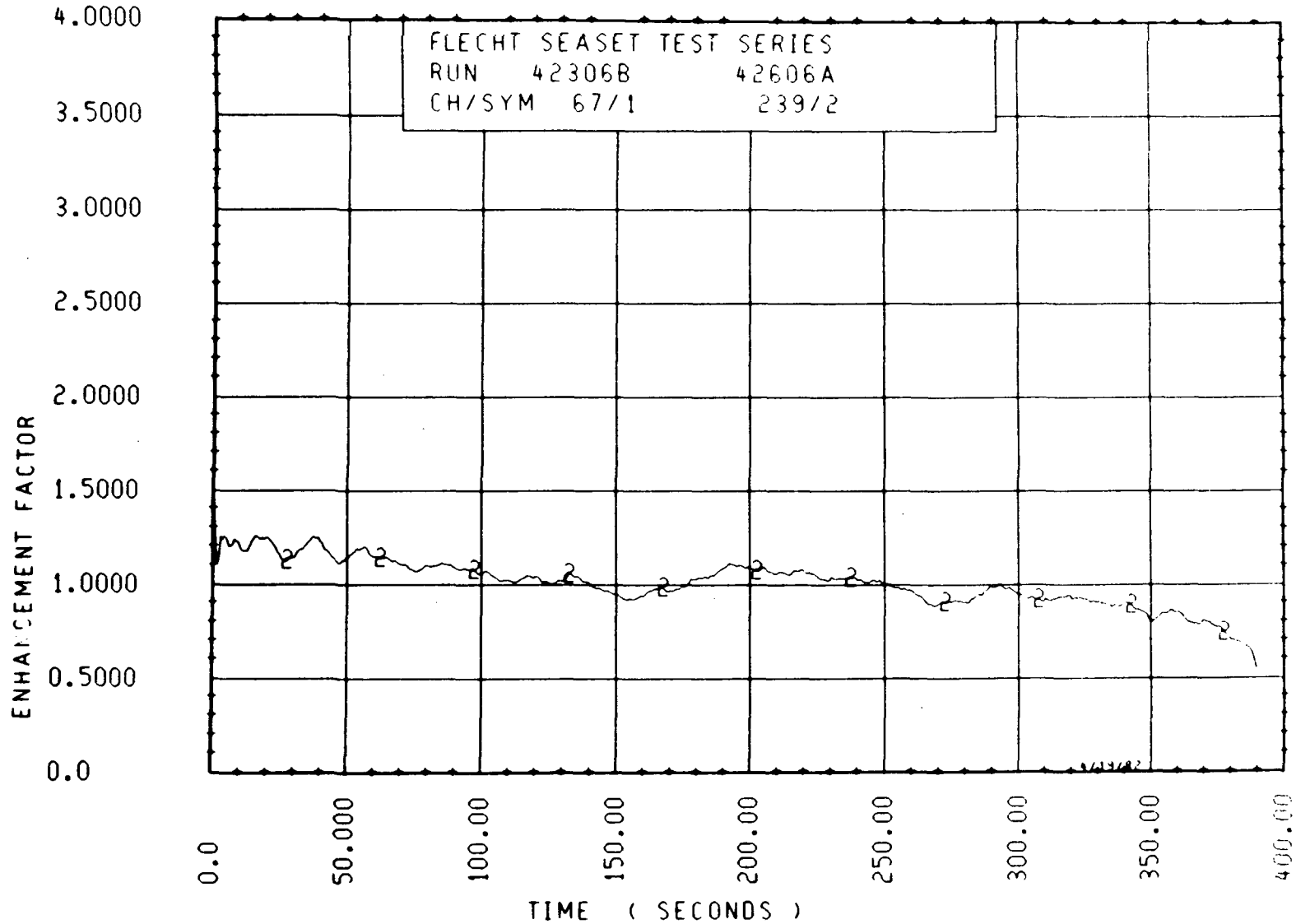


Figure O-22. Enhancement Factor for Run 42306B, Rod 3E, 1.94 m (76.3 in.) Elevation

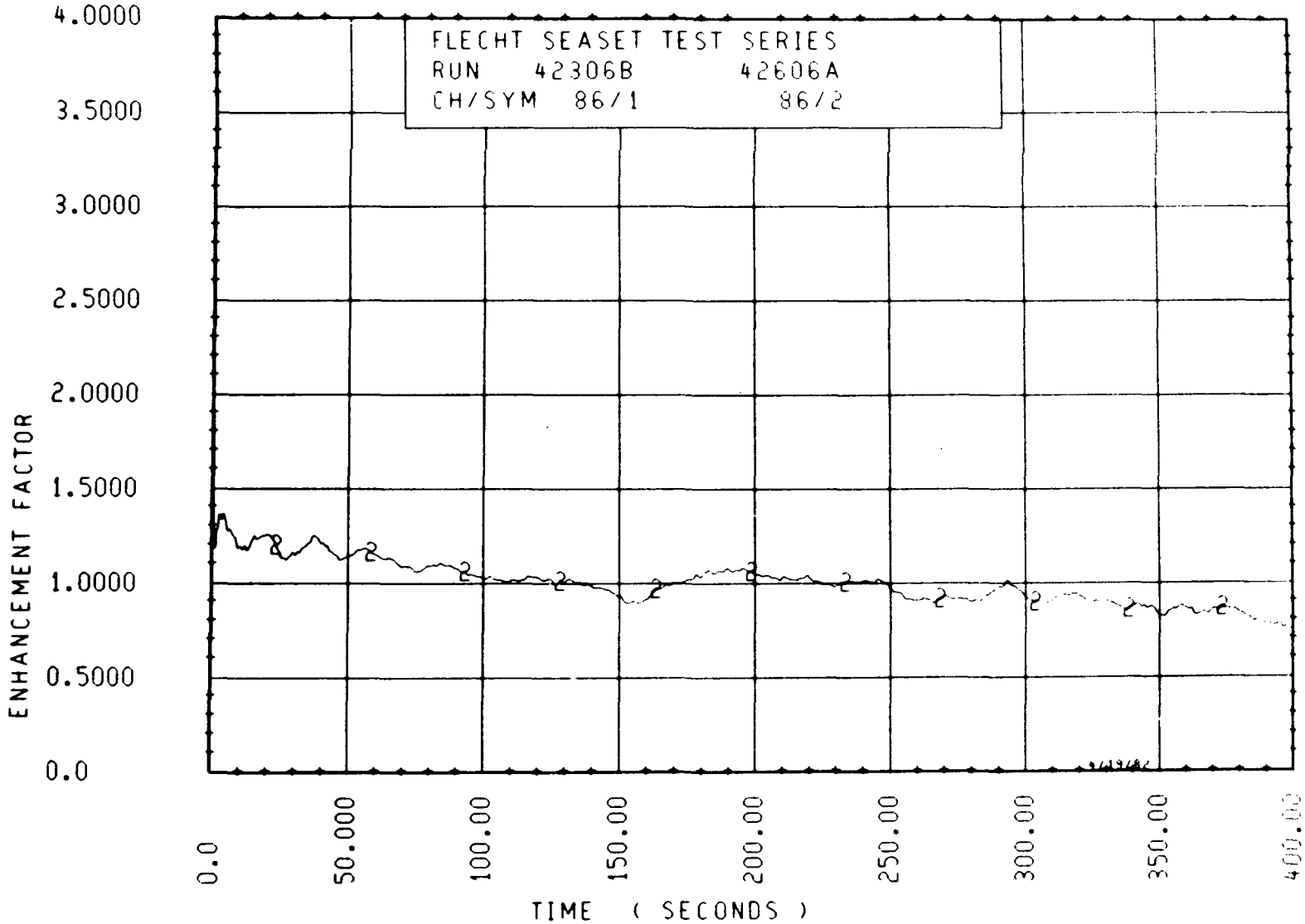


Figure O-23. Enhancement Factor for Run 42306B, Rod 3E, 1.99 m (78.2 in.) Elevation

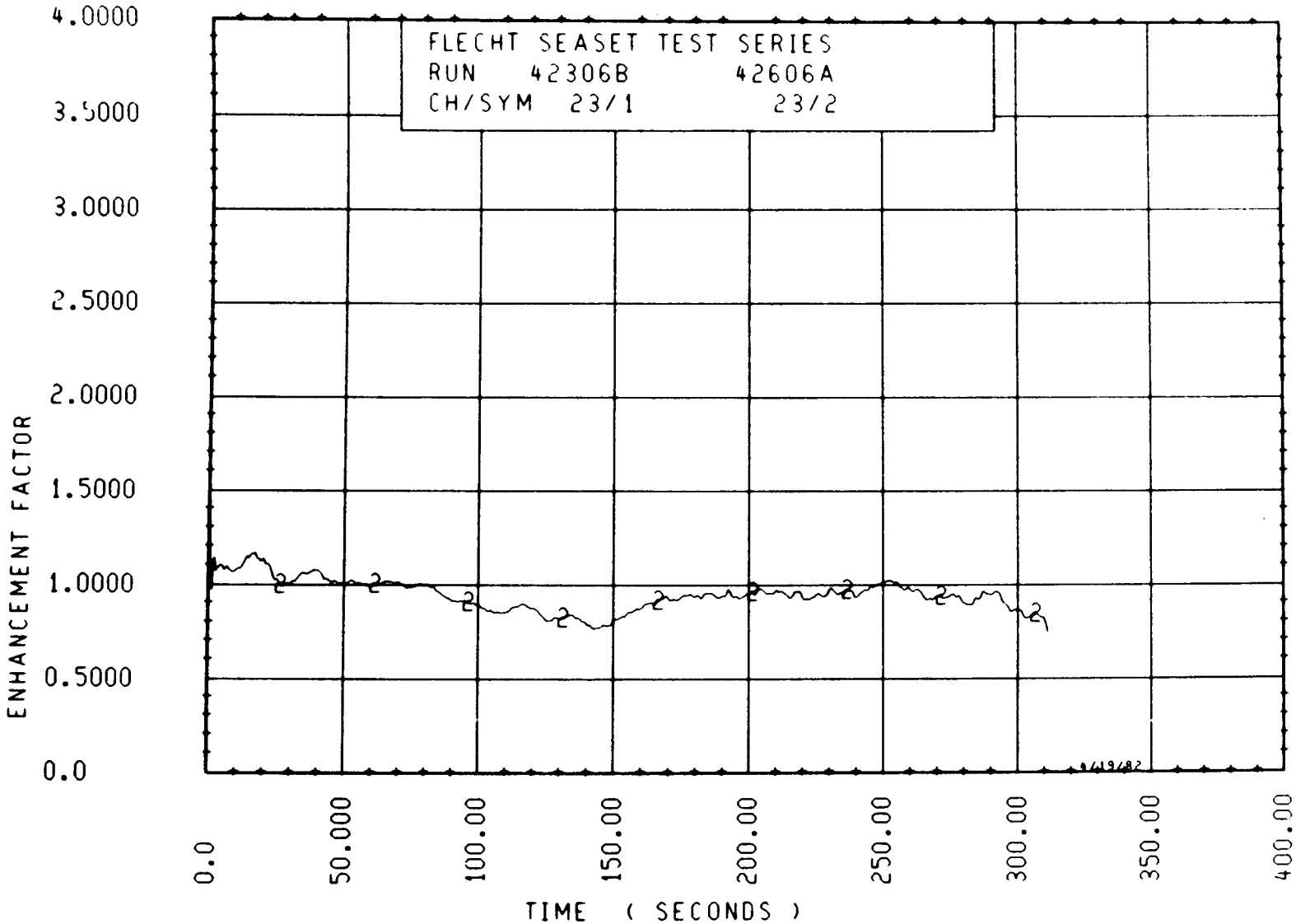


Figure O-24. Enhancement Factor for Run 42306B, Rod 4C, 1.70 m (67.1 in.) Elevation

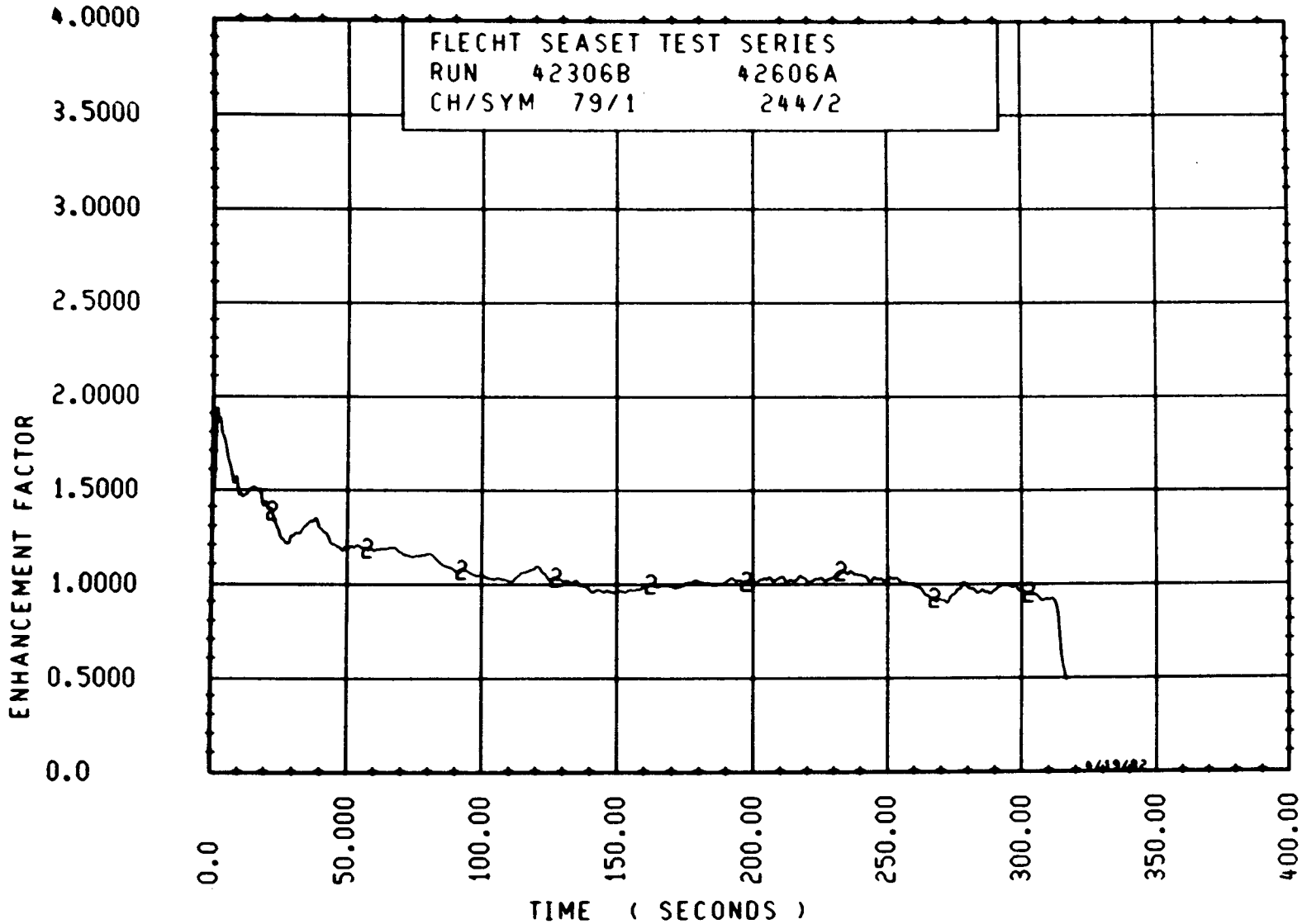


Figure O-25. Enhancement Factor for Run 42306B, Rod 4C, 1.94 m (76.3 in.) Elevation

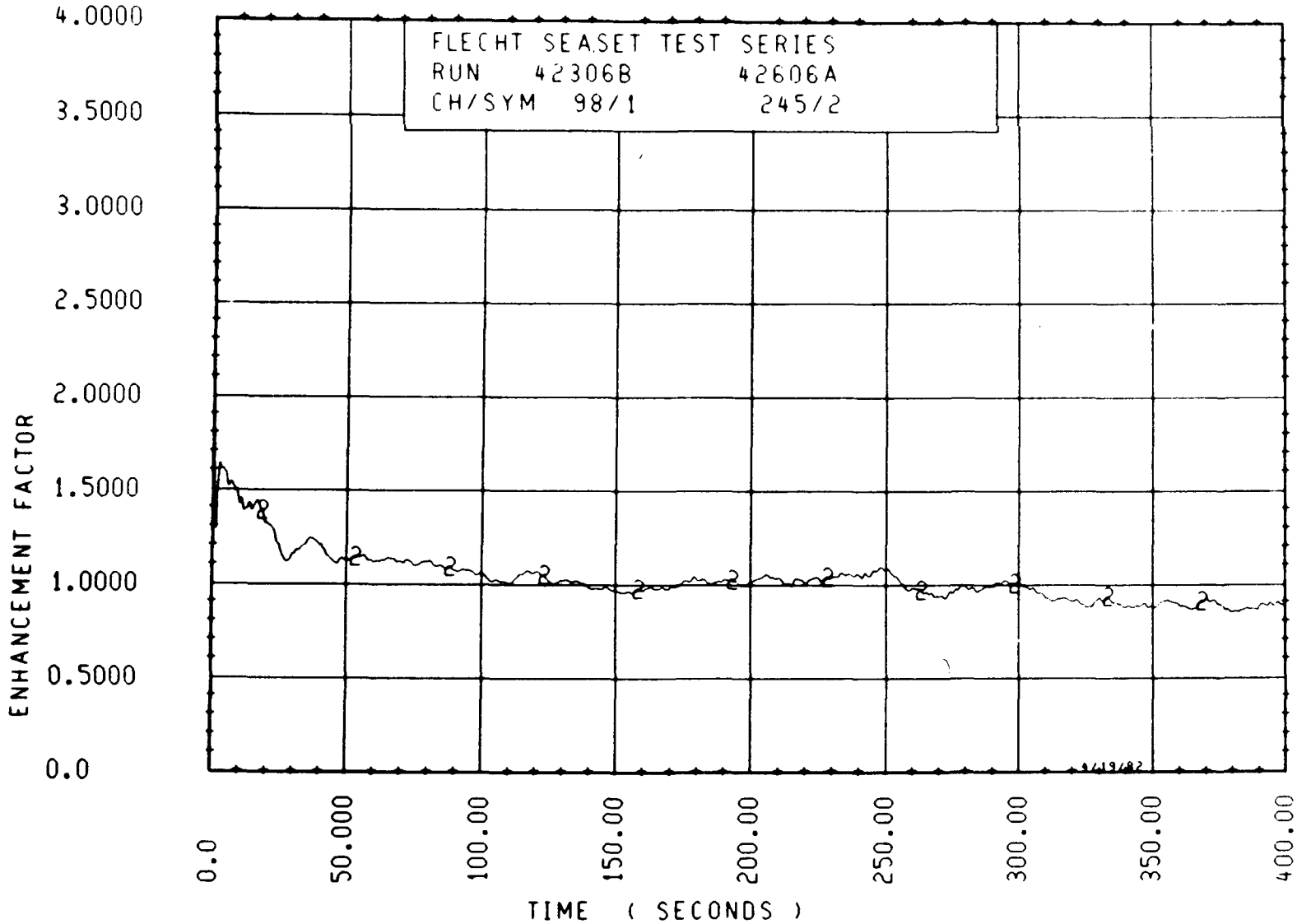


Figure O-26. Enhancement Factor for Run 42306B, Rod 4C, 1.99 m (78.3 in.) Elevation

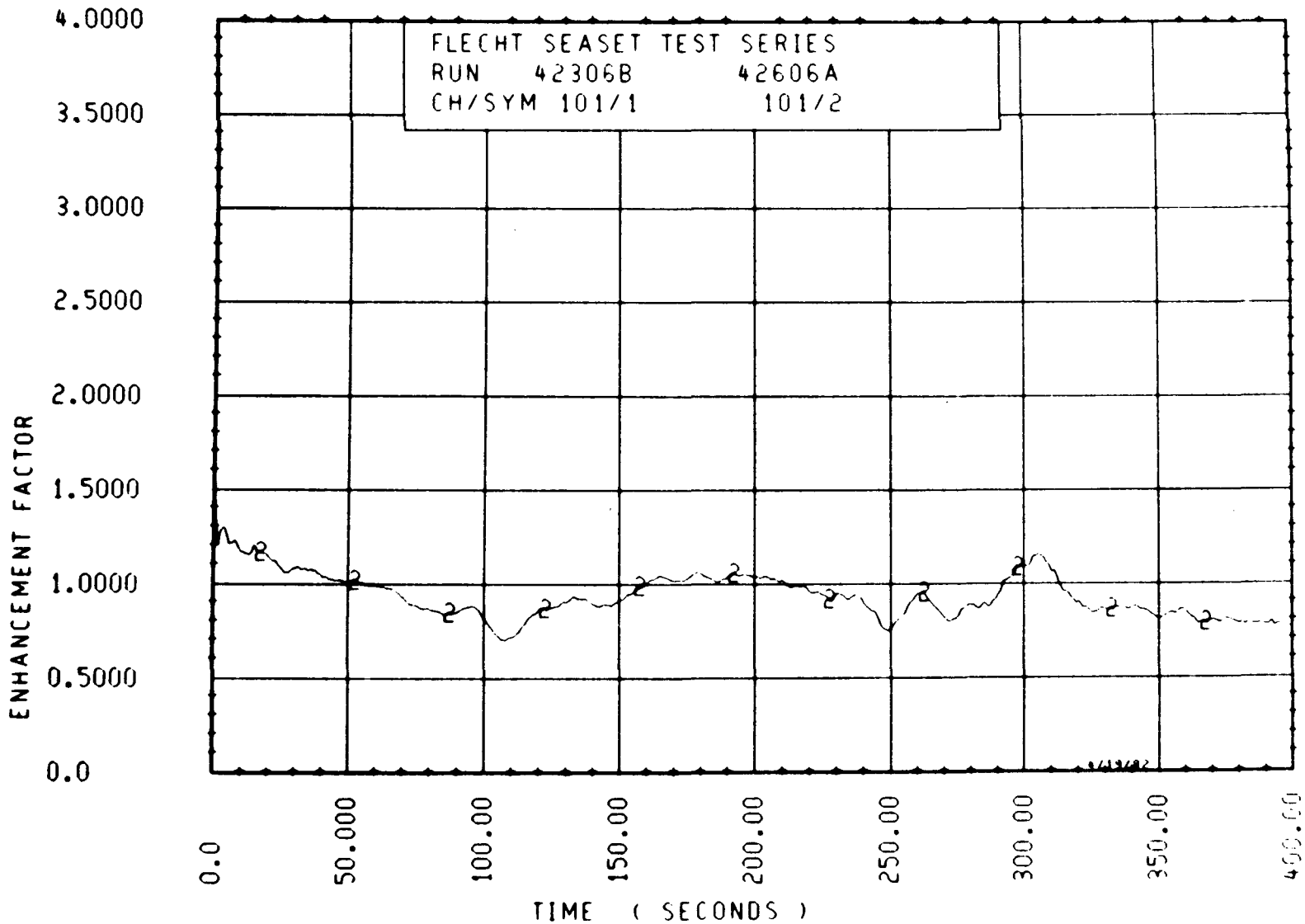


Figure O-27. Enhancement Factor for Run 42306B, Rod 5C, 2.00 m (78.6 in.) Elevation

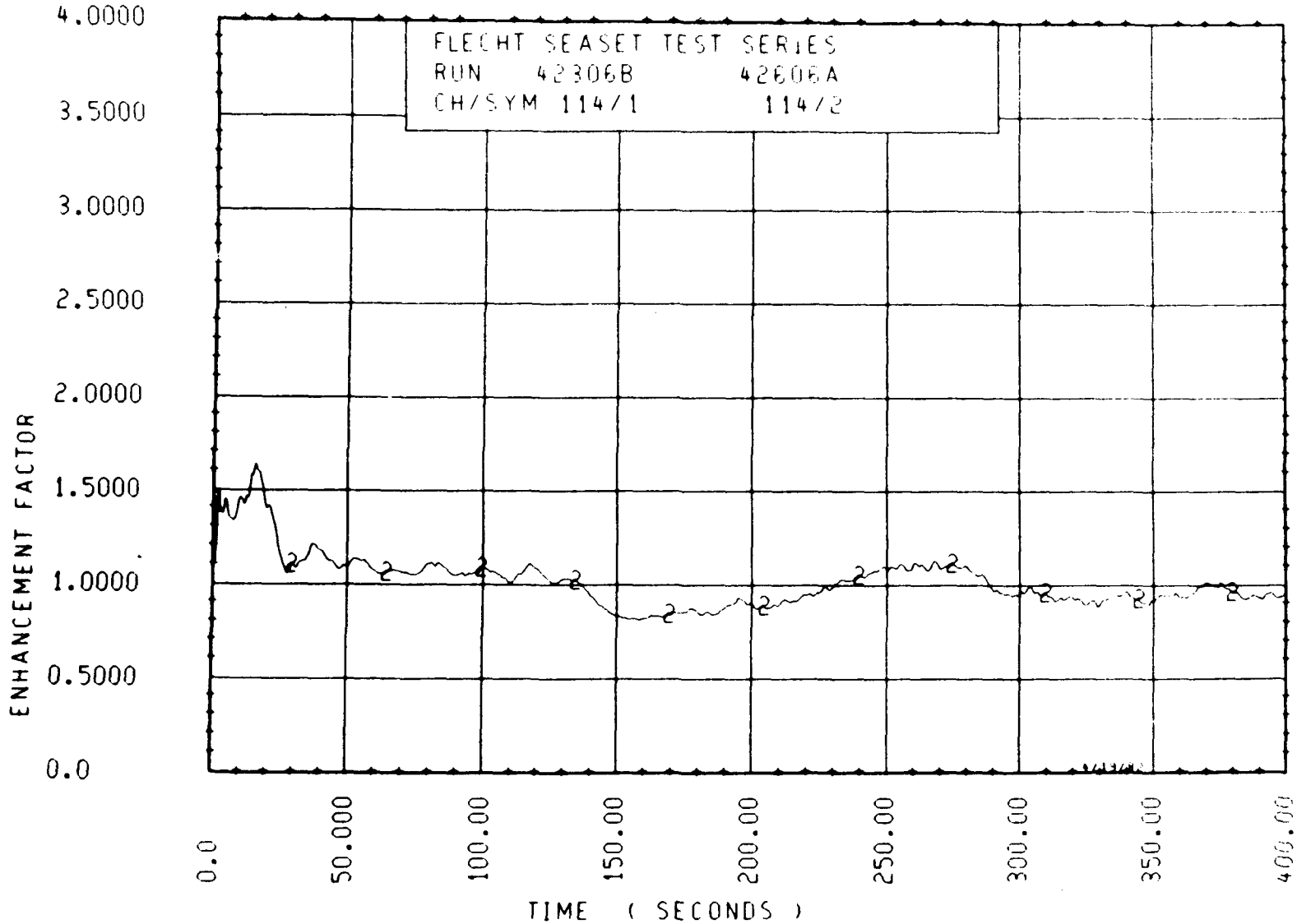


Figure O-28. Enhancement Factor for Run 42306B, Rod 3B, 2.13 m (84 in.) Elevation

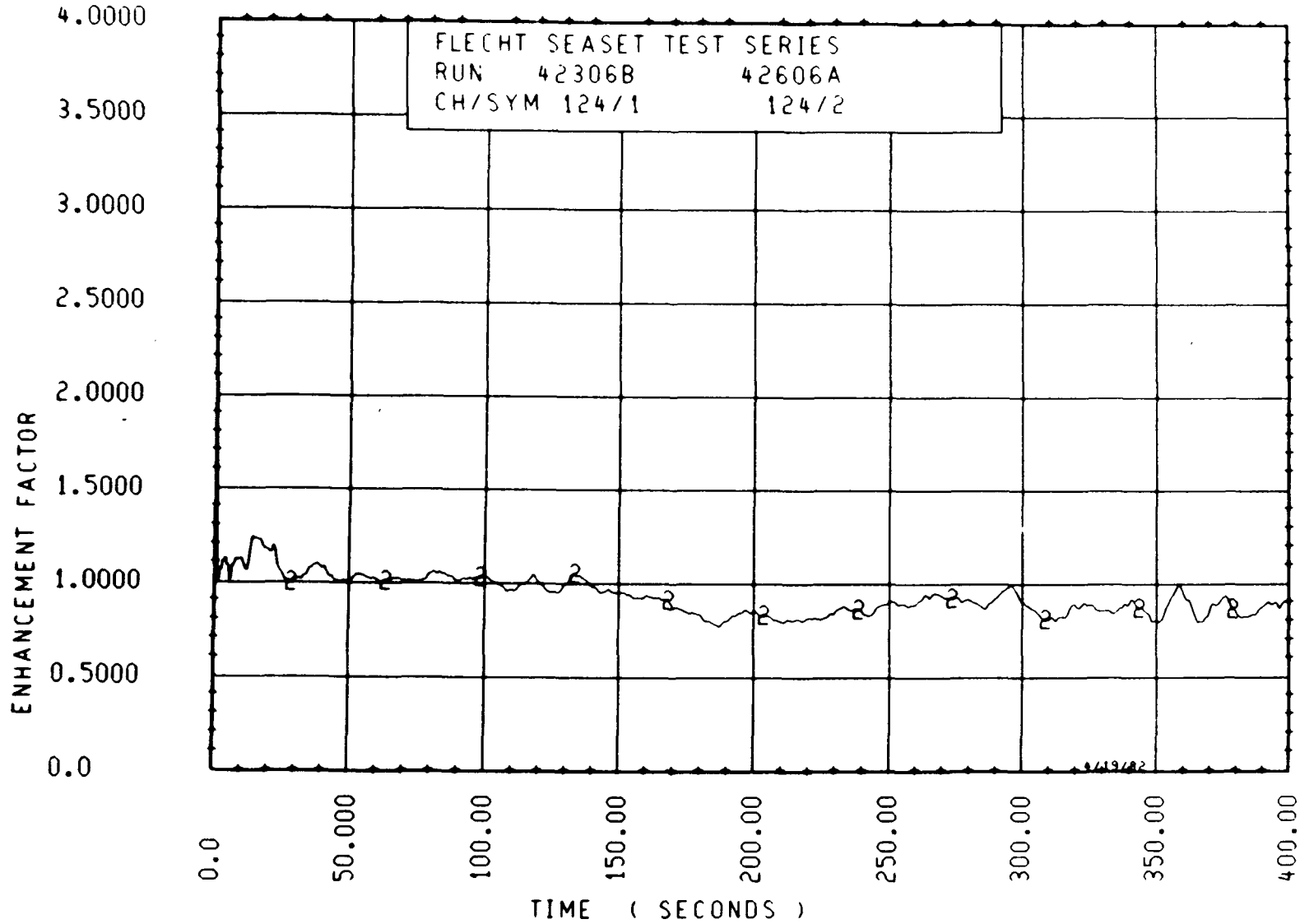


Figure O-29. Enhancement Factor for Run 42306B, Rod 3B, 2.29 m (90 in.) Elevation

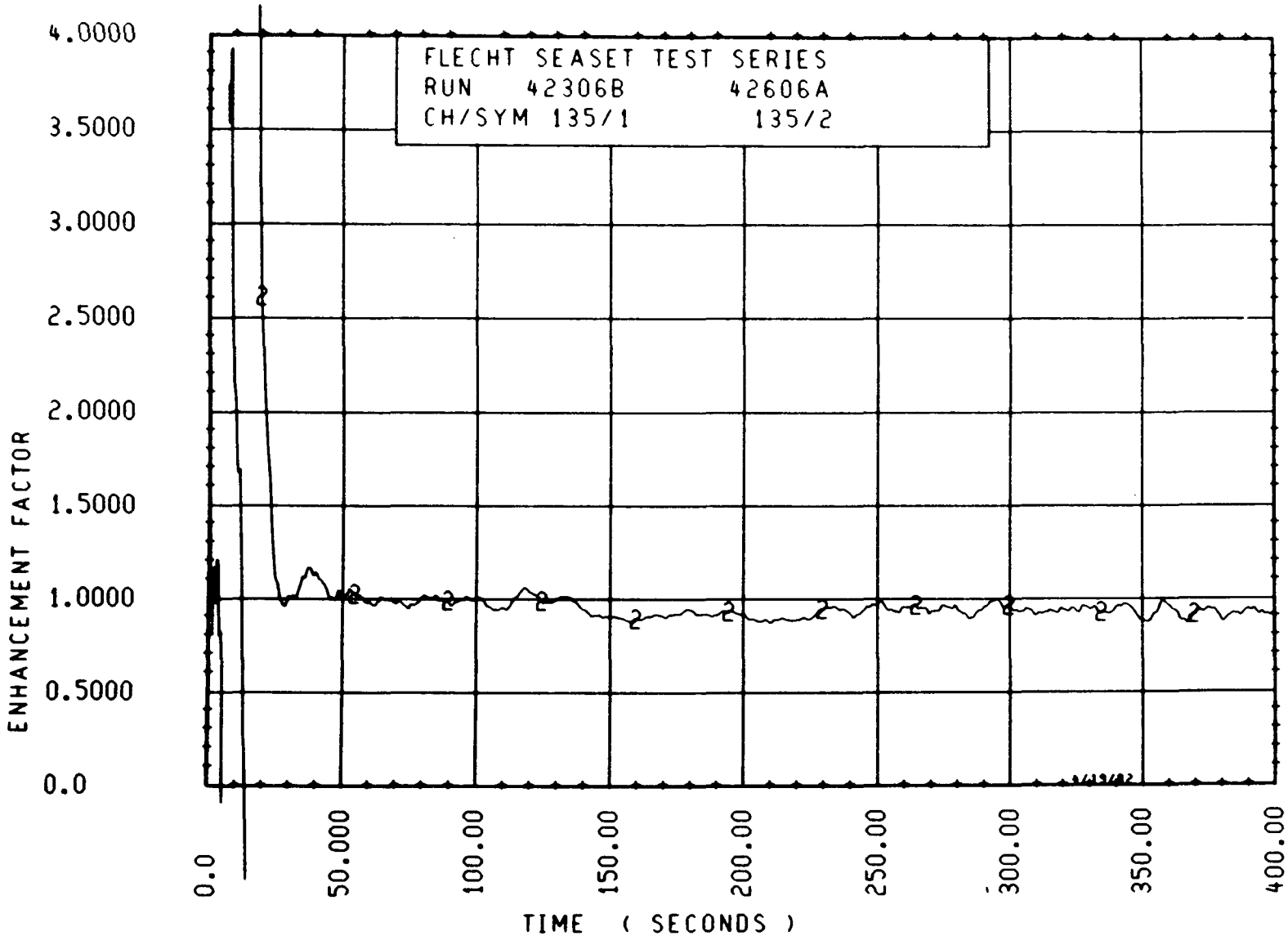


Figure O-30. Enhancement Factor for Run 42306B, Rod 3B, 2.44 m (96 in.) Elevation

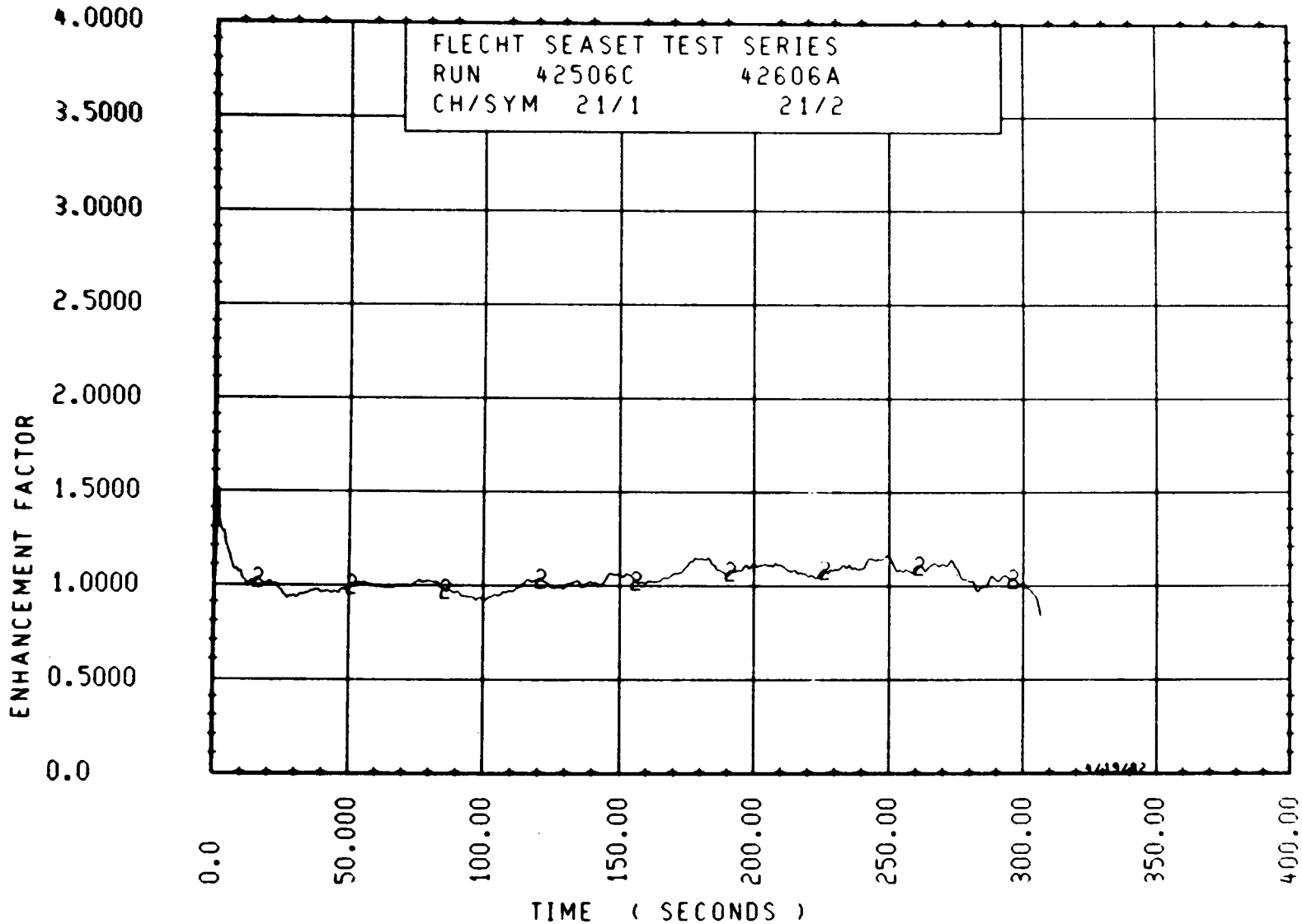


Figure O-31. Enhancement Factor for Run 42506C, Rod 2A, 1.71 m (67.5 in.) Elevation

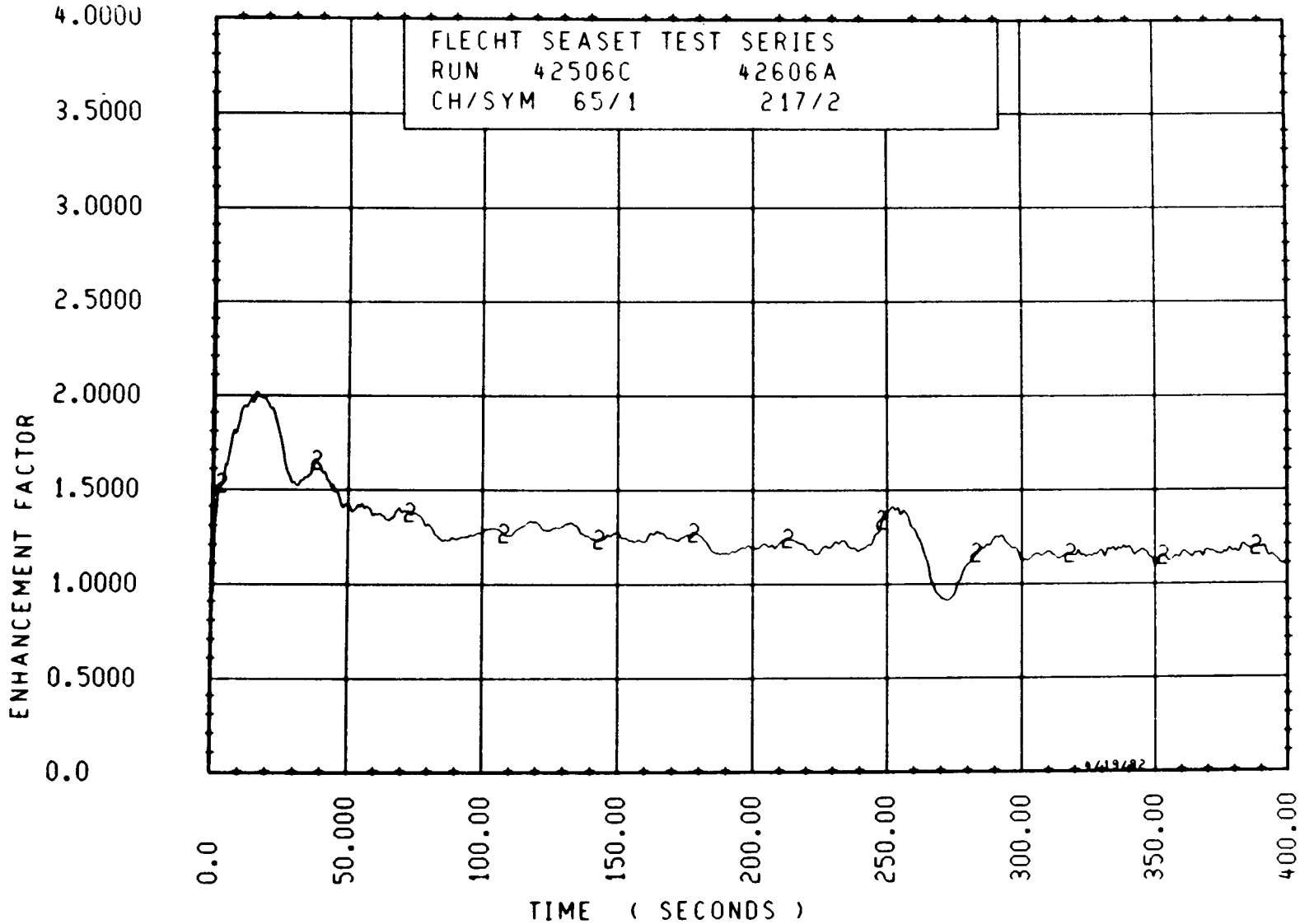


Figure O-32. Enhancement Factor for Run 42506C, Rod 2D, 1.91 m (75.3 in.) Elevation

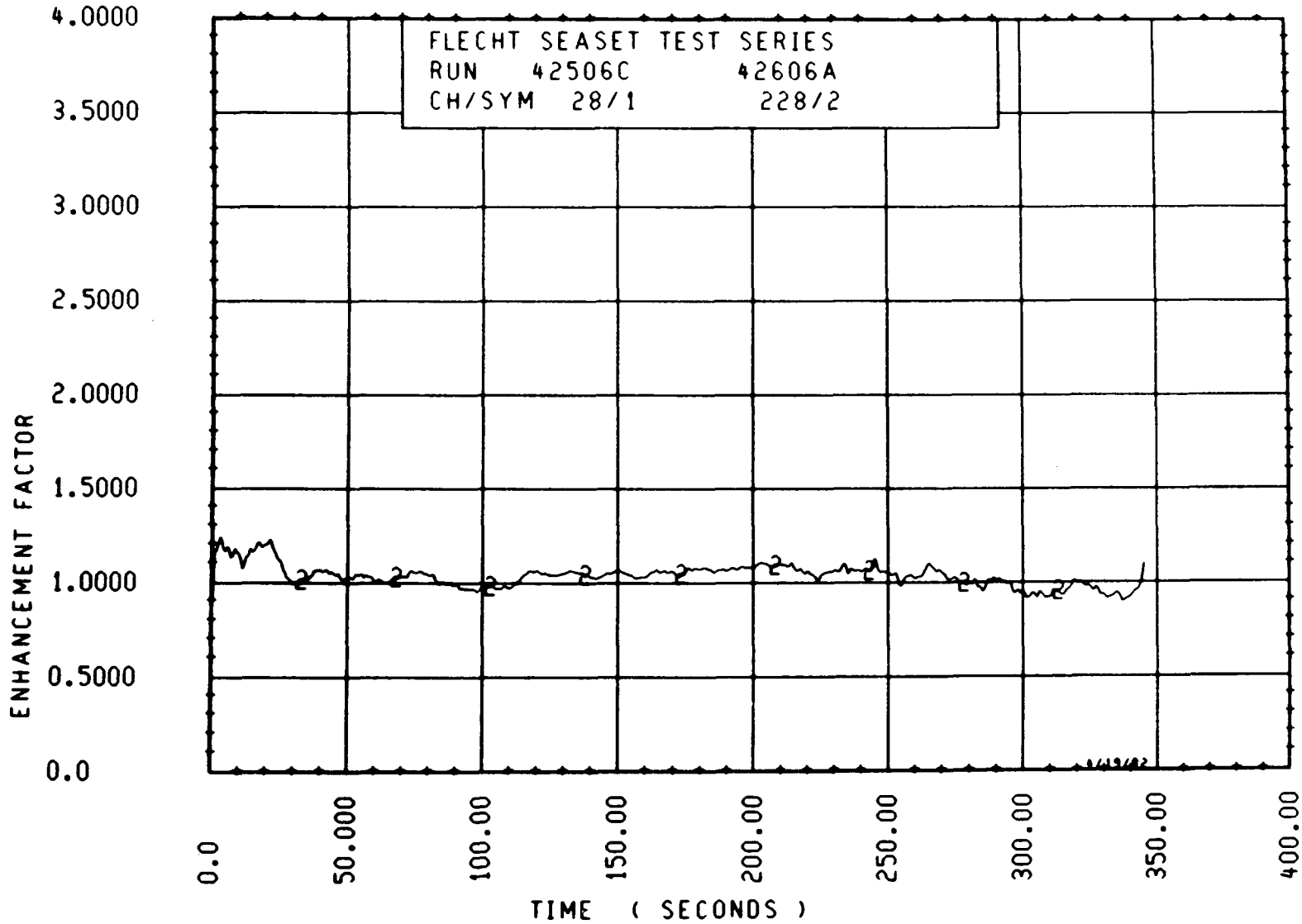


Figure O-33. Enhancement Factor for Run 42506C, Rod 3C, 1.80 m (71 in.) Elevation

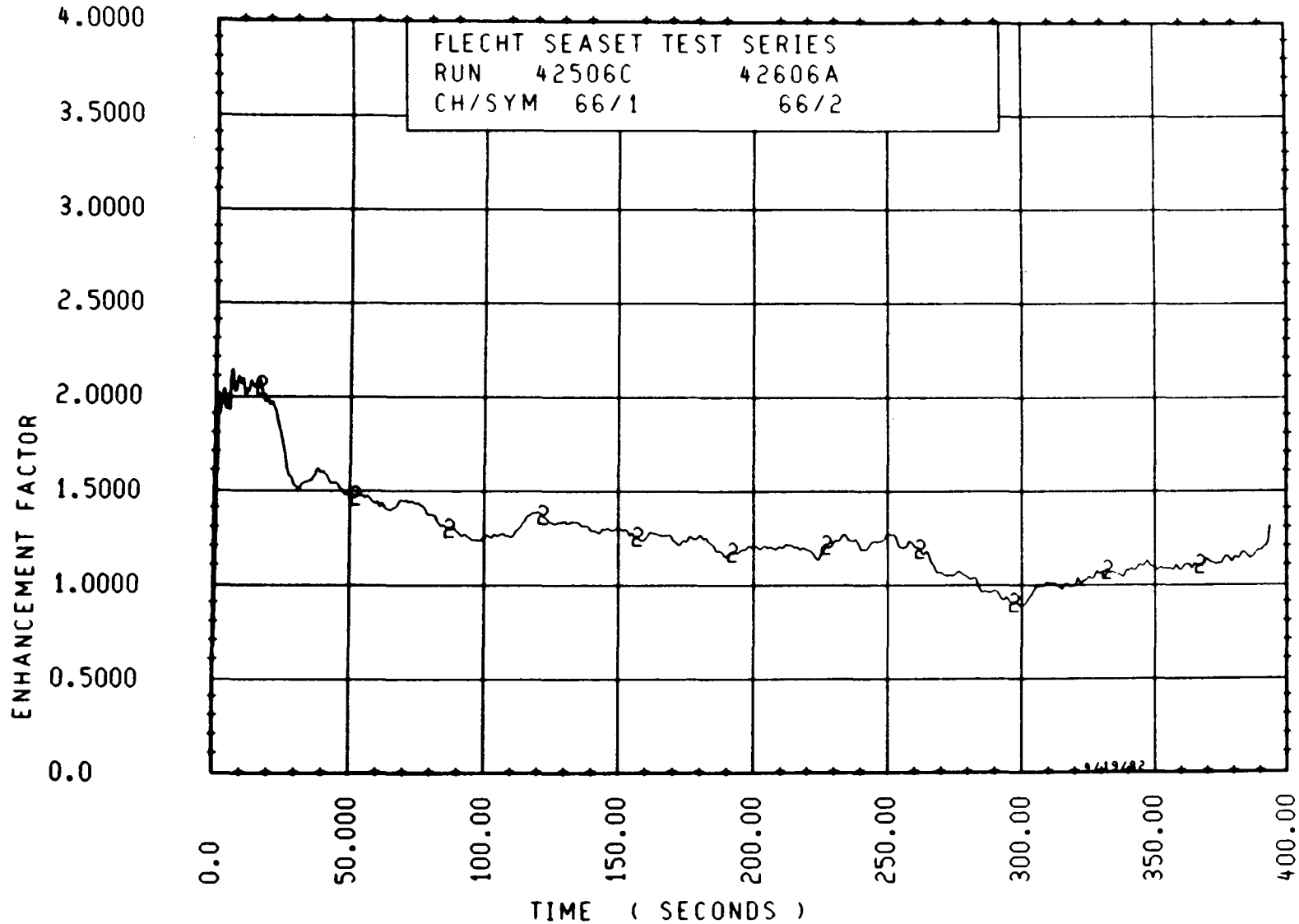


Figure O-34. Enhancement Factor for Run 42506C, Rod 3C, 1.93 m (76.1 in.) Elevation

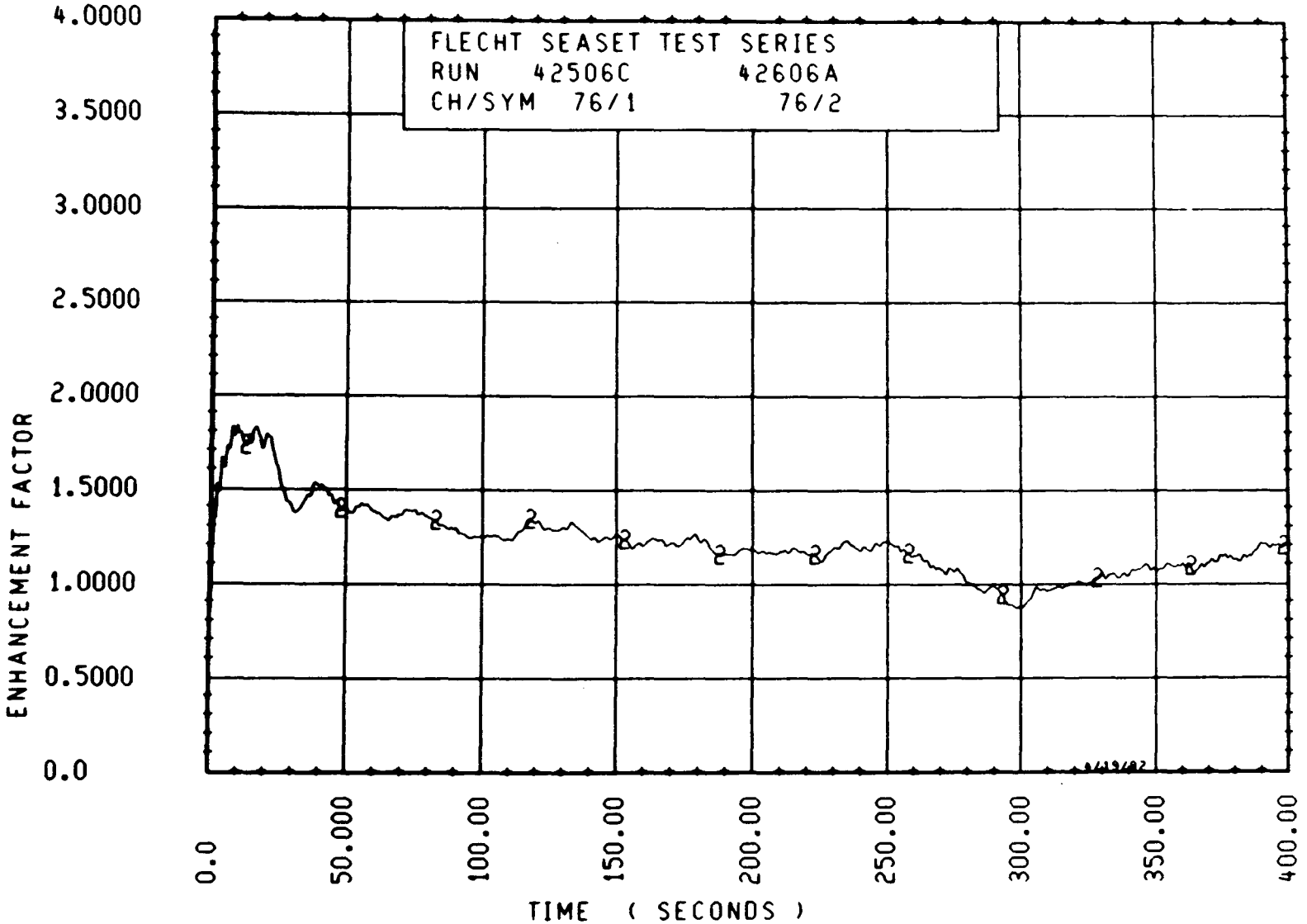


Figure O-35. Enhancement Factor for Run 42506C, Rod 3C, 1.96 m (77 in.) Elevation

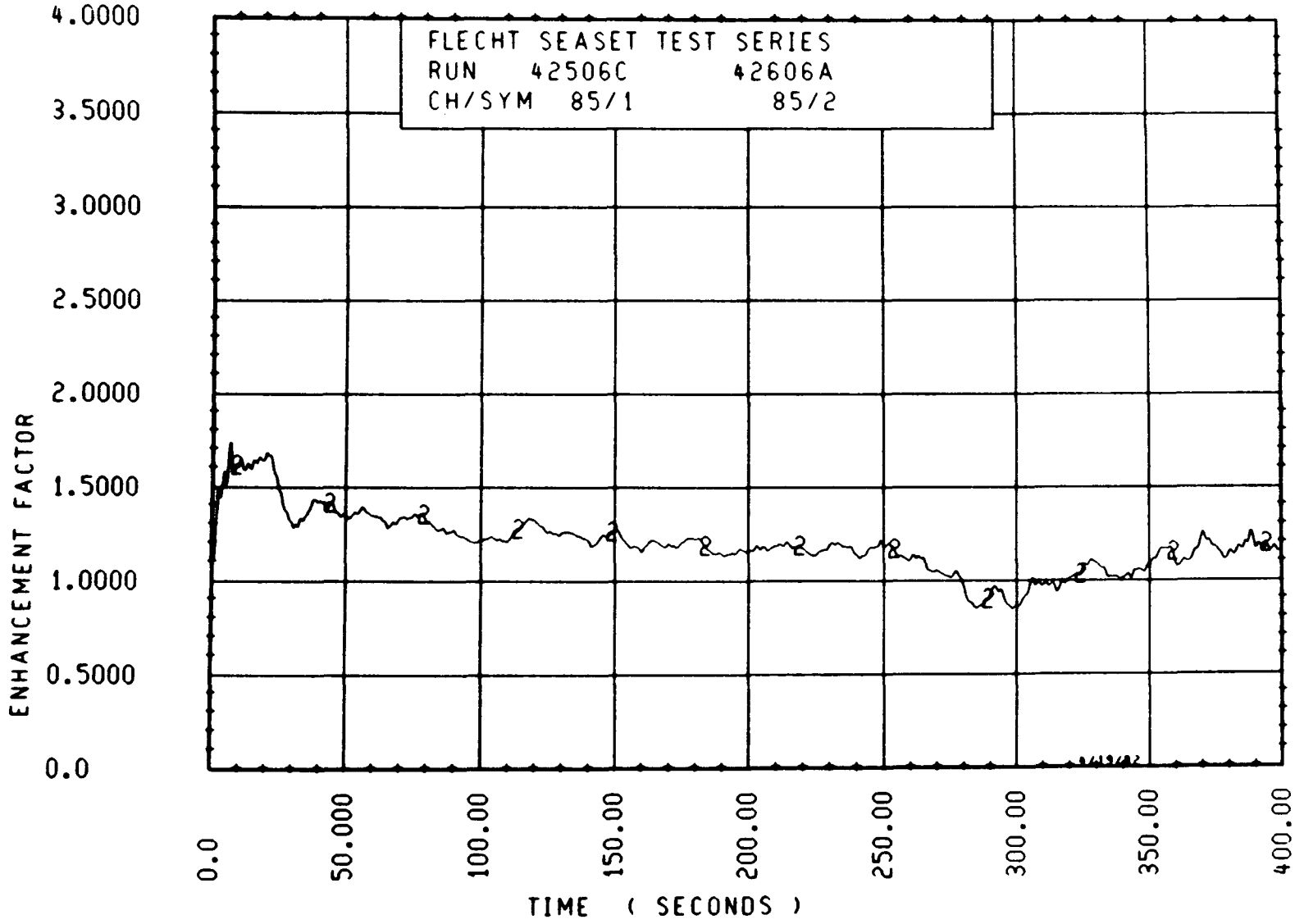


Figure O-36. Enhancement Factor for Run 42506C, Rod 3C, 1.98 m (77.9 in.) Elevation

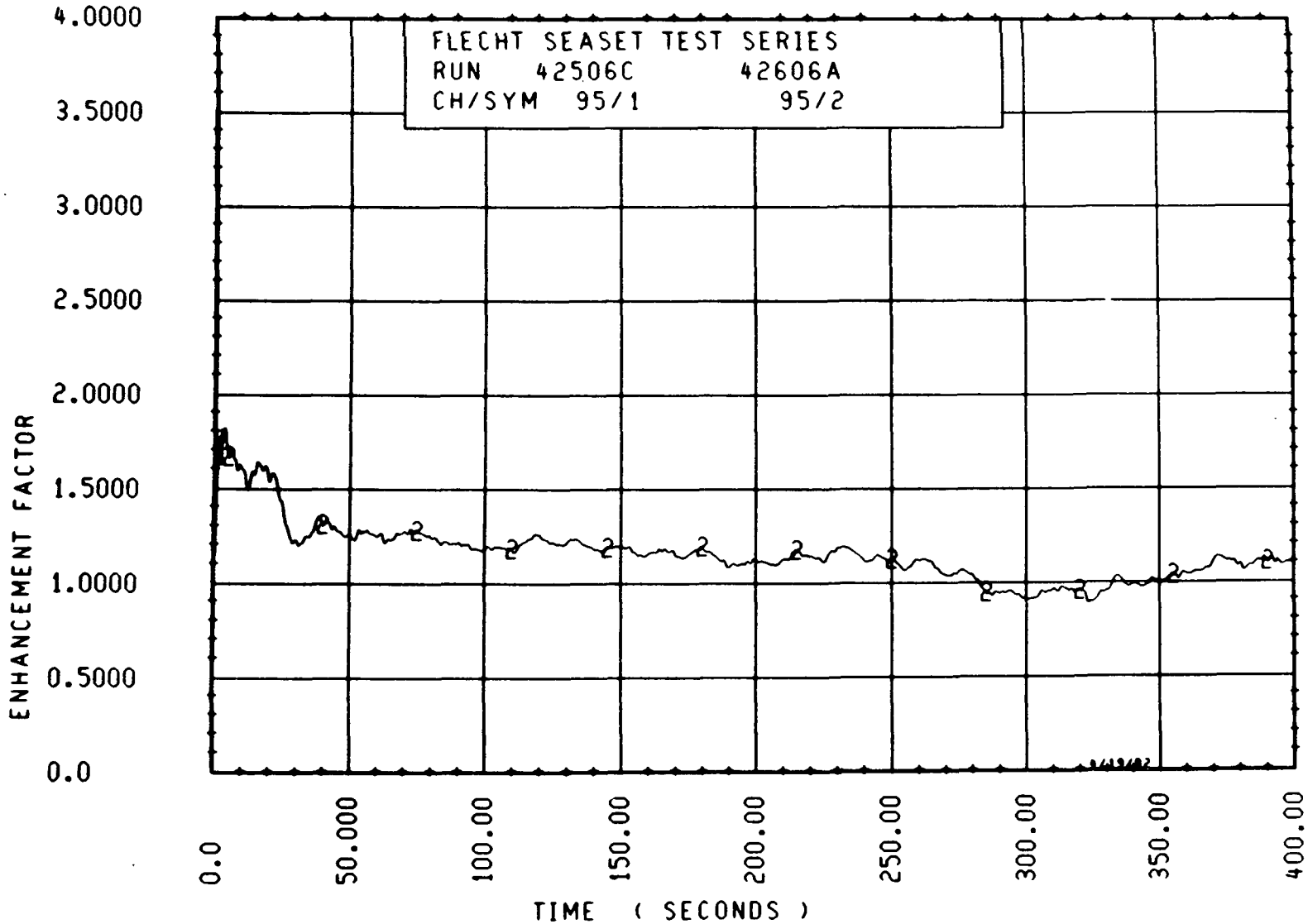


Figure O-37. Enhancement Factor for Run 42506C, Rod 3C, 2.00 m (78.9 in.) Elevation

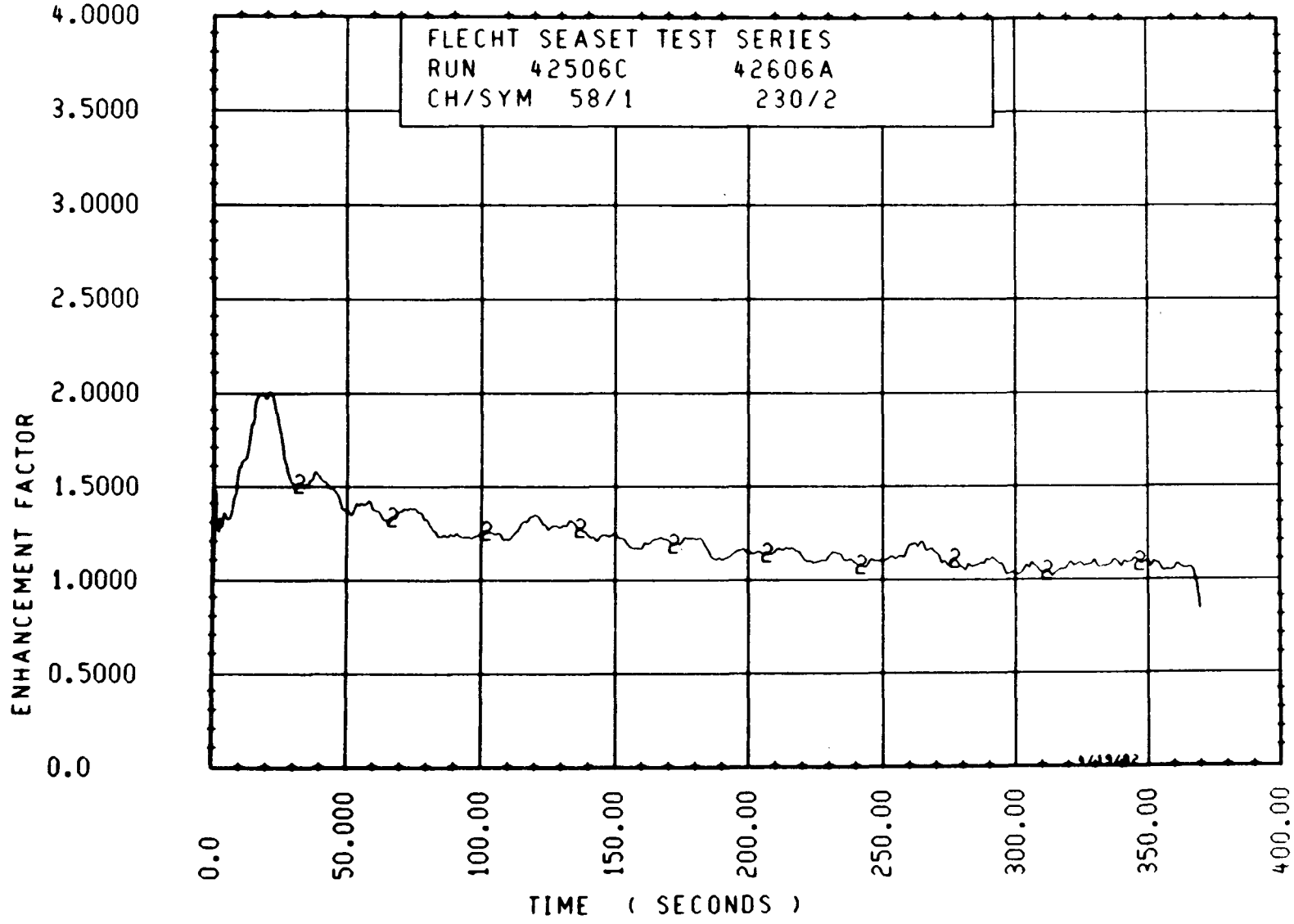


Figure O-38. Enhancement Factor for Run 42506C, Rod 3D, 1.90 m (74.9 in.) Elevation

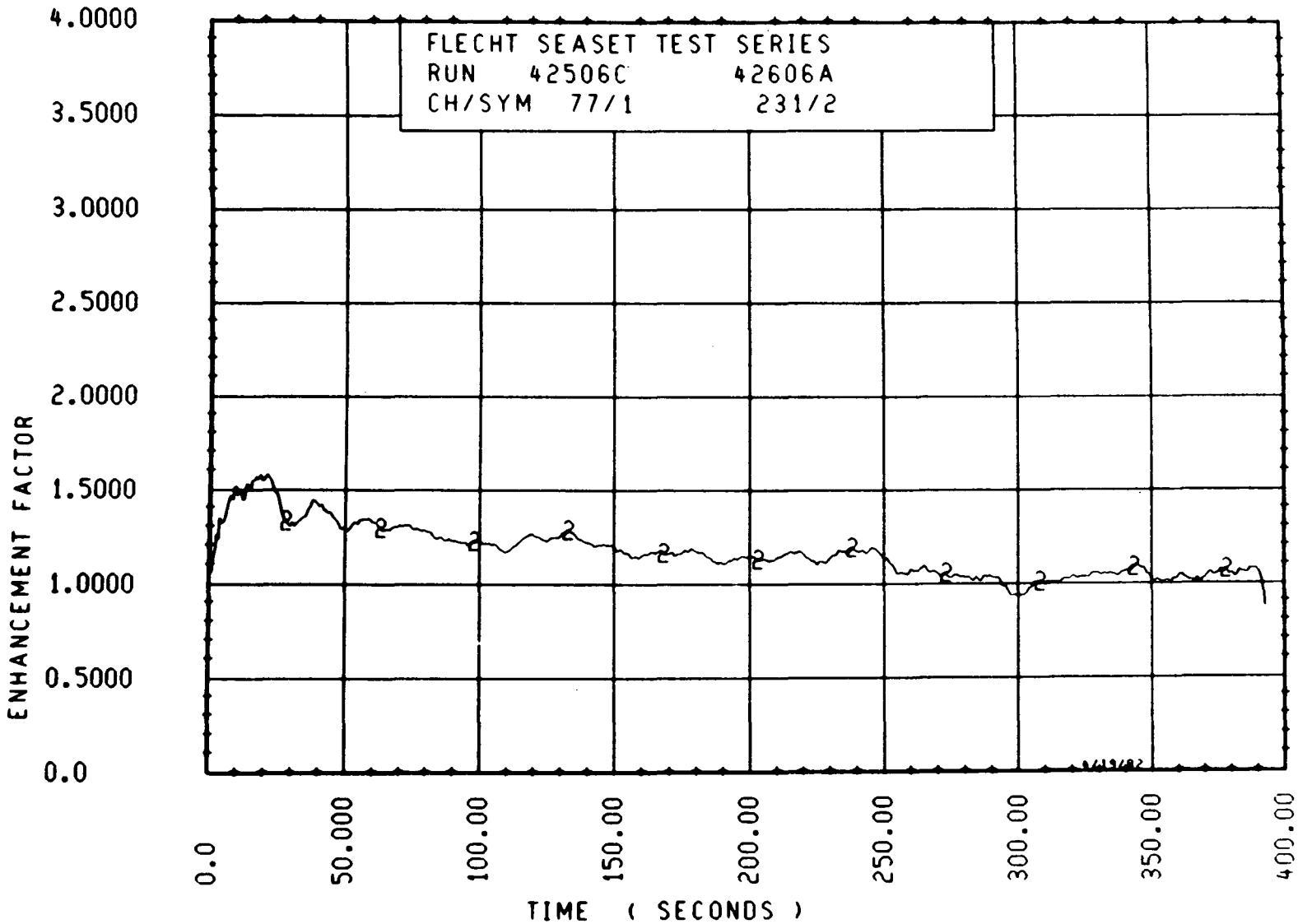


Figure O-39. Enhancement Factor for Run 42506C, Rod 3D, 1.95 m (76.7 in.) Elevation

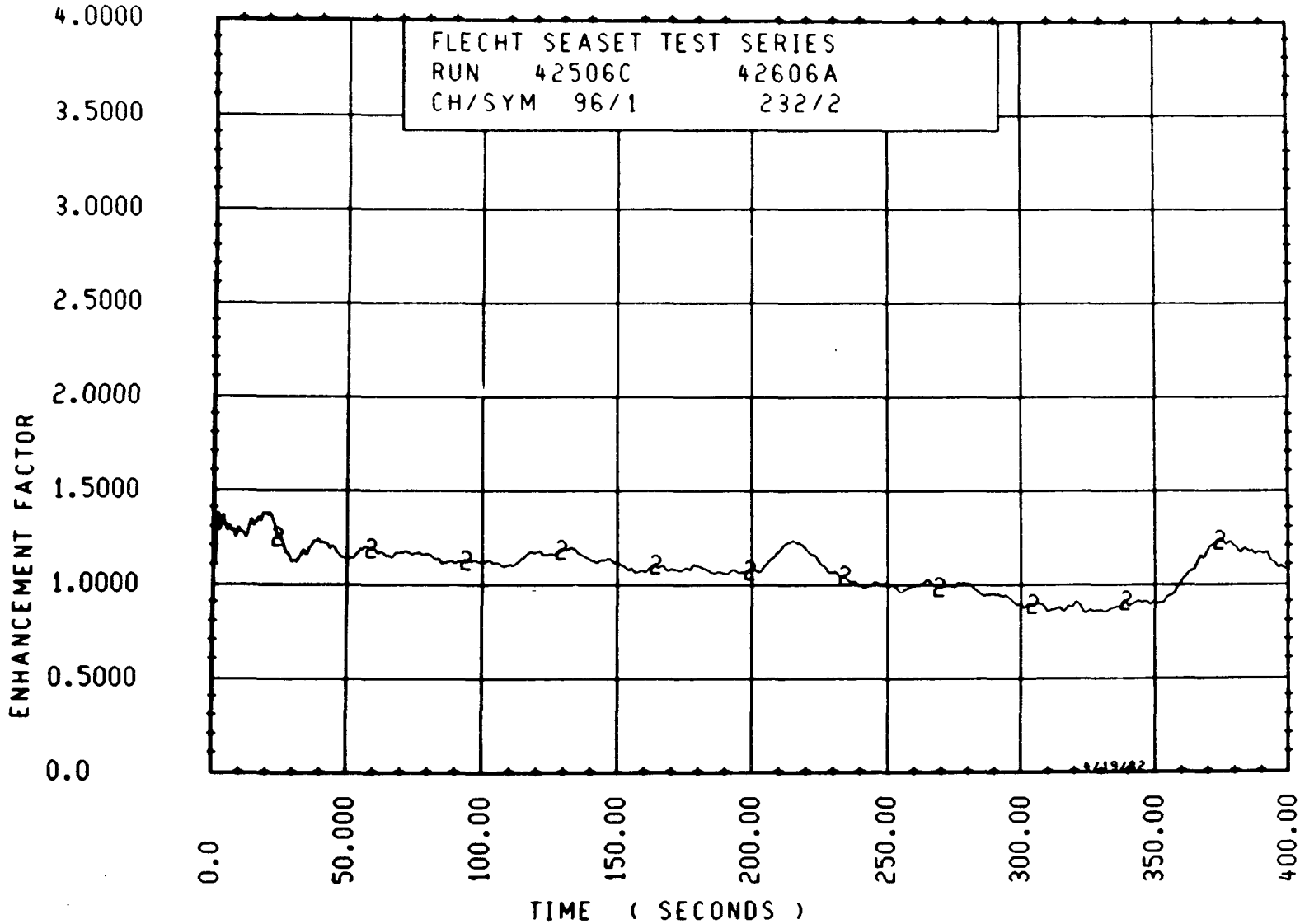


Figure O-40. Enhancement Factor for Run 42506C, Rod 3D, 2.00 m (78.9 in.) Elevation

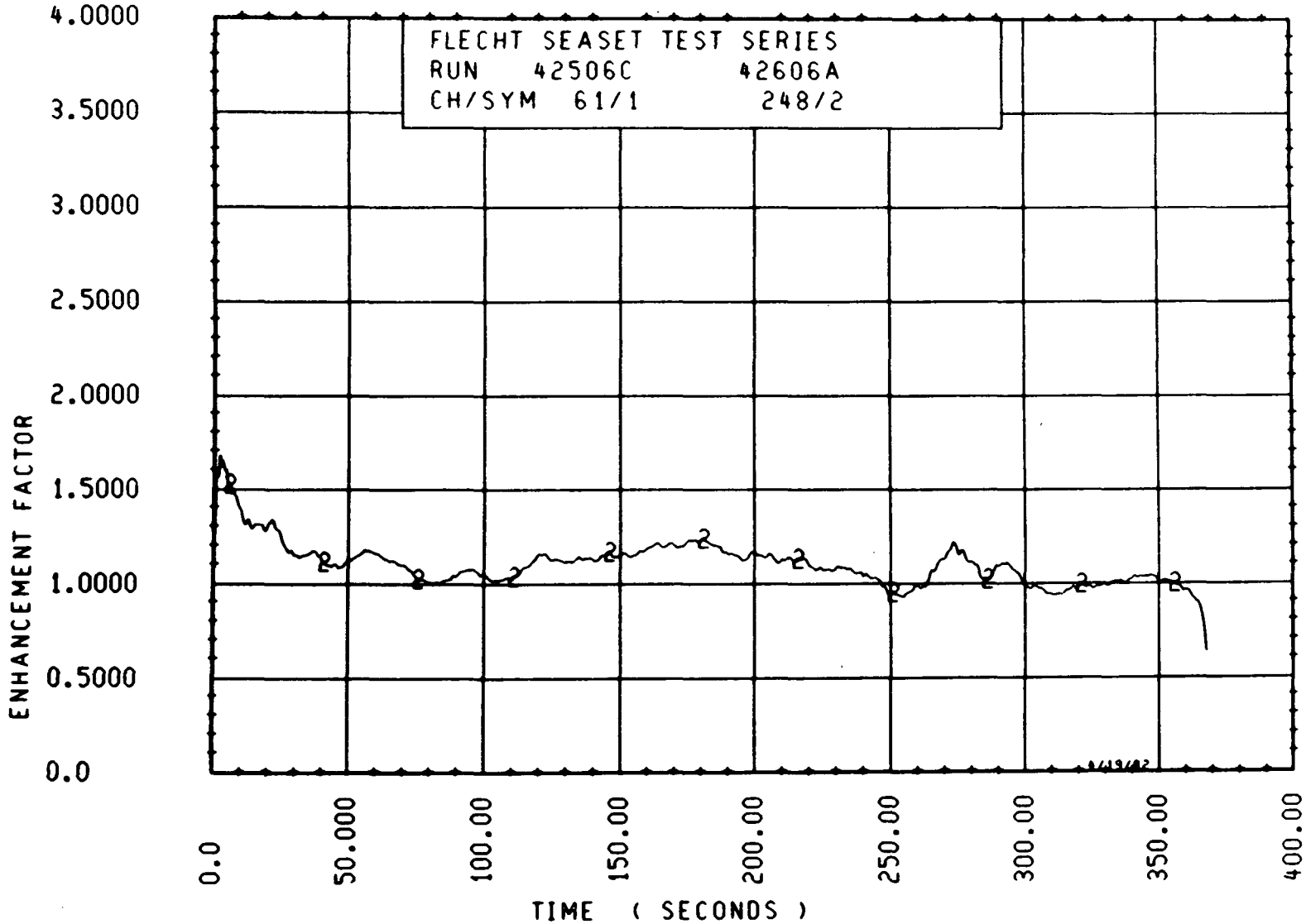


Figure O-41. Enhancement Factor for Run 42506C, Rod 5C, 1.88 m (74.1 in.) Elevation

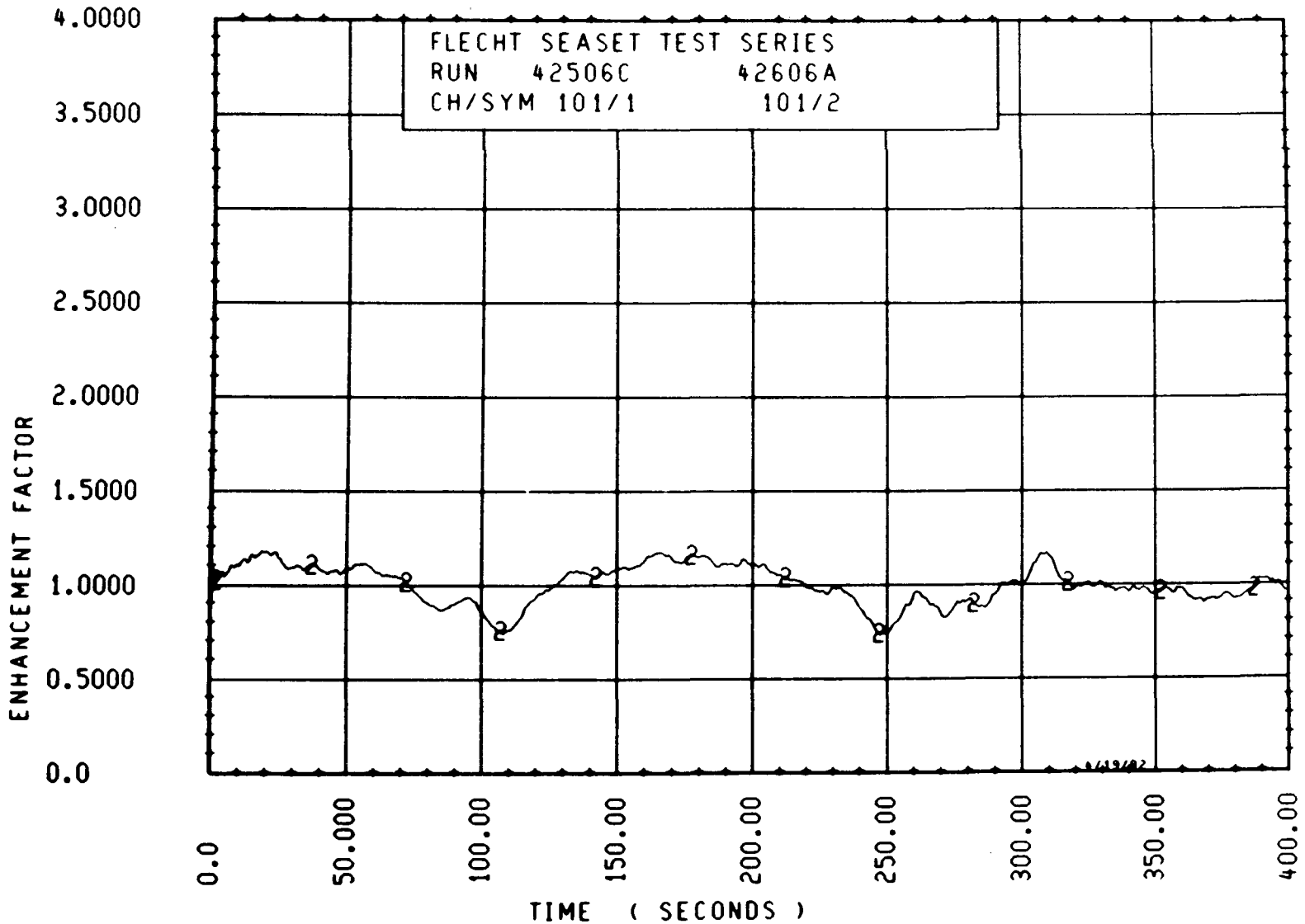


Figure O-42. Enhancement Factor for Run 42506C, Rod 5C, 1.98 m (78 in.) Elevation

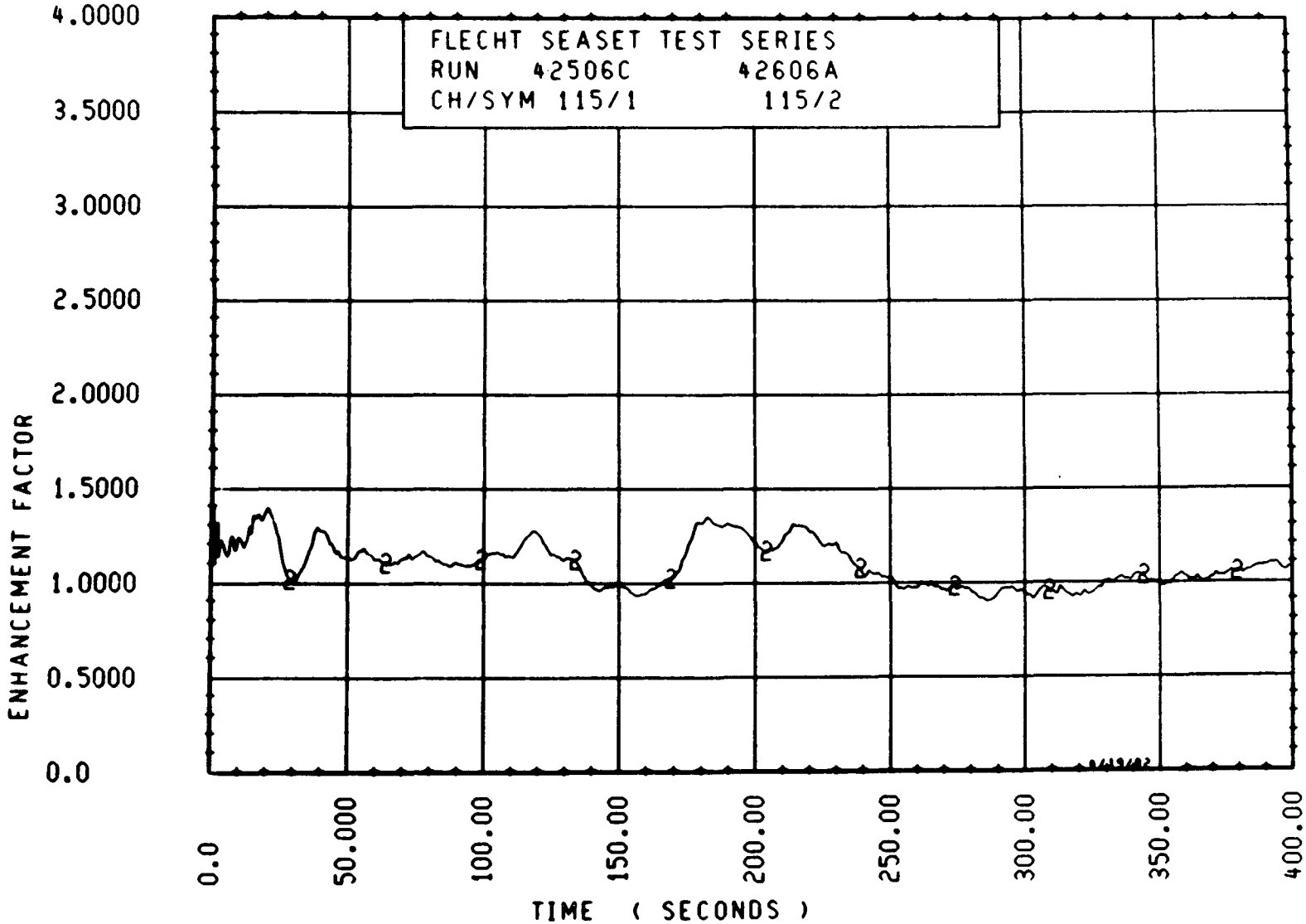


Figure O-43. Enhancement Factor for Run 42506C, Rod 3D, 2.13 m (84 in.) Elevation

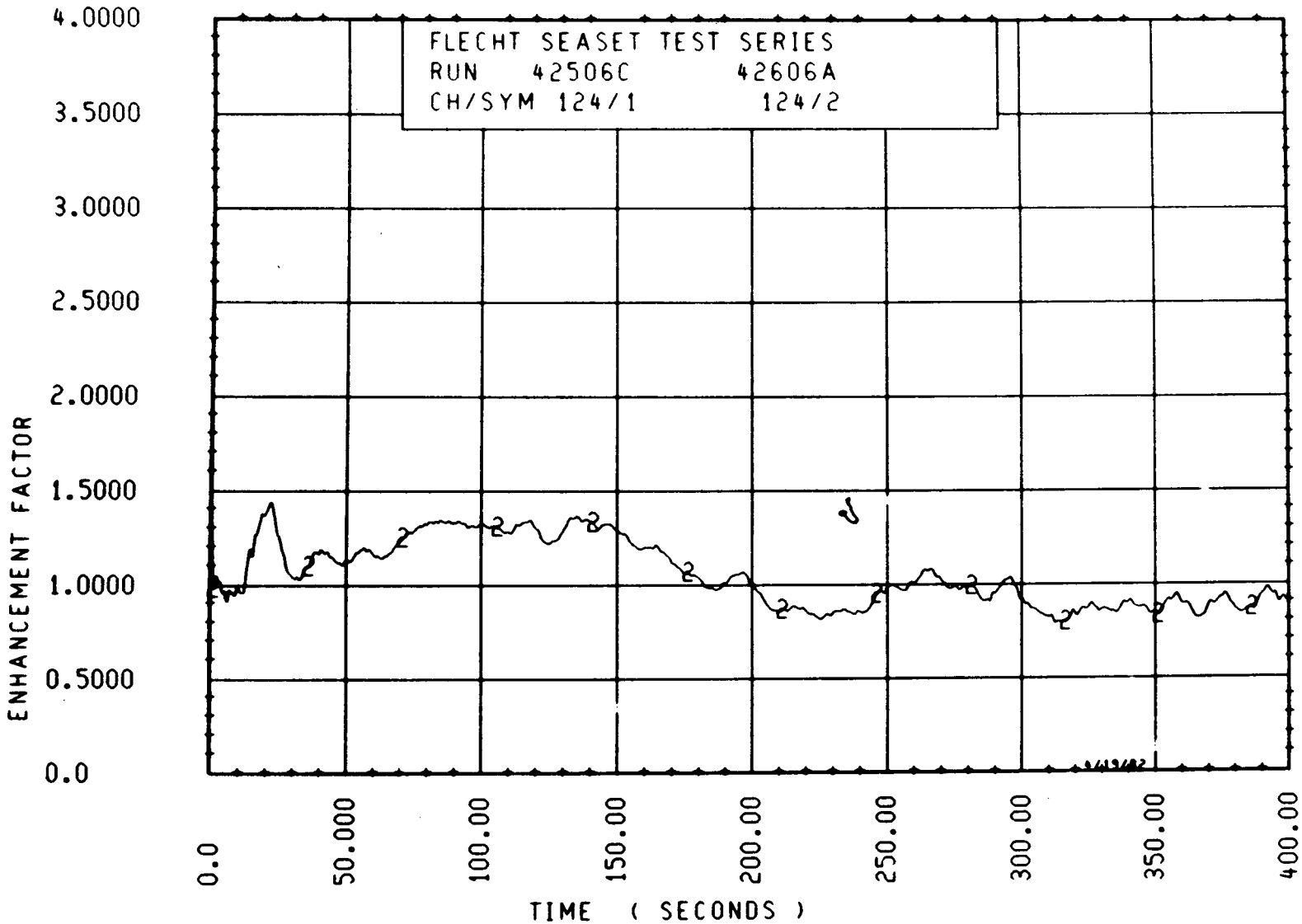


Figure O-44. Enhancement Factor for Run 42506C, Rod 3B, 2.29 m (90 in.) Elevation

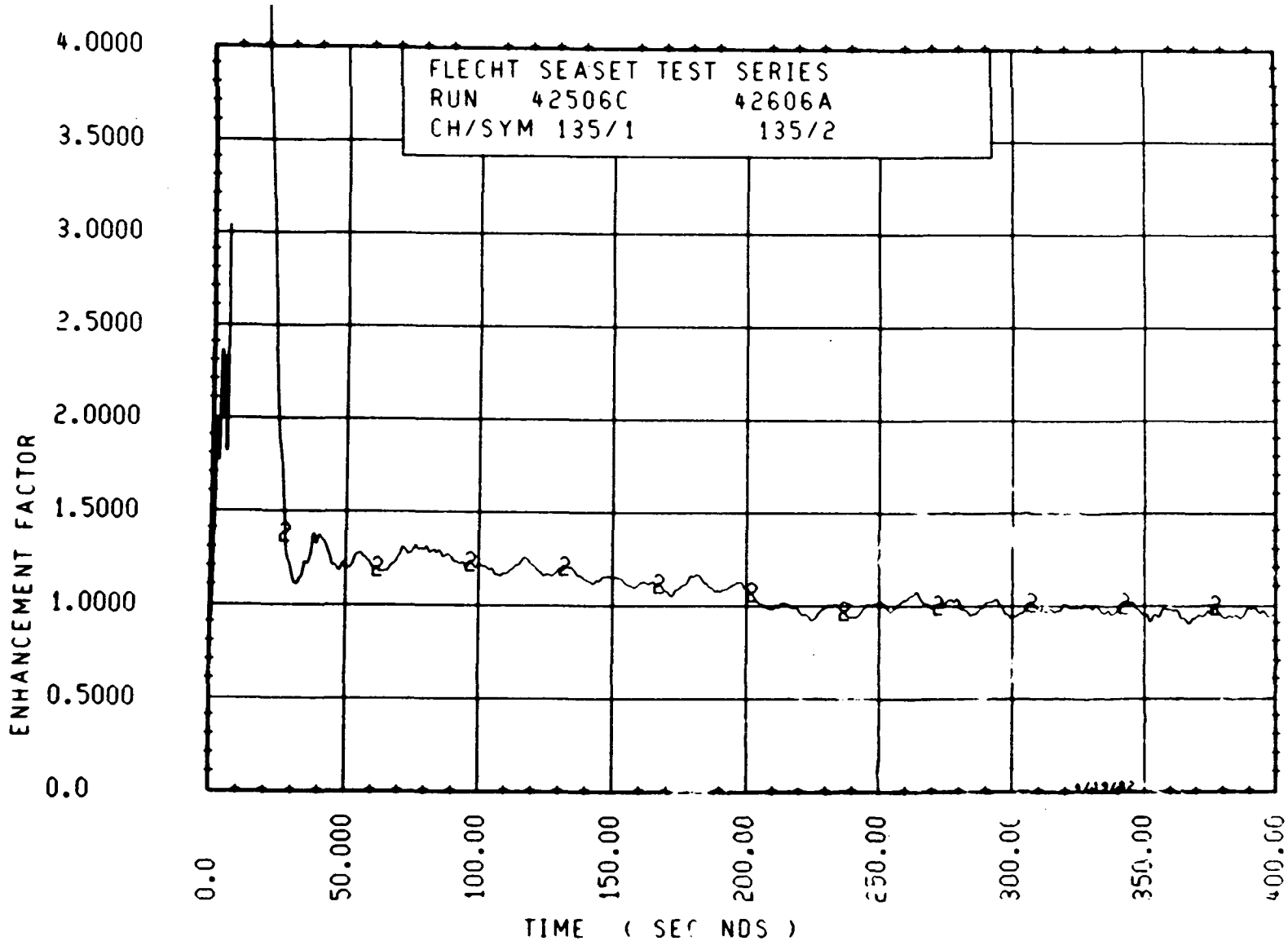


Figure O-45. Enhancement Factor for Run 42506C, Rod 3B, 2.44 m (96 in.) Elevation

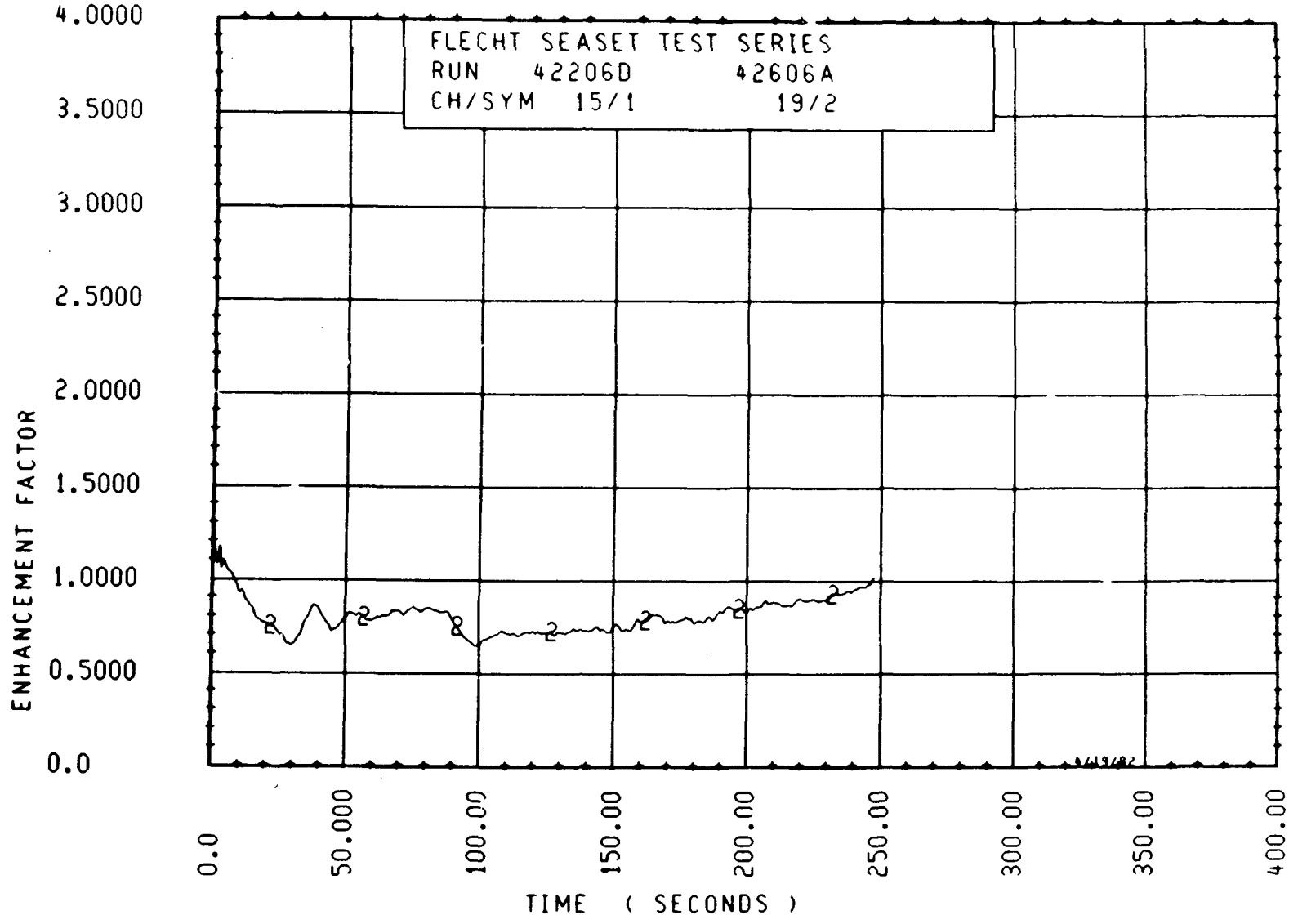


Figure O-46. Enhancement Factor for Run 42206D, Rod 4C, 1.52 m (60 in.) Elevation

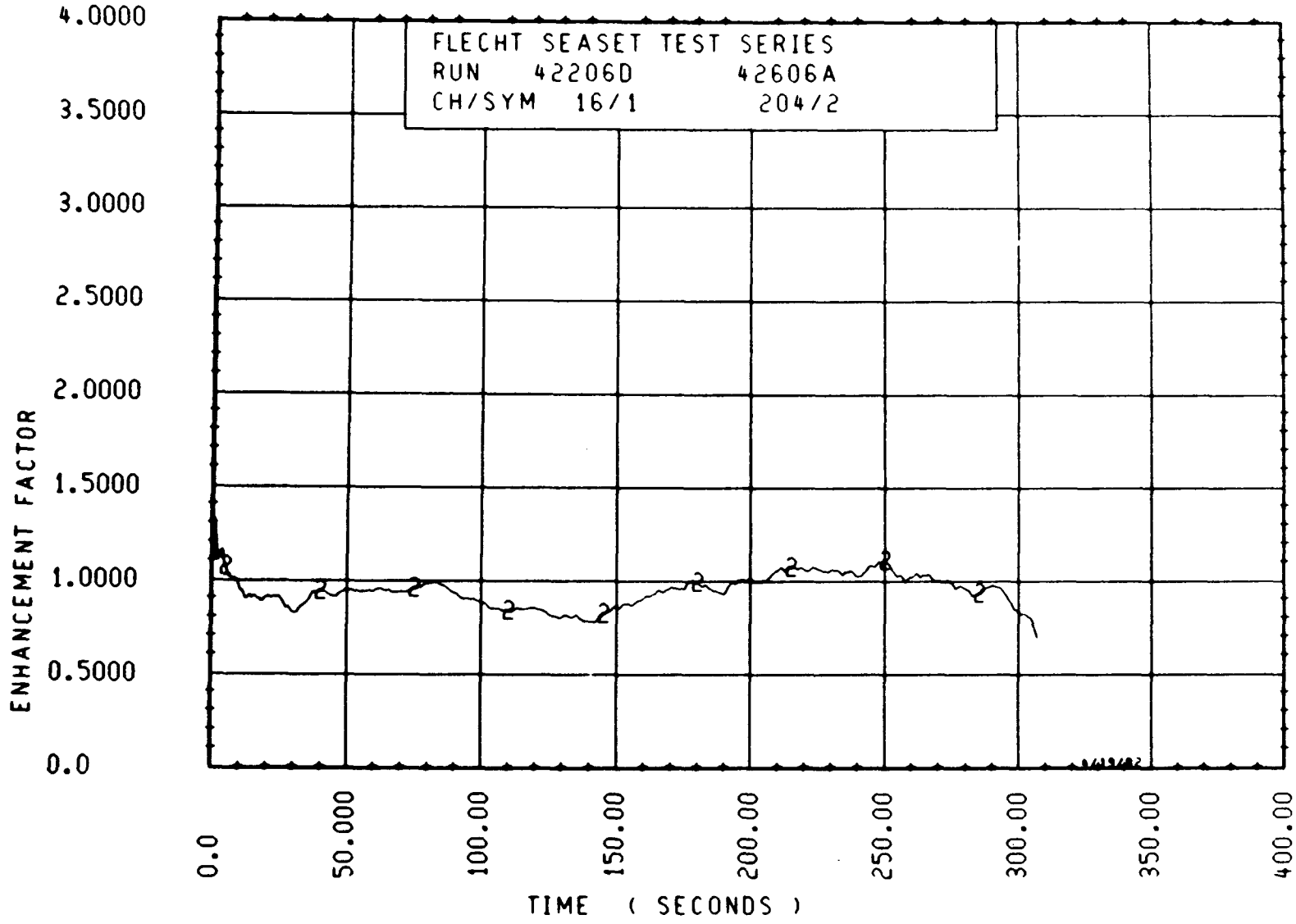


Figure O-47. Enhancement Factor for Run 42206D, Rod 2A, 1.72 m (67.8 in.) Elevation

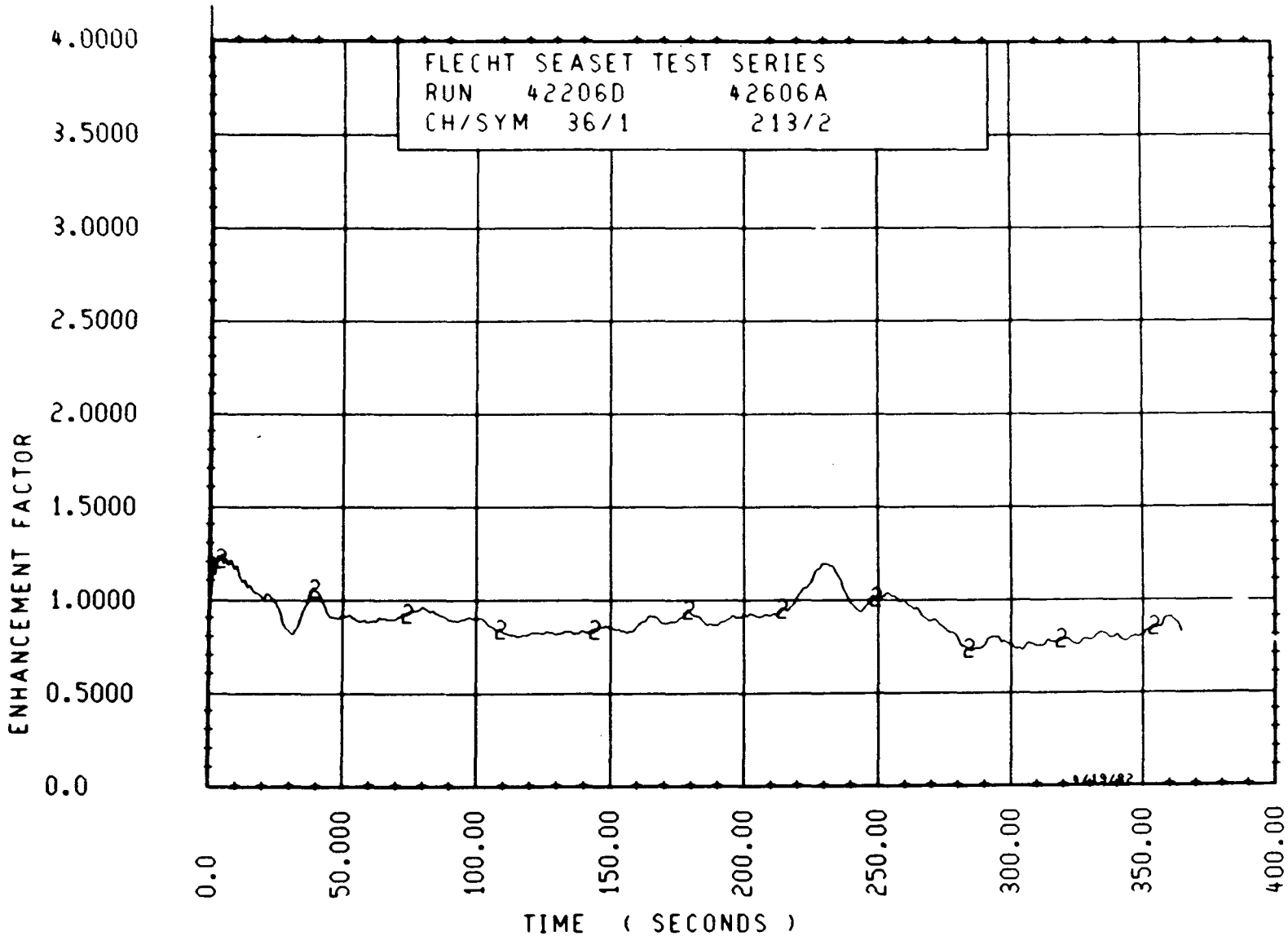


Figure O-48. Enhancement Factor for Run 42206D, Rod 2D, 1.84 m (72.4 in.) Elevation

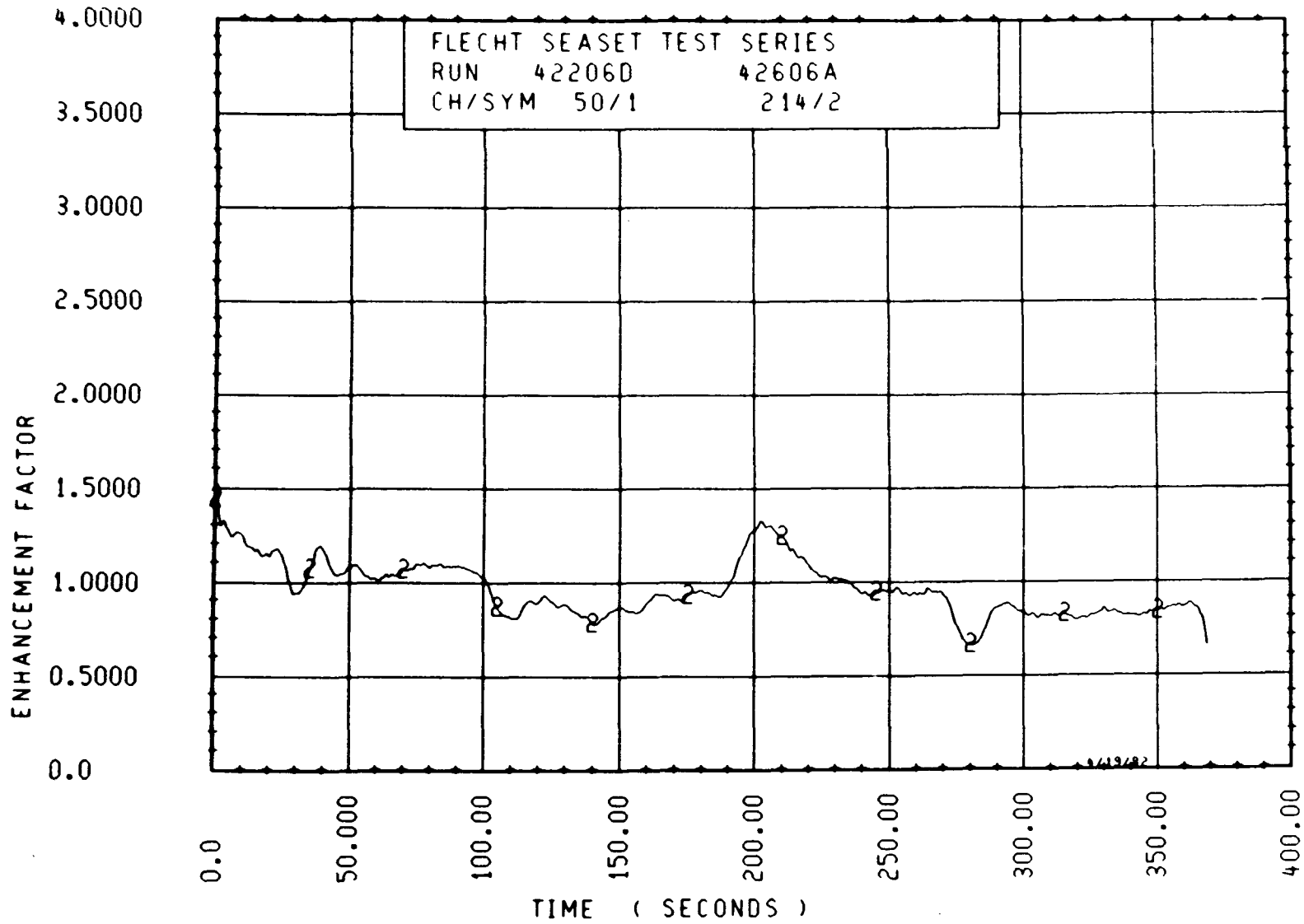


Figure O-49. Enhancement Factor for Run 42206D, Rod 2D, 1.89 m (74.4 in.) Elevation

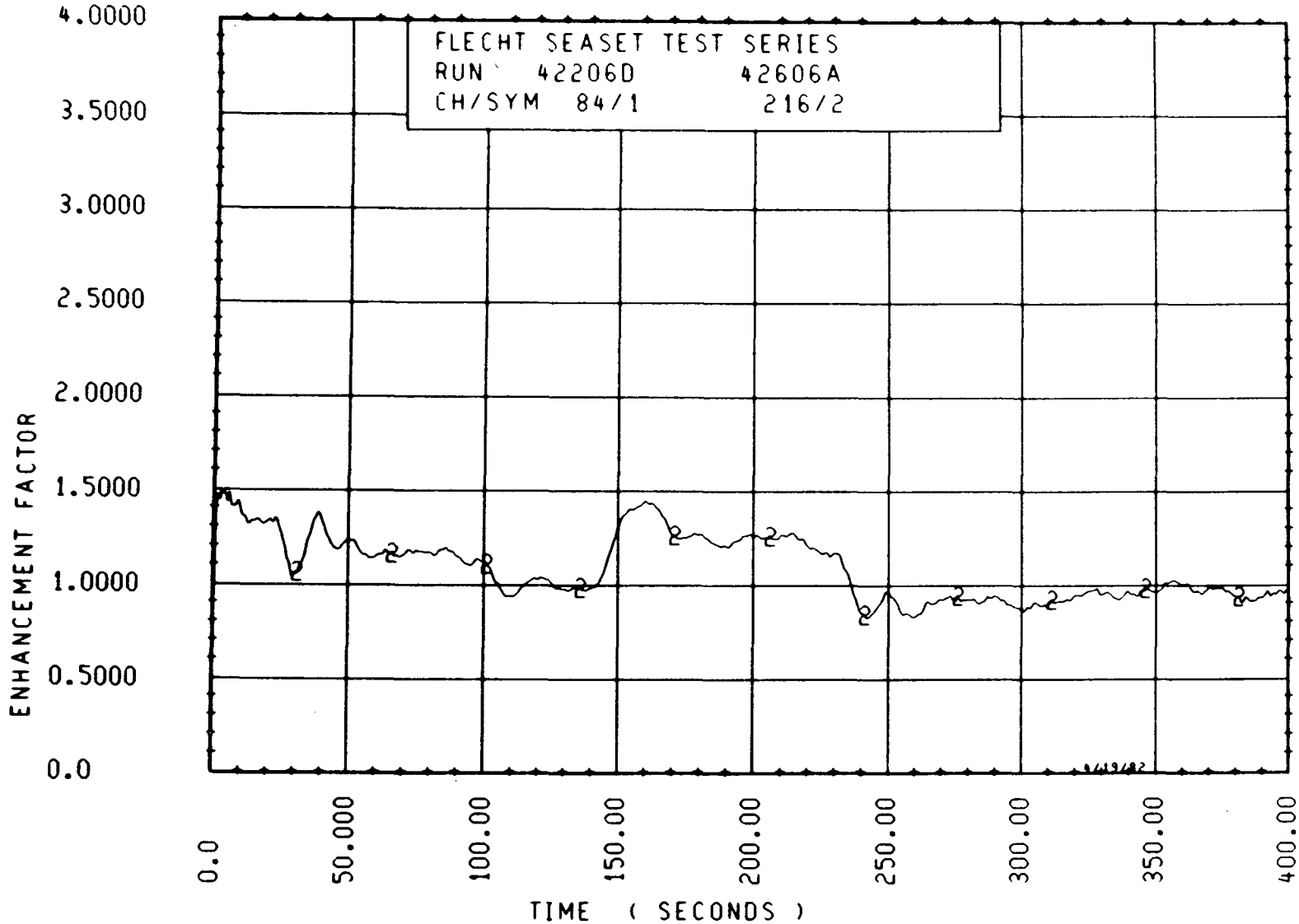


Figure O-50. Enhancement Factor for Run 42206D, Rod 2D, 1.97 m (77.4 in.) Elevation

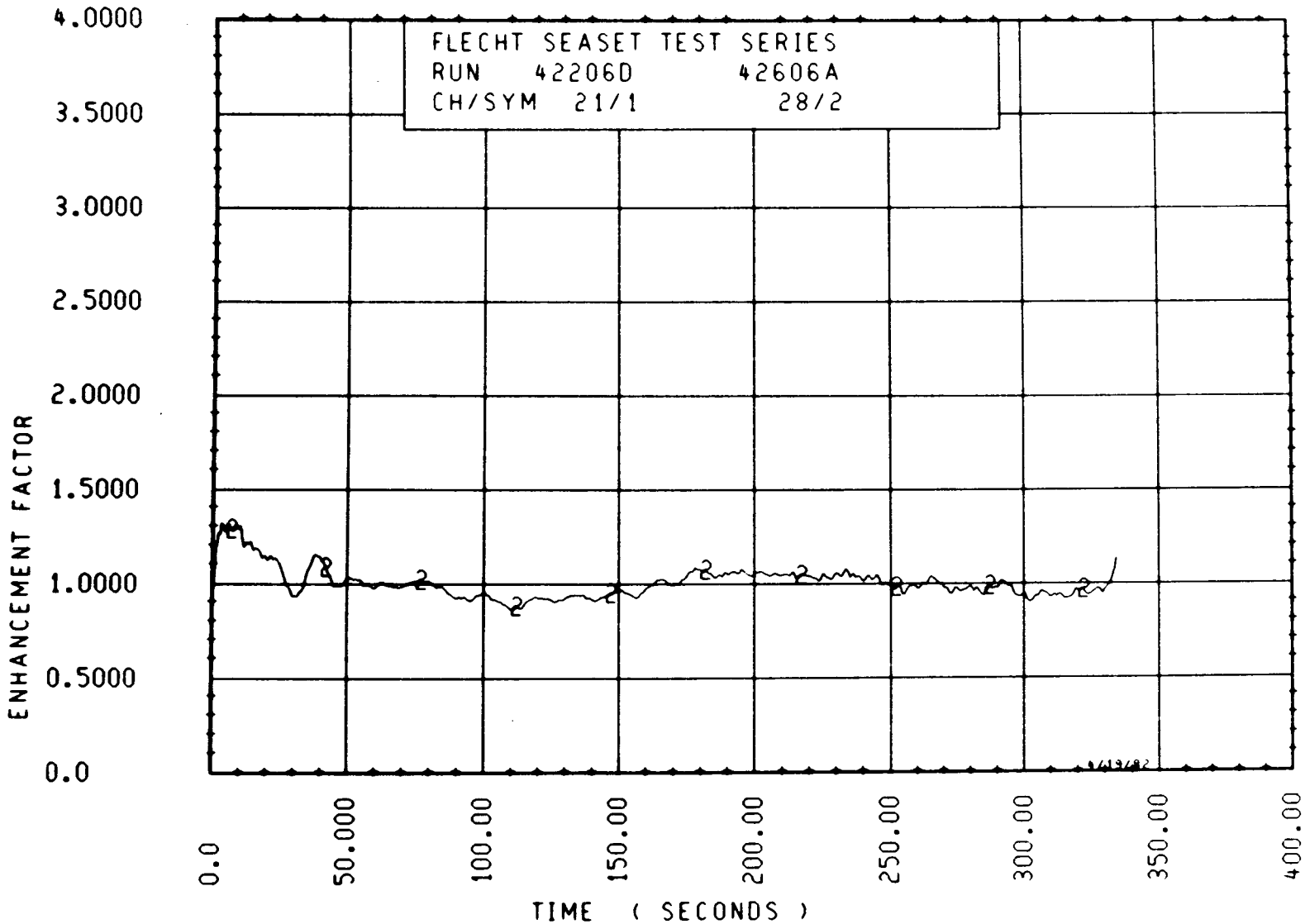


Figure O-51. Enhancement Factor for Run 42206D, Rod 3C, 1.79 m (70.6 in.) Elevation

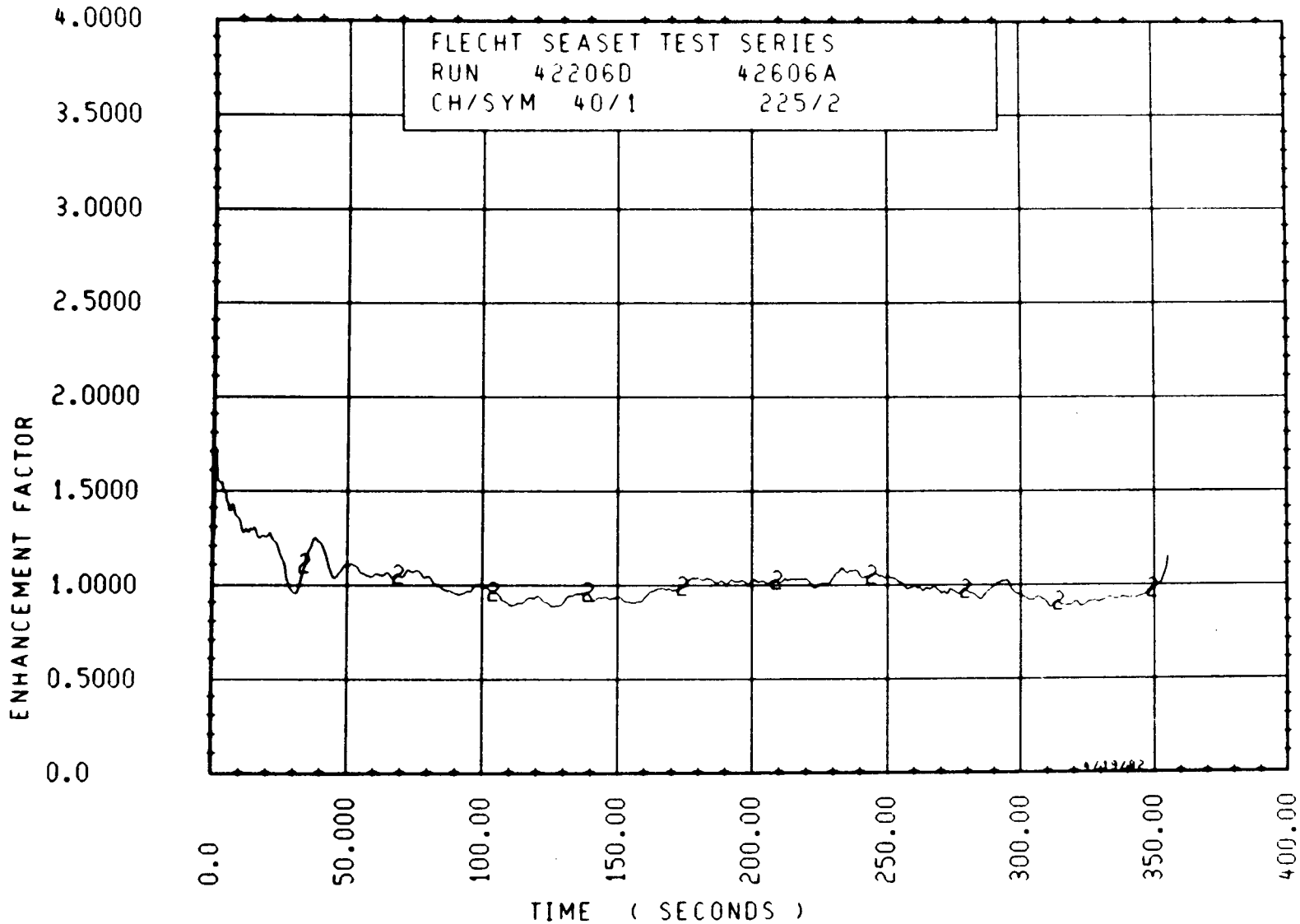


Figure O-52. Enhancement Factor for Run 42206D, Rod 3C, 1.84 m (72.6 in.) Elevation

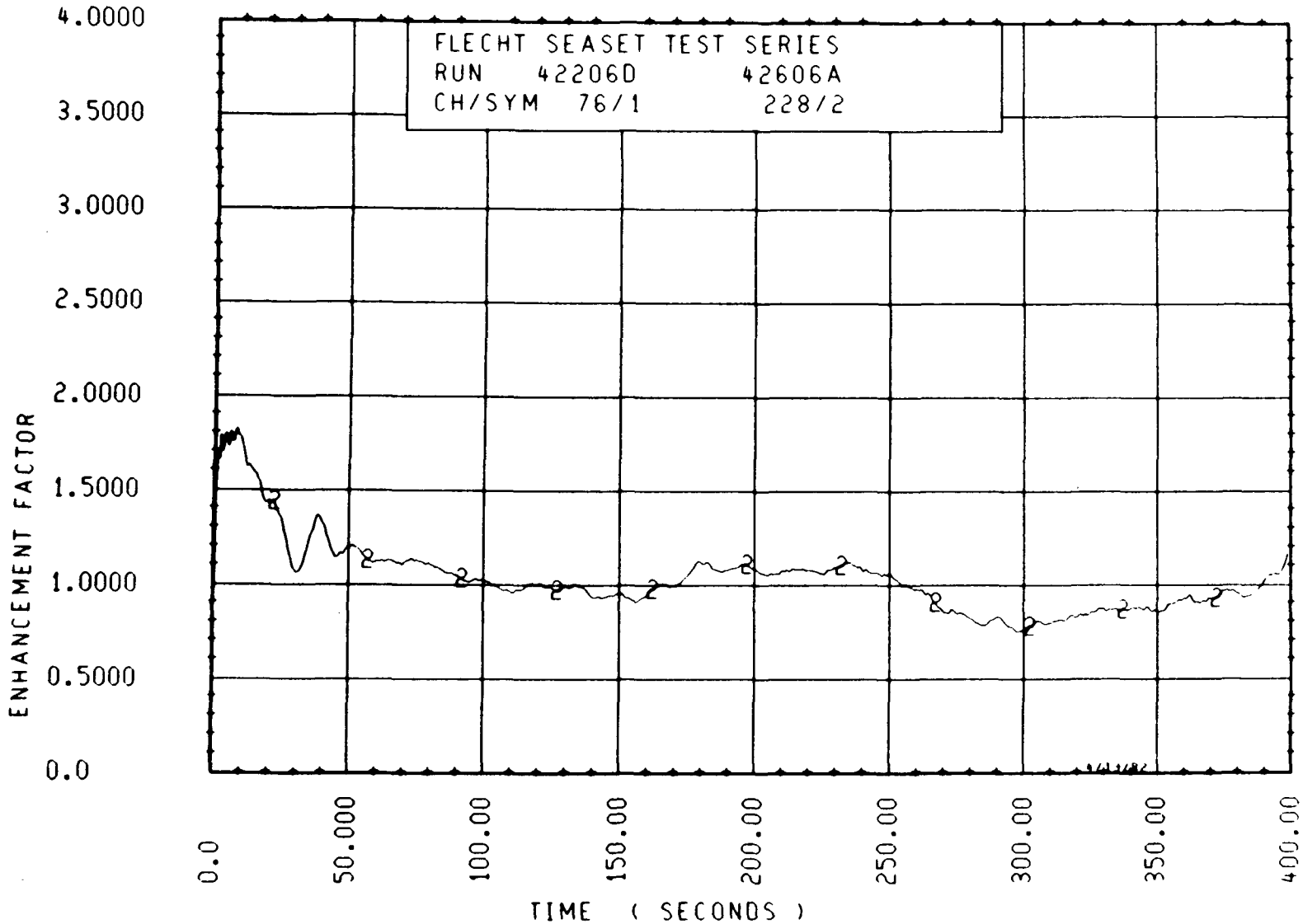


Figure O-53. Enhancement Factor for Run 42206D, Rod 3C, 1.95 m (76.8 in.) Elevation

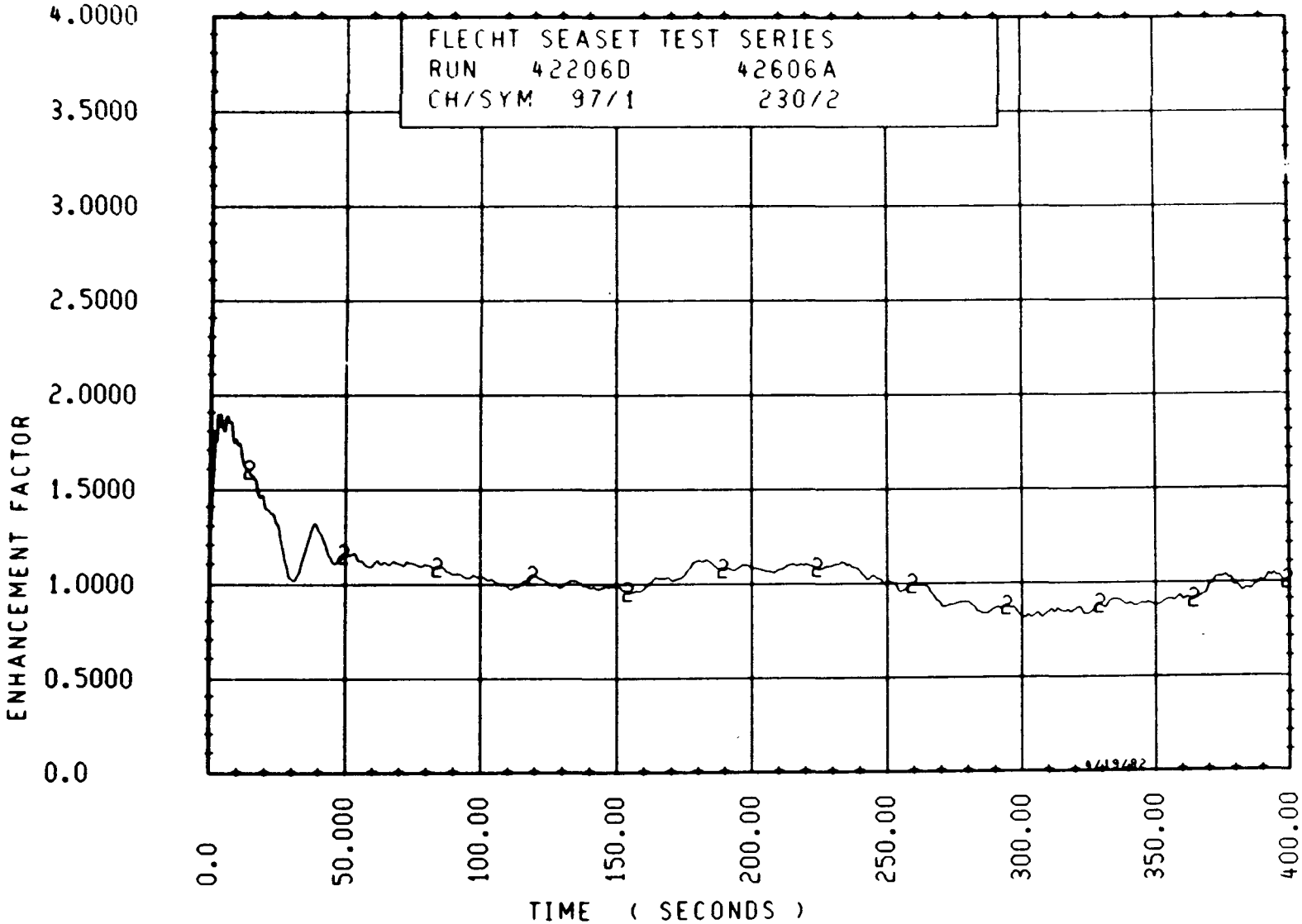


Figure O-54. Enhancement Factor for Run 42206D, Rod 3C, 2.00 m (78.8 in.) Elevation

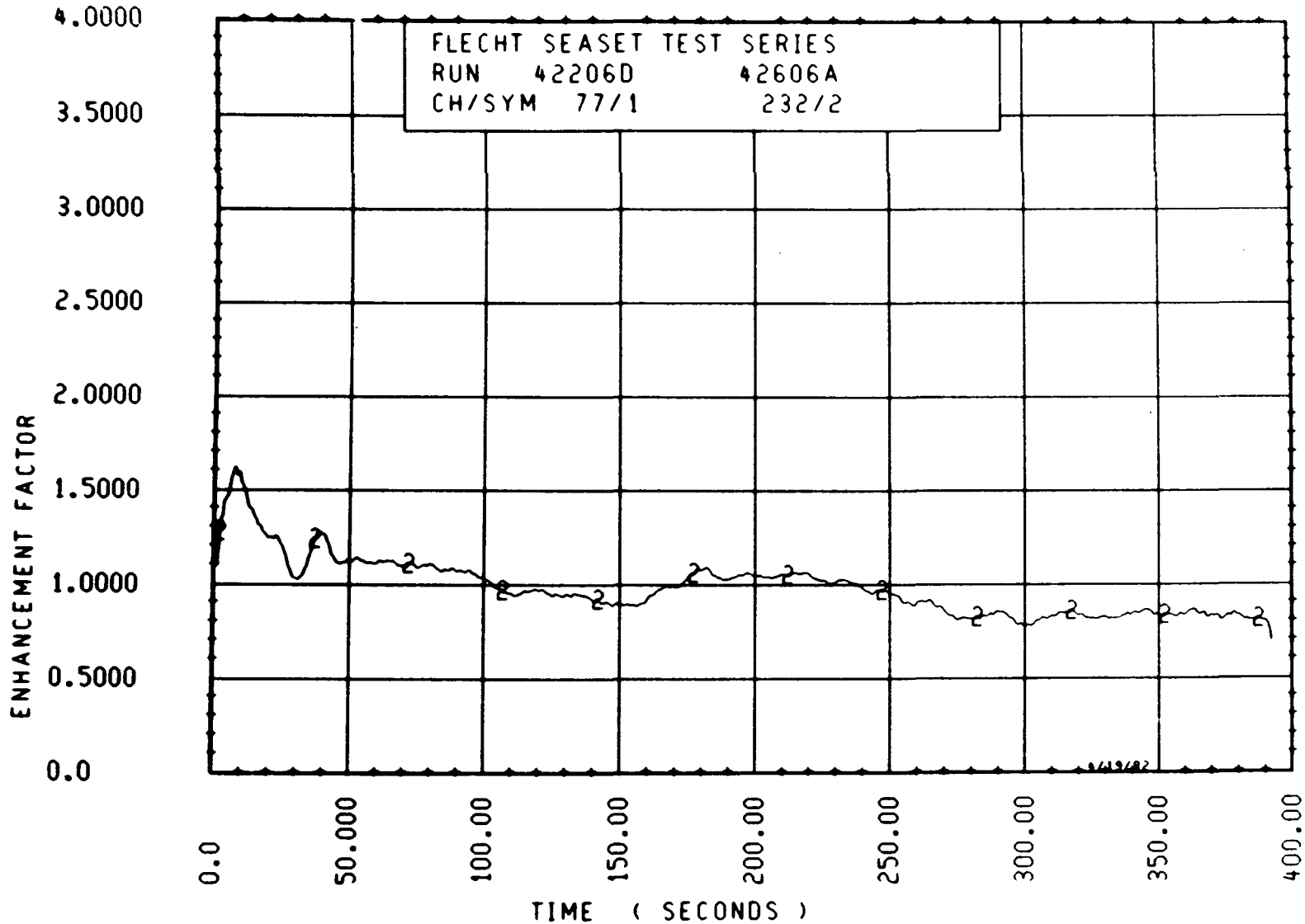


Figure O-55. Enhancement Factor for Run 42206D, Rod 3D, 1.94 m (76.4 in.) Elevation

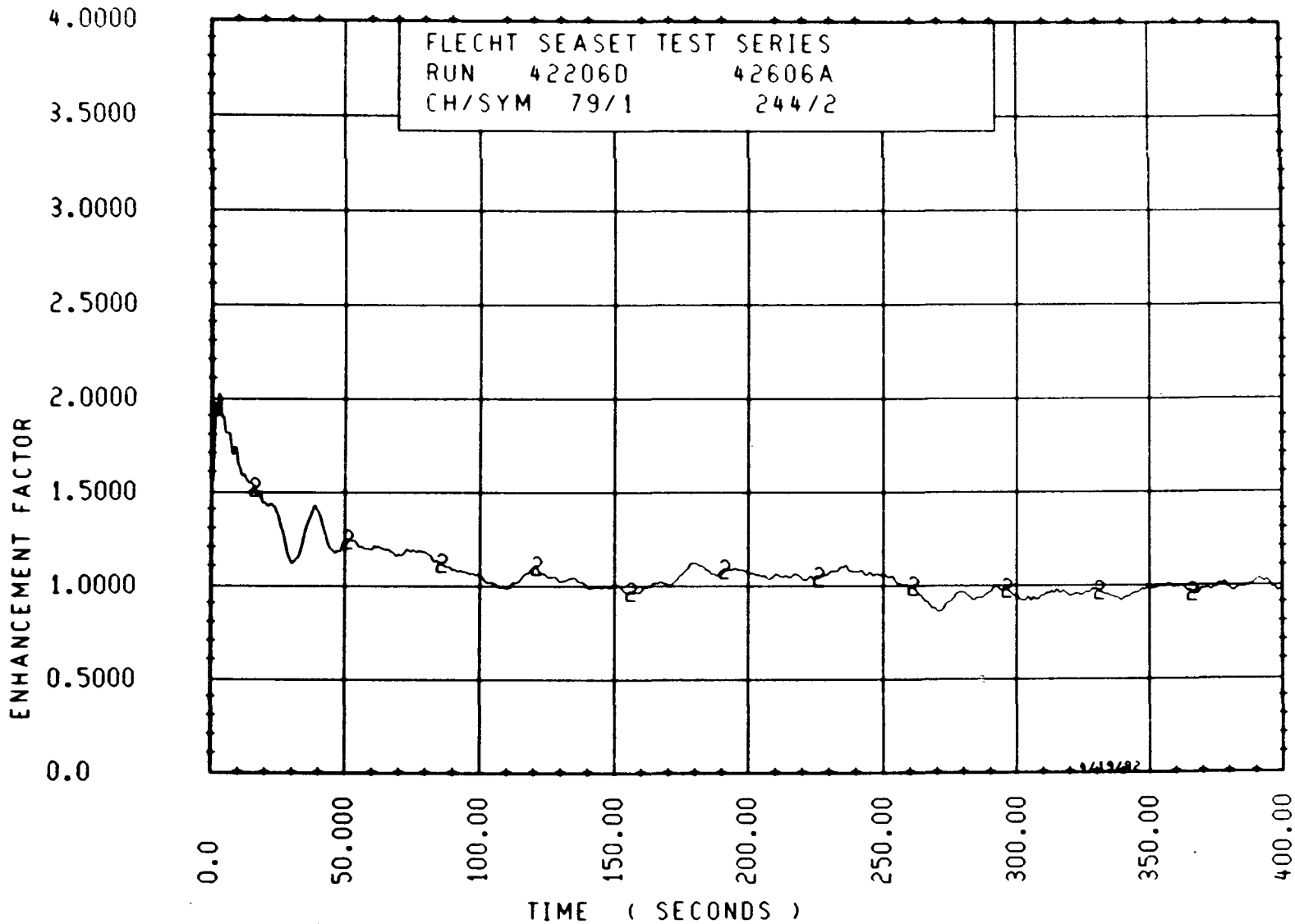


Figure O-56. Enhancement Factor for Run 42206D, Rod 4C, 1.95 m (76.9 in.) Elevation

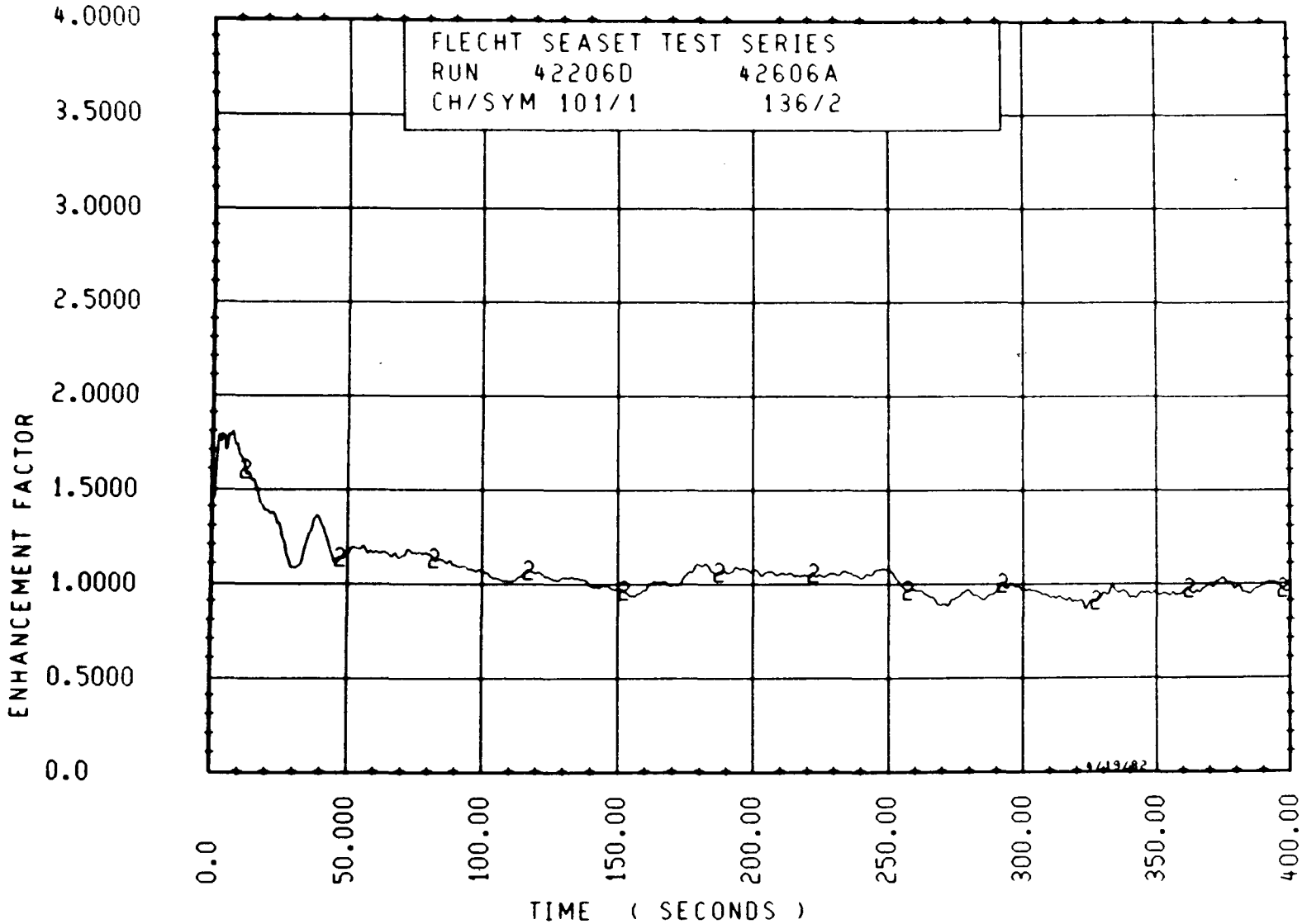


Figure O-57. Enhancement Factor for Run 42206D, Rod 4C, 2.00 m (78.9 in.) Elevation

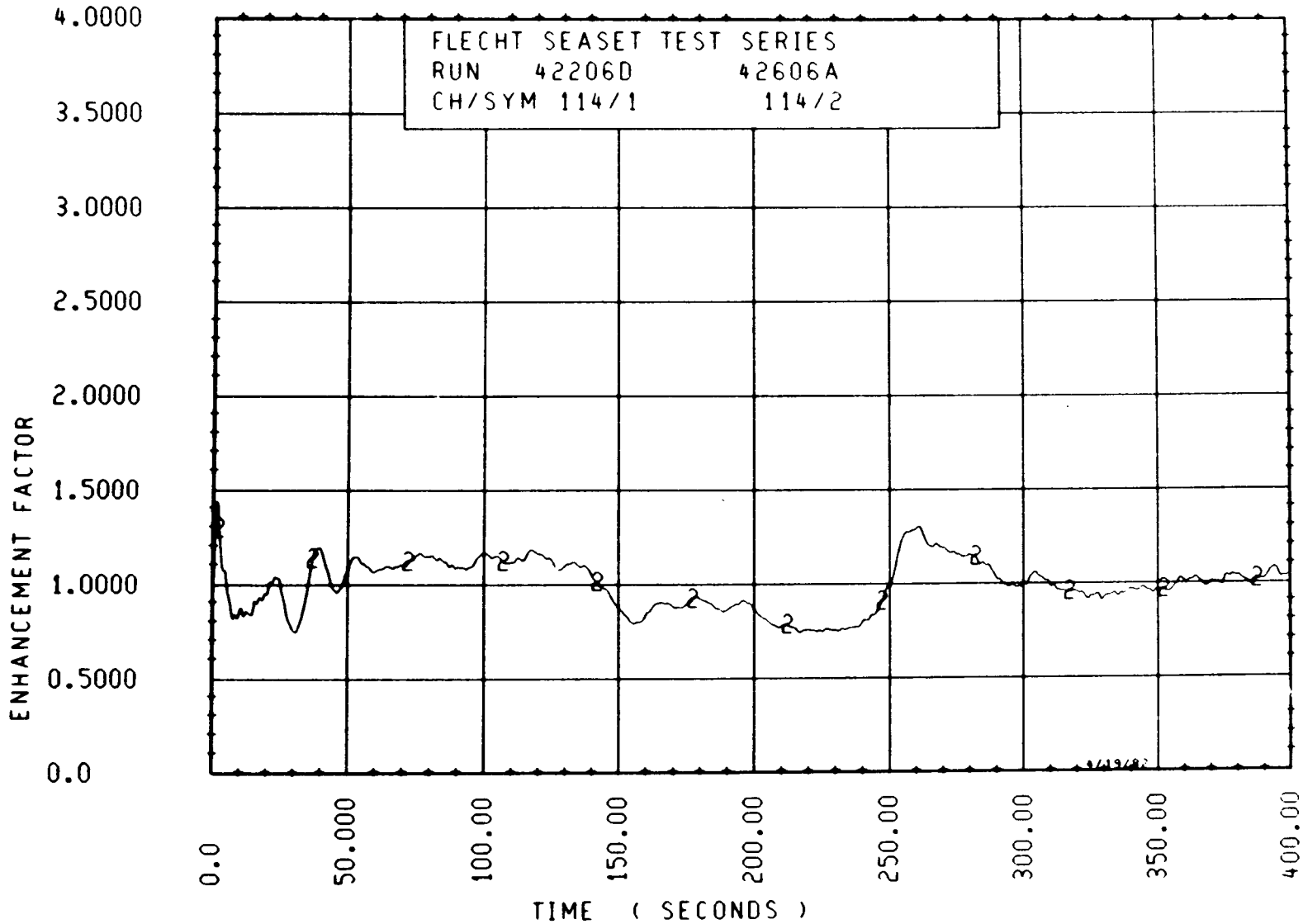


Figure O-58. Enhancement Factor for Run 42206D, Rod 3B, 2.13 m (84 in.) Elevation

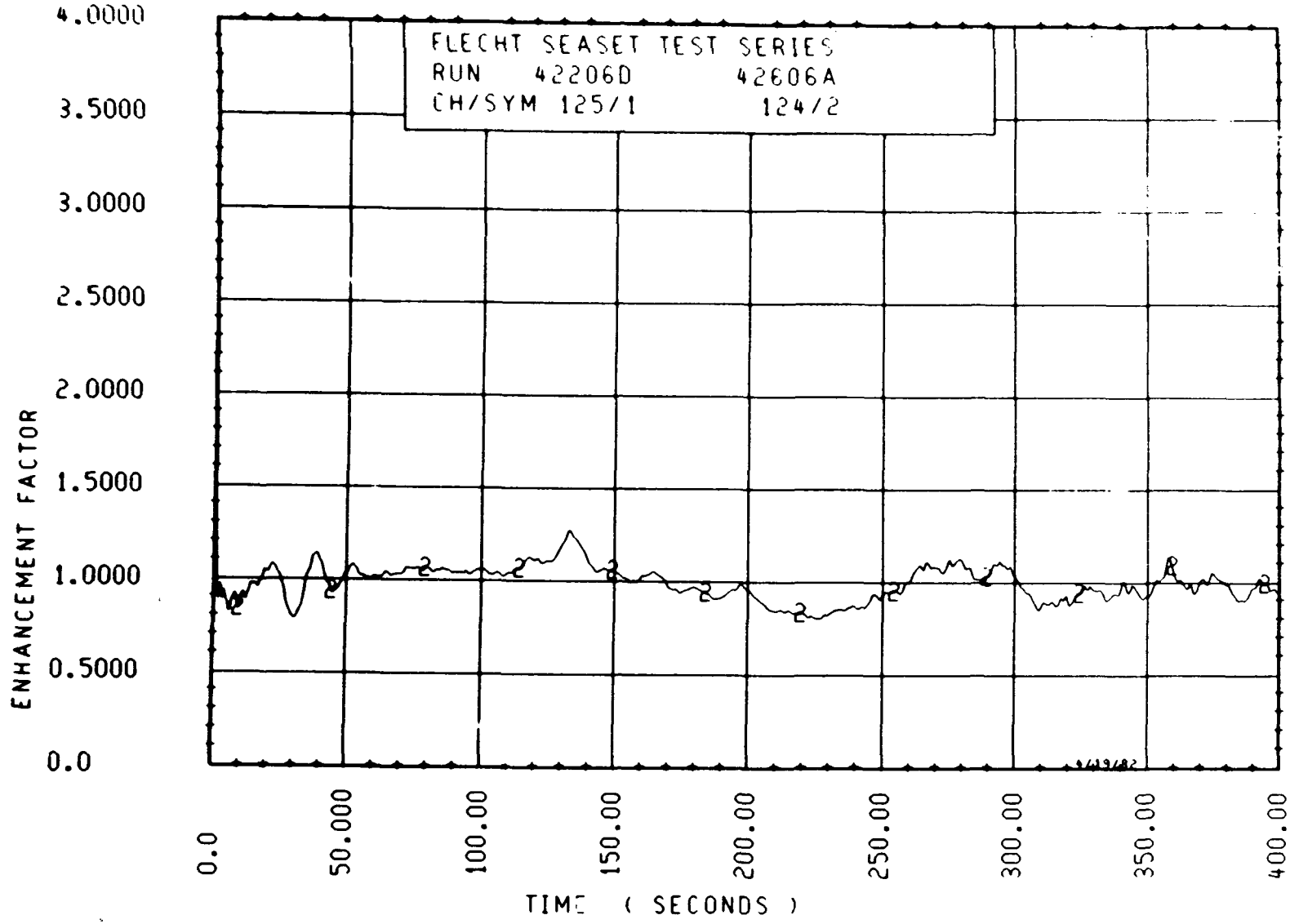


Figure O-59. Enhancement Factor for Run 42206D, Rod 3B, 2.29 m (90 in.) Elevation

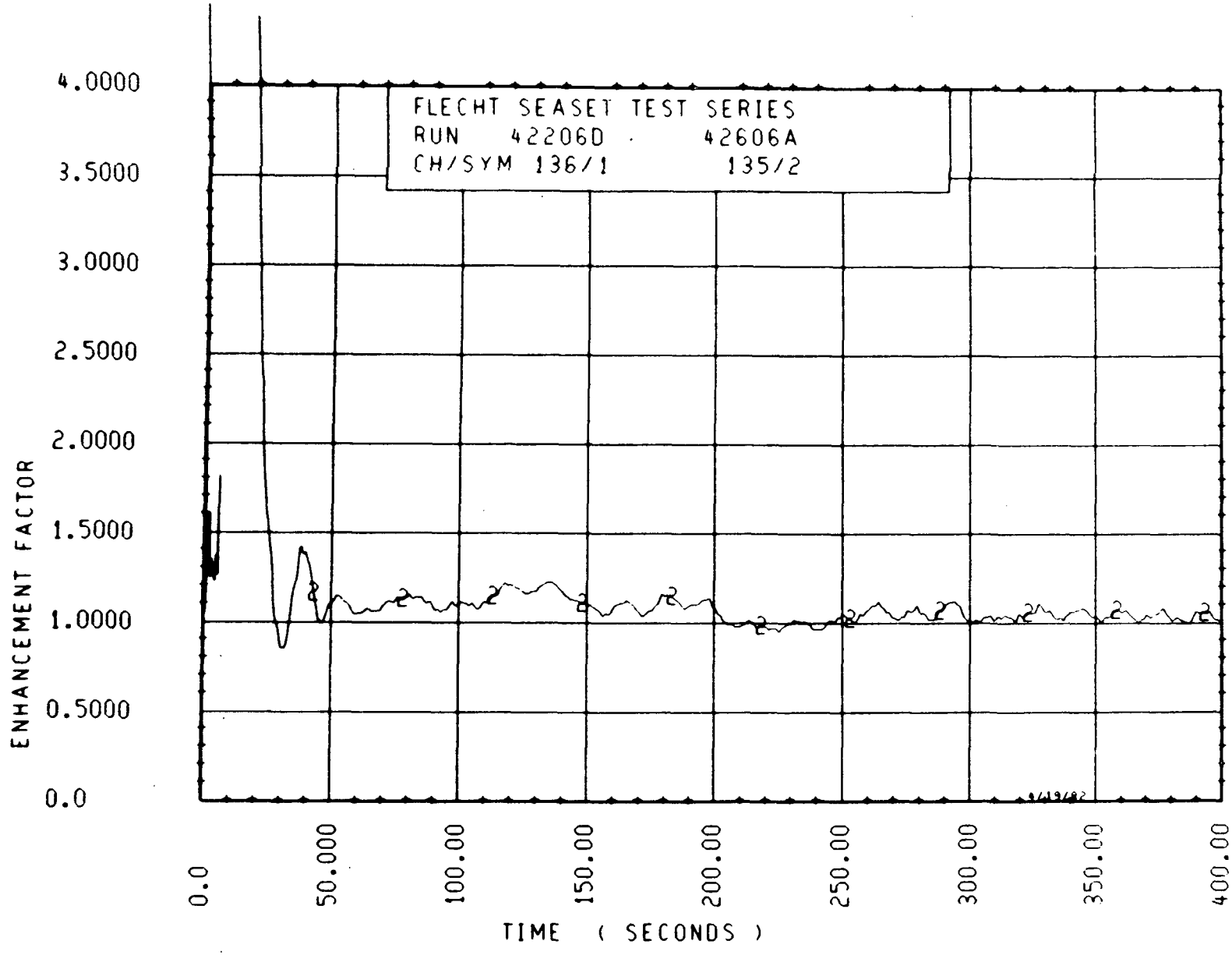


Figure O-60. Enhancement Factor for Run 42206D, Rod 3B, 2.44 m (96 in.) Elevation

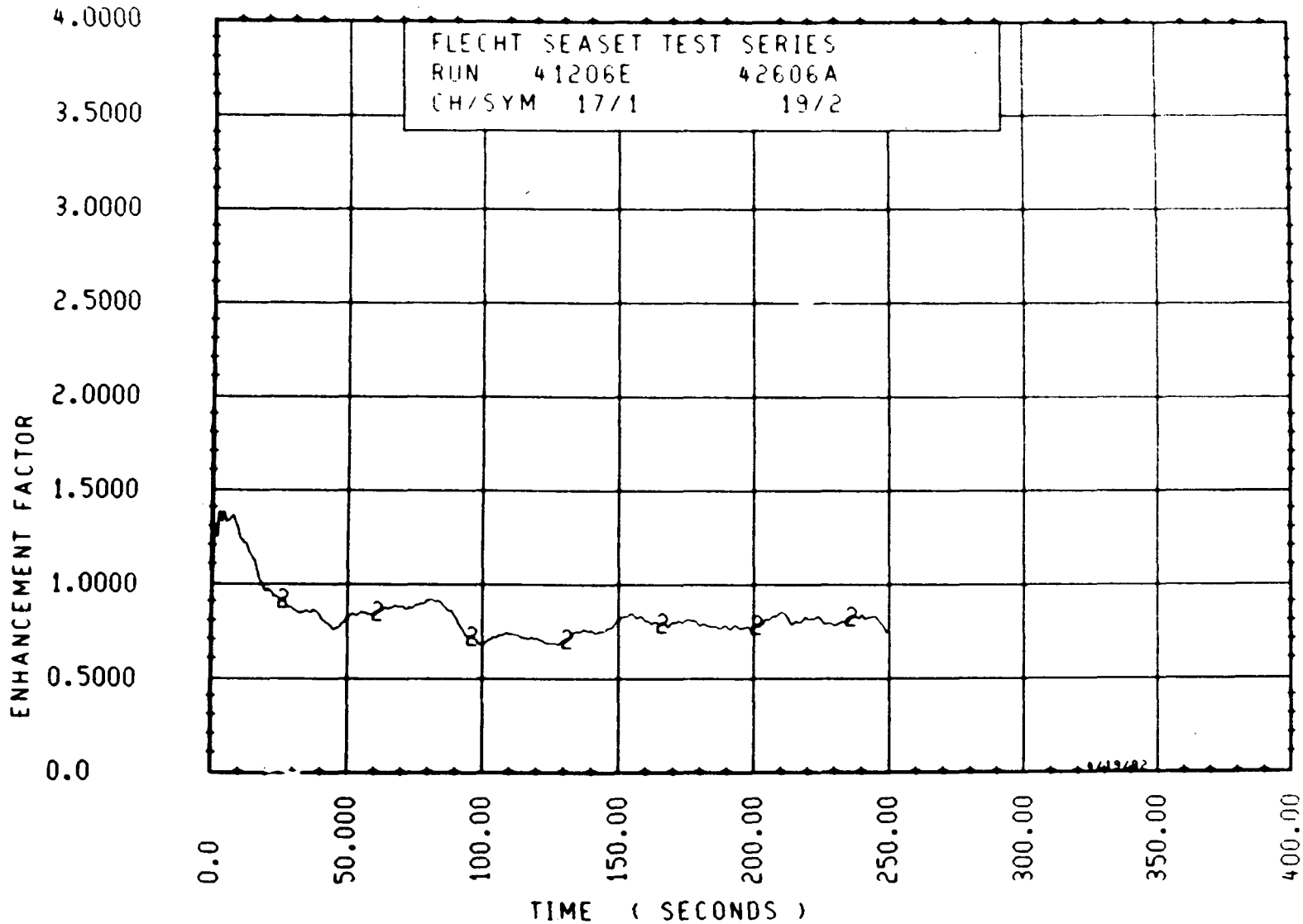


Figure O-61. Enhancement Factor for Run 41206E, Rod 4C, 1.52 m (60 in.) Elevation

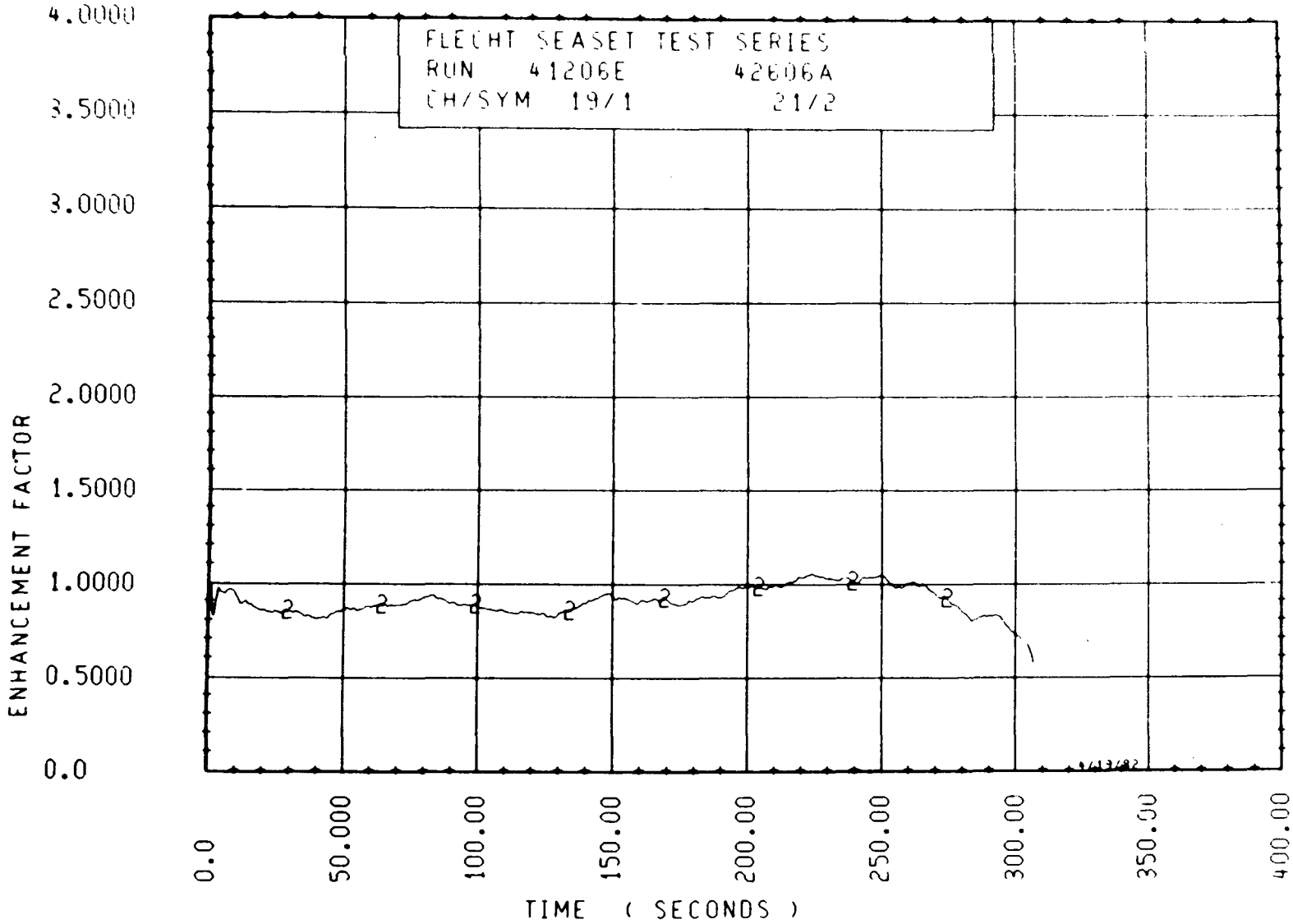


Figure O-62. Enhancement Factor for Run 41206E, Rod 2A, 1.68 m (66.3 in.) Elevation

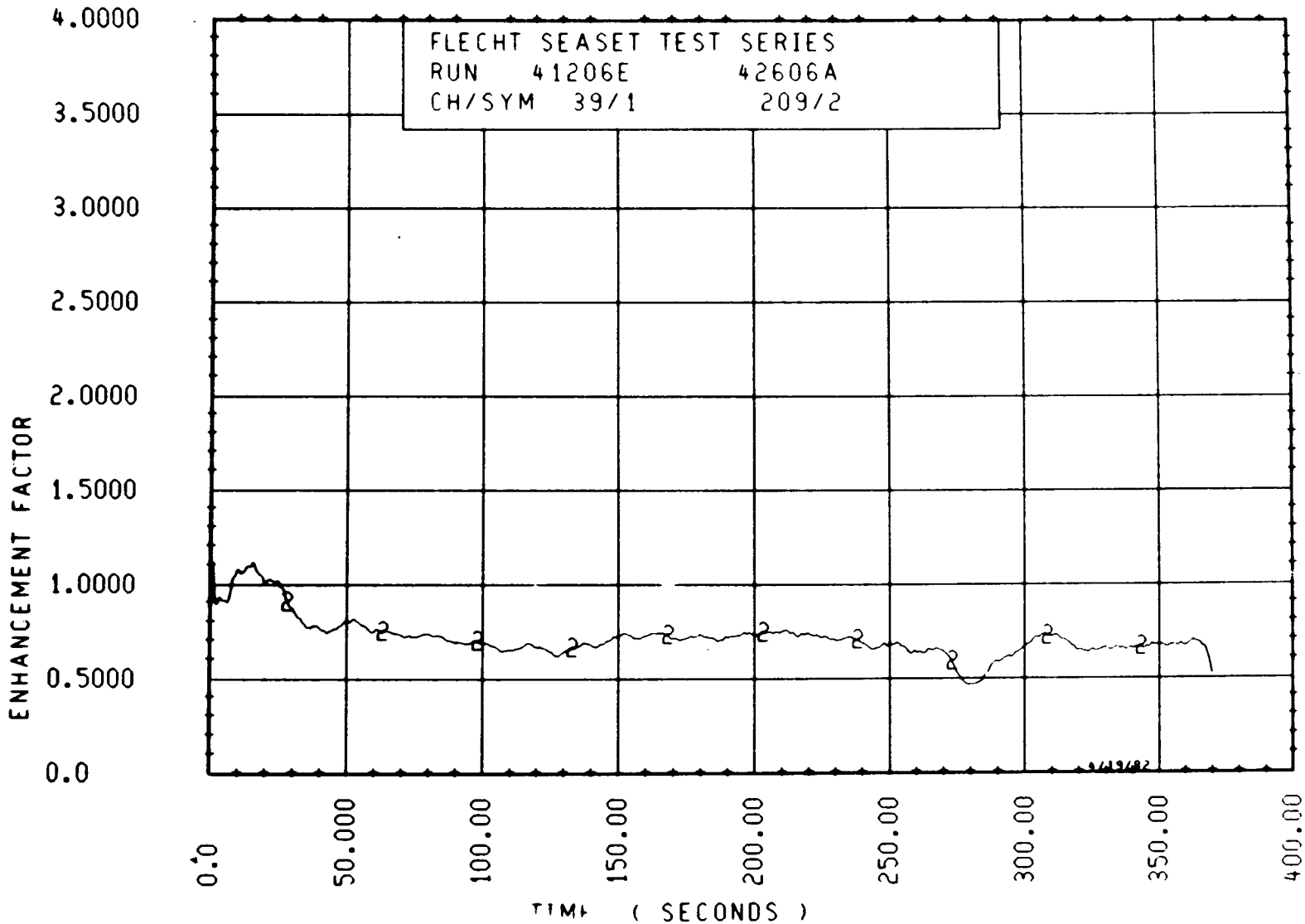


Figure O-63. Enhancement Factor for Run 41206E, Rod 2D, 1.89 m (74.5 in.) Elevation

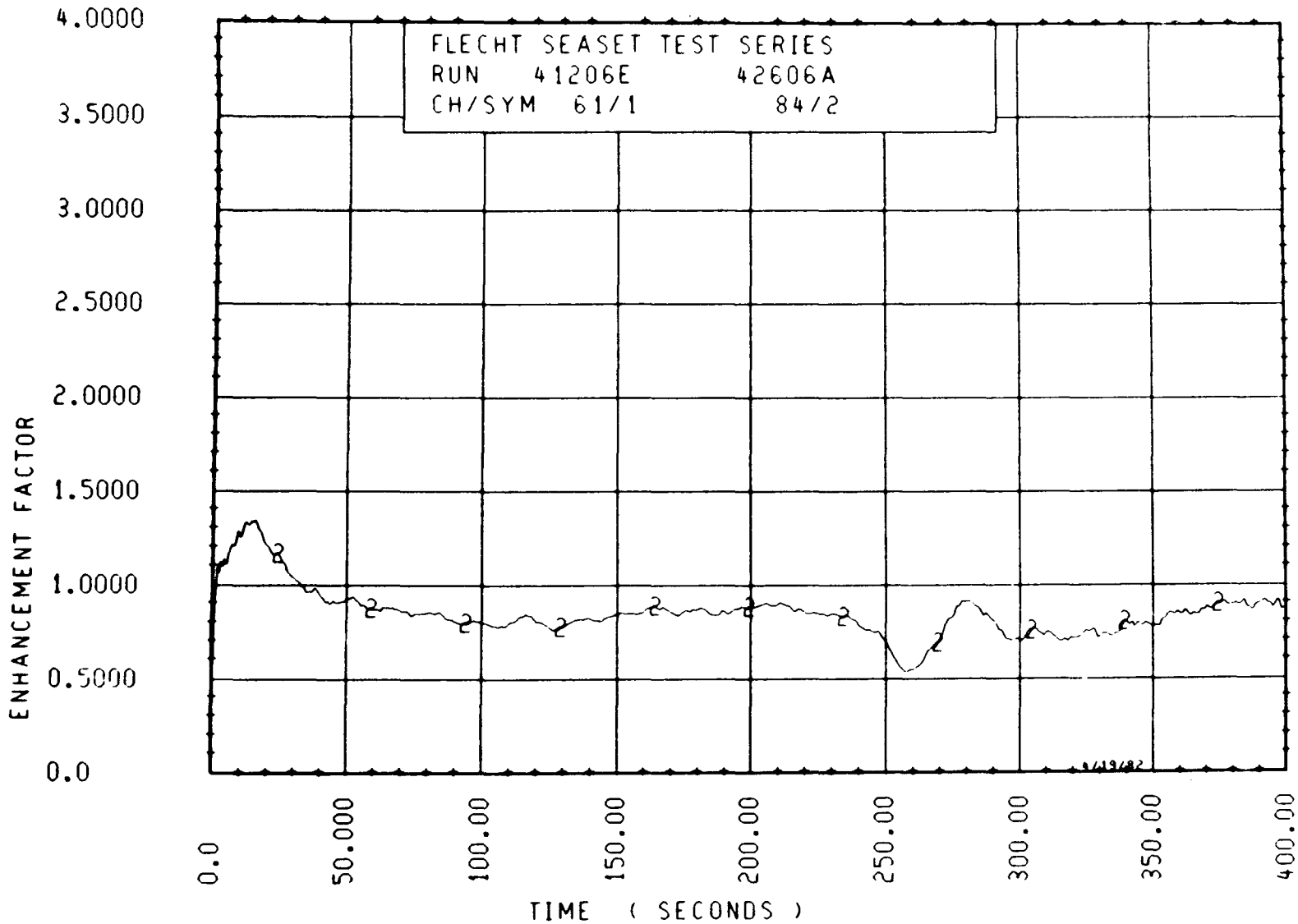


Figure O-64. Enhancement Factor for Run 41206E, Rod 2D, 1.95 m (76.8 in.) Elevation

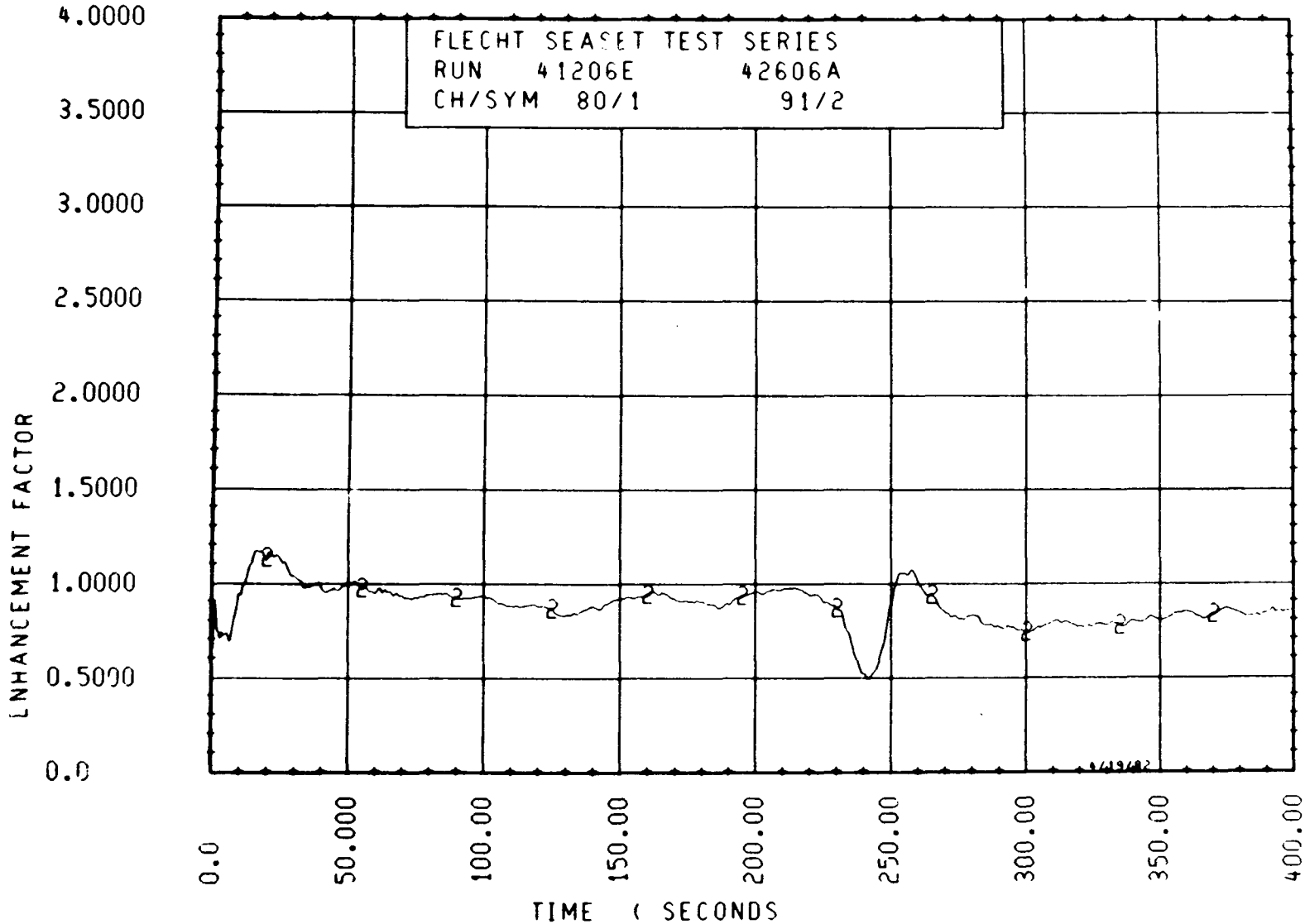


Figure O-65. Enhancement Factor for Run 41206E, Rod 2D, 2.00 m (78.7 in.) Elevation

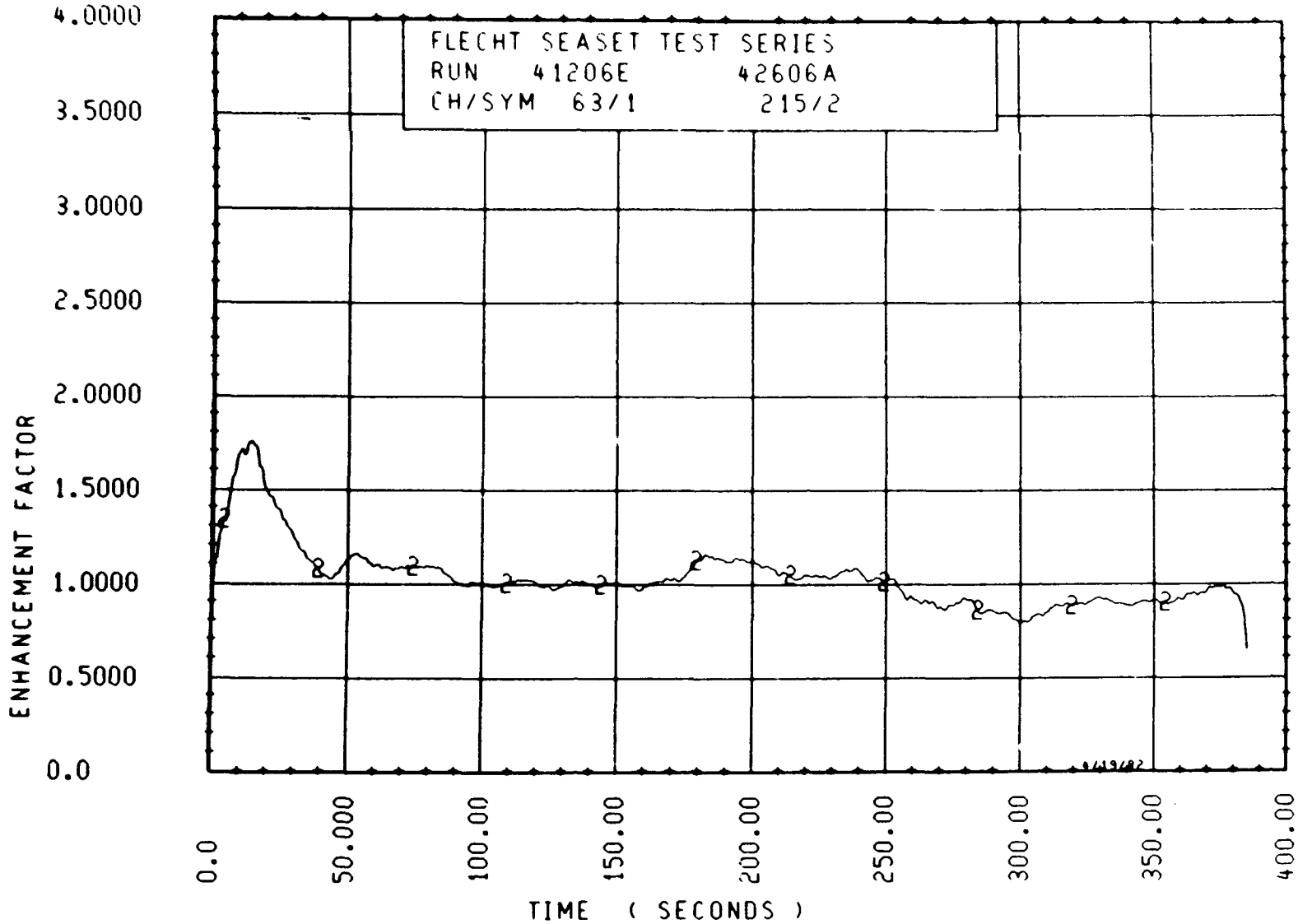


Figure O-66. Enhancement Factor for Run 41206E, Rod 3B, 1.96 m (77.1 in.) Elevation

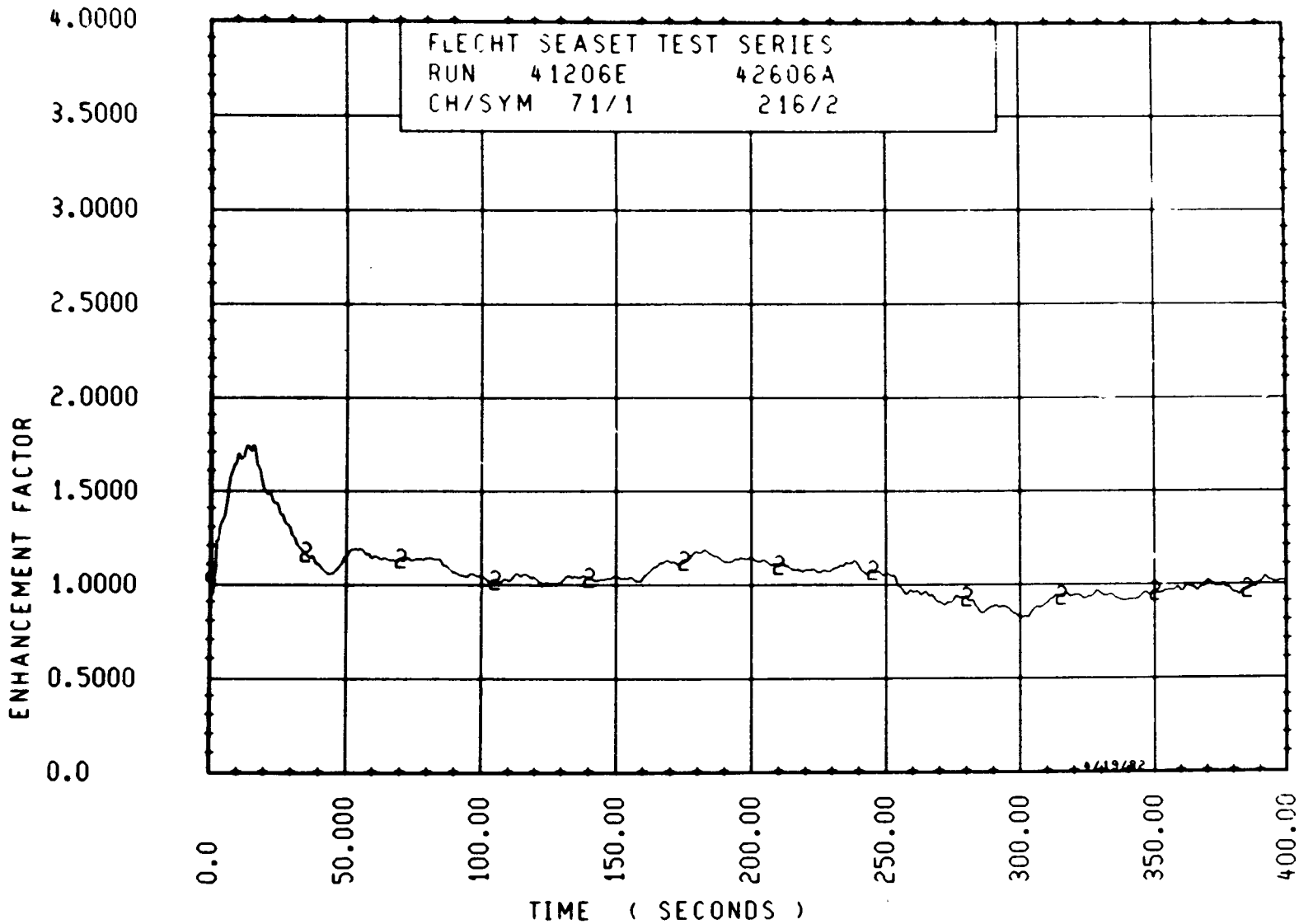


Figure O-67. Enhancement Factor for Run 41206E, Rod 3B, 1.98 m (78.1 in.) Elevation

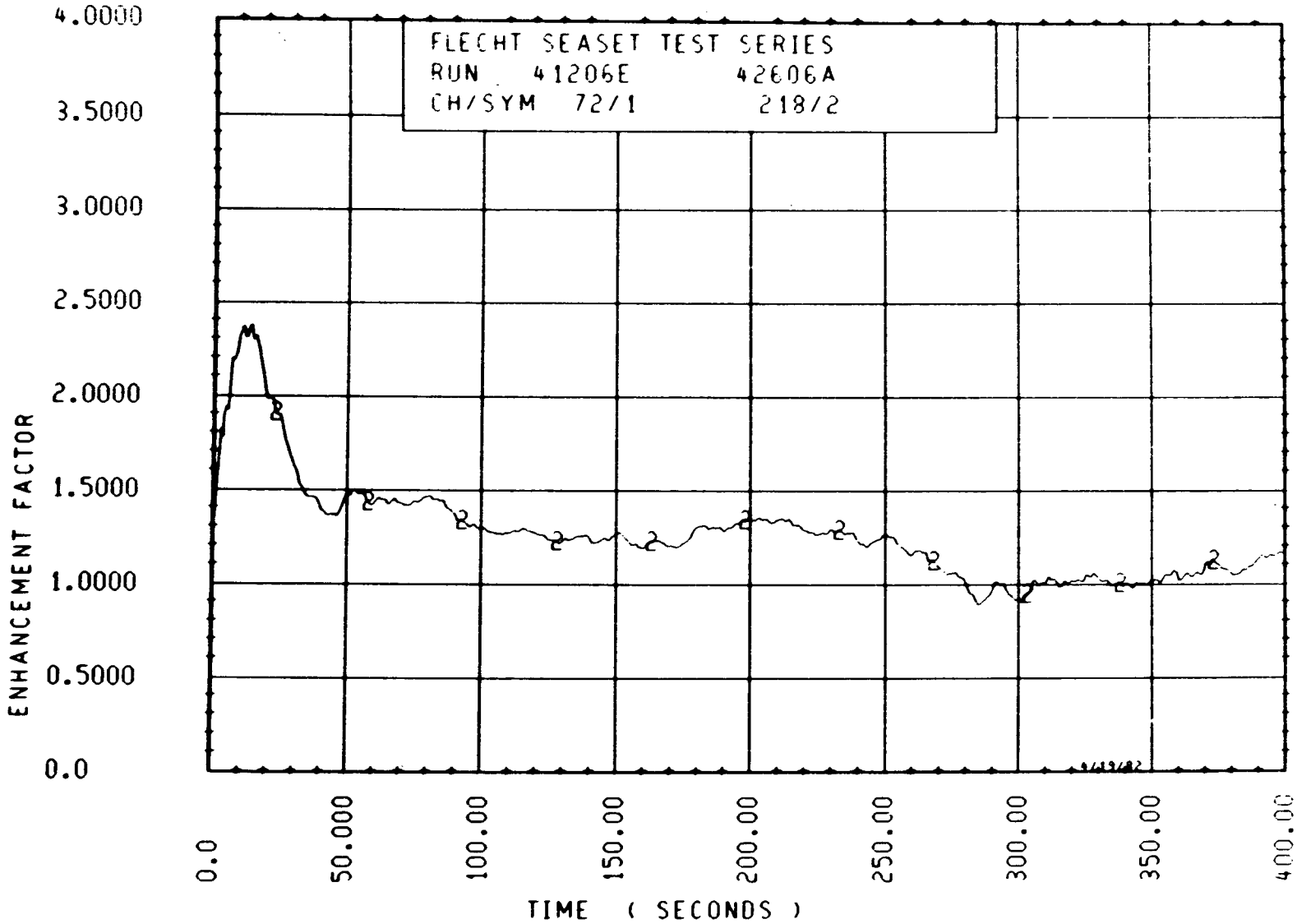


Figure O-68. Enhancement Factor for Run 41206E, Rod 3C, 1.99 m (78.2 in.) Elevation

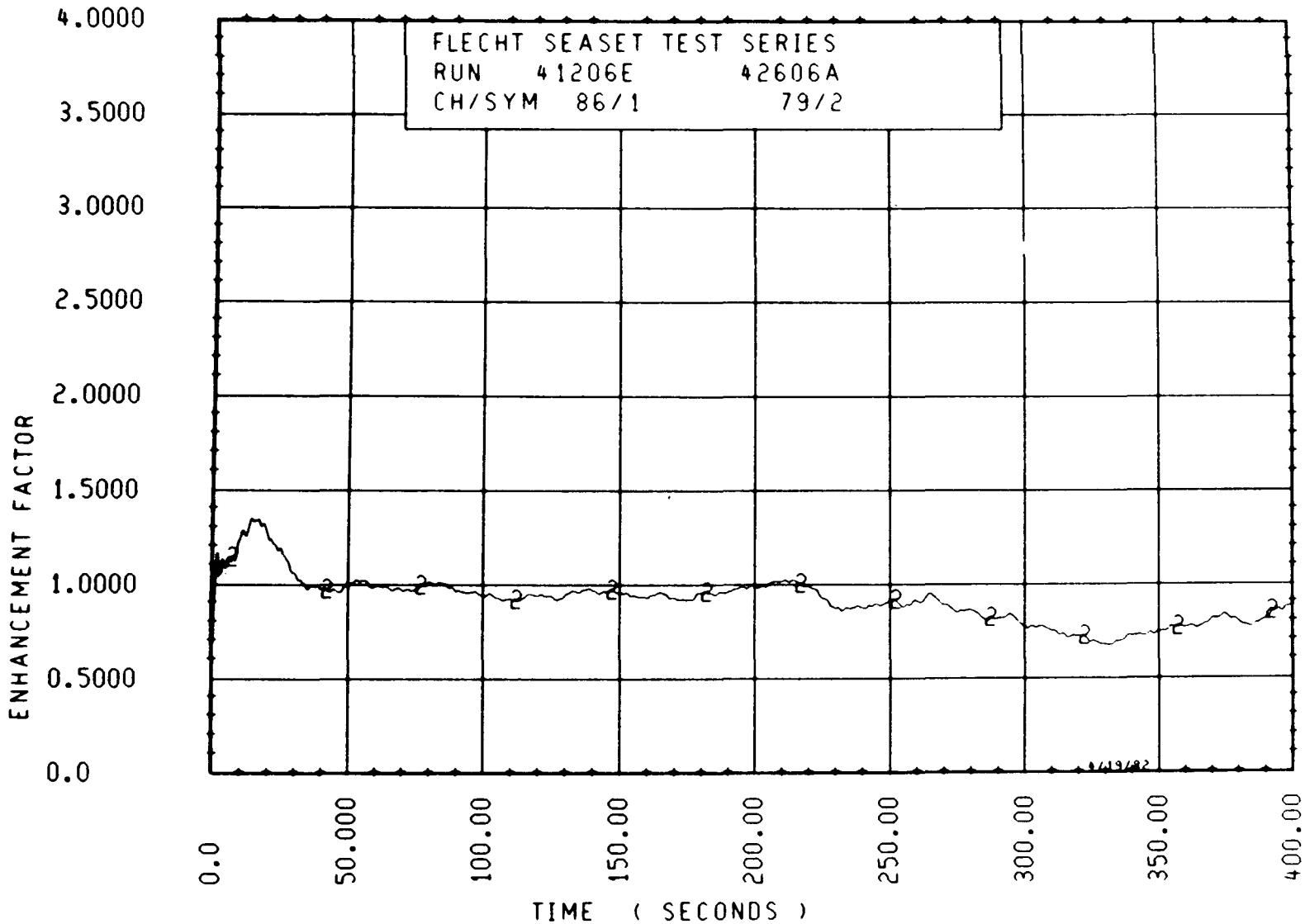


Figure O-69. Enhancement Factor for Run 41206E, Rod 3D, 2.02 m (79.6 in.) Elevation

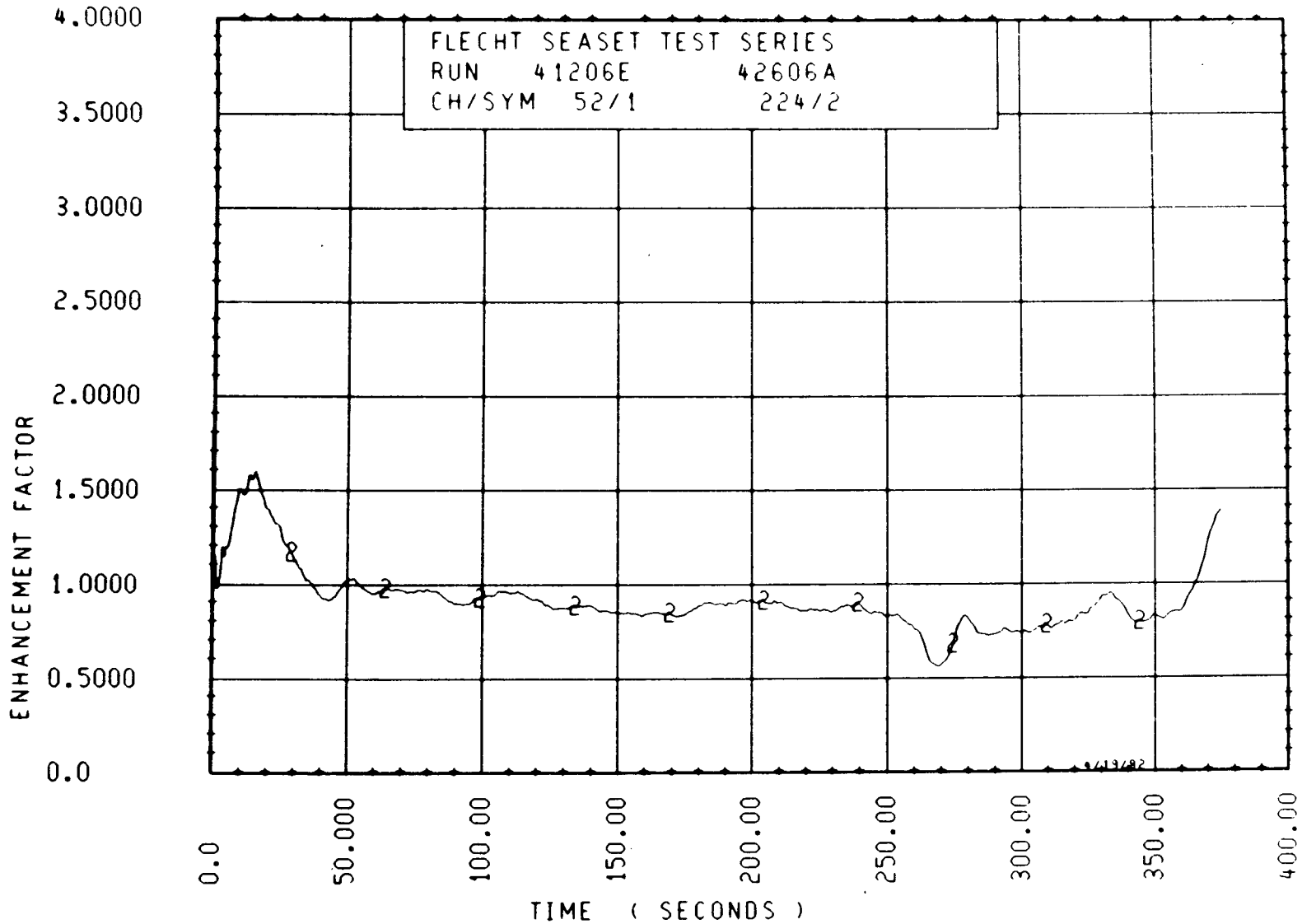


Figure O-70. Enhancement Factor for Run 41206E, Rod 4B, 1.93 m (75.9 in.) Elevation

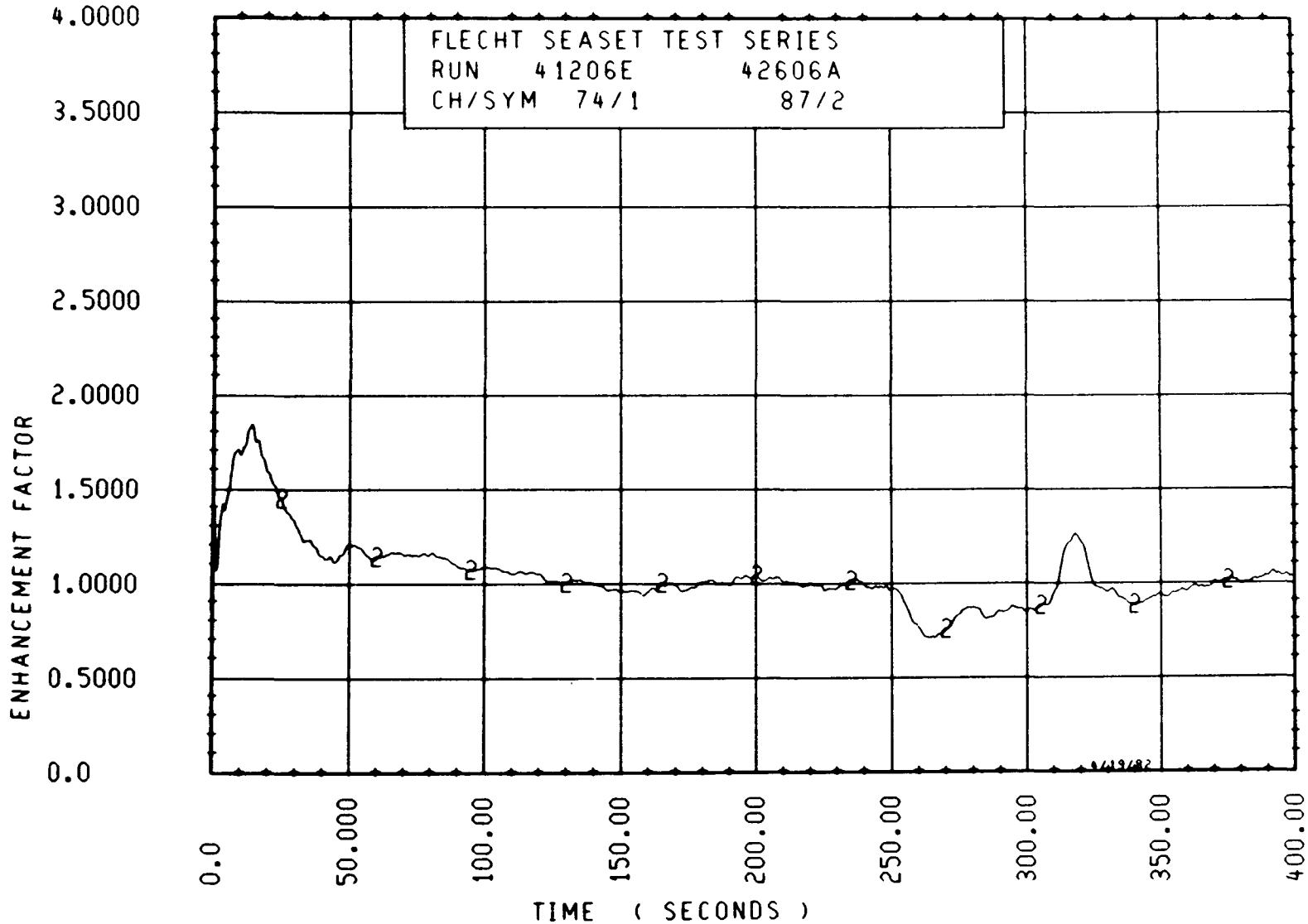


Figure O-71. Enhancement Factor for Run 41206E, Rod 4B, 1.98 m (78.1 in.) Elevation

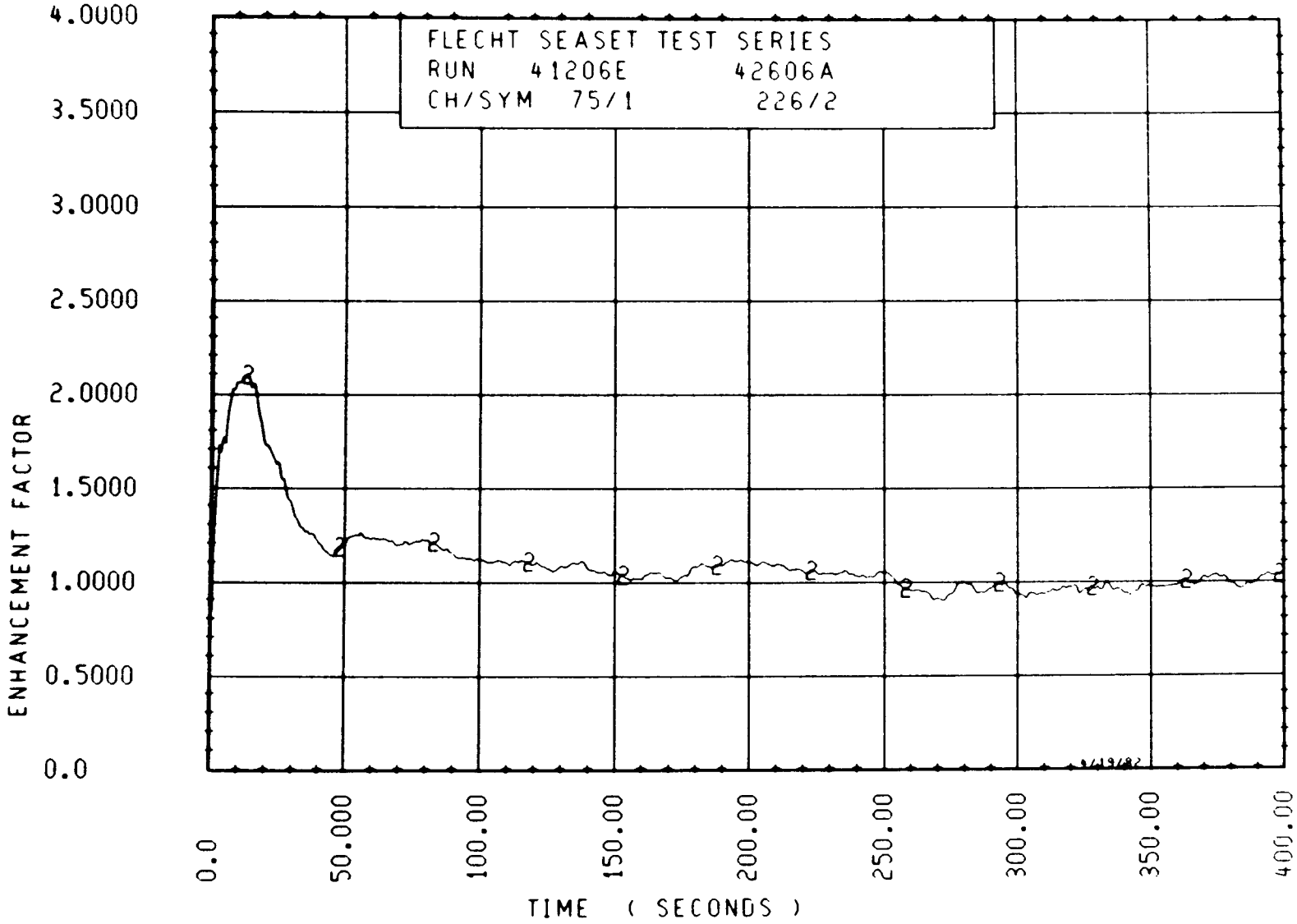


Figure O-72. Enhancement Factor for Run 41206E, Rod 4C, 1.99 m (78.4 in.) Elevation

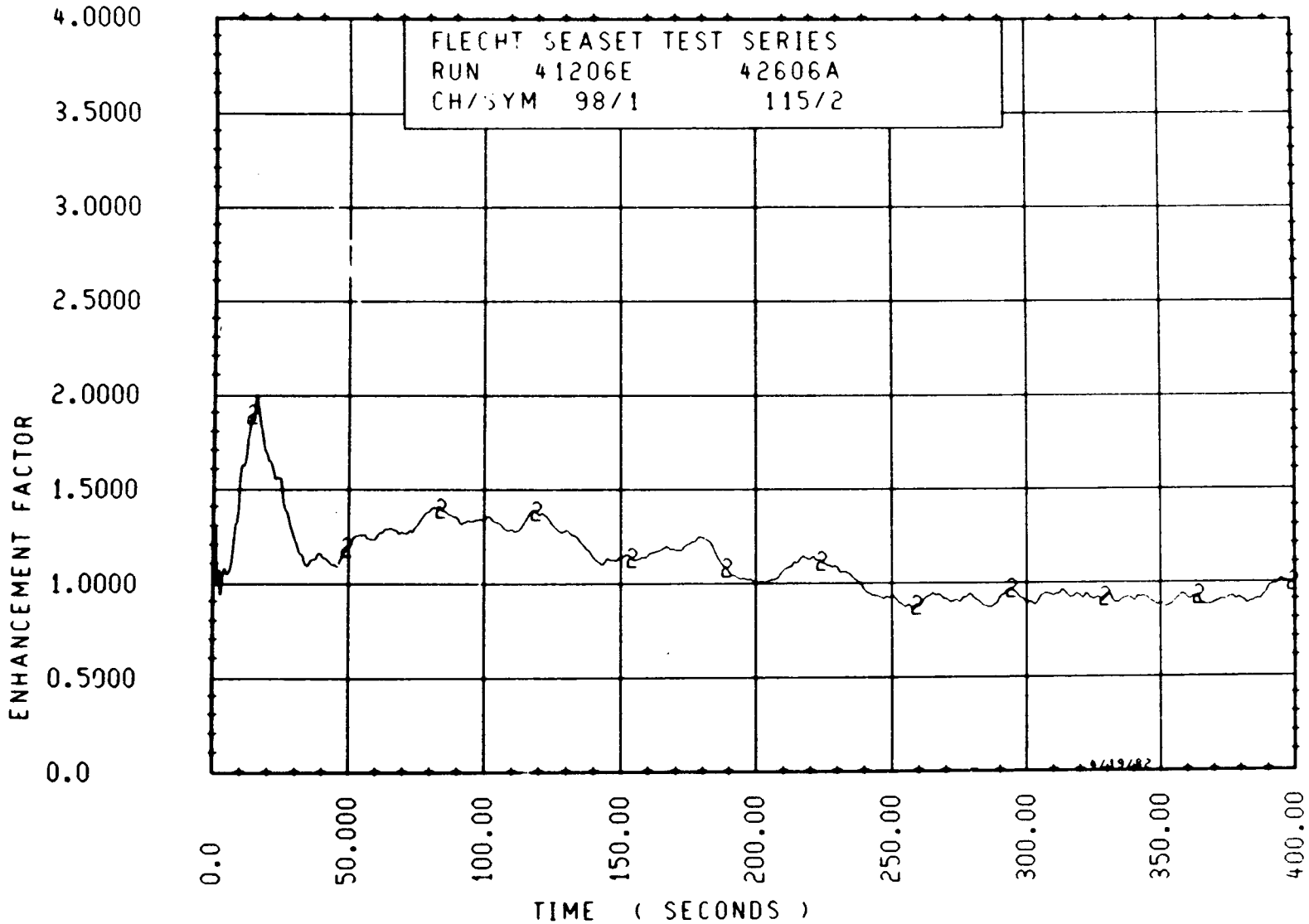


Figure O-73. Enhancement Factor for Run 41206E, Rod 3D, 2.13 m (84 in.) Elevation

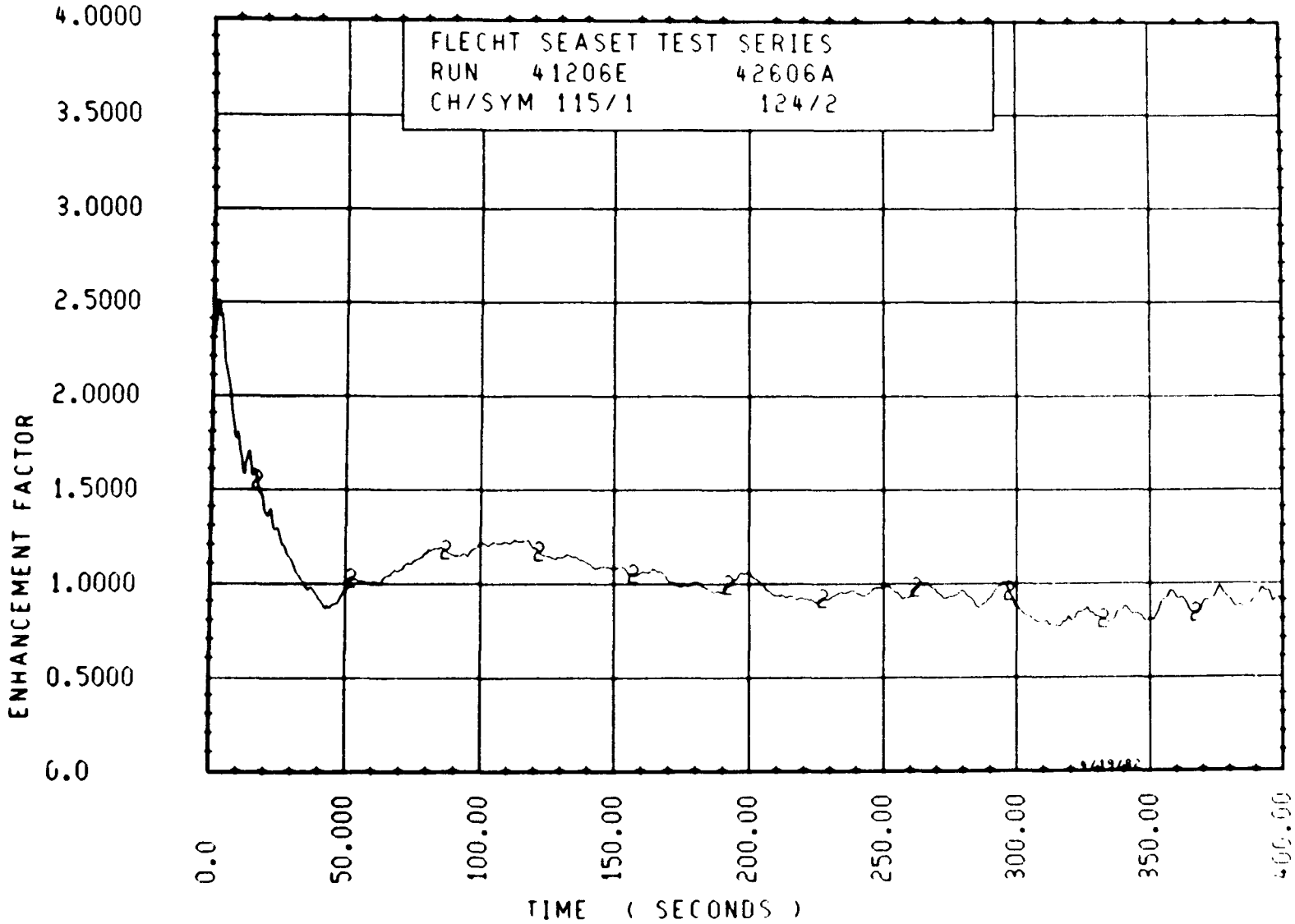


Figure O-74. Enhancement Factor for Run 41206E, Rod 3B, 2.29 m (90 in.) Elevation

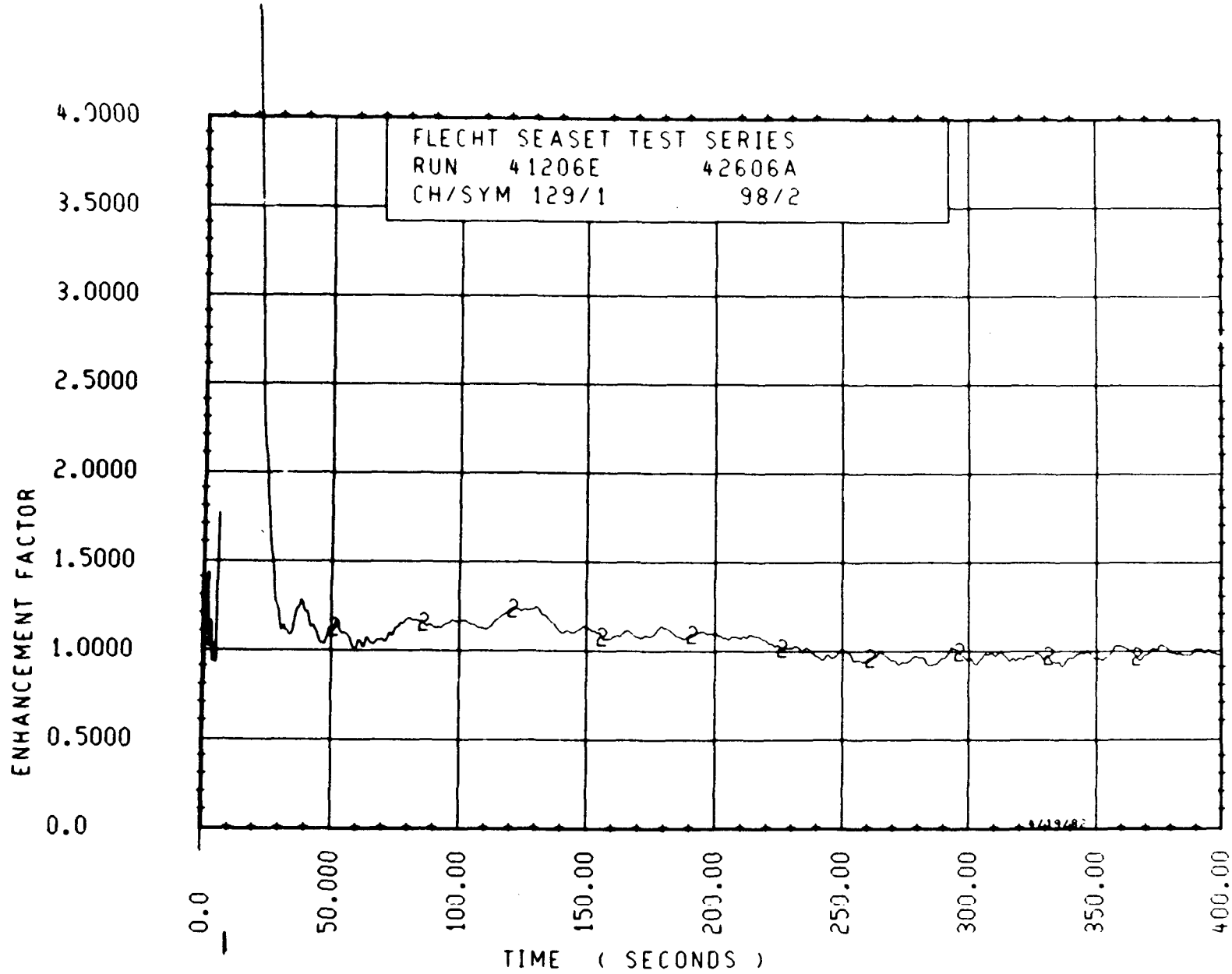


Figure O-75. Enhancement Factor for Run 41206E, Rod 3D, 2.44 m (96 in.) Elevation

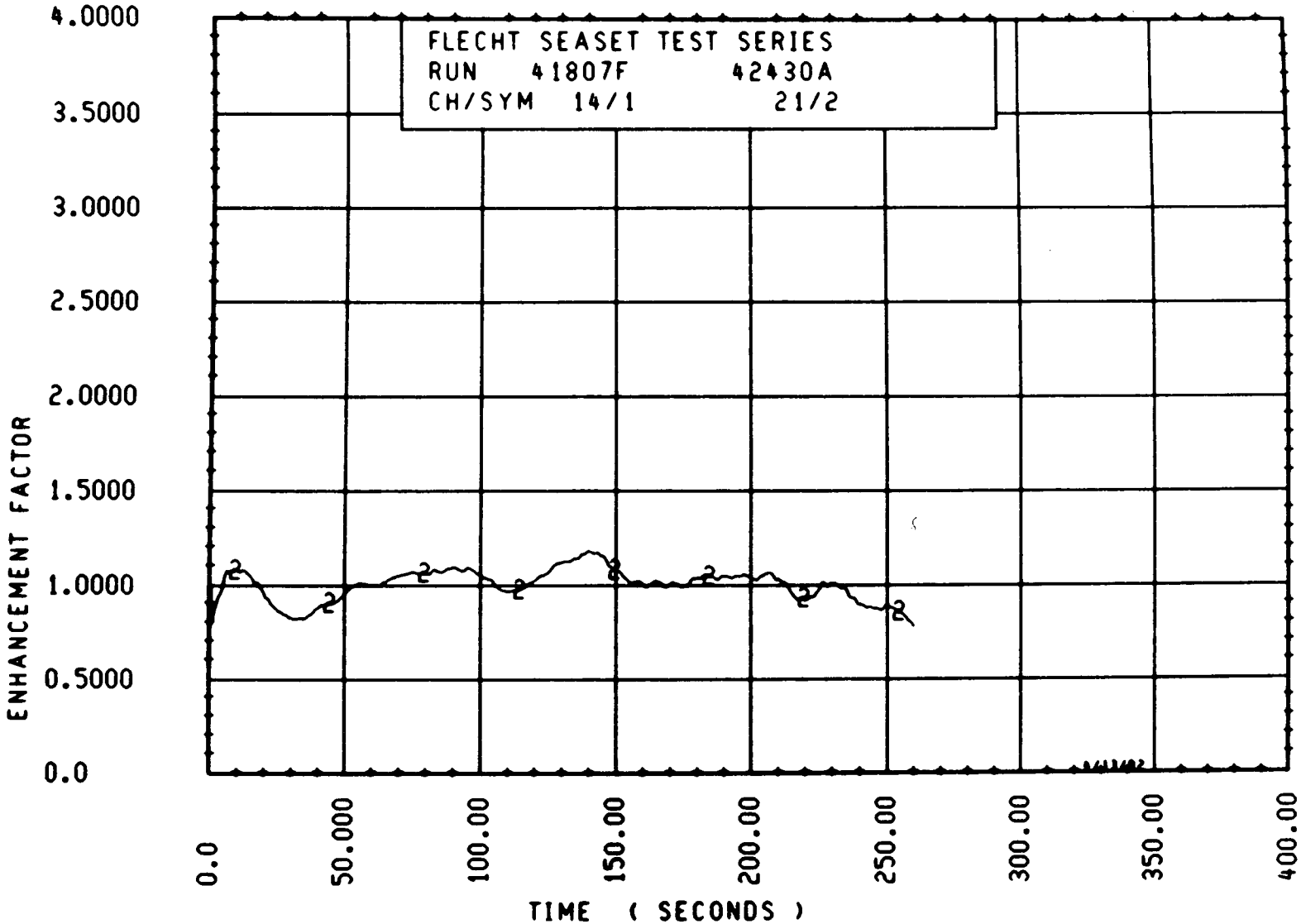


Figure O-76. Enhancement Factor for Run 41807F, Rod 2A, 1.67 m (65.7 in.) Elevation

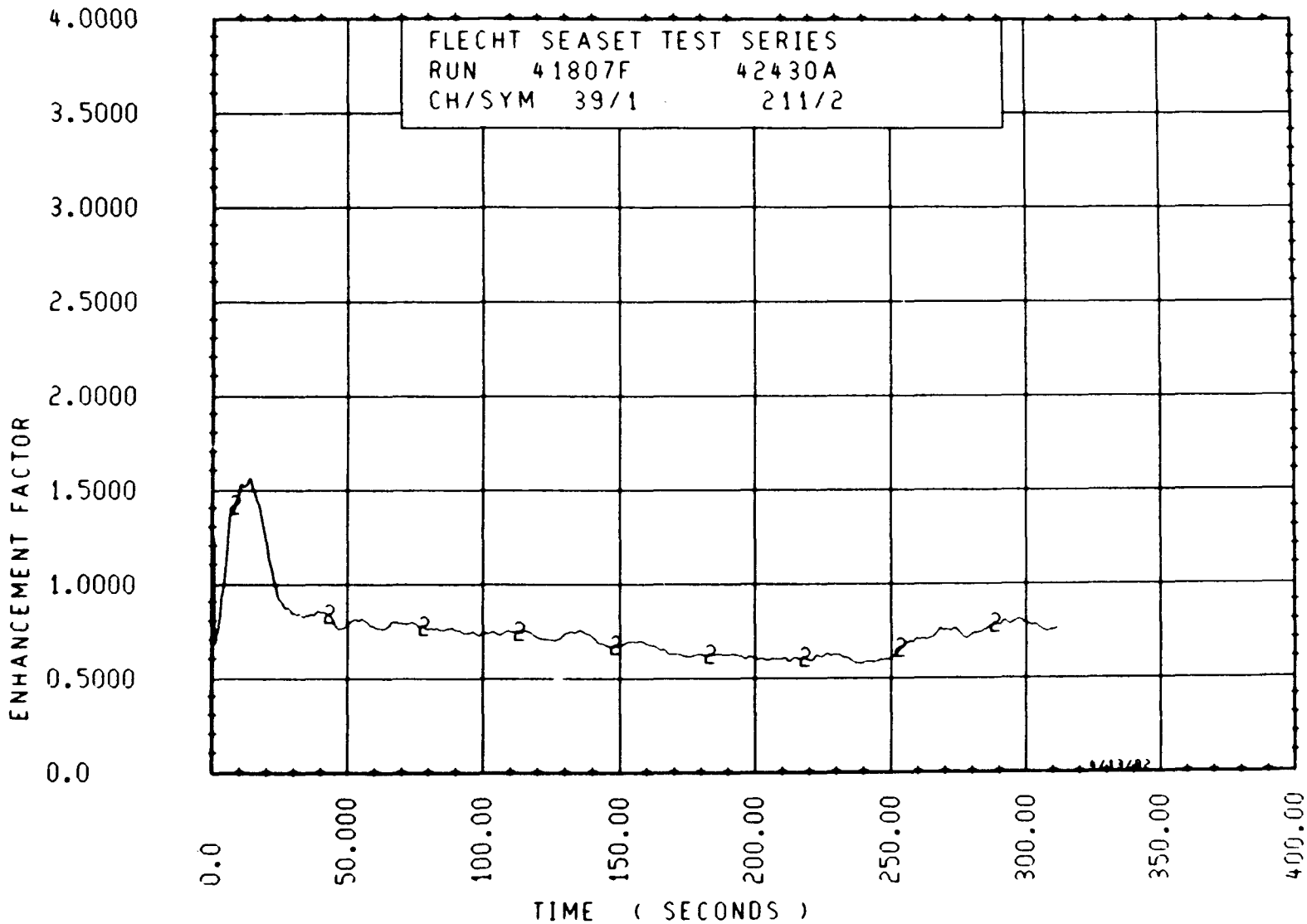


Figure O-77. Enhancement Factor for Run 41807F, Rod 2D, 1.90 m (74.7 in.) Elevation

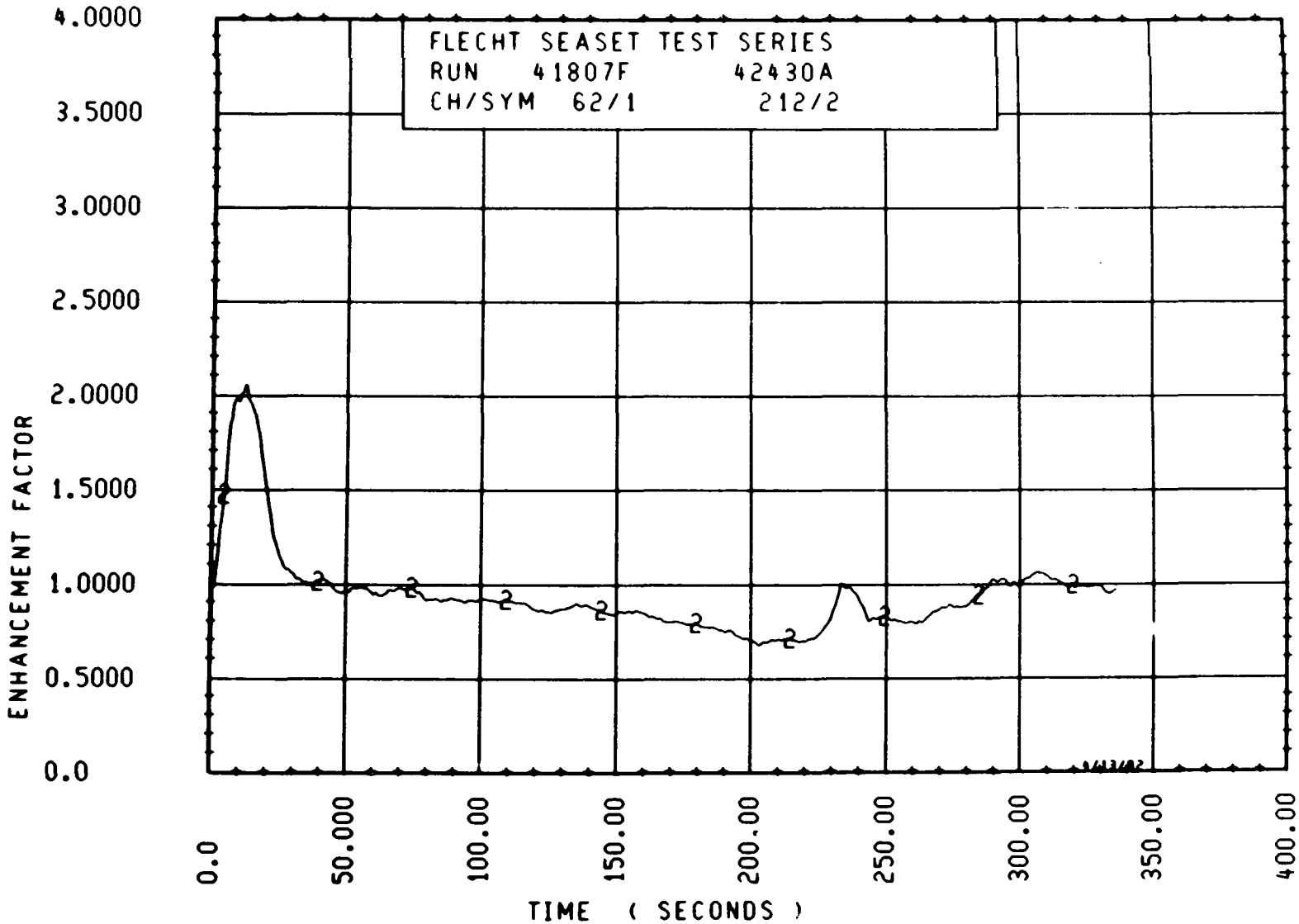


Figure O-78. Enhancement Factor for Run 41807F, Rod 2D, 1.95 m (76.9 in.) Elevation

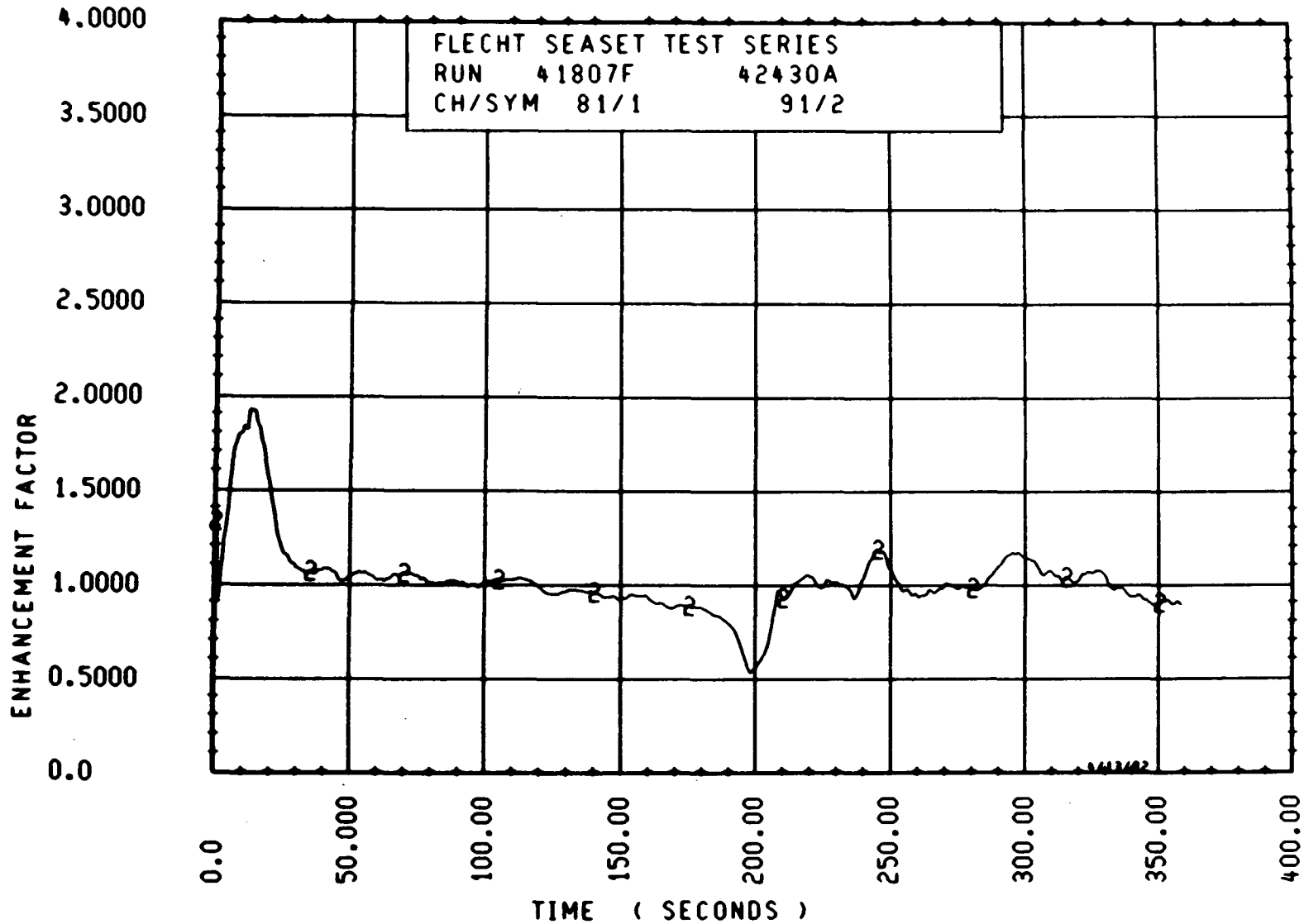


Figure O-79. Enhancement Factor for Run 41807F, Rod 2D, 2.00 m (78.9 in.) Elevation

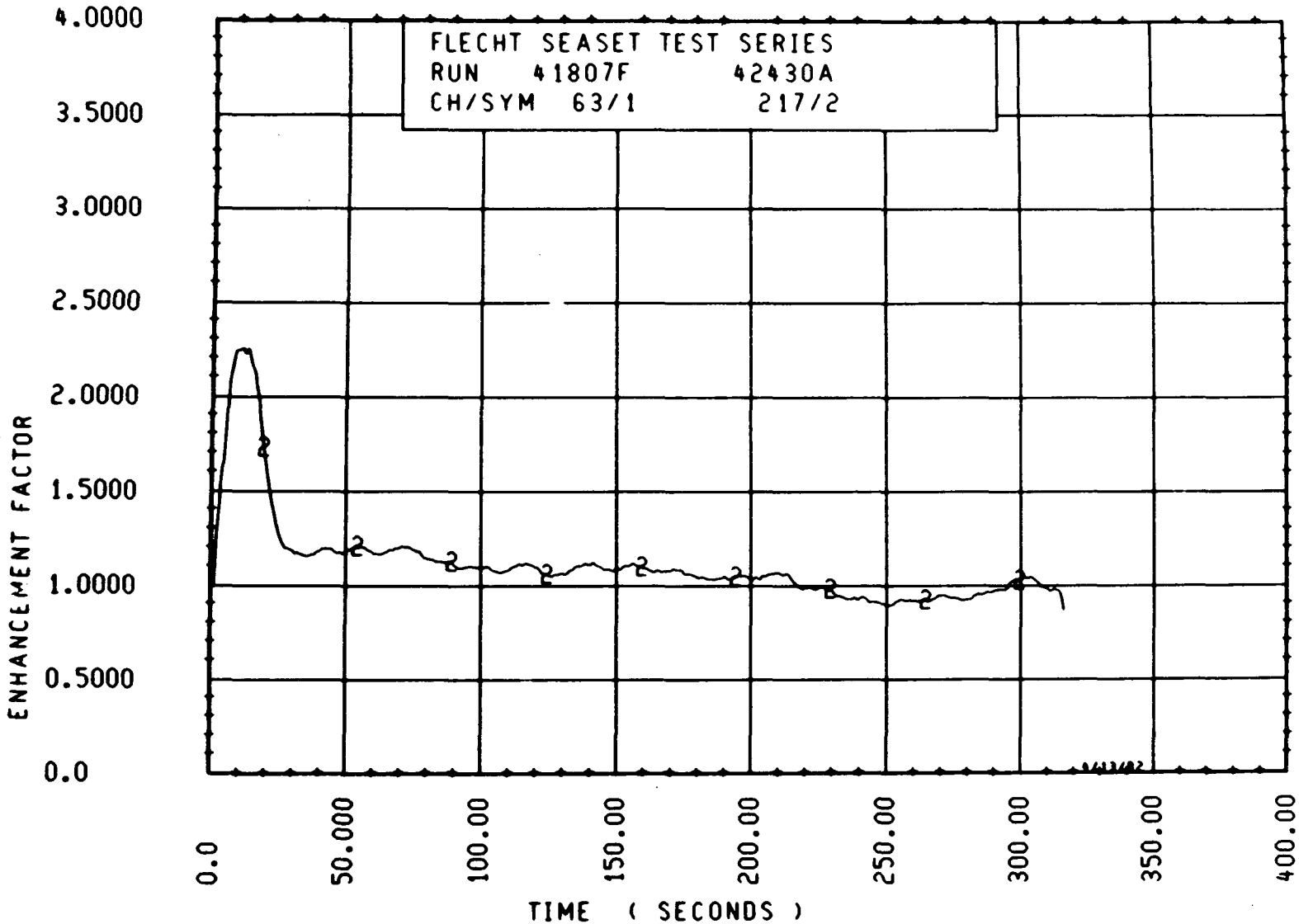


Figure O-80. Enhancement Factor for Run 41807F, Rod 3B, 1.95 m (76.7 in.) Elevation

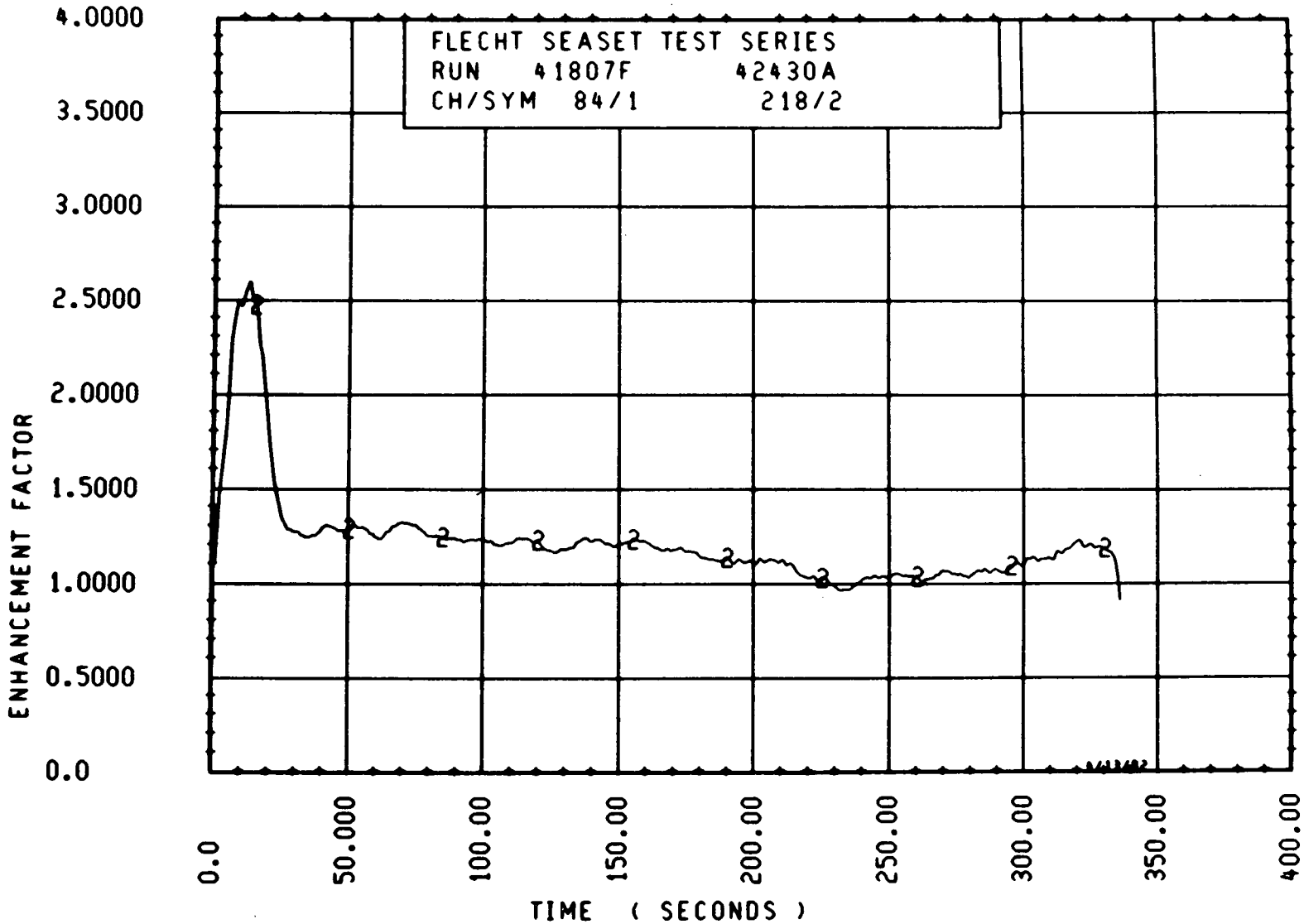


Figure O-81. Enhancement Factor for Run 41807F, Rod 3B, 2.00 m (78.9 in.) Elevation

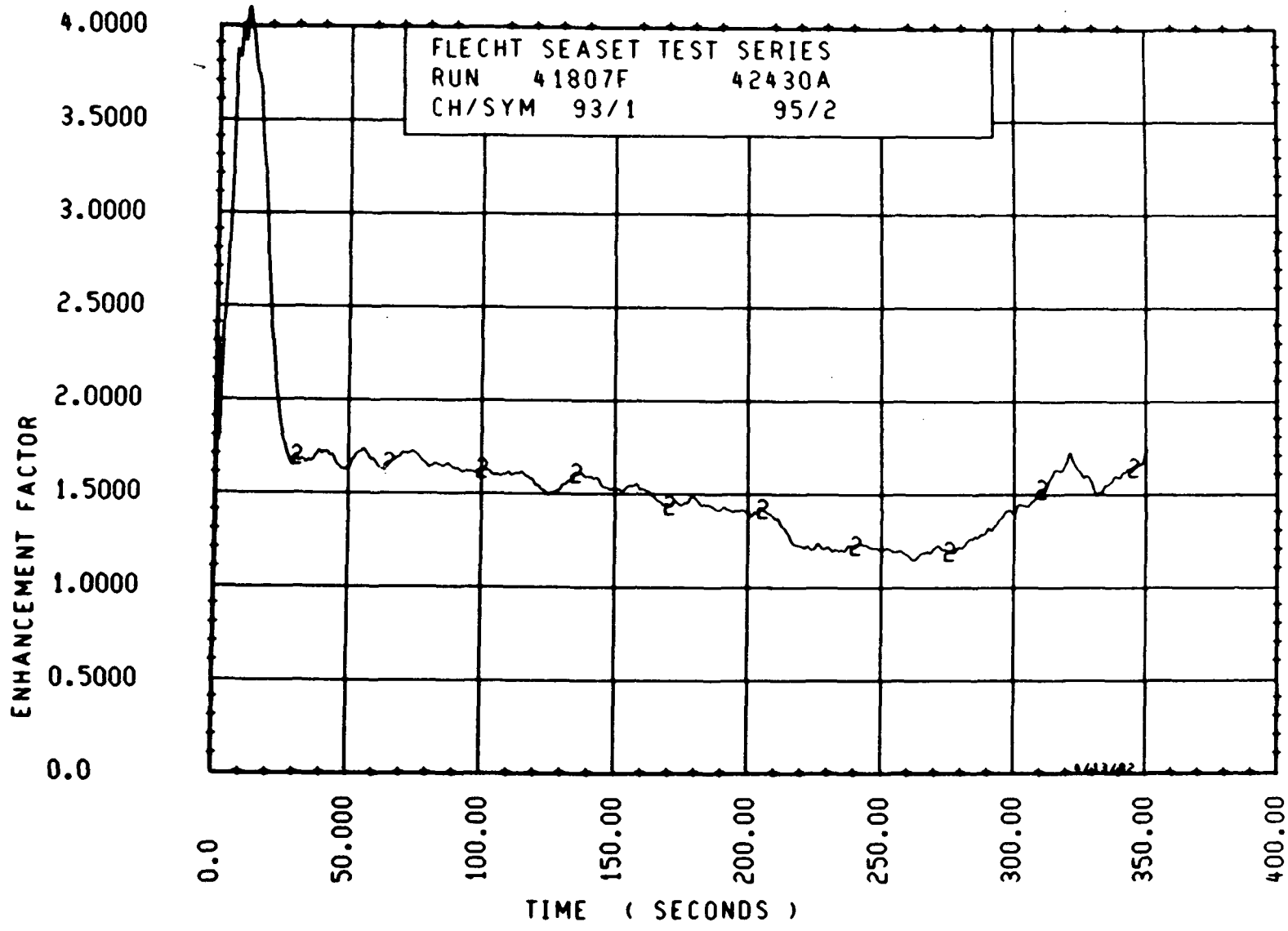


Figure O-82. Enhancement Factor for Run 41807F, Rod 3C, 2.02 m (79.6 in.) Elevation

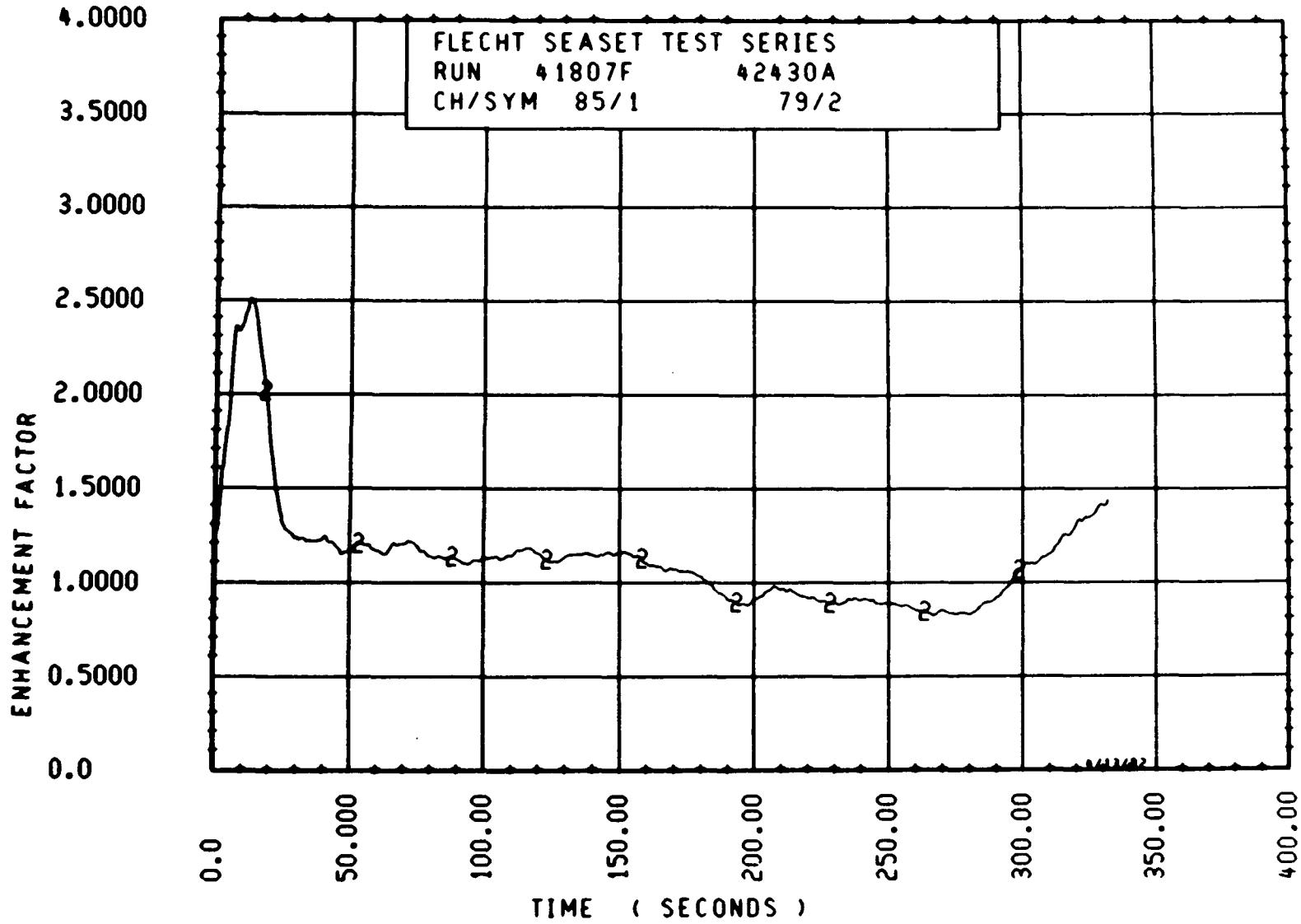


Figure O-83. Enhancement Factor for Run 41807F, Rod 3D, 2.02 m (79.5 in.) Elevation

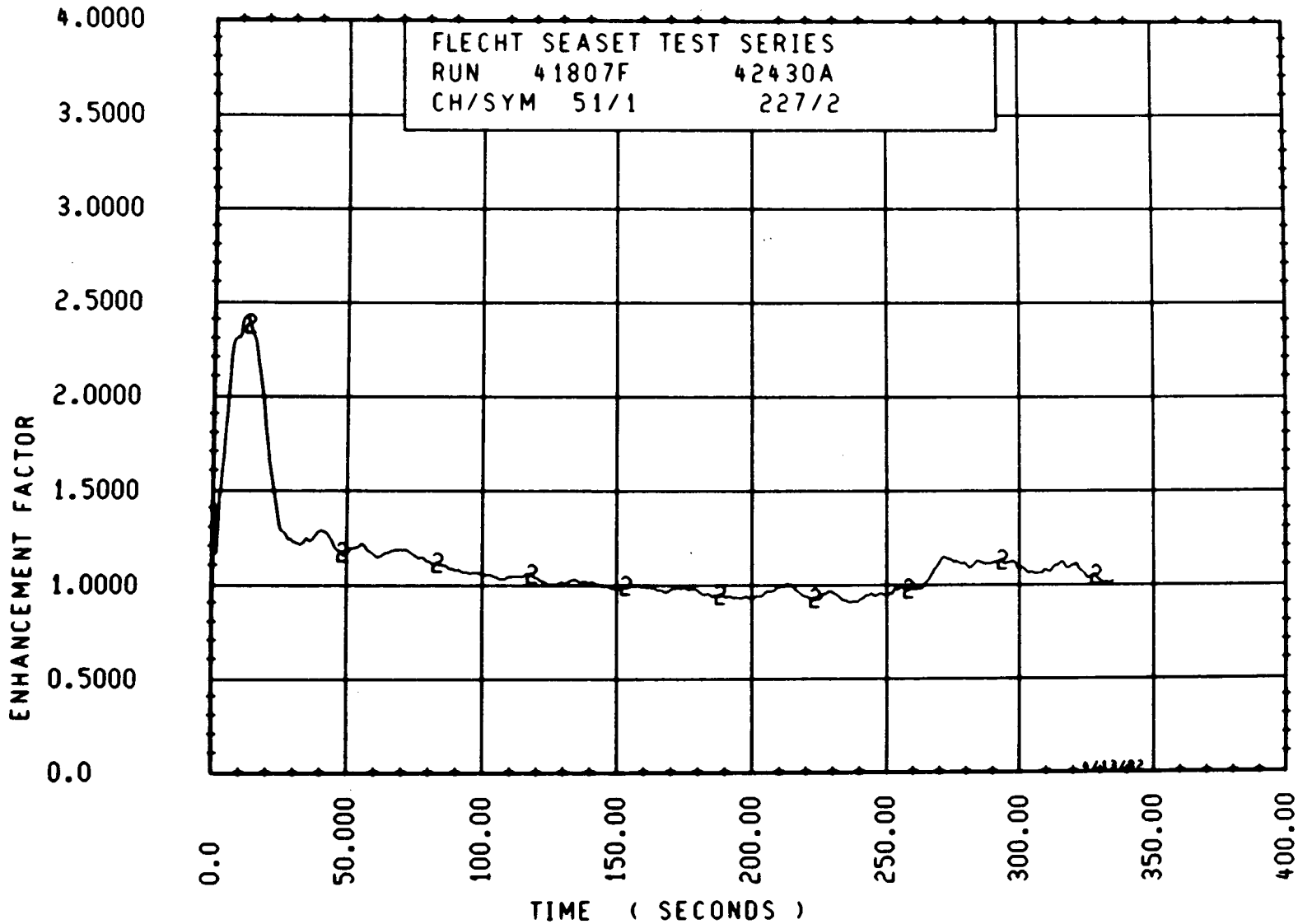


Figure O-84. Enhancement Factor for Run 41807F, Rod 4B, 1.94 m (76.2 in.) Elevation

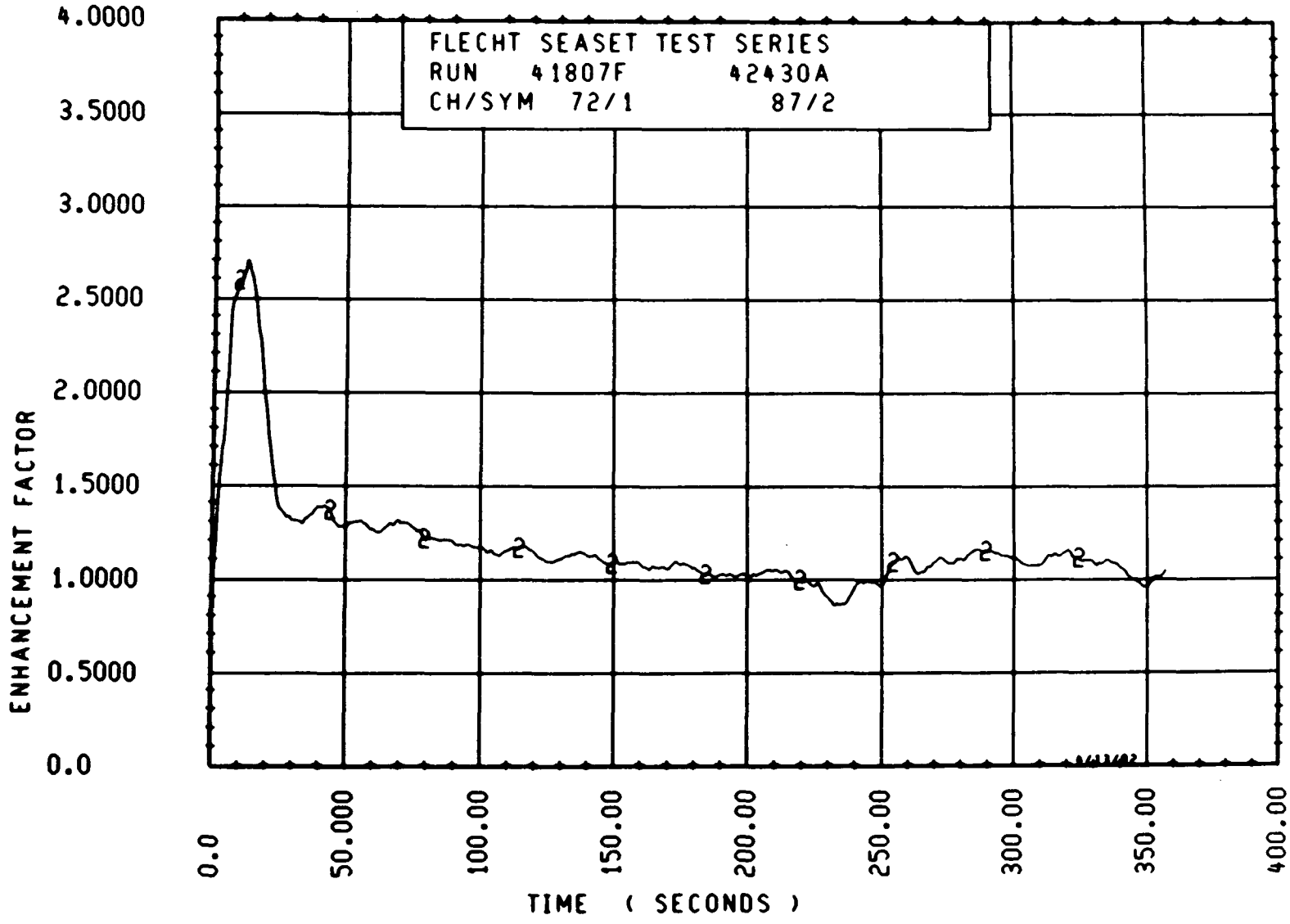


Figure O-85. Enhancement Factor for Run 41807F, Rod 4B, 1.99 m (78.4 in.) Elevation

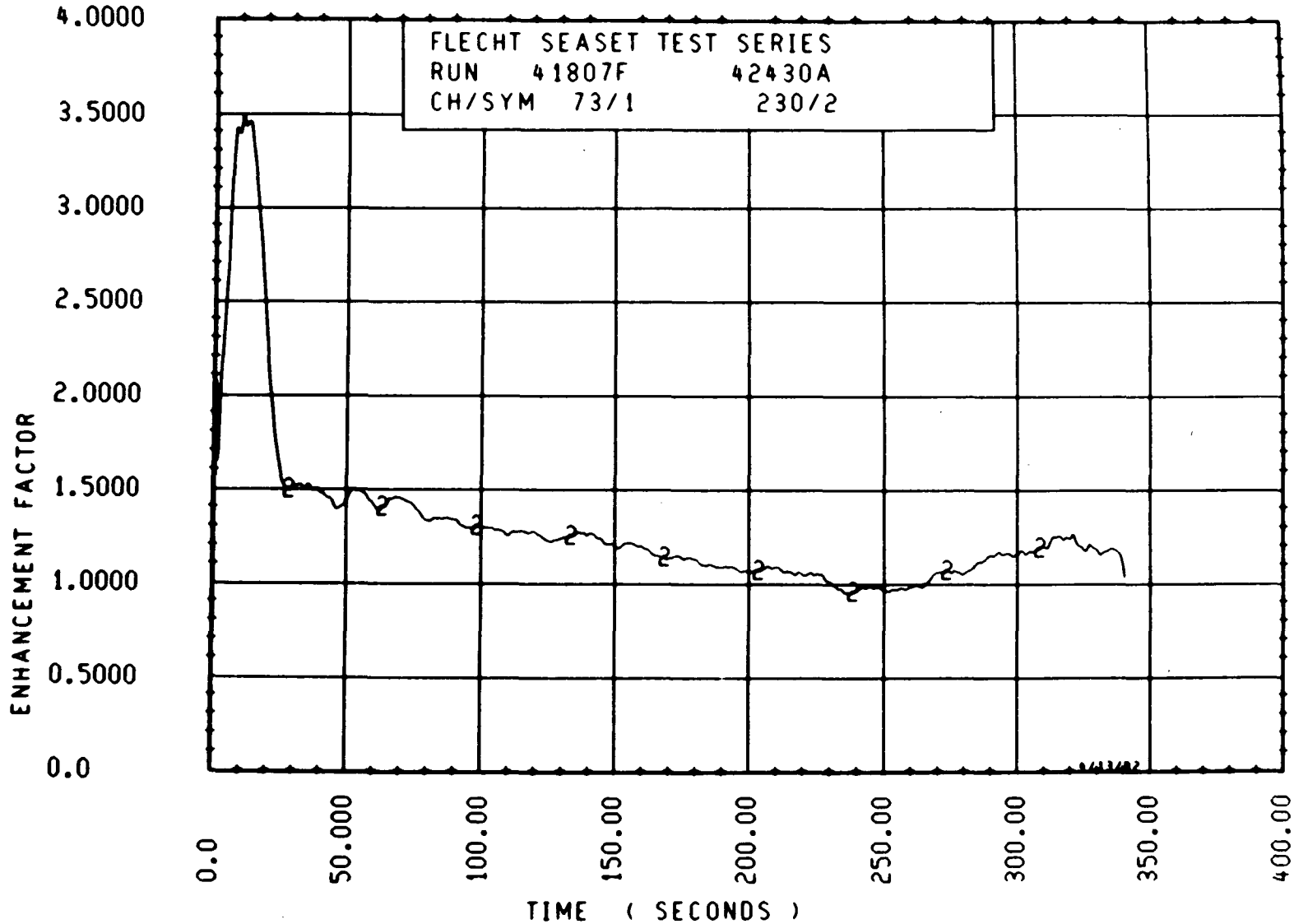


Figure O-86. Enhancement Factor for Run 41807F, Rod 4C, 1.99 m (78.2 in.) Elevation

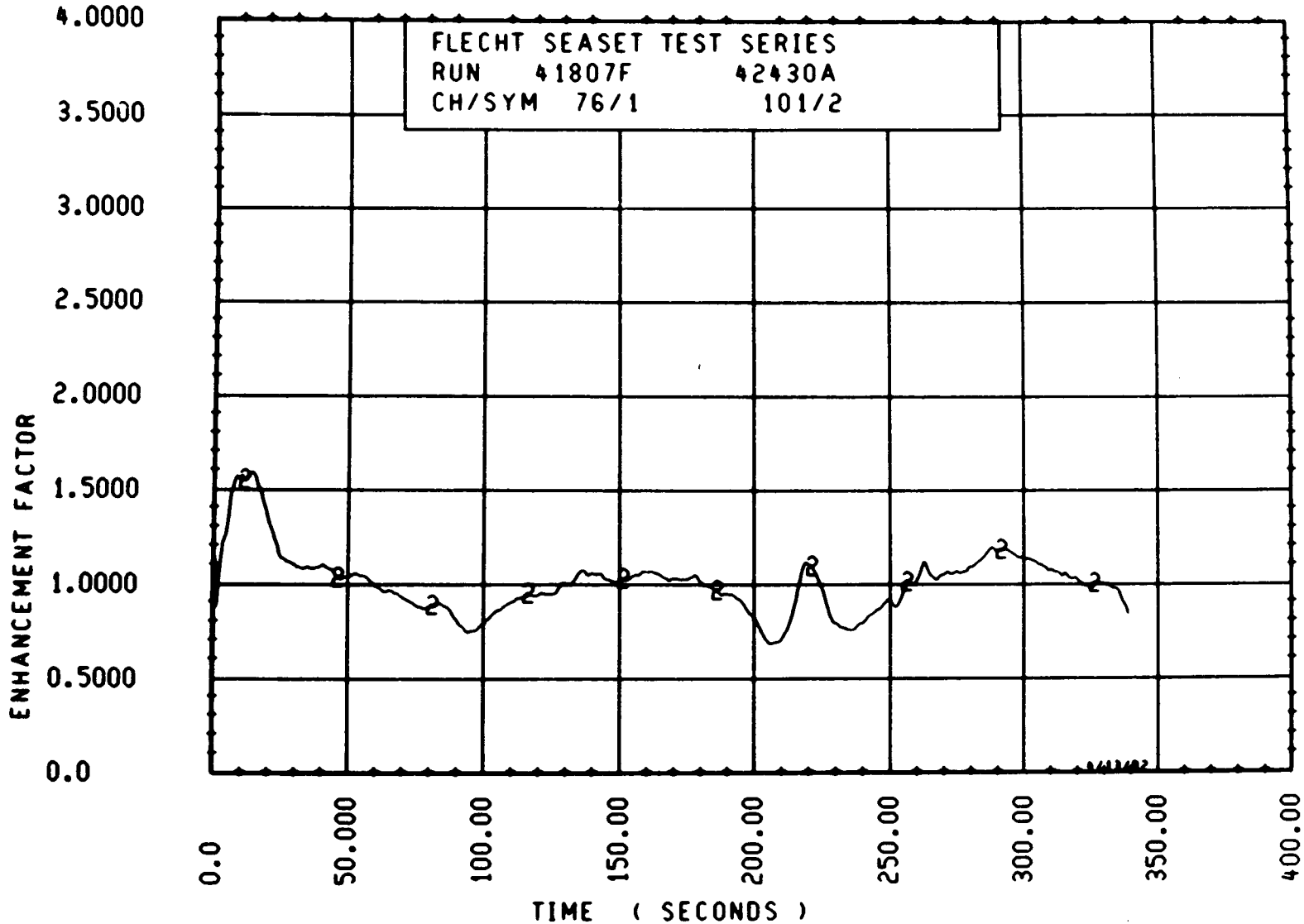


Figure O-87. Enhancement Factor for Run 41807F, Rod 5C, 1.99 m (78.3 in.) Elevation

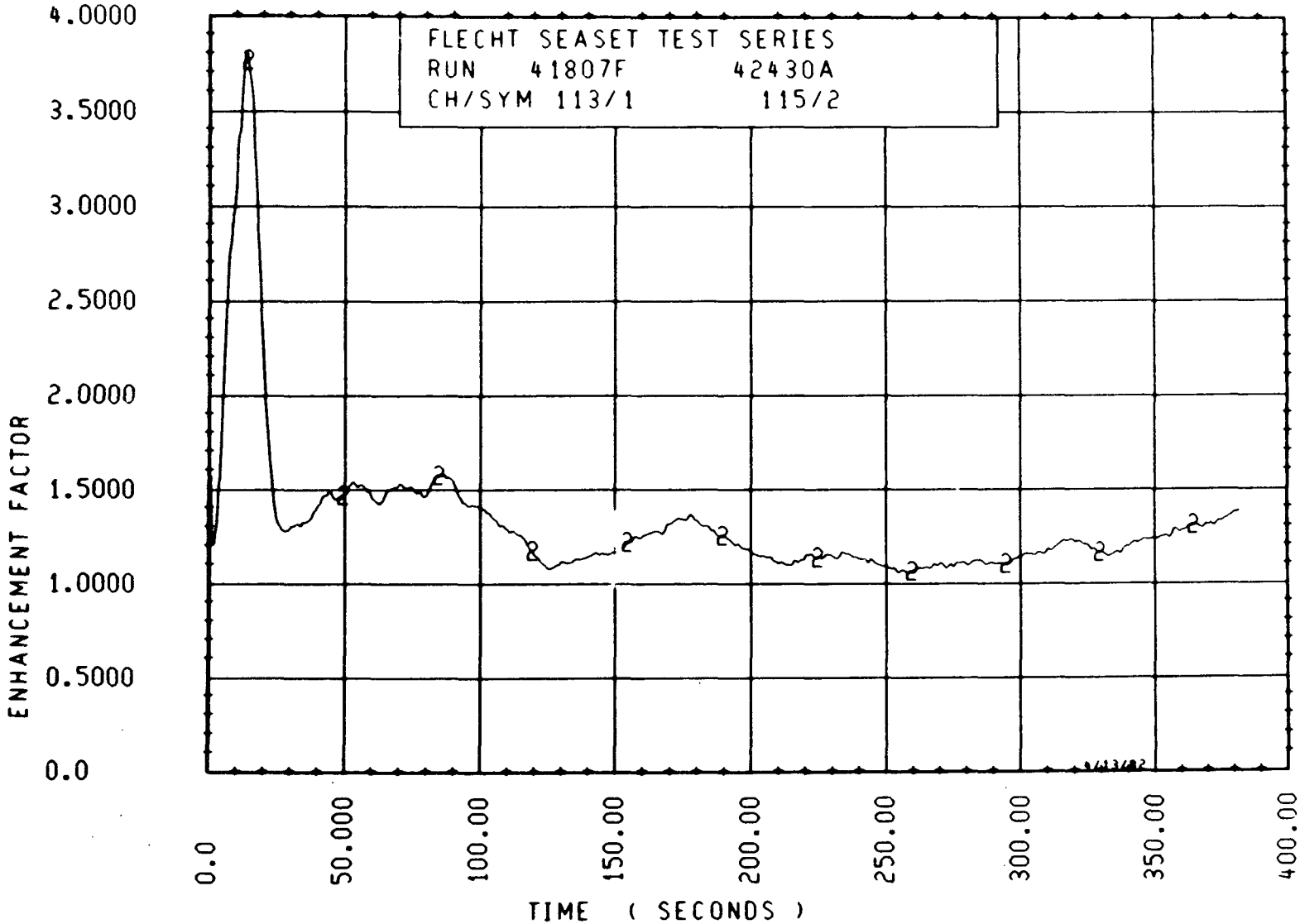


Figure O-88. Enhancement Factor for Run 41807F, Rod 3D, 2.13 m (84 in.) Elevation

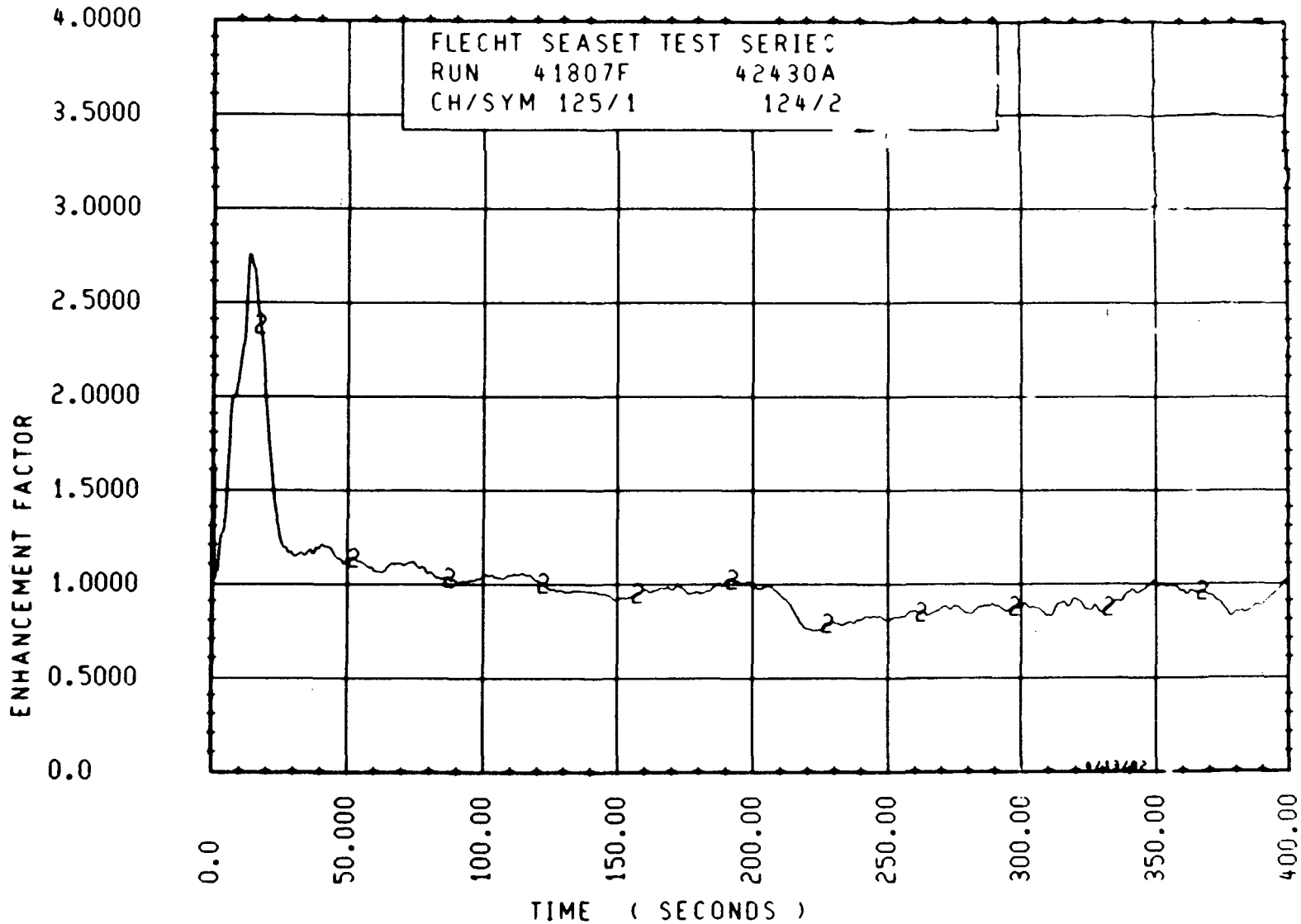


Figure O-89. Enhancement Factor for Run 41807F, Rod 3B, 2.29 m (90 in.) Elevation

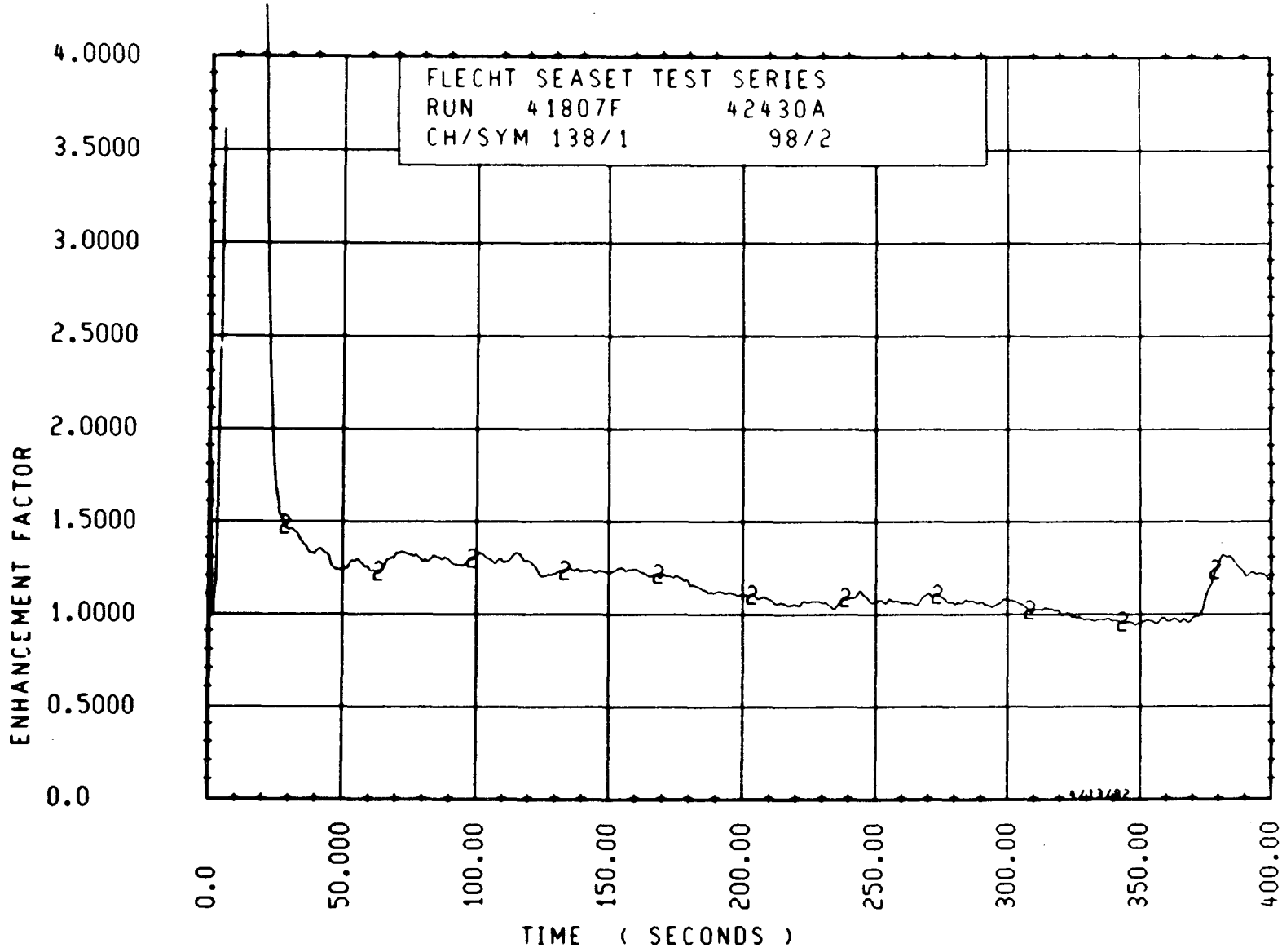


Figure O-90. Enhancement Factor for Run 41807F, Rod 3D, 2.44 m (96 in.) Elevation

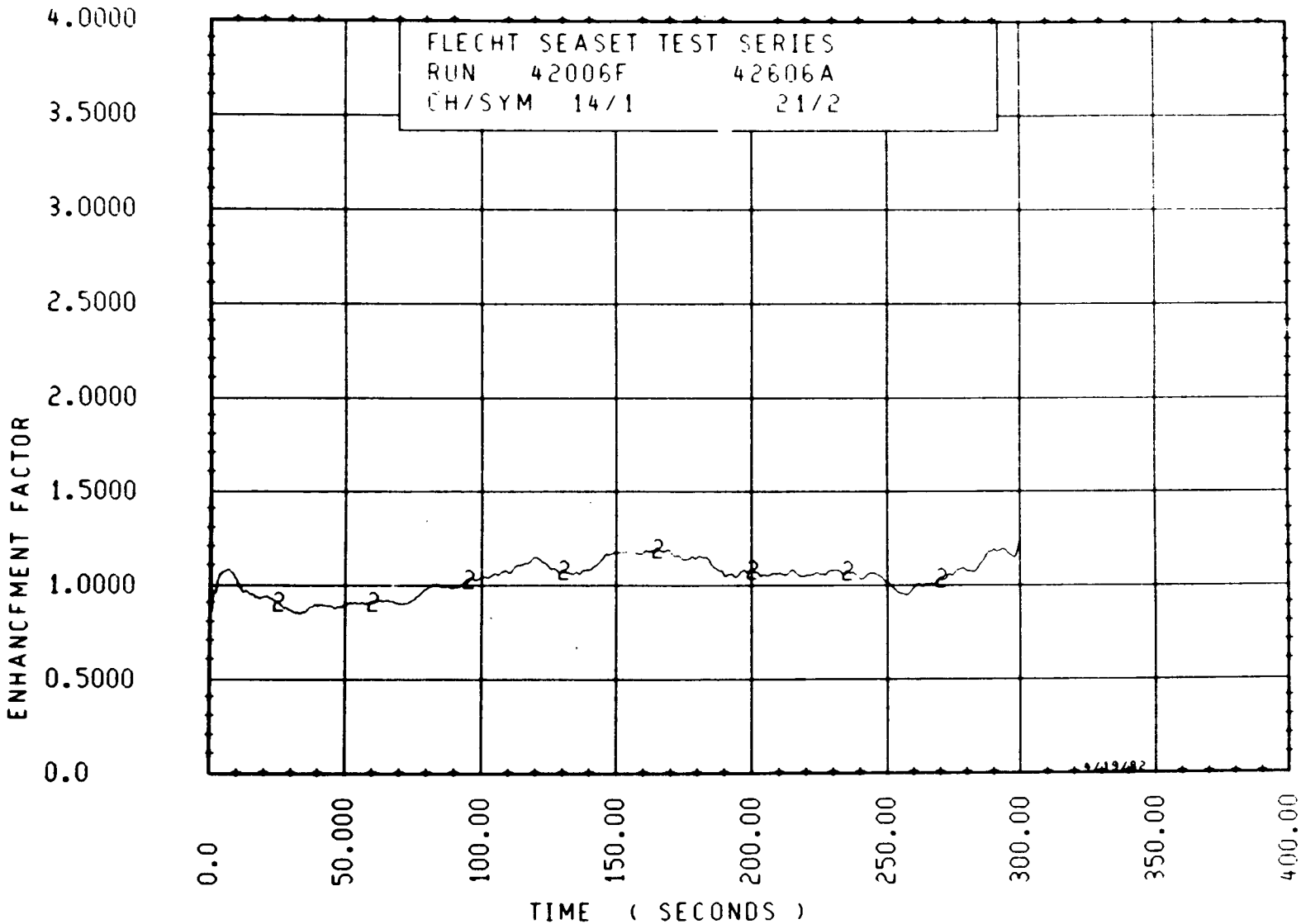


Figure O-91. Enhancement Factor for Run 42006F, Rod 2A, 1.67 m (65.7 in.) Elevation

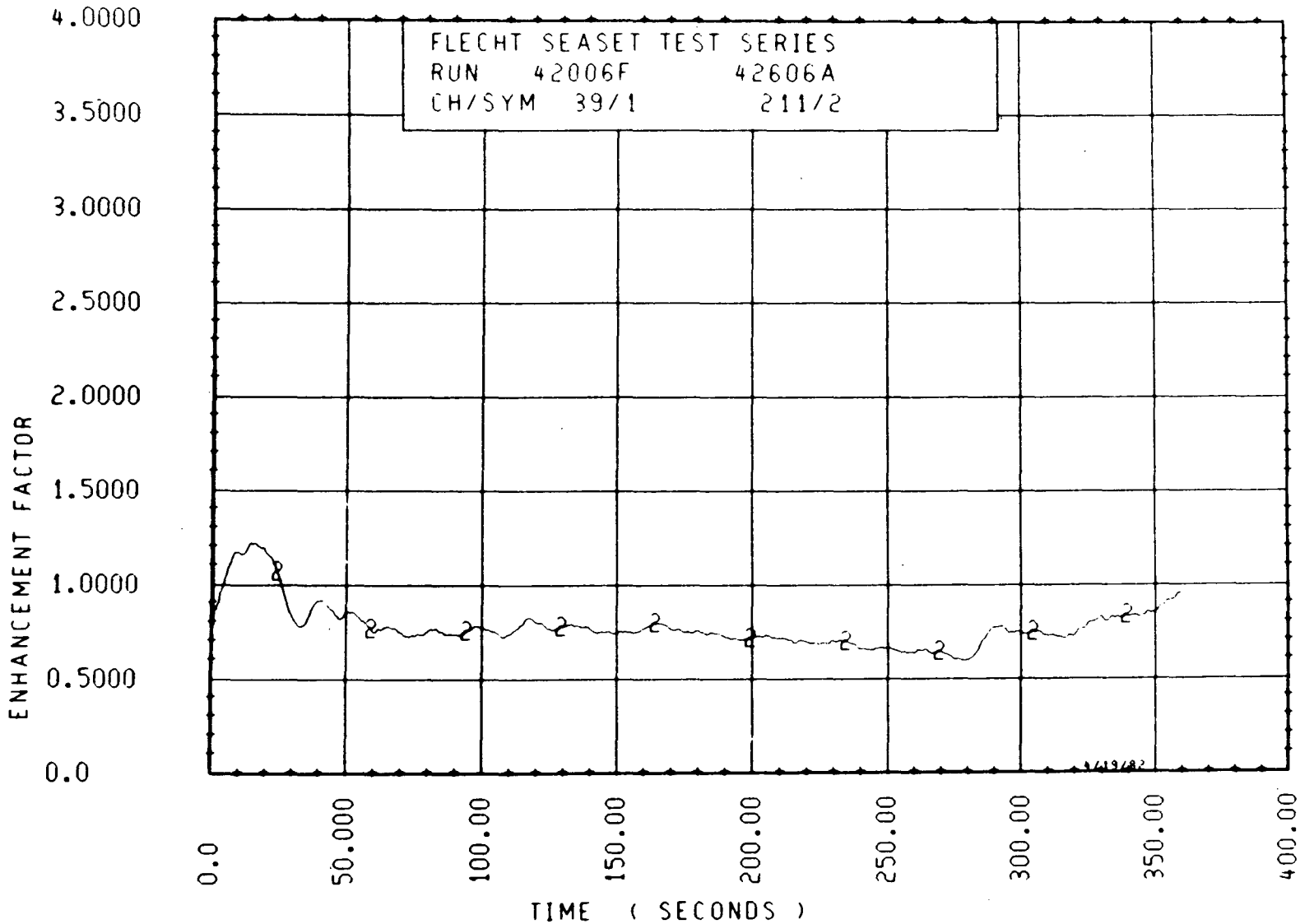


Figure O-92. Enhancement Factor for Run 42006F, Rod 2D, 1.90 m (74.7 in.) Elevation

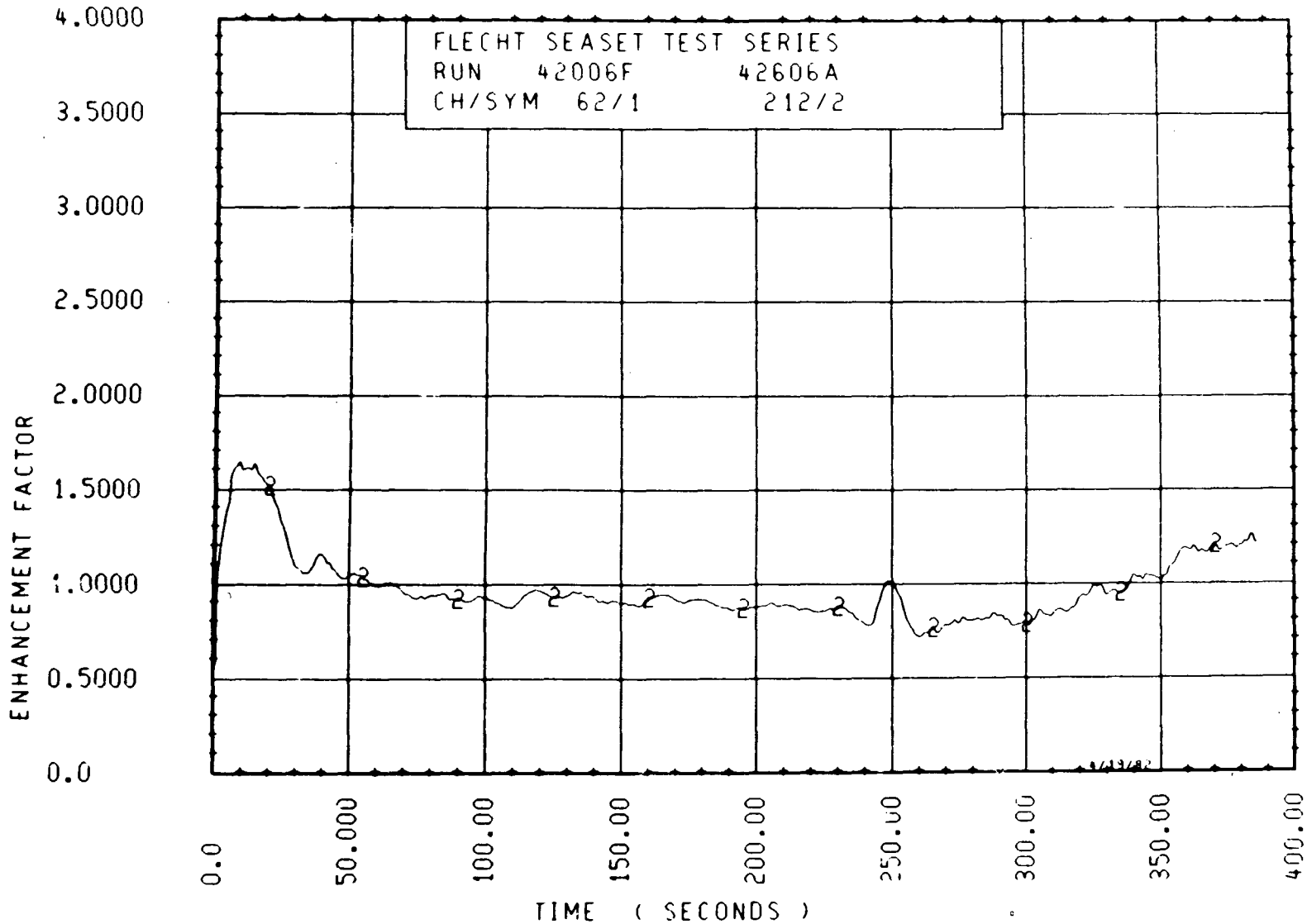


Figure O-93. Enhancement Factor for Run 42006F, Rod 2D, 1.95 m (76.9 in.) Elevation

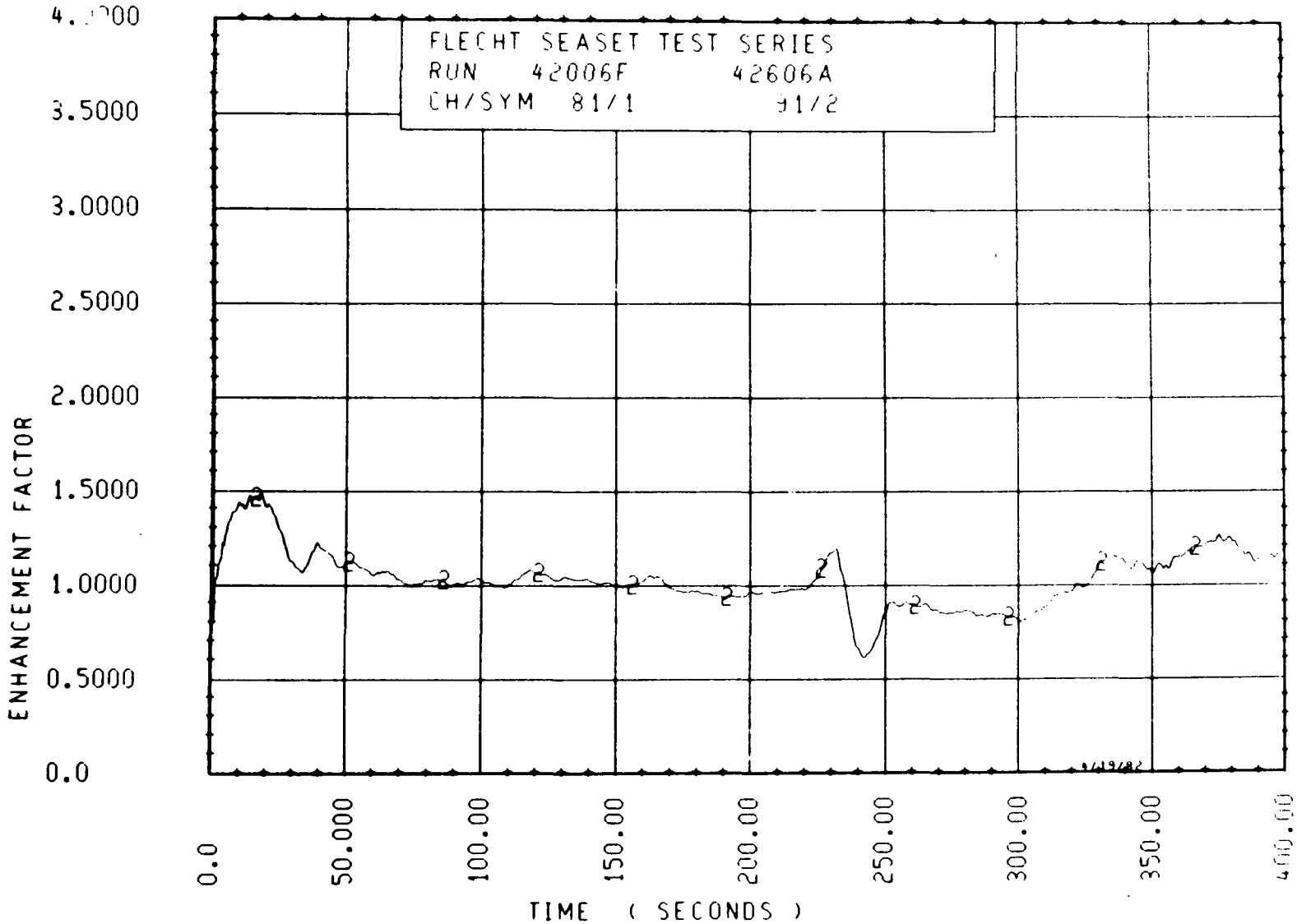


Figure O-94. Enhancement Factor for Run 42006F, Rod 2D, 2.00 m (78.9 in.) Elevation

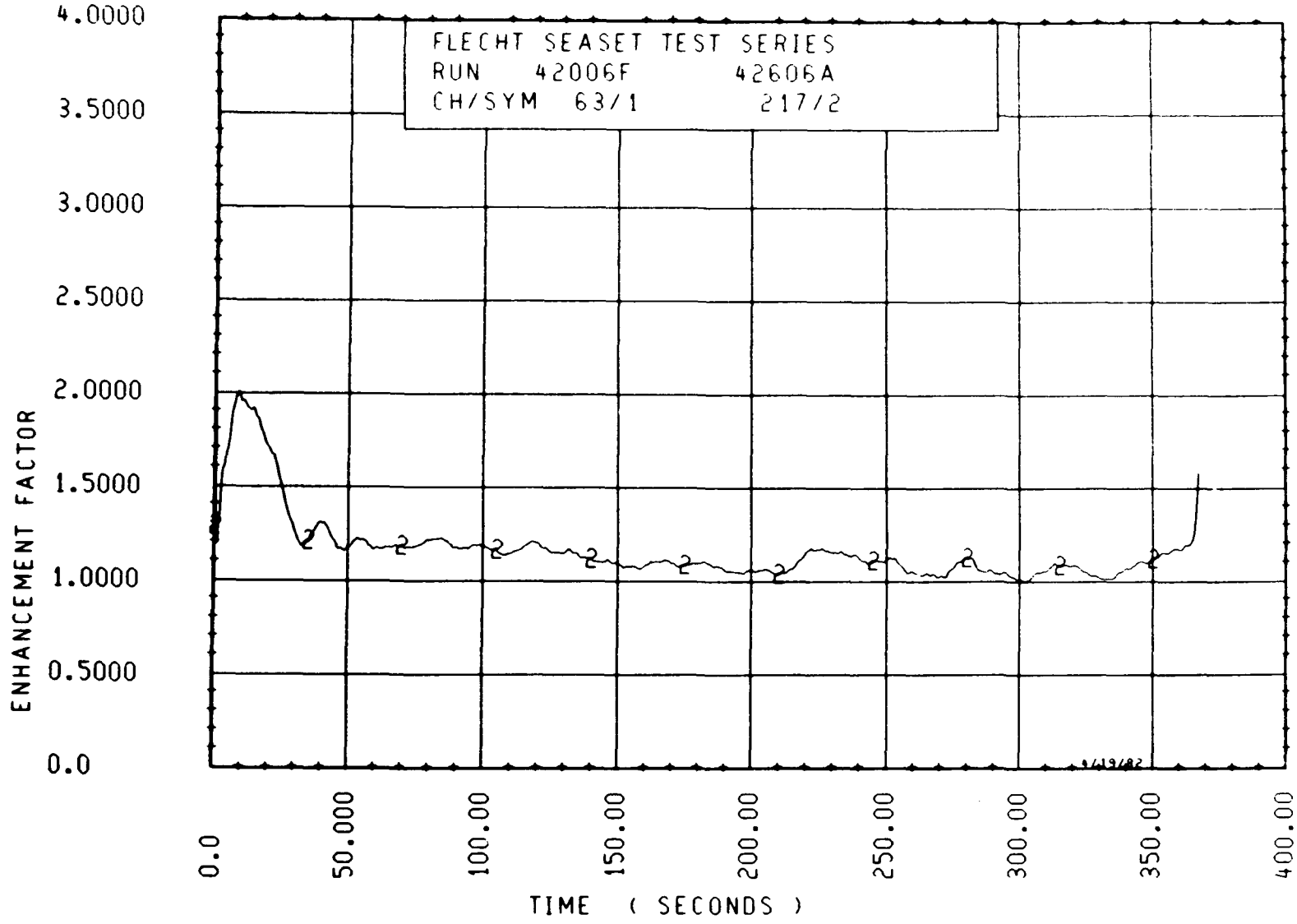


Figure O-95. Enhancement Factor for Run 42006F, Rod 3B, 1.95 m (76.7 in.) Elevation

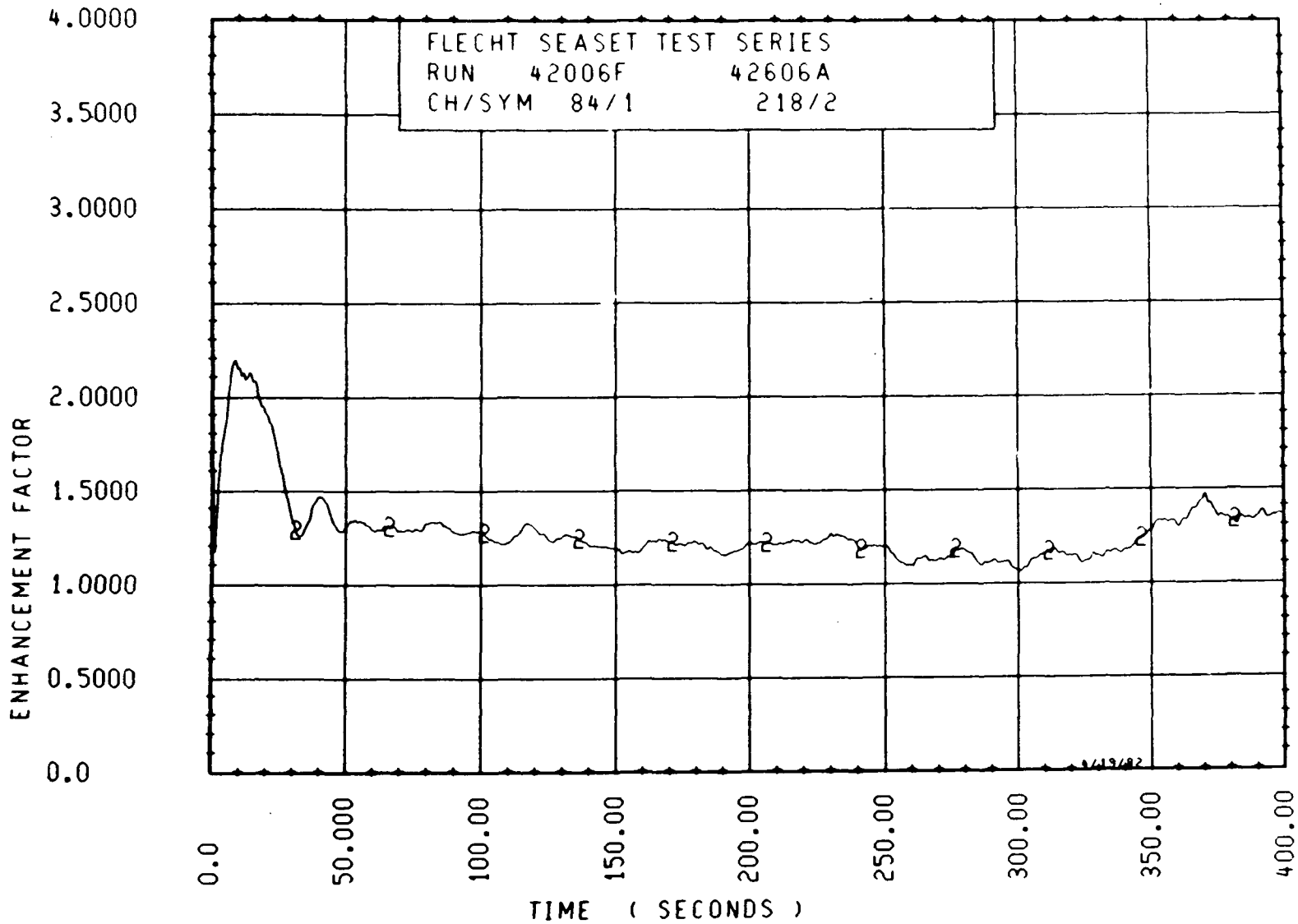


Figure O-96. Enhancement Factor for Run 42006F, Rod 3B, 2.00 m (78.9 in.) Elevation

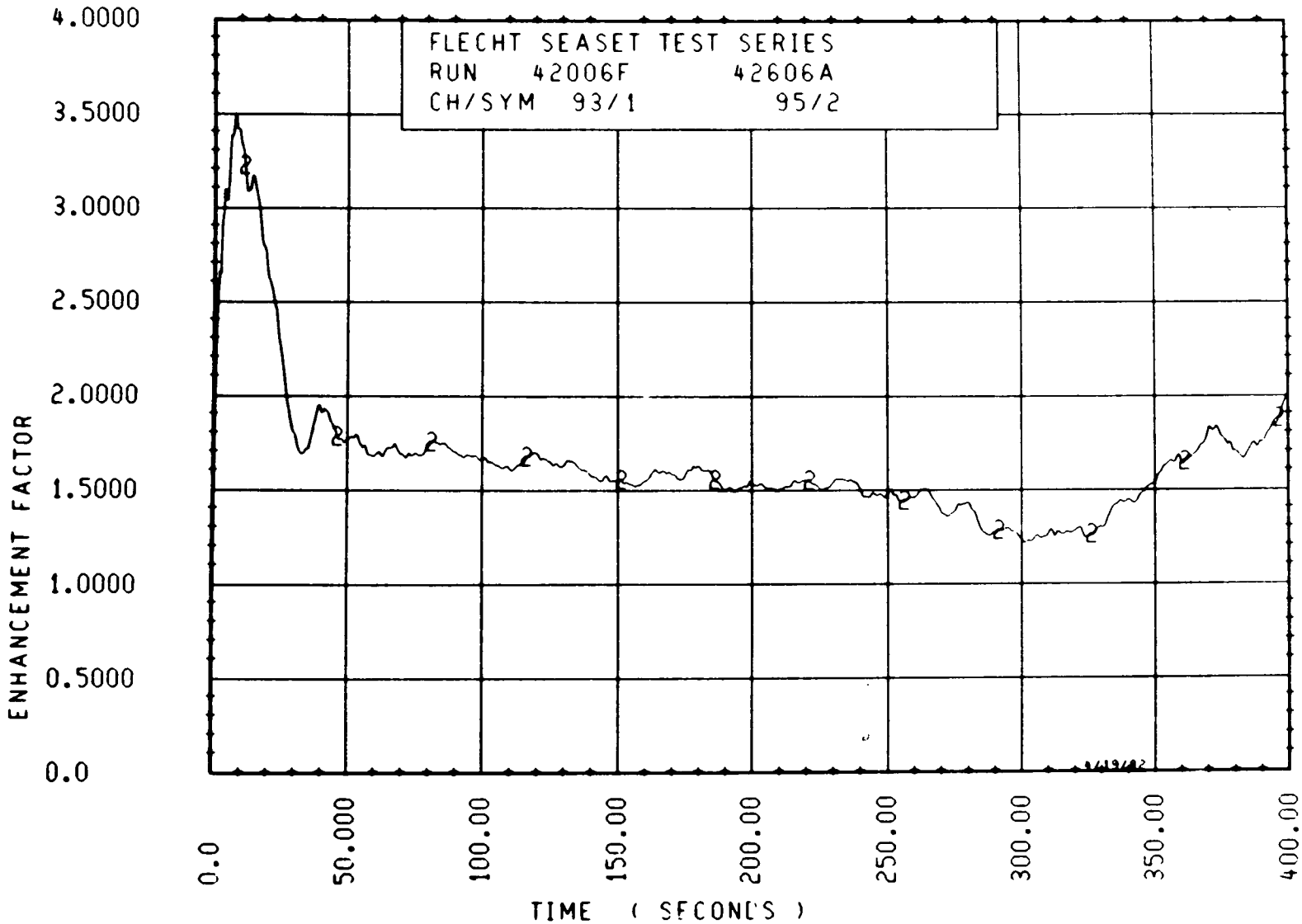


Figure O-97. Enhancement Factor for Run 42006F, Rod 3C, 2.02 m (79.6 in.) Elevation

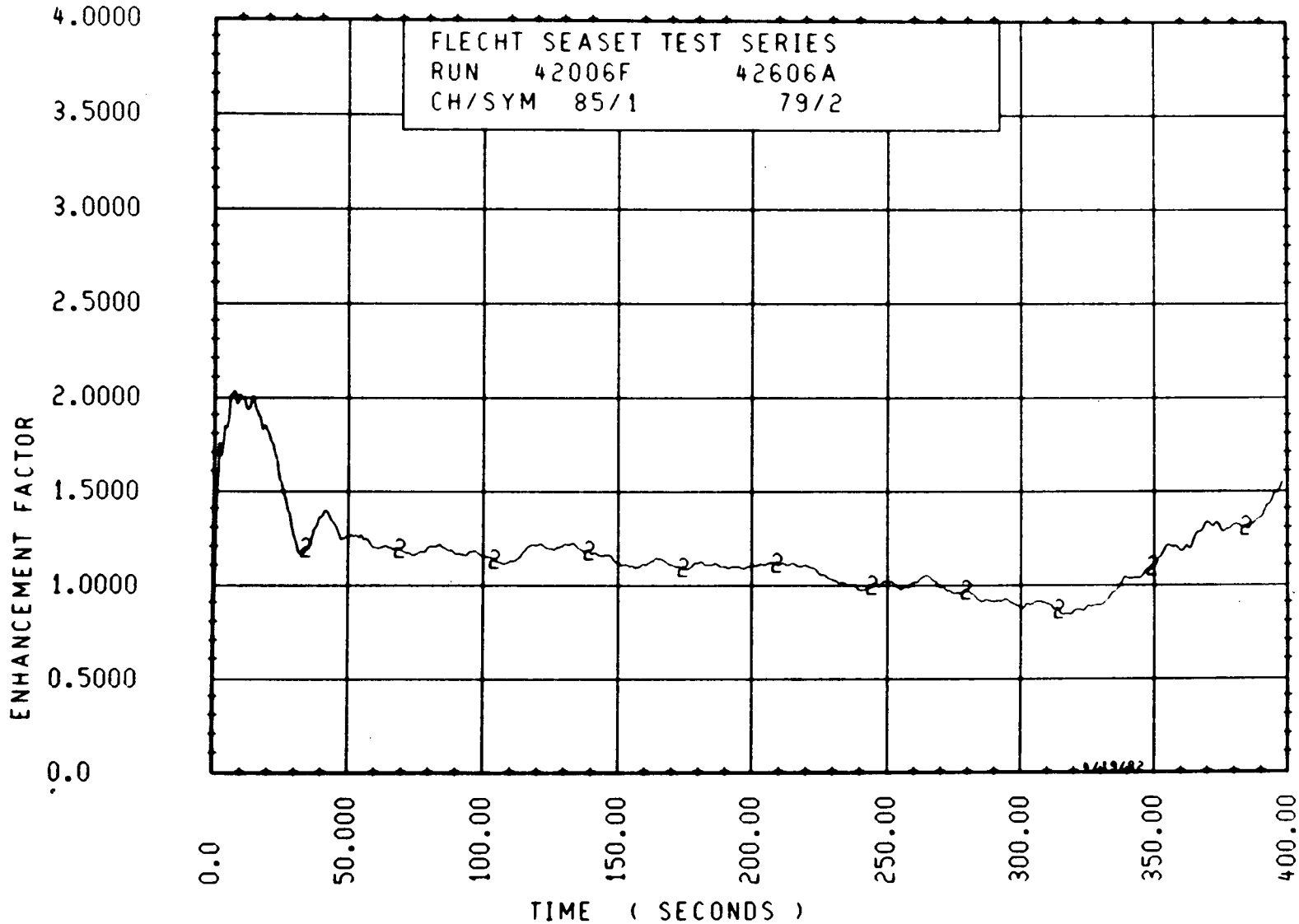


Figure O-98. Enhancement Factor for Run 42006F, Rod 3D, 2.02 m (79.5 in.) Elevation

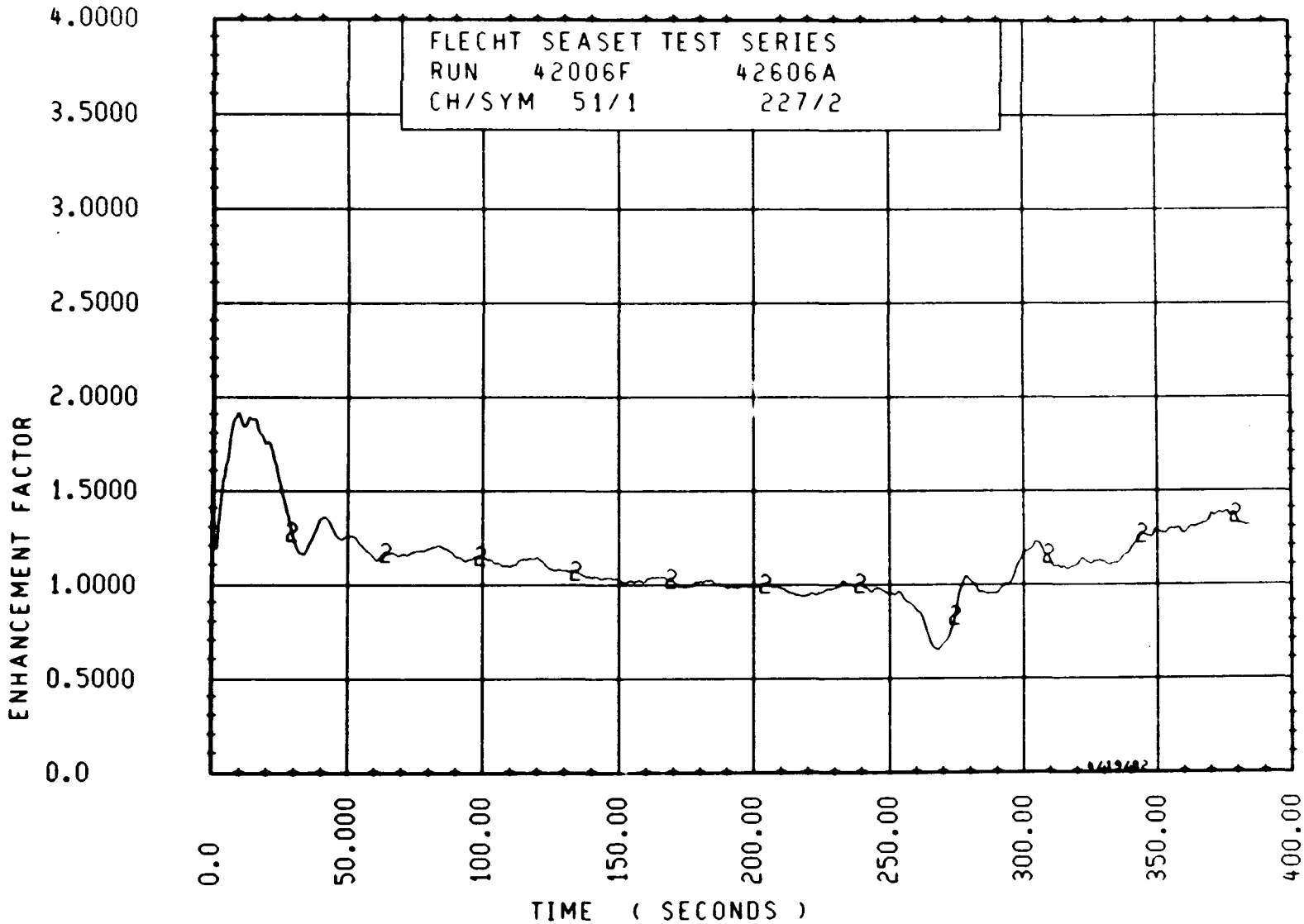


Figure O-99. Enhancement Factor for Run 42006F, Rod 4B, 1.94 m (76.2 in.) Elevation

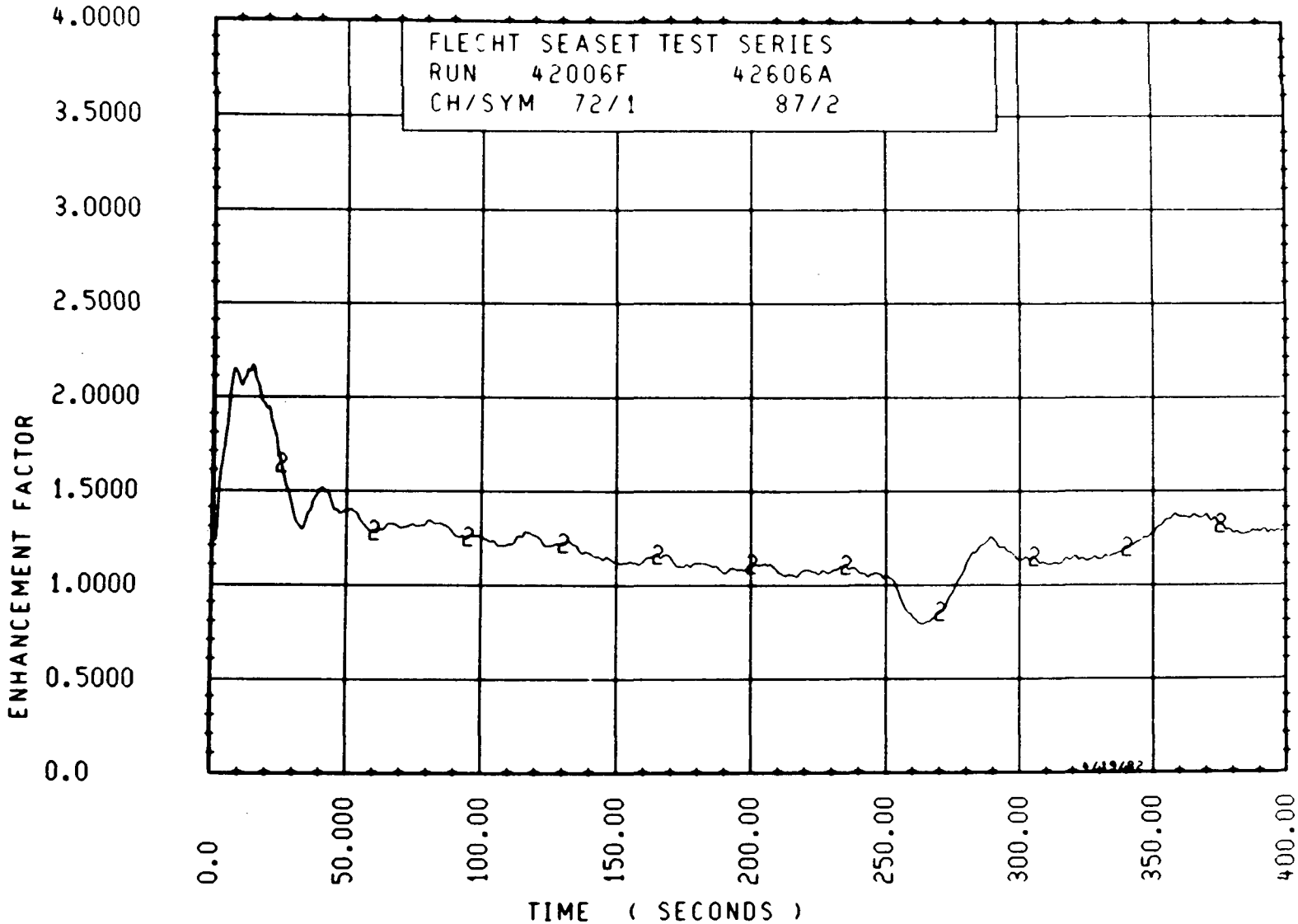


Figure O-100. Enhancement Factor for Run 42006F, Rod 4B, 1.99 m (78.4 in.) Elevation

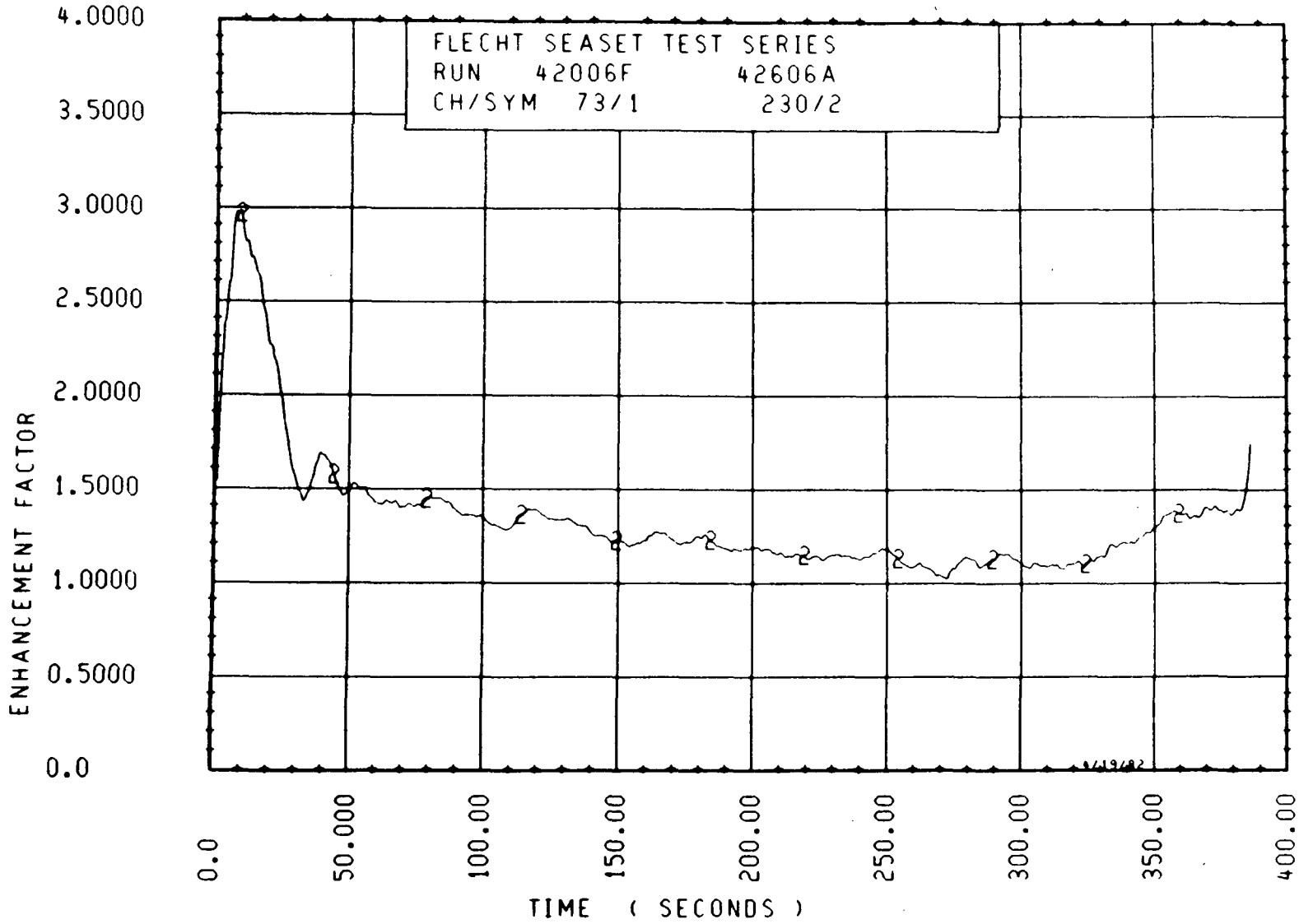


Figure O-101. Enhancement Factor for Run 42006F, Rod 4C, 1.99 m (78.2 in.) Elevation

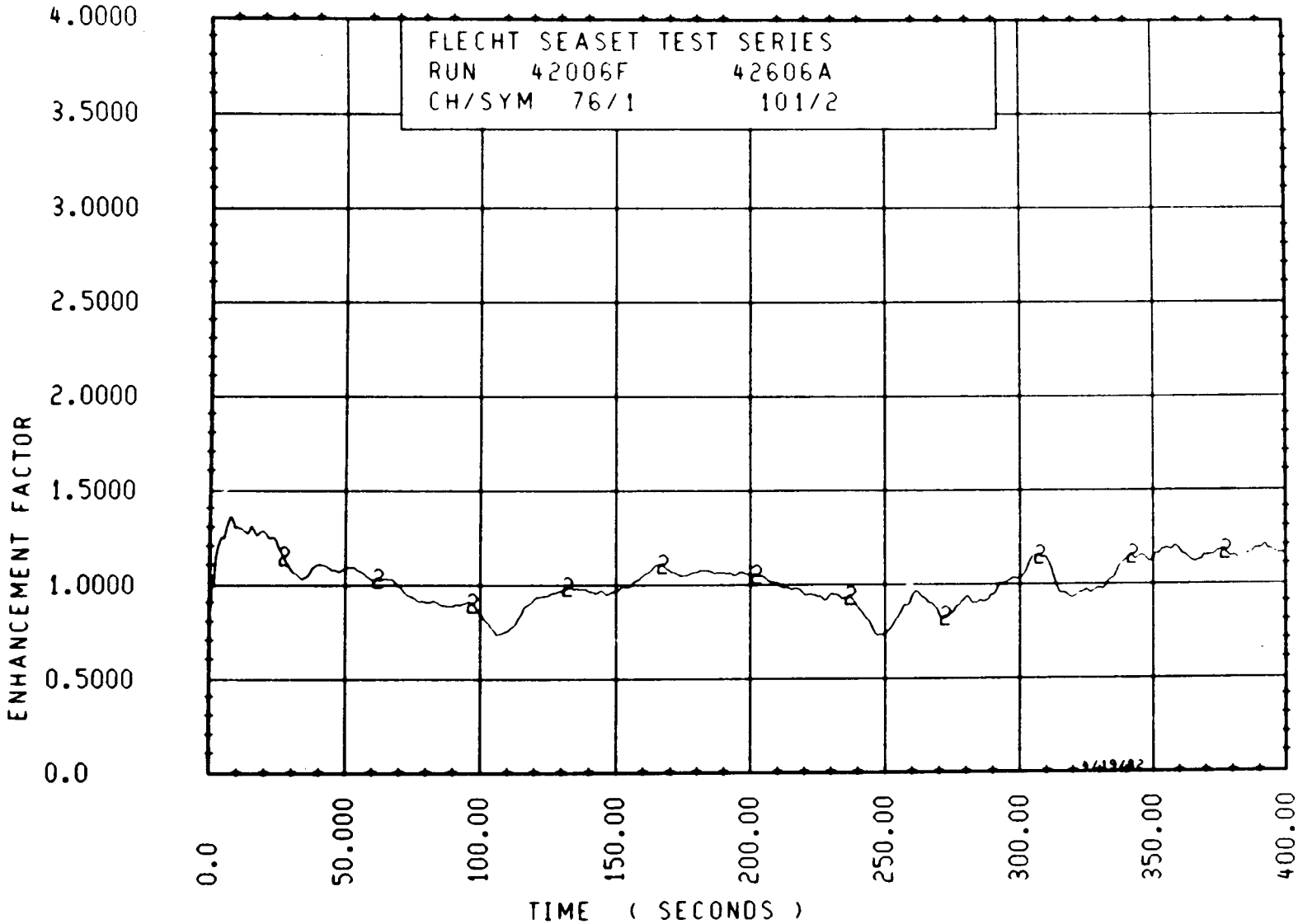


Figure O-102. Enhancement Factor for Run 42006F, Rod 5C, 1.99 m (78.3 in.) Elevation

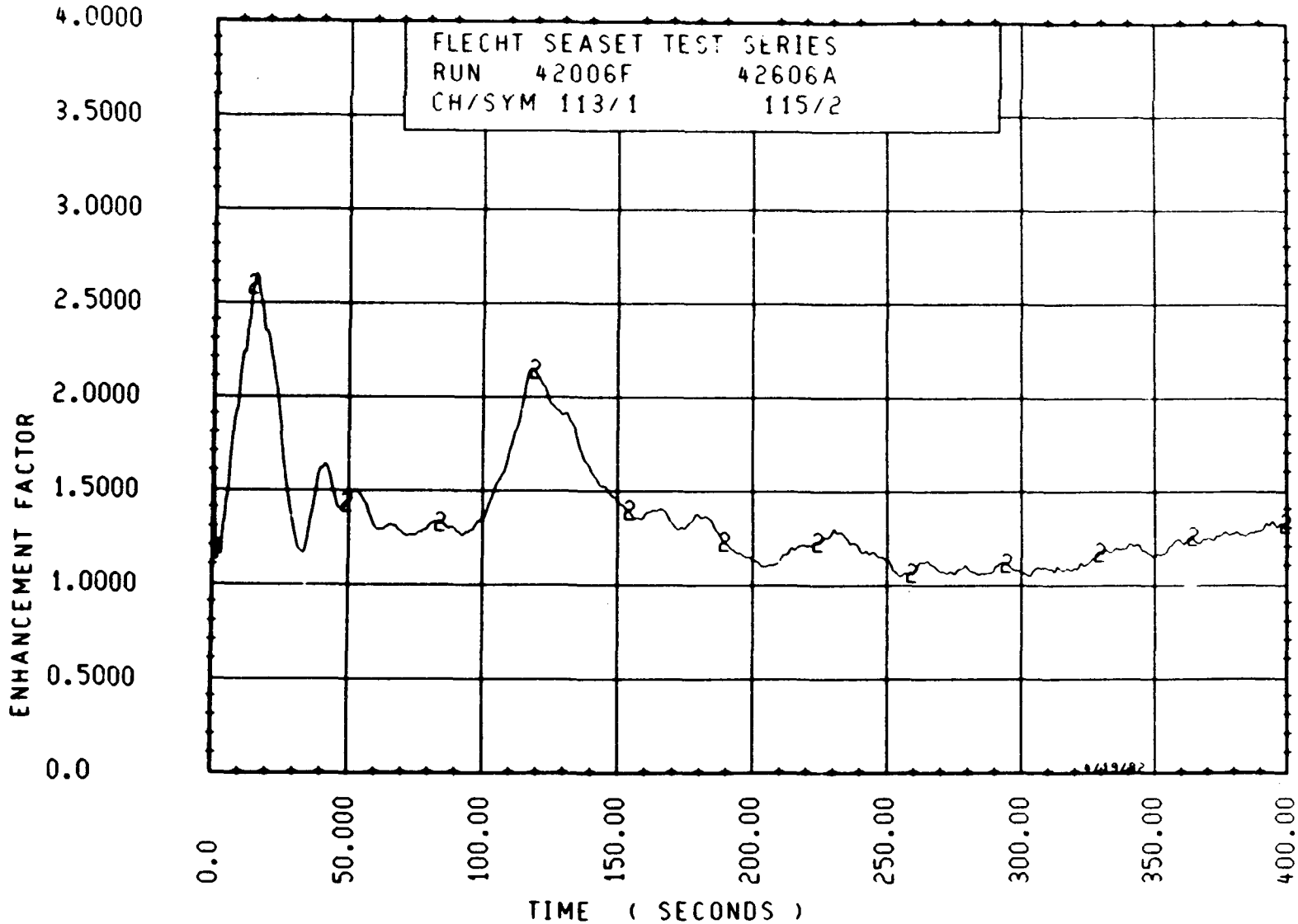


Figure O-103. Enhancement Factor for Run 42006F, Rod 3D, 2.13 m (84 in.) Elevation

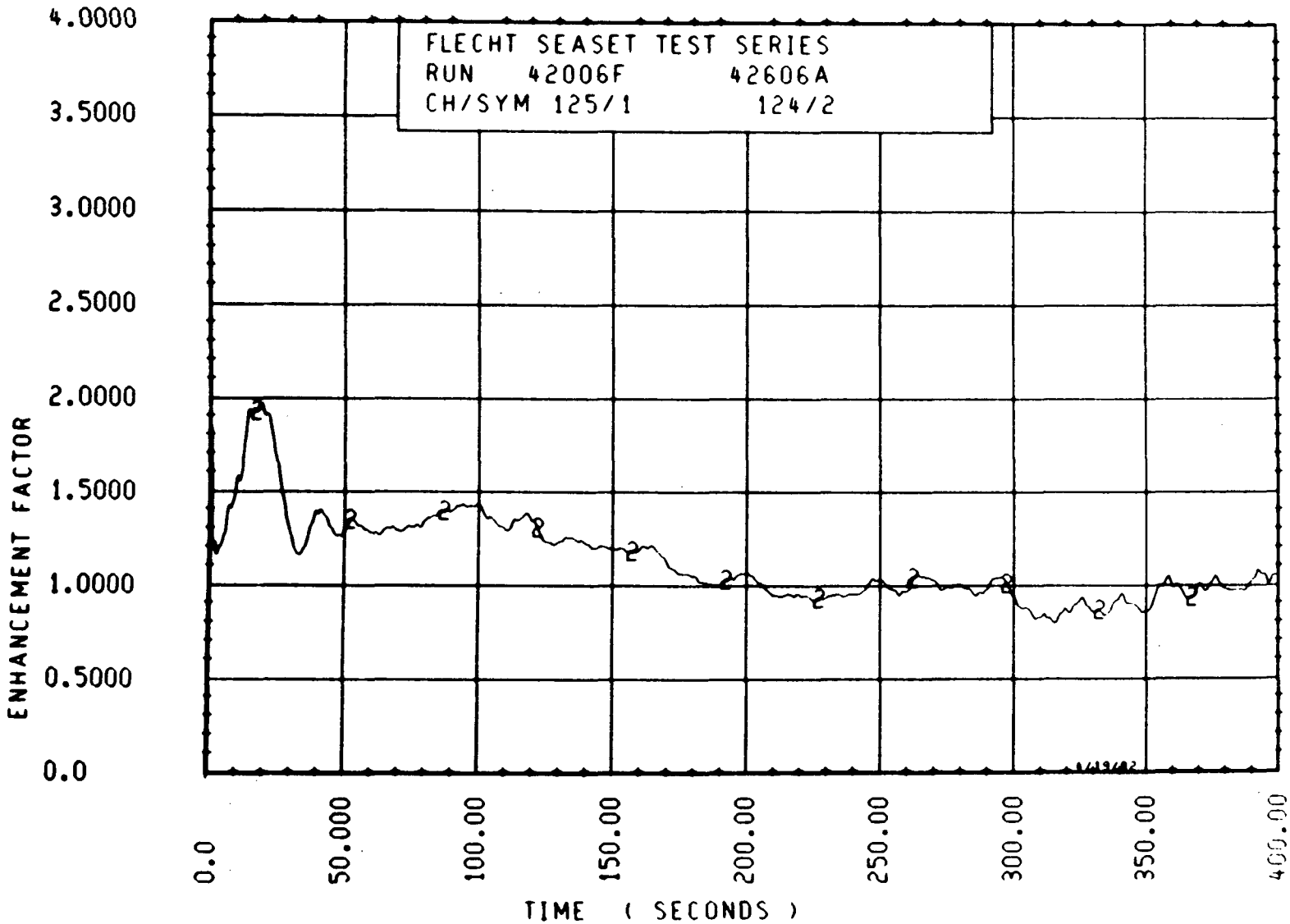


Figure O-104. Enhancement Factor for Run 42006F, Rod 3B, 2.29 m (90 in.) Elevation

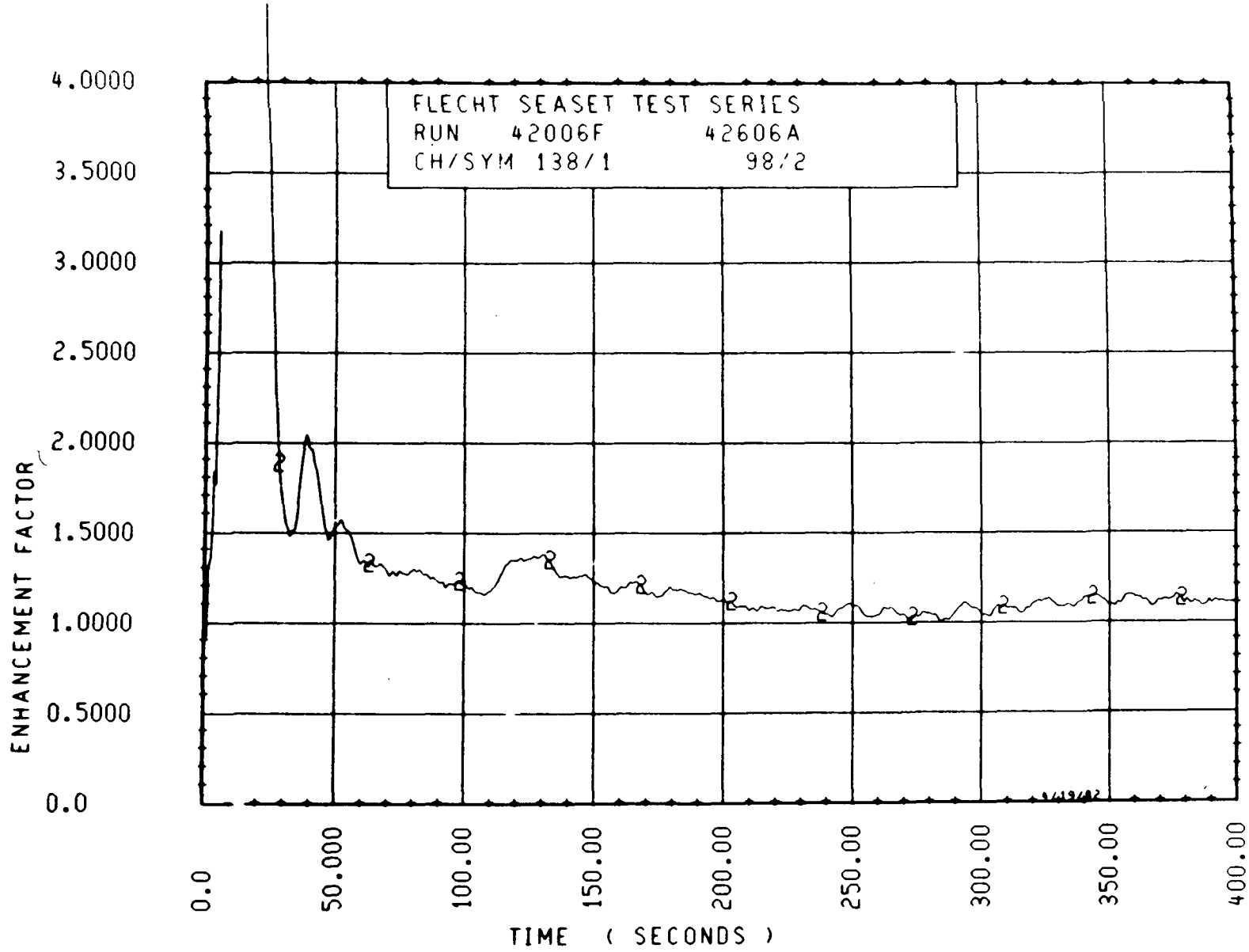


Figure O-105. Enhancement Factor for Run 42006F, Rod 3D, 2.44 m (96 in.) Elevation

APPENDIX P
TEMPERATURE HISTORY CALCULATION

P-1. INTRODUCTION

Temperature histories were calculated from the estimated heat transfer coefficients according to equation (C-3) to determine the effect of heat transfer during the early period on the resultant temperature rise. This appendix explains the rod geometry and physical properties which are necessary to calculate the parameters in equation (C-3). The method of solving the equation is also discussed briefly.

P-2. ROD GEOMETRY AND PROPERTIES

The rod structure is shown in figure P-1 with the pertinent geometrical parameters and material information. Table P-1 lists the properties of the rod materials. Table P-2 shows the fraction of Kanthal in zone 2 of the rod.

For simplicity, the rod was considered to be homogeneous and the quantity $(A\rho\ C_p)$ for the rod was estimated as follows:

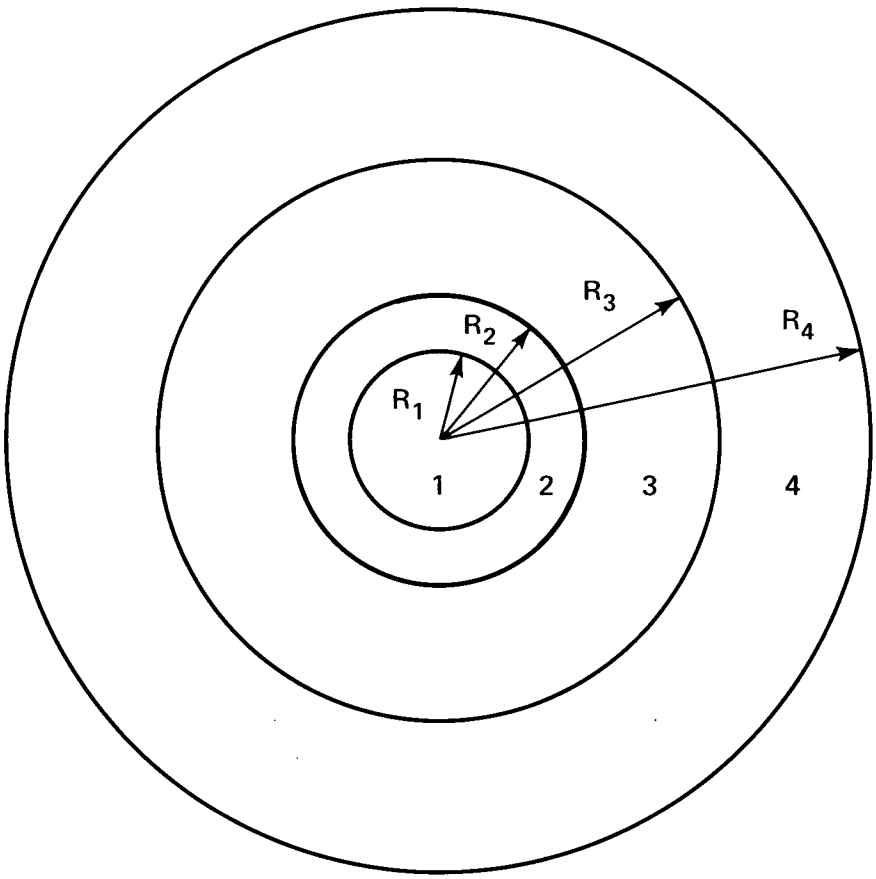
$$(A\rho C_p)_{rod} = (A\rho C_p)_{BN} + (A\rho C_p)_{KN} + (A\rho C_p)_{SS} \qquad \text{(P-1)}$$

The first and second terms on the right-hand side of equation (P-1) were calculated according to the following:

$$(A\rho C_p)_{BN} = (\rho C_p)_{BN} (A)_{zone\ 1} + (A)_{zone\ 3} + (A)_{zone\ 2} (1-f) \qquad \text{(P-2)}$$

$$(A\rho C_p)_{KN} = (\rho C_p)_{KN} (A)_{zone\ 2}\ f \qquad \text{(P-3)}$$

where f is the Kanthal fraction in zone 2 (obtained from table P-2).



ZONE	1	2	3	4
MATERIAL	BORON NITRIDE (BN)	BORON NITRIDE & KANTHAL (KN)	BORON NITRIDE	STAINLESS STEEL 304
RADIUS	0.825mm (0.0325")	1.71 mm (0.0675")	4.11 mm (0.162")	4.75 mm (0.187")

Figure P-1. Heater Rod Model

TABLE P-1

MATERIAL PROPERTIES OF HEATER ROD MATERIALS

Material	Density [kg/m^3 (lb/ft^3)]	Heat Capacity [J/kg-^oC (Btu/lb-^oF)]
Boron nitride (BN)	1999 (124.8)	2017.7-1396.3 e (-0.00245 T) [0.48193-0.33349 e (-0.0013611 T)]
Kanthal (KN)	7145 (446)	456 + 0.46 T for T $\leq$ 649^oC [0.109 + (5.9E-5)T for T $\leq$ 1200^oF] -1758 + 0.39 T for 649^oC < T $\leq$ 760^oC [-0.42 + (5.0E-4)T for 1200^oF < T $\leq$ 1400^oF] 4162 - 3.8 T for 760^oC < T $\leq$ 871^oC [0.994-(5.1E-4)T for 1400^oF < T $\leq$ 1600^oF] 664.9 + 0.090 T for T > 871^oC [0.1588 + (1.2E-5)T for T > 1600^oF]
Stainless steel 304 (SS)	8026 (501)	444 + 0.2888 T for T $\leq$ 315.11^oC [0.106 + (3.833E-5)T for T $\leq$ 599.25^oF] 484.4 + 0.1668 T for T > 315.11^oC [0.1157 + (2.2143E-5)T for T > 599.25^oF]

TABLE P-2

KANTHAL FRACTION IN ROD ZONE 2

Elevation [m (in.)]	Kanthal Factor (f)	Elevation [m (in.)]	Kanthal Factor (f)
0 (0)	0.1116	1.98 (78)	0.4013
0.15 (6)	0.1116	2.13 (84)	0.4442
0.30 (12)	0.1116	2.29 (90)	0.4286
0.46 (18)	0.1116	2.44 (96)	0.3141
0.61 (24)	0.1607	2.59 (102)	0.2681
0.76 (30)	0.2133	2.74 (108)	0.2138
0.91 (36)	0.2644	2.90 (114)	0.2138
1.07 (42)	0.2644	3.05 (120)	0.1602
1.22 (48)	0.3073	3.20 (126)	0.1040
1.37 (54)	0.3528	3.35 (132)	0.1040
1.52 (60)	0.3827	3.51 (138)	0.1040
1.68 (66)	0.4013	3.66 (144)	0.1040
1.83 (72)	0.4013		

P-2. SOLUTION FOR EQUATION (C-3)

Since all the parameters of equation (C-3) are readily available from the test results, operating conditions, and test design, the ordinary differential equation can be solved with a proper initial condition. The initial condition was provided by the measured initial temperature. The subroutine DGEAR of IMSL[1] was used for the present calculations. The resulting program was called HEATUP.

1. The IMSL Library, Edition 8, International Mathematical and Statistical Libraries, Inc., Houston, TX.

EPRI NP-2014, Volume 2

Below are five index cards that allow for filing according to the four cross-references in addition to the title of the report. A brief abstract describing the major subject area covered in the report is included on each card.

EPRI NP-2014
Volume 2
RP959-1
Topical Report
September 1982
FLECHT
SEASET
Program
Report No. 11
NUREG/CR-2444
WCAP-9992

EPRI

PWR FLECHT SEASET 21-Rod Bundle Flow Blockage Task Data and Analysis Report
Volume 2

Contractor: Westinghouse Electric Corporation

Volume 2 contains Appendixes K-P. Instrumentation error analysis, calculation techniques, heater rod thermocouple as-built locations, enhancement factors of reflooding tests, and temperature history calculations are detailed. 902 pp.

EPRI Project Manager: Bill K. H. Sun

Cross-References:
1. EPRI NP-2014, Volume 2
2. RP959-1
3. Analysis and Testing Program
4. Pressurized Water Reactor

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