

NUREG/CR-2444
EPRI NP-2014
WCAP-9992
Vol. 2

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

NRC/EPRI/Westinghouse Report No. 11

Appendices K-P

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FLECHT SEASET Program
NRC/EPRI/Westinghouse Report No. 11
NUREG/CR-2444, Vol. 2
NP-2014
WCAP-9992

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21-ROD BUNDLE FLOW BLOCKAGE TASK
DATA AND ANALYSIS REPORT

September 1982

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by

Westinghouse Electric Corporation

under

Contract No. NRC-04-77-127, EPRI Project No. RP959-1

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NRC FIN B6204

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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.

ACKNOWLEDGMENTS

The authors acknowledge the efforts of the following Westinghouse Nuclear Energy Systems contributors, especially the continual and sustained efforts of C. E. Conway, D. P. Kitzmiller, J. Carovac, and A. Villella:

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The work of the following members of the Program Management Group, their colleagues, and their consultants is hereby acknowledged:

EPRI - K. H. Sur
NRC-RSR - M. L. Picklesimer, L. H. Sullivan, A. L. M. Hon
NRC-NRR - W. Hodges, D. A. Powers
ORNL - R. W. McCulloch, S. D. Snyder
Battelle - C. Stewart
ITI - P. Davis

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

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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 | 0.51 (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 ⁰ | 207 | 210 | 210 | 211 | 211 |
| 1.98 m (78 in.) at 315 ⁰ | 210 | 211 | 211 | 212 | 212 |
| 2.13 m (84 in.) at 45 ⁰ | 208 | 213 | 213 | 214 | 214 |
| 2.13 m (84 in.) at 315 ⁰ | 211 | 212 | 212 | 213 | 213 |
| 2.98 m (111 in.) at 315 ⁰ | 212 | 215 | 215 | 216 | 216 |

-- Blockage sleeve temperatures for the following locations:⁽¹⁾

| Blockage Sleeve Thermocouple Location | | Computer Channel Number | | | | |
|--|-------------------------------|-------------------------|-----|-----|-----|-----|
| Rod | Elevation [m (in.)] | B | C | D | E | F |
| 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 ⁰ | - | - | - | 207 | 207 |
| 3C | 1.90 (75) at 112 ⁰ | - | - | - | 208 | 208 |
| 3C | 1.90 (75) at 90 ⁰ | - | - | - | 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 downstream 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

| CHN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41070A | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42102A | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42207A | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42430A | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42514A | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42606A | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42755A | | | | 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 | | | |
| 44502A | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 44607A | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |

TABLE K-1 (cont)

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

| CHN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41070A | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42102A | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42207A | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42430A | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42514A | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42606A | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42755A | 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 | | |
| 44502A | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 44607A | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |

TABLE K-1 (cont)

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

| RUN NUMBER | 1R | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D | |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 41900A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 42100A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 42200A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 42430A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 42514A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 42600A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 42700A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 42800A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 42900A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 43013A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 43117A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 43200A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 43511A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 43610A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 43715A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 43916A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 44117A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 44300A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 44401A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 44500A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |
| 44602A | | | | 9 | | | | | | | | | | 10 | | 11 | | | | | | |

TABLE K-1 (cont)

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

| RUN NUMBER | 1R | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D | |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 41900A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 42100A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 42200A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 42430A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 42514A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 42600A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 42700A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 42800A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 42900A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 43013A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 43117A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 43200A | 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 | | |
| 44300A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 44401A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 44500A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |
| 44602A | 13 | 14 | | | | | | | | | | | | | | | 15 | | | 16 | | |

TABLE K-1 (cont)

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

| CH NUMBER | 18 | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|--------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41907A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |
| 42177A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |
| 42277A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |
| 42430A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |
| 42514A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |
| 42676A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |
| 42705A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |
| 42706A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |
| 42907A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |
| 43013A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |
| 43117A | | | | 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 | | | | |
| 44307A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |
| 44401A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |
| 44570A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |
| 44602A | | | | 17 | | | | | | | | | | 18 | 19 | | 20 | | | | |

TABLE K-1 (cont)

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

| CH NUMBER | 18 | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|--------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41907A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |
| 42177A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |
| 42207A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |
| 42430A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |
| 42514A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |
| 42676A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |
| 42705A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |
| 42706A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |
| 42907A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |
| 43013A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |
| 43117A | | | | 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 | | | | |
| 44307A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |
| 44401A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |
| 44570A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |
| 44602A | | | | 21 | | | | | | | | | | 22 | 23 | | 24 | | | | |

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS
 CONFIGURATION A, 1.78 m (70 in.) ELEVATION

| PIN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41009A | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | 30 | | |
| 42109A | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | 30 | | |
| 42207A | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | 30 | | |
| 42410A | 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 | | |
| 43117A | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | 30 | | |
| 43209A | 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 | | |
| 44520A | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | 30 | | |
| 44607A | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | 30 | | |

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS
 CONFIGURATION A, 1.80 m (71 in.) ELEVATION

| PIN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41009A | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | 36 | | | | | | 37 |
| 42109A | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | 36 | | | | | | 37 |
| 42207A | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | 36 | | | | | | 37 |
| 42410A | | | 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 |
| 43117A | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | 36 | | | | | | 37 |
| 43209A | | | 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 |
| 44520A | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | 36 | | | | | | 37 |
| 44607A | | | 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 | |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 41000A | 38 | 39 | | | | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | | | | 48 | 49 | |
| 42100A | 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 | |
| 42806A | 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 | |
| 43208A | 38 | 39 | | | | | 41 | 42 | | 44 | 45 | 46 | | | | | | | | 48 | 49 | |
| 43311A | 38 | 39 | | | | | 41 | 42 | | 44 | 45 | 46 | | | | | | | | 48 | 49 | |
| 43610A | 38 | 39 | | | | | 41 | | | 44 | 45 | 46 | | | | | | | | 48 | 49 | |
| 43718A | 38 | 39 | | | | | 41 | | | 44 | 45 | 46 | | | | | | | | 48 | 49 | |
| 43917A | 38 | 39 | | | | | 41 | | | 44 | 45 | 46 | | | | | | | | 48 | 49 | |
| 44118A | 38 | 39 | | | | | 41 | | | 44 | 45 | 46 | | | | | | | | 48 | 49 | |
| 44308A | 38 | 39 | | | | | 41 | | | 44 | 45 | 46 | | | | | | | | 48 | 49 | |
| 44401A | 38 | 39 | | | | | 41 | | | 44 | 45 | 46 | | | | | | | | 48 | 49 | |
| 44509A | 38 | 39 | | | | | 41 | | | 44 | 45 | 46 | | | | | | | | 48 | 49 | |
| 44607A | 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 | | |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41000A | | | 50 | | 51 | 52 | 53 | 54 | | 56 | 57 | 58 | 59 | | 60 | | | | | | 61 | 62 | |
| 42100A | | | 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 |
| 42806A | | | 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 |
| 43208A | | | 50 | | | 52 | 53 | 54 | | 56 | 57 | 58 | 59 | | 60 | | | | | | | 61 | 62 |
| 43311A | | | 50 | | | 52 | 53 | 54 | | 56 | 57 | 58 | 59 | | 60 | | | | | | | 61 | 62 |
| 43610A | | | 50 | | | 52 | 53 | 54 | | 56 | 57 | 58 | 59 | | 60 | | | | | | | 61 | 62 |
| 43718A | | | 50 | | | 52 | 53 | 54 | | 56 | 57 | 58 | 59 | | 60 | | | | | | | 61 | 62 |
| 43917A | | | 50 | | | 52 | 53 | 54 | | 56 | 57 | 58 | 59 | | 60 | | | | | | | 61 | 62 |
| 44118A | | | 50 | | | 52 | 53 | 54 | | 56 | 57 | 58 | 59 | | 60 | | | | | | | 61 | 62 |
| 44308A | | | 50 | | | 52 | 53 | 54 | | 56 | 57 | 58 | 59 | | 60 | | | | | | | 61 | 62 |
| 44401A | | | 50 | | | 52 | 53 | 54 | | 56 | 57 | 58 | 59 | | 60 | | | | | | | 61 | 62 |
| 44509A | | | 50 | | | 52 | 53 | 54 | | 56 | 57 | 58 | 59 | | 60 | | | | | | | 61 | 62 |
| 44607A | | | 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 | 5A | 5C | 5D | |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41900A | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42108A | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42207A | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42437A | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42814A | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42806A | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42705A | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42804A | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42807A | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 43017A | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 43112A | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 43204A | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 43111A | | | 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 |
| 44500A | | | 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 | 5A | 5C | 5D |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41900A | | | | 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 | | 81 |
| 42705A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 42804A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 42807A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 43017A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 43112A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 43204A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 43111A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 43610A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 43715A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 43916A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 44117A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 44303A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 44401A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 44500A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |
| 44602A | | | | 70 | 71 | | 72 | 73 | | | 75 | 76 | 77 | | 78 | | 96 | | 80 | | 81 |

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 | |
| 42109A | | | 82 | | | 83 | 84 | | | | 85 | | 86 | | 87 | | | | | | 88 | |
| 42207A | | | 82 | | | 83 | 84 | | | | 85 | | 86 | | 87 | | | | | | 88 | |
| 42437A | | | 82 | | | 83 | 84 | | | | 85 | | 86 | | 87 | | | | | | 88 | |
| 42814A | | | 82 | | | 83 | 84 | | | | 85 | | 86 | | 87 | | | | | | 88 | |
| 42826A | | | 82 | | | 83 | 84 | | | | 85 | | 86 | | 87 | | | | | | 88 | |
| 42725A | | | 82 | | | 83 | 84 | | | | 85 | | 86 | | 87 | | | | | | 88 | |
| 42724A | | | 82 | | | 83 | 84 | | | | 85 | | 86 | | 87 | | | | | | 88 | |
| 42907A | | | 82 | | | 83 | 84 | | | | 85 | | 86 | | 87 | | | | | | 88 | |
| 43013A | | | 82 | | | 83 | 84 | | | | 85 | | 86 | | 87 | | | | | | 88 | |
| 43117A | | | 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 | |
| 44302A | | | 82 | | | 83 | 84 | | | | 85 | | 86 | | 87 | | | | | | 88 | |
| 44401A | | | 82 | | | 83 | 84 | | | | 85 | | 86 | | 87 | | | | | | 88 | |
| 44529A | | | 82 | | | 83 | 84 | | | | 85 | | 86 | | 87 | | | | | | 88 | |
| 44672A | | | 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 | |
| 42109A | | | | 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 | |
| 42814A | | | | 89 | | | 91 | 92 | | 94 | 95 | 79 | | 97 | | 136 | | 100 | | 101 | |
| 42826A | | | | 89 | | | 91 | 92 | | 94 | 95 | 79 | | 97 | | 136 | | 100 | | 101 | |
| 42725A | | | | 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 | |
| 43117A | | | | 89 | | | 91 | | | 94 | 95 | 79 | | 97 | | 136 | | 100 | | 101 | |
| 43208A | | | | 89 | | | 91 | | | 94 | 95 | 79 | | 97 | | 136 | | 100 | | 101 | |
| 43511A | | | | 89 | | | 91 | | | 94 | 95 | 79 | | 97 | | 136 | | 100 | | 101 | |
| 43610A | | | | 89 | | | 91 | | | 94 | 95 | 79 | | 97 | | 136 | | 100 | | 101 | |
| 43715A | | | | 89 | | | 91 | | | 94 | 95 | 79 | | 97 | | 136 | | 100 | | 101 | |
| 43916A | | | | 89 | | | 91 | | | 94 | 95 | 79 | | 97 | | 136 | | 100 | | 101 | |
| 44117A | | | | 89 | | | 91 | | | 94 | 95 | 79 | | 97 | | 136 | | 100 | | 101 | |
| 44302A | | | | 89 | | | 91 | | | 94 | 95 | 79 | | 97 | | 136 | | 100 | | 101 | |
| 44401A | | | | 89 | | | 91 | | | 94 | 95 | 79 | | 97 | | 136 | | 100 | | 101 | |
| 44529A | | | | 89 | | | 91 | | | 94 | 95 | 79 | | 97 | | 136 | | 100 | | 101 | |
| 44672A | | | | 89 | | | 91 | | | 94 | 95 | 79 | | 97 | | 136 | | 100 | | 101 | |

TABLE K-1 (cont)

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

| PIN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D | |
|------------|-----|-----|----|-----|----|----|-----|-----|-----|----|-----|----|----|-----|----|----|-----|-----|----|----|----|--|
| 41999A | 109 | 110 | | 111 | | | 112 | 113 | 114 | | 115 | | | 116 | | | 117 | 118 | | | | |
| 42100A | 109 | 110 | | 111 | | | 112 | 113 | 114 | | 115 | | | 116 | | | 117 | 118 | | | | |
| 42201A | 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 | | | | | |
| 42707A | 109 | 110 | | 111 | | | 112 | 113 | 114 | | 115 | | | 116 | | | 117 | | | | | |
| 42804A | 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 | | | | | |
| 43200A | 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 | | | | | |
| 43914A | 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

| PIN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D | |
|------------|----|----|-----|-----|-----|----|-----|-----|-----|----|-----|-----|----|-----|----|----|----|----|----|-----|-----|--|
| 41999A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 | |
| 42100A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 | |
| 42201A | | | 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 | |
| 42707A | | | 119 | | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 | |
| 42804A | | | 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 | |
| 43200A | | | 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 | |
| 43914A | | | 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

| PIN NUMBER | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|------------|-----|-----|-----|----|----|-----|----|----|----|----|----|----|-----|-----|-----|----|-----|----|-----|----|----|
| 41079A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 47108A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 47707A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 47437A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 47514A | 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 | | |
| 47804A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 47907A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 43013A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 43117A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 43704A | 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 | | |
| 43714A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 43914A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 44117A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 44377A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 44401A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 44572A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |
| 44677A | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | 146 | | 147 | | 148 | | |

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION A, 2.59 m (102 in.) ELEVATION

| PIN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|------------|-----|-----|----|----|-----|----|----|-----|-----|-----|----|----|----|----|----|----|-----|----|-----|-----|----|
| 41079A | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 42108A | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 47707A | 130 | 131 | | | 132 | | | 133 | | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 47437A | 130 | 131 | | | 132 | | | 133 | | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 42514A | 130 | 131 | | | 132 | | | 133 | | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 47677A | 130 | 131 | | | 132 | | | 133 | | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 47705A | 130 | 131 | | | 132 | | | 133 | | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 47804A | 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 | |
| 43117A | 130 | 131 | | | 132 | | | 133 | | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 47704A | 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 | |
| 43714A | 130 | 131 | | | | | | 133 | | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 43914A | 130 | 131 | | | | | | 133 | | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 44117A | 130 | 131 | | | | | | 133 | | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 44377A | 130 | 131 | | | | | | 133 | | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 44401A | 130 | 131 | | | | | | 133 | | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 44579A | 130 | 131 | | | | | | 133 | | 135 | | 98 | | | | | 137 | | 138 | 139 | |
| 44607A | 130 | 131 | | | | | | 133 | | 135 | | 98 | | | | | 137 | | 138 | 139 | |

TABLE K-1 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION A, 2.82 m (111 in.) ELEVATION

| RIN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|------------|----|----|----|-----|-----|----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|
| 41999A | | | | 149 | 150 | | | 151 | 152 | 153 | | 154 | | 162 | | 156 | | 157 | | 158 | |
| 42100A | | | | 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 | |
| 42626A | | | | 149 | 150 | | | 151 | 152 | 153 | | 154 | | 162 | | 156 | | 157 | | 158 | |
| 42725A | | | | 149 | 150 | | | 151 | 152 | 153 | | 154 | | 162 | | 156 | | 157 | | 158 | |
| 42804A | | | | 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

| RIN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|------------|-----|-----|-----|----|----|-----|----|----|----|----|----|----|-----|----|-----|----|-----|----|-----|----|-----|
| 41999A | 159 | 160 | 161 | | | 155 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 42100A | 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 |
| 42626A | 159 | 160 | 161 | | | 155 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 42725A | 159 | 160 | 161 | | | 155 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 42804A | 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 |
|------------|----|----|----|-----|----|----|----|----|----|----|----|----|----|-----|-----|-----|----|----|----|----|----|
| 41000A | | | | 168 | | | | | | | | | | 169 | 170 | 171 | | | | | |
| 42100A | | | | 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 | | | | | |
| 43816A | | | | 168 | | | | | | | | | | 169 | 170 | 171 | | | | | |
| 44117A | | | | 168 | | | | | | | | | | 169 | 170 | 171 | | | | | |
| 44303A | | | | 169 | | | | | | | | | | 169 | 170 | 171 | | | | | |
| 44401A | | | | 169 | | | | | | | | | | 169 | 170 | 171 | | | | | |
| 44520A | | | | 169 | | | | | | | | | | 169 | 170 | 171 | | | | | |
| 44607A | | | | 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 | |
|------------|----|----|----|-----|----|-----|----|----|----|----|----|----|----|-----|-----|----|----|----|----|----|-----|-----|
| 41000A | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 | |
| 42100A | | | | 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 |
| 43816A | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | | 176 |
| 44117A | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | | 176 |
| 44303A | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | | 176 |
| 44401A | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | | 176 |
| 44520A | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | | 176 |
| 44607A | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | | 176 |

TABLE K-1 (cont)

VALID STEAM TEMPERATURE CHANNELS
CONFIGURATION A

| Run | Subchannel Number | Elevation [m (in.)] |
|--------|-------------------|---------------------|
| 41909A | 6 | 3.5 (138) |
| 42108A | 11 | 3.35 (132) |
| 42207A | 6 | 3.05 (120) |
| 42430A | 15 | 3.05 (120) |
| 42514A | 14 | 3.05 (120) |
| 42606A | 5 | 2.82 (111) |
| 42705A | 10 | 2.82 (111) |
| 42804A | 9 | 2.44 (96) |
| 42907A | 8 | 2.44 (96) |
| 43013A | 10 | 2.44 (96) |
| 43112A | 5 | 2.29 (90) |
| 43208A | 7 | 2.29 (90) |
| 43311A | 10 | 2.29 (90) |
| 43610A | 6 | 2.29 (90) |
| 43715A | 6 | 1.98 (78) |
| 43916A | 11 | 1.98 (78) |
| 44117A | 9 | 1.98 (78) |
| 44303A | 8 | 1.98 (76) |
| 44401A | 7 | 1.88 (74) |
| 44529A | 8 | 1.70 (67) |
| 44602A | 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) |

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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41103R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 41401R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 41709R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 41908R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 41907R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42014R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42105R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42204R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42306R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42415R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42711B | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42810R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42915R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43129R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43202R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43412R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43513R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43717R | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43816R | | | | 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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41103R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 41401R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 41709R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 41908R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 41907R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42014R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42105R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42204R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42306R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42415R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42711R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42810R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 42915R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 43129R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 43202R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 43412R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 43513R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 43717R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |
| 43816R | 5 | 6 | | | | | | | | | | | | | | | 7 | | 8 | | |

TABLE K-2 (cont)

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

| RIJN NUMBER | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 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 | | | |
| 43120B | | | | 9 | | | | | | | | | | 10 | | 11 | | 12 | | | |
| 43202B | | | | 9 | | | | | | | | | | 10 | | 11 | | 12 | | | |
| 43412B | | | | 9 | | | | | | | | | | 10 | | 11 | | 12 | | | |
| 43513B | | | | 9 | | | | | | | | | | 10 | | 11 | | 12 | | | |
| 43717B | | | | 9 | | | | | | | | | | 10 | | 11 | | 12 | | | |
| 43916B | | | | 9 | | | | | | | | | | 10 | | 11 | | 12 | | | |

TABLE K-2 (cont)

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

| RIJN NUMBER | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 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 | | |
| 43120B | 13 | 14 | | | | | | | | | | | | | | | 15 | | 16 | | |
| 43202B | 13 | 14 | | | | | | | | | | | | | | | 15 | | 16 | | |
| 43412B | 13 | 14 | | | | | | | | | | | | | | | 15 | | 16 | | |
| 43513B | 13 | 14 | | | | | | | | | | | | | | | 15 | | 16 | | |
| 43717B | 13 | 14 | | | | | | | | | | | | | | | 15 | | 16 | | |
| 43916B | 13 | 14 | | | | | | | | | | | | | | | 15 | | 16 | | |

TABLE K-2 (cont)

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

| PIJN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D |
|----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41103R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 41401R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 41709R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 41908R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 41907R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 42014R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 42105R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 42204R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 42306R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 42415R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 42711R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 42810R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 42915R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 43129R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 43202R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 43412R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 43513R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 43717R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |
| 43816R | | | | 17 | | | | | | | | | | 1F | 1G | 20 | | | | | |

TABLE K-2 (cont)

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

| PIJN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D |
|----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41103R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 41401R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 41709R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 41908R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 41907R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 42014R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 42105R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 42204R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 42306R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 42415R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 42711R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 42810R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 42915R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 43129R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 43202R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 43412R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 43513R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 43717R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |
| 43816R | | | | 21 | | | | | | | | | | 22 | 23 | 24 | | | | | |

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION B, 1.78 m (70 in.) ELEVATION

| RUN NUMBER | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D | |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 41103R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | 30 | | |
| 41401P | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | 30 | | |
| 41709R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | 30 | | |
| 41908R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | 30 | | |
| 41907R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | 30 | | |
| 42014R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | 30 | | |
| 42105R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | 30 | | |
| 42204R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | 30 | | |
| 42306R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | 30 | | |
| 42415R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | | | |
| 42711R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | | | |
| 42810R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | | | |
| 42915R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | | | |
| 43129R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | | | |
| 43202R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | | | |
| 43412R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | | | |
| 43513R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | | | |
| 43717R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | | | |
| 43816R | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | | | | |

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION B, 1.80 m (71 in.) ELEVATION

| RUN NUMBER | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D | |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41103R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 41401P | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 41709R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 41908R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 41907R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 42014R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 42105R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 42204R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 42306R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 42415R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 42711R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 42810R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 42915R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 43129R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 43202R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 43412R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 43513R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 43717R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |
| 43816R | | | 31 | | | 32 | 33 | | | | 34 | | 35 | | | 36 | | | | | | 37 |

TABLE K-2 (cont)

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

| RUN NUMBER | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41103R | 3A | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 41401R | 3B | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 41709R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 41808R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 41907R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 42014R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 42105R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 42204R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 42306R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 42415R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 42711R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 42910R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 42915R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 43129R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 43202R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 43412R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 43513R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 43717R | | 3A | | | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | | | | | 47 | | 48 | 49 | |
| 43916R | | 3A | | | 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 | 5A | 5C | 5D | |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 41103R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 41401R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 41709R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 41808R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 41907R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 42014R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 42105R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 42204R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 42306R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 42415R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 42711R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 42910R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 42915R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 43129R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 43202R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 43412R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 43513R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 43717R | | | 50 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 60 | | | | 61 | 62 | |
| 43916R | | | 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 | 5A | 5C | 5D | |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41103R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 41401R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 41709R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 41404R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 41907R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42014R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42105R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42214R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42306R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42415R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42711R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42410R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42715R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 43129R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 43202R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 43412R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 43513R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 43717R | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 43816R | | | 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 | 5A | 5C | 5D | |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41103R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 41401R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 41709R | | | | 70 | 71 | | | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 41404R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 41907R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 42014R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 42105R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 42204R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 42306R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 42415R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 42711R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 42410R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 42715R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 43129R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 43202R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 43412R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 43513R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 43717R | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | 80 | | | | 81 |
| 43816R | | | | 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 | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41103R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 41401R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 41709R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 41808R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 41907R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 42014R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 42105R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 42204R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 42306R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 42415R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 42711R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 42810R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 42915R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 43129R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 43202R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 43412R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 43513R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 43717R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |
| 43916R | | | R2 | | | R3 | R4 | | | | R5 | | R6 | | R7 | | | | | | R8 |

TABLE K-2 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION B, 1.98 m (78 in.) ELEVATION

| RUN NUMBER | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|-----|----|
| 41103R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 41401R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 41709R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 41808R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 41907R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 42014R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 42105R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 42204R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 42306R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 42415R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 42711R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 42810R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 42915R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 43129R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 43202R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 43412R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 43513R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 43717R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |
| 43916R | | | | R0 | R0 | | R1 | R2 | R3 | R4 | R5 | R6 | | R7 | | R8 | | 100 | | 101 | |

TABLE K-2 (cont)

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

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

| PIN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D |
|------------|----|----|-----|-----|-----|----|-----|-----|-----|----|-----|-----|----|-----|----|----|----|----|----|-----|-----|
| 41103A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 41401A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 41709A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 41808A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 41907A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 42014A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 42105A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 42204A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 42306A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 42415A | | | 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 |
| 42915A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 43129A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 43202A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 43412B | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 27 | | | | | | 128 | 129 |
| 43513A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 43717A | | | 119 | 120 | 121 | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | | 128 | 129 |
| 43816A | | | 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 | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2F | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D |
|------------|-----|-----|----|----|-----|----|----|-----|-----|-----|----|----|-----|----|----|----|-----|----|-----|-----|----|
| 41103R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 41401R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 41709R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 41908R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 41907B | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 42014R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 42105R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 42204R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 42306R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 42415R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 42711B | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 42810R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 42915R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 43129R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 43202R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 43412R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 43513R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 43717R | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | | 136 | | | | 137 | | 138 | 139 | |
| 43816R | 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 | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2F | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D |
|------------|-----|-----|-----|----|----|-----|----|----|----|----|----|----|-----|-----|----|-----|----|-----|----|-----|----|
| 41103R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 41401R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 41709R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 41908R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 41907B | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 42014R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 42105R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 42204R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 42306R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 42415R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 42711B | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 42810R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 42915R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 43129R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 43202R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 43412R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 43513R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 43717R | 140 | 141 | 142 | | | 143 | | | | | | | 144 | 145 | | 146 | | 147 | | 148 | |
| 43816R | 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 | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D |
|------------|----|----|----|-----|-----|----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|
| 41103R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 41401R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 41709R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 41908R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 41907R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 42014R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 42105R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 42204A | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 42306R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 42415R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 42711R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 42810R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 42915R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 43129R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 43202R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 43412R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 43513R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 43717R | | | | 140 | 150 | | | 151 | 152 | 153 | | 154 | | 155 | | 156 | | 157 | | 158 | |
| 43816R | | | | 140 | 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 | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D |
|------------|-----|-----|-----|----|----|-----|----|----|----|----|----|----|-----|----|-----|----|-----|----|-----|----|-----|
| 41103R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 41401R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 41709R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 41908R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 41907R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 42014R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 42105R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 42204A | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 42306R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 42415R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 42711R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 42810R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 42915R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 43129R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 43202R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 43412R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 43513R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 43717R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 43816R | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |

TABLE K-2 (cont)

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

| PIN NUMBER | 1R | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|---------------|----|----|----|-----|----|----|----|----|----|----|----|----|----|-----|-----|----|-----|----|----|----|----|
| 41103R | | | | 16R | | | | | | | | | | 16Q | 170 | | 171 | | | | |
| 41401R | | | | 16R | | | | | | | | | | 16Q | 170 | | 171 | | | | |
| 41709R | | | | 16R | | | | | | | | | | 16Q | 170 | | 171 | | | | |
| 41808R | | | | 16R | | | | | | | | | | 16Q | 170 | | 171 | | | | |
| 41707R | | | | 16R | | | | | | | | | | 16Q | 170 | | 171 | | | | |
| 42014R | | | | 16R | | | | | | | | | | 16Q | 170 | | 171 | | | | |
| 42105A | | | | 16R | | | | | | | | | | 16Q | 170 | | 171 | | | | |
| 42204A | | | | 16R | | | | | | | | | | 16Q | 170 | | 171 | | | | |
| 42306A | | | | 16R | | | | | | | | | | 16Q | 170 | | 171 | | | | |
| 42415P | | | | 16R | | | | | | | | | | 16Q | 170 | | 171 | | | | |
| 42711B | | | | 16R | | | | | | | | | | 16Q | | | 171 | | | | |
| 42710P | | | | 16R | | | | | | | | | | 16Q | | | 171 | | | | |
| 42215A | | | | 16R | | | | | | | | | | 16Q | | | 171 | | | | |
| 43129P | | | | 16R | | | | | | | | | | 16Q | | | 171 | | | | |
| 43202P | | | | 16R | | | | | | | | | | 16Q | | | 171 | | | | |
| 43412B | | | | 16R | | | | | | | | | | 16Q | | | 171 | | | | |
| 43513R | | | | 16R | | | | | | | | | | 16Q | | | 171 | | | | |
| 43717R | | | | 16R | | | | | | | | | | 16Q | | | 171 | | | | |
| 43816P | | | | 16R | | | | | | | | | | 16Q | | | 171 | | | | |

TABLE K-2 (cont)

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

| PIN NUMBER | 1R | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|---------------|----|----|----|-----|----|-----|----|----|----|----|----|----|----|-----|-----|----|----|----|----|----|-----|
| 41103R | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 41401R | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 41709R | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 41808R | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 41707R | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 42014R | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 42105R | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 42204R | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 42306R | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 42415R | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 42711R | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 42910R | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 42915R | | | | 172 | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 43129P | | | | | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 43202P | | | | | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 43412B | | | | | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 43513R | | | | | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 43717R | | | | | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |
| 43816R | | | | | | 173 | | | | | | | | 174 | 175 | | | | | | 176 |

TABLE K-2 (cont)

VALID STEAM TEMPERATURE CHANNELS
CONFIGURATION B

| Run | 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) |
| | 6 | 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) |
| | 9 | 3.51 (138) |

TABLE K-3

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

| RIJN 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 | | | |
| 41731C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 41909C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42009C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42107C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42314C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42413C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42504C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42605C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42714C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42804C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 42912C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43110C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43211C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43319C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43431C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43531C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43716C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43817C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |
| 43907C | | | | 1 | | | | | | | | | | 2 | | 3 | | 4 | | | |

TABLE K-3 (cont)

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

| RIJN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41073C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 41201C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 41329C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 41731C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 41731C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 41909C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 42009C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 42107C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 42314C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 42413C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 42504C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 42605C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 42714C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 42804C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 42912C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 43110C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 43211C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 43319C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 43431C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 43531C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 43716C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 43817C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |
| 43907C | 5 | 6 | | | | | | | | | | | | | | | | 7 | | | |

TABLE K-3 (cont)

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

| RIJN NUMREF | 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 | | | | | |
| 42718C | | | | 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

| RIJN NUMREF | 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 | | |
| 42718C | 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 | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41000C | | | | 17 | | | | | | | | | | 18 | | | | 20 | | | |
| 41201C | | | | 17 | | | | | | | | | | 18 | | | | 20 | | | |
| 41320C | | | | 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 |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41000C | | | | 21 | | | | | | | | | | 22 | | 23 | | 24 | | | |
| 41201C | | | | 21 | | | | | | | | | | 22 | | 23 | | 24 | | | |
| 41320C | | | | 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 | 1A | 1C | 1U | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41003F | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | 30 | | |
| 41201C | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | 30 | | |
| 41329C | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | 30 | | |
| 41731F | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | 30 | | |
| 41831C | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | 30 | | |
| 41929C | 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 | | |
| 42608C | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | 30 | | |
| 42711C | 25 | 26 | | | | | 27 | | | | 28 | | | | | | 29 | | 30 | | |
| 42804C | 25 | 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 | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41003F | | | | | | 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 |
| 41929C | | | | | | 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 |
| 42608C | | | | | | 32 | 33 | | | | 34 | | 35 | | 36 | | | | | | 37 |
| 42711C | | | | | | 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

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

TABLE K-3 (cont)

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

| CHN NUMBER | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41003C | | | 53 | | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | | | 63 | | | | 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 | | | 53 | | 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 | 5A | 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 |
| 41999C | | | 63 | | | 64 | 65 | | | | 66 | | 67 | | 68 | | | | | | | 69 |
| 42009C | | | 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 |
| 42719C | | | 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 |
| 43319C | | | 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 | 2A | 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 |
| 41999C | | | | 70 | 71 | | 72 | 73 | 74 | 75 | 76 | 77 | | 78 | | 79 | | | | | | 80 |
| 42009C | | | | 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 |
| 42719C | | | | 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 |
| 43319C | | | | 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

| WIN NUMRFP | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D | |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 41003C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 41201C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 41329C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 41731C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 41831C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 41909C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 42004C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 42107C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 42314C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 42413C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 42506C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 42505C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 42715C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 42804C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 42912C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 43110C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 43211C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 43315C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 43431C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 43531C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 43716C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 43817C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |
| 43907C | | | 02 | | | 03 | 04 | | | | 05 | | 06 | | 07 | | | | | | | 08 |

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION C, 1.98 m (78 in.) ELEVATION

| WIN NUMRFP | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|-----|
| 41003C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 41221C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 41329C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 41731C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 41831C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 41909C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 42004C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 42107C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 42314C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 42413C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 42506C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 42605C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 42715C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 42804C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 42912C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 43110C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 43211C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 43315C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 43431C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 43531C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 43716C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 43817C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |
| 43907C | | | | 09 | 00 | | 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | | 100 | | | 101 |

TABLE K-3 (cont.)

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

| RTN NUMBER | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D |
|---------------|----|----|----|-----|-----|----|----|-----|-----|-----|----|-----|-----|----|-----|----|----|----|----|-----|-----|
| 41003C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |
| 41201C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |
| 41370C | | | | 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 | 126 | | 127 | | | | | 128 | 129 |
| 42605C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |
| 42715C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |
| 42804C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |
| 42912C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |
| 43110C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |
| 43211C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |
| 43310C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |
| 43431C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |
| 43531C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |
| 43716C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |
| 43817C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |
| 43922C | | | | 120 | 121 | | | 122 | 123 | 124 | | 125 | 126 | | 127 | | | | | 128 | 129 |

TABLE K-3 (cont.)

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

| RTN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5A | 5C | 5D |
|---------------|-----|-----|----|----|-----|----|----|-----|-----|-----|----|-----|----|----|----|----|-----|----|----|-----|-----|
| 41003C | 109 | 110 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | 116 | | | 117 | 118 |
| 41201C | 109 | 110 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | 116 | | | 117 | 118 |
| 41320C | 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 |
| 43310C | 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 |
| 43922C | 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 | 19 | 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 | | |
| 41201F | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | 136 | | | | | 137 | | 138 | 139 | | |
| 41329C | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | 136 | | | | | 137 | | 138 | 139 | | |
| 41731F | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | 136 | | | | | 137 | | 138 | 139 | | |
| 41831C | 130 | 131 | | | 132 | | | 133 | 134 | 135 | | 136 | | | | | 137 | | 138 | 139 | | |
| 41909F | 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 | | |
| 42917C | 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 | 19 | 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 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 42314C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 42413C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 42506C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 42605C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 42715C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 42804C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 42917C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 43110C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 43211C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 43315C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 43431C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 43531C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 43716C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 43817C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |
| 43902C | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | 146 | | | | 148 |

TABLE K-3 (cont)

VALID THERMOCOUPLE CHANNELS
CONFIGURATION C, 2.82 m (111 in.) ELEVATION

| PLN NUMBER | 19 | 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 | | |
| 41900C | | | | 150 | | | | 151 152 153 | | | 154 | | 155 | | 156 | | 157 | | 158 | | |
| 42000C | | | | 150 | | | | 151 152 153 | | | 154 | | 155 | | 156 | | 157 | | 158 | | |
| 42177C | | | | 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 | | |
| 42675C | | | | 150 | | | | 152 153 | | | 154 | | 155 | | 156 | | 157 | | 158 | | |
| 42715C | | | | 150 | | | | 152 153 | | | 154 | | 155 | | 156 | | 157 | | 158 | | |
| 42754C | | | | 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 | | |
| 43318C | | | | 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 | | |
| 43718C | | | | 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

| PLN 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 |
| 41900C | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 42000C | 159 | 160 | 161 | | | 162 | | | | | | | 163 | | 164 | | 165 | | 166 | | 167 |
| 42177C | 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 |
| 42675C | 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 |
| 43318C | 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 |
| 43718C | 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

| RTN NUMBER | 19 | 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 | | | | 169 | | | | | | | | | | 169 | | 170 | | 171 | | | |
| 41900C | | | | 169 | | | | | | | | | | 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 | | | |
| 43907C | | | | 168 | | | | | | | | | | 169 | | 170 | | 171 | | | |

TABLE K-3 (cont)

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

| RTN NUMBER | 19 | 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 |
| 41900C | | | 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 |
| 43907C | | | 172 | | | 173 | | | | | | | | 174 | | 175 | | | | | 176 |

TABLE K-3 (cont)

VALID STEAM TEMPERATURE CHANNELS
CONFIGURATION C

| Run | Subchannel Number | Elevation [m (in.)] |
|--------|-------------------|---------------------|
| 41003C | 9 | 0.89 (35) |
| 41201C | 10 | 1.19 (47) |
| 41329C | 15 | 1.47 (58) |
| 41731C | 10 | 1.47 (58) |
| 41831C | 8 | 1.70 (67) |
| 41903C | Special | 1.70 (67) |
| 42008C | 9 | 1.70 (67) |
| 42107C | 11 | 1.70 (67) |
| 42314C | 6 | 1.96 (77) |
| 42413C | 8 | 1.96 (77) |
| 42506C | 9 | 1.96 (77) |
| 42605C | 11 | 1.96 (77) |
| 42715C | 6 | 2.26 (89) |
| 42804C | 7 | 2.26 (89) |
| 42912C | 10 | 2.26 (89) |
| 43110C | 5 | 2.26 (89) |
| 43211C | 8 | 2.46 (97) |
| 43315C | 9 | 2.46 (97) |
| 43431C | 10 | 2.46 (97) |
| 43531C | 5 | 2.77 (109) |
| 43716C | 10 | 2.77 (109) |
| 43817C | 14 | 3.05 (120) |
| 43902C | 6 | 3.05 (120) |
| | 15 | 3.05 (120) |
| | 11 | 3.30 (130) |
| | 6 | 3.51 (138) |

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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 411030 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 412020 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 415290 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 419080 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 420140 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 422060 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 423050 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 424040 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 425120 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 426150 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 427110 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 429100 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 430090 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 431150 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 432150 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 434010 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 435130 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 441160 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |
| 443170 | | | | 1 | | | | | | | | | | 2 | | 3 | | | | | |

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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 411030 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 412020 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 415290 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 418080 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 420140 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 422060 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 423050 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 424040 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 425120 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 426150 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 427110 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 429100 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 430090 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 431150 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 432150 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 434010 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 435130 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 441160 | | | 4 | | | | | | | | | | | | | | | 5 | | 6 | |
| 443170 | | | 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 |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 411030 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 412020 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 415290 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 418080 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 420140 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 422060 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 423050 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 424040 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 425120 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 426150 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 427110 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 429100 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 430090 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 431150 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 432150 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 434010 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 438130 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 441160 | | | | 7 | | | | | | | | | | 8 | | 9 | | | | | |
| 443170 | | | | 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 | |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 411030 | | | 10 | | | | | | | | | | | | | | | | | | 11 | |
| 412020 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 415290 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 418080 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 420140 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 422060 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 423050 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 424040 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 425120 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 426150 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 427110 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 429100 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 430090 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 431150 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 432150 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 434010 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 438130 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 441160 | | | 10 | | | | | | | | | | | | | | | | | | | 11 |
| 443170 | | | 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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 411030 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 412020 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 4152-J | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 418080 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 420140 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 422060 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 423050 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 424040 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 425120 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 426150 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 427110 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 429100 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 430090 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 431150 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 432150 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 434010 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 438130 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 441150 | | | | 13 | | | | | | | | | | 14 | | 15 | | | | | |
| 443170 | | | | 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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 411030 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 412020 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 415290 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 418080 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 420140 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 422060 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 423050 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 424040 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 425120 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 426150 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 427110 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 429100 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 430090 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 431150 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 432150 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 434010 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 438130 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 441160 | | | | 16 | | | | | | | | | | 17 | | 18 | | | | | |
| 443170 | | | | 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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 411030 | | 19 | | | | | 20 | | | | 21 | | | | | | 22 | 23 | | | |
| 412020 | | 19 | | | | | 20 | | | | 21 | | | | | | 22 | 23 | | | |
| 415290 | | 19 | | | | | 20 | | | | 21 | | | | | | 22 | 23 | | | |
| 418080 | | 19 | | | | | 20 | | | | 21 | | | | | | 22 | 23 | | | |
| 420140 | | 19 | | | | | 20 | | | | 21 | | | | | | 22 | 23 | | | |
| 422060 | | | | | | | | | | | | | | | | | | | | | |
| 423050 | | 19 | | | | | 20 | | | | 21 | | | | | | 22 | | | | |
| 424040 | | 19 | | | | | 20 | | | | 21 | | | | | | 22 | | | | |
| 425120 | | 19 | | | | | 20 | | | | 21 | | | | | | | | | | |
| 426150 | | 19 | | | | | 20 | | | | 21 | | | | | | | | | | |
| 427110 | | 19 | | | | | 20 | | | | 21 | | | | | | | | | | |
| 429100 | | 19 | | | | | 20 | | | | 21 | | | | | | | | | | |
| 430090 | | 19 | | | | | 20 | | | | 21 | | | | | | | | | | |
| 431150 | | 19 | | | | | 20 | | | | 21 | | | | | | | | | | |
| 432150 | | 19 | | | | | 20 | | | | 21 | | | | | | | | | | |
| 434010 | | 19 | | | | | 20 | | | | 21 | | | | | | | | | | |
| 438130 | | 19 | | | | | 20 | | | | 21 | | | | | | | | | | |
| 441160 | | 19 | | | | | 20 | | | | 21 | | | | | | | | | | |
| 443170 | | 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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 411030 | | | 25 | | | 26 | 27 | | | | 28 | | 29 | | 30 | | 31 | | | | |
| 412020 | | | 25 | | | 26 | 27 | | | | 28 | | 29 | | 30 | | 31 | | | | |
| 415290 | | | 25 | | | 26 | 27 | | | | 28 | | 29 | | 30 | | 31 | | | | |
| 418080 | | | 25 | | | 26 | 27 | | | | 28 | | 29 | | 30 | | | | | | |
| 420140 | | | 25 | | | 26 | 27 | | | | 28 | | | | 30 | | | | | | |
| 422060 | | | | | | | | | | | | | | | 30 | | | | | | |
| 423050 | | | 25 | | | 26 | | | | | | | | | 30 | | | | | | |
| 424040 | | | 25 | | | 26 | | | | | | | | | 30 | | | | | | |
| 425120 | | | 25 | | | 26 | | | | | | | | | 30 | | | | | | |
| 426150 | | | 25 | | | 26 | | | | | | | | | 30 | | | | | | |
| 427110 | | | 25 | | | 26 | | | | | | | | | 30 | | | | | | |
| 429100 | | | 25 | | | 26 | | | | | | | | | 30 | | | | | | |
| 430090 | | | 25 | | | 26 | | | | | | | | | 30 | | | | | | |
| 431150 | | | 25 | | | 26 | | | | | | | | | 30 | | | | | | |
| 432150 | | | 25 | | | 26 | | | | | | | | | 30 | | | | | | |
| 434010 | | | 25 | | | 26 | | | | | | | | | 30 | | | | | | |
| 438130 | | | 25 | | | 26 | | | | | | | | | 30 | | | | | | |
| 441160 | | | 25 | | | 26 | | | | | | | | | 30 | | | | | | |
| 443170 | | | 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 | |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 411030 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 412020 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 415290 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 418080 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 420140 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 422060 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 423050 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 424040 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 425120 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 426150 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 427110 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 429100 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 430090 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 431150 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 432150 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 434010 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 438130 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 441160 | 33 | | | | | | 36 | | 38 | 39 | 40 | 41 | | | | | 42 | 43 | 44 | 45 | | |
| 443170 | 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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 411030 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 412020 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 415290 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 418080 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 420140 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 422060 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 423050 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 424040 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 425120 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 426150 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 427110 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 429100 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 430090 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 431150 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 432150 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 434010 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 438130 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 441160 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 59 | 60 |
| 443170 | 46 | | 47 | | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | 57 | | 58 | | 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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 411030 | | | 61 | | | 62 | 63 | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 412020 | | | 61 | | | 62 | 63 | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 415290 | | | 61 | | | 62 | 63 | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 418080 | | | 61 | | | 62 | 63 | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 420140 | | | 61 | | | 62 | 63 | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 422060 | | | 61 | | | | | | | | | | 65 | | 66 | | 67 | | | | 68 |
| 423050 | | | 61 | | | | | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 424040 | | | 61 | | | | | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 425120 | | | 61 | | | | | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 426150 | | | 61 | | | | | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 427110 | | | 61 | | | | | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 429100 | | | 61 | | | | | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 430090 | | | 61 | | | | | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 431150 | | | 61 | | | | | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 432150 | | | 61 | | | | | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 434010 | | | 61 | | | | | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 438130 | | | 61 | | | | | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 441160 | | | 61 | | | | | | | | 64 | | 65 | | 66 | | 67 | | | | 68 |
| 443170 | | | 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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 411030 | 69 | | | 70 | 71 | | | | 74 | 75 | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 412020 | 69 | | | 70 | 71 | | | | 74 | 75 | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 415290 | 69 | | | 70 | 71 | | | | 74 | 75 | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 418080 | 69 | | | 70 | 71 | | | | 74 | 75 | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 420140 | 69 | | | 70 | 71 | | | | 74 | 75 | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 422060 | 69 | | | 70 | 71 | | | | 74 | | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 423050 | 69 | | | 70 | 71 | | | | 74 | | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 424040 | 69 | | | 70 | 71 | | | | 74 | | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 425120 | 69 | | | 70 | 71 | | | | 74 | | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 426150 | 69 | | | 70 | 71 | | | | 74 | | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 427110 | 69 | | | 70 | 71 | | | | 74 | | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 429100 | 69 | | | 70 | 71 | | | | 74 | | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 430090 | 69 | | | 70 | 71 | | | | 74 | | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 431150 | 69 | | | 70 | 71 | | | | 74 | | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 432150 | 69 | | | 70 | 71 | | | | 74 | | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 434010 | 69 | | | 70 | 71 | | | | 74 | | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 438130 | 69 | | | 70 | 71 | | | | 74 | | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 441160 | 69 | | | 70 | 71 | | | | 74 | | 76 | 77 | | 78 | | 79 | 80 | | | | |
| 443170 | 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 | 1A | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D | |
|---------------|-----|-----|----|-----|----|----|-----|-----|-----|----|-----|----|----|----|----|----|----|-----|-----|-----|----|--|
| 411030 | 109 | 110 | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 412020 | 109 | 110 | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 415290 | 109 | 110 | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 418080 | 109 | 110 | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 420140 | 109 | 110 | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 422060 | 109 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 423050 | 109 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 424040 | 109 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 425120 | 109 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 426150 | 109 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 427110 | 109 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 429100 | 109 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 430090 | 109 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 431150 | 109 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 432150 | 109 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 434010 | 109 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 438130 | 109 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 441160 | 109 | | | 111 | | | 112 | 113 | 114 | | 115 | | | | | | | 116 | 117 | 118 | | |
| 443170 | 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 | |
|---------------|-----|-----|----|-----|-----|----|-----|-----|-----|----|----|----|-----|----|-----|----|----|----|----|-----|-----|--|
| 411030 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 412020 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 415290 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 418080 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 420140 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 422060 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 423050 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 424040 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 425120 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 426150 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 427110 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 429100 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 430090 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 431150 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 432150 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 434010 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 438130 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 441160 | 119 | 120 | | 121 | 122 | | 123 | 124 | 125 | | | | 127 | | 128 | | | | | 129 | 130 | |
| 443170 | 119 | 120 | | 121 | 122 | | 123 | 124 | 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 | |
|------------|-----|-----|----|----|-----|----|----|-----|-----|-----|----|-----|----|----|----|----|----|-----|-----|-----|----|--|
| 411030 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 412020 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 415290 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 418080 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 420140 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 422060 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 423050 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 424040 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 425120 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 426150 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 427110 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 429100 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 430090 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 431150 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 432150 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 434010 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 438130 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 441160 | 131 | 132 | | | 133 | | | 134 | 135 | 136 | | 137 | | | | | | 138 | 139 | 140 | | |
| 443170 | 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 |
|------------|----|-----|-----|----|----|-----|----|----|----|----|----|----|-----|----|-----|----|----|-----|-----|----|-----|
| 411030 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 412020 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 415290 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 418080 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 420140 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 422060 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 423050 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 424040 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 425120 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 426150 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 427110 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 429100 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 430090 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 431150 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 432150 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 434010 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 438130 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 441160 | | 141 | 142 | | | 143 | | | | | | | 144 | | 145 | | | 146 | 147 | | 148 |
| 443170 | | 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 |
|------------|----|----|----|-----|----|----|----|----|----|----|----|----|----|-----|----|-----|----|----|----|----|----|
| 411030 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 412020 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 415290 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 418080 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 420140 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 422060 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 423050 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 424040 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 425120 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 426150 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 427110 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 429100 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 430090 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 431150 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 432150 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 434010 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 438130 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 441160 | | | | 167 | | | | | | | | | | 168 | | 169 | | | | | |
| 443170 | | | | 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 |
|------------|----|----|----|-----|----|----|----|----|----|----|----|----|----|-----|----|-----|----|----|----|----|-----|
| 411030 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 412020 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 415290 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 418080 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 420140 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 422060 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 423050 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 424040 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 425120 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 426150 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 427110 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 429100 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 430090 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 431150 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 432150 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 434010 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 438130 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 441160 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |
| 443170 | | | | 170 | | | | | | | | | | 172 | | 173 | | | | | 174 |

TABLE K-4 (cont)

VALID STEAM TEMPERATURE CHANNELS
CONFIGURATION D

| Run | 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) |

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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 40152E | 1 | | | 2 | | | | | | | | | | | | | | 4 | | | |
| 40503E | 1 | | | 2 | | | | | | | | | | | | | | | 4 | | |
| 40691E | 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 |
| 40501E | | 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 | | | |
| 40501E | 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 | | | |
| 41817E | 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 |
| 41817E | | 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 | | | | | | |
| 40903E | 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 | | | | |
| 40903E | | | | 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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 40192E | | | | | | 27 | 28 | | | | 29 | 30 | | | | | 31 | | | | |
| 40593E | | | | | | 27 | 28 | | | | 29 | 30 | | | | | 31 | | | | |
| 40691E | | | | | | 27 | 28 | | | | 29 | 30 | | | | | 31 | | | | |
| 41078E | | | | | | 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 | | | | |
| 43927E | | | | | | 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 | | | | | | | | | | | | | | | | | | | | | | |
| 40503E | | | | | | | | | | | | | | | | | | | | | | |
| 40601E | | | | | | | | | | | | | | | | | | | | | | |
| 41009E | | | | | | | | | | | | | | | | | | | | | | |
| 41206E | | | | | | | | | | | | | | | | | | | | | | |
| 41305E | | | | | | | | | | | | | | | | | | | | | | |
| 41515E | | | | | | | | | | | | | | | | | | | | | | |
| 41612E | | | | | | | | | | | | | | | | | | | | | | |
| 41711E | | | | | | | | | | | | | | | | | | | | | | |
| 41810E | | | | | | | | | | | | | | | | | | | | | | |
| 41913E | | | | | | | | | | | | | | | | | | | | | | |
| 42014E | | | | | | | | | | | | | | | | | | | | | | |
| 42215E | | | | | | | | | | | | | | | | | | | | | | |
| 42315E | | | | | | | | | | | | | | | | | | | | | | |
| 42415E | | | | | | | | | | | | | | | | | | | | | | |
| 42509E | | | | | | | | | | | | | | | | | | | | | | |
| 42704E | | | | | | | | | | | | | | | | | | | | | | |
| 43616E | | | | | | | | | | | | | | | | | | | | | | |
| 43817E | | | | | | | | | | | | | | | | | | | | | | |
| 43929E | | | | | | | | | | | | | | | | | | | | | | |
| 44029E | | | | | | | | | | | | | | | | | | | | | | |

TABLE K-5 (cont)

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

| RJN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 40132E | | | | | | | | 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 |
| 43516E | | | | | | | | 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

| RJN NUMBER | 1B | 1C | 1D | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D | |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 40132E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 40503E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 40601E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 41008E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 41206E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 41305E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 41515E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 41612E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 41711E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 41913E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 41913E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 42014E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 42215E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 42315E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 42415E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 42509E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 42704E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 43516E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 43817E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 43929E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |
| 44029E | 37 | | | 36 | | | | | | | | | | | | | | | | | | |

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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 4J102E | | | | | | | 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 | | | | |
| 41910E | | | | | | | 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 |
| 41910E | 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 | 1U | 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 |
| 41817E | | | 47 | | 48 | | | | 49 | | | 50 | | 51 | 52 | | 53 | | | 54 | 55 |
| 41913E | | | 47 | | 48 | | | | 49 | | | 50 | | 51 | 52 | | 53 | | | 54 | 55 |
| 42314E | | | 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 | | 48 | | | | 49 | | | 50 | | 51 | 52 | | 53 | | | 54 | 55 |
| 43927E | | | 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 | 1U | 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 |
| 41817E | 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 | |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 40132E | | 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 |
| 41238E | | 67 | | | 68 | | | 69 | 70 | 71 | 72 | | | 73 | 74 | 75 | 76 | 77 | | | | 78 |
| 41236E | | 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 |
| 41512E | | 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 |
| 41813E | | 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 | |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 40132E | | | | | | 79 | 80 | | 81 | | 82 | | 83 | | | | | | | | | 84 |
| 40503E | | | | | | 79 | 80 | | 81 | | 82 | | 83 | | | | | | | | | 84 |
| 40601E | | | | | | 79 | 80 | | 81 | | 82 | | 83 | | | | | | | | | 84 |
| 41238E | | | | | | 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 |
| 41813E | | | | | | 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 |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 40122E | | | | | 85 | | | | | | | 86 | | 87 | | | | 88 | 89 | 90 | |
| 40523E | | | | | 85 | | | | | | | 86 | | 87 | | | | 88 | 89 | 90 | |
| 40621E | | | | | 85 | | | | | | | 86 | | 87 | | | | 88 | 89 | 90 | |
| 41222E | | | | | 85 | | | | | | | 86 | | 87 | | | | 88 | 89 | 90 | |
| 41226E | | | | | 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 | |
| 43615E | | | | | 85 | | | | | | | 86 | | 87 | | | | 88 | 89 | 90 | |
| 43817E | | | | | 85 | | | | | | | 86 | | 87 | | | | 88 | 89 | 90 | |
| 43927E | | | | | 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 | |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 40122E | | | | | | | | | | | | 91 | | | | | | | | | | |
| 40523E | | | | | | | | | | | | 91 | | | | | | | | | | |
| 40621E | | | | | | | | | | | | 91 | | | | | | | | | | |
| 41222E | | | | | | | | | | | | 91 | | | | | | | | | | |
| 41226E | | | | | | | | | | | | 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 | | | | | | | | | | |
| 43615E | | | | | | | | | | | | 91 | | | | | | | | | | |
| 43817E | | | | | | | | | | | | 91 | | | | | | | | | | |
| 43927E | | | | | | | | | | | | 91 | | | | | | | | | | |
| 44029E | | | | | | | | | | | | 91 | | | | | | | | | | |

TABLE K-5 (cont)

VALID THERMOCOUPLE CHANNELS
 CONFIGURATION E, 2.08 m (82 in.) ELEVATION

| RUN NUMBER | 1B | 1C | 1U | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D | |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 40132E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 40503E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 40601E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 41378E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 41236E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 41325E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 41515E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 41612E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 41711E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 41813E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 41913E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 42014E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 42215E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 42315E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 42415E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 42529E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 42724E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 43516E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 43817E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 43929E | | | | | | | | | | | | | 92 | | | | | | | | | |
| 44229E | | | | | | | | | | | | | 92 | | | | | | | | | |

TABLE K-5 (cont)

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

| RUN NUMBER | 1B | 1C | 1U | 2A | 2B | 2C | 2D | 2E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|----|-----|----|-----|-----|----|
| 40132E | | 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 | |
| 41236E | | 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 | |
| 41813E | | 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 | |
| 42529E | | 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 | |
| 44229E | | 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 |
|------------|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|-----|----|----|-----|-----|
| 40107E | | | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | | | 121 | | | 122 | 123 |
| 40773E | | | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | | | 121 | | | 122 | 123 |
| 40801E | | | 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 |
| 41236E | | | 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 |
| 43610E | | | 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 |
|------------|----|-----|----|----|----|----|-----|-----|----|-----|-----|-----|-----|----|-----|----|-----|----|----|-----|-----|
| 47102E | | 124 | | | | | 125 | 126 | | 127 | 128 | 129 | 130 | | 131 | | 132 | | | 133 | 134 |
| 47503E | | 124 | | | | | 125 | 126 | | 127 | 128 | 129 | 130 | | 131 | | 132 | | | 133 | 134 |
| 47601E | | 124 | | | | | 125 | 126 | | 127 | 128 | 129 | 130 | | 131 | | 132 | | | 133 | 134 |
| 41378E | | 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 |
| 43610E | | 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 |
|------------|----|-----|-----|----|-----|-----|----|-----|-----|-----|----|----|----|-----|-----|----|----|----|-----|----|-----|
| 4010ZE | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 40503E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 40601E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 41008E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 41206E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 41305E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 41515E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 41612E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 41711E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 41810E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 41913E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 42014E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 42215E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 42315E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 42415E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 42509E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 42704E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 43616E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 43817E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 43929E | | 135 | 130 | | 137 | 138 | | 139 | 140 | 141 | | | | 142 | 143 | | | | 144 | | 145 |
| 44029E | | 135 | 130 | | 137 | 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 |
|------------|-----|----|----|-----|----|----|-----|----|----|----|-----|-----|-----|----|----|----|-----|-----|-----|----|----|
| 4010ZE | 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 | |
| 43516E | 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 | |
| 44229E | 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 | | | |
| 43516E | 167 | | | 168 | | | | | | | | | | 169 | | | | 170 | | | |
| 43817E | 167 | | | 168 | | | | | | | | | | 169 | | | | 170 | | | |
| 43929E | 167 | | | 168 | | | | | | | | | | 169 | | | | 170 | | | |
| 44229E | 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 | 4E | 3A | 3B | 3C | 3D | 3E | 4A | 4B | 4C | 4D | 4E | 5B | 5C | 5D | |
|---------------|----|----|-----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 40102E | | | 171 | | | | | | 172 | | | | | | | | | | | | | |
| 40503E | | | 171 | | | | | | 172 | | | | | | | | | | | | | |
| 40501E | | | 171 | | | | | | 172 | | | | | | | | | | | | | |
| 41008E | | | 171 | | | | | | 172 | | | | | | | | | | | | | |
| 41206E | | | 171 | | | | | | 172 | | | | | | | | | | | | | |
| 41305E | | | 171 | | | | | | 172 | | | | | | | | | | | | | |
| 41519E | | | 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 | | | | | | | | | | | | | |
| 44029E | | | 171 | | | | | | 172 | | | | | | | | | | | | | |

TABLE K-5 (cont)
 VALID STEAM TEMPERATURE CHANNELS
 CONFIGURATION E

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

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 | | | | | | | | |
| 43813F | | 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 | | | |
| 41909F | 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 | | 56 | 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 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 40701F | 65 | | | 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 | 2F | 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 | | | 167 | | 168 | | | | | | 169 |
| 41807F | | | 164 | | | | | | 165 | 166 | | | 167 | | 168 | | | | | | 169 |
| 41914F | | | 164 | | | | | | 165 | 166 | | | 167 | | 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 | | | 167 | | 168 | | | | | | 169 |
| 42711F | | | 164 | | | | | | 165 | 166 | | | 167 | | 168 | | | | | | 169 |
| 42810F | | | 164 | | | | | | 165 | 166 | | | 167 | | 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 | | | 167 | | 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

| RJN 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 | | | | |
| 41907F | 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

| RJN 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

| Run | 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) |

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 |
| 40129C | 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 overtemperature 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 scrambled 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 | $6.3 \times 10^{-4} \text{ m}^3/\text{sec}$ (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 | $6.69 \times 10^{-4} \text{ m}^3/\text{sec}$ (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:

- 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 | $6.36 \times 10^{-4} \text{ m}^3/\text{sec}$ (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 | $6.37 \times 10^{-4} \text{ m}^3/\text{sec}$ (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 | $6.75 \times 10^{-4} \text{ m}^3/\text{sec}$ (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 | $0.590 \times 10^{-4} \text{ m}^3/\text{sec}$ (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 | $1.3 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $1.32 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $1.25 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $1.27 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $1.29 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $1.2 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $1.9 \times 10^{-3} \text{ m}^3/\text{sec}$ (30 gal/min) |
| Coolant temperature | 25°C (77°F) |
| Average and range of initial bundle (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 | $1.9 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $1.87 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $1.96 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $1.91 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $1.92 \times 10^{-3} \text{ m}^3/\text{sec}$ (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, noncircular,
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 | $1.96 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $1.97 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $2.00 \times 10^{-3} \text{ m}^3/\text{sec}$ (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) |
| Estimated 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 | $1.93 \times 10^{-3} \text{ m}^3/\text{sec}$ (30.6 gal/min) |
| Coolant temperature | 15°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 | $1.84 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $1.88 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $2.5 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $2.49 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $2.48 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $2.49 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $2.57 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $2.48 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $3.2 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $3.17 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $3.24 \times 10^{-3} \text{ m}^3/\text{sec}$ (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:

- 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 | $3.17 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $3.2 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $3.11 \times 10^{-3} \text{ m}^3/\text{sec}$ (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:

- 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 | $3.8 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $3.76 \times 10^{-3} \text{ m}^3/\text{sec}$ (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:

- 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 | $3.72 \times 10^{-3} \text{ m}^3/\text{sec}$ (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 | $3.8 \times 10^{-3} \text{ m}^3/\text{sec}$ (60 gal/min) |
| Coolant temperature | 23°C (73°F) |
| Average and range of initial 133 rods (72 in.) housing temperature | N/A |
| Initial bundle water level | N/A |

B. Summary Results:

| | |
|--|--|
| Reynolds number: | 157 \bar{v} |
| Grid loss coefficients: | 0.51 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: | 29.50 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 | $3.8 \times 10^{-3} \text{ m}^3/\text{sec}$ (6.0 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.

- 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 | $3.51 \times 10^{-3} \text{ m}^3/\text{sec}$ (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:

- 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 | $3.77 \times 10^{-3} \text{ m}^3/\text{sec}$ (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:

- 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.° DEG C

TOTAL POWER = 2.39 KW

| Z (M) | RUD 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 | 119.39 | 113.18 | 32.96 | 7127.5 |
| .30 | 4E | 441.30 | 119.33 | 113.11 | 29.52 | 3430.3 |
| | AVE | 440.45 | 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 | 25.92 | 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 | 19.46 | 3309.2 |
| .99 | 4A | 1127.02 | 136.65 | 121.41 | 20.63 | 3302.0 |
| .99 | 4C | 1106.68 | 135.15 | 121.50 | 35.05 | 6674.8 |
| | AVE | 1127.55 | 136.56 | 121.42 | 25.76 | 4497.0 |
| 1.22 | 1B | 1369.06 | 146.82 | 129.36 | 21.35 | 3283.3 |
| 1.22 | 1C | 1355.09 | 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 | 23.70 | 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 | 32.16 | 3238.0 |
| | AVE | 1664.46 | 154.95 | 140.42 | 34.70 | 3775.0 |

44401A-2

| WATER USE # & USE DESCRIPTION | WATER METER LOCATION | FEET PER HOUR (FPH) | WATER FLOW (GPM) | WATER TEMPERATURE (DEG F) | WATER PRESSURE (PSI) | WATER LOSS (GALLONS) |
|-------------------------------|----------------------|---------------------|------------------|---------------------------|----------------------|----------------------|
| 1.70(1.72) | 28 | 169.84 | 101.42 | 166.80 | 27.46 | 1228.2 |
| 1.71(1.72) | 30 | 174.67 | 101.71 | 169.70 | 27.20 | 1364.9 |
| 1.72(1.72) | 40 | 171.07 | 101.81 | 167.04 | 26.71 | 1526.2 |
| 1.73(1.72) | 45 | 175.88 | 101.81 | 167.20 | 26.71 | 2075.4 |
| 1.74(1.72) | 55 | 172.64 | 101.81 | 167.68 | 26.71 | 377.2 |
| 1.75(1.72) | 65 | 178.43 | 101.81 | 169.54 | 30.60 | 1141.7 |
| 1.76(1.72) | 75 | 172.67 | 101.81 | 166.61 | 26.71 | 1440.1 |
| 1.77(1.72) | 85 | 178.67 | 101.81 | 163.63 | 30.71 | 444.7 |
| 1.78(1.72) | 95 | 175.84 | 101.81 | 159.15 | 29.74 | 1115.4 |
| 1.79(1.72) | 100 | 175.73 | 101.81 | 162.19 | 29.74 | 471.5 |
| 1.79(1.72) | 110 | 175.87 | 101.81 | 160.86 | 29.74 | 567.9 |
| 1.79(1.72) | 115 | 176.22 | 101.81 | 159.70 | 29.74 | 450.4 |
| 1.80(1.72) | 125 | 176.03 | 101.81 | 157.71 | 29.84 | 302.0 |
| 1.81(1.72) | 135 | 176.24 | 101.81 | 157.39 | 30.14 | 603.9 |
| 1.82(1.72) | 145 | 171.07 | 101.81 | 152.23 | 31.20 | 444.0 |
| 1.83(1.72) | 155 | 175.84 | 101.81 | 153.15 | 31.79 | 623.4 |
| 1.84(1.72) | 165 | 174.07 | 101.81 | 147.23 | 27.11 | 111.1 |
| 1.85(1.72) | 175 | 174.99 | 101.81 | 144.49 | 29.71 | 476.9 |
| 1.86(1.72) | 185 | 174.26 | 101.81 | 151.22 | 29.71 | 31.4 |
| 1.86(1.72) | 195 | 174.26 | 101.81 | 151.22 | 29.71 | 481.2 |
| 1.87(1.72) | 205 | 176.68 | 101.81 | 151.72 | 29.71 | 461.2 |
| 1.88(1.72) | 215 | 176.49 | 101.81 | 151.47 | 29.71 | 541.0 |
| 1.89(1.72) | 225 | 176.67 | 101.81 | 148.74 | 29.71 | 531.0 |
| 1.90(1.72) | 235 | 176.67 | 101.81 | 147.63 | 29.71 | 613.0 |
| 1.91(1.72) | 245 | 174.54 | 101.81 | 142.84 | 30.60 | 624.7 |
| 1.92(1.72) | 255 | 176.54 | 101.81 | 142.79 | 30.80 | 614.4 |
| 1.93(1.72) | 265 | 175.87 | 101.81 | 140.79 | 30.74 | 694.7 |
| 1.93(1.72) | 275 | 176.68 | 101.81 | 147.66 | 29.71 | 111.2 |
| 1.94(1.72) | 285 | 176.85 | 101.81 | 143.86 | 29.65 | 561.3 |
| 1.95(1.72) | 295 | 176.85 | 101.81 | 144.79 | 30.71 | 603.7 |
| 1.96(1.72) | 305 | 176.67 | 101.81 | 142.97 | 30.71 | 572.0 |
| 1.97(1.72) | 315 | 176.67 | 101.81 | 144.65 | 30.71 | 444.0 |

| | | | | | |
|------------|----|--------|--------|-------|--------|
| 1.98(1.94) | CF | 167.09 | 151.67 | 27.12 | 3000.6 |
| 1.98(1.92) | 2B | 170.26 | 155.49 | 26.93 | 6594.6 |
| 1.98(1.9) | 3C | 173.51 | 154.51 | 27.27 | 6280.4 |
| 1.98(1.92) | 3D | 173.82 | 156.08 | 28.61 | 6144.2 |
| 1.98(1.89) | 3E | 173.13 | 155.25 | 26.64 | 5503.6 |
| 1.99(1.93) | 4B | 177.35 | 157.73 | 29.1 | 4743.6 |
| 1.98(1.87) | 5A | 172.23 | 149.8 | 26.97 | 5259.7 |
| 1.98(1.95) | 5B | 173.8 | 156.67 | 23.84 | 2974.4 |
| AV | | 175.17 | 153.93 | 28.7 | 4927.4 |
| 1.91(1.95) | 4D | 171.1 | 155.09 | 30.5 | 504.7 |
| 1.91(1.94) | 5C | 170.25 | 155.12 | 29.5 | 6207.5 |
| 1.91(1.91) | 6D | 172.5 | 156.61 | 32.7 | 4955.3 |
| 1.91(1.93) | 5E | 174.07 | 155.66 | 28.2 | 6243.0 |
| 1.91(1.95) | 6E | 172.66 | 151.74 | 29.6 | 523.5 |
| 1.91(1.95) | 7A | 173.6 | 158.9 | 29.6 | 4749.4 |
| 1.91(1.93) | 7B | 173.44 | 155.11 | 24.7 | 5568.0 |
| AV | | 175.62 | 153.57 | 29.7 | 4777.2 |
| 1.93(1.95) | 2A | 173.69 | 155.06 | 29.5 | 2996.8 |
| 1.93(1.92) | 6A | 170.27 | 157.06 | 29.7 | 4499.7 |
| 1.93(1.92) | 6B | 170.1 | 157.93 | 32.3 | 4697.0 |
| 1.93(1.94) | 2B | 173.97 | 153.63 | 24.0 | 3038.2 |
| 1.93(1.96) | 3B | 175.12 | 157.25 | 28.3 | 6107.4 |
| 1.93(1.96) | 3C | 173.54 | 156.5 | 28.6 | 6292.6 |
| 1.93(1.96) | 5D | 173.1 | 156.6 | 28.7 | 6142.0 |
| 1.93(1.95) | 6E | 173.69 | 157.44 | 27.2 | 4965.2 |
| 1.93(1.95) | 7E | 171.08 | 156.12 | 27.6 | 4985.2 |
| 1.93(1.95) | 6C | 174.07 | 156.7 | 29.17 | 6034.8 |
| AV | | 175.11 | 156.41 | 28.7 | 4600.4 |
| 1.96(1.95) | 4D | 172.67 | 157.66 | 28.1 | 3011.7 |
| 1.96(1.94) | 5C | 170.3 | 158.07 | 29.3 | 6254.3 |
| 1.96(1.92) | 2D | 171.6 | 159.2 | 31.5 | 4805.2 |
| 1.96(1.95) | 5E | 171.6 | 157.31 | 27.0 | 6605.0 |
| 1.96(1.97) | 5B | 174.34 | 157.95 | 29.6 | 5176.7 |
| 1.96(1.96) | 4A | 173.3 | 156.13 | 29.2 | 4749.1 |
| 1.96(1.97) | 3D | 174.09 | 157.65 | 28.3 | 6155.5 |
| AV | | 177.33 | 157.71 | 28.9 | 4739.7 |
| 1.98(1.9) | 5D | 165.89 | 156.1 | 28.0 | 6027.5 |
| 1.98(1.9) | 6E | 174.22 | 157.92 | 28.7 | 2907.5 |
| 1.98(1.95) | 7E | 173.13 | 157.33 | 28.1 | 4805.4 |

| | | | | | | |
|-----------|----|---------|--------|--------|-------|--------|
| 1.9812.24 | 30 | 1654.23 | 152.63 | 150.7 | 29.77 | 64.52 |
| 1.9812.24 | 30 | 1745.94 | 162.83 | 150.74 | 27.24 | 6477.8 |
| 1.9812.24 | 4A | 1745.24 | 170.74 | 150.40 | 26.74 | 2929.6 |
| 1.9812.24 | 4C | 1745.24 | 174.85 | 150.33 | 26.94 | 2963.7 |
| 1.9812.24 | 4C | 1677.87 | 170.59 | 149.74 | 27.67 | 2931.0 |
| 4Vc | | 1658.84 | 174.54 | 150.74 | 28.42 | 479.7 |
| 1.3 | 14 | 1666.62 | 173.71 | 162.71 | 27.62 | 324.44 |
| 2.13 | 10 | 1586.83 | 174.89 | 158.43 | 33.41 | 362.8 |
| 2.13 | 20 | 1542.74 | 174.45 | 154.77 | 32.21 | 4187.1 |
| 2.13 | 30 | 1572.25 | 174.22 | 153.22 | 31.53 | 2994.2 |
| 2.13 | 30 | 1510.44 | 172.23 | 163.44 | 33.77 | 3166.7 |
| 2.13 | 30 | 1557.44 | 172.22 | 153.88 | 32.32 | 3201.5 |
| 2.13 | 40 | 1628.36 | 177.54 | 165.28 | 47.72 | 4029.6 |
| 2.13 | 50 | 1652.52 | 172.44 | 164.01 | 47.24 | 3192.4 |
| 4Vf | | 1666.62 | 170.2 | 160.74 | 60.27 | 4354.1 |
| 2.29 | 11 | 1563.49 | 170.29 | 167.28 | 28.2 | 3033.2 |
| 2.29 | 20 | 1568.16 | 177.79 | 164.23 | 29.22 | 3626.2 |
| 2.29 | 30 | 1603.43 | 174.49 | 167.76 | 56.12 | 2942.6 |
| 2.29 | 34 | 1574.27 | 172.28 | 165.32 | 26.71 | 4971.2 |
| 2.29 | 34 | 1588.68 | 170.43 | 169.53 | 28.14 | 3372.6 |
| 2.29 | 30 | 1623.87 | 172.02 | 158.74 | 27.61 | 302.4 |
| 2.29 | 30 | 1527.83 | 177.44 | 164.20 | 30.11 | 3192.3 |
| 2.29 | 40 | 1566.87 | 177.17 | 171.24 | 31.26 | 4474.3 |
| 2.29 | 20 | 1528.66 | 171.59 | 164.41 | 27.8 | 3368.4 |
| 2.29 | 31 | 1556.43 | 174.78 | 167.08 | 32.12 | 3664.4 |
| 4Vg | | 1544.76 | 163.63 | 157.40 | 33.21 | 4161.2 |
| 2.44 | 31 | 1525.62 | 172.78 | 173.64 | 27.26 | 3747.7 |
| 2.44 | 13 | 1671.70 | 173.41 | 171.64 | 25.24 | 4936.4 |
| 2.44 | 20 | 1666.41 | 170.43 | 167.02 | 27.46 | 3159.7 |
| 2.44 | 25 | 1615.61 | 172.63 | 172.31 | 23.21 | 615.6 |
| 2.44 | 31 | 1566.61 | 174.52 | 174.44 | 24.41 | 3641.4 |
| 2.44 | 40 | 1687.64 | 174.51 | 175.34 | 23.23 | 4636.4 |
| 2.44 | 50 | 1566.14 | 171.41 | 170.91 | 21.31 | 3754.6 |
| 2.44 | 11 | 1657.44 | 173.46 | 169.27 | 31.46 | 3166.1 |
| 4Vh | | 1672.23 | 173.26 | 172.16 | 23.12 | 4344.6 |

RUN 44401A

MASS FLOW = 0.0310 LB/SEC

INLET VAPOR TEMP = 230.0 DEG F

TOTAL POWER = 2.27 BTU/SEC

| Z (IN) | KJD LOCATION | HEAT FLUX (BTU/HK-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | HTI /PR**0.33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|------------------------------|-----------------------|---------------|--------------|
| 12 | 2A | 134.06 | 247.89 | 235.58 | 18.54 | 3427.5 |
| 12 | 4A | 140.19 | 247.95 | 235.60 | 18.54 | 3427.1 |
| 12 | 4C | 134.24 | 246.80 | 235.72 | 32.06 | 7127.5 |
| 12 | 4E | 139.87 | 246.79 | 235.60 | 20.54 | 3436.3 |
| | AVE | 134.61 | 247.36 | 235.63 | 22.44 | 4353.1 |
| 24 | 1B | 211.94 | 257.72 | 240.71 | 20.24 | 3459.8 |
| 24 | 1C | 210.62 | 257.60 | 239.32 | 25.82 | 5805.3 |
| 24 | 4D | 213.83 | 257.67 | 241.70 | 29.24 | 5317.7 |
| 24 | 5B | 213.72 | 256.50 | 240.75 | 22.03 | 3422.9 |
| | AVE | 212.52 | 257.37 | 240.62 | 24.34 | 4526.4 |
| 39 | 2A | 366.07 | 280.19 | 250.46 | 19.48 | 3309.2 |
| 39 | 4A | 357.22 | 277.98 | 250.53 | 20.63 | 3302.6 |
| 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 | 433.43 | 296.27 | 254.85 | 21.35 | 3483.3 |
| 48 | 1C | 423.17 | 299.49 | 251.20 | 23.54 | 5651.1 |
| 48 | 4D | 427.00 | 300.60 | 267.78 | 26.94 | 5176.5 |
| 48 | 5B | 423.87 | 293.16 | 255.46 | 23.70 | 3237.5 |
| | AVE | 426.44 | 297.38 | 254.82 | 23.90 | 4337.1 |
| 60 | 2A | 527.45 | 311.60 | 284.00 | 28.76 | 3472.3 |
| 60 | 4A | 526.90 | 312.35 | 285.96 | 30.04 | 2899.1 |
| 60 | 4C | 530.99 | 310.27 | 294.26 | 47.84 | 5490.7 |
| 60 | 4E | 524.85 | 309.42 | 284.83 | 32.18 | 3238.0 |
| | AVE | 527.56 | 310.91 | 284.76 | 34.71 | 3775.6 |

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| MESS FLOW • SIB LOG# | | FUEL FLOW • SIB LOG# | | TOTAL POWER • SIB LOG# | | REVENUE No. | |
|----------------------|------|----------------------|-----------------|------------------------|----------|-------------|-------------|
| (1) | LOG# | FEW FLOW (L/Hr) | FEW FLOW (L/Hr) | WHP (HP) | WHP (HP) | WHP (HP) | REVENUE No. |
| 67 (67.0) | 67 | 326.13 | 326.13 | 276.28 | 276.28 | 27.62 | 3449.2 |
| 67 (67.0) | 67 | 331.01 | 331.01 | 299.60 | 299.60 | 27.11 | 3449.5 |
| 67 (67.0) | 67 | 340.13 | 340.13 | 298.70 | 298.70 | 27.11 | 3449.5 |
| 67 (67.0) | 67 | 337.22 | 337.22 | 297.19 | 297.19 | 26.97 | 3449.4 |
| Avg | | 332.07 | 332.07 | 297.80 | 297.80 | 26.94 | 3771.5 |
| 70 (70.0) | 70 | 320.31 | 320.31 | 301.17 | 301.17 | 27.62 | 3141.7 |
| 70 (70.0) | 70 | 327.43 | 327.43 | 295.71 | 295.71 | 26.83 | 3440.1 |
| 70 (70.0) | 70 | 331.30 | 331.30 | 304.67 | 304.67 | 27.11 | 4545.7 |
| 70 (70.0) | 70 | 325.71 | 325.71 | 292.10 | 292.10 | 27.24 | 6289.4 |
| 70 (70.0) | 70 | 320.52 | 320.52 | 295.04 | 295.04 | 27.11 | 4700.2 |
| 70 (70.0) | 70 | 334.22 | 334.22 | 303.64 | 303.64 | 25.83 | 3247.9 |
| Avg | | 328.49 | 328.49 | 299.30 | 299.30 | 26.93 | 4800.5 |
| 70 (72.0) | 70 | 332.27 | 332.27 | 305.07 | 305.07 | 28.02 | 3642.6 |
| 70 (72.0) | 70 | 345.08 | 345.08 | 303.70 | 303.70 | 27.17 | 6000.9 |
| 70 (72.0) | 70 | 341.26 | 341.26 | 306.01 | 306.01 | 31.72 | 4044.6 |
| 70 (72.0) | 70 | 347.22 | 347.22 | 304.92 | 304.92 | 29.05 | 6243.4 |
| 70 (72.0) | 70 | 337.29 | 337.29 | 297.11 | 297.11 | 27.11 | 3207.2 |
| 70 (72.0) | 70 | 347.11 | 347.11 | 305.33 | 305.33 | 27.21 | 4724.9 |
| 70 (72.0) | 70 | 335.66 | 335.66 | 304.94 | 304.94 | 27.11 | 3514.7 |
| Avg | | 342.22 | 342.22 | 304.11 | 304.11 | 28.71 | 4123.2 |
| 70 (72.0) | 70 | 331.25 | 331.25 | 306.63 | 306.63 | 31.04 | 2409.6 |
| 70 (72.0) | 70 | 340.75 | 340.75 | 309.07 | 309.07 | 26.71 | 3201.1 |
| 70 (72.0) | 70 | 341.32 | 341.32 | 309.35 | 309.35 | 33.10 | 4543.4 |
| 70 (72.0) | 70 | 341.24 | 341.24 | 309.05 | 309.05 | 26.71 | 6001.5 |
| 70 (72.0) | 70 | 331.23 | 331.23 | 306.67 | 306.67 | 29.05 | 6244.7 |
| 70 (72.0) | 70 | 340.25 | 340.25 | 304.05 | 304.05 | 27.11 | 6124.6 |
| 70 (72.0) | 70 | 343.04 | 343.04 | 304.31 | 304.31 | 26.71 | 4940.7 |
| 70 (72.0) | 70 | 347.26 | 347.26 | 303.70 | 303.70 | 27.21 | 3231.1 |
| Avg | | 340.18 | 340.18 | 304.60 | 304.60 | 28.00 | 3100.0 |
| 74 (74.0) | 74 | 330.41 | 330.41 | 309.17 | 309.17 | 27.11 | 3207.7 |
| 74 (74.0) | 74 | 340.65 | 340.65 | 309.14 | 309.14 | 27.24 | 6001.1 |
| 74 (74.0) | 74 | 340.71 | 340.71 | 309.05 | 309.05 | 27.11 | 4543.4 |

| | | | | | |
|-----------|----|--------|--------|-------|--------|
| 74 (72.4) | 28 | 533.84 | 305.61 | 27.12 | 26.926 |
| 74 (75.4) | 24 | 374.8 | 311.49 | 26.24 | 26.926 |
| 74 (74.4) | 30 | 370.23 | 310.13 | 27.27 | 26.926 |
| 74 (75.4) | 30 | 370.23 | 310.74 | 28.60 | 26.926 |
| 74 (74.4) | 3E | 370.23 | 312.81 | 34.64 | 26.926 |
| 74 (74.4) | 43 | 370.23 | 311.83 | 29.11 | 26.926 |
| 74 (73.7) | 20 | 370.23 | 311.27 | 24.91 | 26.926 |
| 74 (74.7) | 10 | 370.23 | 310.71 | 23.84 | 26.926 |
| 440 | | 370.23 | 310.71 | 20.70 | 26.926 |
| 75 (77.4) | 10 | 314.10 | 312.67 | 25.72 | 26.926 |
| 75 (76.4) | 20 | 312.84 | 311.23 | 23.32 | 26.926 |
| 75 (75.2) | 20 | 312.84 | 313.91 | 27.11 | 26.926 |
| 75 (76.4) | 30 | 312.84 | 312.14 | 28.20 | 26.926 |
| 75 (76.4) | 31 | 312.84 | 314.27 | 25.52 | 26.926 |
| 75 (76.4) | 43 | 312.84 | 314.23 | 22.61 | 26.926 |
| 75 (75.4) | 10 | 312.84 | 312.01 | 24.72 | 26.926 |
| 440 | | 240.12 | 312.73 | 29.11 | 26.926 |
| 76 (76.4) | 44 | 312.73 | 312.73 | 27.41 | 26.926 |
| 76 (75.7) | 23 | 314.71 | 314.71 | 29.71 | 26.926 |
| 76 (75.4) | 25 | 315.14 | 315.14 | 27.11 | 26.926 |
| 76 (74.4) | 25 | 314.71 | 314.71 | 24.20 | 26.926 |
| 76 (77.0) | 20 | 314.71 | 315.71 | 29.11 | 26.926 |
| 76 (77.0) | 35 | 312.73 | 313.73 | 28.60 | 26.926 |
| 76 (77.0) | 20 | 312.73 | 312.73 | 29.70 | 26.926 |
| 76 (76.4) | 44 | 314.64 | 314.64 | 27.71 | 26.926 |
| 76 (75.4) | 47 | 314.34 | 314.34 | 27.60 | 26.926 |
| 76 (75.7) | 47 | 314.34 | 314.34 | 23.57 | 26.926 |
| 440 | | 314.34 | 314.34 | 20.56 | 26.926 |
| 77 (75.4) | 10 | 342.44 | 311.71 | 21.11 | 26.926 |
| 77 (76.0) | 20 | 310.71 | 314.13 | 29.11 | 26.926 |
| 77 (76.0) | 20 | 314.64 | 315.74 | 23.43 | 26.926 |
| 77 (77.4) | 10 | 314.64 | 315.20 | 27.14 | 26.926 |
| 77 (77.7) | 10 | 314.64 | 317.27 | 29.20 | 26.926 |
| 77 (77.0) | 41 | 314.64 | 314.64 | 23.81 | 26.926 |
| 77 (77.7) | 10 | 314.64 | 311.20 | 21.11 | 26.926 |
| 440 | | 314.64 | 317.17 | 20.91 | 26.926 |
| 74 (74.4) | 10 | 317.49 | 317.49 | 20.81 | 26.926 |
| 74 (76.0) | 10 | 317.49 | 317.49 | 21.11 | 26.926 |
| 74 (75.4) | 10 | 317.49 | 317.49 | 21.11 | 26.926 |

| | | | | | |
|-----------|----|--------|--------|-------|---------|
| 74 (79.5) | 24 | 514.54 | 310.42 | 73.14 | 6105.89 |
| 74 (72.9) | 36 | 523.83 | 317.55 | 37.67 | 6277.60 |
| 74 (73.0) | 44 | 524.50 | 319.87 | 36.79 | 6474.66 |
| 74 (78.7) | 68 | 525.80 | 316.72 | 35.91 | 6813.87 |
| 74 (70.8) | 46 | 547.80 | 317.73 | 35.67 | 6911.80 |
| AVG | | 527.44 | 317.73 | 35.42 | 4760.87 |
| 84 | 40 | 505.83 | 324.80 | 36.41 | 5445.09 |
| 84 | 50 | 504.83 | 317.18 | 33.42 | 5625.86 |
| 84 | 60 | 504.83 | 328.47 | 35.22 | 4187.21 |
| 84 | 28 | 542.24 | 325.97 | 51.83 | 4992.82 |
| 84 | 36 | 498.80 | 321.19 | 38.36 | 5068.87 |
| 84 | 30 | 516.24 | 325.18 | 32.27 | 5148.22 |
| 84 | 20 | 513.84 | 325.13 | 32.30 | 5466.85 |
| 84 | 40 | 565.80 | 329.51 | 47.51 | 4689.86 |
| 84 | 33 | 521.24 | 327.20 | 47.21 | 5193.84 |
| AVG | | 515.24 | 324.08 | 40.91 | 4524.84 |
| 9 | 10 | 476.45 | 333.11 | 28.30 | 3633.85 |
| 9 | 20 | 477.94 | 324.82 | 30.22 | 3628.82 |
| 9 | 28 | 508.80 | 334.20 | 50.21 | 4985.84 |
| 9 | 33 | 455.84 | 320.58 | 28.70 | 4970.80 |
| 9 | 38 | 563.84 | 327.16 | 28.14 | 5273.81 |
| 9 | 30 | 483.84 | 331.74 | 27.80 | 5262.81 |
| 9 | 35 | 484.84 | 327.54 | 38.11 | 5190.83 |
| 9 | 40 | 482.84 | 347.41 | 31.80 | 4474.83 |
| 9 | 35 | 454.84 | 328.01 | 37.88 | 5308.81 |
| 9 | 30 | 480.80 | 324.24 | 32.21 | 3264.84 |
| AVG | | 484.84 | 332.48 | 33.81 | 4513.85 |
| 95 | 30 | 415.87 | 344.54 | 31.21 | 5797.87 |
| 95 | 45 | 462.81 | 341.05 | 30.24 | 5930.84 |
| 95 | 40 | 461.81 | 336.20 | 33.80 | 5159.87 |
| 95 | 48 | 464.84 | 342.16 | 31.70 | 5165.80 |
| 95 | 38 | 445.80 | 346.54 | 24.64 | 5043.84 |
| 95 | 40 | 468.83 | 337.88 | 39.83 | 4688.80 |
| 95 | 43 | 442.87 | 362.20 | 19.30 | 2456.80 |
| 95 | 35 | 411.84 | 328.27 | 31.44 | 5160.87 |
| AVG | | 464.84 | 341.84 | 33.81 | 4564.84 |

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 = 0.0141 KG/SEC

INLET VAPOR TEMP = 110.5 DEG C

TOTAL POWER = 2.41 KW

| Z (M) | ROD LOCATION | HEAT FLUX (WATT/SQCM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | REYNOLDS NO. |
|-------|--------------|-----------------------|---------------------------|--------------------|---------------|--------------|
| .30 | 2A | 446.62 | 119.93 | 113.13 | 19.06 | 3456.1 |
| .30 | 4A | 446.81 | 120.04 | 113.14 | 18.48 | 3455.3 |
| .30 | 4C | 437.89 | 119.33 | 113.29 | 32.12 | 7180.4 |
| .30 | 4E | 429.60 | 119.63 | 113.17 | 19.11 | 3457.6 |
| | AVE | 438.73 | 119.73 | 113.15 | 22.18 | 4388.9 |
| .61 | 1B | 709.93 | 125.77 | 116.05 | 25.87 | 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 | 125.31 | 116.10 | 27.50 | 3467.5 |
| | AVE | 711.37 | 125.28 | 115.98 | 25.93 | 4563.2 |
| .99 | 2A | 1147.20 | 137.28 | 121.48 | 25.27 | 3339.2 |
| .99 | 4A | 1127.40 | 137.56 | 121.54 | 19.65 | 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 | 1347.95 | 147.79 | 127.48 | 25.95 | 5699.2 |
| 1.22 | 4D | 1386.02 | 149.04 | 131.07 | 28.19 | 5220.5 |
| 1.22 | 5B | 1415.79 | 147.36 | 130.99 | 22.22 | 3250.2 |
| | AVE | 1346.27 | 148.50 | 129.54 | 23.72 | 4365.6 |
| 1.52 | 2A | 1682.30 | 159.03 | 149.17 | 23.54 | 3428.6 |
| 1.52 | 4A | 1651.17 | 157.78 | 147.78 | 25.67 | 3096.5 |
| 1.52 | 4C | 1627.35 | 158.39 | 149.26 | 36.80 | 6529.3 |
| 1.52 | 4E | 1626.89 | 157.03 | 149.01 | 25.81 | 3156.7 |
| | AVE | 1654.92 | 158.26 | 149.31 | 27.97 | 3977.8 |

41401B-2

KLN 414010

MASS FLOW = 0.141 KG/SEC

INLET VAPOR TEMP = 120.0 DEG C

TOTAL POWER = 2.41 KW

| Z (M) | RJD LOCATION | HEAT FLUX (WATT/CM ²) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR ^{0.33} | REYNOLDS NO. |
|------------|--------------|-----------------------------------|---------------------------|--------------------|-------------------------|--------------|
| 1.70(1.72) | 2A | 1745.87 | 166.70 | 146.83 | 27.56 | 3143.4 |
| 1.70(1.72) | 4A | 1748.56 | 172.26 | 148.36 | 18.73 | 2418.6 |
| 1.70(1.72) | 4C | 1745.15 | 170.00 | 147.62 | 31.14 | 5742.2 |
| 1.70(1.71) | 4E | 1761.15 | 169.32 | 140.52 | 17.96 | 3111.8 |
| | AVE | 1750.18 | 170.14 | 147.37 | 27.56 | 3754.6 |
| 1.78(1.80) | 1B | 1798.83 | 172.30 | 149.34 | 27.04 | 3250.2 |
| 1.78(1.79) | 1C | 1738.14 | 168.33 | 140.20 | 37.84 | 5550.7 |
| 1.78(1.80) | 2D | 1741.81 | 173.00 | 151.83 | 28.16 | 4427.2 |
| 1.78(1.78) | 3C | 1787.18 | 173.06 | 144.99 | 37.74 | 6127.8 |
| 1.78(1.79) | 4D | 1765.24 | 173.84 | 152.43 | 23.24 | 4644.6 |
| 1.78(1.81) | 5E | 1709.55 | 165.11 | 150.93 | 31.04 | 3218.7 |
| | AVE | 1756.91 | 170.62 | 150.13 | 29.14 | 4629.2 |
| 1.80(1.83) | 1D | 1725.88 | 169.72 | 150.37 | 22.86 | 3812.4 |
| 1.80(1.82) | 2D | 1741.81 | 173.74 | 152.00 | 23.14 | 5082.1 |
| 1.80(1.81) | 3C | 1787.16 | 174.20 | 150.88 | 30.26 | 5861.4 |
| 1.80(1.83) | 3E | 1756.31 | 168.20 | 147.40 | 37.79 | 5933.8 |
| 1.80(1.81) | 4B | 1733.84 | 177.43 | 154.14 | 24.71 | 4730.5 |
| 1.80(1.82) | 5D | 1750.96 | 168.78 | 150.60 | 24.90 | 3530.4 |
| | AVE | 1749.33 | 172.11 | 151.10 | 26.23 | 4825.7 |
| 1.83(1.85) | 1B | 1746.83 | 173.06 | 150.47 | 23.77 | 4480.4 |
| 1.83(1.85) | 1C | 1738.14 | 170.00 | 148.17 | 24.27 | 7404.1 |
| 1.83(1.86) | 2E | 1775.65 | 167.31 | 151.00 | 24.56 | 4470.3 |
| 1.83(1.86) | 3A | 1692.74 | 174.33 | 144.73 | 24.22 | 7317.0 |
| 1.83(1.85) | 5B | 1709.55 | 162.57 | 152.30 | 42.76 | 4753.9 |
| 1.83(1.84) | 5C | 1834.51 | 164.44 | 148.92 | 37.86 | 6549.2 |
| | AVE | 1758.36 | 169.24 | 150.20 | 27.24 | 5431.3 |
| 1.88(1.91) | 1D | 1725.88 | 169.00 | 153.20 | 26.41 | 3059.2 |
| 1.88(1.91) | 2A | 1507.37 | 174.30 | 150.13 | 32.74 | 4468.6 |
| 1.88(1.91) | 2C | 1753.74 | 172.24 | 154.21 | 34.32 | 6400.0 |
| 1.88(1.91) | 2D | 1741.81 | 172.76 | 150.08 | 34.50 | 5750.2 |
| 1.88(1.91) | 2E | 1775.65 | 170.07 | 150.48 | 31.15 | 2472.7 |
| 1.88(1.92) | 3A | 1692.74 | 170.00 | 151.04 | 27.47 | 2240.7 |

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| | | | | | | |
|------------|----|---------|--------|--------|-------|--------|
| 1.88(1.91) | 3H | 1720.54 | 173.44 | 155.54 | 37.84 | 6245.4 |
| 1.88(1.88) | 3C | 1787.16 | 173.73 | 154.42 | 35.47 | 6666.5 |
| 1.88(1.91) | 3D | 1721.76 | 170.08 | 154.45 | 43.30 | 6295.3 |
| 1.88(1.91) | 3E | 1756.31 | 176.57 | 155.77 | 32.18 | 5316.2 |
| 1.88(1.89) | 4B | 1733.84 | 176.22 | 156.44 | 37.67 | 4981.8 |
| 1.88(1.89) | 5C | 1834.51 | 173.50 | 156.45 | 29.15 | 5344.1 |
| 1.88(1.90) | 5D | 1756.96 | 171.53 | 153.44 | 24.25 | 5226.5 |
| AVE | | 1754.03 | 172.42 | 153.94 | 32.54 | 5346.4 |
| 1.91(1.94) | 1D | 1725.86 | 166.13 | 154.38 | 32.07 | 5073.4 |
| 1.91(1.94) | 2C | 1753.74 | 173.07 | 155.41 | 37.86 | 6442.8 |
| 1.91(1.93) | 2D | 1741.81 | 172.54 | 156.57 | 37.54 | 4984.0 |
| 1.91(1.92) | 3C | 1767.16 | 172.45 | 155.55 | 41.74 | 6383.5 |
| 1.91(1.94) | 3E | 1756.31 | 169.44 | 151.72 | 33.25 | 5279.5 |
| 1.91(1.92) | 4B | 1733.84 | 174.54 | 157.40 | 34.64 | 4644.4 |
| 1.91(1.93) | 5D | 1756.96 | 173.67 | 154.87 | 29.64 | 2965.4 |
| AVE | | 1749.96 | 172.13 | 155.22 | 34.53 | 4853.4 |
| 1.93(1.95) | 2A | 1745.67 | 173.67 | 155.53 | 23.74 | 3503.0 |
| 1.93(1.96) | 2B | 1807.37 | 176.52 | 157.94 | 32.77 | 4942.4 |
| 1.93(1.96) | 2E | 1775.61 | 167.43 | 155.54 | 37.66 | 3516.5 |
| 1.93(1.96) | 3A | 1692.79 | 174.84 | 153.26 | 27.46 | 5183.2 |
| 1.93(1.96) | 3B | 1720.54 | 175.55 | 157.27 | 35.45 | 6235.4 |
| 1.93(1.94) | 3C | 1787.16 | 174.85 | 156.29 | 37.96 | 6349.4 |
| 1.93(1.96) | 3D | 1721.76 | 173.50 | 156.07 | 41.33 | 6286.2 |
| 1.93(1.96) | 4A | 1746.66 | 177.44 | 156.87 | 29.86 | 2965.3 |
| 1.93(1.94) | 4C | 1745.15 | 174.27 | 156.46 | 31.56 | 6174.7 |
| 1.93(1.94) | 4E | 1761.65 | 174.08 | 155.52 | 23.43 | 5031.5 |
| 1.93(1.94) | 5C | 1834.51 | 173.55 | 152.61 | 31.52 | 5153.0 |
| AVE | | 1758.23 | 174.25 | 155.70 | 31.47 | 4758.4 |
| 1.96(1.99) | 1D | 1725.86 | 176.46 | 156.46 | 31.31 | 3085.4 |
| 1.96(1.98) | 2C | 1753.74 | 176.71 | 156.44 | 34.76 | 6378.5 |
| 1.96(1.98) | 2D | 1741.81 | 174.84 | 156.04 | 35.35 | 4462.2 |
| 1.96(1.96) | 3C | 1797.16 | 176.46 | 157.55 | 33.14 | 6371.5 |
| 1.96(1.99) | 3E | 1756.31 | 164.54 | 153.42 | 38.22 | 5244.1 |
| 1.96(1.96) | 4B | 1733.84 | 176.55 | 157.25 | 31.14 | 4651.8 |
| 1.96(1.98) | 5D | 1756.96 | 171.22 | 157.52 | 31.27 | 2444.3 |
| AVE | | 1749.96 | 174.25 | 157.61 | 33.59 | 4541.3 |
| 1.98(2.03) | 2A | 1745.67 | 174.53 | 156.76 | 12.46 | 2468.3 |
| 1.98(2.01) | 2B | 1807.37 | 180.54 | 160.55 | 24.14 | 4342.4 |
| 1.98(2.03) | 2C | 1741.81 | 175.50 | 154.43 | 35.55 | 4252.5 |

| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| 1.98(2.01) | 2E | 1775.65 | 169.67 | 157.37 | 36.04 | 3026.6 |
| 1.98(2.01) | 3A | 1692.79 | 177.74 | 155.21 | 25.34 | 5124.4 |
| 1.98(2.01) | 3B | 1720.54 | 161.00 | 159.29 | 33.71 | 6136.2 |
| 1.98(1.99) | 3C | 1787.16 | 160.53 | 156.40 | 31.36 | 6345.3 |
| 1.98(2.01) | 3D | 1721.76 | 176.71 | 158.00 | 37.14 | 6231.1 |
| 1.98(2.01) | 4A | 1748.66 | 166.37 | 156.44 | 27.35 | 2976.5 |
| 1.98(1.99) | 4C | 1745.15 | 177.74 | 158.23 | 34.51 | 6135.5 |
| 1.98(1.99) | 4E | 1761.05 | 176.11 | 157.00 | 23.27 | 3055.1 |
| 1.98(2.00) | 5C | 1834.51 | 172.00 | 154.51 | 35.76 | 5051.4 |
| | AVE | 1756.86 | 177.32 | 157.02 | 33.14 | 4744.3 |
| 2.13 | 1B | 1586.89 | 175.44 | 161.73 | 27.01 | 3217.3 |
| 2.13 | 1C | 1639.80 | 172.17 | 156.54 | 41.95 | 5682.1 |
| 2.13 | 2B | 1590.87 | 161.06 | 164.57 | 32.13 | 4233.0 |
| 2.13 | 3A | 1602.97 | 174.68 | 159.40 | 27.01 | 5085.3 |
| 2.13 | 3B | 1671.06 | 161.03 | 163.79 | 34.76 | 5085.8 |
| 2.13 | 3D | 1596.60 | 177.86 | 155.25 | 42.04 | 5381.8 |
| 2.13 | 4C | 1627.69 | 176.02 | 164.58 | 39.97 | 4741.7 |
| 2.13 | 5B | 1616.23 | 174.20 | 163.76 | 38.51 | 3190.6 |
| | AVE | 1616.50 | 177.52 | 162.48 | 35.26 | 4577.7 |
| 2.29 | 1D | 1517.91 | 161.22 | 166.53 | 25.87 | 3336.5 |
| 2.29 | 2B | 1499.87 | 192.06 | 169.77 | 22.16 | 4467.4 |
| 2.29 | 2C | 1516.15 | 167.70 | 168.24 | 27.44 | 5762.1 |
| 2.29 | 3A | 1466.54 | 169.20 | 164.77 | 21.56 | 4483.2 |
| 2.29 | 3B | 1560.76 | 172.00 | 164.46 | 25.24 | 5531.2 |
| 2.29 | 3D | 1501.96 | 165.75 | 166.54 | 33.27 | 5744.3 |
| 2.29 | 4A | 1629.24 | 164.24 | 170.79 | 24.87 | 4545.7 |
| 2.29 | 5C | 1483.64 | 162.22 | 167.47 | 24.75 | 3034.0 |
| | AVE | 1521.94 | 167.47 | 166.25 | 25.26 | 4648.6 |
| 2.44 | 2B | 1241.52 | 193.51 | 174.80 | 21.45 | 4591.4 |
| 2.44 | 3A | 1287.77 | 190.83 | 167.62 | 27.33 | 4342.2 |
| 2.44 | 3B | 1294.74 | 196.54 | 174.10 | 21.71 | 5753.2 |
| 2.44 | 3D | 1294.48 | 167.20 | 173.52 | 35.37 | 5715.3 |
| 2.44 | 4C | 1322.37 | 167.78 | 174.47 | 32.46 | 4742.3 |
| 2.44 | 5A | 1343.27 | 165.54 | 173.23 | 22.41 | 2928.6 |
| | AVE | 1298.28 | 190.25 | 173.23 | 25.12 | 4612.2 |

RUN 41401A

MASS FLOW = .0310 LBM/SEC

INLET VAPOR TEMP = 231.7 DEG F

TOTAL POWER = 2.28 BTU/SEC

| Z (IN) | ROW LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU 799**33 | REYNOLDS NU. |
|-----------|-----------------|----------------------------|------------------------------|-----------------------|------------|--------------|
| 12 | 2A | 141.56 | 247.87 | 235.63 | 19.50 | 3456.1 |
| 12 | 4A | 139.71 | 248.06 | 235.65 | 19.46 | 3455.3 |
| 12 | 4C | 138.76 | 246.80 | 235.76 | 37.12 | 7186.4 |
| 12 | 4E | 136.14 | 247.33 | 235.61 | 19.11 | 3457.6 |
| | AVE | 139.06 | 247.51 | 235.65 | 22.16 | 4388.9 |
| 24 | 1B | 225.02 | 258.38 | 240.88 | 20.87 | 3485.9 |
| 24 | 1C | 219.73 | 256.50 | 239.43 | 28.96 | 5917.8 |
| 24 | 4D | 227.57 | 257.60 | 241.78 | 31.45 | 5361.5 |
| 24 | 5B | 224.58 | 257.54 | 240.97 | 22.56 | 3487.5 |
| | AVE | 225.47 | 257.51 | 240.77 | 25.92 | 4563.2 |
| 39 | 2A | 363.63 | 279.10 | 250.66 | 20.27 | 3339.2 |
| 39 | 4A | 357.34 | 279.62 | 250.77 | 19.63 | 3324.6 |
| 39 | 4C | 363.81 | 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 | 22.97 | 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 | 28.14 | 5226.5 |
| 48 | 5B | 448.74 | 297.24 | 266.04 | 22.72 | 3250.2 |
| | AVE | 442.50 | 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 | 3696.5 |
| 60 | 4C | 515.89 | 317.10 | 284.48 | 36.86 | 6529.3 |
| 60 | 4E | 525.77 | 314.65 | 284.52 | 25.81 | 3156.7 |
| | AVE | 524.54 | 316.50 | 284.55 | 27.97 | 3477.8 |

41401B-6

KU 419013

MASS FLOW = .0313 LB/SEC

INLET VAPOR TEMP = 251.6 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 / 1000.33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|------------------------------|-----------------------|--------------|--------------|
| 57 (67.7) | 2A | 553.37 | 335.74 | 296.29 | 27.56 | 3193.4 |
| 67 (67.9) | 4A | 554.25 | 342.10 | 299.55 | 18.73 | 2918.6 |
| 67 (67.1) | 4C | 553.14 | 338.00 | 297.72 | 31.19 | 5742.2 |
| 67 (67.3) | 4E | 558.18 | 337.19 | 295.98 | 17.90 | 3111.8 |
| | AVE | 554.73 | 338.25 | 297.25 | 22.56 | 3754.3 |
| 70 (70.7) | 1B | 570.15 | 342.23 | 300.90 | 23.04 | 3256.2 |
| 70 (70.6) | 1C | 551.14 | 332.43 | 295.15 | 37.84 | 5550.7 |
| 70 (70.7) | 2D | 552.98 | 343.49 | 305.29 | 29.16 | 4227.2 |
| 70 (70.2) | 3C | 566.45 | 343.51 | 301.98 | 37.74 | 6127.3 |
| 70 (70.5) | 4D | 559.51 | 344.71 | 305.37 | 28.24 | 4694.6 |
| 70 (71.1) | 5B | 541.85 | 349.20 | 303.68 | 31.74 | 3218.7 |
| | AVE | 556.86 | 339.12 | 302.23 | 29.19 | 4629.2 |
| 71 (72.1) | 1D | 547.83 | 337.50 | 302.66 | 27.96 | 3812.9 |
| 71 (71.6) | 2D | 552.88 | 344.74 | 306.58 | 23.18 | 5085.1 |
| 71 (71.1) | 3C | 566.45 | 345.50 | 303.59 | 37.20 | 5861.4 |
| 71 (72.1) | 3E | 556.67 | 334.55 | 298.52 | 37.79 | 5933.8 |
| 71 (71.3) | 4B | 549.55 | 332.27 | 309.37 | 23.71 | 4736.5 |
| 71 (71.7) | 5D | 554.98 | 335.00 | 303.10 | 24.30 | 3530.9 |
| | AVE | 554.46 | 341.80 | 303.45 | 26.73 | 4825.7 |
| 72 (72.7) | 1B | 570.15 | 343.50 | 313.74 | 27.77 | 4480.9 |
| 72 (72.7) | 1C | 551.14 | 338.50 | 298.72 | 28.27 | 7459.1 |
| 72 (73.2) | 2E | 562.81 | 335.52 | 304.78 | 28.56 | 4478.3 |
| 72 (73.2) | 3A | 536.54 | 345.80 | 301.51 | 24.20 | 7317.3 |
| 72 (73.7) | 3B | 541.85 | 344.81 | 306.22 | 47.76 | 4753.7 |
| 72 (72.4) | 5C | 581.46 | 337.79 | 311.16 | 37.20 | 6549.2 |
| | AVE | 557.33 | 337.27 | 302.50 | 27.24 | 5831.3 |
| 74 (75.2) | 1D | 547.83 | 337.50 | 307.70 | 26.71 | 3559.2 |
| 74 (75.3) | 2B | 572.86 | 346.79 | 313.03 | 32.74 | 4968.6 |
| 74 (75.5) | 2C | 555.86 | 342.22 | 309.58 | 38.72 | 6455.0 |
| 74 (74.7) | 2D | 552.88 | 342.76 | 312.04 | 34.63 | 5586.2 |
| 74 (75.3) | 2E | 562.81 | 334.52 | 308.20 | 31.15 | 2972.3 |
| 74 (75.4) | 3A | 536.54 | 347.50 | 304.45 | 25.42 | 5246.3 |

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| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| 74 (75.2) | 3B | 545.34 | 344.19 | 311.47 | 37.84 | 6245.4 |
| 74 (74.2) | 3C | 566.45 | 344.70 | 309.95 | 35.47 | 6606.5 |
| 74 (75.2) | 3D | 545.72 | 339.22 | 310.91 | 43.30 | 6295.3 |
| 74 (75.2) | 3E | 556.67 | 336.14 | 303.38 | 32.18 | 5316.2 |
| 74 (74.4) | 4B | 549.55 | 344.21 | 314.49 | 37.67 | 4981.6 |
| 74 (74.6) | 5C | 581.46 | 343.22 | 313.02 | 29.15 | 5344.1 |
| 74 (74.8) | 5D | 554.98 | 342.20 | 306.20 | 24.25 | 3728.6 |
| | AVE | 555.95 | 342.36 | 309.68 | 32.54 | 5046.9 |
| 75 (75.4) | 1D | 547.03 | 334.03 | 319.08 | 32.07 | 3073.9 |
| 75 (75.3) | 2C | 555.16 | 344.61 | 311.74 | 37.30 | 6442.8 |
| 75 (75.8) | 2D | 552.08 | 341.77 | 319.01 | 39.54 | 4984.0 |
| 75 (75.4) | 3C | 566.45 | 342.38 | 311.99 | 41.74 | 6383.5 |
| 75 (76.3) | 3E | 556.67 | 337.29 | 302.10 | 33.25 | 5279.5 |
| 75 (75.6) | 4B | 549.55 | 346.86 | 316.22 | 34.54 | 4844.4 |
| 75 (75.1) | 5D | 554.98 | 340.02 | 310.82 | 23.64 | 2905.9 |
| | AVE | 554.66 | 341.83 | 312.39 | 34.53 | 4853.4 |
| 76 (76.9) | 2A | 553.37 | 344.00 | 311.00 | 23.74 | 3003.0 |
| 76 (77.1) | 2B | 572.86 | 349.21 | 316.50 | 32.77 | 4942.4 |
| 76 (77.2) | 2E | 562.81 | 333.38 | 311.70 | 37.56 | 3018.5 |
| 76 (77.2) | 3A | 536.54 | 346.00 | 307.87 | 27.40 | 5163.2 |
| 76 (77.0) | 3B | 545.34 | 346.17 | 314.40 | 35.45 | 6235.4 |
| 76 (76.2) | 3C | 566.45 | 346.54 | 313.32 | 37.21 | 6399.4 |
| 76 (77.1) | 3D | 545.72 | 343.20 | 314.01 | 41.33 | 6286.2 |
| 76 (77.0) | 4A | 554.25 | 352.29 | 319.57 | 27.36 | 2965.3 |
| 76 (76.3) | 4C | 553.14 | 345.36 | 313.03 | 34.50 | 6174.7 |
| 76 (76.5) | 4E | 556.16 | 346.79 | 312.33 | 22.43 | 3031.1 |
| 76 (76.5) | 5C | 581.46 | 343.20 | 306.71 | 31.52 | 5123.6 |
| | AVE | 557.28 | 345.27 | 312.26 | 31.87 | 4756.4 |
| 77 (79.5) | 1D | 547.03 | 336.03 | 313.63 | 31.31 | 3080.9 |
| 77 (79.0) | 2C | 555.16 | 356.29 | 314.28 | 34.76 | 6378.6 |
| 77 (77.8) | 2D | 552.08 | 346.00 | 317.52 | 35.35 | 4902.2 |
| 77 (77.3) | 3C | 566.45 | 352.22 | 315.14 | 33.24 | 6371.0 |
| 77 (79.2) | 3E | 556.67 | 336.01 | 308.26 | 38.92 | 5244.2 |
| 77 (77.2) | 4D | 544.55 | 353.22 | 320.26 | 39.19 | 4651.8 |
| 77 (79.1) | 5D | 554.98 | 341.22 | 314.64 | 31.27 | 2946.3 |
| | AVE | 554.66 | 345.01 | 314.21 | 33.64 | 4846.3 |
| 78 (79.6) | 2A | 553.37 | 354.22 | 314.20 | 17.52 | 2988.3 |
| 78 (79.2) | 2B | 572.86 | 356.20 | 320.28 | 27.84 | 4842.4 |
| 78 (79.6) | 2D | 552.08 | 346.02 | 318.47 | 35.23 | 4922.6 |

| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| 7A (79.2) | 2E | 562.51 | 337.94 | 315.20 | 36.56 | 3026.6 |
| 7A (79.3) | 3A | 536.54 | 352.30 | 311.38 | 25.89 | 5124.4 |
| 7A (79.3) | 3B | 545.34 | 357.84 | 318.72 | 37.74 | 6156.2 |
| 7A (79.5) | 3C | 566.45 | 356.96 | 317.12 | 31.36 | 6343.3 |
| 7A (79.2) | 3D | 545.72 | 356.50 | 317.48 | 37.11 | 6231.1 |
| 7B (79.0) | 4A | 554.25 | 356.70 | 326.20 | 27.36 | 2976.5 |
| 7A (79.3) | 4C | 553.14 | 352.35 | 316.61 | 34.54 | 6135.6 |
| 7A (79.5) | 4E | 556.18 | 344.00 | 314.70 | 23.27 | 3553.4 |
| 7B (79.6) | 5C | 581.46 | 342.07 | 316.34 | 35.76 | 5551.4 |
| | AVE | 556.85 | 351.20 | 316.18 | 37.14 | 4744.3 |
| 84 | 1B | 502.98 | 347.79 | 323.12 | 27.94 | 3217.3 |
| 84 | 1C | 519.75 | 342.91 | 317.37 | 41.95 | 5682.1 |
| 84 | 2B | 504.24 | 357.99 | 328.22 | 32.13 | 4233.0 |
| 84 | 3A | 508.05 | 355.92 | 317.94 | 24.74 | 5085.3 |
| 84 | 3B | 529.65 | 358.93 | 326.82 | 36.36 | 5085.8 |
| 84 | 3D | 506.05 | 356.19 | 325.67 | 42.14 | 5381.8 |
| 84 | 4D | 515.91 | 352.43 | 327.88 | 37.97 | 4741.7 |
| 84 | 5B | 512.27 | 345.67 | 326.77 | 34.51 | 3196.6 |
| | AVE | 512.36 | 351.23 | 324.47 | 35.96 | 4577.9 |
| 90 | 1D | 481.11 | 357.84 | 331.76 | 25.87 | 3350.5 |
| 90 | 2B | 475.39 | 377.70 | 337.97 | 27.16 | 4467.9 |
| 90 | 2C | 485.56 | 376.22 | 334.63 | 27.44 | 5782.1 |
| 90 | 3A | 464.63 | 372.98 | 328.99 | 27.57 | 4483.5 |
| 90 | 3B | 494.69 | 376.70 | 336.92 | 23.24 | 5531.2 |
| 90 | 3D | 476.76 | 366.36 | 335.46 | 33.27 | 5744.3 |
| 90 | 4B | 516.41 | 372.63 | 339.42 | 28.87 | 4590.7 |
| 90 | 5D | 476.67 | 366.66 | 333.45 | 24.75 | 3037.0 |
| | AVE | 482.39 | 369.90 | 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 | 23.73 | 4942.2 |
| 96 | 3B | 416.39 | 365.91 | 345.49 | 21.71 | 5753.2 |
| 96 | 3D | 411.87 | 366.89 | 343.97 | 33.39 | 5915.5 |
| 96 | 4D | 419.13 | 376.00 | 345.55 | 32.40 | 4742.3 |
| 96 | 5B | 425.89 | 366.52 | 343.70 | 25.41 | 2926.6 |
| | AVE | 411.49 | 374.92 | 343.82 | 26.12 | 4612.2 |

41401B-9

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 412010

MASS FLOW = 0.0141 KG/SEC

INLET VAPOR TEMP = 111.1 DEG C

TOTAL POWER = 2.46 KW

| Z (M) | ROD LOCATION | HEAT FLUX (WATT/SQCM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | REYNOLDS NO. |
|-------|--------------|-----------------------|---------------------------|--------------------|---------------|--------------|
| .30 | 2A | 401.08 | 121.72 | 114.05 | 17.32 | 3422.0 |
| .30 | 4A | 405.27 | 121.40 | 114.06 | 17.90 | 3423.4 |
| .30 | 4C | 434.00 | 121.11 | 114.13 | 27.90 | 7116.1 |
| .30 | 4E | 425.28 | 121.04 | 114.06 | 17.50 | 3425.2 |
| | AVE | 444.05 | 121.32 | 114.08 | 20.17 | 4346.7 |
| .51 | 1B | 708.84 | 128.33 | 117.02 | 17.82 | 3447.6 |
| .51 | 1C | 728.20 | 125.15 | 115.22 | 28.91 | 5862.9 |
| .51 | 4U | 736.50 | 127.23 | 117.57 | 29.23 | 5307.4 |
| | AVE | 724.53 | 127.24 | 116.94 | 25.32 | 4672.6 |
| .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 | 122.67 | 30.68 | 6437.9 |
| .99 | 4E | 1173.48 | 141.44 | 122.58 | 17.20 | 3291.1 |
| | AVE | 1168.11 | 141.34 | 122.60 | 20.10 | 4174.8 |
| 1.22 | 1B | 1319.57 | 152.52 | 130.76 | 16.37 | 3255.3 |
| 1.22 | 1C | 1386.04 | 147.82 | 128.70 | 24.61 | 5639.7 |
| 1.22 | 4U | 1408.01 | 154.22 | 132.39 | 24.16 | 5142.1 |
| 1.22 | 5B | 1402.04 | 154.44 | 131.11 | 15.82 | 3193.3 |
| | AVE | 1391.04 | 152.87 | 130.74 | 20.24 | 4307.6 |
| 1.52 | 2A | 1716.12 | 154.50 | 141.62 | 19.61 | 3103.3 |
| 1.52 | 4A | 1659.39 | 165.72 | 142.19 | 18.74 | 3063.7 |
| 1.52 | 4E | 1678.97 | 163.89 | 141.55 | 19.67 | 3121.2 |
| | AVE | 1664.83 | 164.70 | 141.79 | 19.22 | 3096.0 |

412010-2

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**0.33 | 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 | 3415.5 |
| 1.78(1.79) | 2D | 1790.71 | 175.50 | 153.41 | 27.67 | 4844.9 |
| 1.78(1.80) | 3C | 1906.87 | 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 | 3134.6 |
| | 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 | 1902.61 | 171.75 | 151.93 | 33.21 | 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 |

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| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| 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 | 1747.63 | 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 | 1740.46 | 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 | 163.79 | 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 | 4940.0 |
| 1.98(2.00) | 2A | 1860.48 | 177.94 | 158.55 | 23.06 | 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 | 32.33 | 6132.8 |
| 1.98(2.00) | 3C | 1806.87 | 182.15 | 160.82 | 32.71 | 6425.3 |
| 1.98(2.00) | 3D | 1740.46 | 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 | 160.32 | 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 | 3189.2 |
| 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 | 1563.82 | 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) | RUD LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / DD** .33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|---------------------------------|-----------------------|---------------|--------------|
| 12 | 2A | 146.14 | 251.10 | 237.29 | 17.32 | 3422.0 |
| 12 | 4A | 144.30 | 250.52 | 237.32 | 17.90 | 3423.4 |
| 12 | 4C | 137.74 | 250.00 | 237.43 | 27.90 | 7116.1 |
| 12 | 4E | 134.80 | 249.88 | 237.31 | 17.50 | 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 | 29.91 | 5802.9 |
| 24 | 4D | 233.40 | 261.02 | 243.63 | 29.23 | 5307.4 |
| | AVE | 229.65 | 261.03 | 242.49 | 25.30 | 4872.6 |
| 39 | 2A | 354.43 | 288.67 | 252.58 | 15.44 | 3289.1 |
| 39 | 4A | 367.10 | 285.60 | 252.66 | 17.03 | 3281.0 |
| 39 | 4C | 387.43 | 283.81 | 252.85 | 30.60 | 6637.9 |
| 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 | 439.34 | 301.68 | 263.67 | 24.64 | 5639.7 |
| 48 | 4D | 462.12 | 309.60 | 270.33 | 24.10 | 5142.1 |
| 48 | 5B | 444.55 | 310.88 | 267.99 | 15.82 | 3193.3 |
| | AVE | 441.06 | 307.17 | 267.33 | 20.24 | 4307.6 |
| 60 | 2A | 543.94 | 328.10 | 286.91 | 19.61 | 3103.3 |
| 60 | 4A | 525.95 | 330.30 | 287.93 | 18.34 | 3063.7 |
| 60 | 4E | 532.16 | 327.01 | 286.87 | 19.67 | 3121.2 |
| | AVE | 534.62 | 328.47 | 287.21 | 19.20 | 3096.0 |

41201C-6

RUN 41201C

MASS FLOW = .0310 LHM/SEC

INLET VAPOR TEMP = 232.0 DEG F

TOTAL POWER = 2.34 BTU/SEC

| Z (IN) | ROD LOCATION | HEAT FLUX (RTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU /PR**0.33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|---------------------------------|-----------------------|--------------|--------------|
| 67 (67.5) | 2A | 589.69 | 341.37 | 297.34 | 19.53 | 1168.0 |
| 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 | 309.06 | 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 | 3519.0 |
| 72 (71.9) | 5C | 578.59 | 347.87 | 301.63 | 24.98 | 5569.3 |
| | AVE | 587.82 | 349.53 | 301.96 | 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 | 597.20 | 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 |

41201C-7

41201C-B

| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| 74 (74.9) | 5D | 571.35 | 336.87 | 311.04 | 32.04 | 3076.1 |
| | AVE | 568.74 | 339.24 | 311.77 | 41.21 | 5156.4 |
| 75 (76.9) | 1D | 554.13 | 338.00 | 313.88 | 33.28 | 3244.6 |
| 75 (76.4) | 2C | 540.98 | 348.52 | 314.46 | 35.33 | 6390.2 |
| 75 (75.3) | 2D | 567.58 | 338.00 | 315.36 | 48.57 | 4975.7 |
| 75 (76.1) | 3C | 572.70 | 344.55 | 316.82 | 45.98 | 8566.0 |
| 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 | 4360.7 |
| 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 | 235.11 | 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 (76.3) | 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 | 20.26 | 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 | 3075.2 |
| 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 | 379.80 | 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 | 535.92 | 355.60 | 336.28 | 38.83 | 3964.4 |
| | AVE | 496.08 | 370.26 | 335.82 | 27.76 | 4727.3 |
| 96 | 1B | 423.93 | 366.43 | 345.25 | 27.50 | 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 |

41201C-9

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 = 2.42 KW

| Z (M) | POD LOCATION | HEAT FLUX (WATT/SQM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | WIF /0000.33 | REYNOLDS NO. |
|----------|-----------------|-------------------------|------------------------------|-----------------------|--------------|--------------|
| .30 | 2A | 443.07 | 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 | 27.60 | 4756.0 |
| .61 | 1C | 737.42 | 124.86 | 115.27 | 39.41 | 5985.7 |
| .61 | 4E | 728.80 | 127.73 | 116.02 | 17.74 | 3518.2 |
| .61 | 5B | 689.83 | 126.50 | 116.03 | 19.80 | 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 | 1109.43 | 138.18 | 121.49 | 19.54 | 3362.3 |
| .99 | 4C | 1155.11 | 137.93 | 121.59 | 30.63 | 6489.3 |
| | 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 | 1391.00 | 146.84 | 129.59 | 21.90 | 3349.4 |
| | AVE | 1376.59 | 146.88 | 129.62 | 24.30 | 4560.2 |
| 1.52 | 2A | 1703.92 | 159.64 | 140.43 | 23.28 | 3185.3 |
| 1.52 | 4A | 1549.77 | 154.00 | 140.76 | 23.13 | 3155.7 |
| 1.52 | 4C | 1574.70 | 157.89 | 140.29 | 37.21 | 6667.2 |
| | AVE | 1632.81 | 158.84 | 140.49 | 27.91 | 4316.1 |

434010-D-2

RUN 43401D

MASS FLOW = .0143 KG/SEC

INLET VAPOR TEMP = 110.0 DEG C

TOTAL POWER = 2.43 KW

| Z (M) | KUD LOCATIONS | HEAT FLUX (WATT/SQCM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | REYNOLDS NO. |
|------------|---------------|-----------------------|---------------------------|--------------------|---------------|--------------|
| 1.70(1.72) | 2A | 1760.43 | 165.12 | 147.83 | 26.36 | 3206.0 |
| 1.70(1.72) | 4A | 1809.12 | 171.33 | 147.82 | 19.70 | 3156.1 |
| 1.70(1.72) | 4C | 1851.56 | 170.01 | 147.74 | 37.24 | 6392.1 |
| | AVE | 1807.04 | 168.82 | 147.80 | 26.40 | 4221.4 |
| 1.78(1.80) | 1C | 1758.22 | 169.41 | 147.70 | 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 | 1846.28 | 175.49 | 154.25 | 29.53 | 5826.7 |
| 1.83(1.84) | 3C | 1803.63 | 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 | 5524.5 |
| | AVE | 1851.61 | 172.29 | 152.61 | 32.83 | 5899.0 |
| 1.88(1.88) | 1B | 1862.81 | 166.31 | 157.14 | 36.31 | 3622.7 |
| 1.88(1.84) | 1D | 1789.92 | 175.89 | 153.89 | 26.83 | 3624.4 |
| 1.88(1.84) | 2B | 1963.21 | 173.29 | 156.49 | 38.59 | 5763.5 |
| 1.88(1.85) | 2C | 1771.51 | 172.11 | 156.25 | 44.01 | 6516.4 |
| 1.88(1.84) | 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 | 32.14 | 5497.5 |
| 1.88(1.84) | 3B | 1869.82 | 172.44 | 154.90 | 41.87 | 7267.8 |
| 1.88(1.90) | 4B | 1716.47 | 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 | 37.70 | 3830.8 |
| | AVE | 1812.07 | 171.03 | 154.19 | 34.91 | 5241.1 |
| 1.91(1.92) | 1D | 1764.42 | 172.36 | 154.59 | 25.59 | 3408.6 |
| 1.91(1.93) | 3C | 1731.42 | 165.10 | 152.11 | 47.36 | 5341.3 |
| 1.91(1.93) | 4A | 1716.47 | 174.89 | 157.01 | 34.33 | 5495.1 |

43401D-3

43401D-4

| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| 1.91(1.91) | 4U | 1848.54 | 172.44 | 156.55 | 39.66 | 5932.5 |
| 1.91(1.93) | 5U | 1730.61 | 168.22 | 154.72 | 32.76 | 3151.2 |
| | AVE | 1763.49 | 170.50 | 155.14 | 35.94 | 4595.7 |
| 1.93(1.93) | 1B | 1862.81 | 166.92 | 154.67 | 38.93 | 3133.7 |
| 1.93(1.95) | 2A | 1700.43 | 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 | 3271.4 |
| 1.93(1.95) | 3C | 1863.63 | 172.44 | 156.56 | 46.21 | 6633.0 |
| 1.93(1.94) | 3U | 1842.76 | 174.25 | 156.31 | 39.70 | 6185.2 |
| 1.93(1.95) | 4A | 1809.12 | 173.66 | 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) | 4U | 1848.54 | 172.84 | 157.41 | 40.83 | 5148.8 |
| | AVE | 1842.63 | 171.88 | 156.11 | 38.84 | 4919.4 |
| 1.96(1.96) | 1D | 1789.92 | 173.00 | 155.90 | 24.66 | 3161.5 |
| 1.96(2.02) | 2C | 1771.51 | 175.41 | 158.86 | 41.85 | 6353.6 |
| 1.96(1.97) | 3C | 1863.63 | 172.45 | 157.43 | 47.20 | 6549.7 |
| 1.96(1.97) | 3E | 1731.42 | 167.08 | 153.51 | 45.14 | 5260.7 |
| 1.96(1.97) | 4B | 1716.47 | 178.00 | 159.46 | 31.22 | 4974.8 |
| 1.96(1.96) | 5U | 1730.61 | 170.59 | 155.93 | 29.94 | 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 | 1700.43 | 174.08 | 158.10 | 27.74 | 3090.0 |
| 1.98(2.00) | 3A | 1841.65 | 175.84 | 155.49 | 31.55 | 3795.3 |
| 1.98(1.99) | 3B | 1860.82 | 176.21 | 156.59 | 41.25 | 6327.8 |
| 1.98(2.00) | 3C | 1863.63 | 174.26 | 158.48 | 46.26 | 6582.6 |
| 1.98(1.99) | 3U | 1842.76 | 173.65 | 157.98 | 44.12 | 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 | 6364.8 |
| 1.98(1.98) | 4U | 1848.54 | 172.45 | 159.41 | 48.17 | 5055.0 |
| 1.98(1.98) | 5C | 1804.31 | 172.46 | 154.55 | 35.35 | 5242.4 |
| | AVE | 1834.50 | 174.17 | 157.58 | 37.86 | 5633.4 |
| 2.13 | 1B | 1667.28 | 170.80 | 162.79 | 52.36 | 3244.7 |
| 2.13 | 2B | 1697.80 | 173.38 | 165.32 | 70.91 | 4324.6 |
| 2.13 | 2E | 1643.62 | 174.56 | 163.21 | 34.24 | 3647.0 |
| 2.13 | 3A | 1698.46 | 175.60 | 160.79 | 30.64 | 3168.8 |
| 2.13 | 3B | 1641.84 | 175.50 | 163.98 | 54.83 | 5264.6 |
| 2.13 | 3U | 1660.20 | 175.50 | 163.25 | 50.74 | 5466.3 |
| 2.13 | 4E | 1666.84 | 174.88 | 162.26 | 33.28 | 3333.6 |
| 2.13 | 5B | 1710.66 | 171.11 | 162.90 | 52.42 | 3332.8 |

| | | | | | | |
|------|-----|---------|--------|--------|-------|--------|
| 2.13 | 5C | 1646.54 | 172.43 | 157.12 | 46.52 | 5711.3 |
| | AVE | 1663.64 | 173.75 | 152.72 | 48.53 | 4310.4 |
| 2.29 | 1B | 1665.10 | 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 | 157.96 | 47.86 | 2989.8 |
| 2.29 | 3A | 1549.90 | 182.22 | 166.05 | 33.71 | 5008.8 |
| 2.29 | 3B | 1570.46 | 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 | 173.78 | 154.93 | 39.67 | 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 | 37.16 | 4471.0 |
| 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 |

43401D-5

RUN 434010

MASS FLOW = 0.0316 LBM/SEC

INLET VAPOR TEMP = 230.0 DEG F

TOTAL POWER = 2.33 BTU/SEC

| Z (IN) | RJG LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU PRANDTL | REYNOLDS NO. |
|-----------|-----------------|----------------------------|---------------------------------|-----------------------|---------------|-----------------|
| 12 | 2A | 140.54 | 244.00 | 235.65 | 17.28 | 3444.0 |
| 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 | 27.60 | 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 | 18.76 | 7170.3 |
| 39 | 4A | 370.60 | 280.72 | 250.68 | 19.54 | 3362.3 |
| 39 | 4C | 366.12 | 280.28 | 250.86 | 30.63 | 6489.3 |
| | AVE | 370.14 | 281.08 | 250.77 | 22.99 | 4574.0 |
| 48 | 1C | 431.74 | 296.46 | 261.75 | 26.63 | 5770.9 |
| 48 | 4E | 440.40 | 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 | 23.36 | 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 | 284.89 | 27.91 | 4316.1 |

434010-D-6

RUN 434010

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**0.33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|---------------------------------|-----------------------|---------------|--------------|
| 57 (67.8) | 2A | 557.48 | 329.21 | 298.10 | 26.38 | 3206.6 |
| 57 (67.8) | 4A | 573.41 | 340.40 | 298.77 | 19.70 | 3106.1 |
| 57 (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 (70.6) | 1C | 557.28 | 336.93 | 296.97 | 28.17 | 5871.1 |
| 70 (70.6) | 3C | 590.69 | 343.35 | 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) | 2B | 583.29 | 347.89 | 309.66 | 29.53 | 5826.7 |
| 72 (72.6) | 3C | 590.69 | 343.90 | 305.97 | 34.92 | 7490.9 |
| 72 (72.4) | 3D | 584.08 | 347.42 | 305.52 | 31.24 | 7044.2 |
| 72 (72.6) | 4D | 585.41 | 343.50 | 308.70 | 32.72 | 5529.5 |
| | AVE | 586.88 | 342.13 | 305.70 | 32.83 | 5898.6 |
| 74 (74.1) | 1B | 590.43 | 331.35 | 307.65 | 35.31 | 3622.7 |
| 74 (74.5) | 1D | 567.33 | 339.44 | 308.83 | 25.83 | 3024.4 |
| 74 (74.4) | 2B | 603.24 | 343.93 | 313.68 | 39.59 | 5763.5 |
| 74 (76.6) | 2C | 561.49 | 341.79 | 313.24 | 44.01 | 6516.4 |
| 74 (74.4) | 2U | 583.29 | 345.18 | 312.38 | 36.42 | 5965.9 |
| 74 (74.0) | 2E | 573.99 | 338.00 | 307.59 | 27.37 | 3910.0 |
| 74 (75.0) | 3A | 583.72 | 341.36 | 305.09 | 32.19 | 5497.5 |
| 74 (74.0) | 3B | 589.81 | 342.39 | 310.82 | 41.97 | 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 | 37.70 | 3830.8 |
| | AVE | 574.35 | 339.85 | 309.54 | 34.71 | 5241.1 |
| 75 (75.4) | 1D | 567.33 | 342.24 | 317.26 | 25.59 | 3408.6 |
| 75 (76.1) | 3E | 548.74 | 329.19 | 305.80 | 47.30 | 5391.3 |
| 75 (75.4) | 4B | 544.20 | 340.80 | 316.24 | 34.73 | 5045.1 |

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43401D-8

| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| 75 (75.1) | 4D | 585.91 | 342.40 | 313.79 | 39.68 | 5932.5 |
| 75 (75.8) | 5U | 598.53 | 354.79 | 310.50 | 32.76 | 3151.2 |
| | AVE | 592.25 | 339.00 | 311.32 | 35.94 | 4595.7 |
| 76 (75.9) | 1B | 590.43 | 332.46 | 310.41 | 38.93 | 5133.7 |
| 75 (76.7) | 2A | 557.98 | 336.90 | 312.50 | 33.07 | 3074.1 |
| 75 (76.3) | 2H | 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 | 590.64 | 342.39 | 313.81 | 46.21 | 6633.0 |
| 76 (76.4) | 3U | 584.00 | 345.04 | 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) | 4U | 585.91 | 343.10 | 315.35 | 40.83 | 5148.0 |
| | 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 | 561.44 | 347.73 | 317.96 | 41.85 | 6353.6 |
| 77 (77.7) | 3C | 590.64 | 343.30 | 315.38 | 47.20 | 6599.7 |
| 77 (77.6) | 3E | 548.74 | 352.74 | 308.32 | 45.14 | 5260.7 |
| 77 (77.6) | 4B | 544.27 | 352.41 | 312.93 | 31.70 | 4974.8 |
| 77 (77.0) | 5D | 548.53 | 339.06 | 312.67 | 29.94 | 3042.4 |
| | AVE | 560.17 | 343.11 | 314.36 | 37.01 | 4888.0 |
| 78 (77.9) | 1B | 590.43 | 335.77 | 313.98 | 39.10 | 3050.8 |
| 78 (78.4) | 2A | 557.98 | 345.34 | 316.58 | 27.74 | 3090.0 |
| 78 (78.9) | 3A | 583.72 | 346.50 | 311.89 | 31.55 | 5095.3 |
| 78 (78.5) | 3B | 589.80 | 349.18 | 317.46 | 41.25 | 6327.8 |
| 78 (78.8) | 3C | 590.64 | 345.67 | 317.27 | 46.20 | 6502.6 |
| 78 (78.5) | 3U | 584.00 | 344.50 | 316.36 | 46.12 | 6458.0 |
| 78 (78.6) | 4A | 573.41 | 350.08 | 315.86 | 23.95 | 3001.3 |
| 78 (78.9) | 4C | 586.87 | 351.19 | 317.92 | 39.76 | 6384.8 |
| 78 (78.0) | 4U | 585.91 | 342.41 | 318.93 | 48.17 | 5055.0 |
| 78 (78.1) | 5C | 571.84 | 342.42 | 310.19 | 35.33 | 5292.4 |
| | AVE | 581.48 | 345.51 | 315.64 | 37.80 | 5033.9 |
| 84 | 1B | 528.40 | 339.44 | 325.02 | 52.38 | 5244.7 |
| 84 | 2B | 538.15 | 344.08 | 329.57 | 70.01 | 4324.6 |
| 84 | 2E | 526.46 | 346.22 | 325.74 | 36.24 | 3047.0 |
| 84 | 3A | 538.34 | 348.09 | 321.43 | 39.64 | 5108.8 |
| 84 | 3A | 526.24 | 347.90 | 326.98 | 54.83 | 5264.6 |
| 84 | 3U | 507.21 | 347.90 | 325.85 | 57.74 | 5486.3 |
| 84 | 4E | 528.33 | 346.79 | 324.07 | 33.08 | 3333.0 |
| 84 | 5B | 542.12 | 343.50 | 325.27 | 52.42 | 3332.8 |

| | | | | | | |
|----|-----|--------|--------|--------|-------|--------|
| 84 | 5C | 521.88 | 342.38 | 329.21 | 46.52 | 5711.3 |
| | AVE | 527.30 | 344.75 | 324.90 | 48.53 | 4310.4 |
| 90 | 1B | 527.78 | 363.02 | 333.54 | 27.80 | 3050.1 |
| 90 | 2B | 507.61 | 363.25 | 339.66 | 40.24 | 4576.8 |
| 90 | 2C | 501.88 | 368.89 | 335.65 | 32.54 | 5851.4 |
| 90 | 2E | 491.90 | 351.25 | 334.32 | 47.98 | 2989.8 |
| 90 | 3A | 507.10 | 359.49 | 330.89 | 33.70 | 5008.8 |
| 90 | 3B | 447.93 | 355.88 | 337.41 | 38.54 | 5662.4 |
| 90 | 3E | 500.99 | 359.12 | 328.61 | 31.83 | 5222.0 |
| 90 | 4B | 445.30 | 371.56 | 338.84 | 28.14 | 4678.7 |
| 90 | 5C | 500.40 | 353.80 | 328.87 | 39.77 | 5346.7 |
| | 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 | 446.11 | 362.21 | 342.67 | 11.60 | 2939.4 |
| 96 | 3A | 459.03 | 362.44 | 339.76 | 37.10 | 4971.0 |
| 96 | 3B | 450.60 | 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 | 456.40 | 363.86 | 341.28 | 26.82 | 3067.8 |
| 96 | 5C | 457.11 | 364.30 | 337.39 | 32.56 | 5194.7 |
| | AVE | 440.13 | 367.06 | 342.78 | 32.57 | 4465.7 |

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.

KUN 40501E

MASS FLOW = .0118 KG/SEC

INLET VAPOR TEMP = 110.7 DEG C

TOTAL POWER = 1.76 KW

| Z (M) | ROD LOCATION | HEAT FLUX (WATT/CM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | REYNOLDS NO. |
|----------|-----------------|------------------------|------------------------------|-----------------------|---------------|--------------|
| .70 | 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 | 30.76 | 5642.2 |
| .61 | 5B | 540.62 | 125.90 | 115.97 | 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 | 14.05 | 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 | 3525.1 |
| 1.22 | 1C | 1093.51 | 146.55 | 126.98 | 27.99 | 4759.0 |
| 1.22 | 3B | 1083.62 | 149.22 | 129.55 | 23.25 | 5313.3 |
| 1.22 | 5B | 1082.69 | 146.17 | 129.19 | 17.36 | 2705.8 |
| | AVE | 1086.41 | 147.31 | 128.54 | 20.54 | 4259.3 |
| 1.52 | 1B | 1437.39 | 152.58 | 139.13 | 16.12 | 2617.6 |
| 1.52 | 2A | 1385.03 | 153.28 | 139.23 | 15.15 | 2602.4 |
| 1.52 | 4C | 1419.44 | 158.36 | 139.45 | 37.84 | 5447.5 |
| | AVE | 1413.95 | 151.41 | 139.27 | 21.70 | 3555.8 |

40601E-2

RUN 40601E

MASS FLOW = .0118 KG/SEC

INLET VAPOR TEMP = 110.0 DEG C

TOTAL POWER = 1.20 KW

| Z (M) | RJD LOCATION | HEAT FLUX (WATT/SQM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU /PR**0.33 | REYNOLDS NO. |
|------------|-----------------|-------------------------|---------------------------------|-----------------------|--------------|--------------|
| 1.70(1.68) | 2A | 1407.97 | 167.07 | 145.05 | 16.58 | 2658.9 |
| 1.70(1.69) | 2B | 1374.76 | 173.00 | 147.48 | 21.16 | 4296.5 |
| 1.70(1.68) | 2C | 1399.59 | 165.71 | 144.67 | 26.80 | 5384.8 |
| 1.70(1.69) | 2E | 1405.55 | 168.81 | 145.28 | 15.45 | 2634.5 |
| 1.70(1.69) | 4A | 1402.40 | 162.10 | 145.39 | 21.90 | 2677.7 |
| 1.70(1.70) | 4B | 1398.80 | 163.38 | 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 | 1406.70 | 165.93 | 145.71 | 17.10 | 2674.8 |
| | AVE | 1403.41 | 167.58 | 146.01 | 20.70 | 3744.4 |
| 1.78(1.79) | 3C | 1399.59 | 171.23 | 148.42 | 24.46 | 6677.9 |
| 1.78(1.76) | 3C | 1375.64 | 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 | 27.79 | 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 | 171.63 | 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 | 19.94 | 3819.6 |
| 1.93(1.92) | 1D | 1394.80 | 170.02 | 150.92 | 18.71 | 3513.3 |

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| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| 1.93(1.92) | 3A | 1412.21 | 165.15 | 150.77 | 34.90 | 4655.4 |
| 1.93(1.92) | 3D | 1412.40 | 174.27 | 153.61 | 26.90 | 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 | 5744.9 |
| 1.93(1.97) | 5C | 1403.83 | 168.18 | 152.11 | 30.91 | 4570.6 |
| 1.93(1.97) | 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 | 173.26 | 151.07 | 25.09 | 5033.8 |
| 1.96(1.95) | 1D | 1394.81 | 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 | 3000.1 |
| | 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 | 171.45 | 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 | 35.90 | 2671.4 |
| 1.98(1.98) | 4B | 1398.80 | 173.60 | 158.37 | 31.14 | 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 | 29.23 | 2848.4 |
| 1.98(1.99) | 5D | 1414.44 | 167.74 | 153.16 | 24.80 | 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) | 2U | 1410.83 | 173.05 | 157.23 | 30.37 | 4835.2 |
| 2.01(2.01) | 3A | 1412.21 | 167.55 | 154.94 | 39.44 | 4188.3 |
| 2.01(2.02) | 3C | 1300.03 | 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(2.00) | 5C | 1403.83 | 165.68 | 154.92 | 46.13 | 4573.6 |
| | AVE | 1391.70 | 170.84 | 155.97 | 35.03 | 4470.5 |
| 2.03(2.02) | 2B | 1346.47 | 177.94 | 157.59 | 22.37 | 4715.4 |

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| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| 2.03(2.02) | 3D | 1412.45 | 173.12 | 157.27 | 35.73 | 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 |
| 2.13(2.05) | 5B | 1312.13 | 168.17 | 157.07 | 30.11 | 2703.7 |
| 2.03(2.10) | 5C | 1352.12 | 167.53 | 157.50 | 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 | 157.59 | 31.51 | 4711.9 |
| 2.13 | 2B | 1346.47 | 173.27 | 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 | 3U | 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 | 5d | 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 | 157.63 | 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 | 1266.35 | 181.61 | 166.42 | 32.01 | 4838.9 |
| 2.29 | 2D | 1255.50 | 183.44 | 158.09 | 27.05 | 3805.8 |
| 2.29 | 2E | 1257.82 | 174.18 | 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 | 168.73 | 27.49 | 4634.6 |
| 2.29 | 3C | 1311.84 | 184.64 | 158.52 | 30.99 | 4690.1 |
| 2.29 | 3D | 1278.25 | 195.34 | 166.77 | 26.25 | 4873.9 |
| 2.29 | 3E | 1254.02 | 179.78 | 152.69 | 25.19 | 4369.4 |
| 2.29 | 4A | 1274.20 | 174.89 | 165.70 | 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 |

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| | | | | | | |
|------|-----|---------|--------|--------|-------|--------|
| 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 | 3H | 1107.38 | 189.51 | 173.05 | 25.29 | 4844.5 |
| 2.44 | 3C | 1074.00 | 189.61 | 172.84 | 24.53 | 4471.5 |
| 2.44 | 3D | 1101.59 | 189.41 | 171.48 | 24.55 | 4967.8 |
| 2.44 | 3E | 1099.62 | 182.25 | 157.15 | 24.75 | 4213.7 |
| 2.44 | 4B | 1116.53 | 187.68 | 173.67 | 26.06 | 3893.3 |
| 2.44 | 4U | 1097.90 | 186.49 | 171.99 | 24.86 | 3969.7 |
| 2.44 | 5B | 1083.76 | 179.31 | 170.26 | 22.46 | 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 = 1.96 BTU/SEC

| Z (IN) | ROD LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | HI / PR00.33 | 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 | 30.00 | 5692.2 |
| 24 | 5B | 171.35 | 258.62 | 240.66 | 15.47 | 2893.8 |
| | AVE | 177.27 | 256.58 | 240.29 | 23.60 | 4506.7 |
| 39 | 1B | 295.86 | 283.37 | 250.26 | 14.12 | 2759.4 |
| 39 | 2A | 294.64 | 283.40 | 250.22 | 14.05 | 2761.2 |
| 39 | 4C | 298.57 | 278.20 | 250.58 | 26.65 | 5773.8 |
| 39 | 4E | 291.45 | 280.26 | 250.24 | 15.44 | 2765.9 |
| | AVE | 295.25 | 281.29 | 250.32 | 17.56 | 3515.1 |
| 48 | 1C | 346.65 | 295.79 | 260.39 | 27.99 | 4759.6 |
| 48 | 3B | 343.46 | 300.60 | 265.20 | 23.25 | 5313.3 |
| 48 | 5B | 342.97 | 295.11 | 264.54 | 17.36 | 2765.8 |
| | AVE | 344.34 | 297.17 | 263.37 | 27.54 | 4259.3 |
| 60 | 1B | 455.59 | 324.64 | 282.43 | 16.12 | 2817.6 |
| 60 | 2A | 459.00 | 325.95 | 282.61 | 15.13 | 2802.4 |
| 60 | 4C | 449.96 | 317.55 | 283.01 | 30.84 | 5447.5 |
| | AVE | 448.16 | 322.53 | 282.64 | 20.70 | 3555.8 |

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RUN 40601E

MASS FLOW = .0266 LBM/SEC

INLET VAPOR TEMP = 230.0 DEG F

TOTAL POWER = 1.36 BTU/SEC

| Z (IN) | ROD LOCATION | HEAT FLUX (BTU/HK-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU /PR=0.33 | 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 | 4246.5 |
| 67 (66.0) | 2C | 443.61 | 330.29 | 292.32 | 26.90 | 5384.6 |
| 67 (66.7) | 2E | 445.50 | 335.85 | 293.51 | 15.45 | 2639.5 |
| 67 (66.5) | 4A | 444.50 | 323.74 | 293.69 | 21.90 | 2677.7 |
| 67 (66.8) | 4B | 443.36 | 336.89 | 298.62 | 27.81 | 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 | 17.16 | 2674.6 |
| | 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 | 20.74 | 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 | 5905.6 |
| 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 | 4018.6 |
| | AVE | 450.11 | 342.39 | 300.67 | 15.85 | 4441.2 |
| 74 (74.5) | 2D | 447.17 | 344.59 | 308.34 | 23.90 | 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 | 4014.0 |
| 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 | 3432.4 |
| | AVE | 447.46 | 338.03 | 303.20 | 19.29 | 3819.6 |
| 76 (75.6) | 1D | 442.09 | 338.03 | 303.66 | 18.71 | 3513.3 |

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| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| 76 (75.6) | 3A | 447.64 | 329.27 | 303.38 | 34.96 | 4655.4 |
| 76 (75.6) | 3U | 447.69 | 345.68 | 308.51 | 26.96 | 7005.5 |
| 76 (76.0) | 4A | 444.55 | 327.01 | 306.41 | 31.54 | 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 | 5744.9 |
| 76 (77.6) | 5C | 444.95 | 334.72 | 305.79 | 30.94 | 4576.6 |
| 76 (75.8) | 5D | 448.32 | 327.00 | 304.12 | 28.74 | 3674.8 |
| | AVE | 444.74 | 335.10 | 306.95 | 29.24 | 4577.2 |
| 77 (77.3) | 1B | 453.95 | 349.00 | 306.01 | 15.20 | 3300.5 |
| 77 (77.1) | 1C | 453.31 | 338.46 | 303.89 | 25.99 | 5033.8 |
| 77 (76.8) | J | 442.09 | 338.08 | 305.48 | 19.70 | 3261.7 |
| 77 (77.3) | A | 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 | 36.74 | 4824.4 |
| 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 | 4110.7 |
| 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 | 3077.7 |
| 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 | 34.73 | 3459.5 |
| 78 (77.8) | 4A | 444.55 | 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 | 29.23 | 2848.4 |
| 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 | 310.87 | 39.49 | 4108.3 |
| 79 (79.4) | 3C | 431.23 | 347.16 | 319.40 | 34.45 | 3467.8 |
| 79 (78.6) | 3E | 445.02 | 339.13 | 305.64 | 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 | 35.73 | 5192.2 |
| 80 (79.8) | 4A | 431.40 | 331.40 | 314.28 | 36.55 | 2639.6 |
| 80 (80.4) | 4E | 432.60 | 343.09 | 311.86 | 19.95 | 2833.2 |
| 80 (80.7) | 5B | 415.88 | 334.70 | 314.73 | 39.11 | 2703.7 |
| 80 (82.8) | 5C | 428.56 | 333.55 | 314.60 | 45.16 | 4669.2 |
| | AVE | 430.49 | 339.78 | 314.37 | 31.83 | 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 | 3952.6 |
| 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 | 29.75 | 4047.0 |
| 84 | 5B | 415.88 | 334.67 | 321.16 | 44.79 | 2696.2 |
| 84 | 5C | 428.56 | 341.30 | 316.30 | 34.00 | 4658.2 |
| | AVE | 424.30 | 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 | 3B | 1.77 | 344.86 | 328.89 | 50.49 | 4231.1 |
| 90 | 3H | 412.85 | 367.35 | 334.93 | 27.49 | 4634.6 |
| 90 | 3C | 415.83 | 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 | 416.86 | 366.56 | 335.87 | 25.93 | 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 | 397.00 | 349.08 | 327.33 | 25.80 | 2578.8 |
| | AVE | 405.03 | 358.53 | 330.90 | 28.35 | 3837.2 |

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| | | | | | | |
|----|-----|--------|--------|--------|-------|--------|
| 95 | 1C | 347.38 | 360.00 | 331.76 | 23.77 | 4223.4 |
| 96 | 2D | 344.91 | 370.36 | 343.93 | 24.16 | 3878.6 |
| 96 | 2E | 338.47 | 357.76 | 336.54 | 22.28 | 2438.6 |
| 95 | 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 | 24.50 | 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 | 365.89 | 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) | RUD LOCATION | HEAT FLUX (WATT/SQM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / 1000+.33 | KEYNGLOS NO. |
|-------|--------------|----------------------|---------------------------|--------------------|---------------|--------------|
| .30 | 4C | 371.17 | 122.42 | 116.29 | 26.98 | 6024.2 |
| .30 | 4E | 348.80 | 122.33 | 116.27 | 16.51 | 2893.4 |
| | AVE | 360.01 | 122.38 | 116.28 | 21.74 | 4458.8 |
| .61 | 3C | 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 | 140.42 | 124.11 | 14.88 | 2788.8 |
| .99 | 2A | 858.13 | 142.12 | 124.09 | 13.15 | 2786.0 |
| .99 | 4C | 919.04 | 139.67 | 124.16 | 20.53 | 5825.4 |
| | AVE | 893.73 | 140.90 | 124.12 | 17.85 | 3000.1 |
| 1.22 | 1C | 1035.10 | 149.23 | 129.50 | 19.46 | 4866.8 |
| 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 | 1020.20 | 144.90 | 129.52 | 25.00 | 4631.8 |
| | AVE | 1031.46 | 147.79 | 130.46 | 21.50 | 4511.9 |
| 1.52 | 1B | 1273.13 | 163.32 | 141.19 | 15.77 | 2651.1 |
| 1.52 | 2A | 1306.53 | 165.89 | 141.28 | 13.74 | 2624.0 |
| 1.52 | 4E | 1360.03 | 154.72 | 141.33 | 26.92 | 2681.9 |
| | AVE | 1311.23 | 161.31 | 141.27 | 18.61 | 2654.0 |

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| | | | | | | |
|------------|-----|---------|--------|-------|--------|--------|
| 1.96(1.96) | 20 | 157.45 | 156.11 | 20.19 | 404.47 | 150.17 |
| 1.98(1.97) | AV | 156.67 | 156.19 | 20.37 | 410.48 | |
| 1.98(1.97) | 10 | 156.27 | 153.46 | 31.10 | 1340.6 | |
| 1.98(1.97) | 20 | 156.03 | 155.08 | 16.64 | 2908.0 | |
| 1.98(1.96) | 30 | 155.82 | 157.32 | 24.54 | 3143.6 | |
| 1.98(1.96) | 40 | 155.63 | 156.23 | 26.72 | 3903.2 | |
| 1.98(1.97) | 50 | 155.74 | 156.08 | 17.67 | 4711.9 | |
| 1.98(1.99) | 60 | 155.48 | 150.81 | 20.11 | 4684.7 | |
| 1.98(1.97) | 70 | 156.21 | 159.14 | 30.11 | 4610.0 | |
| 1.98(1.97) | 80 | 155.63 | 167.36 | 31.70 | 5412.0 | |
| 1.98(1.97) | 90 | 156.21 | 154.00 | 22.07 | 3131.0 | |
| 1.98(1.97) | 100 | 156.19 | 154.08 | 30.12 | 4662.4 | |
| 1.98(1.97) | 110 | 156.63 | 155.00 | 22.71 | 3322.2 | |
| AV | | 1301.11 | 156.22 | 27.42 | 4124.9 | |
| 2. 1(2.1) | 10 | 1309.54 | 154.05 | 18.62 | 2370.1 | |
| 2. 1(2.1) | 20 | 1320.07 | 154.27 | 31.45 | 2402.5 | |
| 2. 1(2.1) | 30 | 1343.03 | 157.43 | 24.74 | 5120.2 | |
| 2. 1(2.1) | 40 | 1347.53 | 157.54 | 30.01 | 4011.4 | |
| 2. 1(1.97) | 50 | 1371.02 | 154.07 | 32.74 | 2901.7 | |
| 2. 1(2.00) | 60 | 1354.52 | 154.31 | 24.32 | 4648.2 | |
| 2. 1(2.02) | 70 | 1304.01 | 150.23 | 26.62 | 4507.9 | |
| 2. 1(2.02) | 80 | 1392.34 | 158.44 | 32.24 | 4090.2 | |
| 2. 1(2.04) | 90 | 1355.40 | 146.32 | 26.72 | 4010.0 | |
| 2. 1(2.04) | 100 | 1373.11 | 157.01 | 31.31 | 2614.2 | |
| 2. 1(2.1) | 110 | 1302.19 | 156.0 | 27.02 | 4011.0 | |
| AV | | 1306.52 | 156.02 | 27.21 | 420.44 | |
| 2. 3(2.63) | 10 | 1309.24 | 156.02 | 16.71 | 3220.2 | |
| 2. 3(2.63) | 20 | 1314.05 | 156.16 | 31.10 | 2100.0 | |
| 2. 3(2.63) | 30 | 1345.72 | 159.20 | 21.40 | 4100.1 | |
| 2. 3(2.63) | 40 | 1340.27 | 168.30 | 22.02 | 4000.1 | |
| 2. 3(2.63) | 50 | 1345.12 | 151.42 | 31.74 | 2000.0 | |
| 2. 3(2.63) | 60 | 1322.44 | 150.20 | 21.22 | 4700.1 | |
| 2. 3(2.63) | 70 | 1306.0 | 149.21 | 16.71 | 2000.1 | |
| 2. 3(2.63) | 80 | 1322.44 | 149.21 | 21.22 | 2000.1 | |
| AV | | 1302.54 | 156.11 | 27.21 | 2000.1 | |
| 3. 4(3.11) | 10 | 1305.24 | 156.11 | 30.31 | 64.64 | |

| | | | | | | |
|------|-----|---------|--------|--------|-------|--------|
| 2.13 | AVE | 408.52 | 108.27 | 176.23 | 38.22 | 44.6.2 |
| 2.13 | 40 | 451.407 | 172.20 | 150.60 | 33.04 | 60.4.7 |
| 2.13 | 28 | 455.23 | 159.59 | 149.83 | 33.84 | 27.5.2 |
| 2.13 | 20 | 455.57 | 170.21 | 152.21 | 34.60 | 30.5.6 |
| 2.13 | 16 | 452.53 | 173.65 | 146.77 | 34.70 | 59.0.4 |
| 2.13 | 12 | 453.44 | 170.14 | 162.62 | 33.21 | 45.6.4 |
| 2.13 | 8 | 465.21 | 17.01 | 160.79 | 30.84 | 40.6.7 |
| 2.13 | 4 | 480.60 | 177.21 | 162.62 | 28.71 | 26.9.8 |
| 2.13 | 40 | 454.42 | 175.21 | 159.54 | 34.31 | 40.4.5 |
| 2.13 | 28 | 454.84 | 173.65 | 149.81 | 40.11 | 27.4.8 |
| 2.13 | 20 | 454.72 | 173.11 | 165.75 | 26.62 | 28.1.1 |
| 2.13 | 16 | 454.23 | 17.00 | 149.73 | 31.81 | 37.2.6 |
| 2.29 | 40 | 469.81 | 174.75 | 145.20 | 31.81 | 26.5.0 |
| 2.29 | 28 | 474.71 | 164.17 | 147.41 | 17.84 | 59.1.2 |
| 2.29 | 20 | 461.15 | 13.64 | 146.84 | 26.31 | 44.7.4 |
| 2.29 | 16 | 464.84 | 164.87 | 167.81 | 23.80 | 38.6.8 |
| 2.29 | 12 | 461.82 | 174.87 | 147.81 | 22.81 | 45.0.2 |
| 2.29 | 8 | 495.41 | 135.28 | 146.27 | 21.81 | 41.4.2 |
| 2.29 | 4 | 468.51 | 142.81 | 148.11 | 10.81 | 40.5.1 |
| 2.29 | 36 | 466.84 | 484.42 | 159.23 | 24.21 | 47.2.5 |
| 2.29 | 30 | 466.11 | 167.18 | 147.63 | 21.21 | 48.8.2 |
| 2.29 | 24 | 465.84 | 132.77 | 167.87 | 2.81 | 41.3.5 |
| 2.29 | 18 | 464.70 | 163.19 | 148.84 | 28.10 | 59.2.2 |
| 2.29 | 12 | 464.10 | 140.10 | 148.25 | 20.64 | 40.3.7 |
| 2.29 | 6 | 466.84 | 177.33 | 148.50 | 20.21 | 45.7.2 |
| 2.29 | 1 | 443.84 | 179.80 | 144.66 | 27.84 | 49.1.1 |
| 2.44 | AVE | 466.82 | 163.45 | 147.11 | 26.61 | 20.4.7 |
| 2.44 | 20 | 466.80 | 167.75 | 171.68 | 24.71 | 11.1.5 |
| 2.44 | 20 | 465.34 | 139.29 | 172.72 | 21.81 | 24.4.1 |
| 2.44 | 32 | 465.45 | 131.64 | 173.31 | 21.14 | 20.3.4 |
| 2.44 | 31 | 447.20 | 164.10 | 172.14 | 24.71 | 14.7.2 |
| 2.44 | 26 | 465.27 | 142.19 | 172.27 | 26.11 | 24.8.0 |
| 2.44 | 18 | 464.80 | 149.10 | 173.10 | 23.21 | 31.8.1 |
| 2.44 | 10 | 465.27 | 167.58 | 173.20 | 23.70 | 4.9.8 |
| 2.44 | 1 | 467.00 | 164.40 | 168.80 | 29.61 | 40.7.5 |
| 2.44 | AVE | 466.84 | 171.14 | 172.14 | 24.10 | 41.9.2 |

RUN 40901F

MASS FLOW = .0263 LBM/SEC

INLET VAPOR TEMP = 236.0 DEG F

TOTAL POWER = 2.30 BTU/SEC

| Z (IN) | RUB LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | HI / PR ** .33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|---------------------------------|-----------------------|----------------|--------------|
| 12 | 4C | 117.65 | 252.36 | 241.32 | 26.76 | 6024.2 |
| 12 | 4E | 110.07 | 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 | 2768.8 |
| 39 | 2A | 271.44 | 287.81 | 255.37 | 13.15 | 2786.0 |
| 39 | 4C | 291.31 | 283.40 | 255.42 | 25.53 | 5825.4 |
| | AVE | 283.27 | 285.62 | 255.42 | 17.85 | 3860.1 |
| 48 | 1C | 328.08 | 305.61 | 265.17 | 19.66 | 4800.8 |
| 48 | 2C | 324.18 | 301.23 | 269.51 | 24.03 | 5636.7 |
| 48 | 2E | 327.07 | 297.41 | 268.59 | 17.44 | 2778.4 |
| 48 | 3E | 323.38 | 292.82 | 265.14 | 25.70 | 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 | 333.61 | 286.31 | 13.79 | 2629.0 |
| 60 | 4E | 431.07 | 313.50 | 285.47 | 26.92 | 2681.9 |
| | AVE | 415.60 | 322.36 | 286.28 | 18.60 | 2654.6 |

40901F-6

| MASS LTV | W253 LHM | LOC | PLC | PLC | PLC | PLC | PLC | PLC | PLC | PLC | PLC | PLC | PLC | PLC | PLC |
|-----------|----------|--------|--------|--------|--------|-------|--------|--------|-----|-----|-----|-----|-----|-----|-----|
| 07 (65.7) | CA | 466.00 | 334.79 | 294.30 | 294.30 | 35.04 | 466.00 | 466.00 | | | | | | | |
| 07 (66.0) | CA | 424.42 | 341.42 | 302.41 | 302.41 | 20.01 | 424.42 | 424.42 | | | | | | | |
| 07 (67.4) | CA | 465.03 | 344.37 | 301.74 | 301.74 | 17.63 | 465.03 | 465.03 | | | | | | | |
| 07 (67.4) | CA | 431.75 | 302.49 | 294.30 | 294.30 | 17.41 | 431.75 | 431.75 | | | | | | | |
| 07 (67.4) | CA | 428.04 | 304.02 | 294.30 | 294.30 | 19.72 | 428.04 | 428.04 | | | | | | | |
| 71 (69.2) | CA | 434.22 | 341.42 | 302.41 | 302.41 | 20.01 | 434.22 | 434.22 | | | | | | | |
| 71 (71.1) | CA | 454.00 | 354.98 | 302.41 | 302.41 | 15.57 | 454.00 | 454.00 | | | | | | | |
| 71 (71.7) | CA | 422.14 | 347.04 | 302.41 | 302.41 | 19.63 | 422.14 | 422.14 | | | | | | | |
| 74 (73.0) | CA | 441.00 | 341.42 | 302.41 | 302.41 | 18.61 | 441.00 | 441.00 | | | | | | | |
| 74 (73.0) | CA | 428.00 | 341.42 | 302.41 | 302.41 | 25.59 | 428.00 | 428.00 | | | | | | | |
| 74 (73.0) | CA | 428.00 | 341.42 | 302.41 | 302.41 | 25.59 | 428.00 | 428.00 | | | | | | | |
| 75 (74.7) | CA | 454.00 | 341.42 | 302.41 | 302.41 | 15.57 | 454.00 | 454.00 | | | | | | | |
| 75 (74.7) | CA | 431.75 | 302.49 | 294.30 | 294.30 | 17.41 | 431.75 | 431.75 | | | | | | | |
| 75 (74.7) | CA | 428.04 | 304.02 | 294.30 | 294.30 | 19.72 | 428.04 | 428.04 | | | | | | | |
| 75 (74.7) | CA | 431.75 | 302.49 | 294.30 | 294.30 | 17.41 | 431.75 | 431.75 | | | | | | | |
| 75 (74.7) | CA | 428.04 | 304.02 | 294.30 | 294.30 | 19.72 | 428.04 | 428.04 | | | | | | | |
| 75 (74.7) | CA | 428.04 | 304.02 | 294.30 | 294.30 | 19.72 | 428.04 | 428.04 | | | | | | | |
| 77 (76.4) | CA | 454.00 | 341.42 | 302.41 | 302.41 | 15.57 | 454.00 | 454.00 | | | | | | | |
| 77 (76.4) | CA | 428.00 | 341.42 | 302.41 | 302.41 | 25.59 | 428.00 | 428.00 | | | | | | | |
| 77 (76.4) | CA | 428.00 | 341.42 | 302.41 | 302.41 | 25.59 | 428.00 | 428.00 | | | | | | | |

| | | | | | | |
|-----------|----|--------|--------|--------|-------|--------|
| 77 (77.6) | 60 | 426.00 | 347.40 | 316.10 | 26.67 | 533.07 |
| 77 (77.4) | 60 | 426.00 | 330.00 | 312.71 | 36.29 | 502.92 |
| 77 (77.7) | 58 | 426.00 | 340.00 | 315.27 | 29.73 | 404.47 |
| 77 (77.6) | 58 | 426.00 | 333.00 | 311.20 | 29.80 | 292.54 |
| AVE | | 421.00 | 341.00 | 313.36 | 27.37 | 410.00 |
| 74 (77.7) | 40 | 427.00 | 330.00 | 308.22 | 19.78 | 534.00 |
| 74 (74.0) | 24 | 426.00 | 347.00 | 311.54 | 14.46 | 290.00 |
| 74 (74.0) | 20 | 426.00 | 344.00 | 310.38 | 14.62 | 244.00 |
| 74 (74.0) | 24 | 426.00 | 343.00 | 311.50 | 14.50 | 244.00 |
| 74 (77.7) | 40 | 426.00 | 347.00 | 312.71 | 13.89 | 272.00 |
| 74 (74.0) | 40 | 426.00 | 340.00 | 310.64 | 15.36 | 400.00 |
| 74 (74.0) | 40 | 426.00 | 344.00 | 311.50 | 14.50 | 400.00 |
| 74 (77.0) | 40 | 426.00 | 330.00 | 305.24 | 20.76 | 344.00 |
| 74 (74.0) | 40 | 426.00 | 333.00 | 310.92 | 15.08 | 344.00 |
| 74 (74.0) | 40 | 426.00 | 330.00 | 311.11 | 14.89 | 332.00 |
| AVE | | 431.00 | 342.00 | 313.20 | 17.00 | 414.00 |
| 73 (74.0) | 40 | 434.00 | 344.00 | 310.02 | 23.38 | 337.00 |
| 73 (74.0) | 40 | 427.00 | 330.00 | 300.00 | 27.00 | 300.00 |
| 73 (74.0) | 40 | 425.00 | 344.00 | 315.97 | 9.03 | 220.00 |
| 73 (74.0) | 40 | 427.00 | 342.00 | 310.64 | 16.36 | 428.00 |
| 73 (74.0) | 40 | 424.00 | 327.00 | 310.76 | 13.24 | 290.00 |
| 73 (74.0) | 40 | 426.00 | 347.00 | 313.38 | 12.62 | 26.00 |
| 73 (74.0) | 40 | 426.00 | 344.00 | 312.81 | 13.19 | 427.00 |
| 73 (74.0) | 40 | 421.00 | 347.00 | 313.20 | 8.00 | 427.00 |
| 73 (74.0) | 40 | 424.00 | 334.00 | 313.00 | 11.00 | 420.00 |
| 73 (74.0) | 40 | 424.00 | 330.00 | 312.40 | 11.60 | 420.00 |
| AVE | | 431.00 | 342.00 | 313.40 | 13.00 | 420.00 |
| 8 (74.0) | 40 | 434.00 | 340.00 | 310.40 | 23.60 | 420.00 |
| 8 (74.0) | 40 | 412.00 | 340.00 | 312.00 | 0.00 | 300.00 |
| 8 (74.0) | 40 | 412.00 | 337.00 | 312.00 | 0.00 | 400.00 |
| 8 (74.0) | 40 | 424.00 | 344.00 | 317.00 | 7.00 | 400.00 |
| 8 (74.0) | 40 | 426.00 | 333.00 | 312.00 | 14.00 | 300.00 |
| 8 (74.0) | 40 | 426.00 | 340.00 | 310.00 | 16.00 | 400.00 |
| 8 (74.0) | 40 | 425.00 | 344.00 | 310.77 | 14.23 | 264.00 |
| 8 (74.0) | 40 | 424.00 | 342.00 | 310.11 | 13.89 | 200.00 |
| AVE | | 425.00 | 341.00 | 310.40 | 13.00 | 300.00 |
| 91 (74.0) | 40 | 425.00 | 344.00 | 310.20 | 14.80 | 440.00 |

| | | | | | | |
|-----|-----|--------|--------|--------|--------|--------|
| 84 | AVE | 444.70 | 334.70 | 317.20 | 311.2 | 444.02 |
| 84 | 10 | 443.20 | 341.90 | 317.14 | 311.64 | 443.47 |
| 84 | 20 | 443.00 | 339.70 | 323.66 | 311.84 | 443.22 |
| 84 | 30 | 442.50 | 332.01 | 324.13 | 311.40 | 442.80 |
| 84 | 40 | 442.00 | 324.43 | 325.53 | 311.70 | 442.60 |
| 84 | 50 | 442.00 | 322.00 | 324.73 | 311.77 | 442.60 |
| 84 | 60 | 442.00 | 314.10 | 318.34 | 311.4 | 442.07 |
| 84 | 70 | 442.00 | 311.79 | 324.72 | 311.7 | 442.00 |
| 84 | 80 | 442.00 | 308.44 | 325.20 | 311.71 | 442.00 |
| 84 | 90 | 442.00 | 304.00 | 323.20 | 311.71 | 442.00 |
| 84 | 100 | 442.00 | 300.00 | 321.00 | 311.70 | 442.00 |
| AVE | | 442.00 | 347.90 | 322.10 | 311.50 | 442.00 |
| 90 | 10 | 442.00 | 340.00 | 320.00 | 311.00 | 442.00 |
| 90 | 20 | 442.00 | 332.00 | 333.00 | 311.00 | 442.00 |
| 90 | 30 | 442.00 | 325.00 | 335.00 | 311.00 | 442.00 |
| 90 | 40 | 442.00 | 318.00 | 337.00 | 311.00 | 442.00 |
| 90 | 50 | 442.00 | 311.00 | 339.00 | 311.00 | 442.00 |
| 90 | 60 | 442.00 | 304.00 | 341.00 | 311.00 | 442.00 |
| 90 | 70 | 442.00 | 297.00 | 343.00 | 311.00 | 442.00 |
| 90 | 80 | 442.00 | 290.00 | 345.00 | 311.00 | 442.00 |
| 90 | 90 | 442.00 | 283.00 | 347.00 | 311.00 | 442.00 |
| 90 | 100 | 442.00 | 276.00 | 349.00 | 311.00 | 442.00 |
| AVE | | 442.00 | 313.11 | 332.07 | 311.60 | 442.00 |
| 90 | 10 | 442.00 | 309.00 | 340.00 | 311.00 | 442.00 |
| 90 | 20 | 442.00 | 307.00 | 342.00 | 311.00 | 442.00 |
| 90 | 30 | 442.00 | 305.00 | 344.00 | 311.00 | 442.00 |
| 90 | 40 | 442.00 | 303.00 | 346.00 | 311.00 | 442.00 |
| 90 | 50 | 442.00 | 301.00 | 348.00 | 311.00 | 442.00 |
| 90 | 60 | 442.00 | 299.00 | 350.00 | 311.00 | 442.00 |
| 90 | 70 | 442.00 | 297.00 | 352.00 | 311.00 | 442.00 |
| 90 | 80 | 442.00 | 295.00 | 354.00 | 311.00 | 442.00 |
| 90 | 90 | 442.00 | 293.00 | 356.00 | 311.00 | 442.00 |
| 90 | 100 | 442.00 | 291.00 | 358.00 | 311.00 | 442.00 |
| AVE | | 442.00 | 308.00 | 351.00 | 311.00 | 442.00 |

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 43202A

MASS FLOW = .0281 KG/SEC

INLET VAPOR TEMP = 111.7 DEG C

TOTAL POWER = 4.72 KW

| Z (M) | KJD LOCATION | HEAT FLUX (WATT/SQCM) | 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 | 808.32 | 124.82 | 114.41 | 23.96 | 6909.1 |
| .30 | 4C | 862.52 | 121.72 | 114.37 | 52.52 | 13902.7 |
| .30 | 4E | 840.92 | 122.49 | 114.39 | 30.06 | 6933.0 |
| | AVE | 854.20 | 123.43 | 114.39 | 32.73 | 8663.9 |
| .61 | 1B | 1398.48 | 131.75 | 117.38 | 27.51 | 6921.7 |
| .61 | 1C | 1365.62 | 128.35 | 116.60 | 45.62 | 11624.5 |
| .61 | 4D | 1414.34 | 127.52 | 117.73 | 55.33 | 10472.4 |
| .61 | 5B | 1426.80 | 133.69 | 117.43 | 30.47 | 6936.6 |
| | AVE | 1401.32 | 129.58 | 117.27 | 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 | 2197.92 | 141.80 | 122.89 | 32.17 | 6660.4 |
| | AVE | 2234.92 | 143.10 | 122.92 | 36.15 | 8313.1 |
| 1.22 | 1B | 2724.98 | 156.13 | 131.04 | 26.92 | 6554.2 |
| 1.22 | 1C | 2753.82 | 150.68 | 129.02 | 47.57 | 11213.2 |
| 1.22 | 4D | 2734.25 | 154.21 | 132.42 | 45.77 | 10126.5 |
| 1.22 | 5B | 2788.95 | 155.23 | 131.47 | 31.51 | 6455.7 |
| | AVE | 2750.57 | 154.56 | 130.99 | 37.84 | 8587.4 |
| 1.52 | 2A | 3314.07 | 165.68 | 141.46 | 35.72 | 6918.5 |
| 1.52 | 4A | 3252.62 | 164.49 | 142.58 | 38.76 | 5762.8 |
| 1.52 | 4C | 3205.76 | 160.33 | 141.90 | 71.02 | 10652.8 |
| 1.52 | 4E | 3227.65 | 162.90 | 141.81 | 40.54 | 6445.4 |
| | AVE | 3260.62 | 163.35 | 141.94 | 46.52 | 7444.4 |

43202B-2

RUN 43202B

MASS FLOW = .0281 KG/SEC

INLET VAPOR TEMP = 111.7 DEG C

TOTAL POWER = 4.75 KW

| Z (M) | ROD LOCATION | HEAT FLUX (WATT/CM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | 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 | 150.14 | 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 | 45.35 | 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 | 50.86 | 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 | 150.10 | 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 | 179.06 | 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 | 150.76 | 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 | 179.45 | 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 |

43202B-3

| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| 1.88(1.91) | 3D | 3391.68 | 176.34 | 156.77 | 67.81 | 12020.6 |
| 1.88(1.91) | 5E | 3459.73 | 180.50 | 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 | 53.25 | 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 | 53.47 | 9610.4 |
| 1.93(1.96) | 2E | 3497.84 | 180.99 | 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 | 3389.29 | 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 | 29.26 | 5997.7 |
| 1.93(1.94) | 5C | 3613.79 | 181.52 | 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(1.97) | 3E | 3459.73 | 184.73 | 155.07 | 40.17 | 10140.7 |
| 1.96(1.96) | 4B | 3415.49 | 184.32 | 161.29 | 49.24 | 9330.9 |
| 1.96(1.98) | 5D | 3449.20 | 189.78 | 158.69 | 32.81 | 5909.3 |
| | AVE | 3447.23 | 184.55 | 158.67 | 43.60 | 9358.6 |
| 1.98(2.00) | 2A | 3439.17 | 181.04 | 158.68 | 36.42 | 5981.3 |
| 1.98(2.01) | 2B | 3560.33 | 186.79 | 161.51 | 46.79 | 9501.1 |
| 1.98(2.00) | 2D | 3431.19 | 186.80 | 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 | 157.61 | 45.59 | 9977.8 |
| 1.98(2.01) | 3B | 3389.28 | 184.43 | 161.19 | 45.84 | 11735.1 |
| 1.98(1.99) | 3C | 3520.51 | 186.49 | 160.36 | 50.72 | 12149.0 |
| 1.98(2.01) | 3D | 3391.68 | 187.34 | 160.44 | 48.25 | 11849.3 |
| 1.98(2.01) | 4A | 3444.67 | 182.84 | 160.77 | 38.83 | 5914.4 |
| 1.98(1.99) | 4C | 3437.75 | 186.84 | 160.25 | 47.59 | 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 | 176.44 | 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 | 186.38 | 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 | 166.14 | 53.24 | 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 | 55.39 | 8828.5 |
| 2.29 | 1D | 2990.11 | 192.50 | 167.92 | 29.50 | 6058.0 |
| 2.29 | 2B | 2954.58 | 195.12 | 171.64 | 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 | 16569.2 |
| 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 | 194.55 | 172.71 | 47.68 | 8906.8 |
| 2.29 | 5C | 3109.24 | 185.34 | 166.68 | 57.36 | 10308.0 |
| 2.29 | 5D | 2921.53 | 194.74 | 169.54 | 27.70 | 6018.6 |
| | AVE | 3003.73 | 192.67 | 169.21 | 41.52 | 8936.4 |
| 2.44 | 1B | 2576.90 | 187.64 | 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 | 184.74 | 173.07 | 28.35 | 5766.8 |
| 2.44 | 3A | 2536.77 | 186.64 | 171.72 | 59.21 | 9744.5 |
| 2.44 | 3B | 2550.59 | 188.28 | 176.24 | 40.89 | 11038.1 |
| 2.44 | 3D | 2559.87 | 198.47 | 175.26 | 40.84 | 11276.4 |
| 2.44 | 4D | 2604.92 | 198.64 | 176.23 | 37.14 | 9177.2 |
| 2.44 | 5B | 2646.84 | 188.74 | 175.04 | 45.66 | 2863.4 |
| 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 432028

MASS FLOW = 0.0620 LBM/SEC

INLET VAPOR TEMP = 233.0 DEG F

TOTAL POWER = 4.20 BTU/SEC

| Z (IN) | RUD LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR**0.33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|------------------------------|-----------------------|---------------|--------------|
| 12 | 2A | 278.80 | 256.48 | 237.91 | 24.45 | 6910.7 |
| 12 | 4A | 275.22 | 256.68 | 237.93 | 23.90 | 6909.1 |
| 12 | 4C | 273.30 | 251.09 | 237.86 | 52.52 | 13902.7 |
| 12 | 4E | 268.28 | 252.47 | 237.90 | 37.00 | 6933.0 |
| | AVE | 273.93 | 254.18 | 237.90 | 32.73 | 8663.9 |
| 24 | 1B | 443.20 | 269.16 | 243.28 | 27.51 | 6921.7 |
| 24 | 1C | 432.84 | 263.03 | 241.88 | 45.62 | 11624.5 |
| 24 | 4D | 448.20 | 261.53 | 241.92 | 55.33 | 10472.4 |
| 24 | 5B | 452.25 | 267.24 | 243.38 | 30.47 | 6930.8 |
| | AVE | 444.10 | 265.24 | 243.11 | 39.73 | 8987.4 |
| 39 | 2A | 716.31 | 294.20 | 253.21 | 27.32 | 6647.7 |
| 39 | 4A | 703.42 | 293.01 | 253.31 | 27.74 | 6635.5 |
| 39 | 4C | 716.65 | 283.89 | 253.31 | 57.30 | 13288.6 |
| 39 | 4E | 696.49 | 287.24 | 253.20 | 32.17 | 6680.4 |
| | AVE | 708.34 | 287.58 | 253.26 | 36.15 | 6313.1 |
| 48 | 1B | 863.73 | 316.63 | 267.86 | 26.91 | 6554.2 |
| 48 | 1C | 872.84 | 303.23 | 264.24 | 47.57 | 11213.2 |
| 48 | 4D | 866.04 | 319.59 | 273.76 | 45.37 | 10126.5 |
| 48 | 5B | 883.98 | 311.41 | 268.65 | 31.51 | 6455.7 |
| | AVE | 871.74 | 310.21 | 267.78 | 37.84 | 8507.4 |
| 60 | 2A | 1050.42 | 330.23 | 296.64 | 15.71 | 6918.5 |
| 60 | 4A | 1030.44 | 328.08 | 298.65 | 38.70 | 5762.8 |
| 60 | 4C | 1016.07 | 320.60 | 297.42 | 71.02 | 6052.8 |
| 60 | 4E | 1035.70 | 325.22 | 287.27 | 40.50 | 6445.4 |
| | AVE | 1033.28 | 326.03 | 297.40 | 46.52 | 7444.4 |

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KUN 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**0.33 | 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 | 350.05 | 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 | 9524.2 |
| 70 (70.2) | 3C | 1115.85 | 353.17 | 305.57 | 52.32 | 11555.6 |
| 70 (70.5) | 4D | 1102.17 | 359.06 | 309.70 | 42.13 | 8947.9 |
| | AVE | 1102.88 | 352.54 | 304.74 | 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 | 355.02 | 301.17 | 37.96 | 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 | 306.94 | 47.06 | 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 | 37.18 | 14165.9 |
| 72 (73.2) | 5B | 1067.39 | 346.80 | 304.42 | 41.07 | 9317.3 |
| 72 (72.4) | 5C | 1145.42 | 355.24 | 303.04 | 43.51 | 12741.1 |
| | AVE | 1092.82 | 351.08 | 305.10 | 41.35 | 11931.0 |
| 74 (75.2) | 1D | 1077.59 | 352.04 | 310.08 | 36.23 | 6115.2 |
| 74 (75.3) | 2B | 1128.47 | 353.05 | 315.64 | 57.00 | 9091.4 |
| 74 (75.0) | 2C | 1094.98 | 349.59 | 312.36 | 55.44 | 12469.7 |
| 74 (74.7) | 2D | 1087.54 | 351.23 | 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 | 44.78 | 16191.4 |
| 74 (75.2) | 3B | 1074.26 | 354.52 | 315.34 | 61.46 | 11930.6 |
| 74 (74.2) | 3C | 1115.85 | 354.50 | 313.47 | 60.24 | 12715.8 |

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| | | | | | | |
|-----------|-----|---------|--------|--------|-------|---------|
| 74 (75.2) | 3D | 1075.02 | 349.42 | 314.19 | 67.81 | 12020.6 |
| 74 (75.2) | 3E | 1096.59 | 350.20 | 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 | 46.78 | 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 | 315.20 | 71.35 | 12275.3 |
| 75 (76.3) | 3E | 1096.59 | 366.16 | 308.05 | 41.38 | 10244.4 |
| 75 (75.6) | 4B | 1082.56 | 355.87 | 314.84 | 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 | 44.56 | 10009.1 |
| 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 | 355.00 | 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 | 5947.7 |
| 76 (76.5) | 5C | 1145.42 | 357.83 | 309.80 | 45.92 | 9976.5 |
| | AVE | 1096.93 | 356.38 | 315.62 | 47.89 | 9250.9 |
| 77 (78.5) | 1D | 1077.59 | 361.30 | 315.99 | 33.66 | 6108.2 |
| 77 (78.9) | 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 | 316.65 | 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 | 317.68 | 34.81 | 5965.0 |

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| | | | | | | |
|-----------|----|---------|--------|--------|-------|---------|
| 78 (79.3) | 3A | 1056.93 | 366.00 | 314.62 | 45.59 | 9977.8 |
| 78 (79.3) | 3B | 1074.24 | 372.98 | 322.24 | 45.84 | 11735.1 |
| 78 (78.5) | 3C | 1115.85 | 368.58 | 320.64 | 50.72 | 12149.0 |
| 78 (79.2) | 3D | 1075.02 | 364.31 | 320.79 | 48.25 | 11849.3 |
| 78 (79.0) | 4A | 1091.81 | 361.03 | 321.59 | 39.83 | 5914.4 |
| 78 (78.3) | 4C | 1089.62 | 368.31 | 320.41 | 47.59 | 11675.5 |
| 78 (78.5) | 4E | 1099.55 | 373.74 | 317.65 | 27.42 | 6023.1 |
| 78 (78.6) | 5C | 1145.42 | 366.90 | 313.41 | 47.22 | 9841.5 |

AVE 1096.93 366.10 319.16 42.36 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 | 6226.4 |
| 84 | 2E | 1026.04 | 365.15 | 326.87 | 37.51 | 5962.0 |
| 84 | 3A | 1000.00 | 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 | 326.98 | 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 1010.66 361.07 327.03 56.39 8828.5

| | | | | | | |
|----|----|---------|--------|--------|-------|---------|
| 90 | 1D | 947.74 | 378.50 | 334.25 | 29.50 | 6058.0 |
| 90 | 2B | 936.48 | 383.21 | 340.90 | 49.71 | 8654.2 |
| 90 | 2C | 946.04 | 365.84 | 337.97 | 41.78 | 11025.2 |
| 90 | 2E | 958.37 | 375.48 | 335.36 | 32.96 | 5848.6 |
| 90 | 3A | 915.07 | 365.24 | 332.51 | 53.23 | 9849.9 |
| 90 | 3B | 974.49 | 366.19 | 340.50 | 43.21 | 10569.2 |
| 90 | 3D | 937.78 | 367.03 | 338.84 | 41.25 | 10915.4 |
| 90 | 3E | 926.66 | 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 | 16199.1 |
| 96 | 2B | 775.17 | 382.73 | 349.64 | 42.82 | 8917.6 |
| 96 | 2E | 812.03 | 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 | 49.89 | 11038.1 |
| 96 | 3D | 811.35 | 384.25 | 347.46 | 40.82 | 11256.4 |
| 96 | 4D | 825.65 | 384.64 | 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 | 4920.7 |

AVE 821.01 379.25 344.65 42.46 8782.3

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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 = .0231 KG/SEC

INLET VAPOR TEMP = 111.7 DEG C

TOTAL POWER = 4.36 KW

| Z (M) | KUD LOCATION | HEAT FLUX (WATT/SQM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | REYNOLDS NO. |
|-------|--------------|----------------------|---------------------------|--------------------|---------------|--------------|
| .30 | 2A | 909.53 | 129.55 | 114.43 | 17.14 | 6892.2 |
| .30 | 4A | 848.00 | 129.72 | 114.44 | 16.75 | 6890.0 |
| .30 | 4C | 827.22 | 125.78 | 114.40 | 33.54 | 13877.4 |
| .30 | 4E | 836.91 | 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 | 1436.40 | 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 | 2235.82 | 152.09 | 123.03 | 27.72 | 6614.5 |
| .99 | 4A | 2285.03 | 153.63 | 123.08 | 27.37 | 6582.3 |
| .99 | 4C | 2411.10 | 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 | 8256.4 |
| 1.22 | 1B | 2603.61 | 155.48 | 131.25 | 27.15 | 6514.0 |
| 1.22 | 1C | 2734.11 | 160.04 | 129.29 | 32.84 | 11107.3 |
| 1.22 | 4D | 2876.00 | 160.52 | 132.74 | 37.14 | 10072.3 |
| 1.22 | 5B | 2766.60 | 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 | 174.34 | 142.45 | 22.71 | 6123.3 |
| 1.52 | 4E | 3311.94 | 172.28 | 141.80 | 28.10 | 6242.8 |
| | AVE | 3323.50 | 176.13 | 142.05 | 25.25 | 6211.7 |

43902C-2

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**0.33 | REYNOLDS NO. |
|------------|--------------|----------------------|---------------------------|--------------------|--------------|--------------|
| 1.70(1.71) | 2A | 3669.99 | 183.86 | 148.60 | 26.24 | 6356.4 |
| 1.70(1.71) | 4A | 3416.00 | 170.25 | 149.81 | 21.98 | 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 | 3644.00 | 186.97 | 149.64 | 33.87 | 10396.2 |
| 1.80(1.82) | 5D | 3505.83 | 182.23 | 152.87 | 30.42 | 7217.3 |
| | AVE | 3570.25 | 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 | 37.61 | 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 | 46.85 | 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 | 3644.00 | 179.51 | 152.63 | 47.34 | 11003.4 |
| 1.88(1.93) | 4H | 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 |

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| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| | 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 | 39.86 | 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 | 182.85 | 158.56 | 46.79 | 9811.1 |
| 1.93(1.96) | 2E | 3466.76 | 180.31 | 157.89 | 38.80 | 6140.8 |
| 1.93(1.93) | 3A | 3715.75 | 177.30 | 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 | 157.56 | 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 | 3466.76 | 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 | 33.34 | 5964.1 |
| 1.98(2.00) | 4C | 3627.33 | 189.55 | 160.66 | 48.01 | 11876.6 |
| 1.98(1.98) | 4E | 3565.90 | 192.15 | 158.80 | 26.28 | 6015.3 |

| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| 1.98(1.98) | 5C | 3606.91 | 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 | 47.62 | 10947.6 |
| 2.13 | 2B | 3271.70 | 190.29 | 165.56 | 43.56 | 8364.2 |
| 2.13 | 2E | 3239.62 | 187.15 | 154.70 | 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 | 50.20 | 9920.1 |
| 2.13 | 3D | 3271.77 | 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 | 3042.11 | 191.67 | 167.46 | 42.85 | 10289.7 |
| 2.29 | 5D | 3335.30 | 188.94 | 170.16 | 43.16 | 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 | 43.66 | 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 | 5792.6 |
| 2.44 | 3A | 2816.47 | 199.40 | 172.92 | 35.74 | 9570.0 |
| 2.44 | 3B | 2725.74 | 206.67 | 176.07 | 32.57 | 11125.2 |
| 2.44 | 3D | 2701.97 | 204.25 | 175.45 | 34.40 | 11309.5 |
| 2.44 | 4D | 2667.63 | 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) | Avg SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR** .33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|-----------------------------|-----------------------|---------------|--------------|
| 12 | 2A | 288.28 | 265.19 | 237.99 | 17.14 | 6892.2 |
| 12 | 4A | 284.65 | 265.49 | 238.00 | 16.75 | 6890.0 |
| 12 | 4C | 271.7J | 253.41 | 237.93 | 37.54 | 13877.4 |
| 12 | 4E | 265.90 | 261.92 | 237.99 | 18.72 | 6409.9 |
| | 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 | 699.10 | 305.77 | 253.46 | 27.72 | 6614.5 |
| 39 | 4A | 724.26 | 308.53 | 253.54 | 27.37 | 6582.3 |
| 39 | 4C | 704.24 | 297.37 | 253.55 | 42.29 | 13179.4 |
| 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 | 911.54 | 320.94 | 270.96 | 37.14 | 10072.3 |
| 48 | 5B | 676.91 | 325.89 | 258.84 | 23.19 | 6412.8 |
| | AVE | 870.03 | 324.19 | 268.19 | 29.33 | 8526.6 |
| 60 | 2A | 1072.97 | 350.19 | 287.42 | 24.95 | 6219.6 |
| 60 | 4A | 1037.50 | 304.81 | 288.42 | 22.71 | 6123.3 |
| 60 | 4E | 1049.74 | 342.11 | 297.74 | 28.10 | 6292.8 |
| | AVE | 1053.41 | 349.34 | 297.69 | 25.25 | 6211.4 |

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RUN 43902C

MASS FLOW = .0620 LBM/SEC

INLET VAPOR TEMP = 233.0 DEG F

TOTAL POWER = 4.61 BTU/SEC

| Z (IN) | RJD 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 (71.6) | 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 | 10395.2 |
| 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 | 376.70 | 304.25 | 30.76 | 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 | 1117.66 | 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 | 59.06 | 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 | 304.73 | 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 |

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|-----------|-----|---------|--------|--------|-------|---------|
| | 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 | 53.86 | 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 | 32.50 | 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 | 312.44 | 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 | 46.66 | 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 | 32.39 | 5964.1 |
| 78 (78.0) | 4C | 1149.71 | 373.20 | 321.19 | 48.01 | 11876.6 |
| 78 (77.8) | 4E | 1130.24 | 377.44 | 317.83 | 26.26 | 6015.3 |

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|-----------|-----|---------|--------|--------|-------|---------|
| 78 (78.0) | 5C | 1141.33 | 355.30 | 313.64 | 53.88 | 9849.5 |
| | AVE | 1128.60 | 372.35 | 319.42 | 39.51 | 9298.1 |
| 84 | 1B | 1011.08 | 369.38 | 327.82 | 33.94 | 6342.3 |
| 84 | 1C | 1045.91 | 358.22 | 322.85 | 57.62 | 10947.6 |
| 84 | 2B | 1037.61 | 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 | 10862.2 |
| | AVE | 1033.33 | 370.55 | 327.87 | 43.87 | 8831.5 |
| 90 | 2B | 959.59 | 396.61 | 340.53 | 31.16 | 8828.5 |
| 90 | 2C | 1056.90 | 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 | 994.29 | 388.96 | 338.26 | 36.29 | 9175.6 |
| 96 | 1B | 836.20 | 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 | 26.80 | 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 | 4248.3 |
| 96 | 5B | 849.57 | 383.33 | 348.64 | 33.25 | 5891.4 |
| 96 | 5C | 878.40 | 385.40 | 342.12 | 38.16 | 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 412020

MASS FLOW = .0281 KG/SEC

INLET VAPOR TEMP = 112.2 DEG C

TOTAL POWER = 4.33 KW

| Z (M) | GRID LOCATION | HEAT FLUX (WATT/CM ²) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | REYNOLDS NO. |
|----------|------------------|--------------------------------------|------------------------------|-----------------------|---------------|--------------|
| .30 | 2A | 873.55 | 131.28 | 115.63 | 15.82 | 6844.8 |
| .30 | 4A | 878.73 | 133.76 | 115.62 | 16.45 | 6850.5 |
| .30 | 4C | 830.42 | 127.77 | 115.58 | 37.12 | 13784.6 |
| | AVE | 860.90 | 129.94 | 115.61 | 27.82 | 9160.0 |
| .61 | 1C | 1452.25 | 134.84 | 117.87 | 33.18 | 11516.2 |
| .61 | 4E | 1435.20 | 136.32 | 118.59 | 22.67 | 6677.4 |
| .61 | 5B | 1358.22 | 136.68 | 114.60 | 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 | 2303.02 | 151.21 | 124.16 | 23.20 | 6579.9 |
| .99 | 4C | 2274.82 | 147.57 | 124.15 | 41.36 | 13151.4 |
| | AVE | 2300.10 | 150.76 | 124.18 | 28.76 | 8768.3 |
| 1.22 | 1C | 2682.53 | 154.58 | 130.47 | 33.96 | 11671.5 |
| 1.22 | 4E | 2739.40 | 157.78 | 132.32 | 28.71 | 6566.8 |
| | AVE | 2711.00 | 158.68 | 131.39 | 31.34 | 8816.1 |
| 1.52 | 2A | 3355.62 | 183.49 | 143.07 | 27.82 | 6134.0 |
| 1.52 | 4A | 3190.51 | 174.89 | 143.40 | 25.69 | 6142.1 |
| 1.52 | 4C | 3146.63 | 174.17 | 143.21 | 47.53 | 12333.0 |
| | AVE | 3215.58 | 177.68 | 143.23 | 29.22 | 8202.7 |

412020-D-2

RUN #1202D

MASS FLOW = .0281 KG/SEC

INLET VAPOR TEMP = 112.2 DEG C

TOTAL POWER = 4.83 KW

| Z (M) | ROD LOCATION | HEAT FLUX (WATT/CM ²) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | REYNOLDS NO. |
|------------|--------------|-----------------------------------|---------------------------|--------------------|---------------|--------------|
| 1.70(1.72) | 2A | 3466.91 | 192.60 | 150.58 | 27.44 | 6142.9 |
| 1.70(1.72) | 4A | 3562.80 | 192.60 | 150.54 | 27.99 | 6094.3 |
| 1.70(1.72) | 4C | 3646.38 | 184.68 | 150.75 | 41.89 | 11974.6 |
| | AVE | 3558.70 | 190.60 | 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 | 13788.2 |
| 1.80(1.81) | 2D | 3624.17 | 190.96 | 156.44 | 29.48 | 10781.6 |
| 1.80(1.82) | 3C | 3670.15 | 186.06 | 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 | 25.71 | 6895.5 |
| 1.83(1.84) | 2D | 3624.17 | 195.14 | 157.13 | 31.48 | 11009.2 |
| 1.83(1.84) | 3C | 3670.15 | 190.10 | 155.31 | 40.57 | 13923.2 |
| 1.83(1.84) | 3D | 3629.04 | 193.33 | 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(1.89) | 1B | 3668.52 | 191.46 | 156.64 | 25.55 | 6992.1 |
| 1.88(1.89) | 1D | 3524.98 | 189.61 | 156.68 | 26.40 | 6982.2 |
| 1.88(1.89) | 2B | 3748.49 | 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 | 193.34 | 156.72 | 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 | 189.51 | 158.00 | 44.45 | 13606.8 |
| 1.88(1.90) | 4B | 3391.31 | 188.37 | 159.78 | 39.26 | 10478.0 |
| 1.88(1.83) | 4D | 3640.43 | 187.78 | 150.31 | 41.13 | 12024.0 |
| 1.86(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 |

41202D-3

| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| | AVE | 3574.58 | 188.14 | 157.25 | 35.86 | 10141.1 |
| 1.91(1.92) | 1D | 3524.98 | 190.21 | 157.49 | 26.57 | 6574.2 |
| 1.91(1.98) | 2C | 3488.74 | 189.02 | 160.48 | 45.75 | 12022.4 |
| 1.91(1.92) | 2D | 3624.17 | 194.07 | 159.94 | 34.97 | 13711.1 |
| 1.91(1.93) | 3E | 3409.77 | 175.79 | 155.15 | 57.57 | 10358.5 |
| 1.91(1.93) | 4B | 3381.31 | 189.53 | 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 | 189.00 | 150.53 | 37.41 | 9896.2 |
| 1.93(1.94) | 3B | 3664.61 | 189.01 | 159.66 | 46.91 | 12102.6 |
| 1.93(1.95) | 3C | 3670.15 | 189.46 | 159.70 | 47.27 | 12363.3 |
| 1.93(1.94) | 3D | 3629.04 | 192.35 | 159.11 | 42.03 | 12290.1 |
| 1.93(1.95) | 4A | 3562.60 | 188.39 | 158.62 | 27.55 | 5920.4 |
| 1.93(1.95) | 4C | 3646.36 | 188.42 | 160.05 | 42.21 | 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 | 193.36 | 161.71 | 37.74 | 9549.1 |
| 1.96(1.97) | 3C | 3670.15 | 189.03 | 160.65 | 49.36 | 12309.7 |
| 1.96(1.97) | 3E | 3409.77 | 177.44 | 156.56 | 55.30 | 10122.6 |
| 1.96(1.97) | 4B | 3381.31 | 192.50 | 162.51 | 36.87 | 9427.4 |
| 1.96(1.96) | 5D | 3408.19 | 181.08 | 156.78 | 38.10 | 5454.2 |
| | AVE | 3501.04 | 188.13 | 160.17 | 41.13 | 9324.8 |
| 1.98(1.98) | 1B | 3668.52 | 196.96 | 159.01 | 23.74 | 5862.9 |
| 1.98(2.00) | 2A | 3466.91 | 198.25 | 161.03 | 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(2.03) | 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 | 190.03 | 161.71 | 47.99 | 12282.4 |
| 1.98(1.99) | 3D | 3629.04 | 190.87 | 161.10 | 46.46 | 12678.5 |
| 1.98(2.00) | 4A | 3562.60 | 192.08 | 160.61 | 27.74 | 5849.2 |
| 1.98(2.00) | 4C | 3646.36 | 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 | 192.60 | 160.99 | 38.47 | 9516.7 |
| 2.13 | 1B | 3203.47 | 190.85 | 165.86 | 32.01 | 5248.6 |
| 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 | 48.91 | 10326.3 |
| 2.13 | 4E | 3262.70 | 184.67 | 165.32 | 41.72 | 6505.2 |
| 2.13 | 5B | 3367.75 | 175.07 | 166.65 | 64.00 | 6502.8 |
| 2.13 | 5C | 3242.62 | 181.84 | 163.26 | 59.63 | 11004.6 |
| | AVE | 3275.48 | 186.02 | 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 | 204.46 | 174.69 | 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 | 35.24 | 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 | 183.66 | 170.58 | 59.76 | 6149.1 |
| | AVE | 3149.24 | 196.44 | 170.99 | 38.16 | 8437.8 |
| 2.44 | 1B | 2597.06 | 200.67 | 175.49 | 24.47 | 5778.4 |
| 2.44 | 1C | 2784.00 | 197.69 | 172.62 | 36.66 | 9760.5 |
| 2.44 | 2B | 2804.22 | 207.81 | 179.17 | 37.83 | 8798.8 |
| 2.44 | 2E | 2771.76 | 201.95 | 175.82 | 25.11 | 5707.3 |
| 2.44 | 3A | 2727.66 | 196.27 | 174.14 | 47.69 | 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 | 197.54 | 174.95 | 28.86 | 5909.0 |
| 2.44 | 5B | 2714.90 | 193.28 | 175.08 | 35.78 | 6053.4 |
| 2.44 | 5C | 2840.16 | 190.00 | 173.00 | 52.93 | 11168.0 |
| | AVE | 2750.67 | 199.52 | 175.54 | 35.33 | 8116.6 |

41202D-5

RUN 41202D

MASS FLOW = .0620 LBM/SEC

INLET VAPOR TEMP = 234.0 DEG F

TOTAL POWER = 4.58 BTU/SEC

| Z (IN) | POD LULATION (DU/HR-SQFT) | HEAT FLUX | 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 | 257.37 | 240.11 | 16.45 | 6850.5 |
| 12 | 4C | 263.21 | 261.79 | 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 | 33.16 | 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 | 277.62 | 255.49 | 41.76 | 13151.4 |
| | AVE | 724.03 | 303.36 | 255.53 | 28.70 | 8768.3 |
| 48 | 1C | 850.25 | 319.24 | 256.84 | 33.96 | 11671.5 |
| 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 | 998.28 | 346.80 | 290.11 | 25.69 | 6141.1 |
| 60 | 4C | 995.40 | 345.51 | 289.78 | 40.53 | 12333.0 |
| | AVE | 1019.20 | 351.83 | 289.81 | 27.01 | 8262.7 |

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| | | | | | | |
|-----------|-----|---------|--------|--------|-------|---------|
| | AVE | 1132.99 | 370.65 | 315.05 | 36.86 | 10141.1 |
| 75 (75.4) | 1D | 1117.27 | 374.36 | 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 | 319.45 | 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 | 361.65 | 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 | 373.65 | 314.57 | 47.27 | 12363.3 |
| 76 (76.4) | 3D | 1150.25 | 377.09 | 318.39 | 42.03 | 12246.1 |
| 76 (76.7) | 4A | 1129.25 | 371.11 | 317.52 | 29.55 | 5920.4 |
| 76 (76.9) | 4C | 1155.75 | 371.10 | 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 | 379.33 | 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 | 378.60 | 324.52 | 36.87 | 9427.4 |
| 77 (77.5) | 5D | 1080.25 | 357.94 | 317.80 | 39.16 | 5954.2 |
| | AVE | 1109.68 | 370.63 | 320.30 | 41.13 | 9324.8 |
| 78 (77.9) | 1B | 1162.77 | 386.52 | 319.29 | 23.74 | 5862.9 |
| 78 (78.9) | 2A | 1098.86 | 386.85 | 321.86 | 22.62 | 5949.4 |
| 78 (78.1) | 2B | 1187.98 | 387.33 | 325.24 | 35.66 | 9371.3 |
| 78 (78.5) | 2D | 1148.71 | 381.30 | 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 | 381.43 | 323.39 | 47.87 | 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 | 12076.5 |
| 78 (78.6) | 4A | 1129.25 | 377.74 | 321.10 | 27.75 | 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 |

41202D-7

RUN 41202D

MASS FLOW = .0629 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 TEMP (DEG F) | SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR** .33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|-------------------------|----------------------------|-----------------------|---------------|--------------|
| 67 (67.8) | 2A | 1098.84 | 378.80 | 378.80 | 303.04 | 23.44 | 6142.9 |
| 67 (67.6) | 4A | 1129.25 | 378.80 | 378.80 | 302.97 | 20.99 | 6044.3 |
| 67 (67.8) | 4C | 1155.75 | 364.43 | 364.43 | 303.36 | 41.89 | 11974.6 |
| | AVE | 1127.95 | 374.31 | 374.31 | 303.12 | 27.78 | 8070.6 |
| 70 (70.9) | 1C | 1097.48 | 365.46 | 365.46 | 302.38 | 34.19 | 11243.2 |
| 70 (70.6) | 3C | 1163.28 | 369.87 | 369.87 | 308.00 | 41.31 | 13311.0 |
| 70 (71.5) | 4E | 1110.82 | 366.31 | 366.31 | 308.44 | 30.49 | 7092.0 |
| | AVE | 1123.86 | 365.22 | 365.22 | 306.27 | 35.33 | 10548.9 |
| 71 (73.5) | 2C | 1105.74 | 376.64 | 376.64 | 313.55 | 36.72 | 13786.2 |
| 71 (71.4) | 2D | 1148.71 | 366.53 | 366.53 | 313.60 | 29.46 | 10781.6 |
| 71 (71.6) | 3C | 1163.28 | 370.52 | 370.52 | 309.80 | 42.71 | 13399.5 |
| 71 (71.6) | 3E | 1080.75 | 370.11 | 370.11 | 313.26 | 45.86 | 11576.6 |
| 71 (71.0) | 4D | 1153.86 | 396.40 | 396.40 | 312.36 | 25.54 | 11290.0 |
| | AVE | 1130.48 | 376.44 | 376.44 | 310.51 | 35.96 | 12166.8 |
| 72 (71.9) | 1B | 1162.77 | 374.39 | 374.39 | 306.95 | 25.71 | 6895.5 |
| 72 (72.4) | 2D | 1148.71 | 383.25 | 383.25 | 314.83 | 31.48 | 11009.2 |
| 72 (72.6) | 3C | 1163.28 | 374.16 | 374.16 | 311.56 | 40.57 | 13923.2 |
| 72 (72.4) | 3D | 1150.25 | 379.46 | 379.46 | 310.97 | 35.55 | 13127.2 |
| 72 (72.0) | 4D | 1153.86 | 376.00 | 376.00 | 313.80 | 34.68 | 10455.6 |
| | AVE | 1155.77 | 377.58 | 377.58 | 312.63 | 33.66 | 11082.1 |
| 74 (74.1) | 1B | 1162.77 | 376.63 | 376.63 | 312.88 | 25.55 | 6992.1 |
| 74 (74.5) | 1D | 1117.27 | 373.30 | 373.30 | 314.03 | 26.46 | 6982.2 |
| 74 (74.4) | 23 | 1187.98 | 383.18 | 383.18 | 318.98 | 34.59 | 10884.9 |
| 74 (76.6) | 2C | 1105.74 | 373.30 | 373.30 | 318.89 | 44.16 | 12184.1 |
| 74 (74.4) | 2D | 1148.71 | 374.47 | 374.47 | 317.70 | 34.89 | 11204.0 |
| 74 (74.0) | 2E | 1130.20 | 366.60 | 366.60 | 312.73 | 29.62 | 7566.7 |
| 74 (75.0) | 3A | 1149.56 | 372.22 | 372.22 | 310.55 | 35.36 | 10518.7 |
| 74 (74.6) | 3B | 1161.52 | 373.30 | 373.30 | 316.41 | 44.45 | 13606.8 |
| 74 (74.7) | 4B | 1071.73 | 371.06 | 371.06 | 319.60 | 39.26 | 10478.0 |
| 74 (74.0) | 4D | 1153.86 | 370.00 | 370.00 | 316.96 | 41.13 | 12024.0 |
| 74 (74.2) | 5C | 1126.25 | 358.90 | 358.90 | 309.57 | 44.87 | 11767.6 |
| 74 (73.8) | 5D | 1080.25 | 350.10 | 350.10 | 312.30 | 40.73 | 7484.0 |

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| | | | | | | |
|-----------|-----|---------|--------|--------|-------|---------|
| 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 | 1740.72 | 375.52 | 330.54 | 32.01 | 6248.6 |
| 84 | 1C | 1735.84 | 371.08 | 325.15 | 43.40 | 10749.1 |
| 84 | 2B | 1359.77 | 381.00 | 335.20 | 42.79 | 8135.8 |
| 84 | 2E | 1325.95 | 373.27 | 331.23 | 33.81 | 5904.1 |
| 84 | 3A | 1060.18 | 375.50 | 326.84 | 41.72 | 9776.7 |
| 84 | 3B | 1024.84 | 374.59 | 332.67 | 52.79 | 4799.6 |
| 84 | 3D | 998.86 | 375.53 | 331.56 | 48.81 | 10326.3 |
| 84 | 4E | 1040.48 | 364.40 | 329.58 | 41.72 | 6505.2 |
| 84 | 5B | 1267.43 | 354.33 | 330.89 | 64.00 | 6502.8 |
| 84 | 5C | 1027.77 | 359.31 | 325.86 | 52.63 | 11004.6 |
| | AVE | 1038.19 | 370.43 | 329.95 | 45.07 | 8495.3 |
| 90 | 1B | 1039.39 | 389.45 | 339.14 | 28.11 | 5948.8 |
| 90 | 1D | 1027.52 | 377.01 | 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 | 968.64 | 383.69 | 339.95 | 30.24 | 5802.9 |
| 90 | 3A | 998.68 | 388.00 | 336.44 | 35.34 | 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 | 985.44 | 374.38 | 334.71 | 47.34 | 10386.6 |
| 90 | 5D | 1329.24 | 362.46 | 339.05 | 52.76 | 6149.1 |
| | AVE | 998.17 | 386.48 | 339.79 | 38.16 | 8437.8 |
| 96 | 1B | 823.18 | 393.21 | 347.88 | 24.47 | 5778.4 |
| 96 | 1C | 882.41 | 367.84 | 342.71 | 36.66 | 9760.5 |
| 96 | 2B | 888.82 | 406.06 | 354.50 | 30.83 | 8798.8 |
| 96 | 2E | 878.53 | 345.52 | 348.48 | 25.11 | 5707.3 |
| 96 | 3A | 864.60 | 365.20 | 345.45 | 40.59 | 9310.8 |
| 96 | 3B | 887.45 | 401.91 | 352.31 | 37.16 | 10980.4 |
| 96 | 3D | 866.44 | 398.54 | 350.87 | 37.82 | 11219.0 |
| 96 | 4E | 866.28 | 387.56 | 346.42 | 28.96 | 5909.0 |
| 96 | 5B | 860.51 | 379.45 | 347.15 | 35.78 | 6053.4 |
| 96 | 5C | 904.21 | 375.55 | 343.39 | 52.93 | 10068.0 |
| | AVE | 871.84 | 391.14 | 347.97 | 35.03 | 8378.6 |

41202D-9

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) | RUD LOCATION | HEAT FLUX (WATT/CM ²) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR** .33 | REYNOLDS NO. |
|----------|-----------------|--------------------------------------|---------------------------------|-----------------------|---------------|--------------|
| .30 | 1B | 662.90 | 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 | 125.20 | 117.17 | 55.36 | 10049.8 |
| .61 | 5B | 964.80 | 127.71 | 117.26 | 26.20 | 5178.4 |
| | AVE | 998.14 | 125.30 | 116.94 | 41.23 | 7989.2 |
| .99 | 1B | 1665.87 | 143.88 | 122.69 | 21.69 | 4937.1 |
| .99 | 2A | 1658.94 | 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 | 31.34 | 8402.2 |
| 1.22 | 3B | 1933.90 | 152.28 | 130.82 | 37.74 | 9286.0 |
| 1.22 | 5B | 1931.10 | 151.68 | 137.69 | 24.84 | 4822.5 |
| | AVE | 1938.87 | 151.87 | 129.98 | 31.34 | 7003.7 |
| 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 | 2033.21 | 162.54 | 140.79 | 47.40 | 9544.8 |
| | AVE | 2023.43 | 167.54 | 140.68 | 30.60 | 6282.1 |

40102E-2

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/SCM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU /PR**0.33 | 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 | 40.44 | 9465.4 |
| 1.70(1.69) | 2E | 2508.43 | 177.43 | 146.64 | 23.89 | 4693.1 |
| 1.70(1.69) | 4A | 2502.80 | 169.39 | 146.98 | 28.77 | 4752.0 |
| 1.70(1.70) | 4B | 2496.38 | 176.76 | 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 | 33.15 | 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 | 2474.36 | 175.33 | 154.45 | 43.36 | 11511.9 |
| | AVE | 2496.68 | 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(1.93) | 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 |

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40102E-4

| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| 1.93(1.92) | 3A | 2520.31 | 171.56 | 152.60 | 46.76 | 8175.7 |
| 1.93(1.92) | 3D | 2520.74 | 174.97 | 154.94 | 37.38 | 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 | 25.87 | 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 | 5011.4 |
| 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 | 184.36 | 157.59 | 36.30 | 8837.4 |
| 1.98(1.97) | 2E | 2508.43 | 175.00 | 154.89 | 30.76 | 5364.6 |
| 1.98(1.98) | 3A | 2520.31 | 168.43 | 155.00 | 68.60 | 7192.7 |
| 1.98(1.98) | 3B | 2503.31 | 176.15 | 159.03 | 57.05 | 8315.2 |
| 1.98(1.99) | 3C | 2453.96 | 179.15 | 154.81 | 47.23 | 6309.9 |
| 1.98(1.98) | 4A | 2502.80 | 171.14 | 156.30 | 42.81 | 4739.5 |
| 1.98(1.98) | 4B | 2496.38 | 174.15 | 159.92 | 43.66 | 7122.6 |
| 1.98(1.99) | 4C | 2554.75 | 180.34 | 154.16 | 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 | 29.67 | 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 | 177.45 | 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 | 156.64 | 59.25 | 7281.1 |
| 2.01(2.02) | 3C | 2428.07 | 174.78 | 161.00 | 50.07 | 6281.4 |
| 2.01(2.03) | 3E | 2505.86 | 175.50 | 154.55 | 41.74 | 7653.8 |
| 2.01(2.05) | 5C | 2505.36 | 176.00 | 156.84 | 64.75 | 7922.8 |
| | AVE | 2483.81 | 175.70 | 157.50 | 50.67 | 7861.7 |
| 2.03(2.02) | 2B | 2462.99 | 183.87 | 159.04 | 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 | 156.60 | 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 | 183.89 | 163.18 | 38.60 | 6403.7 |
| 2.13 | 2C | 2425.36 | 180.33 | 162.43 | 53.21 | 7931.9 |
| 2.13 | 2D | 2415.24 | 184.08 | 163.69 | 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 | 178.05 | 166.68 | 66.32 | 7452.9 |
| 2.29 | 3B | 2324.61 | 189.64 | 164.83 | 44.29 | 8113.7 |
| 2.29 | 3C | 2341.16 | 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 | 186.89 | 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 | 170.31 | 33.98 | 6686.2 |
| 2.29 | 4D | 2263.24 | 191.18 | 168.25 | 32.69 | 7104.4 |
| 2.29 | 5C | 2296.19 | 182.17 | 164.57 | 44.48 | 7735.7 |
| 2.29 | 5D | 2235.67 | 182.22 | 162.97 | 33.93 | 4621.8 |
| | AVE | 2280.55 | 187.56 | 167.72 | 38.31 | 6755.2 |

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| | | | | | | |
|------|-----|---------|--------|--------|-------|--------|
| 2.44 | 1C | 1955.97 | 188.76 | 168.38 | 32.27 | 7445.5 |
| 2.44 | 2D | 1942.00 | 194.56 | 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 | 185.66 | 172.34 | 34.78 | 4388.3 |
| 2.44 | 5C | 2022.43 | 164.67 | 169.12 | 43.95 | 7495.3 |
| | AVE | 1961.27 | 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**0.33 | h / NULUS NO. |
|-----------|-----------------|----------------------------|---------------------------------|-----------------------|---------------|---------------|
| 12 | 1B | 216.13 | 250.68 | 237.83 | 26.73 | 5141.3 |
| 12 | 2A | 243.80 | 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 | 5D | 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 | 618.50 | 305.00 | 263.16 | 31.39 | 8402.2 |
| 48 | 3B | 612.96 | 306.10 | 267.48 | 37.79 | 9286.5 |
| 48 | 5D | 612.04 | 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 | 47.40 | 9544.8 |
| | AVE | 799.82 | 333.56 | 285.22 | 30.66 | 6282.1 |

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RUN 40102E

MASS FLOW = .0463 LBM/SEC

INLET VAPOR TEMP = 233.0 DEG F

TOTAL POWER = 3.32 BTU/SEC

| Z (IN) | ROD LOCATION | HEAT FLUX (BTU/HR-SCFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU /PR**0.33 | KEYNOLDS 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 (66.9) | 2C | 791.69 | 359.13 | 294.68 | 40.49 | 9465.4 |
| 67 (66.7) | 2E | 795.06 | 351.37 | 296.30 | 27.89 | 4693.1 |
| 67 (66.5) | 4A | 793.28 | 336.90 | 296.56 | 29.77 | 4752.0 |
| 67 (66.8) | 4B | 791.24 | 356.06 | 301.07 | 31.38 | 7459.3 |
| 67 (67.5) | 4C | 809.74 | 350.86 | 298.13 | 34.51 | 9396.6 |
| 67 (67.9) | 4E | 795.73 | 349.18 | 297.00 | 22.10 | 4745.0 |
| | AVE | 793.86 | 346.50 | 297.42 | 27.06 | 6604.0 |
| 70 (70.4) | 2C | 791.69 | 356.76 | 301.62 | 36.10 | 11711.6 |
| 70 (69.2) | 3C | 777.81 | 345.66 | 300.21 | 39.55 | 10695.6 |
| 70 (70.1) | 3D | 798.97 | 349.51 | 302.42 | 39.46 | 11676.3 |
| | AVE | 789.49 | 348.47 | 301.42 | 37.70 | 11361.2 |
| 72 (71.4) | 3E | 794.26 | 351.32 | 298.74 | 30.15 | 10716.8 |
| 72 (74.0) | 5C | 794.09 | 347.41 | 303.98 | 35.99 | 10054.8 |
| | AVE | 794.17 | 349.61 | 301.38 | 33.57 | 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 | 303.66 | 22.78 | 7846.8 |
| 74 (74.5) | 2D | 798.05 | 356.16 | 310.06 | 38.49 | 11440.7 |
| 74 (73.9) | 4D | 784.25 | 347.60 | 310.51 | 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 | 7109.2 |
| 75 (74.7) | 1D | 788.99 | 354.48 | 305.89 | 23.27 | 6621.7 |
| 75 (75.6) | 2E | 795.06 | 347.40 | 307.49 | 29.31 | 6350.2 |
| 75 (74.8) | 5D | 800.09 | 333.54 | 306.11 | 42.41 | 6946.9 |
| | 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 |

40102E-8

40102E-9

| | | | | | | |
|-----------|-----|--------|--------|--------|-------|---------|
| 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 | 338.27 | 309.73 | 40.51 | 5165.0 |
| 76 (75.9) | 4B | 791.24 | 349.05 | 310.16 | 46.26 | 7891.8 |
| 76 (76.0) | 4D | 784.25 | 345.68 | 313.06 | 46.47 | 10196.7 |
| 76 (77.6) | 5C | 794.09 | 344.01 | 309.18 | 44.56 | 7914.8 |
| 76 (75.8) | 5D | 800.09 | 354.75 | 317.38 | 42.48 | 6489.1 |
| | AVE | 793.72 | 344.88 | 310.05 | 41.61 | 8046.4 |
| 77 (77.3) | 1B | 810.14 | 359.02 | 319.27 | 23.20 | 5894.6 |
| 77 (77.1) | 1C | 773.31 | 346.86 | 307.12 | 39.68 | 8707.7 |
| 77 (76.8) | 1D | 788.99 | 351.14 | 319.06 | 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 | 310.52 | 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 | 312.66 | 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 | 340.25 | 313.34 | 42.91 | 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 |
| 78 (78.3) | 5D | 800.09 | 343.20 | 310.95 | 35.34 | 5522.6 |
| | AVE | 790.87 | 349.53 | 314.63 | 43.46 | 6987.0 |
| 79 (79.1) | 2C | 768.74 | 352.32 | 316.15 | 47.95 | 9497.4 |
| 79 (78.7) | 2D | 798.05 | 354.50 | 316.49 | 40.20 | 8533.7 |
| 79 (79.2) | 3A | 798.83 | 341.29 | 314.05 | 59.25 | 7281.1 |
| 79 (79.4) | 3C | 769.60 | 355.60 | 321.81 | 57.77 | 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 | 7422.8 |
| | AVE | 787.26 | 348.27 | 315.50 | 57.67 | 7861.7 |
| 80 (79.7) | 2B | 761.65 | 362.97 | 318.37 | 32.44 | 8328.7 |

4010ZE-10

| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| 80 (79.6) | 3D | 798.97 | 352.30 | 317.60 | 53.91 | 9183.7 |
| 80 (79.8) | 4A | 769.89 | 343.50 | 317.40 | 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 | 39.60 | 6433.7 |
| 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 | 769.60 | 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 | 742.20 | 343.50 | 324.44 | 55.50 | 4779.6 |
| 84 | 5C | 764.84 | 349.01 | 319.72 | 51.33 | 6113.2 |
| | AVE | 757.34 | 354.44 | 323.92 | 48.68 | 6979.0 |
| 90 | 1D | 725.98 | 366.28 | 330.64 | 29.16 | 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 | 373.50 | 335.86 | 35.29 | 6723.4 |
| 90 | 2E | 711.50 | 370.90 | 331.83 | 25.27 | 4417.2 |
| 90 | 3A | 734.87 | 353.53 | 332.03 | 66.32 | 7452.9 |
| 90 | 3B | 736.80 | 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 | 339.84 | 36.40 | 8514.8 |
| 90 | 3E | 709.35 | 368.24 | 328.53 | 34.37 | 7690.0 |
| 90 | 4A | 723.59 | 359.79 | 335.39 | 41.05 | 4397.4 |
| 90 | 4B | 733.24 | 378.60 | 338.92 | 33.98 | 6686.2 |
| 90 | 4D | 717.35 | 376.15 | 335.39 | 32.69 | 7104.4 |
| 90 | 5C | 727.79 | 359.91 | 328.22 | 44.46 | 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 | 346.37 | 26.16 | 4344.4 |
| 96 | 3B | 626.40 | 379.76 | 346.40 | 39.54 | 8459.0 |
| 96 | 3C | 618.86 | 360.28 | 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/CM ²) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR** .33 | REYNOLDS NO. |
|-------|--------------|-----------------------------------|---------------------------|--------------------|---------------|--------------|
| .30 | 4C | 609.10 | 122.94 | 114.91 | 37.20 | 10466.2 |
| .30 | 4E | 628.87 | 123.95 | 114.99 | 29.15 | 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 | 1746.93 | 146.81 | 123.24 | 19.74 | 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 | 1865.95 | 152.28 | 128.99 | 29.93 | 8253.6 |
| 1.22 | 2C | 1872.24 | 152.56 | 130.85 | 36.15 | 9597.4 |
| 1.22 | 2E | 1806.18 | 152.26 | 130.95 | 23.55 | 4822.4 |
| 1.22 | 3E | 1839.21 | 148.01 | 129.01 | 36.37 | 8306.4 |
| | AVE | 1859.34 | 151.28 | 129.95 | 31.56 | 7745.2 |
| 1.52 | 1B | 2295.06 | 164.93 | 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 |

41002F-2

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**0.33 | 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 | 31.07 | 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 |

41002F-3

41002F-4

| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| 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) | 1B | 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 | 6963.9 |
| 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 | 2437.67 | 175.50 | 155.84 | 31.30 | 5778.5 |
| | AVE | 2453.65 | 178.67 | 157.07 | 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 | 46.06 | 5307.9 |
| 2.03(2.04) | 3D | 2403.86 | 180.39 | 160.20 | 46.13 | 8217.0 |
| 2.03(2.02) | 4A | 2306.53 | 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 | 46.76 | 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 | 6677.9 |
| 2.29 | 2C | 2201.31 | 191.04 | 168.31 | 36.56 | 8309.4 |
| 2.29 | 2D | 2169.71 | 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 | 15.92 | 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) | RJD LOCATION | HEAT FLUX (BTU/HK-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR** .33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|------------------------------|-----------------------|---------------|--------------|
| 12 | 4C | 212.08 | 253.30 | 238.84 | 37.20 | 40406.2 |
| 12 | 4E | 199.33 | 255.11 | 238.98 | 29.13 | 5033.5 |
| | AVE | 205.70 | 254.20 | 238.91 | 28.67 | 7719.9 |
| 24 | 3E | 297.90 | 262.30 | 242.83 | 34.14 | 8567.5 |
| | AVE | 297.90 | 262.30 | 242.83 | 34.14 | 8567.5 |
| 39 | 1d | 516.50 | 292.14 | 253.88 | 21.14 | 4847.2 |
| 39 | 2A | 490.31 | 296.26 | 253.84 | 18.04 | 4834.4 |
| 39 | 4L | 525.14 | 286.65 | 253.88 | 39.06 | 9939.2 |
| | AVE | 510.65 | 291.69 | 253.84 | 26.78 | 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 | 23.50 | 4822.9 |
| 48 | 3E | 582.95 | 298.42 | 264.22 | 36.37 | 6316.4 |
| | AVE | 589.33 | 304.30 | 265.91 | 31.50 | 7745.2 |
| 60 | 1d | 727.44 | 337.88 | 285.96 | 29.66 | 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 | 23.80 | 4587.5 |

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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**0.33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|---------------------------------|-----------------------|--------------|--------------|
| 67 (65.7) | 2A | 769.43 | 350.00 | 295.70 | 20.55 | 4583.1 |
| 67 (66.8) | 2B | 776.65 | 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 |

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| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| 77 (77.2) | 2B | 776.05 | 358.85 | 315.51 | 34.20 | 9099.4 |
| 77 (76.9) | 2D | 776.17 | 344.60 | 314.09 | 48.81 | 9654.0 |
| 77 (76.7) | 3B | 779.82 | 358.88 | 316.89 | 40.96 | 8249.2 |
| 77 (77.0) | 5B | 784.56 | 347.90 | 317.63 | 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 | 367.00 | 316.66 | 34.15 | 8716.0 |
| 78 (78.0) | 3A | 772.77 | 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 | 49.46 | 9258.5 |
| 78 (78.3) | 4E | 778.50 | 349.00 | 312.13 | 50.26 | 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 | 48.25 | 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 | 370.50 | 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 (80.4) | 3E | 736.80 | 343.63 | 314.84 | 50.72 | 7520.6 |

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| | | | | | | |
|----|-----|--------|--------|--------|-------|--------|
| | 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 | 360.94 | 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 | 55.70 | 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 | 46.46 | 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 | 333.29 | 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 | 736.84 | 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 | 666.32 | 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 | 668.77 | 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 | 636.18 | 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 inlet 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 = 6.39 KW

| Z (M) | ROD LOCATION | HEAT FLUX (WATT/CM ²) | FALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | 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 | 1700.40 | 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 | 2438.77 | 146.88 | 126.27 | 38.99 | 8182.6 |
| .99 | 4A | 2867.69 | 146.19 | 126.31 | 39.46 | 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 | 154.81 | 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 | 4236.37 | 168.26 | 146.81 | 50.89 | 7044.2 |
| 1.52 | 4C | 4262.71 | 164.54 | 145.09 | 93.25 | 12903.1 |
| 1.52 | 4E | 4215.47 | 166.96 | 146.13 | 52.35 | 7802.7 |
| | AVE | 4235.23 | 166.83 | 146.18 | 61.56 | 9071.8 |

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KUN 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/CM ²) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR ^{0.33} | 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 | 30.11 | 7114.1 |
| 1.70(1.72) | 4C | 4396.58 | 184.02 | 150.38 | 56.43 | 13786.7 |
| 1.70(1.72) | 4E | 4376.13 | 179.19 | 153.29 | 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 | 47.14 | 7690.1 |
| 1.78(1.81) | 1C | 4416.80 | 186.16 | 152.91 | 45.76 | 12929.6 |
| 1.78(1.78) | 2D | 4533.45 | 187.25 | 157.72 | 51.23 | 11641.9 |
| 1.78(1.87) | 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 | 11632.8 |
| 1.80(1.83) | 3C | 4442.47 | 189.31 | 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 | 188.47 | 161.21 | 52.92 | 11081.2 |
| 1.80(1.82) | 5D | 4444.83 | 181.57 | 157.47 | 45.96 | 7385.6 |
| | AVE | 4470.17 | 186.73 | 157.80 | 50.93 | 11345.0 |
| 1.83(1.85) | 1B | 4502.33 | 182.83 | 157.61 | 44.51 | 7616.9 |
| 1.83(1.86) | 1C | 4416.80 | 186.16 | 154.78 | 45.37 | 12790.9 |
| 1.83(1.83) | 2D | 4533.45 | 187.42 | 159.93 | 54.85 | 11631.5 |
| 1.83(1.85) | 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 | 194.27 | 159.44 | 57.48 | 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 | 4489.91 | 188.26 | 158.06 | 49.48 | 11832.3 |
| 1.88(1.93) | 1D | 4502.83 | 186.83 | 160.98 | 43.34 | 7459.3 |
| 1.88(1.91) | 2C | 4504.50 | 193.80 | 160.71 | 51.62 | 14591.7 |
| 1.88(1.89) | 2D | 4533.45 | 191.57 | 162.56 | 51.27 | 11548.0 |

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| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| 1.88(1.84) | 2E | 4310.7F | 185.28 | 157.81 | 38.98 | 7419.0 |
| 1.88(1.92) | 3B | 4591.17 | 190.88 | 162.37 | 57.23 | 14134.0 |
| 1.88(1.90) | 3C | 4442.47 | 193.30 | 161.41 | 52.91 | 14490.7 |
| 1.88(1.92) | 3D | 4593.87 | 195.20 | 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 | 191.08 | 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 | 55.66 | 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 | 187.19 | 162.26 | 43.94 | 7341.1 |
| 1.93(1.92) | 2B | 4291.55 | 190.88 | 163.03 | 51.95 | 11614.7 |
| 1.93(1.93) | 2D | 4533.45 | 193.28 | 163.93 | 57.68 | 11511.5 |
| 1.93(1.89) | 2E | 4310.7F | 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 | 184.27 | 162.44 | 45.04 | 7285.8 |
| 1.93(1.95) | 4C | 4396.5F | 193.16 | 163.70 | 55.53 | 14077.7 |
| | AVE | 4440.12 | 192.41 | 163.10 | 47.49 | 10906.5 |
| 1.96(2.00) | 1D | 4502.83 | 189.01 | 164.03 | 43.79 | 7364.8 |
| 1.96(1.99) | 2C | 4504.50 | 197.55 | 163.88 | 53.35 | 14449.6 |
| 1.96(1.95) | 2D | 4533.45 | 194.54 | 164.07 | 49.98 | 11482.7 |
| 1.96(1.98) | 3C | 4442.47 | 192.44 | 164.47 | 51.48 | 14454.8 |
| 1.96(1.97) | 3E | 4429.39 | 187.47 | 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 | 188.29 | 163.79 | 44.51 | 7249.1 |
| | AVE | 4470.17 | 192.74 | 164.04 | 49.16 | 11212.1 |
| 1.98(2.01) | 3D | 4593.87 | 199.39 | 165.67 | 51.72 | 14145.3 |
| 1.98(2.00) | 2A | 4437.12 | 190.78 | 164.35 | 41.01 | 7288.5 |
| 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 | 57.74 | 14425.6 |
| 1.98(2.01) | 4A | 4428.05 | 192.34 | 166.05 | 40.96 | 7111.9 |
| 1.98(2.00) | 4E | 4376.13 | 192.57 | 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 | 188.02 | 165.42 | 58.62 | 13432.9 |
| 2.13 | 2B | 4052.85 | 187.78 | 171.82 | 83.91 | 9913.7 |
| 2.13 | 2E | 4121.44 | 184.66 | 170.97 | 68.94 | 7245.3 |
| 2.13 | 3A | 4003.38 | 188.07 | 167.15 | 64.53 | 12115.9 |
| 2.13 | 3B | 4113.03 | 197.07 | 170.77 | 54.34 | 11746.8 |
| 2.13 | 3D | 4141.14 | 196.77 | 170.16 | 57.67 | 12334.0 |
| 2.13 | 4D | 4219.60 | 189.97 | 172.55 | 74.88 | 10958.0 |
| 2.13 | 5B | 4026.71 | 187.17 | 170.94 | 63.40 | 7688.9 |
| | AVE | 4088.14 | 189.77 | 169.31 | 64.47 | 10351.2 |
| 2.29 | 1D | 3824.87 | 198.16 | 174.26 | 38.15 | 7393.6 |
| 2.29 | 2C | 3837.27 | 203.06 | 175.82 | 51.77 | 13061.1 |
| 2.29 | 2E | 4079.94 | 191.19 | 174.78 | 54.86 | 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 | 3867.07 | 196.83 | 171.49 | 67.16 | 12378.0 |
| 2.29 | 4A | 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 | 195.70 | 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 | 196.06 | 175.52 | 51.67 | 12293.9 |
| 2.44 | 2E | 3244.76 | 197.98 | 174.37 | 41.32 | 7058.8 |
| 2.44 | 3B | 3365.95 | 200.43 | 182.52 | 46.98 | 12996.5 |
| 2.44 | 4D | 3276.40 | 203.48 | 183.36 | 57.57 | 10448.3 |
| 2.44 | 5B | 3309.23 | 196.06 | 180.05 | 47.09 | 7206.9 |
| 2.44 | 5C | 3302.73 | 192.90 | 176.63 | 67.38 | 12368.6 |
| | AVE | 3291.03 | 199.46 | 179.68 | 50.69 | 10430.2 |

44303A-5

RUN 44303A

MASS FLOW = .0760 LBM/SEC

INLET VAPOR TEMP = 238.0 DEG F

TOTAL POWER = 5.77 BTU/SEC

| Z (IN) | RUD LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR ^{0.33} | REYNOLDS NO. |
|-----------|-----------------|----------------------------|------------------------------|-----------------------|-------------------------|--------------|
| 12 | 2A | 353.69 | 259.69 | 243.40 | 35.12 | 8503.3 |
| 12 | 4A | 356.72 | 257.81 | 243.42 | 47.14 | 8515.5 |
| 12 | 4C | 354.41 | 255.40 | 243.33 | 74.01 | 16962.2 |
| 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 | 248.97 | 36.27 | 8496.1 |
| 24 | 1C | 535.92 | 269.41 | 247.55 | 54.14 | 14115.0 |
| 24 | 4D | 544.68 | 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 | 75.16 | 16117.9 |
| | AVE | 909.37 | 293.17 | 259.31 | 51.22 | 10829.7 |
| 48 | 1B | 1164.14 | 317.13 | 274.42 | 39.06 | 8674.4 |
| 48 | 1C | 1076.75 | 327.51 | 270.89 | 45.27 | 13445.0 |
| 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 | 44.81 | 10450.9 |
| 60 | 2A | 1342.11 | 333.60 | 294.28 | 57.16 | 8477.2 |
| 60 | 4A | 1340.85 | 334.87 | 296.25 | 50.84 | 7044.2 |
| 60 | 4C | 1351.13 | 328.18 | 294.97 | 93.25 | 12903.1 |
| 60 | 4E | 1335.49 | 332.53 | 295.73 | 52.35 | 7862.7 |
| | AVE | 1342.39 | 332.30 | 295.13 | 61.46 | 9071.8 |

44303A-6

RUN 44303A

MASS FLOW = .0760 LBM/SEC

INLET VAPOR TEMP = 238.0 DEG F

TOTAL POWER = 5.77 BTU/S

| Z (IN) | ROD LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR ^{0.33} | 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 | 35.11 | 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 | 49.46 | 10888.4 |
| 71 (72.7) | 1D | 1427.28 | 366.03 | 316.13 | 46.04 | 7582.3 |
| 71 (72.9) | 2C | 1427.73 | 373.22 | 315.00 | 53.72 | 14747.4 |
| 71 (70.8) | 2D | 1436.91 | 369.48 | 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 | 366.94 | 308.61 | 45.44 | 12489.5 |
| 71 (71.7) | 4B | 1405.31 | 372.14 | 322.19 | 52.92 | 11381.2 |
| 71 (71.5) | 5D | 1406.82 | 358.83 | 315.36 | 45.96 | 7385.6 |
| | AVE | 1416.85 | 368.11 | 316.04 | 50.33 | 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 | 316.49 | 50.48 | 14197.5 |
| 72 (72.6) | 5B | 1383.41 | 362.33 | 318.18 | 41.32 | 7324.9 |
| 72 (71.6) | 5C | 1418.26 | 358.19 | 309.42 | 37.21 | 12516.1 |
| | AVE | 1423.10 | 370.80 | 316.50 | 49.48 | 11832.3 |
| 74 (75.8) | 1D | 1427.20 | 367.43 | 321.76 | 43.34 | 7459.3 |
| 74 (75.1) | 2C | 1427.73 | 366.46 | 321.28 | 51.62 | 14591.7 |
| 74 (74.6) | 2D | 1436.91 | 377.04 | 324.61 | 51.27 | 11548.0 |

44303A-7

44303A-8

| | | | | | | |
|-----------|-----|---------|--------|--------|-------|---------|
| 74 (72.4) | 2E | 1366.33 | 365.50 | 316.00 | 38.98 | 7419.0 |
| 74 (75.4) | 3B | 1455.20 | 386.38 | 324.27 | 50.23 | 14104.0 |
| 74 (74.9) | 3C | 1408.07 | 374.44 | 322.53 | 52.91 | 14440.7 |
| 74 (75.4) | 3D | 1456.06 | 383.46 | 323.55 | 51.84 | 14203.9 |
| 74 (74.6) | 3E | 1403.93 | 371.10 | 313.98 | 47.73 | 12396.1 |
| 74 (74.8) | 4B | 1405.31 | 377.34 | 328.57 | 53.15 | 11145.1 |
| 74 (73.7) | 5C | 1418.20 | 380.44 | 313.11 | 38.69 | 12451.1 |
| 74 (74.7) | 5D | 1408.82 | 364.78 | 321.27 | 45.51 | 7314.4 |
| | AVE | 1419.42 | 374.08 | 320.91 | 49.57 | 11556.7 |
| 75 (77.0) | 1D | 1427.20 | 370.22 | 323.46 | 43.29 | 7420.6 |
| 75 (76.3) | 2C | 1427.73 | 383.20 | 323.49 | 51.42 | 14534.8 |
| 75 (75.2) | 2D | 1436.91 | 378.70 | 322.75 | 50.66 | 11528.6 |
| 75 (76.1) | 3C | 1408.07 | 382.13 | 324.74 | 52.75 | 14484.1 |
| 75 (75.9) | 3E | 1403.93 | 366.98 | 316.25 | 51.69 | 12386.6 |
| 75 (76.9) | 4B | 1405.31 | 376.89 | 330.33 | 53.83 | 11161.0 |
| 75 (75.8) | 5D | 1408.82 | 366.82 | 323.36 | 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 | 327.57 | 53.68 | 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 | 384.24 | 326.34 | 52.14 | 14471.0 |
| 76 (77.2) | 3D | 1456.06 | 367.26 | 326.37 | 51.15 | 14177.6 |
| 76 (76.9) | 4A | 1403.93 | 375.30 | 327.03 | 43.32 | 7128.1 |
| 76 (76.6) | 4E | 1387.05 | 372.08 | 324.40 | 40.04 | 7285.8 |
| 76 (76.7) | 4C | 1393.52 | 379.64 | 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 | 43.59 | 7364.8 |
| 77 (78.2) | 2C | 1427.73 | 387.60 | 326.48 | 53.35 | 14449.6 |
| 77 (76.8) | 2D | 1436.91 | 362.10 | 328.76 | 47.98 | 11482.7 |
| 77 (77.9) | 3C | 1408.07 | 386.50 | 328.04 | 51.46 | 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 | 370.22 | 326.82 | 44.51 | 7249.1 |
| | AVE | 1416.85 | 374.30 | 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 | 41.71 | 7268.5 |
| 78 (78.5) | 2D | 1436.91 | 384.30 | 331.32 | 47.73 | 11455.8 |

| | | | | | | |
|-----------|-----|---------|--------|--------|-------|---------|
| 78 (79.3) | 3B | 1455.2C | 341.8y | 331.39 | 51.07 | 14074.2 |
| 78 (78.9) | 3C | 1408.67 | 309.79 | 329.87 | 50.04 | 14425.6 |
| 76 (79.0) | 4A | 1403.5C | 378.20 | 330.88 | 49.96 | 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 | 363.80 | 330.00 | 47.57 | 11224.9 |
| 84 | 1B | 1295.74 | 372.87 | 330.99 | 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 | 1306.22 | 364.42 | 338.12 | 68.94 | 7245.0 |
| 84 | 3A | 1268.90 | 370.55 | 332.88 | 64.53 | 12115.9 |
| 84 | 3B | 1303.66 | 360.73 | 339.38 | 58.34 | 11745.8 |
| 84 | 3D | 1312.57 | 386.50 | 338.28 | 57.67 | 12334.0 |
| 84 | 4D | 1337.42 | 373.90 | 342.08 | 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 | 388.75 | 345.67 | 38.15 | 7393.6 |
| 90 | 2C | 1216.25 | 397.01 | 348.47 | 51.77 | 13001.1 |
| 90 | 2E | 1293.17 | 376.14 | 346.61 | 57.86 | 7186.8 |
| 90 | 3A | 1269.72 | 309.74 | 342.85 | 59.69 | 11811.3 |
| 90 | 3B | 1281.27 | 464.41 | 350.97 | 49.69 | 12370.8 |
| 90 | 3D | 1229.00 | 400.70 | 349.47 | 49.92 | 12850.4 |
| 90 | 3E | 1232.03 | 375.00 | 340.68 | 67.10 | 12378.0 |
| 90 | 4B | 1228.19 | 344.27 | 354.06 | 55.17 | 10505.4 |
| 90 | 5C | 1257.12 | 373.20 | 341.21 | 74.50 | 12825.8 |
| 90 | 5D | 1239.12 | 364.30 | 347.00 | 45.18 | 7494.7 |
| | AVE | 1245.81 | 388.45 | 346.70 | 54.21 | 10781.8 |
| 96 | 3D | 1068.62 | 345.50 | 358.90 | 60.91 | 13381.1 |
| 96 | 1B | 1025.69 | 390.12 | 353.69 | 37.98 | 7187.7 |
| 96 | 1C | 1021.11 | 384.94 | 347.93 | 51.67 | 12293.9 |
| 96 | 2E | 1028.45 | 368.37 | 304.87 | 41.32 | 7058.8 |
| 96 | 3B | 1066.86 | 407.17 | 360.53 | 45.98 | 12446.5 |
| 96 | 4D | 1038.48 | 398.27 | 361.00 | 50.57 | 10448.3 |
| 96 | 5B | 1048.84 | 384.90 | 356.10 | 49.09 | 7206.9 |
| 96 | 5C | 1746.83 | 374.23 | 349.93 | 67.06 | 12368.6 |
| | AVE | 1043.12 | 391.04 | 355.43 | 50.69 | 10430.2 |

44303A-9

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 41103B

MASS FLOW = .0349 KG/SEC

INLET VAPOR TEMP = 113.9 DEG C

TOTAL POWER = 6.25 KW

| Z (M) | RDD 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 | 115.83 | 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 | 1076.23 | 125.94 | 116.82 | 33.75 | 8649.1 |
| | AVE | 1106.90 | 125.89 | 116.92 | 40.35 | 10769.8 |
| .61 | 1B | 1781.49 | 135.13 | 119.91 | 32.85 | 8606.8 |
| .61 | 1C | 1759.62 | 131.89 | 119.14 | 53.14 | 14342.5 |
| .61 | 4D | 1801.69 | 133.11 | 120.24 | 53.33 | 12917.9 |
| .61 | 5B | 1617.83 | 133.14 | 119.96 | 38.82 | 8629.4 |
| | AVE | 1785.11 | 133.32 | 119.81 | 44.40 | 11124.2 |
| .99 | 2A | 2878.92 | 148.06 | 125.60 | 35.75 | 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 | 165.86 | 134.43 | 35.68 | 8615.4 |
| | 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 | 7817.5 |
| | AVE | 4152.84 | 172.53 | 144.97 | 44.70 | 9621.5 |

41103B-2

RUN 41103B

MASS FLOW = .0349 KG/SEC

INLET VAPOR TEMP = 113.9 DEG C

TOTAL POWER = 6.05 KW

| Z (M) | RUD LOCATION | HEAT FLUX (WATT/SQCM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR** .33 | REYNOLDS NO. |
|------------|--------------|-----------------------|---------------------------|--------------------|---------------|--------------|
| 1.70(1.72) | 2A | 4382.07 | 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 | 4375.27 | 183.34 | 152.81 | 55.92 | 13500.0 |
| 1.70(1.71) | 4E | 4419.17 | 185.89 | 151.41 | 32.79 | 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 | 4376.91 | 188.34 | 156.82 | 46.30 | 11689.8 |
| 1.78(1.78) | 3C | 4484.67 | 187.17 | 155.31 | 54.40 | 14263.9 |
| 1.78(1.79) | 4D | 4429.64 | 188.42 | 157.54 | 47.81 | 11099.2 |
| 1.78(1.81) | 5B | 4289.44 | 182.31 | 155.98 | 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 | 4407.20 | 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 | 4425.81 | 193.15 | 156.40 | 41.72 | 10970.0 |
| 1.83(1.86) | 3A | 4247.87 | 191.44 | 155.02 | 39.82 | 17329.4 |
| 1.83(1.85) | 5B | 4284.94 | 179.65 | 157.41 | 48.30 | 11564.2 |
| 1.83(1.84) | 5C | 4603.51 | 183.08 | 154.24 | 55.18 | 15678.6 |
| | AVE | 4412.92 | 185.47 | 155.41 | 44.19 | 14025.7 |
| 1.88(1.91) | 1D | 4336.92 | 184.67 | 158.14 | 47.58 | 7552.9 |
| 1.88(1.91) | 2B | 4335.92 | 190.22 | 151.39 | 52.25 | 11833.8 |
| 1.88(1.91) | 2C | 4466.82 | 186.33 | 159.58 | 63.27 | 15162.9 |
| 1.88(1.90) | 2D | 4376.91 | 187.78 | 157.82 | 53.85 | 12037.4 |
| 1.88(1.91) | 2E | 4455.81 | 181.03 | 158.47 | 49.30 | 7414.8 |
| 1.88(1.92) | 3A | 4247.87 | 190.03 | 156.00 | 43.80 | 12456.4 |

41103B-3

41103B-4

| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| 1.88(1.91) | 3B | 4317.52 | 187.72 | 161.02 | 61.97 | 14611.7 |
| 1.88(1.88) | 3C | 4404.64 | 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 | 54.71 | 12680.5 |
| 1.88(1.89) | 4B | 4350.90 | 193.52 | 167.37 | 45.95 | 11724.8 |
| 1.88(1.89) | 5C | 4603.51 | 184.29 | 156.29 | 56.50 | 12837.6 |
| 1.88(1.90) | 5D | 4393.85 | 185.45 | 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 | 4466.82 | 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 | 4467.25 | 183.18 | 157.07 | 58.10 | 12629.4 |
| 1.91(1.92) | 4B | 4350.93 | 193.22 | 163.41 | 53.51 | 11426.4 |
| 1.91(1.93) | 5D | 4393.85 | 193.22 | 159.93 | 35.64 | 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 | 57.81 | 11747.8 |
| 1.93(1.96) | 2E | 4455.81 | 189.39 | 150.45 | 55.64 | 7450.9 |
| 1.93(1.96) | 3A | 4447.87 | 189.31 | 158.68 | 47.24 | 12347.6 |
| 1.93(1.96) | 3B | 4317.52 | 193.22 | 162.72 | 59.74 | 14589.5 |
| 1.93(1.94) | 3C | 4404.64 | 187.49 | 161.83 | 61.90 | 15051.4 |
| 1.93(1.96) | 3D | 4326.57 | 187.21 | 167.17 | 66.03 | 14720.1 |
| 1.93(1.96) | 4A | 4388.08 | 195.58 | 152.02 | 31.85 | 7243.3 |
| 1.93(1.94) | 4C | 4379.27 | 187.20 | 162.10 | 61.69 | 14428.6 |
| 1.93(1.94) | 4E | 4419.17 | 193.46 | 160.76 | 35.14 | 7449.1 |
| 1.93(1.94) | 5C | 4603.51 | 184.15 | 158.03 | 60.52 | 12317.8 |
| | AVE | 4412.69 | 188.42 | 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 | 4466.82 | 191.38 | 162.48 | 57.93 | 14968.4 |
| 1.96(1.98) | 2D | 4370.90 | 193.23 | 163.98 | 54.88 | 11784.0 |
| 1.96(1.96) | 3C | 4484.69 | 194.50 | 162.88 | 53.70 | 14942.0 |
| 1.96(1.94) | 3E | 4467.26 | 182.83 | 158.82 | 63.06 | 12556.8 |
| 1.96(1.96) | 4B | 4350.93 | 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 | 190.14 | 161.85 | 32.07 | 7337.9 |
| 1.98(2.01) | 2B | 4535.42 | 196.40 | 165.43 | 46.07 | 11606.0 |
| 1.98(2.01) | 2D | 4370.90 | 195.83 | 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 | 167.71 | 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 | 197.77 | 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 | 4388.08 | 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 | 4663.51 | 185.28 | 160.07 | 62.42 | 12185.8 |
| | AVE | 4468.65 | 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 | 3492.11 | 196.39 | 170.21 | 49.41 | 10028.7 |
| 2.13 | 2E | 4123.74 | 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 | 159.56 | 60.73 | 11961.9 |
| 2.13 | 3D | 4006.49 | 192.03 | 164.85 | 65.11 | 12676.0 |
| 2.13 | 4D | 4084.52 | 192.31 | 170.03 | 59.75 | 11313.4 |
| 2.13 | 5B | 4055.75 | 187.58 | 159.24 | 53.91 | 7834.4 |
| 2.13 | 5C | 4043.83 | 182.62 | 165.63 | 81.02 | 13439.0 |
| | AVE | 4061.91 | 184.72 | 167.80 | 59.56 | 10843.1 |
| 2.29 | 1D | 3809.03 | 197.18 | 172.06 | 36.36 | 7517.5 |
| 2.29 | 2H | 3763.77 | 207.27 | 175.81 | 37.90 | 10536.6 |
| 2.29 | 2C | 3854.65 | 201.82 | 174.29 | 51.00 | 13462.7 |
| 2.29 | 2E | 3851.76 | 191.20 | 172.59 | 49.76 | 7320.1 |
| 2.29 | 3A | 3680.14 | 202.41 | 170.87 | 38.36 | 11926.7 |
| 2.29 | 3B | 3416.50 | 206.23 | 175.41 | 46.85 | 12890.8 |
| 2.29 | 3D | 3769.01 | 194.46 | 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 | 3460.78 | 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 | 37.25 | 10835.4 |
| 2.44 | 2E | 3206.02 | 194.95 | 177.19 | 43.90 | 7217.7 |
| 2.44 | 3A | 3231.52 | 203.12 | 175.78 | 38.54 | 11844.6 |
| 2.44 | 3B | 3244.13 | 208.25 | 190.43 | 42.36 | 13432.3 |
| 2.44 | 3D | 3260.86 | 200.77 | 179.40 | 57.97 | 13838.5 |
| 2.44 | 4D | 3318.35 | 202.44 | 190.36 | 47.64 | 11320.1 |
| 2.44 | 5B | 3371.81 | 198.26 | 179.14 | 41.80 | 7259.8 |
| 2.44 | 5C | 3023.32 | 195.67 | 175.39 | 58.97 | 12244.7 |
| | AVE | 3299.70 | 199.91 | 177.88 | 46.42 | 10781.7 |

41103R-5

RUN 41103B

MASS FLOW = 0.776 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 ^{0.33} | REYNOLDS NO. |
|-----------|-----------------|----------------------------|---------------------------------|-----------------------|-------------------------|--------------|
| 12 | 2A | 355.23 | 259.42 | 242.29 | 33.59 | 8643.9 |
| 12 | 4A | 356.60 | 259.87 | 242.31 | 32.32 | 8640.1 |
| 12 | 4C | 348.23 | 256.46 | 242.23 | 61.73 | 17146.3 |
| 12 | 4E | 341.73 | 258.69 | 242.28 | 33.73 | 8649.1 |
| | AVE | 348.96 | 258.61 | 242.29 | 47.35 | 10769.8 |
| 24 | 1B | 504.63 | 275.23 | 247.84 | 32.83 | 8606.8 |
| 24 | 1C | 521.38 | 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 | 412.49 | 278.50 | 258.77 | 35.33 | 8302.0 |
| 39 | 4A | 696.76 | 299.46 | 258.17 | 33.76 | 8273.2 |
| 39 | 4C | 412.92 | 295.20 | 258.15 | 59.61 | 16246.7 |
| 39 | 4E | 687.24 | 299.47 | 258.06 | 33.23 | 8292.2 |
| | AVE | 492.34 | 298.16 | 258.11 | 47.46 | 10289.5 |
| 48 | 1B | 1100.23 | 328.10 | 273.17 | 30.06 | 8133.4 |
| 48 | 1C | 1111.84 | 317.78 | 269.57 | 48.26 | 13729.9 |
| 48 | 4D | 1163.94 | 323.19 | 275.63 | 52.38 | 12482.0 |
| 48 | 5B | 1126.08 | 321.54 | 273.97 | 35.68 | 8015.4 |
| | AVE | 1116.55 | 321.88 | 273.08 | 41.16 | 10596.2 |
| 63 | 1A | 1338.10 | 346.80 | 292.41 | 35.86 | 7736.9 |
| 63 | 4A | 1313.24 | 344.59 | 293.55 | 37.54 | 7642.9 |
| 63 | 4C | 1294.34 | 338.18 | 293.23 | 65.61 | 5268.5 |
| 63 | 4E | 1319.30 | 343.66 | 292.10 | 39.79 | 7817.3 |
| | AVE | 1316.27 | 342.55 | 292.82 | 44.76 | 9621.5 |

41103B-6

RUN 41173A

MASS FLOW = .0770 LBM/SEC

INLET VAPOR TEMP = 237.0 DEG F

TOTAL POWER = 5.73 BTU/SEC

| Z (IN) | RID LOCATION | HEAT FLUX (BTU/HR-SQF) | FALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR = .33 | REYNOLDS NU. |
|-----------|-----------------|---------------------------|---------------------------------|-----------------------|---------------|--------------|
| 67 (67.7) | 2A | 1388.61 | 367.57 | 304.91 | 31.49 | 7894.9 |
| 67 (67.9) | 4A | 1340.83 | 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 | 32.79 | 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 | 1385.34 | 371.02 | 314.40 | 46.30 | 11689.8 |
| 70 (70.2) | 3C | 1421.45 | 358.90 | 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 | 366.05 | 311.48 | 35.19 | 9300.1 |
| 71 (71.6) | 2D | 1385.34 | 375.55 | 315.84 | 42.76 | 12053.3 |
| 71 (71.1) | 3C | 1421.45 | 372.12 | 313.24 | 52.78 | 13682.4 |
| 71 (72.1) | 3E | 1340.91 | 362.47 | 307.78 | 50.17 | 14170.6 |
| 71 (71.3) | 4B | 1374.05 | 382.21 | 318.89 | 40.78 | 11158.0 |
| 71 (71.7) | 5D | 1392.60 | 365.52 | 311.99 | 36.82 | 6639.2 |
| | 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 | 1412.33 | 361.07 | 313.58 | 41.72 | 10970.0 |
| 72 (73.2) | 3A | 1340.39 | 376.59 | 311.04 | 39.82 | 17329.4 |
| 72 (73.0) | 5B | 1354.73 | 322.38 | 315.33 | 48.31 | 11564.2 |
| 72 (72.4) | 5C | 1454.12 | 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 | 52.75 | 11833.8 |
| 74 (75.1) | 2C | 1344.87 | 367.39 | 319.24 | 53.27 | 15162.9 |
| 74 (74.7) | 2D | 1385.34 | 373.03 | 321.48 | 53.85 | 12037.4 |
| 74 (75.3) | 2E | 1412.33 | 357.86 | 317.24 | 49.30 | 7414.8 |
| 74 (75.4) | 3A | 1340.39 | 374.15 | 314.58 | 43.86 | 12456.4 |

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41103B-8

| | | | | | | |
|-----------|-----|---------|--------|--------|-------|---------|
| 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) | 3U | 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 | 363.34 | 324.27 | 45.93 | 11724.8 |
| 74 (74.0) | 5C | 1459.11 | 363.73 | 313.31 | 56.56 | 12837.6 |
| 74 (74.6) | 5U | 1392.60 | 366.72 | 317.21 | 39.62 | 7514.2 |
| | AVE | 1395.13 | 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 | 59.99 | 15119.1 |
| 75 (75.8) | 2D | 1365.34 | 368.90 | 323.50 | 57.52 | 11840.1 |
| 75 (75.4) | 3L | 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) | 5U | 1392.60 | 374.40 | 319.87 | 35.69 | 7323.6 |
| | AVE | 1391.87 | 369.13 | 320.93 | 53.80 | 11562.5 |
| 76 (76.4) | 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 | 59.74 | 14589.5 |
| 76 (76.2) | 3L | 1421.45 | 373.08 | 323.29 | 61.90 | 15051.4 |
| 76 (77.1) | 3U | 1309.44 | 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 | 1368.04 | 372.56 | 323.78 | 61.69 | 14428.6 |
| 76 (76.5) | 4E | 1400.69 | 375.73 | 327.11 | 35.14 | 7449.1 |
| 76 (76.5) | 5C | 1459.11 | 363.47 | 316.46 | 69.52 | 12317.8 |
| | AVE | 1398.44 | 372.65 | 321.87 | 51.64 | 11340.1 |
| 77 (78.5) | 1D | 1372.72 | 368.40 | 322.82 | 41.70 | 7558.0 |
| 77 (78.0) | 2C | 1394.87 | 376.49 | 324.46 | 57.93 | 14968.4 |
| 77 (77.8) | 2U | 1365.34 | 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 | 47.70 | 11453.5 |
| 77 (78.1) | 5U | 1392.60 | 366.61 | 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 | 7331.9 |
| 78 (79.2) | 2B | 1437.53 | 386.42 | 329.77 | 46.97 | 11606.0 |
| 78 (78.6) | 2D | 1385.34 | 375.50 | 328.67 | 55.20 | 11762.5 |

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|-----------|-----|---------|--------|--------|-------|---------|
| 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 | 1421.40 | 396.72 | 327.24 | 51.12 | 14852.0 |
| 78 (79.2) | 3D | 1364.44 | 377.53 | 327.48 | 58.93 | 14571.3 |
| 78 (74.0) | 4A | 1346.83 | 384.43 | 327.53 | 30.66 | 7270.1 |
| 78 (78.3) | 4C | 1388.04 | 380.87 | 327.07 | 55.44 | 14337.7 |
| 78 (78.5) | 4E | 1466.69 | 373.90 | 323.97 | 34.74 | 7481.4 |
| 78 (78.6) | 5C | 1459.11 | 365.50 | 320.12 | 62.42 | 12185.8 |
| | AVE | 1347.36 | 379.37 | 325.81 | 48.72 | 11288.5 |
| 84 | 1D | 1262.17 | 373.29 | 332.77 | 43.14 | 7879.3 |
| 84 | 1C | 1304.25 | 364.52 | 327.41 | 67.90 | 13657.3 |
| 84 | 2B | 1205.33 | 385.50 | 338.38 | 49.41 | 10028.7 |
| 84 | 2E | 1307.04 | 361.22 | 333.81 | 66.58 | 7456.8 |
| 84 | 3A | 1274.43 | 373.90 | 333.06 | 48.75 | 12184.2 |
| 84 | 3B | 1329.11 | 384.30 | 337.20 | 60.03 | 11961.9 |
| 84 | 3D | 1269.84 | 377.66 | 335.97 | 65.11 | 12676.0 |
| 84 | 4D | 1294.62 | 378.16 | 338.05 | 59.73 | 11313.4 |
| 84 | 5B | 1285.50 | 369.65 | 335.83 | 53.91 | 7834.4 |
| 84 | 5C | 1281.71 | 365.72 | 330.13 | 81.02 | 13439.0 |
| | AVE | 1287.40 | 373.49 | 334.03 | 59.50 | 10843.1 |
| 91 | 1D | 1207.30 | 386.92 | 341.71 | 36.30 | 7517.5 |
| 91 | 2B | 1142.40 | 405.09 | 348.46 | 37.90 | 10536.6 |
| 91 | 2C | 1205.93 | 345.27 | 345.71 | 51.00 | 13462.7 |
| 91 | 2E | 1220.84 | 370.16 | 342.51 | 49.76 | 7320.1 |
| 91 | 3A | 1106.40 | 396.34 | 339.56 | 38.38 | 11926.7 |
| 91 | 3B | 1241.38 | 403.22 | 347.75 | 46.55 | 12890.8 |
| 91 | 3D | 1194.61 | 391.02 | 346.06 | 55.80 | 13426.5 |
| 91 | 3E | 1186.40 | 352.20 | 337.34 | 91.23 | 12661.7 |
| 91 | 4B | 1245.85 | 344.17 | 357.08 | 47.60 | 10900.6 |
| 91 | 5C | 1255.43 | 374.31 | 339.01 | 67.61 | 12719.7 |
| 91 | 5D | 1179.61 | 391.38 | 343.97 | 33.60 | 7489.3 |
| | AVE | 1212.80 | 389.19 | 343.83 | 50.54 | 10986.6 |
| 96 | 1B | 1040.40 | 382.58 | 349.61 | 42.83 | 7344.8 |
| 96 | 1C | 1038.42 | 381.91 | 344.96 | 52.90 | 12478.7 |
| 96 | 2B | 987.47 | 404.88 | 357.47 | 37.20 | 10835.4 |
| 96 | 2E | 1035.14 | 382.90 | 350.03 | 43.91 | 7217.7 |
| 96 | 3A | 1024.20 | 347.62 | 348.40 | 38.54 | 11844.6 |
| 96 | 3B | 1029.84 | 406.86 | 356.77 | 42.36 | 13432.3 |
| 96 | 3D | 1033.00 | 392.12 | 354.02 | 57.07 | 13838.5 |
| 96 | 4D | 1051.77 | 396.39 | 356.65 | 47.64 | 11320.1 |
| 96 | 5B | 1068.72 | 388.86 | 354.45 | 41.81 | 7209.8 |
| 96 | 5C | 1148.40 | 384.21 | 347.71 | 58.97 | 12244.7 |
| | AVE | 1045.80 | 391.83 | 352.19 | 46.42 | 10781.7 |

41103B-9

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:

KUN 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/CM ²) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | REYNOLDS NO. |
|-------|--------------|-----------------------------------|---------------------------|--------------------|---------------|--------------|
| .30 | 2A | 1132.70 | 130.14 | 115.14 | 21.45 | 8596.2 |
| .30 | 4A | 1118.40 | 133.71 | 115.15 | 20.34 | 8588.5 |
| .30 | 4C | 1067.61 | 126.50 | 115.11 | 41.56 | 7644.1 |
| .30 | 4E | 1044.81 | 128.33 | 115.15 | 22.56 | 8617.9 |
| | AVE | 1096.92 | 128.92 | 115.14 | 26.49 | 10724.2 |
| .61 | 1B | 1741.44 | 136.64 | 118.21 | 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 | 11085.7 |
| .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 | 3002.48 | 147.99 | 123.88 | 52.99 | 16247.4 |
| .99 | 4E | 2882.90 | 152.14 | 123.88 | 27.77 | 8250.6 |
| | AVE | 2869.75 | 152.22 | 123.88 | 37.63 | 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 | 3581.46 | 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 | 29.04 | 7645.3 |
| 1.52 | 4E | 4124.81 | 179.22 | 142.79 | 28.95 | 7783.3 |
| | AVE | 4139.21 | 179.18 | 143.05 | 29.26 | 7724.1 |

410030-C-2

RUN 41003C

MASS FLOW = .0349 KG/SEC

INLET VAPOR TEMP = 112.2 DEG C

TOTAL POWER = 0.05 KW

| Z (M) | ROD LOCATION | HEAT FLUX (WATT/CM ²) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU FOR #.33 | REYNOLDS NO. |
|------------|--------------|-----------------------------------|---------------------------|--------------------|-------------|--------------|
| 1.70(1.71) | 2A | 4570.75 | 189.60 | 149.66 | 29.55 | 7086.7 |
| 1.70(1.71) | 4A | 4254.42 | 190.47 | 150.80 | 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 | 4466.01 | 183.57 | 149.89 | 46.04 | 13143.6 |
| 1.78(1.79) | 2D | 4399.35 | 187.94 | 155.02 | 44.56 | 11668.0 |
| 1.78(1.87) | 3C | 4439.05 | 187.15 | 154.54 | 52.62 | 13985.1 |
| 1.78(1.87) | 4D | 4518.57 | 193.31 | 156.29 | 47.44 | 10961.2 |
| 1.78(1.80) | 5B | 4538.37 | 191.50 | 153.68 | 29.70 | 7726.4 |
| | AVE | 4476.68 | 187.11 | 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 | 49.76 | 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 | 4454.64 | 187.83 | 154.63 | 43.18 | 11865.3 |
| 1.83(1.83) | 3A | 4627.73 | 194.55 | 152.45 | 37.51 | 13242.8 |
| 1.83(1.83) | 5C | 4484.71 | 190.27 | 152.66 | 40.26 | 13416.8 |
| | AVE | 4556.22 | 192.38 | 152.26 | 38.88 | 13329.8 |
| 1.89(1.93) | 1D | 4295.10 | 179.31 | 157.37 | 49.34 | 7691.9 |
| 1.88(1.89) | 2B | 4391.76 | 181.70 | 158.46 | 63.46 | 12587.6 |
| 1.88(1.91) | 2C | 4193.16 | 186.50 | 157.07 | 71.35 | 15410.6 |
| 1.89(1.89) | 2D | 4399.35 | 186.81 | 158.42 | 66.04 | 12816.4 |
| 1.89(1.93) | 2E | 4242.95 | 174.27 | 157.62 | 64.23 | 7066.5 |
| 1.88(1.88) | 3A | 4627.73 | 184.57 | 154.35 | 52.59 | 13571.3 |
| 1.88(1.89) | 3B | 4475.47 | 180.59 | 158.25 | 77.55 | 15404.2 |
| 1.88(1.91) | 3C | 4439.05 | 178.21 | 158.77 | 88.84 | 15732.0 |
| 1.88(1.90) | 3D | 4374.17 | 174.17 | 158.05 | 83.47 | 15140.0 |
| 1.88(1.89) | 3E | 4551.41 | 179.76 | 153.82 | 67.92 | 13567.5 |
| 1.88(1.93) | 4B | 4435.45 | 184.53 | 160.82 | 61.94 | 11616.6 |
| 1.88(1.88) | 5C | 4484.71 | 186.55 | 154.31 | 44.19 | 13664.3 |

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41003C-4

| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| 1.88(1.95) | 5D | 4428.57 | 106.49 | 156.89 | 47.13 | 7573.9 |
| | AVE | 4409.37 | 100.73 | 157.27 | 64.13 | 12493.2 |
| 1.91(1.95) | 1D | 4295.10 | 102.03 | 158.52 | 40.97 | 7708.9 |
| 1.91(1.94) | 2C | 4193.16 | 106.95 | 158.70 | 37.92 | 15273.5 |
| 1.91(1.91) | 2D | 4399.35 | 174.70 | 159.00 | 71.41 | 12098.7 |
| 1.91(1.93) | 3C | 4439.05 | 102.99 | 159.70 | 75.30 | 15670.2 |
| 1.91(1.92) | 3E | 4551.41 | 170.22 | 159.79 | 74.21 | 12569.2 |
| 1.91(1.96) | 4B | 4405.45 | 108.09 | 162.09 | 54.70 | 11661.9 |
| 1.91(1.94) | 5D | 4428.57 | 102.22 | 158.03 | 46.74 | 7520.0 |
| | AVE | 4387.44 | 102.00 | 158.73 | 67.50 | 11785.9 |
| 1.93(1.95) | 2A | 4570.75 | 105.03 | 158.51 | 41.77 | 7622.6 |
| 1.93(1.94) | 2B | 4391.76 | 106.01 | 159.71 | 53.94 | 12171.2 |
| 1.93(1.94) | 2D | 4399.35 | 102.99 | 159.70 | 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 | 174.70 | 155.08 | 67.37 | 12261.9 |
| 1.93(1.94) | 3B | 4475.47 | 104.20 | 159.72 | 73.25 | 14881.2 |
| 1.93(1.95) | 3C | 4439.05 | 106.33 | 160.61 | 66.23 | 15552.0 |
| 1.93(1.95) | 3D | 4374.17 | 104.09 | 159.54 | 67.10 | 14940.9 |
| 1.93(1.94) | 4A | 4254.42 | 105.20 | 159.54 | 40.73 | 7346.0 |
| 1.93(1.94) | 4C | 4517.62 | 108.51 | 160.62 | 65.49 | 14664.4 |
| 1.93(1.92) | 4E | 4441.11 | 102.22 | 157.64 | 45.35 | 7533.3 |
| | AVE | 4430.39 | 103.79 | 159.60 | 58.13 | 11526.6 |
| 1.96(2.00) | 1D | 4295.10 | 107.15 | 160.44 | 39.68 | 7705.9 |
| 1.96(1.94) | 2C | 4193.16 | 105.99 | 158.79 | 59.56 | 15280.5 |
| 1.96(1.96) | 2D | 4399.35 | 106.20 | 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 | 174.17 | 158.92 | 69.26 | 12334.3 |
| 1.96(2.00) | 4B | 4405.45 | 193.07 | 163.09 | 45.95 | 11651.1 |
| 1.96(1.97) | 5D | 4428.57 | 105.97 | 159.89 | 42.03 | 7540.4 |
| | AVE | 4387.44 | 106.97 | 160.00 | 53.16 | 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 | 12000.3 |
| 1.98(1.99) | 2D | 4399.35 | 169.04 | 161.30 | 51.50 | 12080.0 |
| 1.98(2.03) | 2E | 4242.90 | 103.99 | 161.52 | 47.93 | 7692.6 |
| 1.98(1.98) | 3A | 4627.73 | 104.94 | 157.90 | 60.75 | 12046.5 |
| 1.98(1.99) | 3B | 4475.47 | 192.05 | 161.57 | 54.71 | 14653.8 |
| 1.98(2.00) | 3C | 4439.05 | 193.22 | 162.30 | 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 | 161.09 | 37.66 | 7417.0 |

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| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| 1.98(2.0C) | 4C | 4517.62 | 143.13 | 161.88 | 54.98 | 14516.7 |
| 1.98(1.98) | 4E | 4441.11 | 166.36 | 154.67 | 39.42 | 7543.7 |
| 1.98(1.98) | 5C | 4484.71 | 162.03 | 157.59 | 61.11 | 12154.4 |
| | AVE | 4434.92 | 164.32 | 160.83 | 49.44 | 11474.9 |
| 2.13 | 1B | 3475.25 | 142.03 | 165.38 | 36.31 | 7852.9 |
| 2.13 | 1C | 4109.77 | 165.28 | 162.07 | 61.96 | 13473.7 |
| 2.13 | 29 | 4074.76 | 192.21 | 166.75 | 52.36 | 10316.2 |
| 2.13 | 2E | 4034.74 | 160.51 | 165.74 | 47.64 | 7471.5 |
| 2.13 | 3A | 4715.89 | 167.17 | 163.82 | 58.28 | 12225.4 |
| 2.13 | 3B | 4046.26 | 140.84 | 160.76 | 63.63 | 12208.7 |
| 2.13 | 3D | 4074.81 | 141.74 | 166.33 | 60.13 | 12811.0 |
| 2.13 | 4U | 4205.48 | 145.78 | 167.19 | 47.87 | 11426.6 |
| 2.13 | 5B | 4009.07 | 152.64 | 166.66 | 37.52 | 7856.3 |
| 2.13 | 5C | 4757.11 | 168.41 | 163.62 | 55.40 | 13376.5 |
| | AVE | 4060.32 | 140.27 | 165.49 | 52.14 | 10901.9 |
| 2.29 | 2B | 3770.58 | 206.34 | 172.54 | 35.85 | 10866.7 |
| 2.29 | 2C | 4153.15 | 204.22 | 174.46 | 46.73 | 13540.8 |
| 2.29 | 2E | 3759.76 | 145.12 | 171.05 | 37.56 | 7343.5 |
| 2.29 | 3A | 3821.44 | 190.11 | 168.90 | 48.56 | 12303.2 |
| 2.29 | 3B | 3826.52 | 214.27 | 172.34 | 44.17 | 13143.6 |
| 2.29 | 3D | 3839.98 | 203.01 | 171.78 | 45.43 | 13512.8 |
| 2.29 | 3E | 3292.23 | 142.13 | 168.11 | 45.88 | 12388.9 |
| 2.29 | 4A | 3962.97 | 246.57 | 173.48 | 39.15 | 11045.5 |
| 2.29 | 5C | 3851.03 | 145.11 | 168.45 | 49.13 | 12672.3 |
| 2.29 | 5D | 4153.41 | 143.07 | 171.10 | 43.95 | 7682.8 |
| | AVE | 3845.16 | 199.56 | 170.92 | 43.44 | 11420.0 |
| 2.44 | 1B | 3285.93 | 149.37 | 175.68 | 33.37 | 7337.5 |
| 2.44 | 1C | 3326.58 | 145.38 | 172.44 | 48.69 | 12274.8 |
| 2.44 | 2B | 3448.48 | 218.00 | 177.55 | 39.73 | 11130.5 |
| 2.44 | 2E | 3202.79 | 198.70 | 176.03 | 33.56 | 7255.7 |
| 2.44 | 3A | 3507.74 | 148.25 | 173.07 | 47.25 | 11866.7 |
| 2.44 | 3B | 3394.74 | 207.26 | 177.22 | 41.22 | 13651.1 |
| 2.44 | 3D | 3365.14 | 205.17 | 176.03 | 43.18 | 13873.5 |
| 2.44 | 4D | 3247.64 | 206.56 | 177.39 | 35.21 | 11423.3 |
| 2.44 | 5A | 3338.27 | 202.01 | 176.74 | 37.25 | 7311.3 |
| 2.44 | 5C | 3451.76 | 148.16 | 175.24 | 45.65 | 12249.7 |
| | AVE | 3356.44 | 201.91 | 175.67 | 37.41 | 10837.4 |

RUN 4103C

MASS FLOW = .0770 LBM/SEC

INLET VAPOR TEMP = 234.0 DEG F

TOTAL POWER = 5.74 BTU/SEC

| Z (IN) | RUD 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 | 259.76 | 239.19 | 41.56 | 17094.1 |
| 12 | 4E | 331.16 | 263.00 | 239.27 | 22.56 | 8617.9 |
| | AVE | 345.77 | 264.66 | 239.25 | 26.49 | 10724.2 |
| 24 | 1B | 501.96 | 277.94 | 244.76 | 26.47 | 8587.7 |
| 24 | 1C | 567.64 | 272.61 | 243.43 | 47.91 | 14301.2 |
| 24 | 4U | 573.55 | 273.01 | 245.42 | 44.72 | 12898.8 |
| 24 | 5B | 551.47 | 282.08 | 244.80 | 27.47 | 8559.1 |
| | AVE | 561.61 | 276.41 | 244.60 | 34.39 | 11086.7 |
| 39 | 2A | 870.75 | 313.49 | 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 | 913.76 | 305.86 | 254.98 | 27.77 | 8250.0 |
| | AVE | 909.59 | 305.00 | 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 | 13750.3 |
| 48 | 4U | 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 | 34.76 | 10556.7 |
| 50 | 2A | 1336.32 | 354.38 | 289.20 | 29.75 | 7743.6 |
| 60 | 4A | 1292.14 | 354.61 | 290.22 | 29.04 | 7645.3 |
| 60 | 4E | 1307.39 | 354.60 | 289.03 | 28.05 | 7763.3 |
| | AVE | 1311.95 | 354.53 | 289.48 | 29.26 | 7724.1 |

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KUN 41003L

MASS FLOW = .0777 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 / PRNDL. 33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|------------------------------|-----------------------|----------------|--------------|
| 67 (67.5) | 2A | 1448.73 | 373.24 | 304.38 | 29.55 | 7886.7 |
| 67 (67.4) | 4A | 1348.47 | 374.33 | 303.35 | 26.73 | 7141.3 |
| 67 (67.3) | 4C | 1431.89 | 305.47 | 304.17 | 51.65 | 13464.0 |
| 67 (66.7) | 4E | 1407.64 | 374.40 | 300.35 | 27.01 | 7658.1 |
| | AVE | 1409.18 | 372.00 | 302.44 | 33.48 | 9037.5 |
| 70 (71.0) | 1B | 1425.90 | 353.41 | 306.44 | 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 | 379.70 | 313.32 | 47.44 | 10961.2 |
| 70 (70.3) | 5B | 1438.47 | 376.74 | 308.63 | 29.70 | 7726.4 |
| | AVE | 1418.92 | 368.61 | 308.66 | 42.32 | 10941.3 |
| 71 (71.2) | 2D | 1394.41 | 373.78 | 312.34 | 43.78 | 11674.1 |
| 71 (71.9) | 3C | 1406.99 | 373.43 | 311.90 | 42.96 | 13983.1 |
| 71 (71.2) | 3E | 1442.61 | 365.24 | 303.50 | 45.92 | 12870.7 |
| 71 (71.6) | 5D | 1403.67 | 367.44 | 309.38 | 33.76 | 8933.3 |
| | AVE | 1411.92 | 370.34 | 304.26 | 43.18 | 11865.3 |
| 72 (71.9) | 3A | 1466.79 | 362.10 | 306.41 | 37.51 | 13242.8 |
| 72 (71.9) | 5C | 1421.46 | 374.44 | 302.72 | 42.26 | 13416.8 |
| | AVE | 1444.13 | 378.24 | 306.06 | 34.88 | 13329.8 |
| 74 (75.4) | 1D | 1361.36 | 354.73 | 315.27 | 42.74 | 7691.9 |
| 74 (74.6) | 2B | 1342.00 | 359.03 | 317.24 | 53.46 | 12587.6 |
| 74 (75.2) | 2C | 1329.65 | 356.40 | 315.01 | 71.35 | 15416.6 |
| 74 (74.3) | 2D | 1394.41 | 357.46 | 317.13 | 66.74 | 12816.4 |
| 74 (75.9) | 2E | 1344.82 | 345.34 | 313.72 | 54.23 | 7666.5 |
| 74 (74.1) | 3A | 1466.79 | 364.40 | 309.82 | 52.52 | 13571.3 |
| 74 (74.6) | 3A | 1418.53 | 356.17 | 316.85 | 72.53 | 15404.2 |
| 74 (75.0) | 3C | 1436.99 | 352.78 | 317.74 | 88.84 | 15702.0 |
| 74 (74.3) | 3D | 1386.42 | 354.31 | 316.46 | 80.47 | 15140.0 |
| 74 (74.3) | 3E | 1442.60 | 355.30 | 308.08 | 67.92 | 13567.5 |
| 74 (75.3) | 4B | 1396.34 | 364.13 | 321.47 | 51.94 | 11616.0 |
| 74 (74.1) | 5C | 1421.46 | 368.83 | 314.22 | 48.14 | 13664.3 |

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41003C-8

| | | | | | | |
|-----------|-----|---------|--------|--------|-------|---------|
| 74 (74.9) | 5D | 1403.67 | 326.72 | 314.40 | 47.13 | 7573.0 |
| | AVE | 1397.27 | 327.31 | 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 | 325.60 | 318.30 | 71.41 | 12098.7 |
| 75 (76.1) | 3C | 1426.94 | 360.29 | 319.61 | 75.30 | 15670.2 |
| 75 (75.4) | 3E | 1442.60 | 349.00 | 320.23 | 74.21 | 12569.2 |
| 75 (77.0) | 4B | 1396.34 | 371.60 | 323.04 | 54.00 | 11661.9 |
| 75 (76.5) | 5D | 1403.67 | 366.00 | 317.23 | 46.74 | 7520.0 |
| | AVE | 1390.62 | 366.02 | 317.72 | 63.50 | 11785.9 |
| 76 (76.7) | 2A | 1448.73 | 366.14 | 317.32 | 41.77 | 7622.6 |
| 76 (76.4) | 23 | 1392.00 | 368.20 | 319.48 | 53.94 | 12171.2 |
| 76 (76.3) | 2D | 1394.41 | 361.22 | 319.26 | 63.75 | 12147.5 |
| 76 (77.2) | 2E | 1344.82 | 351.20 | 318.10 | 37.89 | 7701.5 |
| 76 (75.9) | 3A | 1466.74 | 325.20 | 322.28 | 67.07 | 12261.9 |
| 76 (76.4) | 3B | 1418.53 | 363.07 | 319.49 | 70.25 | 14881.2 |
| 76 (77.0) | 3C | 1426.94 | 367.40 | 321.10 | 66.23 | 13522.0 |
| 76 (76.7) | 3D | 1386.42 | 364.38 | 319.18 | 67.10 | 14940.9 |
| 76 (76.5) | 4A | 1348.47 | 365.20 | 319.17 | 43.93 | 7346.0 |
| 76 (76.5) | 4C | 1431.89 | 367.72 | 320.04 | 65.49 | 14064.4 |
| 76 (75.7) | 4E | 1407.64 | 360.20 | 315.76 | 45.95 | 7503.3 |
| | AVE | 1404.25 | 362.81 | 318.30 | 58.17 | 11526.6 |
| 77 (76.9) | 1D | 1361.36 | 368.66 | 320.74 | 39.68 | 7705.9 |
| 77 (76.5) | 2C | 1329.05 | 366.00 | 317.81 | 59.56 | 15280.0 |
| 77 (77.1) | 2D | 1394.41 | 367.10 | 320.66 | 56.67 | 12126.5 |
| 77 (77.9) | 3C | 1406.94 | 374.40 | 322.59 | 54.16 | 15411.3 |
| 77 (77.2) | 3E | 1442.60 | 324.21 | 313.26 | 69.26 | 12334.3 |
| 77 (78.7) | 4B | 1396.34 | 366.47 | 322.26 | 46.90 | 11651.1 |
| 77 (77.7) | 5D | 1403.67 | 366.74 | 317.80 | 42.00 | 7540.4 |
| | AVE | 1390.63 | 368.24 | 320.11 | 53.18 | 11721.4 |
| 78 (78.7) | 2A | 1448.73 | 361.20 | 320.98 | 33.47 | 7563.8 |
| 78 (79.4) | 2B | 1392.00 | 363.20 | 323.46 | 43.76 | 12000.3 |
| 78 (78.3) | 2D | 1394.41 | 373.31 | 322.46 | 51.50 | 12086.0 |
| 78 (79.3) | 2E | 1344.82 | 362.14 | 322.73 | 47.93 | 7692.6 |
| 78 (78.3) | 3A | 1466.74 | 363.27 | 316.22 | 63.75 | 12046.5 |
| 78 (78.5) | 3B | 1418.53 | 378.77 | 322.83 | 54.71 | 14653.8 |
| 78 (78.4) | 3C | 1406.94 | 314.74 | 324.20 | 54.56 | 15284.4 |
| 78 (78.9) | 3D | 1386.42 | 317.70 | 322.71 | 54.46 | 14720.2 |
| 78 (78.5) | 4A | 1348.47 | 372.40 | 323.20 | 37.68 | 7417.0 |

| | | | | | | |
|-----------|-----|---------|--------|--------|-------|---------|
| 78 (78.6) | 4C | 1431.89 | 379.03 | 323.34 | 54.88 | 14516.7 |
| 78 (77.8) | 4E | 1407.64 | 371.00 | 319.77 | 33.42 | 7543.7 |
| 78 (78.0) | 5C | 1421.46 | 361.10 | 310.07 | 51.11 | 12154.4 |
| | AVE | 1405.68 | 373.01 | 321.50 | 47.44 | 11474.9 |
| 84 | 19 | 1259.98 | 377.06 | 324.08 | 35.31 | 7852.9 |
| 84 | 1C | 1302.62 | 365.00 | 324.00 | 61.86 | 13473.7 |
| 84 | 28 | 1291.53 | 377.98 | 332.26 | 52.36 | 10316.2 |
| 84 | 2E | 1278.84 | 367.71 | 330.34 | 47.84 | 7471.5 |
| 84 | 3A | 1272.88 | 368.91 | 326.07 | 59.28 | 12225.4 |
| 84 | 3B | 1282.50 | 375.40 | 332.16 | 63.63 | 12208.9 |
| 84 | 3D | 1291.54 | 377.44 | 331.40 | 57.13 | 12811.0 |
| 84 | 4U | 1332.96 | 384.40 | 332.44 | 47.87 | 11426.6 |
| 84 | 53 | 1270.71 | 378.70 | 332.00 | 37.52 | 7856.3 |
| 84 | 5C | 1285.93 | 371.13 | 326.02 | 55.41 | 13376.5 |
| | AVE | 1286.95 | 374.44 | 324.84 | 52.10 | 10901.4 |
| 90 | 28 | 1195.11 | 402.08 | 342.57 | 35.85 | 10866.7 |
| 90 | 2C | 1316.37 | 344.00 | 340.63 | 46.73 | 13540.8 |
| 90 | 2E | 1191.60 | 363.21 | 334.84 | 37.58 | 7343.0 |
| 90 | 3A | 1211.23 | 363.20 | 336.03 | 48.56 | 12003.2 |
| 90 | 3B | 1212.84 | 344.08 | 342.20 | 44.17 | 13143.6 |
| 90 | 3D | 1217.11 | 347.41 | 341.20 | 45.43 | 13512.8 |
| 90 | 3E | 1043.51 | 377.03 | 334.00 | 45.88 | 12388.9 |
| 90 | 43 | 1262.43 | 404.00 | 344.26 | 38.15 | 11345.0 |
| 90 | 5C | 1220.61 | 363.00 | 330.22 | 48.13 | 12672.3 |
| 90 | 5D | 1316.61 | 380.47 | 339.48 | 43.25 | 7682.8 |
| | AVE | 1218.75 | 391.20 | 339.66 | 43.44 | 11420.0 |
| 96 | 19 | 1041.50 | 340.36 | 348.22 | 33.37 | 7337.5 |
| 96 | 1C | 1054.38 | 363.14 | 342.34 | 49.69 | 12274.8 |
| 96 | 23 | 1193.62 | 406.41 | 321.54 | 35.73 | 11130.5 |
| 96 | 2E | 1114.93 | 364.07 | 340.80 | 33.58 | 7255.7 |
| 96 | 3A | 1111.81 | 368.00 | 344.04 | 47.25 | 11866.7 |
| 96 | 3B | 1175.49 | 405.00 | 351.00 | 41.22 | 13601.1 |
| 96 | 3D | 1066.61 | 401.27 | 344.24 | 43.18 | 13873.5 |
| 96 | 4U | 1229.36 | 403.80 | 351.30 | 35.21 | 11423.3 |
| 96 | 5B | 1058.49 | 347.00 | 350.14 | 37.20 | 7311.3 |
| 96 | 5C | 1094.16 | 368.04 | 343.83 | 45.65 | 12249.9 |
| | AVE | 1063.97 | 345.43 | 348.21 | 37.41 | 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/CM ²) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR = .33 | REYNOLDS NO. |
|----------|-----------------|--------------------------------------|------------------------------|-----------------------|---------------|--------------|
| .30 | 2A | 1647.89 | 135.89 | 124.65 | 25.91 | 8397.9 |
| .30 | 4A | 1654.10 | 135.48 | 124.63 | 27.04 | 8403.5 |
| .30 | 4C | 946.16 | 131.28 | 124.58 | 64.70 | 16770.0 |
| | AVE | 1032.71 | 134.22 | 124.62 | 39.22 | 11190.5 |
| .61 | 1C | 1742.08 | 139.78 | 126.87 | 54.37 | 14066.6 |
| .61 | 4E | 1721.70 | 140.28 | 127.55 | 37.72 | 8424.7 |
| .61 | 5B | 1629.63 | 141.40 | 127.57 | 32.36 | 8410.9 |
| | AVE | 1647.80 | 140.26 | 127.33 | 41.32 | 10280.7 |
| .99 | 2A | 2785.98 | 158.47 | 133.06 | 29.21 | 8066.4 |
| .99 | 4A | 2762.65 | 158.52 | 133.01 | 31.34 | 8070.7 |
| .99 | 4C | 2728.82 | 151.08 | 132.98 | 63.06 | 15940.5 |
| | AVE | 2759.14 | 155.36 | 133.02 | 41.73 | 10709.4 |
| 1.22 | 1C | 3217.90 | 163.89 | 139.24 | 47.24 | 13464.0 |
| 1.22 | 4E | 3206.18 | 162.06 | 140.98 | 40.89 | 8058.4 |
| | 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 | 3779.20 | 179.81 | 151.78 | 34.00 | 7548.2 |
| 1.52 | 4C | 3767.42 | 177.77 | 151.67 | 56.58 | 14947.4 |
| | AVE | 3857.33 | 182.20 | 151.61 | 39.09 | 10029.4 |

41103D-2

RUN 41103D

MASS FLOW = .0349 KG/SEC

INLET VAPOR TEMP = 121.7 DEG C

TOTAL POWER = 5.83 KW

| Z (M) | RUN LOCATION | HEAT FLUX (WATT/SQM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | 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 | 158.76 | 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 | 37.36 | 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 |
| 1.90(1.80) | 4D | 4366.97 | 209.77 | 163.76 | 30.44 | 13745.5 |
| | AVE | 4278.46 | 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 | 163.98 | 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) | 2A | 4446.11 | 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(1.84) | 2D | 4347.46 | 197.36 | 166.68 | 46.04 | 13647.3 |
| 1.88(1.88) | 2E | 4277.43 | 197.86 | 164.02 | 38.91 | 9282.3 |
| 1.88(1.91) | 3A | 4350.68 | 193.12 | 167.93 | 48.51 | 12848.9 |
| 1.88(1.84) | 3B | 4395.47 | 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(1.86) | 4D | 4366.97 | 192.50 | 166.27 | 54.48 | 14644.7 |
| 1.88(1.88) | 5C | 4262.48 | 185.47 | 162.47 | 61.53 | 14326.7 |
| 1.88(1.87) | 5D | 4088.57 | 181.67 | 163.83 | 56.69 | 9187.4 |

41103D-3

| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| | 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 | 158.47 | 61.10 | 14572.8 |
| 1.91(1.92) | 2U | 4347.46 | 198.43 | 167.88 | 45.78 | 13047.9 |
| 1.91(1.93) | 3E | 4690.27 | 180.50 | 163.34 | 81.57 | 12620.1 |
| 1.91(1.93) | 4B | 4006.13 | 193.80 | 158.81 | 52.84 | 11776.9 |
| 1.91(1.91) | 4U | 4366.97 | 193.12 | 167.40 | 55.44 | 13659.7 |
| 1.91(1.93) | 5D | 4688.37 | 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 | 33.01 | 7442.0 |
| 1.93(1.95) | 2A | 4108.82 | 196.99 | 166.72 | 33.16 | 7331.0 |
| 1.93(1.94) | 2B | 4496.11 | 198.72 | 159.13 | 49.12 | 11618.8 |
| 1.93(1.95) | 3A | 4300.68 | 193.89 | 164.66 | 49.93 | 12094.2 |
| 1.93(1.94) | 3B | 4345.97 | 193.85 | 167.65 | 63.12 | 14676.3 |
| 1.93(1.95) | 3C | 4462.62 | 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 | 166.67 | 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 | 36.74 | 7383.4 |
| 1.96(2.02) | 2C | 4185.00 | 197.01 | 159.99 | 57.83 | 14432.0 |
| 1.96(1.97) | 2U | 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 | 4690.27 | 182.33 | 164.72 | 79.12 | 12349.1 |
| 1.96(1.97) | 4B | 4006.13 | 197.16 | 170.39 | 48.96 | 11486.9 |
| 1.96(1.96) | 5D | 4688.37 | 186.02 | 166.74 | 51.93 | 7327.3 |
| | AVE | 4179.70 | 192.83 | 168.14 | 55.47 | 11359.4 |
| 1.98(1.98) | 1B | 4406.67 | 202.44 | 167.57 | 30.14 | 7214.9 |
| 1.98(2.05) | 2A | 4108.82 | 203.06 | 158.94 | 29.79 | 7324.1 |
| 1.98(1.98) | 2B | 4496.11 | 201.81 | 170.78 | 46.53 | 11425.9 |
| 1.98(1.99) | 2U | 4347.46 | 198.97 | 170.64 | 49.49 | 11625.1 |
| 1.98(2.00) | 3A | 4300.68 | 197.68 | 166.56 | 46.53 | 11903.7 |
| 1.98(1.99) | 3B | 4345.97 | 198.19 | 169.67 | 57.47 | 14370.7 |
| 1.98(2.05) | 3C | 4462.62 | 194.99 | 169.67 | 65.12 | 14675.7 |
| 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 | 35.81 | 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 | 11666.4 |

41103D-4

41103D-5

| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| 1.98(1.98) | 5C | 4262.48 | 187.01 | 165.72 | 67.69 | 12373.8 |
| | AVE | 4348.58 | 197.21 | 168.94 | 51.15 | 11592.1 |
| 2.13 | 1B | 3436.70 | 195.49 | 173.64 | 43.18 | 7672.8 |
| 2.13 | 1C | 3420.31 | 192.66 | 170.80 | 59.74 | 13122.3 |
| 2.13 | 2B | 4016.80 | 197.58 | 176.20 | 60.13 | 9937.9 |
| 2.13 | 2E | 3882.80 | 194.50 | 174.92 | 45.44 | 7248.8 |
| 2.13 | 3A | 4012.43 | 192.14 | 171.67 | 56.71 | 11938.8 |
| 2.13 | 3B | 3878.65 | 193.99 | 174.85 | 75.51 | 11930.8 |
| 2.13 | 3D | 3780.43 | 195.10 | 174.28 | 67.55 | 12565.0 |
| 2.13 | 4E | 3937.84 | 189.71 | 173.11 | 59.91 | 7990.4 |
| 2.13 | 5B | 4039.86 | 184.12 | 173.84 | 95.67 | 7970.8 |
| 2.13 | 5C | 3864.77 | 186.03 | 171.22 | 88.20 | 13417.0 |
| | AVE | 3929.18 | 192.36 | 173.36 | 65.21 | 10379.5 |
| 2.29 | 1B | 3933.74 | 213.60 | 178.28 | 36.56 | 7329.5 |
| 2.29 | 1D | 3688.85 | 196.94 | 178.23 | 49.36 | 7447.6 |
| 2.29 | 2B | 3783.41 | 219.12 | 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 | 212.15 | 176.84 | 48.73 | 11678.9 |
| 2.29 | 3B | 3711.21 | 205.65 | 180.55 | 51.65 | 12814.4 |
| 2.29 | 3E | 3734.05 | 196.39 | 175.89 | 59.71 | 12236.5 |
| 2.29 | 4H | 3692.09 | 206.91 | 181.37 | 45.44 | 10804.7 |
| 2.29 | 5C | 3729.67 | 194.18 | 176.09 | 67.76 | 12660.6 |
| 2.29 | 5D | 3895.32 | 188.25 | 178.17 | 92.56 | 7578.1 |
| | AVE | 3777.75 | 211.24 | 178.67 | 52.85 | 10310.8 |
| 2.44 | 1B | 3115.36 | 205.25 | 192.96 | 32.62 | 7135.4 |
| 2.44 | 1C | 3339.61 | 201.78 | 190.27 | 50.44 | 11938.5 |
| 2.44 | 2B | 3363.87 | 211.73 | 186.60 | 41.51 | 10740.6 |
| 2.44 | 2E | 3324.93 | 216.11 | 183.29 | 33.94 | 7643.0 |
| 2.44 | 3A | 3272.22 | 212.61 | 181.68 | 56.16 | 11623.3 |
| 2.44 | 3B | 3358.83 | 219.12 | 185.46 | 51.76 | 13332.5 |
| 2.44 | 3D | 3279.17 | 207.19 | 184.75 | 52.74 | 13619.9 |
| 2.44 | 4E | 3276.50 | 201.13 | 182.38 | 41.97 | 7291.9 |
| 2.44 | 5B | 3256.73 | 197.24 | 182.61 | 51.51 | 7459.6 |
| 2.44 | 5C | 3466.49 | 194.96 | 180.69 | 79.24 | 12276.3 |
| | AVE | 3249.63 | 213.54 | 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 (D/G/HR-S/F) | HEAT FLUX | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR**0.33 | REYNOLDS NU. |
|-----------|------------------------------|-----------|------------------------------|-----------------------|---------------|--------------|
| 12 | 2A | 332.14 | 276.61 | 256.37 | 25.91 | 8397.9 |
| 12 | 4A | 334.10 | 275.67 | 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 | 552.16 | 282.34 | 267.37 | 54.37 | 14006.6 |
| 24 | 4E | 545.70 | 284.51 | 261.59 | 37.74 | 8424.7 |
| 24 | 5B | 516.52 | 296.53 | 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 | 8670.7 |
| 39 | 4C | 864.42 | 303.94 | 271.37 | 63.78 | 15990.5 |
| | AVE | 874.33 | 311.65 | 271.44 | 41.23 | 10709.4 |
| 48 | 1C | 1019.44 | 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 | 1275.83 | 372.25 | 304.61 | 26.68 | 7542.7 |
| 60 | 4A | 1147.87 | 355.65 | 305.23 | 34.06 | 7548.2 |
| 61 | 4C | 1174.11 | 351.49 | 304.88 | 56.58 | 14947.4 |
| | AVE | 1222.61 | 354.97 | 304.90 | 39.09 | 10029.4 |

41103D-6

RUN 41103D

MASS FLOW = .0770 LBM/SEC

INLET VAPOR TEMP = 251.0 DEG F

TOTAL POWER = 5.50 BTU/SEC

| Z (IN) | ROD LOCATION (BU/HR-SUFT) | HEAT FLUX (BTU/HR-SUFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR ^{0.33} | KEYNGLOS NO. |
|-----------|------------------------------|----------------------------|------------------------------|-----------------------|-------------------------|--------------|
| 67 (67.8) | 2A | 1318.17 | 388.70 | 317.76 | 25.70 | 7545.7 |
| 67 (67.8) | 4A | 1354.02 | 388.60 | 317.69 | 26.43 | 7487.2 |
| 67 (67.8) | 4C | 1386.40 | 371.75 | 319.12 | 56.78 | 14550.8 |
| | AVE | 1353.00 | 383.02 | 317.86 | 36.14 | 9861.2 |
| 70 (70.9) | 1C | 1316.52 | 373.39 | 317.33 | 45.38 | 13709.1 |
| 70 (70.9) | 3C | 1395.44 | 376.68 | 322.65 | 55.83 | 16172.0 |
| 70 (71.0) | 4E | 1322.52 | 368.84 | 323.03 | 47.68 | 8707.2 |
| | AVE | 1346.16 | 372.97 | 321.07 | 47.79 | 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 | 37.36 | 1162.6 |
| 71 (71.0) | 3C | 1395.44 | 377.65 | 324.41 | 56.52 | 16271.1 |
| 71 (71.0) | 3E | 1296.44 | 357.46 | 318.19 | 64.52 | 14093.2 |
| 71 (71.0) | 4D | 1384.14 | 409.59 | 326.77 | 39.44 | 13745.5 |
| | AVE | 1356.69 | 385.21 | 325.08 | 47.63 | 14862.4 |
| 72 (71.9) | 1B | 1394.82 | 395.45 | 323.59 | 31.66 | 8453.2 |
| 72 (72.4) | 2D | 1377.96 | 391.48 | 329.29 | 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 | 32.16 | 8595.0 |
| 74 (74.5) | 1D | 1340.29 | 362.38 | 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 | 323.31 | 58.14 | 14760.3 |
| 74 (74.4) | 2D | 1377.96 | 387.25 | 332.03 | 46.04 | 13647.3 |
| 74 (74.0) | 2E | 1305.70 | 375.55 | 327.27 | 38.91 | 9282.3 |
| 74 (75.0) | 3A | 1376.48 | 379.61 | 325.28 | 49.51 | 12848.9 |
| 74 (74.6) | 3B | 1393.33 | 381.37 | 330.85 | 59.02 | 16500.9 |
| 74 (74.7) | 4B | 1285.62 | 378.95 | 337.86 | 52.87 | 12775.7 |
| 74 (74.0) | 4D | 1384.14 | 378.50 | 321.29 | 54.48 | 14644.7 |
| 74 (74.2) | 5C | 1351.03 | 366.74 | 324.33 | 61.53 | 14326.7 |
| 74 (73.8) | 5D | 1295.04 | 329.01 | 326.89 | 54.44 | 9167.4 |

41103D-7

41103D-8

| | | | | | | |
|-----------|-----|---------|--------|--------|-------|---------|
| | AVE | 1309.11 | 379.13 | 329.51 | 48.99 | 12368.4 |
| 75 (75.4) | 1U | 1340.25 | 383.35 | 329.89 | 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 (75.4) | 4B | 1285.62 | 381.85 | 335.87 | 52.84 | 11776.9 |
| 75 (75.1) | 4U | 1384.14 | 379.61 | 333.33 | 55.44 | 13659.7 |
| 75 (75.8) | 5D | 1295.84 | 362.64 | 332.02 | 55.54 | 7601.1 |
| | AVE | 1329.53 | 376.30 | 332.08 | 55.24 | 11621.6 |
| 76 (75.4) | 1B | 1394.82 | 388.05 | 330.10 | 33.00 | 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 (76.4) | 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 | 62.84 | 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 (76.4) | 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 | 332.89 | 50.75 | 11680.0 |
| 77 (77.0) | 1U | 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 | 14698.3 |
| 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 (77.4) | 1B | 1394.82 | 396.40 | 339.62 | 30.19 | 7214.9 |
| 78 (78.4) | 2A | 1318.17 | 397.50 | 336.10 | 29.09 | 7324.1 |
| 78 (78.1) | 2B | 1425.07 | 395.25 | 339.40 | 46.55 | 11425.9 |
| 78 (78.5) | 2D | 1377.96 | 390.14 | 339.15 | 49.44 | 11625.1 |
| 78 (78.4) | 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 (74.4) | 4C | 1386.40 | 386.96 | 337.89 | 59.89 | 14477.4 |
| 78 (78.6) | 4D | 1384.14 | 374.05 | 338.42 | 64.56 | 11668.4 |

| | | | | | | |
|-----------|-----|---------|--------|--------|-------|---------|
| 78 (78.1) | >C | 1351.03 | 368.62 | 330.30 | 67.69 | 12373.8 |
| | AVE | 1376.32 | 385.97 | 336.10 | 51.15 | 11592.1 |
| 84 | 1B | 1248.42 | 383.89 | 344.56 | 43.18 | 7672.8 |
| 84 | 1C | 1242.57 | 374.80 | 339.44 | 59.74 | 13122.3 |
| 84 | 2B | 1271.27 | 387.65 | 349.16 | 60.13 | 9937.9 |
| 84 | 2E | 1230.75 | 382.11 | 345.23 | 45.44 | 7248.8 |
| 84 | 3A | 1271.77 | 383.25 | 341.71 | 56.72 | 11938.8 |
| 84 | 3B | 1224.37 | 381.18 | 346.74 | 75.50 | 11930.8 |
| 84 | 3D | 1198.24 | 383.19 | 345.70 | 67.50 | 12565.0 |
| 84 | 4C | 1248.13 | 372.21 | 343.59 | 59.92 | 7990.4 |
| 84 | 5B | 1260.46 | 383.41 | 344.92 | 95.67 | 7970.8 |
| 84 | >C | 1232.89 | 386.85 | 340.19 | 88.26 | 13417.0 |
| | AVE | 1245.38 | 378.25 | 344.05 | 65.21 | 10379.5 |
| 90 | 1B | 1248.83 | 398.48 | 352.91 | 36.58 | 7329.5 |
| 90 | 1D | 1232.08 | 385.50 | 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 | 49.58 | 7148.8 |
| 90 | 3A | 1197.40 | 395.87 | 350.32 | 48.75 | 11678.9 |
| 90 | 3B | 1176.29 | 403.98 | 357.00 | 51.65 | 12814.4 |
| 90 | 3E | 1183.54 | 385.50 | 348.43 | 59.72 | 12238.5 |
| 90 | 4B | 1170.25 | 404.44 | 358.46 | 45.44 | 10804.7 |
| 90 | >C | 1182.10 | 381.52 | 348.87 | 67.76 | 12600.6 |
| 90 | >E | 1234.65 | 370.92 | 352.71 | 92.56 | 7578.1 |
| | AVE | 1197.38 | 394.24 | 353.61 | 52.80 | 10310.8 |
| 95 | 1B | 987.44 | 401.46 | 361.33 | 32.62 | 7135.4 |
| 95 | 1C | 1008.52 | 395.21 | 356.49 | 50.44 | 11938.5 |
| 95 | 2B | 1066.20 | 413.12 | 367.88 | 41.52 | 10740.6 |
| 95 | 2E | 1053.86 | 413.00 | 361.90 | 33.94 | 7043.0 |
| 95 | 3A | 1037.15 | 393.10 | 359.03 | 56.16 | 11623.3 |
| 95 | 3B | 1004.01 | 408.42 | 355.83 | 51.00 | 13332.5 |
| 95 | 3D | 1039.35 | 404.94 | 364.54 | 57.74 | 13619.9 |
| 95 | 4E | 1059.17 | 394.03 | 360.28 | 41.07 | 7291.9 |
| 95 | >B | 1032.24 | 387.56 | 350.71 | 51.51 | 7459.6 |
| 95 | >C | 1079.87 | 382.92 | 357.24 | 78.24 | 12276.3 |
| | AVE | 1045.84 | 398.38 | 361.52 | 48.93 | 10246.1 |

41103D-9

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) | RID LOCATION | HEAT FLUX (WATT/SQM) | FALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU /PR**0.33 | REYNOLDS NU. |
|-------|--------------|----------------------|---------------------------|--------------------|--------------|--------------|
| .30 | 1B | 1084.53 | 126.67 | 114.40 | 25.28 | 8542.2 |
| .30 | 2A | 1051.80 | 126.00 | 114.40 | 25.90 | 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 | 2B | 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 | 3159.20 | 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 |

40503E-2

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/CM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | REYNOLDS NU. |
|------------|--------------|---------------------|---------------------------|--------------------|---------------|--------------|
| 1.70(1.68) | 2A | 4110.64 | 181.04 | 147.06 | 37.11 | 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 | 4394.36 | 175.13 | 147.45 | 37.79 | 7893.8 |
| 1.70(1.70) | 4B | 4083.85 | 180.06 | 150.12 | 45.66 | 12090.6 |
| 1.70(1.71) | 4C | 4179.34 | 179.18 | 148.07 | 52.72 | 15073.4 |
| 1.70(1.70) | 4E | 4107.00 | 182.22 | 147.69 | 30.08 | 7860.1 |
| | AVE | 4297.32 | 180.65 | 148.06 | 39.67 | 10730.1 |
| 1.78(1.79) | 2C | 4086.15 | 182.64 | 150.67 | 50.06 | 18790.2 |
| 1.78(1.76) | 3C | 4014.50 | 178.04 | 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 | 150.00 | 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 | 186.00 | 151.65 | 30.06 | 12642.6 |
| 1.85(1.86) | 2A | 4110.64 | 188.00 | 151.76 | 27.85 | 12990.5 |
| | AVE | 4146.00 | 187.03 | 151.70 | 28.93 | 12816.6 |
| 1.88(1.89) | 2D | 4118.99 | 174.78 | 155.34 | 57.01 | 18412.7 |
| 1.88(1.88) | 4D | 4047.73 | 176.72 | 150.27 | 64.10 | 18579.3 |
| | AVE | 4083.36 | 178.25 | 155.31 | 60.55 | 18496.0 |
| 1.91(1.91) | 1B | 4181.37 | 186.05 | 153.52 | 31.16 | 11583.1 |
| 1.91(1.90) | 1D | 4072.19 | 187.17 | 152.85 | 29.59 | 10838.1 |
| 1.91(1.92) | 2F | 4103.56 | 182.06 | 153.75 | 35.71 | 11428.9 |
| 1.91(1.91) | 5D | 4129.52 | 189.38 | 152.98 | 64.35 | 11420.8 |
| | AVE | 4121.66 | 181.49 | 153.22 | 40.14 | 11067.7 |
| 1.93(1.92) | 1D | 4072.19 | 184.05 | 153.58 | 32.77 | 10070.3 |

40503E-3

40503E-4

| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| 1.93(1.92) | 3A | 4123.00 | 179.78 | 153.29 | 54.10 | 13228.4 |
| 1.93(1.92) | 3D | 4123.70 | 186.24 | 155.41 | 49.18 | 19837.3 |
| 1.93(1.93) | 4A | 4094.36 | 177.14 | 154.41 | 46.46 | 8520.5 |
| 1.93(1.93) | 4B | 4083.65 | 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 | 177.44 | 154.74 | 51.42 | 12721.3 |
| 1.93(1.93) | 5D | 4129.52 | 170.55 | 153.68 | 54.55 | 10683.9 |
| | AVE | 4096.61 | 174.32 | 155.22 | 55.36 | 13039.5 |
| 1.96(1.96) | 1B | 4181.37 | 189.06 | 154.74 | 30.23 | 9680.8 |
| 1.96(1.95) | 1C | 3991.30 | 181.54 | 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 | 186.06 | 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 | 177.09 | 156.03 | 47.32 | 8266.2 |
| 1.96(1.94) | 5D | 4129.52 | 171.20 | 154.18 | 51.74 | 10227.9 |
| | AVE | 4099.77 | 182.48 | 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 | 187.34 | 158.45 | 46.22 | 14208.9 |
| 1.98(1.97) | 2E | 4103.56 | 181.00 | 155.56 | 47.42 | 8860.7 |
| 1.98(1.98) | 3A | 4123.00 | 173.00 | 156.13 | 85.11 | 11532.5 |
| 1.98(1.98) | 3H | 4095.20 | 181.01 | 159.87 | 75.00 | 13360.7 |
| 1.98(1.99) | 3C | 4014.50 | 184.77 | 160.70 | 63.62 | 10512.8 |
| 1.98(1.98) | 4A | 4094.36 | 177.50 | 150.89 | 49.95 | 7799.4 |
| 1.98(1.98) | 4B | 4083.65 | 183.46 | 160.70 | 59.93 | 11487.0 |
| 1.98(1.99) | 4C | 4179.34 | 184.47 | 160.03 | 55.87 | 13140.7 |
| 1.98(1.98) | 4D | 4047.73 | 175.78 | 158.64 | 64.61 | 14000.3 |
| 1.98(2.00) | 4E | 4107.00 | 181.38 | 155.49 | 49.48 | 8712.1 |
| 1.98(1.99) | 5D | 4129.52 | 174.84 | 155.64 | 54.21 | 9156.1 |
| | AVE | 4081.92 | 180.08 | 157.77 | 58.05 | 11350.3 |
| 2.01(2.01) | 2C | 3967.68 | 184.07 | 158.77 | 59.12 | 15219.9 |
| 2.01(2.00) | 2D | 4118.99 | 185.89 | 158.93 | 51.70 | 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 | 180.00 | 155.33 | 36.49 | 12435.2 |
| 2.01(2.05) | 5C | 4098.54 | 172.24 | 157.54 | 97.32 | 12766.5 |
| | AVE | 4063.28 | 180.83 | 158.30 | 67.34 | 12713.3 |
| 2.03(2.02) | 2B | 3931.68 | 141.44 | 159.96 | 41.30 | 13410.6 |

4053E-5

| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| 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 | 43.65 | 8490.9 |
| 2.03(2.05) | 5B | 3830.74 | 179.78 | 154.50 | 47.18 | 7433.3 |
| 2.03(2.17) | 5C | 3947.58 | 174.25 | 154.63 | 93.72 | 13254.2 |
| | AVE | 3965.35 | 181.73 | 159.24 | 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 | 154.63 | 57.67 | 13392.0 |
| 2.13 | 2B | 3931.88 | 174.10 | 164.05 | 49.72 | 10529.7 |
| 2.13 | 2C | 3467.68 | 185.86 | 163.35 | 67.47 | 12907.0 |
| 2.13 | 2D | 3451.12 | 170.50 | 163.99 | 48.97 | 10474.1 |
| 2.13 | 3C | 3972.11 | 184.67 | 166.70 | 91.30 | 11328.7 |
| 2.13 | 3D | 3905.49 | 189.98 | 164.80 | 56.76 | 13476.6 |
| 2.13 | 3E | 3808.91 | 183.07 | 160.05 | 56.63 | 13020.1 |
| 2.13 | 4A | 3973.65 | 174.10 | 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 | 163.04 | 67.00 | 7858.7 |
| 2.13 | 5C | 3947.58 | 178.21 | 160.60 | 77.29 | 13137.3 |
| | 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 | 164.01 | 38.75 | 10883.4 |
| 2.29 | 2C | 3703.00 | 193.84 | 168.75 | 55.35 | 13601.5 |
| 2.29 | 2D | 3065.57 | 196.14 | 167.73 | 45.00 | 10914.5 |
| 2.29 | 2E | 3672.26 | 195.72 | 167.35 | 31.29 | 7295.3 |
| 2.29 | 3A | 3792.86 | 183.78 | 167.50 | 78.32 | 12124.7 |
| 2.29 | 3B | 3802.86 | 194.50 | 170.64 | 59.82 | 13099.4 |
| 2.29 | 3C | 3829.98 | 194.74 | 171.02 | 67.30 | 13068.0 |
| 2.29 | 3D | 3731.91 | 196.74 | 167.23 | 50.38 | 13678.6 |
| 2.29 | 3E | 3861.16 | 196.78 | 165.01 | 48.57 | 12504.8 |
| 2.29 | 4A | 3734.65 | 188.30 | 164.16 | 47.37 | 7277.7 |
| 2.29 | 4B | 3784.48 | 197.40 | 171.30 | 46.84 | 10870.0 |
| 2.29 | 4D | 3702.46 | 194.16 | 164.43 | 49.70 | 11576.6 |
| 2.29 | 5C | 3756.36 | 183.82 | 165.36 | 69.21 | 12567.5 |
| 2.29 | 5D | 3657.36 | 185.20 | 166.02 | 48.14 | 7700.6 |
| | AVE | 3730.77 | 192.71 | 168.54 | 57.74 | 10978.1 |

| | | | | | | |
|------|-----|---------|--------|--------|-------|---------|
| 2.44 | 1C | 3199.80 | 193.98 | 169.18 | 43.03 | 12133.2 |
| 2.44 | 2D | 3176.93 | 200.01 | 174.80 | 39.39 | 11051.4 |
| 2.44 | 2E | 3117.72 | 195.21 | 172.14 | 32.47 | 7199.9 |
| 2.44 | 3B | 3233.85 | 197.04 | 175.57 | 54.58 | 13589.7 |
| 2.44 | 3C | 3194.15 | 197.00 | 175.47 | 53.58 | 13830.9 |
| 2.44 | 3D | 3216.14 | 198.58 | 174.16 | 48.76 | 13929.1 |
| 2.44 | 3E | 3210.40 | 193.09 | 170.32 | 45.76 | 12203.7 |
| 2.44 | 4B | 3265.58 | 196.07 | 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 | 46.79 | 7266.0 |
| 2.44 | 5C | 3308.52 | 186.00 | 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 = 233.0 DEG F

TOTAL POWER = 5.42 BTU/SEC

| Z (IN) | KUD LOCATION (BTU/HR-SQFT) | HEAT FLUX | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR**0.33 | REYNOLDS NO. |
|-----------|-------------------------------|-----------|------------------------------|-----------------------|---------------|--------------|
| 12 | 1B | 343.75 | 260.01 | 237.93 | 25.28 | 8542.2 |
| 12 | 2A | 333.34 | 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 | 2B | 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 | 1001.35 | 311.52 | 267.90 | 34.93 | 8000.5 |
| | AVE | 1005.33 | 312.46 | 255.74 | 44.12 | 12174.2 |
| 63 | 1B | 1330.12 | 350.52 | 285.87 | 30.04 | 7723.7 |
| 63 | 2A | 1281.67 | 351.90 | 286.05 | 28.38 | 7679.5 |
| 63 | 4C | 1313.51 | 327.85 | 286.73 | 73.72 | 15281.0 |
| | AVE | 1308.43 | 343.42 | 286.22 | 44.05 | 10228.1 |

40503E-7

RUN 40503E

MASS FLOW = .0760 LBM/SEC

INLET VAPOR TEMP = 233.0 DEG F

TOTAL POWER = 5.42 BTU/SEC

| Z (IN) | RUD LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR** .33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|------------------------------|-----------------------|---------------|--------------|
| 67 (66.3) | 2A | 1302.90 | 358.95 | 296.71 | 39.11 | 7849.8 |
| 67 (66.7) | 2B | 1272.17 | 366.86 | 303.98 | 49.98 | 12250.8 |
| 67 (66.9) | 2C | 1295.14 | 351.39 | 296.14 | 53.74 | 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 | 357.31 | 302.22 | 45.66 | 12090.6 |
| 67 (67.5) | 4C | 1324.67 | 355.69 | 297.01 | 52.92 | 15073.4 |
| 67 (67.0) | 4E | 1361.74 | 366.50 | 297.85 | 39.08 | 7860.1 |
| | AVE | 1298.68 | 357.17 | 298.52 | 39.67 | 10730.1 |
| 70 (70.4) | 2C | 1295.14 | 366.75 | 303.26 | 53.00 | 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 | 18228.1 |
| 72 (71.4) | 3E | 1299.33 | 363.44 | 300.06 | 40.47 | 17286.6 |
| 72 (74.7) | 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 | 305.57 | 28.93 | 12816.6 |
| 74 (74.5) | 2D | 1305.54 | 355.60 | 311.61 | 57.01 | 18412.7 |
| 74 (73.9) | 4D | 1282.96 | 350.15 | 311.49 | 64.16 | 18579.3 |
| | AVE | 1294.25 | 352.85 | 311.55 | 60.55 | 18496.0 |
| 75 (75.3) | 1B | 1325.31 | 366.33 | 307.98 | 31.10 | 11583.1 |
| 75 (74.7) | 1D | 1290.71 | 368.71 | 307.12 | 29.59 | 10838.1 |
| 75 (75.6) | 2E | 1300.65 | 360.60 | 308.75 | 35.71 | 10428.9 |
| 75 (74.8) | 5D | 1308.88 | 356.89 | 307.37 | 64.35 | 11420.8 |
| | AVE | 1306.39 | 368.08 | 307.80 | 40.11 | 11067.7 |
| 76 (75.6) | 1D | 1290.71 | 364.38 | 308.44 | 32.77 | 10070.3 |

40503E-5

40503E-9

| | | | | | | |
|-----------|-----|---------|--------|--------|-------|---------|
| 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 | 14837.3 |
| 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 | 10437.2 |
| 77 (76.9) | 2D | 1305.54 | 359.99 | 315.13 | 55.57 | 15280.5 |
| 77 (77.1) | 3A | 1298.00 | 358.67 | 318.05 | 70.31 | 13646.4 |
| 77 (77.4) | 5B | 1303.52 | 352.26 | 312.05 | 47.32 | 8266.2 |
| 77 (76.5) | 5D | 1308.88 | 346.17 | 309.52 | 61.74 | 10227.9 |
| | AVE | 1299.45 | 361.37 | 312.32 | 47.27 | 11749.1 |
| 78 (78.4) | 1C | 1265.67 | 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 | 357.61 | 312.00 | 40.42 | 8860.7 |
| 78 (78.1) | 3A | 1306.61 | 343.55 | 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 (77.3) | 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 | 320.55 | 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 | 49.48 | 8712.1 |
| 78 (78.3) | 5D | 1308.88 | 346.62 | 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 | 13949.3 |
| 79 (79.2) | 3A | 1306.61 | 349.60 | 315.18 | 74.86 | 11666.5 |
| 79 (79.4) | 3C | 1258.59 | 365.46 | 323.39 | 65.24 | 10443.0 |
| 79 (78.6) | 3E | 1299.33 | 356.62 | 311.59 | 56.49 | 12435.2 |
| 79 (80.8) | 5C | 1299.06 | 342.22 | 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 | 319.26 | 68.55 | 14853.8 |
| 80 (79.8) | 4A | 1259.46 | 355.60 | 318.49 | 48.15 | 7731.9 |
| 80 (80.4) | 4E | 1263.16 | 366.16 | 316.16 | 40.65 | 8440.9 |
| 80 (80.7) | 5B | 1214.18 | 355.63 | 319.10 | 47.18 | 7933.3 |
| 80 (82.8) | 5C | 1251.21 | 342.66 | 319.33 | 93.72 | 13254.2 |
| | AVE | 1256.85 | 359.22 | 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 | 366.55 | 319.34 | 57.67 | 13392.5 |
| 84 | 2B | 1245.98 | 374.18 | 327.28 | 49.72 | 10529.7 |
| 84 | 2C | 1257.58 | 366.24 | 326.52 | 67.47 | 12907.0 |
| 84 | 2D | 1252.34 | 375.02 | 327.19 | 48.97 | 10474.1 |
| 84 | 3C | 1258.99 | 364.46 | 330.80 | 81.30 | 11328.7 |
| 84 | 3D | 1237.87 | 373.46 | 326.84 | 54.76 | 13075.6 |
| 84 | 3E | 1207.26 | 362.31 | 322.17 | 56.63 | 13020.1 |
| 84 | 4A | 1259.46 | 354.44 | 326.78 | 64.13 | 7635.9 |
| 84 | 4D | 1241.64 | 361.59 | 327.11 | 69.34 | 11806.9 |
| 84 | 5B | 1214.18 | 351.20 | 325.56 | 67.16 | 7858.7 |
| 84 | 5C | 1251.21 | 352.78 | 321.08 | 77.29 | 13157.0 |
| | 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 | 39.75 | 10883.4 |
| 90 | 2C | 1173.69 | 361.00 | 335.74 | 55.35 | 13601.5 |
| 90 | 2D | 1161.81 | 365.55 | 337.51 | 45.00 | 10914.5 |
| 90 | 2E | 1163.95 | 384.30 | 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 | 13599.4 |
| 90 | 3C | 1213.94 | 362.02 | 339.84 | 67.30 | 13068.0 |
| 90 | 3D | 1182.86 | 386.44 | 336.62 | 50.36 | 13678.6 |
| 90 | 3E | 1160.43 | 375.76 | 330.10 | 49.57 | 12504.8 |
| 90 | 4A | 1183.74 | 371.24 | 336.48 | 47.37 | 7277.7 |
| 90 | 4B | 1199.52 | 387.42 | 340.45 | 46.84 | 10870.5 |
| 90 | 4D | 1173.52 | 381.48 | 336.97 | 48.70 | 11576.6 |
| 90 | 5C | 1193.61 | 362.07 | 329.66 | 67.21 | 12567.5 |
| 90 | 5D | 1159.23 | 365.47 | 331.91 | 48.14 | 7750.0 |
| | AVE | 1182.50 | 376.88 | 335.38 | 53.74 | 10978.1 |

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| | | | | | | |
|----|-----|---------|--------|--------|-------|---------|
| 96 | 1C | 1014.20 | 381.16 | 336.52 | 43.73 | 12133.2 |
| 96 | 2D | 1006.95 | 343.10 | 346.63 | 39.39 | 11051.4 |
| 96 | 2E | 988.18 | 363.39 | 341.86 | 32.47 | 7199.9 |
| 96 | 3B | 1024.74 | 387.52 | 348.52 | 54.58 | 13589.7 |
| 96 | 3C | 1012.41 | 387.00 | 347.64 | 53.58 | 13830.9 |
| 96 | 3D | 1019.38 | 369.45 | 345.38 | 49.70 | 13924.1 |
| 96 | 3E | 1017.56 | 366.55 | 338.58 | 45.76 | 12203.7 |
| 96 | 4A | 1035.25 | 386.50 | 349.32 | 51.46 | 11098.5 |
| 96 | 4D | 1015.96 | 382.34 | 346.03 | 51.30 | 11462.1 |
| 96 | 5B | 1002.88 | 372.46 | 343.51 | 46.79 | 7266.0 |
| 96 | 5C | 1048.66 | 367.79 | 337.43 | 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 = 5.77 KW

| Z (M) | GRID LOCATION | HEAT FLUX (WATT/SQM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR** .33 | REYNOLDS NO. |
|-------|---------------|----------------------|---------------------------|--------------------|---------------|--------------|
| .30 | 4C | 1104.04 | 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 | 1042.47 | 136.70 | 123.85 | 49.11 | 13950.6 |
| | AVE | 1042.47 | 136.70 | 123.85 | 49.11 | 13950.6 |
| .99 | 1B | 2047.13 | 157.79 | 130.18 | 27.65 | 6008.8 |
| .99 | 2A | 2702.75 | 160.22 | 130.16 | 24.05 | 7985.1 |
| .99 | 4C | 2644.77 | 152.89 | 130.35 | 53.86 | 15816.4 |
| | AVE | 2814.88 | 156.96 | 130.23 | 35.18 | 10601.4 |
| 1.22 | 1C | 3200.15 | 165.12 | 136.34 | 41.15 | 13340.4 |
| 1.22 | 2C | 3071.07 | 165.11 | 138.42 | 49.98 | 15262.4 |
| 1.22 | 2E | 3256.66 | 166.28 | 138.24 | 30.36 | 7441.8 |
| 1.22 | 3E | 3213.42 | 158.47 | 136.36 | 53.26 | 13469.1 |
| | AVE | 3248.88 | 163.75 | 137.34 | 43.64 | 12503.4 |
| 1.52 | 1B | 4004.86 | 186.11 | 148.79 | 26.94 | 7544.6 |
| 1.52 | 2A | 4046.16 | 191.20 | 148.88 | 24.77 | 7468.6 |
| 1.52 | 4E | 4263.50 | 177.92 | 148.94 | 37.55 | 7628.1 |
| | AVE | 4129.86 | 184.75 | 148.87 | 29.77 | 7547.1 |

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RUN 41103F

MASS FLOW = .0344 KG/SEC

INLET VAPOR TEMP = 118.3 DEG C

TOTAL POWER = 5.97 KW

| Z (M) | RDL LOCATION | HEAT FLUX (WATT/SQM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | REYNOLDS NO. |
|------------|-----------------|-------------------------|------------------------------|-----------------------|---------------|--------------|
| 1.70(1.67) | 2A | 4241.36 | 193.89 | 154.47 | 26.54 | 7527.2 |
| 1.70(1.70) | 2B | 4277.69 | 195.06 | 157.67 | 37.78 | 11959.4 |
| 1.70(1.70) | 4B | 4264.24 | 204.28 | 158.76 | 37.54 | 11654.2 |
| 1.70(1.70) | 5C | 4290.30 | 189.86 | 153.12 | 45.14 | 12199.0 |
| 1.70(1.70) | 5D | 4259.37 | 193.92 | 156.95 | 33.16 | 7357.9 |
| | AVE | 4267.63 | 194.00 | 156.01 | 34.95 | 10159.5 |
| 1.78(1.77) | 3C | 4317.80 | 193.28 | 158.57 | 47.40 | 17687.8 |
| 1.78(1.78) | 4C | 4291.33 | 194.84 | 158.74 | 29.12 | 10567.4 |
| | AVE | 4304.61 | 194.06 | 158.65 | 38.24 | 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 | 33.20 | 12084.2 |
| 1.91(1.90) | 2D | 4249.44 | 187.18 | 163.95 | 60.48 | 26300.2 |
| 1.91(1.89) | 4D | 4259.61 | 189.90 | 164.37 | 57.06 | 20402.3 |
| | AVE | 4275.72 | 189.97 | 162.69 | 46.61 | 16554.4 |
| 1.93(1.93) | 1D | 4284.30 | 189.04 | 162.15 | 39.15 | 10555.6 |
| 1.93(1.94) | 2E | 4326.74 | 183.45 | 162.21 | 59.37 | 16085.4 |
| 1.93(1.94) | 4B | 4289.24 | 196.33 | 158.56 | 49.93 | 12152.5 |
| 1.93(1.92) | 4D | 4259.61 | 189.62 | 165.34 | 57.77 | 18581.1 |
| 1.93(1.94) | 5C | 4296.35 | 183.44 | 162.78 | 69.18 | 13788.1 |
| 1.93(1.93) | 5D | 4259.37 | 189.91 | 162.64 | 45.14 | 11117.0 |
| | AVE | 4280.61 | 188.05 | 163.95 | 51.92 | 12713.3 |
| 1.96(1.95) | 1B | 4313.52 | 194.39 | 162.75 | 33.27 | 10708.8 |
| 1.96(1.95) | 1D | 4284.30 | 184.64 | 163.06 | 39.21 | 9664.9 |
| 1.96(1.95) | 2A | 4241.36 | 196.42 | 163.08 | 30.92 | 9038.4 |

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| | | | | | | |
|------------|-----|---------|--------|--------|-------|---------|
| 1.96(1.96) | 2B | 4277.85 | 178.17 | 156.53 | 43.84 | 14542.0 |
| 1.96(1.95) | 2U | 4245.44 | 184.79 | 165.78 | 67.76 | 15463.6 |
| 1.96(1.95) | 3B | 4278.61 | 178.40 | 167.33 | 51.86 | 13141.6 |
| 1.96(1.96) | 3B | 4324.74 | 192.62 | 164.58 | 37.56 | 8379.9 |
| | AVE | 4283.64 | 174.08 | 164.73 | 42.49 | 11562.7 |
| 1.98(1.97) | 1C | 4252.81 | 178.30 | 152.95 | 56.96 | 14169.2 |
| 1.98(1.98) | 2A | 4242.36 | 197.79 | 164.30 | 30.66 | 8424.5 |
| 1.98(1.98) | 2B | 4277.85 | 178.76 | 157.18 | 43.89 | 13916.6 |
| 1.98(1.98) | 3A | 4254.35 | 196.89 | 164.58 | 44.06 | 10520.8 |
| 1.98(1.97) | 4A | 4306.94 | 203.40 | 165.36 | 27.16 | 7573.3 |
| 1.98(1.99) | 4B | 4264.24 | 177.38 | 177.00 | 46.92 | 11040.0 |
| 1.98(1.99) | 4C | 4448.18 | 195.10 | 169.32 | 64.68 | 12493.6 |
| 1.98(1.97) | 4U | 4254.61 | 190.63 | 167.23 | 52.16 | 14781.8 |
| 1.98(1.99) | 4C | 4291.33 | 193.26 | 164.20 | 35.96 | 8879.2 |
| 1.98(1.99) | 5C | 4246.35 | 187.77 | 164.57 | 62.62 | 12376.6 |
| 1.98(1.99) | 5U | 4254.37 | 191.34 | 164.51 | 38.66 | 9399.3 |
| | AVE | 4286.94 | 194.81 | 165.84 | 46.43 | 11234.0 |
| 2.01(2.01) | 1B | 4313.52 | 197.57 | 164.44 | 31.52 | 9562.0 |
| 2.01(2.01) | 1C | 4252.81 | 188.94 | 153.89 | 57.46 | 13821.2 |
| 2.01(2.00) | 2C | 4231.45 | 196.07 | 167.38 | 51.63 | 14972.3 |
| 2.01(2.00) | 2U | 4245.44 | 193.28 | 167.52 | 53.85 | 13429.1 |
| 2.01(1.99) | 2E | 4326.74 | 184.60 | 164.17 | 52.15 | 8626.7 |
| 2.01(2.01) | 3A | 4263.21 | 199.81 | 165.66 | 47.95 | 10705.2 |
| 2.01(2.01) | 3B | 4278.61 | 201.22 | 169.35 | 50.15 | 12261.4 |
| 2.01(2.02) | 3U | 4306.94 | 195.53 | 168.31 | 67.47 | 13656.3 |
| 2.01(2.01) | 4B | 4269.24 | 201.11 | 170.49 | 44.87 | 10919.4 |
| 2.01(2.01) | 5B | 4324.74 | 195.67 | 166.76 | 44.07 | 7910.1 |
| 2.01(2.01) | 5C | 4246.35 | 189.61 | 165.53 | 60.79 | 12333.3 |
| | AVE | 4285.20 | 194.58 | 164.68 | 49.74 | 11654.3 |
| 2.03(2.03) | 1B | 4313.52 | 198.34 | 165.47 | 31.69 | 9239.8 |
| 2.03(2.03) | 1C | 4269.17 | 189.47 | 164.90 | 56.46 | 13696.3 |
| 2.03(2.03) | 2B | 4223.87 | 202.43 | 168.87 | 39.56 | 13157.6 |
| 2.03(2.03) | 2U | 4222.27 | 194.67 | 168.39 | 57.31 | 12995.5 |
| 2.03(2.02) | 3C | 4237.45 | 196.20 | 171.71 | 59.55 | 8830.4 |
| 2.03(2.04) | 3U | 4249.96 | 196.95 | 169.32 | 56.86 | 13263.7 |
| 2.03(2.02) | 4A | 4333.40 | 206.73 | 167.77 | 24.64 | 7407.7 |
| 2.03(2.03) | 4C | 4226.35 | 193.23 | 166.18 | 76.94 | 8602.2 |
| | AVE | 4170.00 | 197.50 | 167.83 | 44.76 | 10899.1 |
| 2.05(2.05) | 3C | 4061.48 | 188.47 | 165.80 | 67.56 | 12029.2 |

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| | | | | | | |
|------|-----|---------|--------|--------|-------|---------|
| | AVE | 4002.48 | 188.47 | 165.80 | 60.52 | 12029.2 |
| 2.13 | 1C | 4104.17 | 193.74 | 158.48 | 54.36 | 13264.5 |
| 2.13 | 2B | 4123.87 | 212.23 | 172.56 | 44.53 | 10420.5 |
| 2.13 | 2D | 4222.27 | 211.83 | 172.65 | 46.38 | 10138.7 |
| 2.13 | 3C | 4237.40 | 198.26 | 175.53 | 69.04 | 10779.8 |
| 2.13 | 3D | 4244.40 | 213.61 | 172.91 | 56.15 | 12400.5 |
| 2.13 | 3E | 4002.48 | 172.56 | 168.93 | 58.70 | 12507.7 |
| 2.13 | 4A | 4033.42 | 204.28 | 172.68 | 30.26 | 7278.8 |
| 2.13 | 4D | 4235.99 | 195.11 | 173.36 | 67.95 | 11430.1 |
| 2.13 | 5B | 4116.66 | 191.46 | 172.79 | 51.70 | 7674.4 |
| 2.13 | 5D | 4043.59 | 194.74 | 170.70 | 41.03 | 8131.6 |
| | AVE | 4142.77 | 197.43 | 171.99 | 51.47 | 10407.7 |
| 2.29 | 1D | 3840.85 | 203.44 | 175.66 | 32.64 | 7478.2 |
| 2.29 | 2A | 3715.85 | 214.44 | 178.48 | 32.30 | 10732.4 |
| 2.29 | 2C | 3846.07 | 217.35 | 177.96 | 47.70 | 13232.2 |
| 2.29 | 2D | 3825.77 | 208.55 | 178.55 | 47.14 | 10579.0 |
| 2.29 | 2E | 3846.56 | 203.59 | 175.49 | 36.41 | 7224.1 |
| 2.29 | 3A | 3704.20 | 209.67 | 176.58 | 36.77 | 11427.3 |
| 2.29 | 3d | 3901.02 | 215.66 | 179.57 | 38.86 | 12654.2 |
| 2.29 | 3C | 3477.38 | 212.01 | 180.60 | 45.64 | 12541.8 |
| 2.29 | 3D | 3874.06 | 212.06 | 178.50 | 41.78 | 13009.5 |
| 2.29 | 4A | 3453.40 | 211.53 | 178.13 | 27.65 | 6944.1 |
| 2.29 | 4B | 3857.54 | 215.54 | 180.21 | 34.00 | 10637.2 |
| 2.29 | 4D | 4028.85 | 209.65 | 179.20 | 41.54 | 11128.0 |
| 2.29 | 5B | 3674.66 | 202.70 | 177.23 | 35.94 | 7307.5 |
| 2.29 | 5C | 3760.58 | 211.83 | 175.37 | 46.40 | 12074.6 |
| | AVE | 3862.64 | 208.93 | 177.97 | 38.43 | 10501.4 |
| 2.44 | 1C | 3342.23 | 202.71 | 178.77 | 45.43 | 11805.0 |
| 2.44 | 2C | 3357.40 | 204.06 | 183.01 | 46.55 | 13488.7 |
| 2.44 | 2D | 3308.33 | 210.35 | 183.70 | 39.21 | 10764.8 |
| 2.44 | 2E | 3308.14 | 213.70 | 180.29 | 33.20 | 7099.5 |
| 2.44 | 3C | 3355.75 | 213.28 | 185.09 | 42.54 | 13350.8 |
| 2.44 | 3D | 3314.24 | 211.09 | 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 | 27.80 | 6928.5 |
| 2.44 | 4B | 3443.35 | 214.99 | 185.18 | 35.77 | 10819.6 |
| 2.44 | 4D | 3443.38 | 215.89 | 184.48 | 47.53 | 11052.5 |
| 2.44 | 5B | 3473.70 | 203.98 | 182.23 | 37.41 | 7153.6 |
| 2.44 | 5C | 3371.74 | 202.76 | 180.29 | 48.71 | 11763.7 |
| | AVE | 3385.10 | 208.63 | 182.40 | 40.78 | 10782.3 |

RUN 41103F

MASS FLOW = 0.0709 LBM/SEC

INLET VAPOR TEMP = 245.0 DEG F

TOTAL POWER = 0.66 BTU/SEC

| Z (IN) | ROW LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | HU / PP** .33 | KEYINCLUS NO. |
|-----------|-----------------|----------------------------|------------------------------|-----------------------|---------------|---------------|
| 12 | 4C | 370.54 | 257.30 | 250.79 | 55.76 | 16651.7 |
| 12 | 4E | 348.26 | 270.67 | 250.78 | 27.65 | 8374.1 |
| | AVE | 359.40 | 264.04 | 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 | 402.42 | 316.02 | 266.33 | 27.65 | 8008.8 |
| 39 | 2A | 856.66 | 323.39 | 266.29 | 24.05 | 7485.1 |
| 39 | 4C | 417.52 | 337.20 | 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 | 1036.74 | 329.20 | 281.16 | 49.96 | 15262.4 |
| 48 | 2E | 1036.13 | 331.36 | 283.84 | 30.38 | 7941.8 |
| 48 | 3E | 1018.52 | 317.25 | 277.44 | 53.26 | 13469.1 |
| | AVE | 1024.69 | 326.74 | 279.21 | 43.69 | 12503.4 |
| 60 | 1B | 1270.96 | 357.01 | 299.81 | 26.99 | 7544.6 |
| 60 | 2A | 1248.31 | 374.37 | 299.99 | 24.77 | 7468.6 |
| 60 | 4E | 1357.70 | 352.26 | 300.09 | 37.55 | 7628.1 |
| | AVE | 1308.94 | 364.54 | 299.95 | 29.77 | 7547.1 |

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RUN 41103F

MASS FLOW = .0709 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 | 361.00 | 310.04 | 26.54 | 7527.2 |
| 67 (66.8) | 2B | 1355.89 | 363.11 | 315.80 | 37.76 | 11959.4 |
| 67 (67.1) | 4B | 1353.16 | 394.70 | 317.76 | 30.54 | 11654.2 |
| 67 (67.1) | 5C | 1354.86 | 366.54 | 307.61 | 45.14 | 12199.0 |
| 67 (66.9) | 5D | 1350.04 | 375.66 | 312.89 | 30.16 | 7357.9 |
| | AVE | 1352.66 | 361.20 | 312.82 | 34.05 | 10139.5 |
| 70 (69.5) | 3C | 1368.56 | 379.90 | 317.42 | 47.46 | 17687.8 |
| 70 (70.0) | 4E | 1360.17 | 362.70 | 317.74 | 29.12 | 10567.4 |
| | AVE | 1364.37 | 361.30 | 317.58 | 38.29 | 14127.6 |
| 71 (70.7) | 3D | 1390.35 | 386.46 | 320.21 | 45.13 | 19778.1 |
| | AVE | 1390.35 | 386.48 | 320.21 | 45.13 | 19778.1 |
| 74 (73.6) | 4D | 1350.11 | 383.66 | 326.82 | 46.54 | 20408.4 |
| | AVE | 1350.11 | 383.66 | 326.82 | 46.54 | 20408.4 |
| 75 (74.7) | 1B | 1367.23 | 375.88 | 322.41 | 35.61 | 13430.9 |
| 75 (74.5) | 1U | 1357.94 | 378.79 | 322.02 | 33.20 | 12084.2 |
| 75 (74.7) | 2D | 1345.62 | 364.92 | 327.10 | 60.46 | 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 |
| 75 (75.6) | 1D | 1357.94 | 372.28 | 323.88 | 39.15 | 10555.6 |
| 76 (76.4) | 2E | 1369.56 | 362.21 | 323.99 | 50.37 | 10085.4 |
| 76 (76.2) | 4B | 1353.16 | 385.40 | 335.41 | 49.95 | 12152.5 |
| 76 (75.5) | 4D | 1350.11 | 373.31 | 329.61 | 57.77 | 18581.1 |
| 76 (76.2) | 5C | 1359.86 | 363.54 | 325.70 | 69.18 | 13788.1 |
| 75 (75.9) | 5D | 1350.04 | 356.63 | 324.75 | 45.14 | 11117.0 |
| | AVE | 1356.77 | 370.44 | 327.10 | 51.92 | 12713.3 |
| 77 (76.9) | 1B | 1367.20 | 381.83 | 324.95 | 33.27 | 10708.8 |
| 77 (76.0) | 1U | 1357.94 | 373.72 | 325.50 | 39.21 | 9664.9 |
| 77 (76.9) | 2A | 1344.33 | 385.55 | 325.55 | 30.92 | 9036.4 |

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| | | | | | | |
|-----------|-----|---------|--------|--------|-------|---------|
| 77 (77.2) | 2B | 1355.89 | 388.70 | 331.70 | 43.89 | 14542.0 |
| 77 (77.4) | 2D | 1345.62 | 371.82 | 330.40 | 60.76 | 15463.6 |
| 77 (77.7) | 3B | 1362.48 | 389.12 | 333.20 | 51.80 | 13141.6 |
| 77 (77.0) | 3B | 1376.76 | 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 | 375.93 | 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 | 1356.11 | 375.50 | 333.02 | 59.16 | 14781.8 |
| 78 (78.3) | 4E | 1366.17 | 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 | 38.61 | 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 | 372.04 | 327.01 | 57.46 | 13821.2 |
| 79 (78.6) | 2C | 1341.33 | 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 | 1352.24 | 391.66 | 330.18 | 40.93 | 10705.2 |
| 79 (78.4) | 3B | 1362.48 | 394.20 | 336.83 | 50.15 | 12281.4 |
| 79 (79.5) | 3D | 1396.33 | 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 | 1376.76 | 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 (80.1) | 1B | 1367.20 | 389.01 | 329.84 | 31.69 | 9239.8 |
| 80 (80.1) | 1C | 1302.43 | 373.04 | 328.83 | 55.48 | 13696.3 |
| 80 (80.1) | 2B | 1367.69 | 396.38 | 335.97 | 39.56 | 13157.6 |
| 80 (79.9) | 2D | 1356.28 | 392.44 | 335.10 | 52.34 | 12995.5 |
| 80 (79.6) | 3C | 1343.23 | 386.75 | 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 | 1365.96 | 379.82 | 331.12 | 36.94 | 8662.2 |
| | AVE | 1321.73 | 387.55 | 334.09 | 44.76 | 10899.1 |
| 81 (80.9) | 3E | 1267.32 | 371.24 | 330.45 | 60.52 | 12029.2 |

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| | | | | | | |
|----|-----|---------|--------|--------|-------|---------|
| | AVE | 1267.32 | 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 | 10426.5 |
| 84 | 2D | 1330.20 | 390.29 | 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 | 1278.41 | 399.70 | 342.83 | 30.76 | 7278.8 |
| 84 | 4D | 1342.63 | 383.20 | 344.06 | 62.95 | 11430.1 |
| 84 | 5B | 1302.71 | 376.62 | 341.76 | 51.20 | 7674.4 |
| 84 | 5D | 1297.49 | 382.54 | 339.27 | 41.03 | 8131.6 |
| | AVE | 1313.00 | 387.37 | 341.58 | 51.47 | 10407.7 |
| 90 | 1D | 1217.32 | 398.19 | 348.18 | 32.69 | 7478.2 |
| 90 | 2B | 1177.17 | 418.00 | 353.76 | 32.30 | 10732.4 |
| 90 | 2C | 1219.04 | 405.23 | 352.33 | 47.70 | 13232.2 |
| 90 | 2D | 1212.01 | 407.39 | 353.40 | 40.14 | 10579.0 |
| 90 | 2E | 1219.83 | 393.06 | 347.88 | 36.41 | 7224.1 |
| 90 | 3A | 1243.11 | 409.41 | 349.84 | 36.77 | 11427.3 |
| 90 | 3B | 1236.40 | 420.19 | 355.22 | 38.80 | 12654.2 |
| 90 | 3C | 1200.60 | 413.62 | 357.08 | 45.64 | 12541.8 |
| 90 | 3D | 1227.91 | 413.70 | 353.29 | 41.78 | 13009.5 |
| 90 | 4A | 1253.00 | 412.75 | 352.75 | 27.65 | 6994.1 |
| 90 | 4B | 1222.69 | 419.98 | 356.37 | 34.00 | 10637.2 |
| 90 | 4D | 1270.91 | 407.37 | 354.56 | 41.54 | 11128.0 |
| 90 | 5B | 1228.11 | 396.86 | 351.02 | 35.94 | 7307.5 |
| 90 | 5C | 1191.94 | 390.30 | 347.55 | 46.40 | 12074.6 |
| | AVE | 1224.10 | 408.07 | 352.34 | 38.40 | 10501.4 |
| 95 | 1C | 1009.34 | 396.87 | 353.70 | 45.43 | 11805.0 |
| 95 | 2C | 1004.33 | 408.31 | 341.42 | 46.50 | 13486.7 |
| 95 | 2D | 1048.59 | 410.08 | 352.65 | 39.21 | 10764.8 |
| 95 | 2E | 1048.54 | 398.06 | 356.57 | 33.20 | 7099.5 |
| 95 | 3C | 1003.63 | 410.90 | 365.17 | 42.64 | 13350.8 |
| 95 | 3D | 1115.40 | 413.05 | 362.08 | 44.70 | 13387.6 |
| 95 | 3E | 1009.02 | 390.03 | 354.18 | 47.24 | 11773.5 |
| 95 | 4A | 1003.44 | 411.80 | 362.06 | 27.80 | 6928.5 |
| 95 | 4B | 1041.39 | 418.98 | 365.33 | 35.77 | 10819.6 |
| 95 | 4D | 1041.40 | 411.60 | 364.06 | 40.63 | 11052.0 |
| 95 | 5B | 1102.03 | 399.16 | 360.01 | 37.42 | 7153.6 |
| 95 | 5C | 1008.70 | 396.47 | 356.57 | 48.71 | 11763.7 |
| | AVE | 1070.95 | 406.45 | 360.32 | 40.78 | 10702.3 |

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 = 0.056 KG/SEC

INLET VAPOR TEMP = 109.4 DEG C

TOTAL POWER = 1.30 KW

| Z (M) | GRID LOCATION | HEAT FLUX (WATT/SQM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | KEYWORDS NO. |
|-------|---------------|----------------------|---------------------------|--------------------|---------------|--------------|
| 0.30 | 2A | 252.93 | 118.72 | 113.46 | 13.93 | 1341.3 |
| 0.30 | 4A | 254.95 | 117.40 | 113.48 | 12.45 | 1339.4 |
| 0.30 | 4C | 253.30 | 119.30 | 113.77 | 20.37 | 2852.1 |
| | AVE | 253.73 | 119.16 | 113.57 | 15.50 | 1844.4 |
| 0.61 | 1B | 365.42 | 124.72 | 117.34 | 14.92 | 1353.7 |
| 0.61 | 1C | 383.02 | 125.86 | 116.24 | 15.64 | 2329.2 |
| 0.61 | 4D | 388.80 | 125.53 | 118.52 | 22.92 | 2115.0 |
| 0.61 | 5B | 388.60 | 124.10 | 117.38 | 16.53 | 1354.7 |
| | AVE | 386.44 | 124.93 | 117.37 | 17.52 | 1788.2 |
| 0.99 | 2A | 665.72 | 140.89 | 124.84 | 11.47 | 1281.4 |
| 0.99 | 4A | 649.62 | 139.03 | 124.97 | 12.74 | 1278.0 |
| 0.99 | 4C | 634.44 | 139.70 | 125.50 | 19.21 | 2730.2 |
| | AVE | 649.43 | 139.87 | 125.08 | 14.47 | 1763.2 |
| 1.22 | 1D | 789.13 | 149.34 | 136.07 | 16.70 | 1263.1 |
| 1.22 | 4C | 769.50 | 151.45 | 133.06 | 15.13 | 2218.5 |
| 1.22 | 4D | 776.53 | 153.61 | 139.05 | 19.13 | 2024.3 |
| 1.22 | 5D | 770.84 | 148.76 | 136.50 | 17.97 | 1249.9 |
| | AVE | 776.52 | 150.74 | 136.17 | 17.00 | 1689.0 |
| 1.52 | 2A | 954.21 | 151.58 | 151.22 | 24.70 | 1319.4 |
| 1.52 | 4A | 958.31 | 162.62 | 152.65 | 24.82 | 1115.4 |
| 1.52 | 4C | 965.63 | 155.42 | 151.89 | 28.56 | 2153.7 |
| 1.52 | 4E | 924.48 | 157.78 | 151.84 | 41.80 | 1243.2 |
| | AVE | 959.41 | 161.85 | 151.90 | 29.74 | 1457.9 |

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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**0.33 | REYNOLDS NO. |
|------------|-----------------|-------------------------|---------------------------------|-----------------------|---------------|--------------|
| 1.70(1.72) | 2A | 1005.14 | 170.00 | 160.92 | 27.96 | 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 | 1109.7 |
| | AVE | 998.88 | 174.30 | 162.01 | 24.35 | 1454.9 |
| 1.78(1.80) | 1B | 1019.91 | 168.01 | 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 | 160.77 | 23.71 | 2444.5 |
| 1.78(1.78) | 4D | 1031.03 | 182.97 | 164.02 | 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 | 23.08 | 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 | 176.00 | 167.05 | 25.95 | 1139.1 |
| | AVE | 1012.63 | 181.60 | 167.03 | 25.44 | 1847.7 |
| 1.83(1.85) | 1B | 1019.91 | 171.80 | 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 | 23.06 | 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 | 23.14 | 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 | 25.12 | 1932.3 |
| 1.88(1.93) | 1D | 1020.03 | 170.05 | 171.95 | 53.52 | 1144.5 |
| 1.88(1.91) | 2C | 1020.41 | 190.36 | 171.52 | 23.36 | 2415.6 |
| 1.88(1.99) | 2D | 1026.96 | 189.00 | 174.09 | 23.35 | 1859.6 |

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| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| 1.88(1.84) | 2E | 976.52 | 176.49 | 167.65 | 27.42 | 1143.6 |
| 1.88(1.92) | 3B | 1040.04 | 173.50 | 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 | 162.79 | 164.91 | 17.13 | 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 | 165.76 | 171.05 | 25.26 | 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 | 20.46 | 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 | 162.88 | 166.59 | 20.94 | 2004.2 |
| 1.91(1.93) | 4B | 1004.38 | 169.57 | 178.46 | 29.24 | 1821.8 |
| 1.91(1.93) | 5D | 1006.89 | 181.00 | 172.97 | 27.87 | 1121.8 |
| | AVE | 1012.62 | 166.67 | 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 | 26.75 | 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 | 194.56 | 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 | 35.86 | 1111.1 |
| 1.93(1.95) | 4E | 991.33 | 186.39 | 173.76 | 36.76 | 1125.3 |
| 1.93(1.95) | 4C | 995.96 | 192.04 | 175.14 | 22.01 | 2357.5 |
| | AVE | 1005.82 | 167.45 | 174.73 | 27.86 | 1771.2 |
| 1.96(2.00) | 1D | 1020.03 | 179.79 | 176.03 | 66.72 | 1129.5 |
| 1.96(1.99) | 2C | 1020.41 | 193.59 | 175.79 | 21.35 | 2389.8 |
| 1.96(1.95) | 2D | 1026.96 | 190.82 | 177.83 | 25.57 | 1847.5 |
| 1.96(1.98) | 3C | 1006.35 | 195.72 | 175.01 | 19.24 | 2412.0 |
| 1.96(1.97) | 3E | 1003.39 | 184.20 | 186.93 | 22.22 | 1994.2 |
| 1.96(1.98) | 4B | 1004.38 | 191.55 | 181.01 | 32.17 | 1817.0 |
| 1.96(1.97) | 5D | 1006.89 | 184.54 | 175.56 | 28.85 | 1114.6 |
| | AVE | 1012.62 | 168.46 | 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(1.99) | 2D | 1026.96 | 191.14 | 179.54 | 23.53 | 1842.4 |

| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| 1.98(2.01) | 3B | 1040.04 | 195.68 | 178.83 | 22.82 | 2349.1 |
| 1.98(2.00) | 3C | 1306.35 | 197.49 | 177.67 | 19.85 | 2404.7 |
| 1.98(2.01) | 4A | 1303.69 | 183.94 | 178.25 | 42.62 | 1105.7 |
| 1.98(2.00) | 4E | 991.33 | 182.94 | 170.65 | 38.25 | 1116.5 |
| 1.98(2.00) | 4C | 995.96 | 193.76 | 178.95 | 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 | 2A | 906.89 | 188.85 | 179.02 | 33.59 | 1934.1 |
| 2.13 | 3B | 931.73 | 198.20 | 184.81 | 25.44 | 1910.6 |
| 2.13 | 3D | 938.69 | 197.11 | 184.66 | 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 | 196.97 | 186.10 | 29.60 | 1905.9 |
| 2.29 | 3B | 915.73 | 206.89 | 193.15 | 23.8 | 2092.8 |
| 2.29 | 3D | 878.37 | 202.44 | 192.26 | 30.56 | 2161.1 |
| 2.29 | 3E | 880.54 | 189.45 | 184.74 | 61.39 | 1979.2 |
| 2.29 | 4B | 877.79 | 201.59 | 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 | 194.86 | 27.40 | 2185.3 |
| | AVE | 752.01 | 202.95 | 196.24 | 42.37 | 2121.9 |

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RUN 44529A

MASS FLOW = .0123 LBM/SEC

INLET VAPOR TEMP = 229.0 DEG F

TOTAL POWER = 1.31 BTU/SEC

| Z (IN) | RUN LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR = .33 | REYNOLDS NU. |
|-----------|-----------------|----------------------------|---------------------------------|-----------------------|---------------|--------------|
| 12 | 2A | 80.17 | 245.70 | 236.23 | 13.93 | 1341.3 |
| 12 | 4A | 86.81 | 245.92 | 236.26 | 12.45 | 1334.9 |
| 12 | 4C | 86.29 | 246.84 | 236.78 | 20.37 | 2852.1 |
| | AVE | 80.42 | 246.49 | 236.43 | 15.56 | 1844.4 |
| 24 | 1B | 122.10 | 256.50 | 243.22 | 14.92 | 1353.7 |
| 24 | 1C | 121.40 | 258.55 | 241.22 | 15.64 | 2329.2 |
| 24 | 4D | 123.20 | 257.06 | 245.33 | 22.92 | 2115.0 |
| 24 | 5B | 123.14 | 255.38 | 243.28 | 16.53 | 1354.7 |
| | AVE | 122.50 | 256.67 | 243.26 | 17.52 | 1788.2 |
| 39 | 2A | 211.00 | 280.00 | 256.71 | 11.47 | 1281.4 |
| 39 | 4A | 205.90 | 282.26 | 256.82 | 12.74 | 1278.0 |
| 39 | 4C | 201.69 | 283.46 | 257.91 | 19.71 | 2730.2 |
| | AVE | 206.00 | 283.77 | 257.15 | 14.47 | 1763.2 |
| 48 | 1B | 256.12 | 300.82 | 275.93 | 16.00 | 1263.1 |
| 48 | 1C | 243.92 | 300.52 | 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 | 300.06 | 324.75 | 305.40 | 28.56 | 2103.7 |
| 60 | 4E | 302.53 | 310.00 | 305.31 | 41.80 | 1243.2 |
| | AVE | 304.09 | 323.32 | 305.42 | 29.74 | 1457.9 |

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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**0.33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|---------------------------------|-----------------------|--------------|--------------|
| 67 (67.6) | 2A | 318.59 | 338.00 | 321.66 | 27.98 | 1179.4 |
| 67 (67.9) | 4A | 317.94 | 347.94 | 325.49 | 20.14 | 1123.8 |
| 67 (67.7) | 4C | 315.68 | 359.06 | 324.86 | 20.24 | 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 | 2062.6 |
| 70 (70.0) | 2D | 325.50 | 363.00 | 334.61 | 21.48 | 1886.5 |
| 70 (70.9) | 3C | 318.97 | 365.53 | 332.18 | 25.71 | 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 | 29.74 | 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 | 366.40 | 334.64 | 20.06 | 2440.7 |
| 71 (71.5) | 3E | 318.03 | 354.44 | 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 | 337.00 | 25.14 | 2438.0 |
| 72 (73.2) | 3D | 329.84 | 374.37 | 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 | 25.12 | 1932.3 |
| 74 (75.8) | 1D | 323.30 | 349.98 | 341.52 | 53.52 | 1144.5 |
| 74 (75.1) | 2C | 323.42 | 374.04 | 340.73 | 25.38 | 2415.6 |
| 74 (74.6) | 2D | 325.50 | 372.20 | 346.44 | 23.35 | 1859.6 |

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44529A-B

| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| 74 (72.4) | 2E | 309.52 | 349.68 | 333.77 | 27.42 | 1143.6 |
| 74 (75.4) | 3B | 329.65 | 360.31 | 344.27 | 19.41 | 2362.3 |
| 74 (74.9) | 3C | 318.97 | 378.74 | 342.00 | 18.46 | 2425.0 |
| 74 (75.4) | 3D | 329.84 | 376.98 | 342.77 | 19.37 | 2373.1 |
| 74 (74.6) | 3E | 318.03 | 361.02 | 326.85 | 19.13 | 2009.5 |
| 74 (74.8) | 4B | 318.34 | 372.12 | 350.16 | 28.00 | 1824.6 |
| 74 (73.7) | 5C | 321.26 | 355.54 | 327.57 | 22.30 | 2014.1 |
| 74 (74.7) | 5D | 319.14 | 357.64 | 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 | 29.40 | 2404.6 |
| 75 (75.2) | 2D | 325.50 | 373.30 | 347.44 | 23.71 | 1856.0 |
| 75 (76.1) | 3C | 318.97 | 379.92 | 344.95 | 19.35 | 2422.1 |
| 75 (75.9) | 3E | 318.03 | 361.14 | 331.87 | 29.94 | 2004.2 |
| 75 (76.0) | 4B | 318.34 | 373.22 | 353.22 | 29.24 | 1821.8 |
| 75 (75.8) | 5D | 319.14 | 354.24 | 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 | 1128.4 |
| 76 (75.7) | 2B | 308.13 | 371.01 | 349.18 | 26.05 | 1862.0 |
| 76 (75.9) | 2D | 325.50 | 373.44 | 344.78 | 24.75 | 1852.6 |
| 76 (74.4) | 2E | 309.52 | 354.40 | 338.76 | 27.46 | 1134.3 |
| 76 (77.2) | 3B | 329.65 | 382.10 | 348.74 | 29.87 | 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 | 356.76 | 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 | 27.86 | 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 | 364.30 | 349.36 | 19.24 | 2412.0 |
| 77 (77.7) | 3E | 318.03 | 363.56 | 336.07 | 22.22 | 1944.2 |
| 77 (77.8) | 4B | 318.34 | 375.08 | 357.61 | 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 | 39.81 | 1814.9 |
| 78 (79.3) | 3D | 329.84 | 364.31 | 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 | 376.00 | 355.18 | 28.53 | 1842.4 |

| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| 78 (79.3) | 3B | 329.65 | 364.23 | 353.89 | 22.82 | 2349.1 |
| 78 (78.9) | 3C | 318.97 | 367.32 | 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 | 361.56 | 349.97 | 38.25 | 1116.5 |
| 78 (78.8) | 4C | 315.68 | 366.81 | 352.45 | 23.47 | 2351.3 |
| | AVE | 321.30 | 374.39 | 352.26 | 31.07 | 1830.8 |
| 84 | 1C | 289.14 | 366.29 | 350.46 | 30.76 | 2140.2 |
| 84 | 3A | 287.74 | 371.42 | 354.23 | 30.59 | 1934.1 |
| 84 | 3B | 295.32 | 368.77 | 364.67 | 25.44 | 1910.6 |
| 84 | 3D | 297.34 | 366.80 | 363.32 | 26.36 | 2005.0 |
| 84 | 4D | 302.97 | 360.21 | 369.76 | 52.34 | 1748.0 |
| | AVE | 294.44 | 374.20 | 360.49 | 33.08 | 1947.6 |
| 90 | 2C | 275.52 | 396.54 | 376.77 | 28.50 | 2178.7 |
| 90 | 3A | 287.63 | 384.42 | 366.99 | 29.66 | 1905.9 |
| 90 | 3B | 290.25 | 404.40 | 379.08 | 23.82 | 2092.8 |
| 90 | 3D | 278.41 | 396.40 | 377.46 | 30.86 | 2161.1 |
| 90 | 3E | 279.09 | 373.01 | 364.55 | 61.39 | 1979.2 |
| 90 | 4B | 278.22 | 395.55 | 384.36 | 45.01 | 1708.3 |
| 90 | 5C | 284.75 | 372.24 | 364.94 | 72.97 | 2037.0 |
| | AVE | 281.58 | 368.73 | 373.66 | 41.88 | 2009.0 |
| 96 | 3D | 242.08 | 348.76 | 390.01 | 55.31 | 2229.9 |
| 96 | 1C | 231.31 | 363.74 | 373.94 | 43.39 | 1950.6 |
| 96 | 3B | 241.68 | 404.41 | 391.74 | 27.40 | 2185.3 |
| | AVE | 238.35 | 397.28 | 385.23 | 42.37 | 2121.9 |

44529A-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 = 0.0062 KG/SEC

INLET VAPOR TEMP = 112.0 DEG C

TOTAL POWER = 1.40 KW

| Z (M) | NO LOCATION | HEAT FLUX (WATT/SQM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / 0.707 * 0.33 | REYNOLDS NO. |
|----------|----------------|-------------------------|------------------------------|-----------------------|-------------------|--------------|
| .30 | 2A | 261.84 | 123.46 | 116.14 | 10.24 | 1402.2 |
| .30 | 4A | 258.54 | 122.77 | 116.16 | 11.24 | 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 | 116.27 | 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 | 418.24 | 129.45 | 120.84 | 18.46 | 2335.1 |
| | AVE | 411.0 | 128.70 | 119.78 | 16.36 | 2137.7 |
| .99 | 2A | 635.03 | 143.28 | 126.61 | 15.46 | 1423.1 |
| .99 | 4A | 627.84 | 143.25 | 125.67 | 17.96 | 1415.9 |
| .99 | 4C | 694.16 | 143.80 | 127.26 | 17.86 | 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 | 1D | 744.36 | 153.50 | 136.95 | 12.59 | 1401.5 |
| 1.22 | 1C | 787.12 | 151.17 | 134.23 | 17.24 | 2471.8 |
| 1.22 | 4D | 827.44 | 157.34 | 139.64 | 16.63 | 2244.6 |
| 1.22 | 2B | 796.44 | 155.97 | 137.33 | 11.37 | 1379.6 |
| | AVE | 796.25 | 154.50 | 137.04 | 14.33 | 1674.2 |
| 1.52 | 2A | 974.56 | 165.74 | 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 | 17.44 | 1340.3 |
| | AVE | 956.86 | 166.61 | 150.96 | 15.82 | 1329.8 |

41329C-2

RUN 41329C

MASS FLOW = .0062 KG/SEC

INLET VAPOR TEMP = 112.8 DEG C

TOTAL POWER = 1.40 KW

| Z (M) | RDD LOCATION | HEAT FLUX (WATT/SQM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU /PR**0.33 | 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 | 172.75 | 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 | 2064.4 |
| 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 | 2566.3 |
| 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 | 22.65 | 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 | 161.76 | 19.93 | 2423.3 |
| | AVE | 1053.20 | 179.47 | 161.46 | 20.11 | 2416.3 |
| 1.88(1.93) | 1D | 952.84 | 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 | 37.02 | 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 | 163.85 | 22.28 | 2477.1 |
| 1.88(1.90) | 5D | 1023.69 | 175.38 | 168.21 | 35.43 | 1278.4 |

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| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| | 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 | 2756.4 |
| 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 | 49.27 | 2131.1 |
| 1.96(1.98) | 3C | 1026.11 | 185.59 | 173.70 | 30.02 | 2790.7 |
| 1.96(1.96) | 3E | 1052.08 | 174.79 | 166.74 | 44.96 | 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 | 27.76 | 2676.5 |
| 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 | 27.86 | 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 | 174.83 | 28.56 | 2659.0 |
| 1.98(1.98) | 4E | 1026.59 | 178.07 | 171.81 | 40.36 | 1264.7 |
| 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 | 199.88 | 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 | 21.60 | 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 = 0.0137 LBM/SEC

INLET VAPOR TEMP = 235.0 DEG F

TOTAL POWER = 1.33 BTU/SEC

| Z (IN) | KUD LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR ^{0.33} | REYNOLDS NO. |
|-----------|-----------------|----------------------------|---------------------------------|-----------------------|-------------------------|--------------|
| 12 | 2A | 82.94 | 254.23 | 241.05 | 10.24 | 1482.2 |
| 12 | 4A | 81.95 | 252.48 | 241.09 | 11.71 | 1483.5 |
| 12 | 4C | 78.22 | 253.97 | 241.58 | 15.95 | 3147.5 |
| 12 | 4E | 76.55 | 251.95 | 241.07 | 11.47 | 1484.6 |
| | AVE | 79.93 | 253.28 | 241.20 | 12.22 | 1899.5 |
| 24 | 1B | 127.59 | 264.30 | 247.54 | 12.48 | 1497.7 |
| 24 | 1C | 131.66 | 261.46 | 245.74 | 17.97 | 2980.3 |
| 24 | 4D | 132.56 | 265.01 | 249.51 | 18.46 | 2335.1 |
| | AVE | 130.41 | 263.66 | 247.61 | 16.36 | 2137.7 |
| 39 | 2A | 201.26 | 289.40 | 259.89 | 10.46 | 1423.1 |
| 39 | 4A | 208.51 | 289.85 | 260.00 | 10.96 | 1415.9 |
| 39 | 4C | 226.02 | 290.85 | 261.76 | 17.86 | 3017.0 |
| 39 | 4E | 211.22 | 289.90 | 259.99 | 11.72 | 1421.9 |
| | AVE | 216.26 | 290.12 | 260.24 | 12.56 | 1619.5 |
| 48 | 1B | 237.52 | 308.30 | 278.51 | 12.04 | 1401.5 |
| 48 | 1C | 249.48 | 304.11 | 273.61 | 17.24 | 2471.8 |
| 48 | 4D | 262.44 | 315.26 | 293.35 | 16.55 | 2244.6 |
| 48 | 5B | 252.45 | 312.74 | 279.20 | 11.37 | 1379.6 |
| | AVE | 250.47 | 310.11 | 278.67 | 14.33 | 1874.2 |
| 60 | 2A | 308.40 | 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 | 17.44 | 1340.3 |
| | AVE | 303.27 | 331.89 | 303.73 | 15.82 | 1329.8 |

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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 | 18.96 | 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 | 24.06 | 2694.8 |
| 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 | 349.61 | 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 | 2668.7 |
| 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 | 1276.4 |

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| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| | 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 | 1261.7 |
| | 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 | 40.30 | 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 | 29.36 | 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 | 36.21 | 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 | 252.93 | 379.26 | 368.65 | 44.13 | 2182.0 |
| | AVE | 248.50 | 388.91 | 375.72 | 42.42 | 2216.8 |

41329C-9

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.).

KUN 41529D

MASS FLOW = 0.065 KG/SEC

INLET VAPOR TEMP = 117.8 DEG C

TOTAL POWER = 1.42 KW

| Z (M) | RID LOCATION | HEAT FLUX (WATT/SQM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR**0.33 | REYNOLDS NO. |
|----------|-----------------|-------------------------|------------------------------|-----------------------|---------------|--------------|
| .30 | 2A | 256.52 | 128.89 | 120.77 | 8.91 | 1527.1 |
| .30 | 4A | 257.84 | 128.89 | 122.75 | 8.94 | 1527.3 |
| .30 | 4C | 243.67 | 128.89 | 121.02 | 13.57 | 3241.2 |
| | AVE | 252.61 | 128.89 | 120.84 | 10.46 | 2098.5 |
| .61 | 1C | 426.15 | 133.11 | 123.31 | 16.74 | 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 | 12.39 | 1465.4 |
| .99 | 4C | 667.50 | 149.18 | 131.58 | 15.94 | 3116.3 |
| | AVE | 674.91 | 147.39 | 131.22 | 13.27 | 2015.6 |
| 1.22 | 1C | 787.15 | 157.73 | 138.57 | 15.04 | 2542.2 |
| 1.22 | 4E | 663.83 | 155.33 | 141.12 | 14.98 | 1453.6 |
| | AVE | 745.48 | 156.53 | 139.85 | 15.06 | 1997.6 |
| 1.52 | 2A | 984.63 | 175.13 | 154.84 | 16.65 | 1363.6 |
| 1.52 | 4A | 924.45 | 171.26 | 155.18 | 14.60 | 1365.8 |
| 1.52 | 4C | 921.55 | 176.14 | 155.13 | 17.26 | 2842.3 |
| | AVE | 943.54 | 175.18 | 155.05 | 14.15 | 1873.7 |

41529D-2

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**0.33 | REYNOLDS NO. |
|------------|--------------|----------------------|---------------------------|--------------------|---------------|--------------|
| 1.70(1.72) | 2A | 1017.24 | 186.22 | 164.03 | 11.77 | 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 | 1026.36 | 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 | 2503.4 |
| 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 | 1066.20 | 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 | 1042.60 | 184.67 | 168.15 | 21.35 | 2696.7 |
| 1.88(1.87) | 5D | 1000.06 | 178.05 | 170.35 | 32.01 | 1641.1 |

41529D-3

| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| | 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 | 2165.6 |
| 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 | 20.95 | 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 | 1066.20 | 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 | 20.54 | 2742.4 |
| 1.96(1.97) | 2D | 1063.43 | 194.92 | 178.60 | 20.90 | 2167.3 |
| 1.96(1.97) | 3C | 1076.43 | 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 | 2708.5 |
| 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 |

41529D-4

| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| 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 | 5D | 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 | 186.37 | 24.06 | 2191.2 |
| 2.29 | 3B | 907.80 | 207.97 | 191.86 | 20.13 | 2489.8 |
| 2.29 | 3E | 913.34 | 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 | 64.77 | 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 41529D

MASS FLOW = .0143 LBM/SEC

INLET VAPOR TEMP = 244.0 DEG F

TOTAL POWER = 1.34 BTU/SEC

| Z (IN) | ROD LOCATION (BTU/HR-SQFT) | HEAT FLUX | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR ^{0.33} | REYNOLDS NU. |
|-----------|-------------------------------|-----------|------------------------------|-----------------------|-------------------------|--------------|
| 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 | 254.00 | 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 | 5D | 126.35 | 274.79 | 255.71 | 10.46 | 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 | 309.52 | 268.84 | 15.94 | 3110.3 |
| | AVE | 213.92 | 297.30 | 268.19 | 13.27 | 2025.6 |
| 48 | 1C | 249.49 | 315.91 | 281.43 | 15.72 | 2542.2 |
| 48 | 4E | 254.78 | 311.59 | 296.02 | 14.98 | 1453.0 |
| | AVE | 252.13 | 313.75 | 283.72 | 15.00 | 1947.6 |
| 67 | 2A | 312.09 | 352.63 | 310.72 | 19.65 | 1363.0 |
| 67 | 4A | 293.01 | 346.28 | 311.32 | 14.60 | 1365.8 |
| 67 | 4C | 292.07 | 349.04 | 311.23 | 17.20 | 2692.3 |
| | AVE | 299.05 | 347.32 | 311.09 | 14.15 | 1873.7 |

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RUN 41529D

MASS FLOW = .0143 LBM/SEC

INLET VAPOR TEMP = 244.0 DEG F

TOTAL POWER = 1.34 BTU/SEC

| Z (IN) | RUD LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU /PR**0.33 | REYNOLDS NU. |
|-----------|-----------------|----------------------------|---------------------------------|-----------------------|--------------|--------------|
| 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 | 334.19 | 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 | 19.95 | 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 | 339.17 | 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 | 316.48 | 352.48 | 338.62 | 32.01 | 1641.1 |

41529D-7

| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| | 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 | 2356.3 |
| 75 (75.9) | 4B | 314.48 | 379.84 | 351.20 | 29.06 | 2197.5 |
| 75 (75.1) | 4D | 338.56 | 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 | 341.24 | 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 | 334.13 | 377.73 | 349.19 | 25.15 | 2802.1 |
| 76 (76.6) | 4D | 338.58 | 373.58 | 350.45 | 26.91 | 2217.7 |
| | AVE | 337.83 | 377.41 | 346.74 | 20.33 | 2180.7 |
| 77 (77.6) | 1D | 327.84 | 365.50 | 345.23 | 22.36 | 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 | 20.96 | 2167.3 |
| 77 (77.7) | 3C | 341.34 | 383.11 | 350.47 | 27.03 | 2834.7 |
| 77 (77.6) | 3E | 317.12 | 357.86 | 339.37 | 32.98 | 2361.2 |
| 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 | 346.59 | 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 | 1293.6 |
| 78 (78.9) | 4C | 334.13 | 382.10 | 353.44 | 24.89 | 2775.2 |
| 78 (78.0) | 4D | 336.58 | 373.36 | 354.99 | 33.96 | 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 | 4E | 289.50 | 383.31 | 364.65 | 28.71 | 2270.3 |
| 90 | 4B | 286.25 | 403.10 | 378.57 | 20.55 | 2632.8 |
| 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 | 58.96 | 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 |

41529D-9

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 thermocouples 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) | RID LOCATION | HEAT FLUX (KWTT/SQM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU /PR**0.33 | 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 | 340.66 | 130.51 | 119.93 | 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 | 126.37 | 9.41 | 1347.6 |
| .99 | 4C | 641.13 | 144.91 | 127.15 | 16.58 | 2790.3 |
| .99 | 4E | 675.81 | 143.24 | 126.36 | 11.00 | 1352.1 |
| | AVE | 683.46 | 144.40 | 126.54 | 12.03 | 1740.4 |
| 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 | 743.93 | 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 |

43929E-2

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/CM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / 0.00033 | 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 | 23.94 | 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 | 19.63 | 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 |

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| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| 1.93(1.92) | 3D | 1038.31 | 195.01 | 174.27 | 19.62 | 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 | 196.44 | 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 | 186.38 | 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 | 182.36 | 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 | 182.97 | 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) | RJD LOCATION (016/HR-SQFT) | HEAT FLUX | FALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU /PR**33 | REYNOLDS NO. |
|-----------|-------------------------------|-----------|------------------------------|-----------------------|------------|--------------|
| 12 | 1B | 80.39 | 259.70 | 238.53 | 6.63 | 1398.3 |
| 12 | 2A | 83.78 | 257.60 | 238.52 | 7.10 | 1400.7 |
| 12 | 4E | 87.62 | 256.50 | 238.51 | 7.93 | 1401.9 |
| | AVE | 85.43 | 257.93 | 238.52 | 7.24 | 1400.3 |
| 24 | 1C | 131.80 | 264.80 | 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 | 130.00 | 266.66 | 245.52 | 12.90 | 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 | 219.00 | 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 | 24.30 | 2388.2 |
| 48 | 3B | 252.09 | 320.27 | 283.07 | 15.76 | 2459.5 |
| 48 | 5B | 251.64 | 305.92 | 280.41 | 14.90 | 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 | 305.93 | 18.40 | 1262.7 |
| 60 | 4C | 330.09 | 336.87 | 308.68 | 26.41 | 2609.2 |
| | AVE | 328.82 | 334.37 | 306.75 | 20.51 | 1711.1 |

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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-SQ F) | 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 | 322.00 | 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 |

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| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| 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 | 55.46 | 2375.2 |
| 78 (77.8) | 2B | 319.70 | 363.96 | 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 | 75.74 | 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 | 369.43 | 42.80 | 2099.9 |
| 84 | 2D | 314.72 | 377.81 | 366.96 | 52.95 | 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 (82 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/SQCM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU /PR**0.33 | REYNOLDS NU. |
|----------|-----------------|--------------------------|------------------------------|-----------------------|--------------|--------------|
| .30 | 1B | 269.22 | 127.11 | 116.00 | 6.92 | 1353.9 |
| .30 | 2A | 261.11 | 126.50 | 115.99 | 7.10 | 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 | 413.20 | 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 | 127.89 | 9.40 | 1277.1 |
| .99 | 4C | 682.70 | 146.75 | 129.57 | 15.94 | 2718.0 |
| .99 | 4E | 667.56 | 143.83 | 127.90 | 11.49 | 1262.7 |
| | 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 | 169.07 | 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 |

44029E-2

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**0.33 | REYNOLDS NU. |
|------------|-----------------|-------------------------|---------------------------------|-----------------------|--------------|--------------|
| 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 | 3055.4 |
| | 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 |

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| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| 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 | 2620.4 |
| 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 | 2086.4 |
| 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 | 42.54 | 2368.9 |
| 1.96(1.95) | 1D | 1010.88 | 181.36 | 174.25 | 34.70 | 1503.7 |
| 1.96(1.96) | 2A | 1020.42 | 189.39 | 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 | 36.50 | 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 | 64.36 | 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 | 33.74 | 1287.1 |
| 1.98(1.99) | 5D | 1025.11 | 180.45 | 175.73 | 53.05 | 1402.2 |
| | 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 | 1021.24 | 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 | 196.44 | 182.36 | 25.80 | 2319.6 |
| 2.03(2.03) | 4A | 996.42 | 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 |

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| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| 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 | 46.16 | 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 | 55.96 | 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 44029E

MASS FLOW = .0124 LBM/SEC

INLET VAPOR TEMP = 233.0 DEG F

TOTAL POWER = 1.35 BTU/SEC

| Z (IN) | RJD LOCATION (BTU/HR-SQFT) | HEAT FLUX | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU / PR = .33 | REYNOLDS NO. |
|-----------|-------------------------------|-----------|------------------------------|-----------------------|---------------|--------------|
| 12 | 1B | 85.33 | 263.80 | 240.80 | 6.92 | 1333.9 |
| 12 | 2A | 82.70 | 259.70 | 240.79 | 7.16 | 1335.1 |
| 12 | 4E | 86.50 | 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 | 136.44 | 271.60 | 248.79 | 14.27 | 2643.7 |
| 24 | 5B | 124.14 | 269.40 | 248.18 | 9.37 | 1348.1 |
| | AVE | 128.48 | 269.07 | 247.67 | 12.60 | 2123.9 |
| 39 | 1B | 214.42 | 293.90 | 262.24 | 11.66 | 1282.7 |
| 39 | 2A | 213.54 | 297.40 | 262.19 | 9.40 | 1277.1 |
| 39 | 4C | 210.39 | 296.14 | 263.43 | 15.94 | 2718.0 |
| 39 | 4E | 211.59 | 293.90 | 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 | 14.94 | 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 |
| 63 | 1B | 330.19 | 337.76 | 310.56 | 17.56 | 1196.5 |
| 63 | 2A | 318.16 | 334.53 | 310.81 | 19.47 | 1195.1 |
| 63 | 4C | 326.06 | 341.26 | 311.82 | 24.83 | 2518.3 |
| | AVE | 324.60 | 337.85 | 311.76 | 20.62 | 1636.6 |

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RUN 44029E

MASS FLOW = .0124 LBM/SEC

INLET VAPOR TEMP = 233.0 DEG F

TOTAL POWER = 1.35 BTU/SEC

| Z (IN) | RDD 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 | 2846.6 |
| 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 | 1746.9 |
| | 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 | 30.50 | 2134.1 |

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| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| 76 (75.6) | 3D | 324.46 | 388.69 | 350.09 | 17.60 | 3129.3 |
| 76 (76.0) | 4A | 322.15 | 355.63 | 346.24 | 47.66 | 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 | 31.06 | 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 | 2688.4 |
| 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 | 2366.9 |
| 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 | 1200.1 |
| 78 (78.1) | 4B | 321.32 | 372.52 | 363.41 | 64.36 | 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 | 2206.3 |
| 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 | 1179.4 |
| 80 (80.4) | 4E | 313.57 | 360.85 | 355.02 | 74.01 | 1262.3 |
| | AVE | 315.00 | 372.07 | 358.78 | 49.73 | 1723 |

| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| 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 | 55.96 | 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) | RUD LOCATION | HEAT FLUX (WATT/SQM) | WALL SURFACE TEMP (DEG C) | VAPOR TEMP (DEG C) | NU / PR = 0.33 | REYNOLDS NO. |
|-------|--------------|----------------------|---------------------------|--------------------|----------------|--------------|
| .30 | 4C | 264.70 | 125.37 | 117.30 | 14.56 | 2898.7 |
| .30 | 4E | 248.70 | 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 | 1D | 644.60 | 146.72 | 128.54 | 9.68 | 1361.6 |
| .99 | 2A | 611.97 | 148.07 | 128.51 | 8.52 | 1300.0 |
| .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 | 11.20 | 1281.7 |
| 1.22 | 3E | 727.59 | 152.89 | 136.29 | 16.14 | 2271.6 |
| | AVE | 735.56 | 156.70 | 137.79 | 13.85 | 2117.7 |
| 1.52 | 1D | 907.93 | 175.45 | 153.57 | 10.51 | 1213.3 |
| 1.52 | 2A | 927.47 | 176.75 | 153.71 | 17.17 | 1206.9 |
| 1.52 | 4E | 969.90 | 165.15 | 153.79 | 21.93 | 1229.3 |
| | AVE | 935.10 | 172.45 | 153.69 | 14.20 | 1216.5 |

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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=0.33 | 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 | 17.56 | 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 | 172.70 | 19.45 | 3429.7 |
| 1.91(1.89) | 4D | 964.48 | 186.95 | 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 | 184.62 | 174.67 | 27.97 | 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 |

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| | | | | | | |
|------------|-----|---------|--------|--------|-------|--------|
| 1.96(1.96) | 20 | 968.61 | 192.65 | 176.27 | 19.16 | 2424.0 |
| 1.96(1.95) | 20 | 961.27 | 169.60 | 175.22 | 22.67 | 2517.5 |
| 1.96(1.93) | 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 | 187.37 | 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 | 193.26 | 177.09 | 19.29 | 2328.7 |
| 1.98(1.98) | 3A | 964.42 | 187.78 | 173.88 | 22.85 | 1885.0 |
| 1.98(1.97) | 4A | 975.19 | 165.70 | 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 | 162.83 | 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 | 164.05 | 172.50 | 28.06 | 2403.6 |
| 2.01(2.00) | 2C | 958.21 | 194.38 | 177.42 | 25.98 | 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 | 1524.3 |
| 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 | 192.06 | 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 | 184.07 | 174.01 | 33.04 | 2170.1 |
| | AVE | 976.27 | 186.77 | 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 | 28.26 | 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 | 198.07 | 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 | 168.25 | 177.77 | 25.96 | 1209.9 |
| 2.03(2.03) | 4E | 932.93 | 189.56 | 176.19 | 16.86 | 1350.9 |
| | AVE | 944.20 | 191.84 | 178.03 | 21.05 | 1770.8 |
| 2.06(2.05) | 3E | 919.61 | 164.68 | 175.54 | 33.72 | 2033.1 |

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| | | | | | | |
|------|-----|--------|--------|--------|-------|--------|
| | AVE | 919.61 | 104.68 | 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 | 197.00 | 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 | 938.62 | 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 | 194.18 | 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 | 28.58 | 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 | 199.44 | 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 | 1900.2 |
| 2.44 | 4B | 779.66 | 209.02 | 199.92 | 24.57 | 1787.9 |
| 2.44 | 4D | 779.66 | 209.07 | 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 |

KUN 41229F

MASS FLOW = .0126 LBM/SEC

INLET VAPOR TEMP = 236.0 DEG F

TOTAL POWER = 1.26 BTU/SEC

| Z (IN) | KOD LOCATION | HEAT FLUX (BTU/HR-SQFT) | WALL SURFACE TEMP (DEG F) | VAPOR TEMP (DEG F) | NU /PR**.33 | REYNOLDS NO. |
|-----------|-----------------|----------------------------|------------------------------|-----------------------|-------------|--------------|
| 12 | 4C | 85.90 | 257.66 | 243.15 | 14.50 | 2898.7 |
| 12 | 4E | 78.80 | 257.60 | 242.98 | 8.74 | 1361.2 |
| | AVE | 81.36 | 257.63 | 243.07 | 11.60 | 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 | 9.66 | 1301.6 |
| 39 | 2A | 193.97 | 298.53 | 263.32 | 8.52 | 1300.0 |
| 39 | 4C | 207.70 | 297.39 | 263.85 | 14.84 | 2770.5 |
| | AVE | 202.01 | 297.34 | 263.51 | 11.03 | 1790.7 |
| 48 | 1C | 233.97 | 318.20 | 277.25 | 11.84 | 2251.9 |
| 48 | 2C | 234.70 | 317.03 | 282.90 | 16.06 | 2665.6 |
| 48 | 2E | 233.20 | 313.80 | 282.59 | 11.20 | 1281.7 |
| 48 | 3E | 230.62 | 307.20 | 277.32 | 16.14 | 2271.6 |
| | AVE | 233.10 | 314.66 | 281.02 | 13.80 | 2117.7 |
| 60 | 1B | 287.77 | 347.81 | 308.43 | 10.51 | 1213.3 |
| 60 | 2A | 293.47 | 350.15 | 308.68 | 10.17 | 1206.9 |
| 60 | 4E | 307.42 | 329.28 | 308.83 | 21.93 | 1229.3 |
| | AVE | 296.34 | 342.41 | 308.65 | 14.20 | 1216.5 |

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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 | 324.46 | 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 | 356.53 | 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 | 368.96 | 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 | 29.97 | 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 | 29.77 | 1599.5 |
| 77 (76.9) | 2A | 304.39 | 367.39 | 341.47 | 16.22 | 1440.2 |

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| | | | | | | |
|-----------|-----|--------|--------|--------|-------|--------|
| 77 (77.2) | 2B | 307.01 | 378.77 | 349.29 | 19.10 | 2424.0 |
| 77 (76.9) | 2D | 304.66 | 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 | 350.70 | 19.29 | 2328.7 |
| 78 (78.0) | 3A | 305.68 | 376.36 | 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 | 373.33 | 351.50 | 25.70 | 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 | 2187.0 |
| 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 | 363.33 | 342.50 | 28.06 | 2403.6 |
| 79 (78.6) | 2C | 303.71 | 381.88 | 351.36 | 23.98 | 2520.0 |
| 79 (78.9) | 2D | 304.68 | 376.50 | 351.81 | 22.63 | 2140.3 |
| 79 (78.5) | 2E | 310.09 | 352.10 | 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 | 367.00 | 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 (80.7) | 1C | 294.90 | 364.77 | 344.90 | 28.28 | 2354.4 |
| 80 (80.1) | 2B | 295.96 | 385.40 | 354.48 | 17.46 | 2199.2 |
| 80 (79.9) | 2D | 303.02 | 378.15 | 353.99 | 22.93 | 2081.5 |
| 80 (79.6) | 3C | 304.14 | 389.96 | 361.50 | 22.26 | 1375.5 |
| 80 (80.5) | 3D | 301.42 | 386.99 | 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 | 21.55 | 1770.8 |
| 81 (80.9) | 3E | 291.48 | 364.42 | 347.98 | 33.72 | 2033.1 |

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| | | | | | | |
|----|-----|--------|--------|--------|-------|--------|
| | AVE | 291.48 | 304.42 | 347.98 | 33.72 | 2033.1 |
| 84 | 1C | 294.90 | 372.22 | 353.79 | 37.11 | 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 | 391.90 | 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 | 387.09 | 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 | 361.86 | 362.29 | 37.60 | 1696.9 |
| 90 | 2B | 266.67 | 403.07 | 377.24 | 18.20 | 1777.8 |
| 90 | 2C | 276.82 | 394.70 | 376.24 | 24.01 | 2242.7 |
| 90 | 2D | 274.56 | 398.08 | 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 | 23.69 | 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 | 374.98 | 20.11 | 1784.4 |
| 90 | 4D | 289.12 | 403.97 | 374.99 | 21.20 | 1815.6 |
| 90 | 5B | 278.07 | 378.60 | 373.00 | 66.45 | 1178.9 |
| 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 | 2305.7 |
| 96 | 3D | 252.52 | 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 | 23.33 | 1816.4 |
| 96 | 5C | 241.98 | 388.23 | 381.89 | 69.56 | 1943.1 |
| | AVE | 243.34 | 401.22 | 386.96 | 43.92 | 2021.1 |

41229F-9

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 NUMBER 42430A

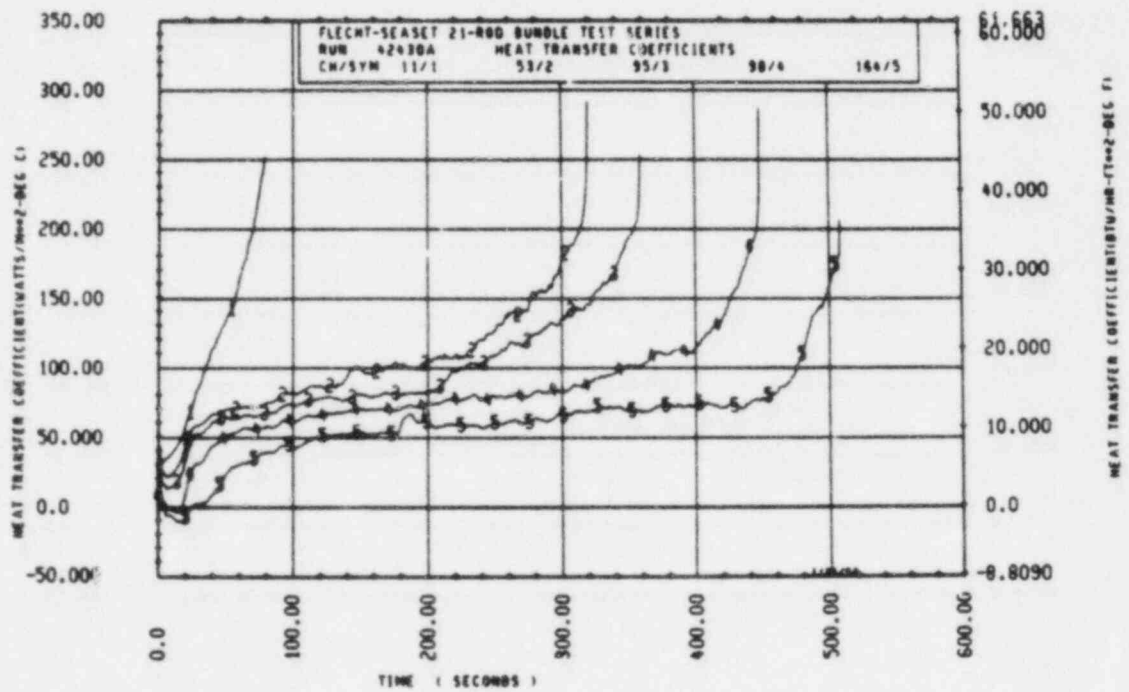
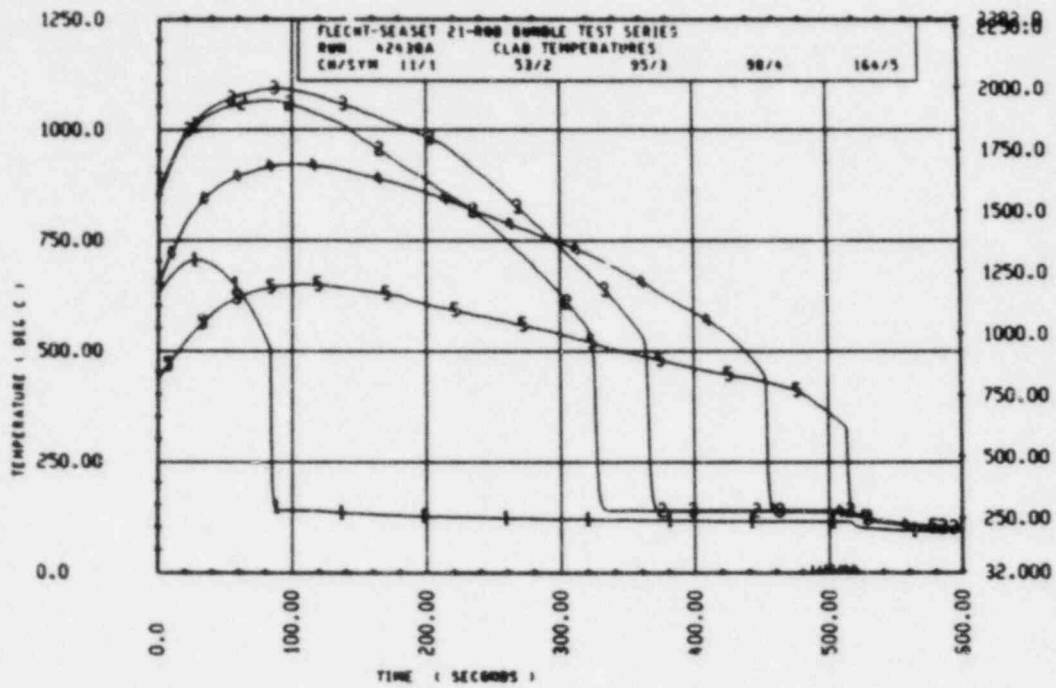
| ROD/ELEV | CHAN. NO | INITIAL FLUO (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|----------|----------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 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 | 1304. | 1491. | 182. | 42.0 | 894. | 136.6 |
| 2A 5- 0 | 17 | 1365. | 1649. | 285. | 75.0 | 899. | 215.7 |
| 2A 5- 7 | 21 | 1442. | 1720. | 258. | 71.5 | 965. | 266.6 |
| 1D 6- 2 | 20 | 1472. | 1825. | 353. | 82.5 | 1030. | 326.6 |
| 2D 6- 2 | 53 | 1560. | 1952. | 372. | 82.5 | 94. | 324.8 |
| 3D 5- 2 | 50 | 1542. | 1975. | 383. | 75.0 | 994. | 328.7 |
| 5C 6- 2 | 61 | 1512. | 1808. | 295. | 59.5 | 1004. | 309.7 |
| 1D 6- 3 | 63 | 1450. | 1812. | 354. | 110.0 | 1030. | 337.6 |
| 4B 6- 3 | 68 | 1557. | 1938. | 382. | 85.0 | 890. | 344.6 |
| 5D 6- 3 | 69 | 1460. | 1863. | 383. | 87.5 | 936. | 333.7 |
| 2A 6- 4 | 70 | 1468. | 1841. | 353. | 86.5 | 951. | 350.4 |
| 3B 6- 4 | 75 | 1563. | 1985. | 403. | 82.5 | 1017. | 339.6 |
| 3D 6- 6 | 74 | 1546. | 1979. | 433. | 87.0 | 912. | 366.8 |
| 2D 6- 5 | 84 | 1560. | 1969. | 401. | 82.5 | 864. | 353.7 |
| 3C 6- 5 | 85 | 1567. | 2010. | 423. | 82.0 | 962. | 353.6 |
| 3E 6- 5 | 86 | 1513. | 1893. | 380. | 98.0 | 1040. | 370.8 |
| 3C 6- 6 | 95 | 1570. | 2002. | 432. | 87.5 | 950. | 363.8 |
| 4A 6- 6 | 97 | 1442. | 1843. | 401. | 91.0 | 973. | 359.6 |
| 3D 7- 0 | 98 | 1211. | 1693. | 482. | 102.0 | 627. | 452.9 |
| 5C 6- 6 | 101 | 1460. | 1783. | 303. | 60.0 | 1023. | 344.7 |
| 1C 7- 0 | 110 | 1467. | 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. | 404.6 |
| 5B 7- 0 | 117 | 1332. | 1669. | 337. | 89.5 | 751. | 400.7 |
| 2B 7- 6 | 120 | 1441. | 1736. | 335. | 56.0 | 743. | 431.9 |
| 2C 7- 6 | 121 | 1376. | 1760. | 384. | 62.0 | 637. | 417.9 |
| 2E 7- 6 | 122 | 1240. | 1621. | 381. | 57.5 | 772. | 412.9 |
| 3A 7- 6 | 123 | 1247. | 1640. | 352. | 75.0 | 761. | 437.0 |
| 3B 7- 6 | 124 | 1417. | 1791. | 374. | 62.0 | 826. | 423.0 |
| 4B 7- 6 | 127 | 1386. | 1742. | 406. | 90.5 | 741. | 436.3 |
| 5C 7- 6 | 128 | 1224. | 1600. | 361. | 106.0 | 844. | 414.0 |
| 1C 8- 0 | 131 | 1170. | 1626. | 452. | 90.5 | 796. | 451.0 |
| 2E 8- 0 | 133 | 704. | 1205. | 501. | 154.0 | 673. | 466.0 |
| 4C 6- 6 | 136 | 1556. | 1991. | 433. | 88.0 | 906. | 364.7 |
| 5B 8- 0 | 136 | 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 | 516. | 465.6 |
| 2C 8- 6 | 143 | 1045. | 1471. | 426. | 71.0 | 713. | 460.0 |
| 4B 8- 6 | 145 | 1111. | 1471. | 360. | 56.0 | 646. | 465.0 |
| 5D 8- 6 | 148 | 965. | 1400. | 415. | 109.0 | 587. | 465.0 |
| 3D 9- 3 | 154 | 865. | 1371. | 506. | 123.0 | 722. | 464.0 |
| 4C 4- 3 | 156 | 966. | 1369. | 403. | 106.0 | 711. | 469.3 |
| 1010- 0 | 161 | 550. | 1050. | 452. | 160.0 | 676. | 461.6 |
| 4310- 0 | 164 | 823. | 1204. | 380. | 106.0 | 625. | 513.0 |
| 5010- 0 | 167 | 716. | 1135. | 416. | 128.0 | 664. | 452.0 |
| 2411- 0 | 168 | 536. | 775. | 239. | 108.0 | 625. | 355.0 |
| 4211- 0 | 170 | 636. | 973. | 337. | 110.0 | 472. | 508.0 |
| 1011- 6 | 172 | 347. | 805. | 408. | 160.0 | 260. | 401.0 |

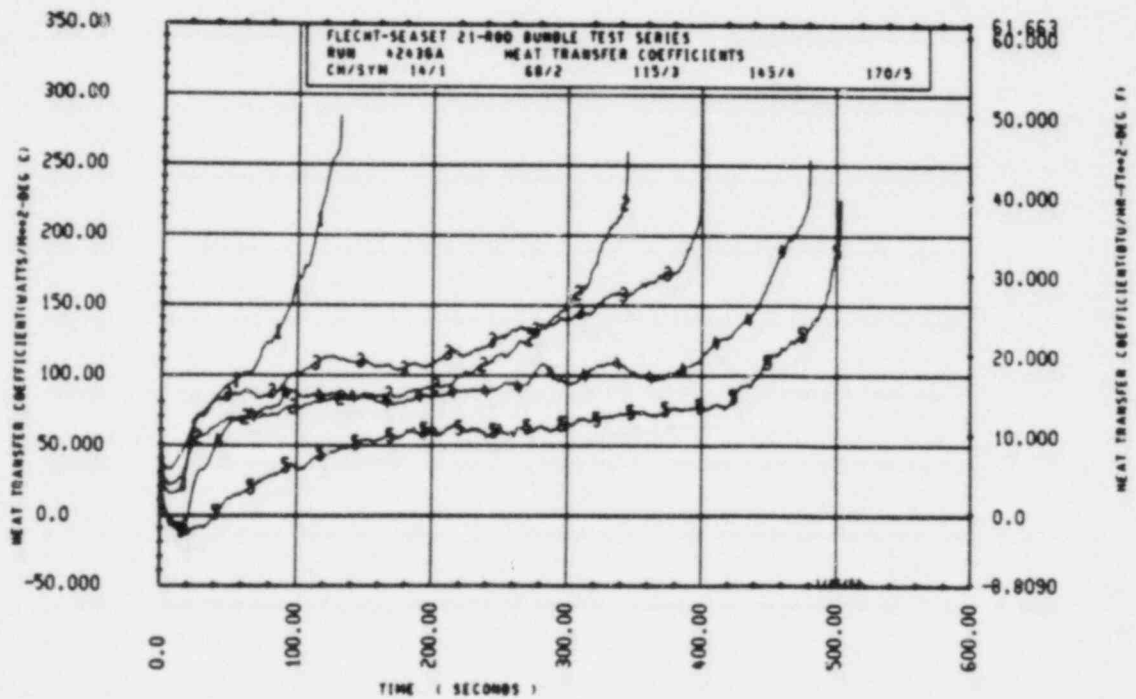
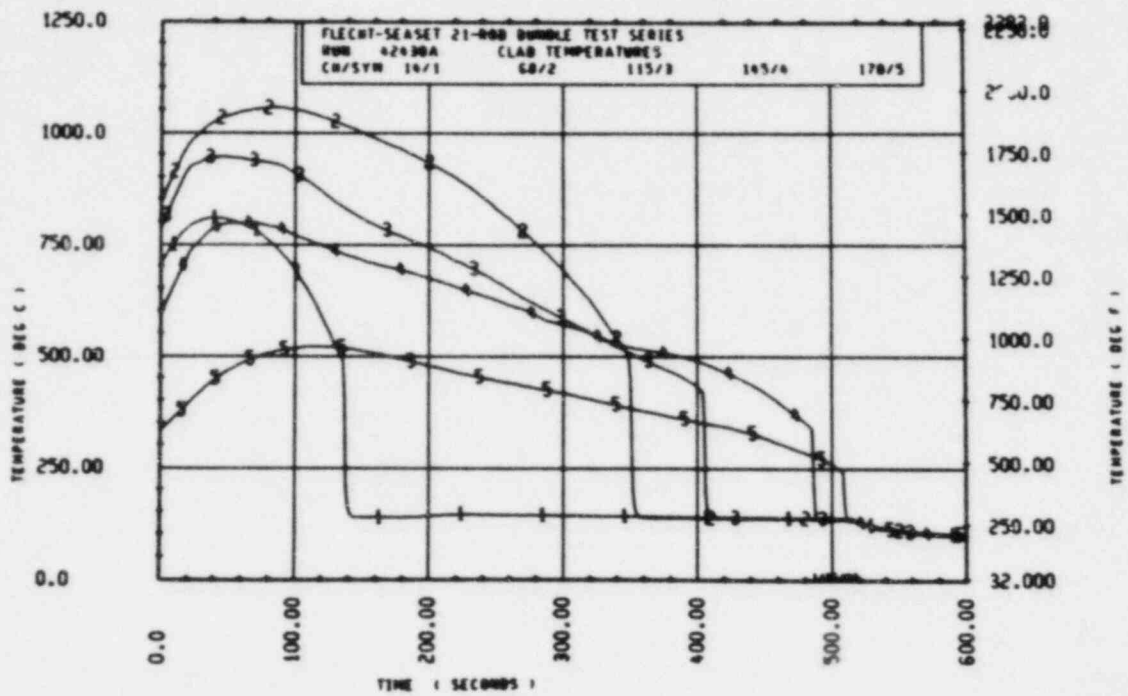
KUN 42430A HEATER ROD STATISTICAL DATA

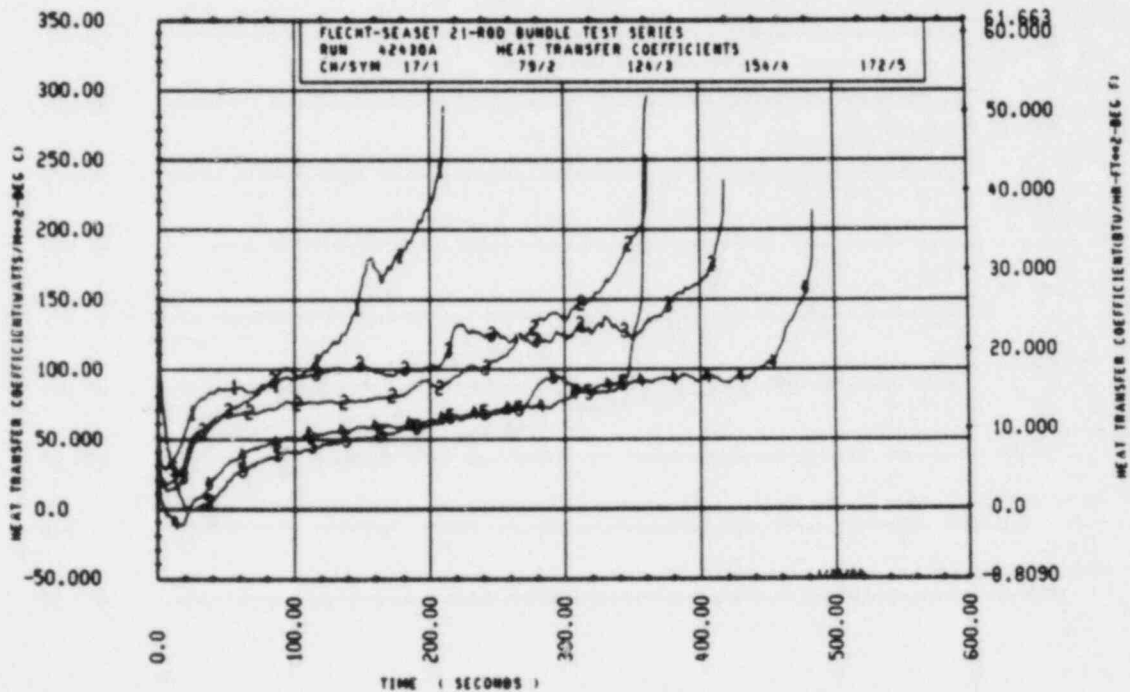
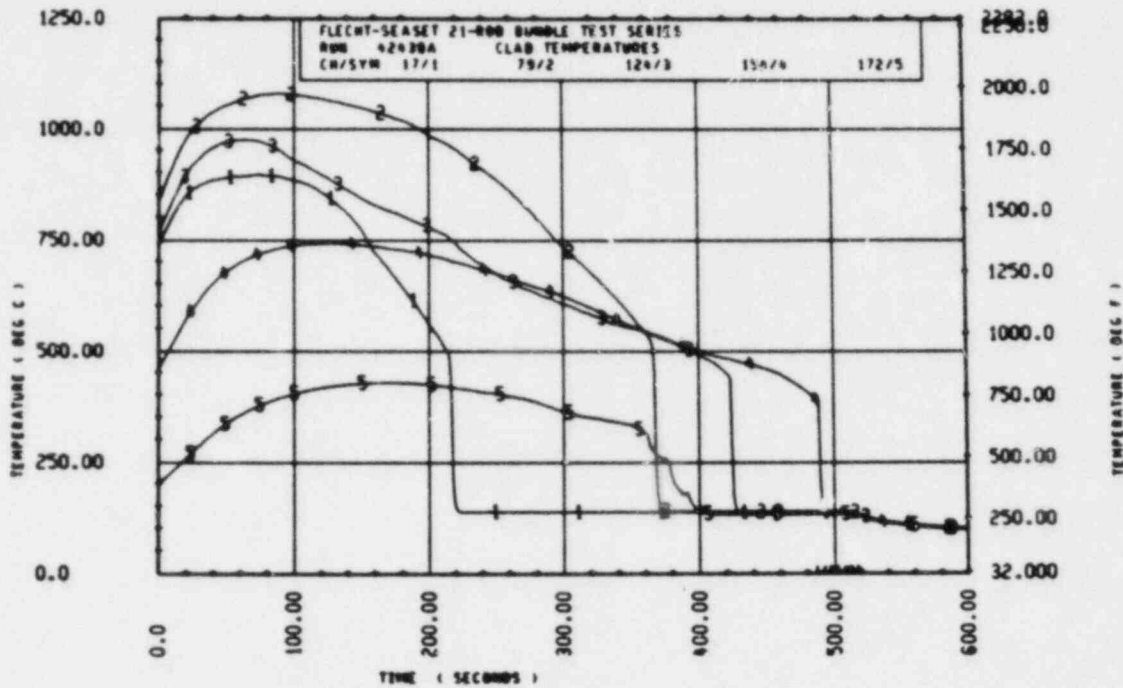
| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 503.2 | 484.4 | 492.2 | 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 |
| 34 | 1171.0 | 1074.7 | 1121.9 | 1303.7 | 1217.1 | 1260.6 | 31.5 | 26.0 | 28.7 |
| 46 | 1322.8 | 1214.4 | 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 | 1478.4 | 1863.2 | 1719.6 | 1769.4 | 71.5 | 55.5 | 63.8 |
| 70 | 1593.5 | 1470.1 | 1543.4 | 1947.6 | 1802.2 | 1976.8 | 82.5 | 64.5 | 75.2 |
| 71 | 1545.6 | 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 | 1584.1 | 1456.2 | 1534.3 | 1990.0 | 1812.3 | 1920.1 | 110.0 | 76.5 | 86.5 |
| 76 | 1586.1 | 1455.0 | 1530.1 | 2001.5 | 1708.5 | 1907.6 | 91.5 | 44.5 | 80.7 |
| 77 | 1567.0 | 1434.4 | 1526.4 | 2009.7 | 1833.8 | 1932.3 | 110.0 | 82.0 | 89.2 |
| 78 | 1564.7 | 1442.2 | 1510.0 | 2031.5 | 1783.2 | 1914.8 | 105.0 | 60.0 | 86.3 |
| 84 | 1453.4 | 1240.2 | 1364.5 | 1744.1 | 1554.9 | 1654.0 | 95.0 | 24.5 | 58.7 |
| 90 | 1416.4 | 1210.3 | 1322.4 | 1792.1 | 1594.9 | 1701.8 | 108.0 | 55.5 | 76.6 |
| 96 | 1276.4 | 763.6 | 1149.1 | 1731.9 | 1204.5 | 1590.6 | 154.0 | 73.0 | 101.8 |
| 102 | 1110.7 | 841.4 | 947.7 | 1545.2 | 1226.5 | 1404.9 | 121.0 | 43.0 | 84.4 |
| 111 | 972.5 | 777.1 | 844.1 | 1447.3 | 1149.4 | 1284.7 | 123.0 | 63.5 | 90.4 |
| 120 | 823.4 | 547.6 | 703.2 | 1231.7 | 1050.1 | 1154.6 | 160.0 | 106.0 | 133.1 |
| 132 | 636.1 | 440.4 | 550.8 | 972.8 | 762.8 | 832.9 | 133.0 | 106.0 | 115.5 |
| 138 | 546.6 | 347.4 | 465.1 | 928.4 | 784.8 | 852.9 | 160.0 | 125.0 | 140.6 |

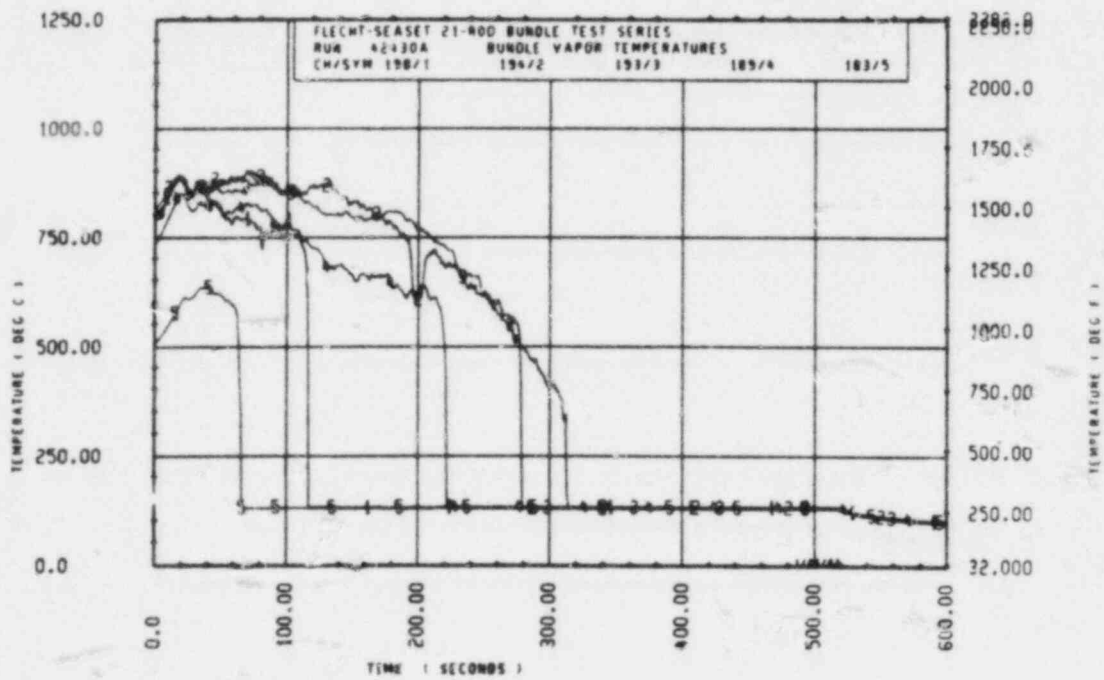
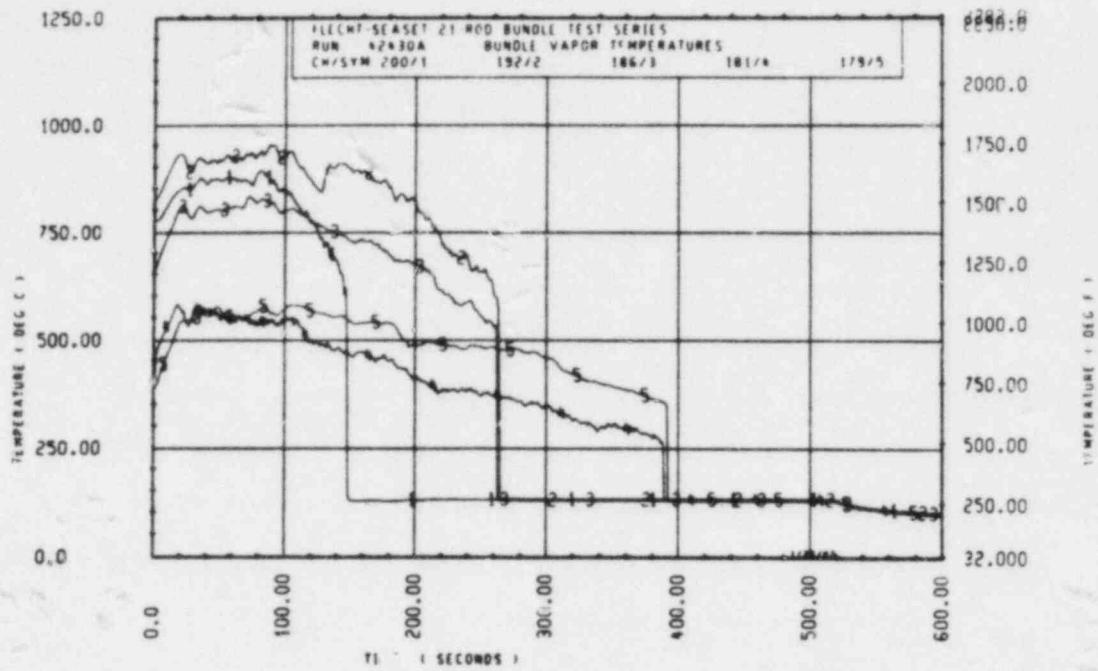
| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 32.3 | 27.4 | 30.4 | 548.9 | 521.5 | 556.2 | 10.0 | 7.3 | 9.0 |
| 24 | 66.1 | 55.5 | 60.4 | 791.8 | 744.8 | 763.2 | 30.4 | 26.2 | 24.1 |
| 34 | 146.0 | 132.7 | 139.7 | 936.8 | 840.6 | 894.5 | 87.4 | 83.4 | 85.9 |
| 46 | 214.3 | 182.5 | 195.9 | 1030.9 | 893.7 | 951.2 | 136.6 | 114.0 | 126.8 |
| 60 | 304.3 | 225.7 | 275.2 | 933.7 | 874.6 | 903.2 | 215.7 | 208.9 | 212.5 |
| 67 | 312.2 | 257.5 | 290.5 | 985.2 | 950.6 | 970.8 | 266.8 | 261.7 | 264.3 |
| 70 | 354.1 | 322.4 | 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 | 320.9 | 1054.0 | 904.7 | 967.6 | 315.8 | 292.2 | 306.4 |
| 74 | 388.5 | 245.4 | 350.0 | 1034.8 | 881.8 | 971.9 | 339.7 | 304.7 | 322.6 |
| 75 | 400.4 | 354.1 | 380.6 | 1060.3 | 889.5 | 969.0 | 349.8 | 324.7 | 335.7 |
| 76 | 413.4 | 244.1 | 377.5 | 1016.7 | 929.2 | 962.5 | 350.4 | 326.8 | 341.6 |
| 77 | 427.1 | 374.0 | 405.4 | 1048.1 | 889.1 | 956.2 | 365.9 | 340.6 | 352.6 |
| 78 | 436.1 | 303.5 | 404.3 | 1023.2 | 863.6 | 946.7 | 368.4 | 344.7 | 360.6 |
| 84 | 337.2 | 244.1 | 294.5 | 819.0 | 695.7 | 747.5 | 410.0 | 387.9 | 402.2 |
| 90 | 411.2 | 335.4 | 376.4 | 892.7 | 741.4 | 811.5 | 437.0 | 412.4 | 424.7 |
| 96 | 500.7 | 374.6 | 441.5 | 867.6 | 673.1 | 776.9 | 468.0 | 434.0 | 451.4 |
| 102 | 504.4 | 245.7 | 407.3 | 712.9 | 517.5 | 622.1 | 485.0 | 466.0 | 471.6 |
| 111 | 530.5 | 310.4 | 390.6 | 751.1 | 541.7 | 679.0 | 497.0 | 430.0 | 474.7 |
| 120 | 550.3 | 354.2 | 451.4 | 701.6 | 624.8 | 666.9 | 513.0 | 440.0 | 486.3 |
| 132 | 336.7 | 234.0 | 276.1 | 681.5 | 472.1 | 574.1 | 508.0 | 321.0 | 400.7 |
| 138 | 431.1 | 284.5 | 367.4 | 607.8 | 284.5 | 506.7 | 507.0 | 364.7 | 443.7 |

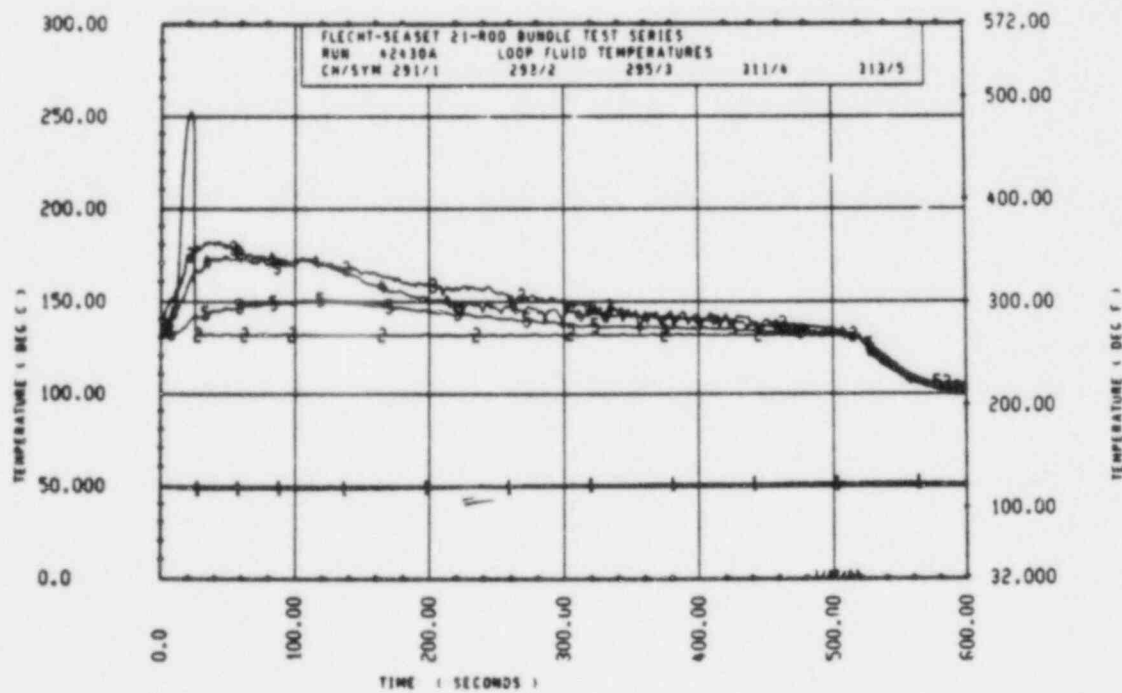
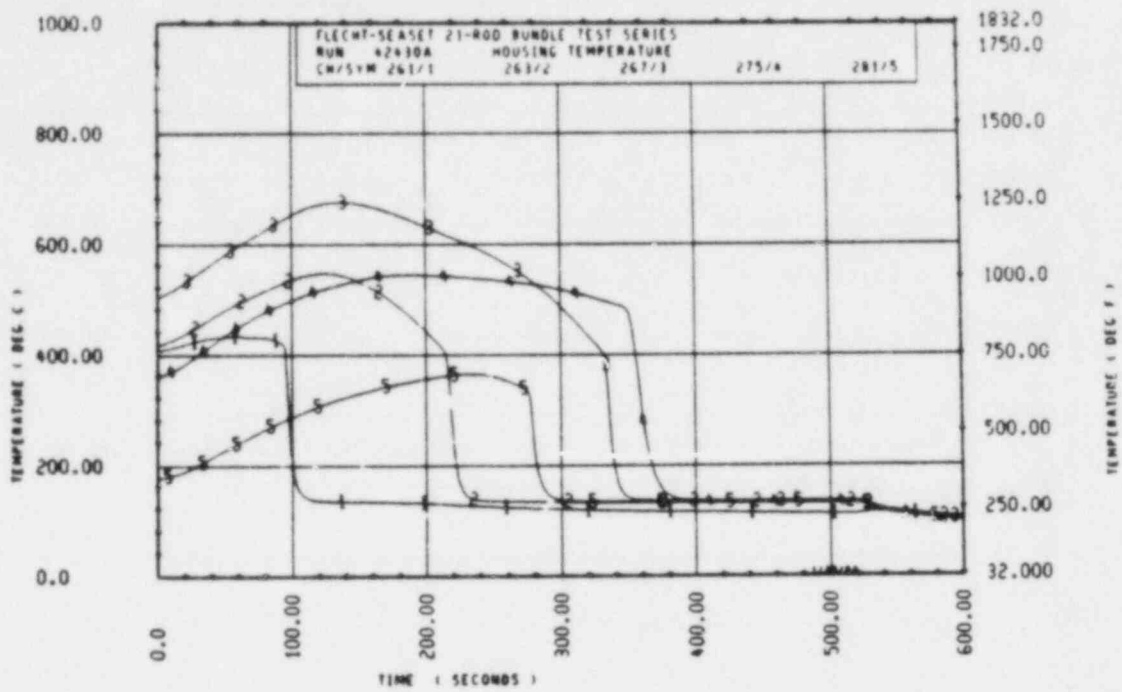
42430A-3

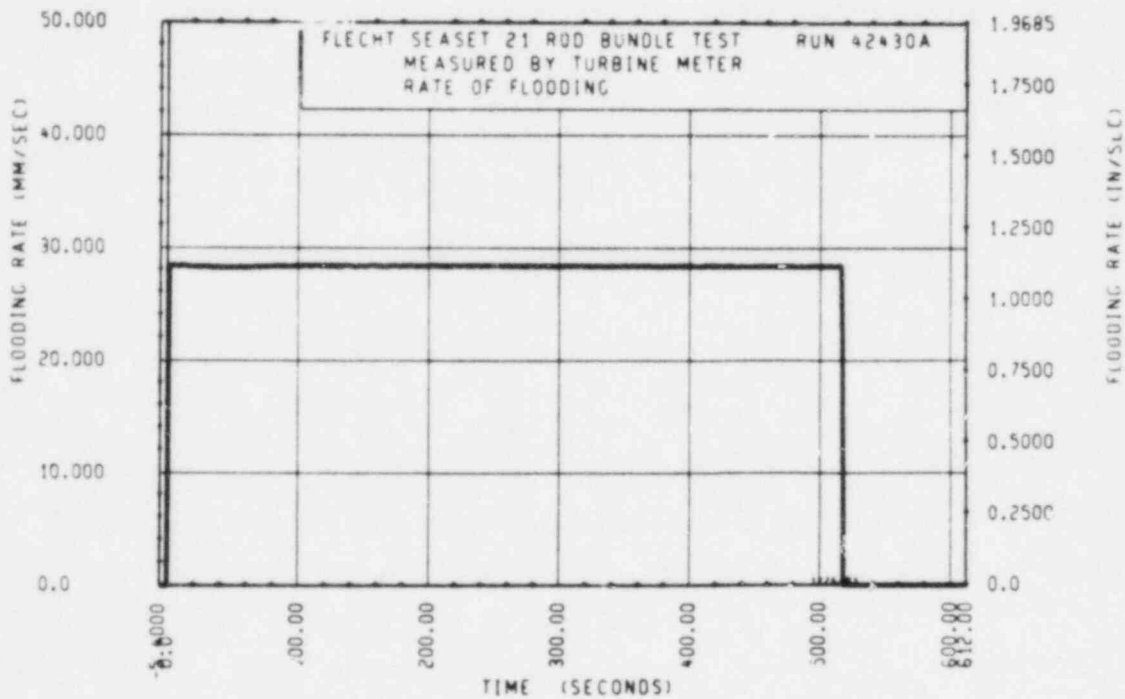
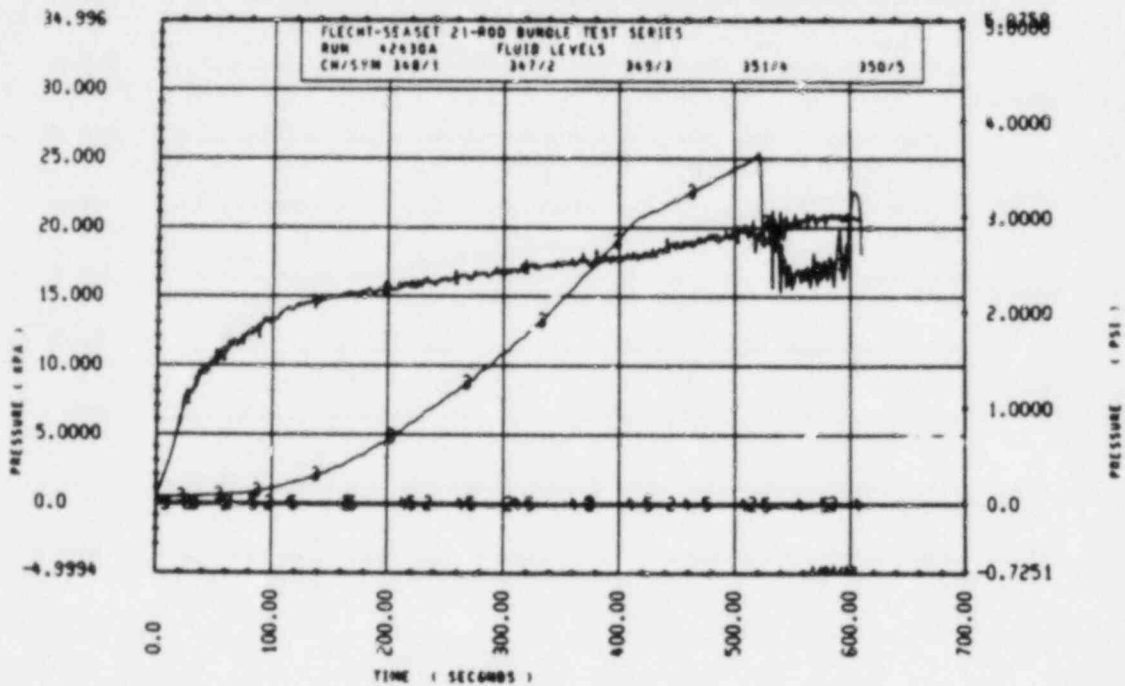


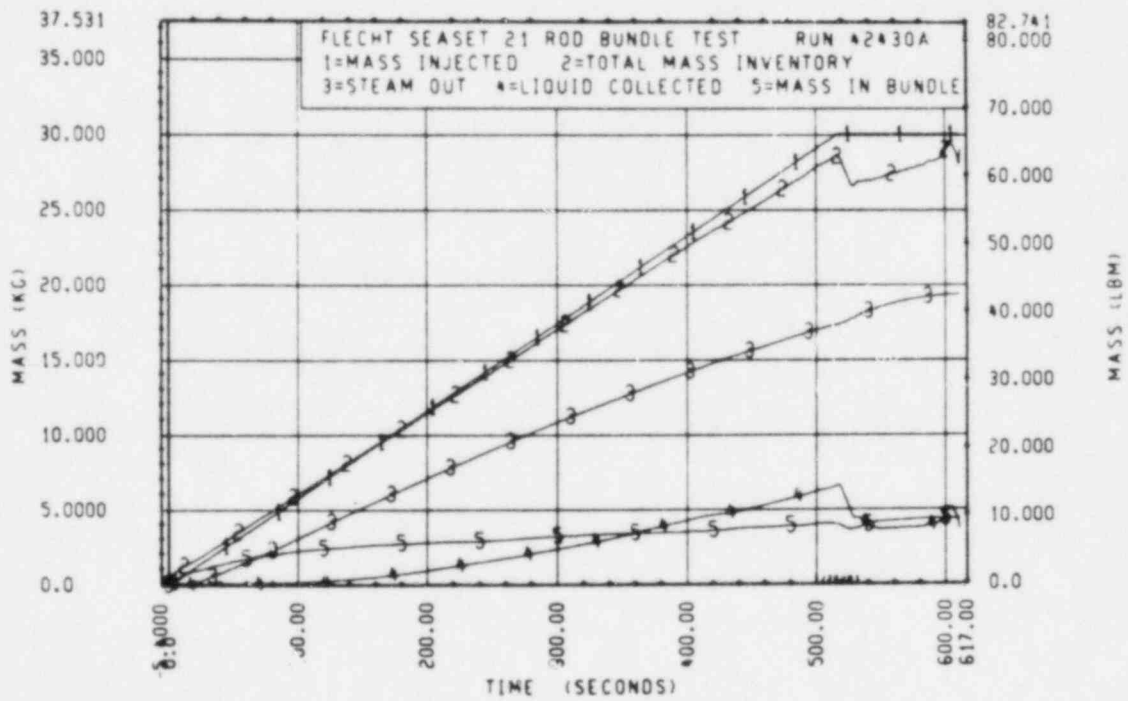
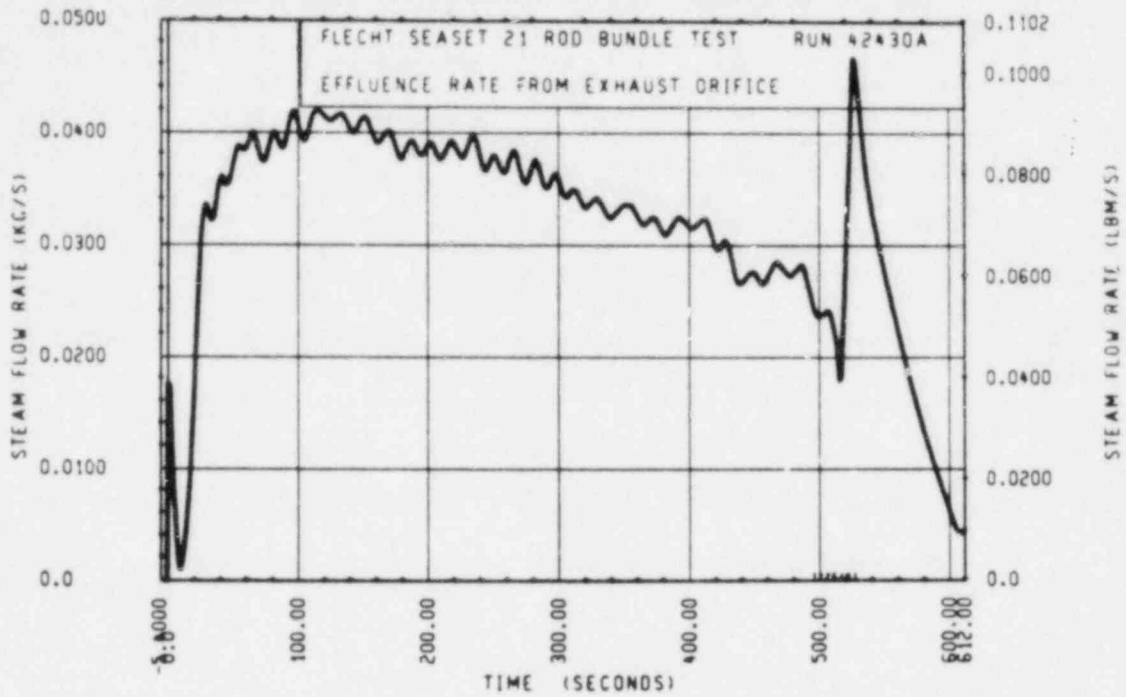


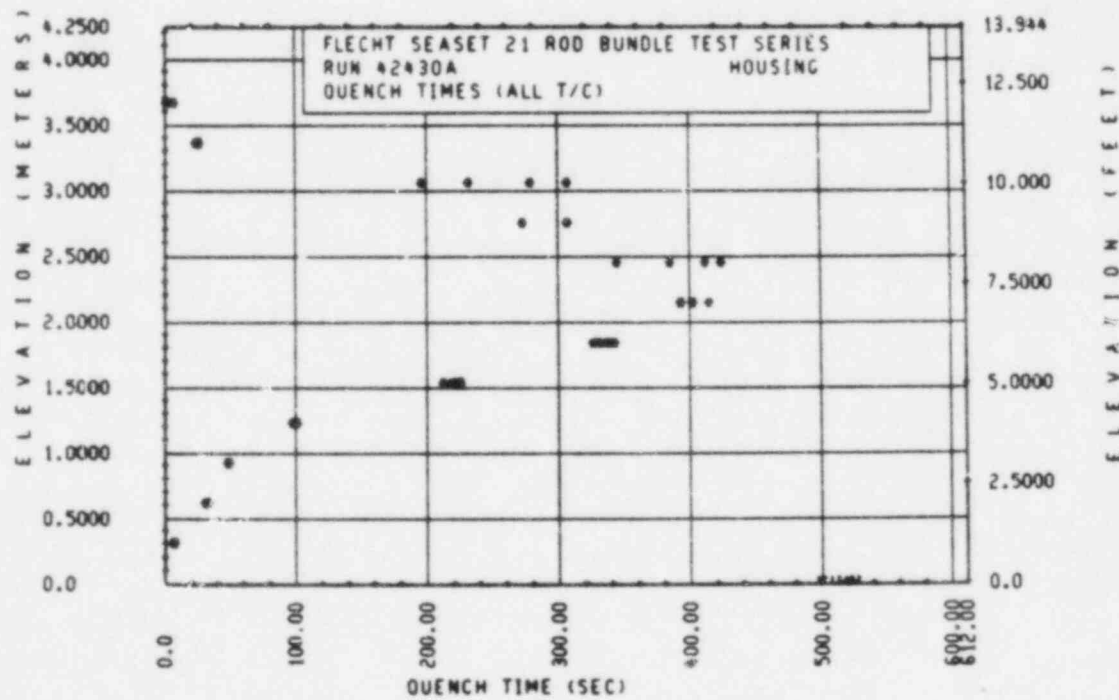
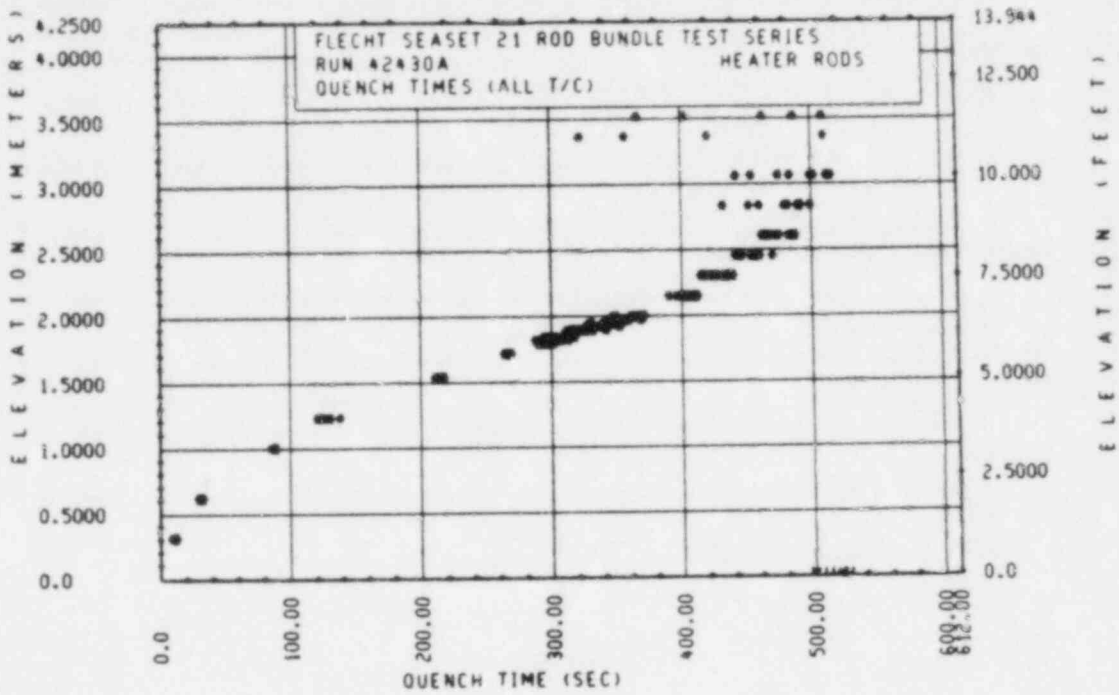


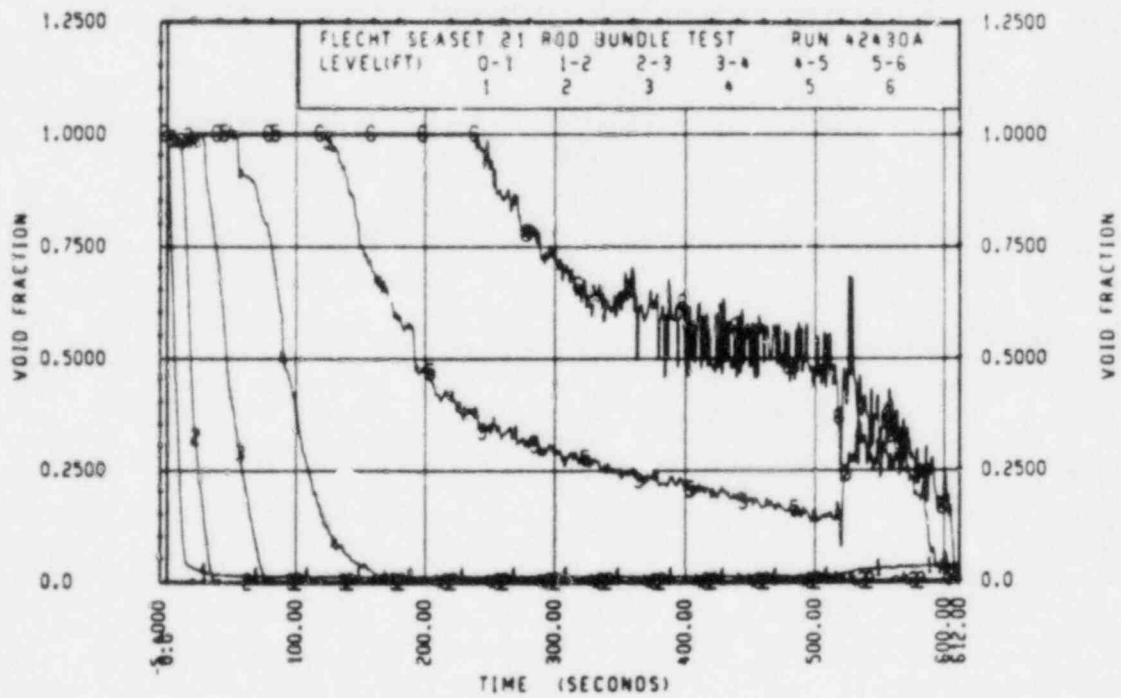
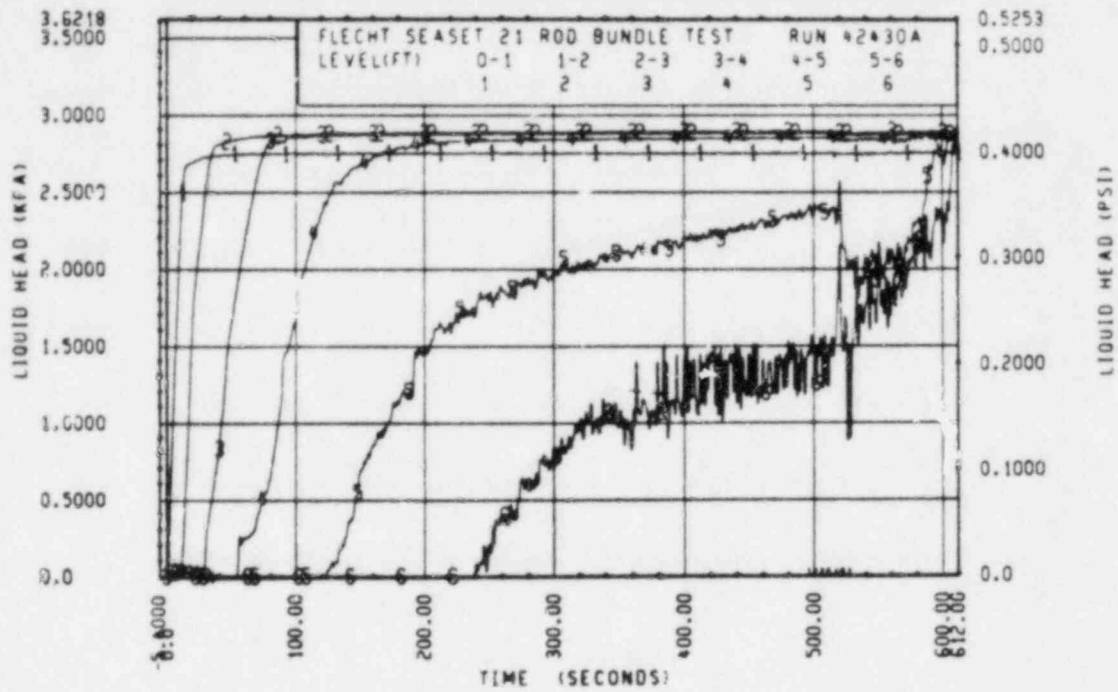


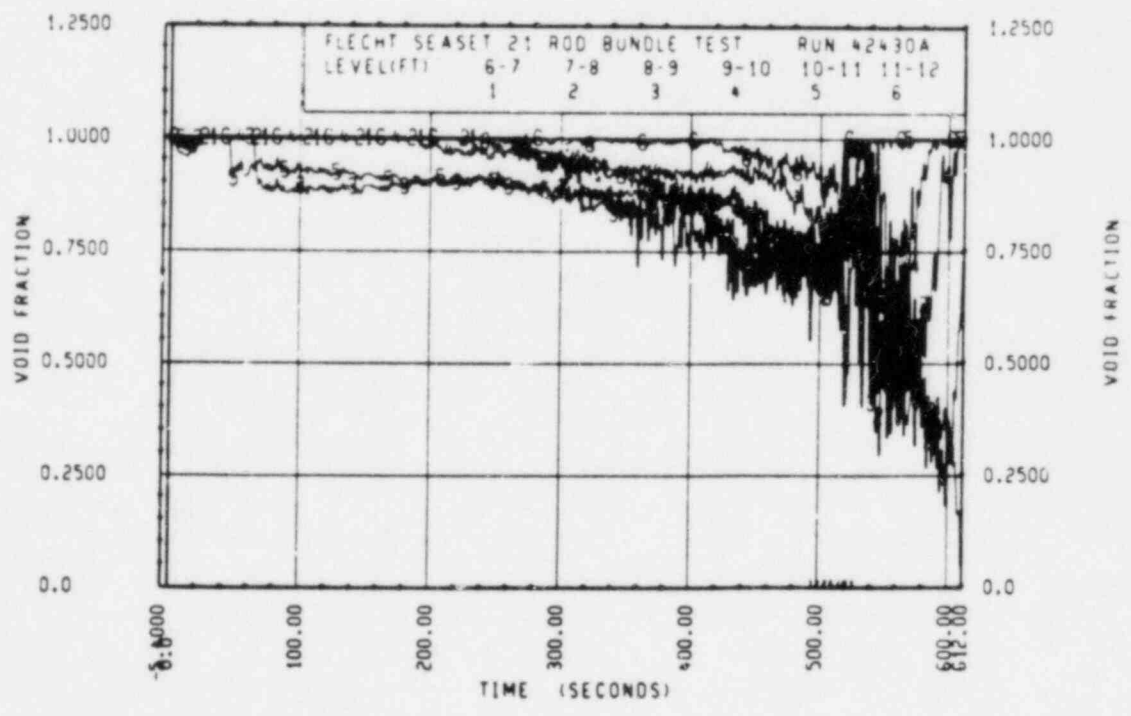
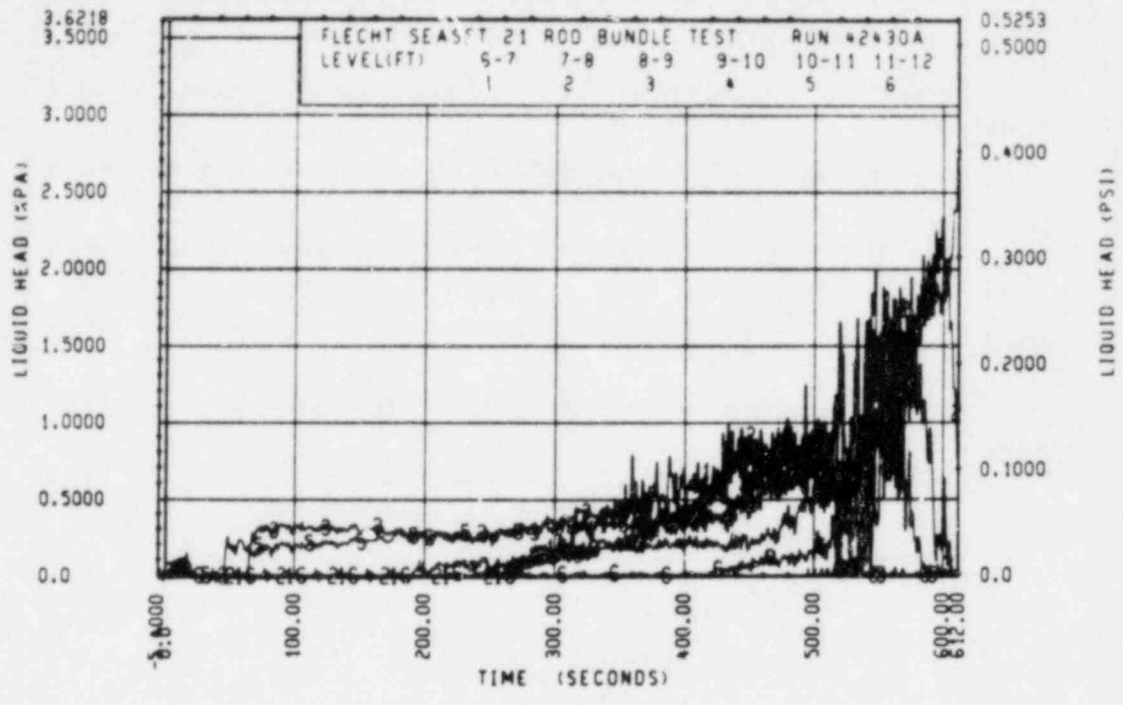












FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

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 NUMBER 41907A

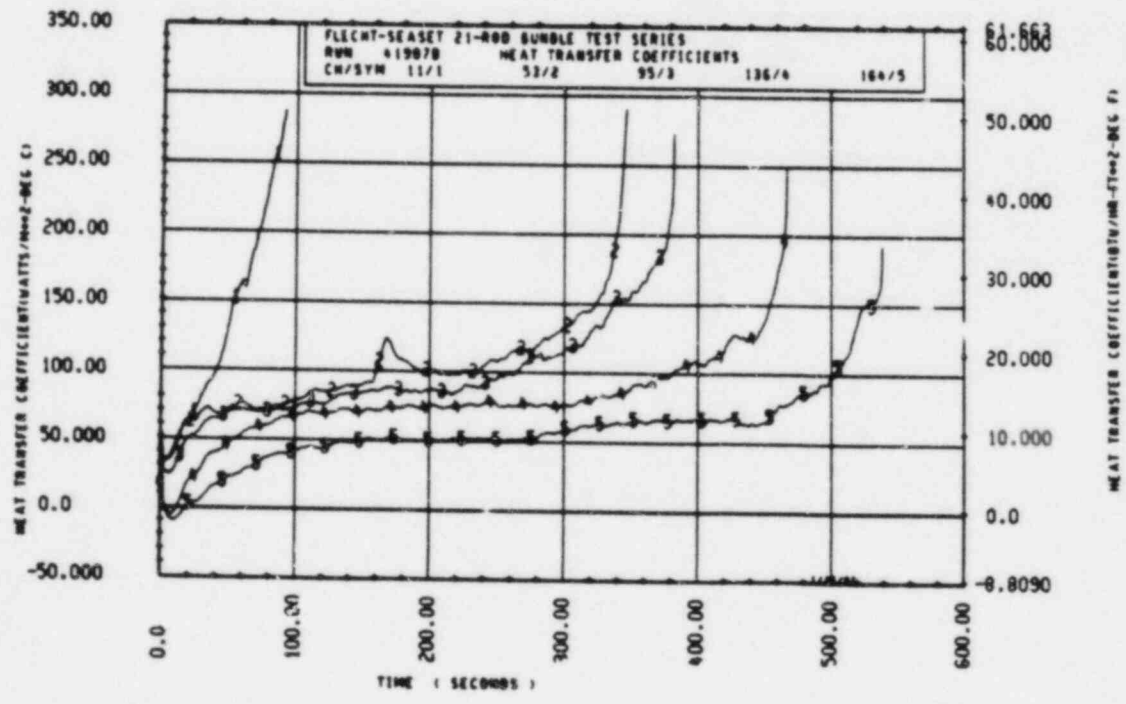
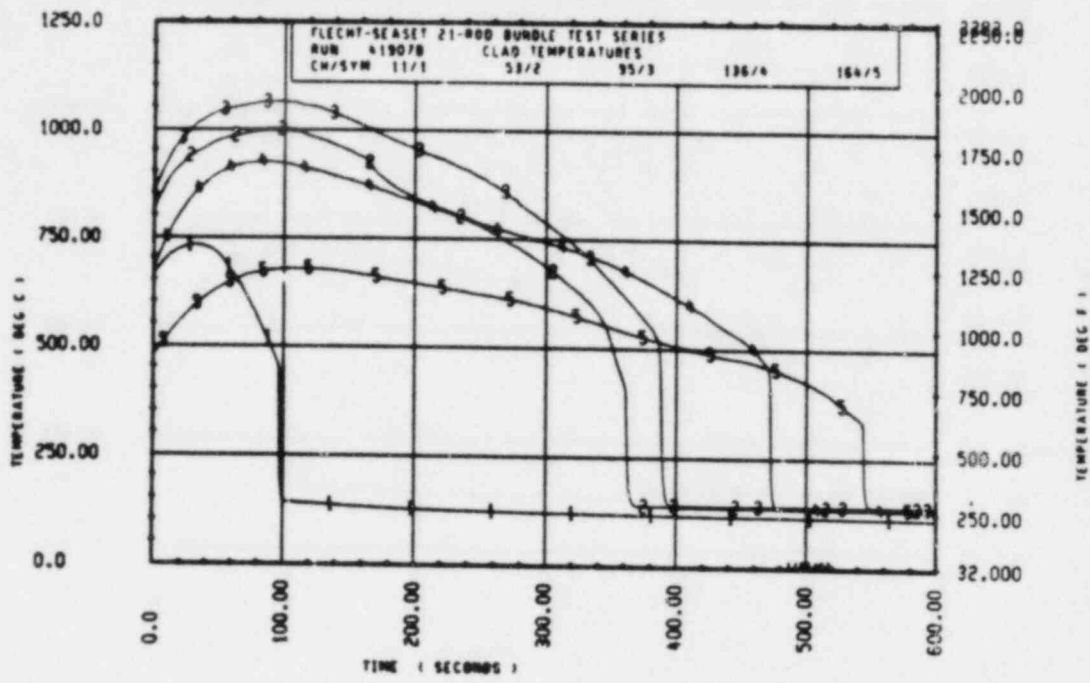
| ROD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|----------|--------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 9 | 1120. | 1262. | 134. | 34.5 | 035. | 46.4 |
| 4C 3- 3 | 11 | 1233. | 1353. | 120. | 28.5 | 030. | 40.7 |
| 1C 4- 0 | 14 | 1327. | 1408. | 141. | 32.0 | 207. | 147.0 |
| 2A 5- 0 | 17 | 1374. | 1653. | 278. | 57.5 | 021. | 231.7 |
| 2A 5- 7 | 21 | 1400. | 1758. | 291. | 82.5 | 650. | 200.0 |
| 10 6- 2 | 50 | 1432. | 1724. | 297. | 94.0 | 603. | 347.0 |
| 20 6- 2 | 53 | 1510. | 1835. | 325. | 93.5 | 709. | 301.0 |
| 30 6- 2 | 58 | 1544. | 1842. | 298. | 94.0 | 052. | 354.0 |
| 5C 6- 2 | 61 | 1400. | 1761. | 275. | 82.0 | 400. | 342.7 |
| 10 6- 3 | 63 | 1429. | 1716. | 287. | 80.0 | 001. | 324.7 |
| 43 6- 3 | 68 | 1500. | 1834. | 306. | 94.0 | 411. | 364.0 |
| 50 6- 3 | 69 | 1422. | 1778. | 345. | 112.0 | 011. | 347.0 |
| 2A 6- 4 | 70 | 1430. | 1762. | 332. | 106.0 | 740. | 378.7 |
| 20 6- 4 | 72 | 1537. | 1856. | 320. | 94.0 | 034. | 377.0 |
| 38 6- 4 | 75 | 1561. | 1806. | 324. | 89.0 | 002. | 322.1 |
| 31 6- 5 | 85 | 1600. | 1937. | 337. | 85.0 | 411. | 378.2 |
| 3E 6- 5 | 86 | 1474. | 1769. | 295. | 94.5 | 441. | 300.0 |
| 31 6- 6 | 95 | 1560. | 1950. | 370. | 95.0 | 423. | 307.7 |
| 30 6- 6 | 46 | 1543. | 1916. | 372. | 94.0 | 407. | 304.0 |
| 4A 6- 6 | 97 | 1412. | 1797. | 385. | 106.0 | 400. | 340.0 |
| 4C 6- 6 | 98 | 1553. | 1920. | 367. | 95.1 | 470. | 300.4 |
| 5C 6- 6 | 101 | 1408. | 1778. | 310. | 97.5 | 450. | 305.0 |
| 11 7- 0 | 110 | 1436. | 1684. | 248. | 51.5 | 740. | 427.4 |
| 28 7- 0 | 111 | 1450. | 1689. | 231. | 49.0 | 720. | 443.4 |
| 30 7- 0 | 115 | 1453. | 1743. | 250. | 46.5 | 707. | 422.0 |
| 5A 7- 0 | 117 | 1355. | 1635. | 281. | 82.5 | 723. | 444.0 |
| 28 7- 6 | 120 | 1424. | 1769. | 340. | 82.0 | 773. | 404.4 |
| 2C 7- 6 | 121 | 1434. | 1775. | 337. | 56.5 | 760. | 402.0 |
| 2E 7- 6 | 122 | 1274. | 1592. | 313. | 63.0 | 720. | 407.4 |
| 3A 7- 6 | 123 | 1405. | 1744. | 339. | 81.0 | 000. | 453.0 |
| 38 7- 6 | 124 | 1444. | 1811. | 367. | 79.0 | 014. | 458.0 |
| 48 7- 6 | 127 | 1455. | 1804. | 350. | 94.0 | 013. | 400.2 |
| 5C 7- 6 | 126 | 1410. | 1740. | 321. | 82.0 | 032. | 400.4 |
| 11 8- 0 | 131 | 1230. | 1640. | 409. | 89.0 | 770. | 402.0 |
| 25 8- 0 | 133 | 471. | 1479. | 508. | 103.0 | 041. | 440.7 |
| 30 8- 0 | 136 | 1200. | 1701. | 434. | 82.5 | 041. | 471.4 |
| 58 8- 0 | 138 | 1227. | 1620. | 392. | 99.0 | 705. | 407.4 |
| 5C 8- 0 | 139 | 1304. | 1641. | 387. | 93.0 | 770. | 404.7 |
| 11 8- 6 | 141 | 1035. | 1433. | 398. | 85.0 | 024. | 504.5 |
| 10 8- 6 | 142 | 045. | 1252. | 407. | 111.0 | 024. | 504.0 |
| 2C 8- 6 | 143 | 1110. | 1521. | 411. | 92.0 | 073. | 510.0 |
| 48 8- 6 | 145 | 1201. | 1658. | 457. | 99.0 | 740. | 504.0 |
| 50 8- 6 | 148 | 1010. | 1307. | 291. | 41.0 | 547. | 510.3 |
| 30 8- 3 | 154 | 432. | 1309. | 436. | 98.5 | 720. | 504.4 |
| 41 9- 3 | 156 | 1045. | 1423. | 377. | 87.0 | 040. | 510.0 |
| 1010- 0 | 161 | 013. | 1126. | 512. | 166.0 | 003. | 544.0 |
| 4810- 0 | 164 | 040. | 1256. | 357. | 107.0 | 030. | 543.4 |
| 5010- 0 | 167 | 710. | 1152. | 442. | 169.0 | 770. | 450.0 |
| 2A 11- 0 | 168 | 555. | 786. | 230. | 147.0 | 593. | 510.0 |
| 4C 11- 0 | 170 | 032. | 973. | 341. | 126.0 | 541. | 541.0 |
| 1011- 6 | 172 | 310. | 030. | 523. | 168.0 | 540. | 533.0 |

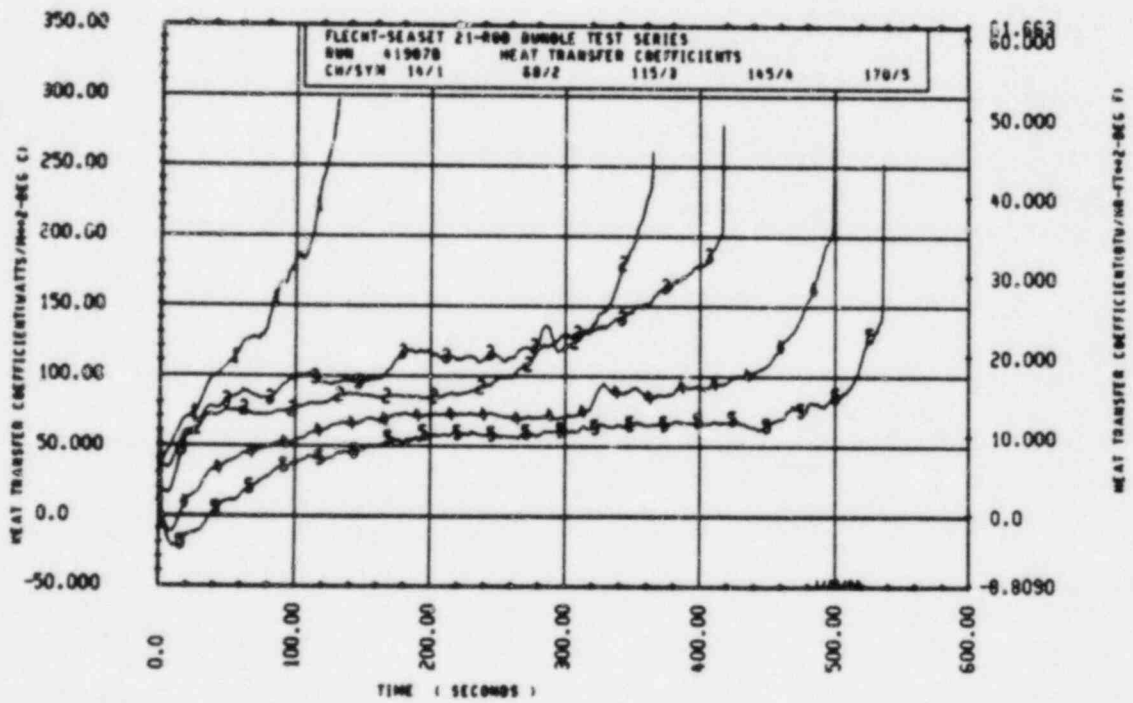
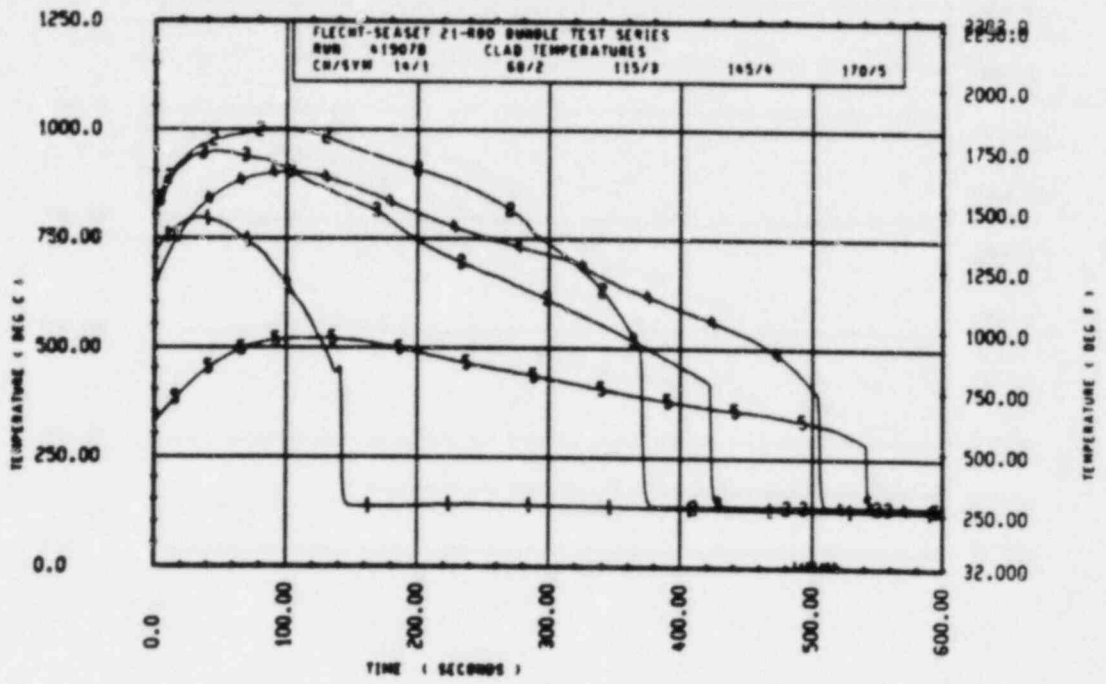
KRM 419078 HEATER ROD STATISTICAL DATA

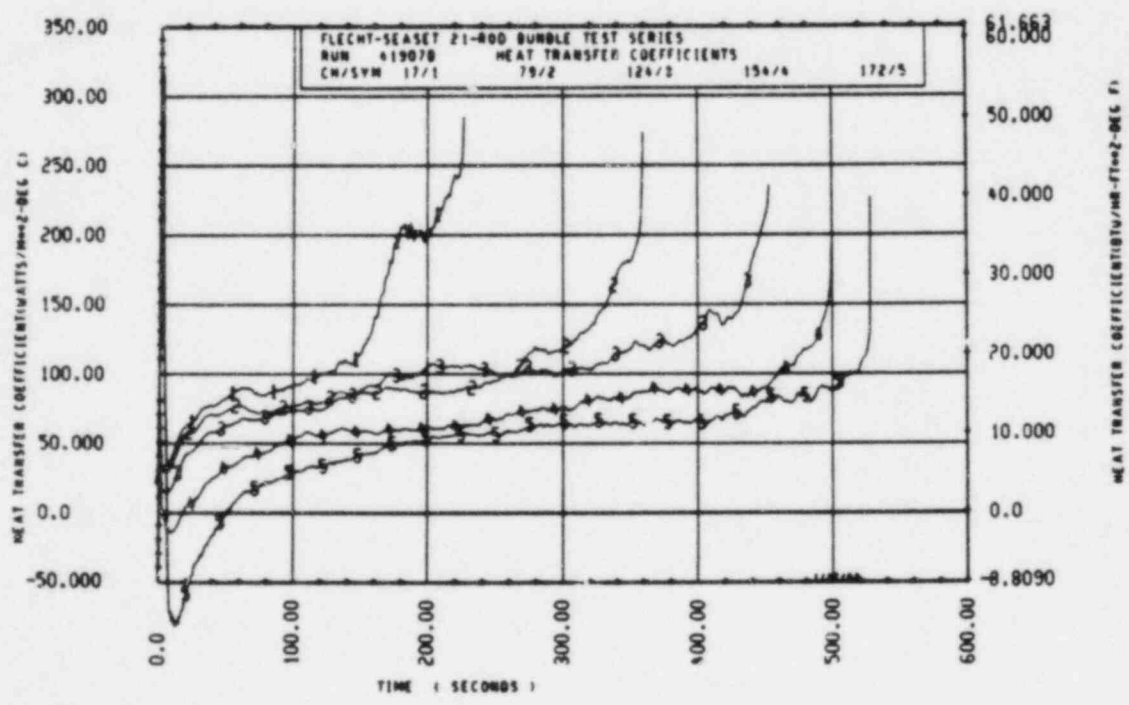
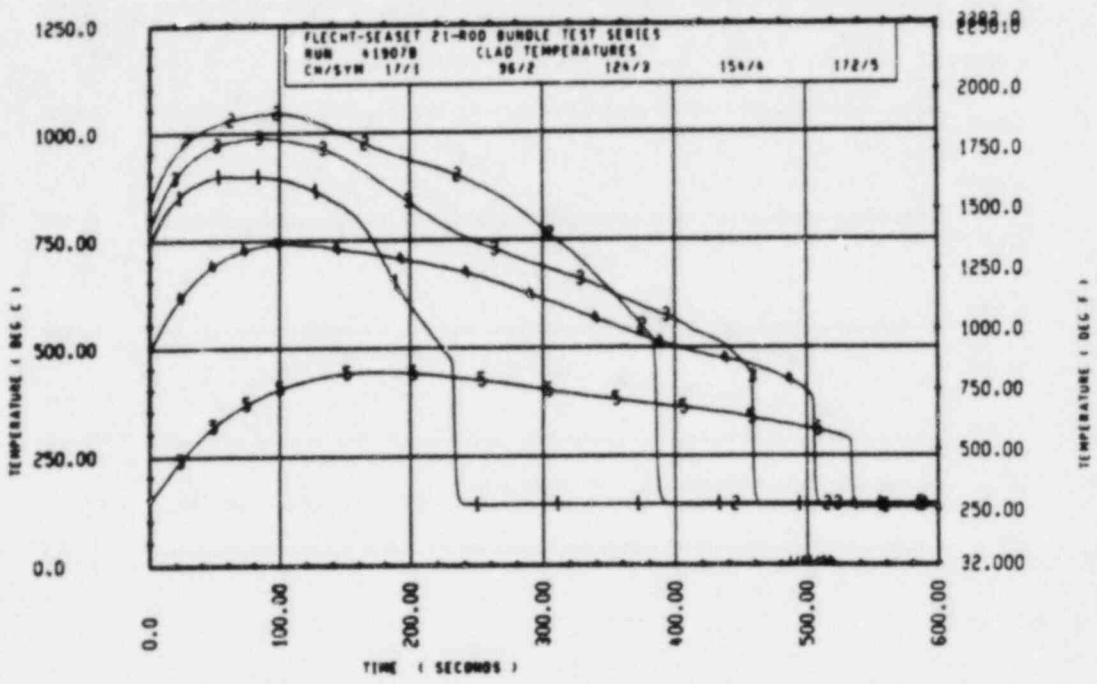
| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 640.6 | 570.9 | 600.5 | 652.0 | 594.0 | 514.0 | 6.5 | 5.0 | 5.6 |
| 24 | 892.7 | 800.6 | 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 |
| 46 | 1370.1 | 1261.8 | 1316.8 | 1543.0 | 1415.2 | 1479.8 | 46.5 | 32.0 | 36.3 |
| 60 | 1465.3 | 1300.7 | 1390.6 | 1768.7 | 1628.7 | 1676.5 | 75.0 | 52.5 | 63.5 |
| 67 | 1572.3 | 1447.6 | 1489.1 | 1848.5 | 1757.5 | 1781.4 | 82.5 | 71.5 | 77.3 |
| 70 | 1605.6 | 1400.1 | 1510.5 | 1924.6 | 1726.3 | 1820.1 | 88.5 | 58.0 | 76.4 |
| 71 | 1590.7 | 1417.6 | 1510.3 | 1928.1 | 1721.8 | 1821.9 | 106.0 | 62.0 | 67.2 |
| 72 | 1480.0 | 1387.5 | 1454.0 | 1791.0 | 1666.8 | 1733.8 | 89.5 | 69.5 | 61.6 |
| 74 | 1547.4 | 1431.7 | 1500.0 | 1887.0 | 1721.8 | 1909.2 | 107.0 | 62.0 | 62.6 |
| 75 | 1584.2 | 1429.0 | 1511.8 | 1887.0 | 1716.3 | 1815.7 | 112.0 | 66.0 | 61.3 |
| 76 | 1597.6 | 1429.6 | 1508.0 | 1678.3 | 1736.3 | 1824.2 | 107.0 | 62.5 | 65.1 |
| 77 | 1600.4 | 1399.0 | 1509.0 | 1937.3 | 1744.1 | 1842.9 | 107.0 | 65.0 | 66.1 |
| 78 | 1579.8 | 1400.1 | 1467.7 | 1949.9 | 1766.4 | 1853.4 | 126.0 | 64.0 | 101.6 |
| 84 | 1493.5 | 1354.6 | 1429.0 | 1747.5 | 1617.8 | 1689.6 | 82.5 | 62.5 | 63.6 |
| 90 | 1454.9 | 1270.5 | 1390.4 | 1811.2 | 1591.7 | 1720.8 | 94.0 | 52.5 | 73.4 |
| 96 | 1315.6 | 971.2 | 1239.4 | 1745.3 | 1479.4 | 1647.0 | 103.0 | 72.0 | 68.0 |
| 102 | 1201.5 | 844.6 | 1039.0 | 1658.1 | 1251.5 | 1434.1 | 111.0 | 61.0 | 77.9 |
| 111 | 1045.2 | 663.5 | 833.7 | 1422.7 | 1150.8 | 1279.1 | 242.0 | 61.5 | 104.9 |
| 120 | 698.3 | 613.4 | 739.2 | 1292.2 | 1121.4 | 1175.8 | 177.0 | 107.0 | 141.4 |
| 132 | 632.2 | 505.7 | 550.8 | 972.8 | 769.0 | 841.8 | 163.0 | 126.0 | 143.5 |
| 136 | 622.3 | 310.0 | 463.2 | 952.2 | 800.2 | 879.8 | 163.0 | 130.0 | 150.0 |

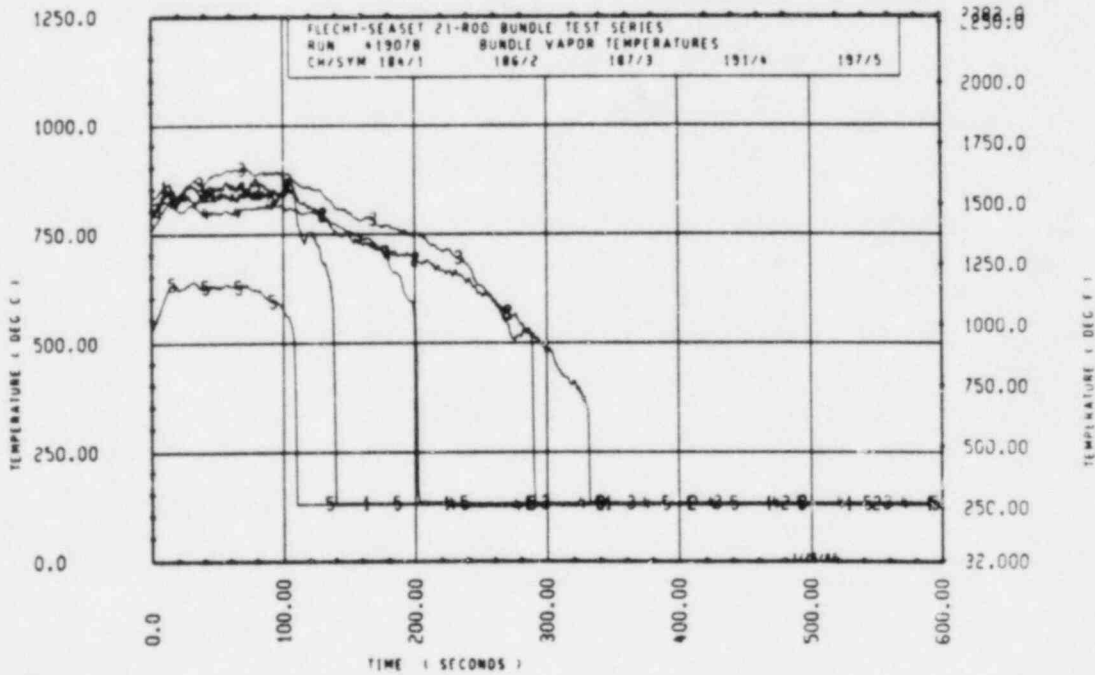
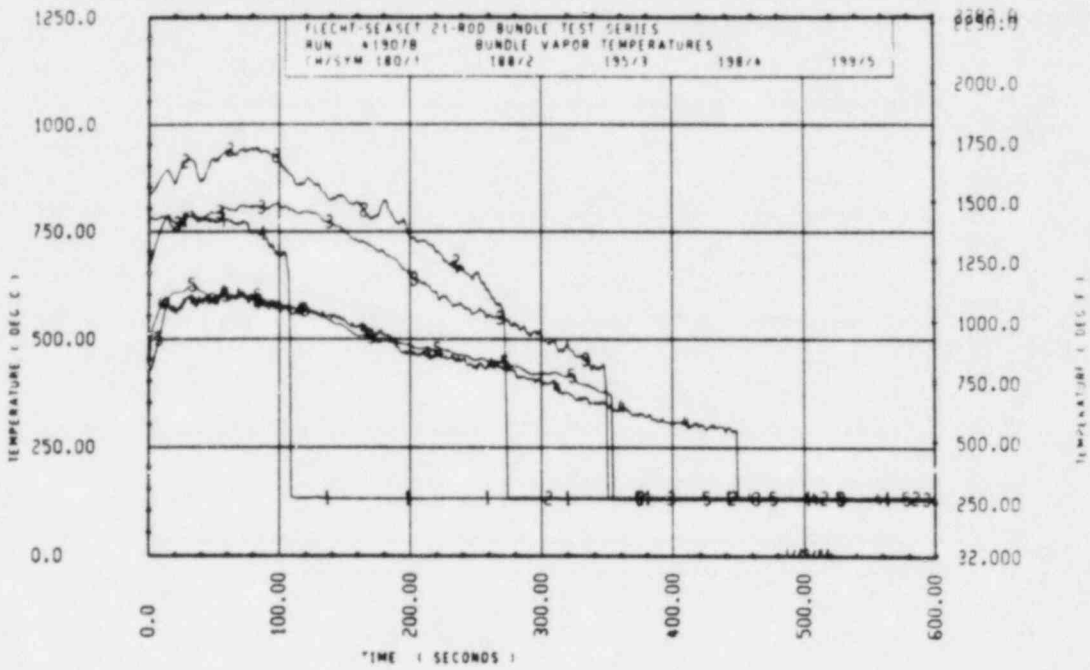
| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 15.1 | 11.4 | 13.6 | 606.3 | 579.3 | 589.0 | 12.9 | 10.0 | 11.2 |
| 24 | 45.2 | 30.0 | 42.0 | 737.0 | 701.9 | 714.5 | 42.3 | 36.4 | 40.7 |
| 39 | 149.1 | 119.6 | 134.3 | 858.4 | 827.3 | 839.7 | 100.9 | 90.7 | 94.2 |
| 46 | 190.6 | 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 | 222.0 | 226.6 |
| 67 | 314.2 | 270.2 | 292.3 | 957.2 | 881.2 | 936.4 | 291.6 | 273.6 | 264.4 |
| 70 | 330.3 | 254.4 | 309.6 | 939.1 | 868.4 | 918.5 | 314.5 | 301.0 | 304.8 |
| 71 | 337.4 | 270.3 | 311.6 | 1019.6 | 862.5 | 933.8 | 357.6 | 306.0 | 323.4 |
| 72 | 314.7 | 254.0 | 279.8 | 954.9 | 808.6 | 877.5 | 332.8 | 320.0 | 326.7 |
| 74 | 376.3 | 273.5 | 309.2 | 996.2 | 651.4 | 860.4 | 372.1 | 334.6 | 355.3 |
| 75 | 345.4 | 279.6 | 303.9 | 996.7 | 811.4 | 900.0 | 397.6 | 324.7 | 364.4 |
| 76 | 355.3 | 282.1 | 318.2 | 905.7 | 797.8 | 889.0 | 385.7 | 362.0 | 372.7 |
| 77 | 350.2 | 295.2 | 333.9 | 941.0 | 839.0 | 902.1 | 388.8 | 366.6 | 375.0 |
| 78 | 380.5 | 310.0 | 360.1 | 974.8 | 854.2 | 929.9 | 403.8 | 360.4 | 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 | 324.4 | 860.6 | 704.7 | 795.2 | 484.0 | 450.0 | 461.3 |
| 96 | 500.2 | 360.1 | 467.7 | 840.8 | 690.5 | 767.8 | 491.9 | 471.4 | 464.8 |
| 102 | 479.3 | 290.5 | 395.1 | 739.6 | 581.1 | 641.6 | 516.3 | 494.0 | 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 | 450.4 | 772.2 | 602.6 | 644.9 | 554.9 | 490.0 | 535.8 |
| 132 | 340.6 | 227.1 | 263.0 | 674.0 | 540.8 | 588.8 | 541.0 | 100.0 | 420.6 |
| 136 | 523.3 | 307.0 | 390.6 | 590.9 | 410.1 | 524.0 | 557.0 | 302.0 | 506.2 |

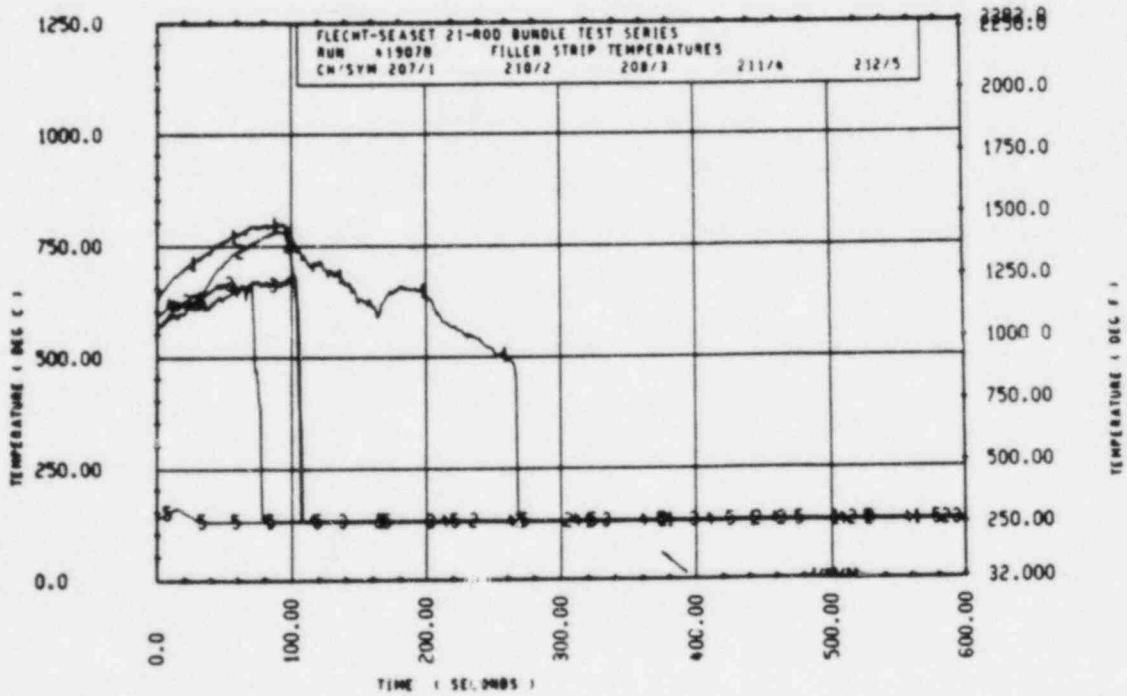
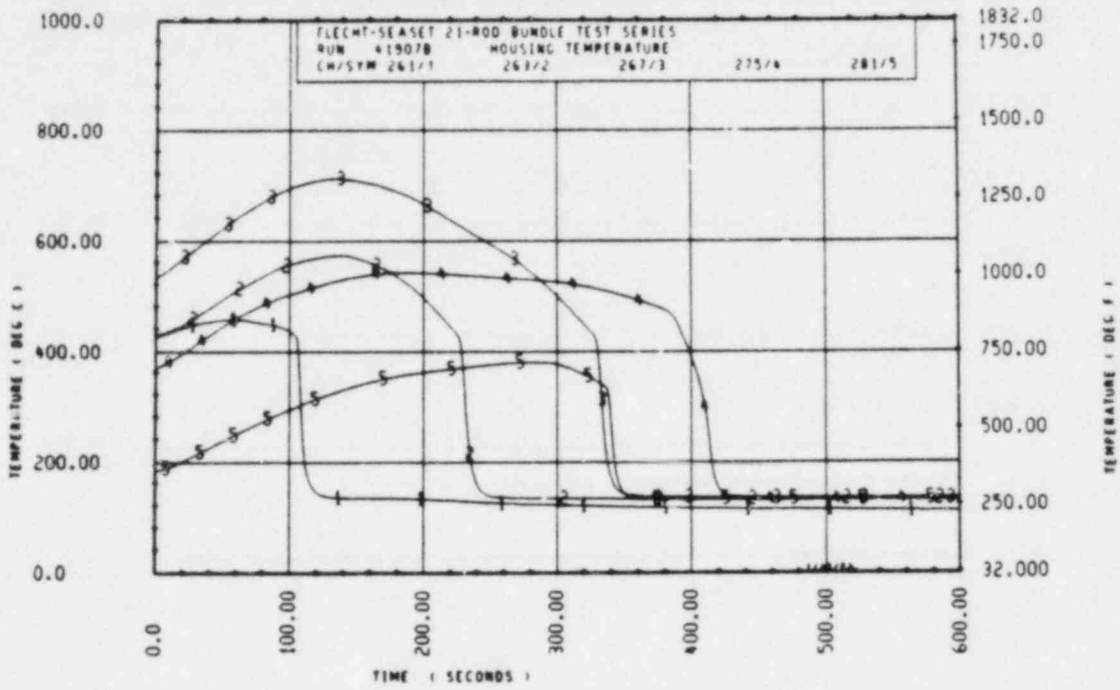
419078-3

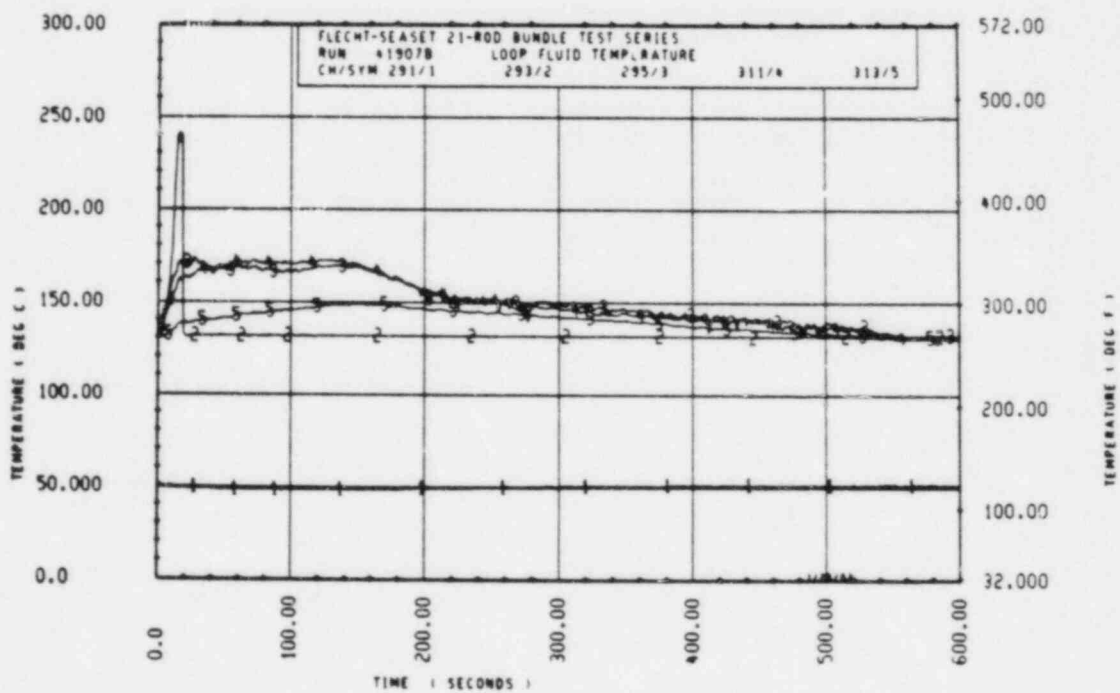
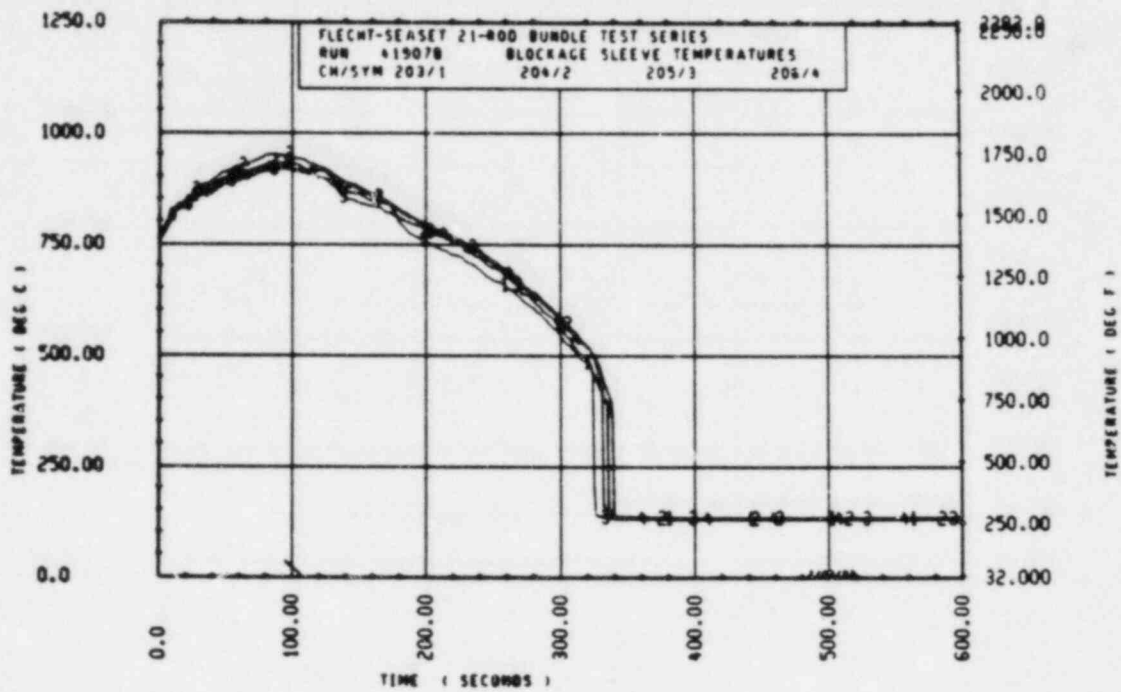


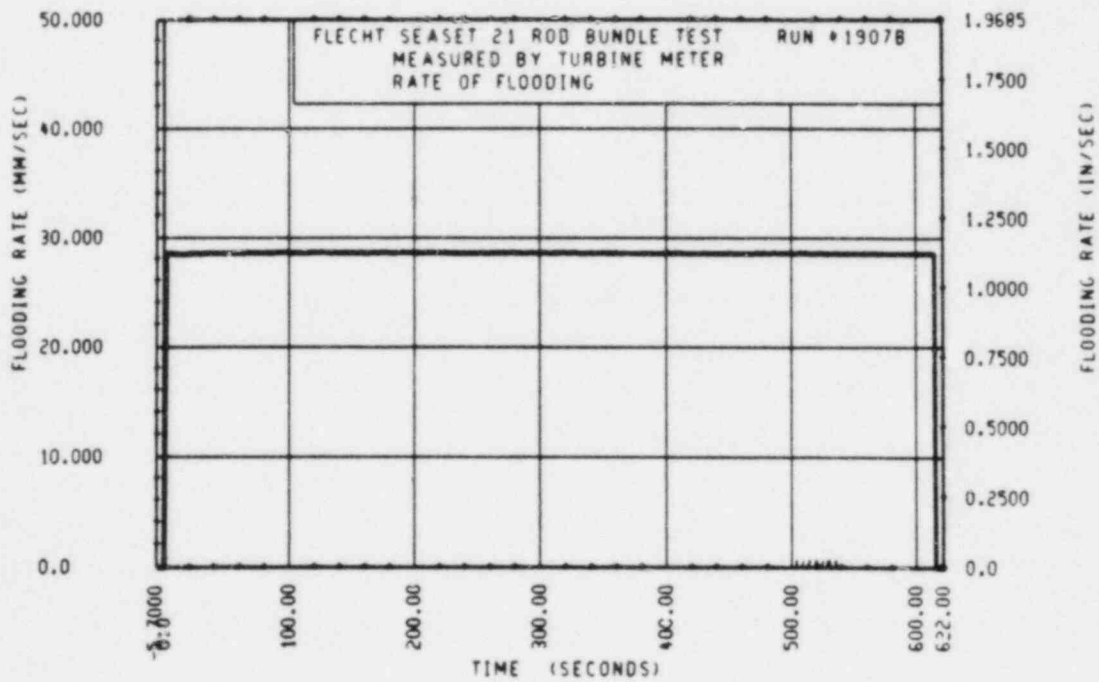
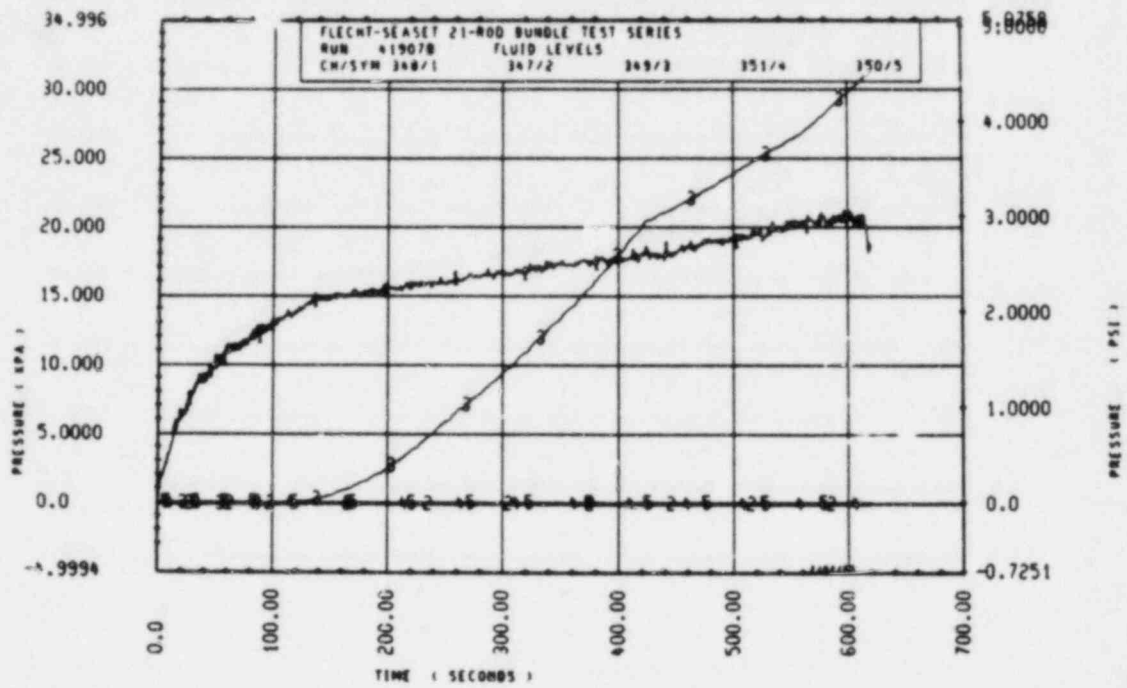


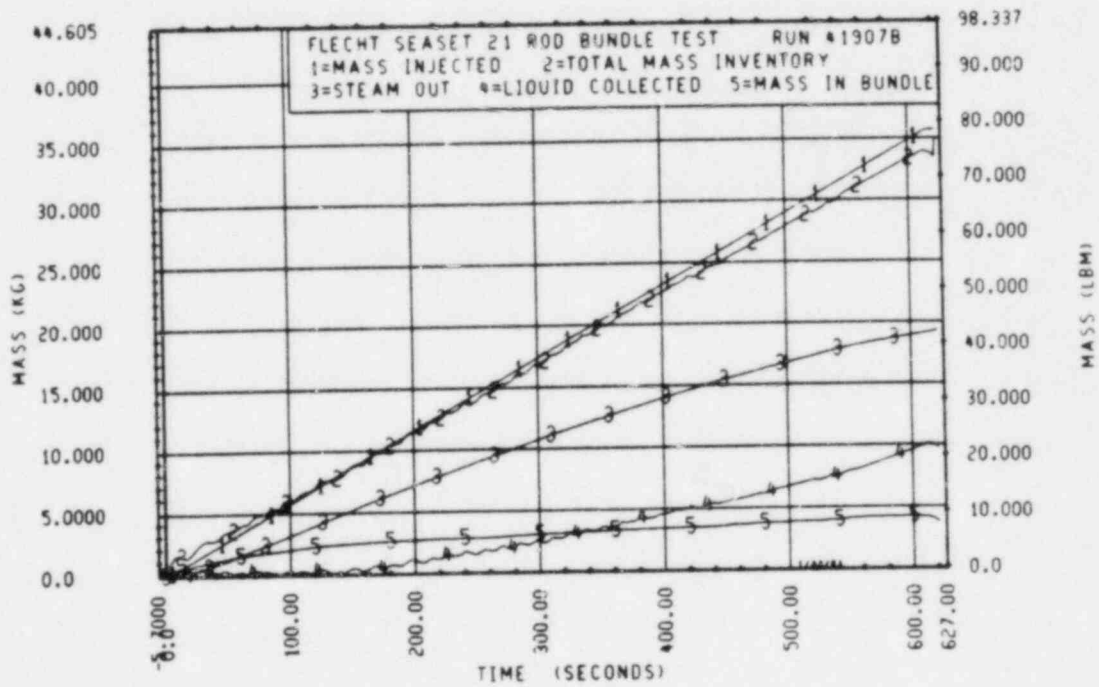
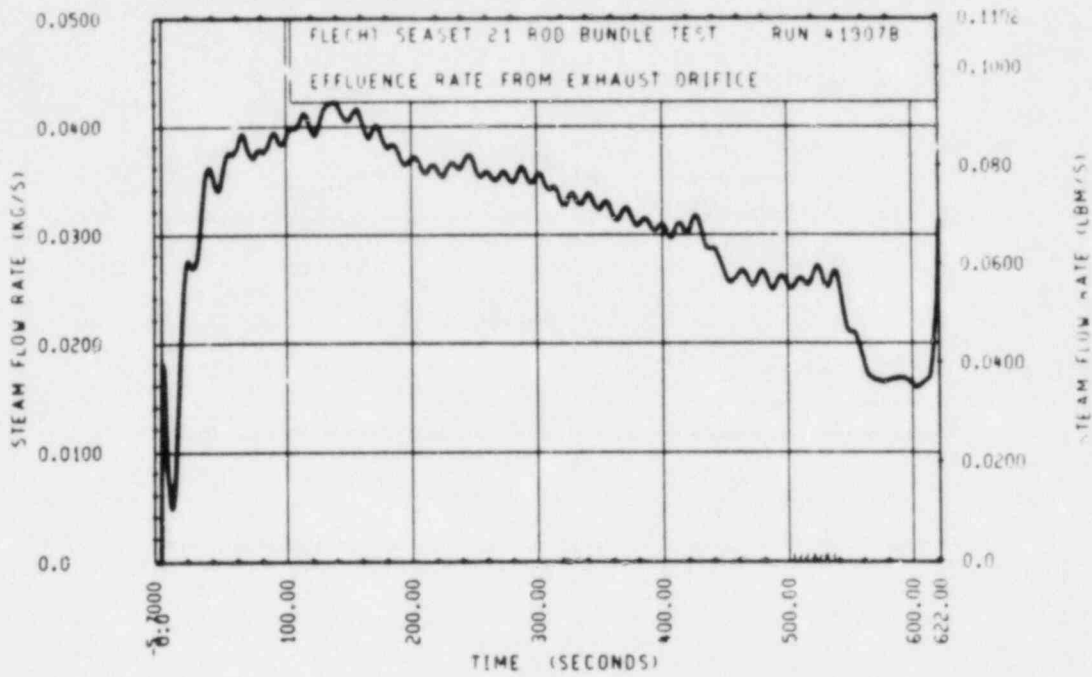


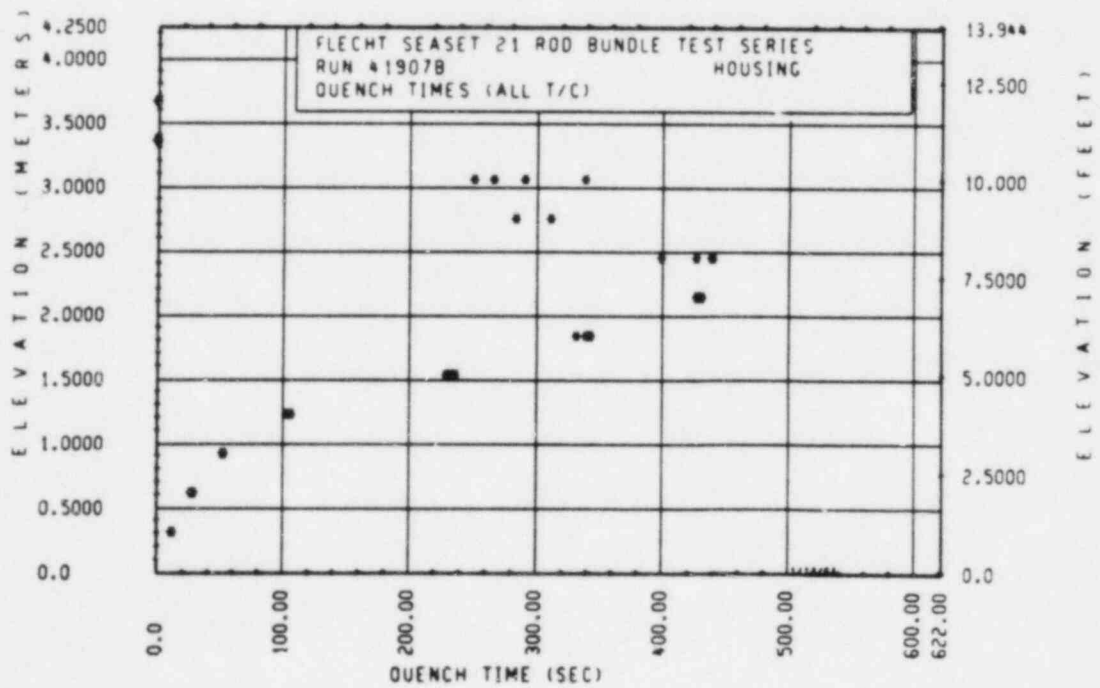
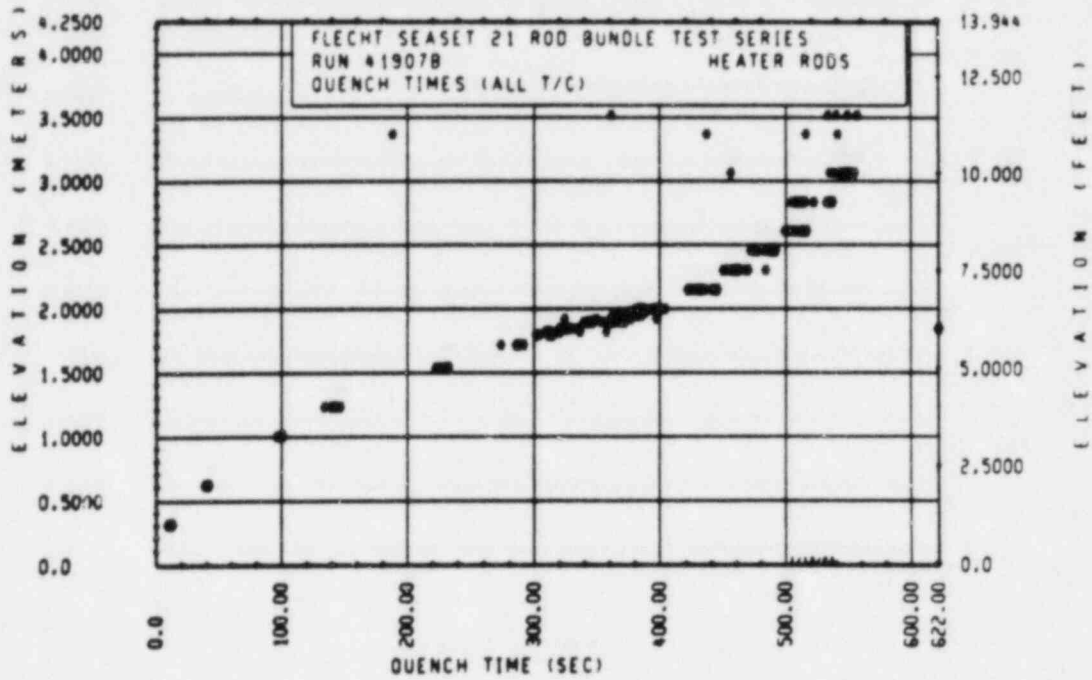


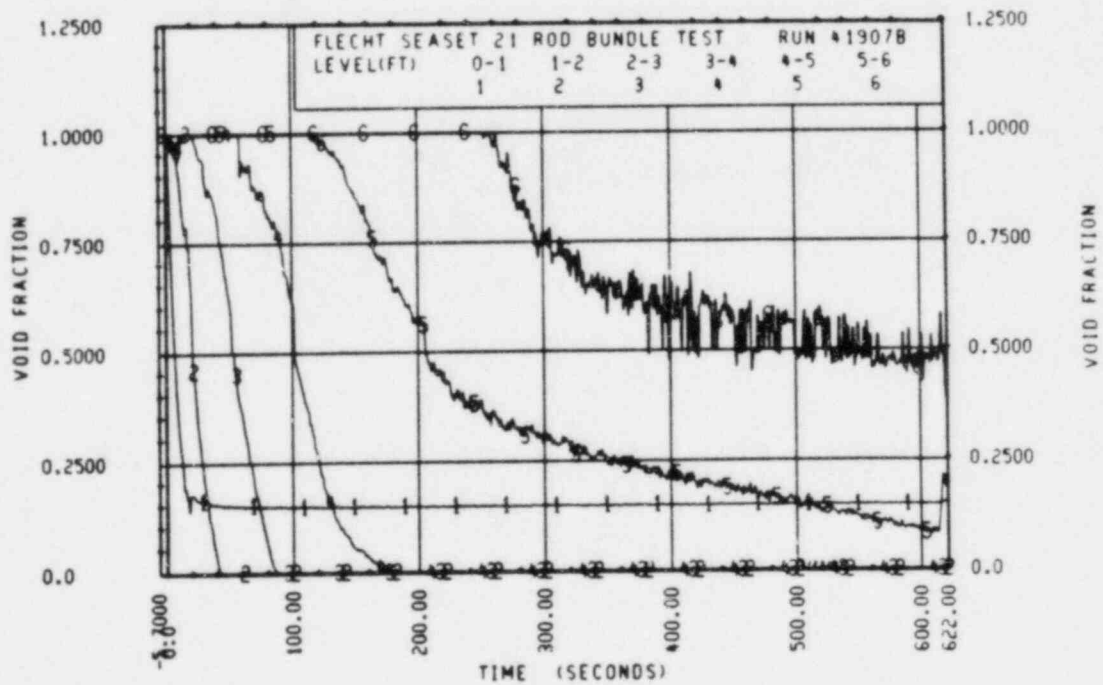
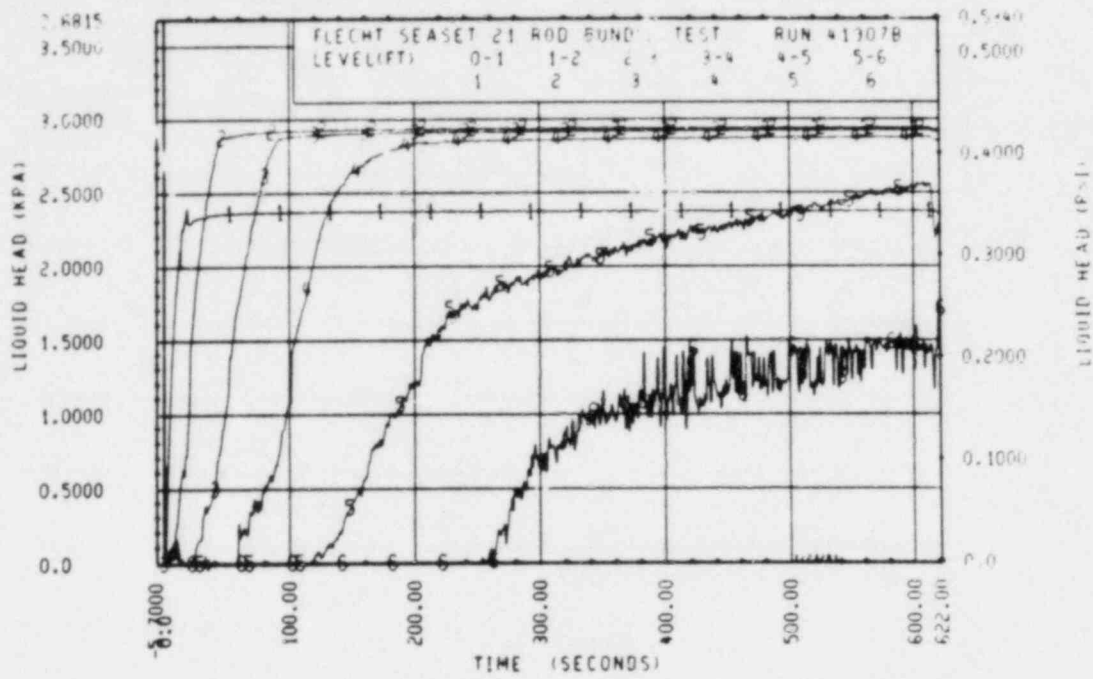


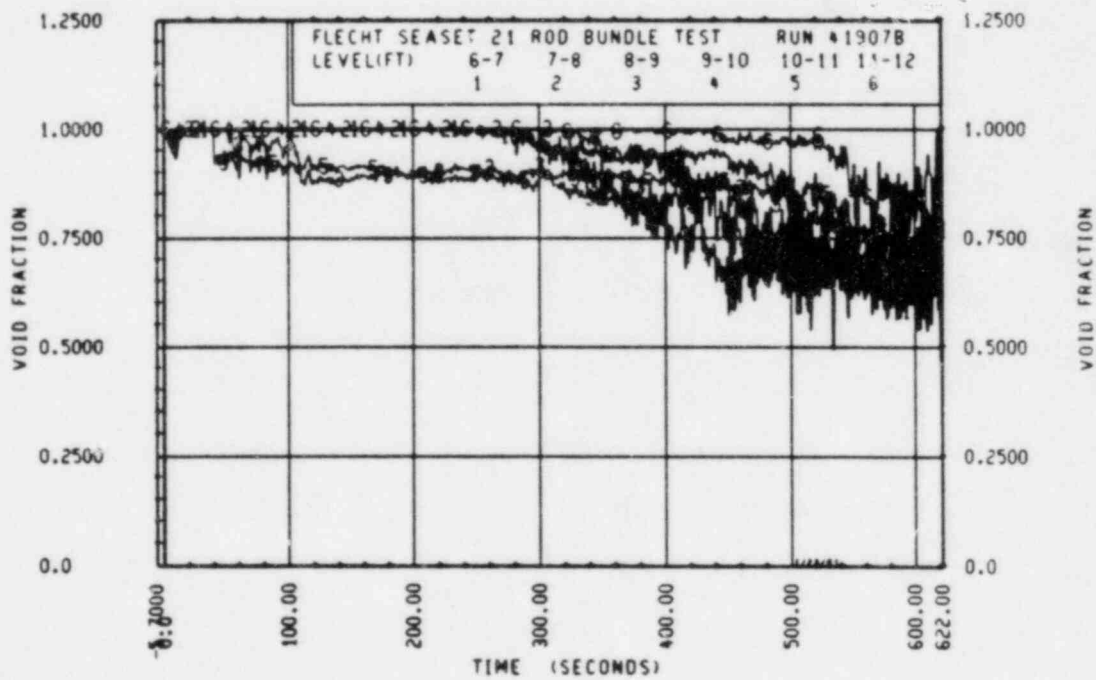
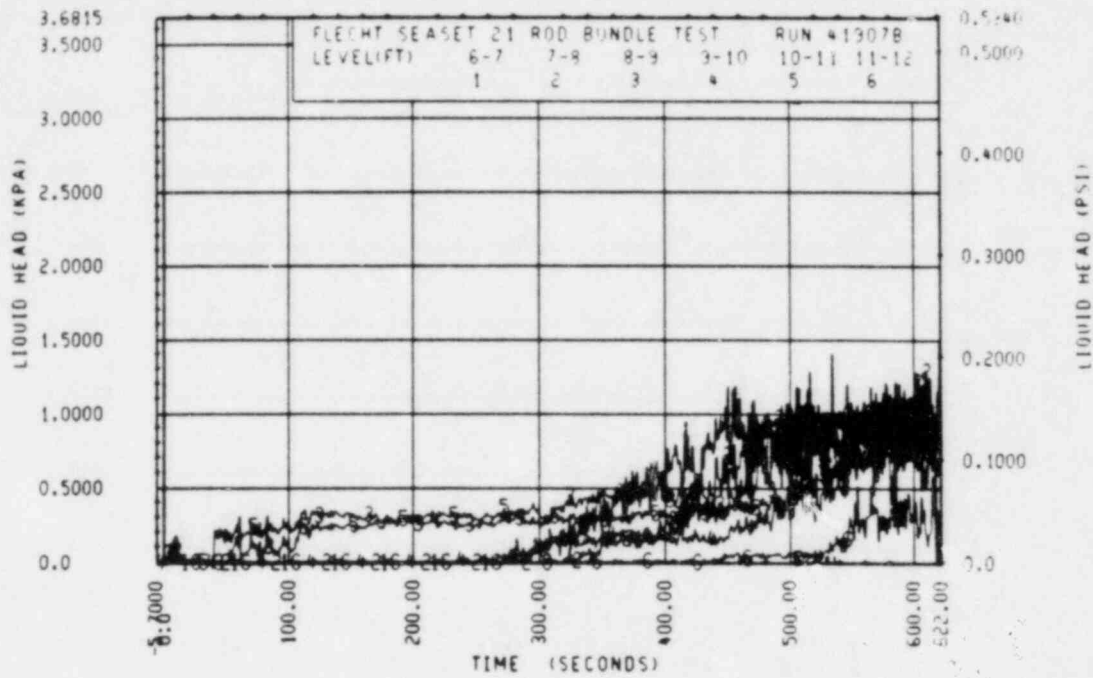












FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

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 42430 A

FLECHT SEA-SET 21 KUD BUNJLE TEST SERIES

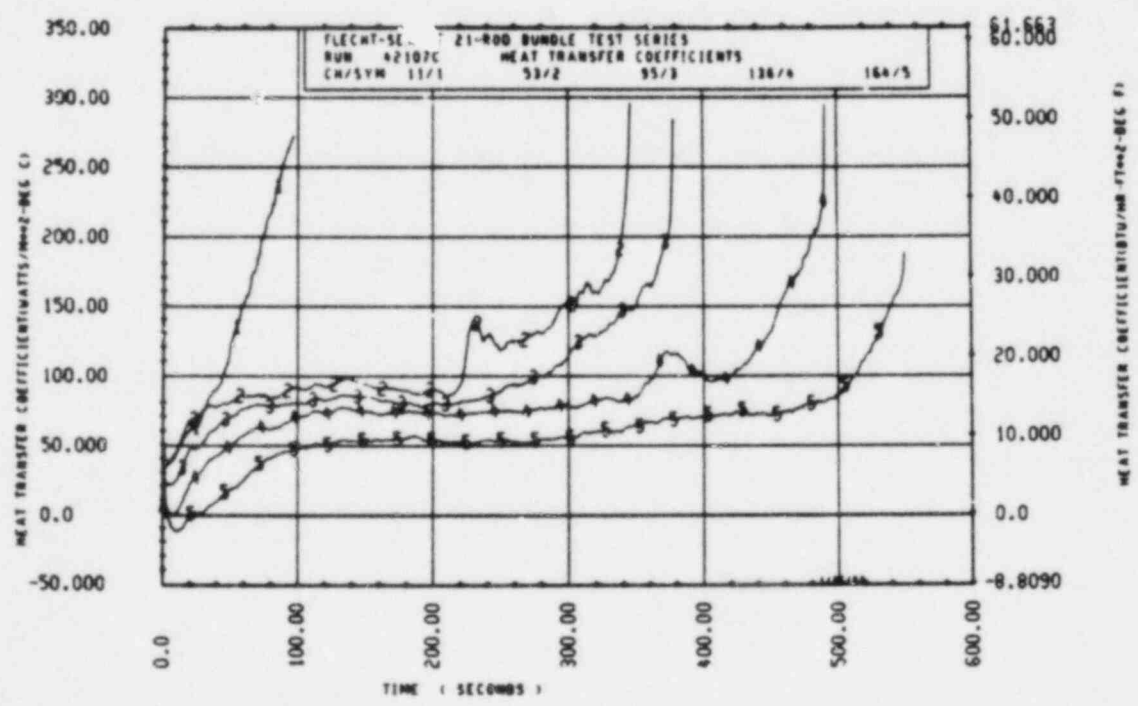
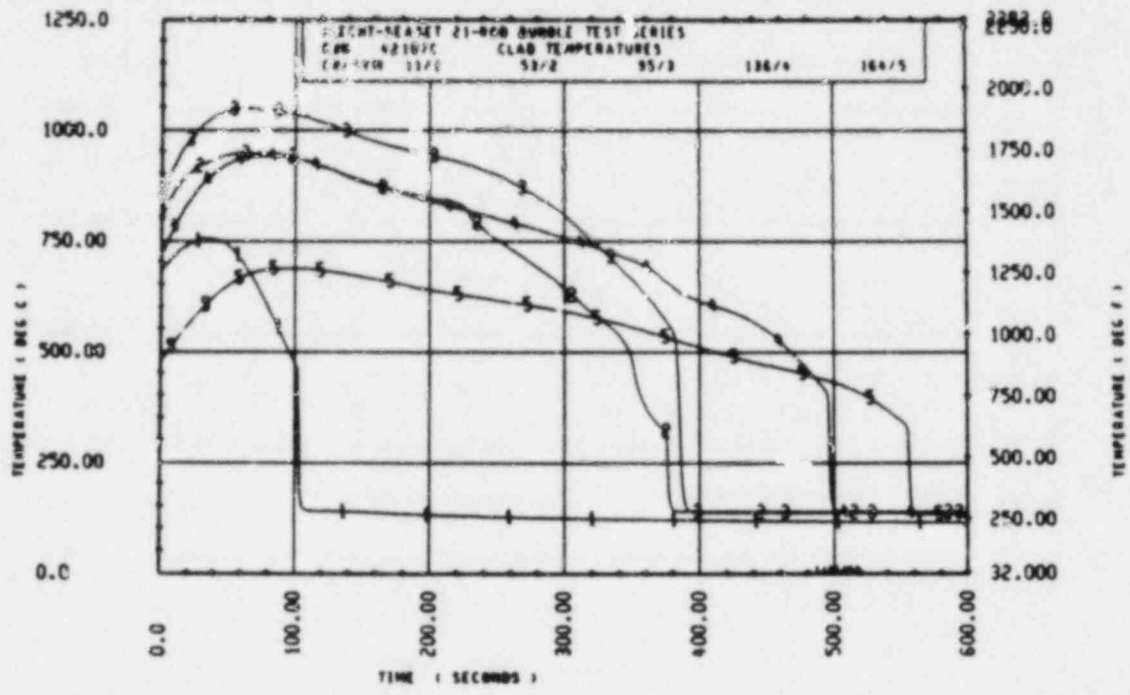
KUN NUMBER 42107C

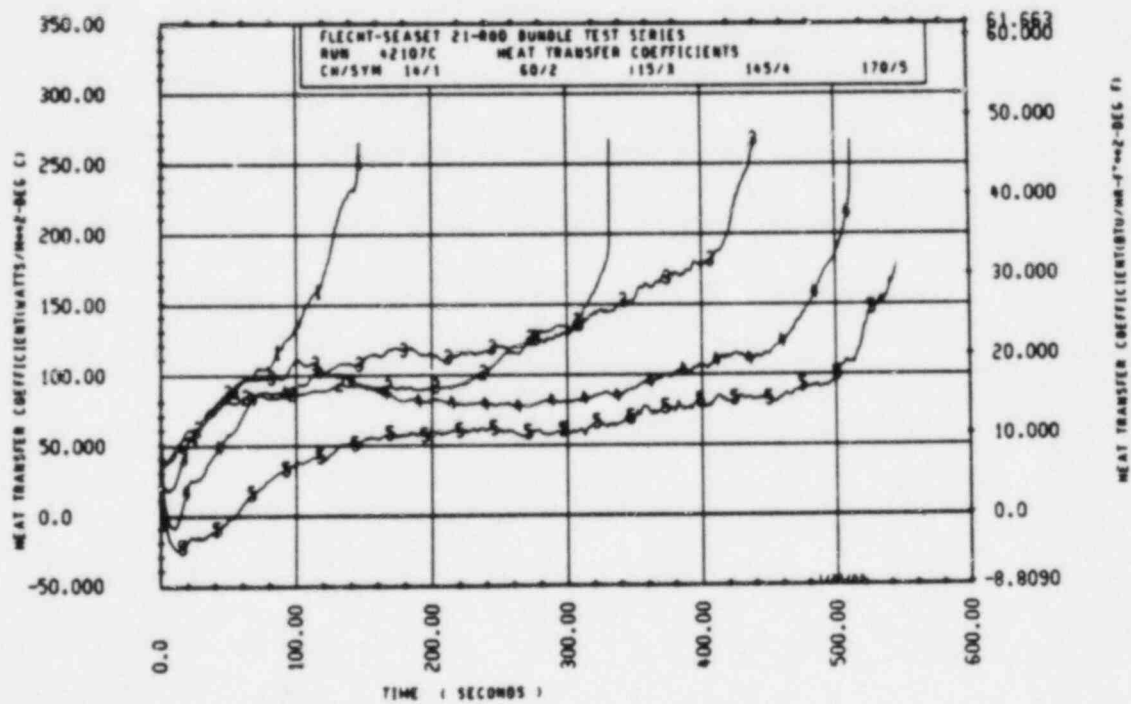
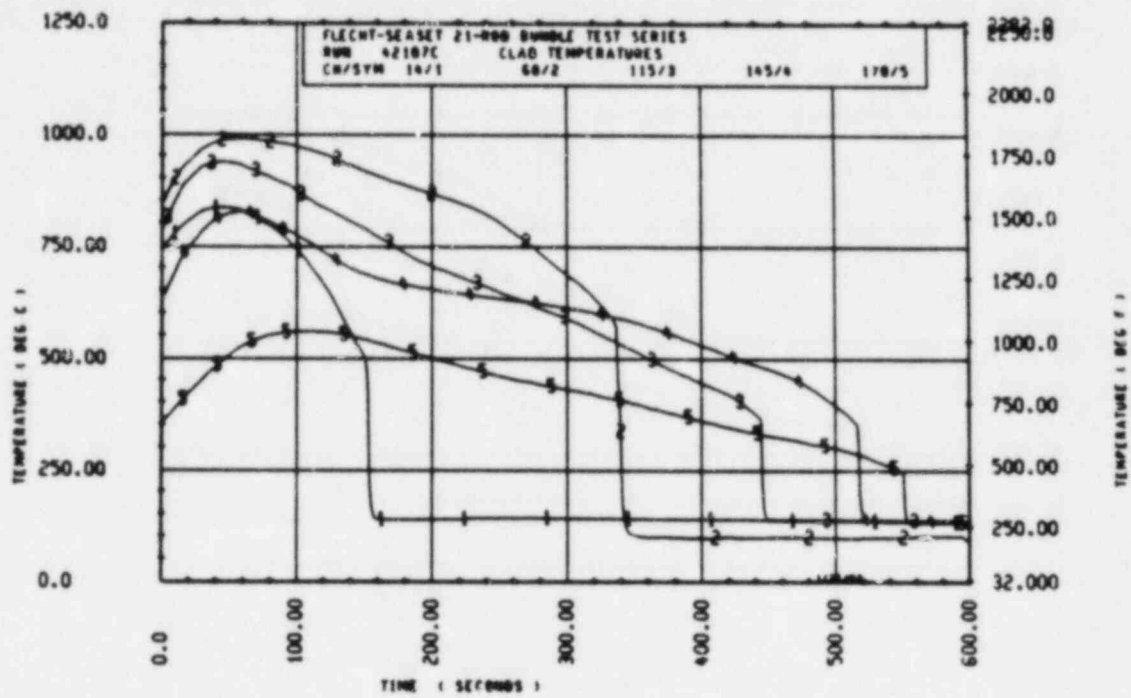
| ROD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | MAX. MIN TEMPERATURE (DEG F) | TI - PEAK/VALLEY RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|---|--------------------------------|------------------------------------|-------------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 9 | 1107. | 1253. | 146. | 40.0 | 886. | 88.3 |
| 4C 3- 3 | 11 | 1261. | 1344. | 133. | 31.5 | 806. | 102.0 |
| 1C 4- 0 | 14 | 1368. | 1541. | 173. | 45.0 | 879. | 152.7 |
| 2A 5- 0 | 17 | 1413. | 1692. | 279. | 50.0 | 921. | 224.6 |
| 2A 5- 7 | 21 | 1504. | 1785. | 281. | 66.0 | 914. | 281.5 |
| 10 6- 2 | 50 | 1457. | 1705. | 248. | 55.5 | 946. | 338.4 |
| 20 6- 2 | 53 | 1487. | 1741. | 254. | 66.0 | 811. | 375.6 |
| 30 6- 2 | 58 | 1547. | 1769. | 221. | 51.5 | 757. | 370.0 |
| 48 6- 2 | 60 | 1557. | 1819. | 262. | 60.0 | 1065. | 337.0 |
| 5C 6- 2 | 61 | 1477. | 1787. | 304. | 90.0 | 574. | 366.2 |
| 17 6- 3 | 63 | 1446. | 1725. | 279. | 78.5 | 1031. | 349.9 |
| 50 6- 3 | 69 | 1445. | 1721. | 276. | 39.5 | 1065. | 344.4 |
| 2A 6- 4 | 70 | 1462. | 1731. | 269. | 53.0 | 1053. | 307.5 |
| 38 6- 4 | 75 | 1579. | 1852. | 273. | 54.0 | 875. | 372.9 |
| 20 5- 5 | 84 | 1542. | 1834. | 292. | 54.0 | 853. | 390.8 |
| 3C 5- 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. | 50.0 | 878. | 383.7 |
| 30 6- 6 | 96 | 1548. | 1843. | 344. | 55.5 | 867. | 401.8 |
| 44 6- 6 | 97 | 1455. | 1782. | 327. | 34.0 | 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 |
| 28 7- 0 | 111 | 1451. | 1691. | 240. | 33.5 | 698. | 444.8 |
| 30 7- 0 | 115 | 1453. | 1724. | 271. | 43.0 | 674. | 444.0 |
| 58 7- 0 | 117 | 1361. | 1622. | 261. | 52.5 | 764. | 427.0 |
| 29 7- 6 | 120 | 1444. | 1762. | 318. | 37.5 | 761. | 469.0 |
| 2C 7- 6 | 121 | 1441. | 1789. | 348. | 57.5 | 801. | 467.6 |
| 2E 7- 6 | 122 | 1285. | 1627. | 342. | 55.5 | 785. | 459.8 |
| 34 7- 6 | 123 | 1428. | 1723. | 295. | 54.5 | 783. | 457.9 |
| 38 7- 6 | 124 | 1455. | 1781. | 326. | 56.0 | 766. | 461.4 |
| 43 7- 6 | 127 | 1447. | 1760. | 333. | 57.0 | 775. | 456.0 |
| 5C 7- 6 | 128 | 1427. | 1722. | 295. | 59.0 | 785. | 450.8 |
| 1C 8- 0 | 131 | 1263. | 1647. | 384. | 77.5 | 674. | 500.5 |
| 2E 8- 0 | 133 | 1132. | 1507. | 435. | 39.5 | 758. | 493.9 |
| 30 8- 0 | 136 | 1328. | 1732. | 404. | 34.5 | 760. | 495.8 |
| 58 8- 0 | 138 | 1191. | 1542. | 351. | 71.0 | 672. | 478.7 |
| 5C 8- 0 | 139 | 1354. | 1673. | 319. | 50.0 | 752. | 479.0 |
| 1C 8- 6 | 141 | 1067. | 1469. | 402. | 66.0 | 591. | 521.0 |
| 10 8- 6 | 142 | 801. | 1237. | 436. | 105.0 | 611. | 499.0 |
| 2C 9- 6 | * * * B A D T H E R M O C O U P L E J A T A * | | | | | | |
| 48 8- 6 | 145 | 1174. | 1524. | 349. | 55.5 | 663. | 516.7 |
| 50 8- 6 | 148 | 1073. | 1453. | 380. | 74.5 | 660. | 497.8 |
| 30 9- 3 | 154 | 960. | 1442. | 481. | 107.0 | 633. | 532.0 |
| 4C 9- 3 | 156 | 1067. | 1431. | 365. | 59.0 | 630. | 526.0 |
| 1010- 0 | 161 | 597. | 1064. | 466. | 152.0 | 751. | 511.9 |
| 4810- 0 | 164 | 898. | 1272. | 375. | 73.0 | 629. | 555.0 |
| 5010- 0 | 167 | 729. | 1117. | 389. | 125.0 | 730. | 496.5 |
| 2411- 0 | 168 | 583. | 826. | 243. | 152.0 | 633. | 406.4 |
| 4C11- 0 | 170 | 677. | 1043. | 366. | 103.0 | 474. | 550.0 |
| 1911- 6 | 172 | 442. | 646. | 404. | 154.0 | 576. | 511.4 |

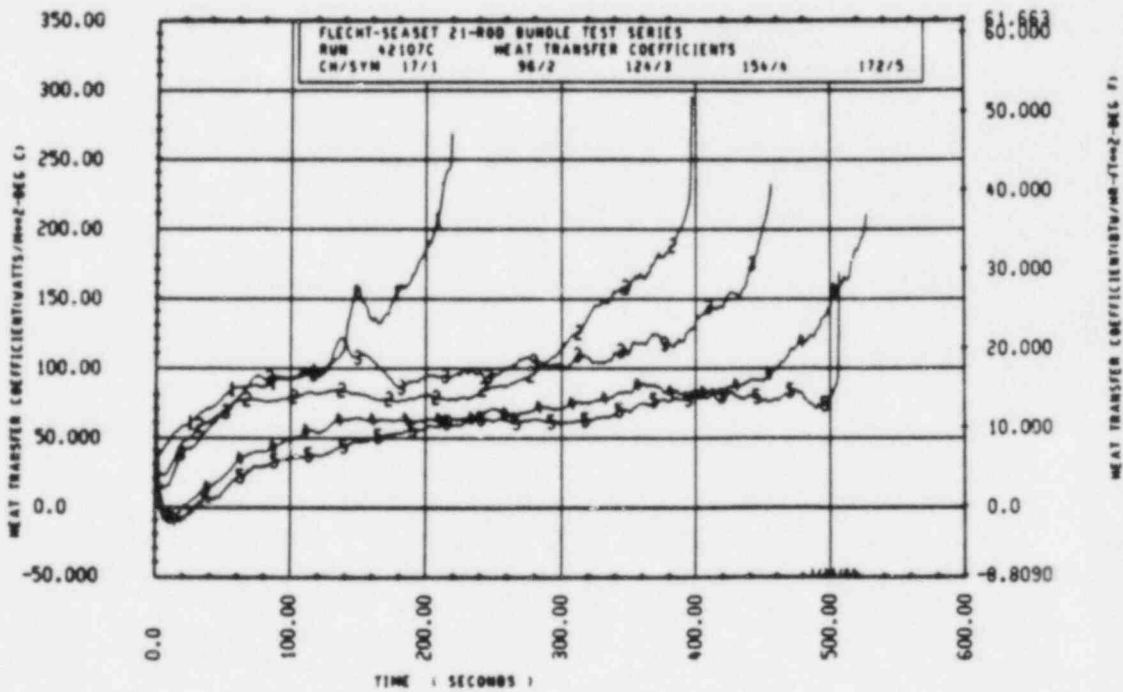
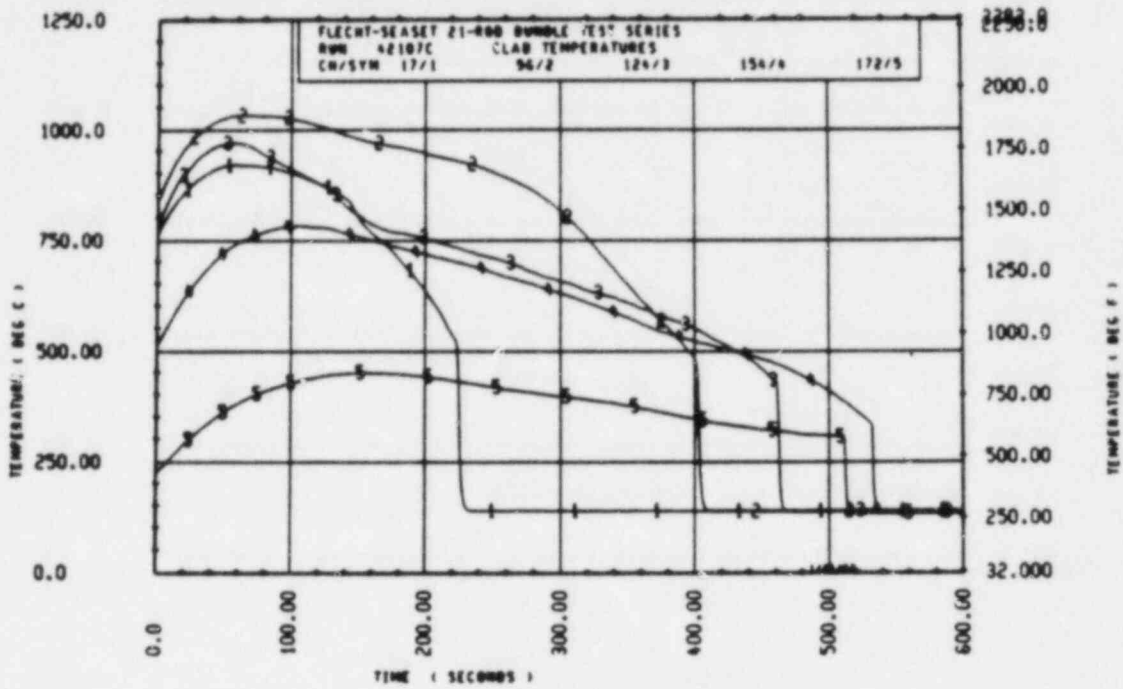
RJK 42107C HEATEK KUD STATISTICAL DATA

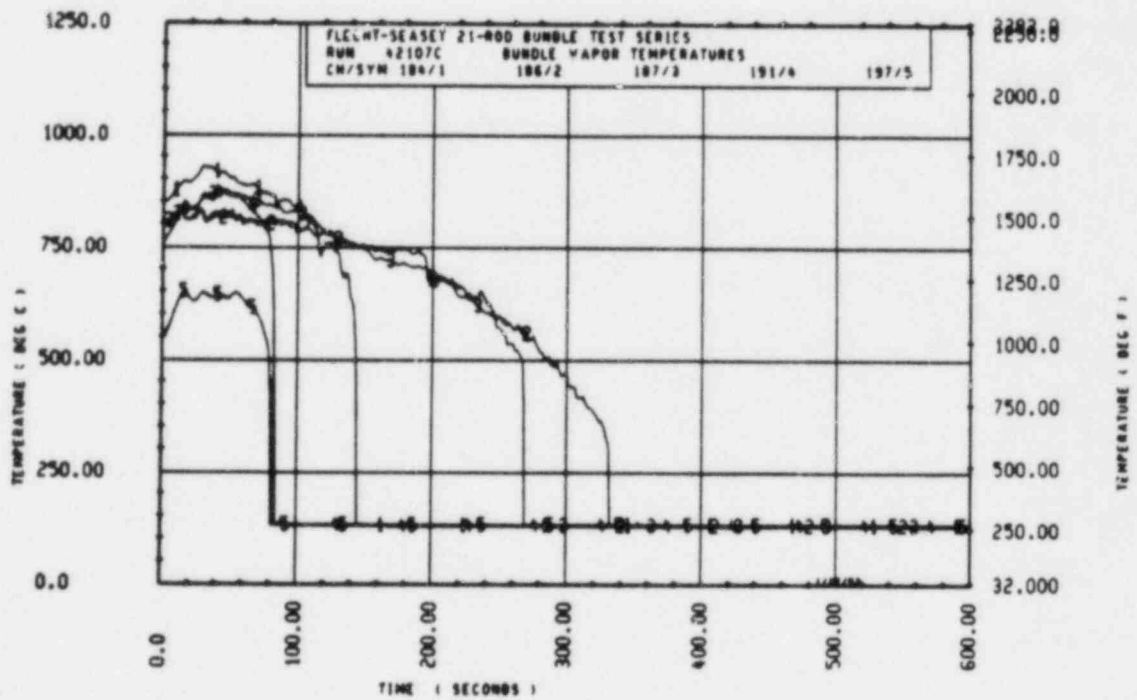
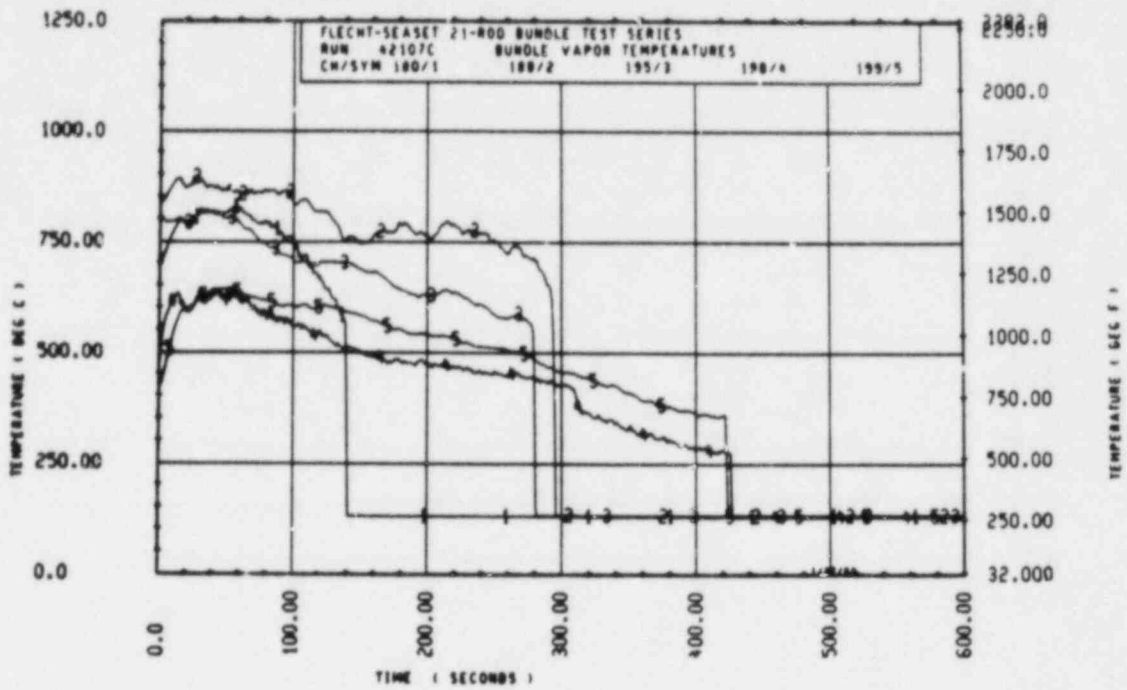
| FLEV | INITIAL TEMP (DEG F) | | | 4RA TEMP (DEG F) | | | TJRAOUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|---------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 553.1 | 586.6 | 608.5 | 662.6 | 597.2 | 619.4 | 5.0 | 4.5 | 4.8 |
| 24 | 300.6 | 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 | 48.6 |
| 60 | 1429.1 | 1413.0 | 1419.8 | 1759.8 | 1674.9 | 1732.7 | 82.5 | 60.0 | 70.3 |
| 67 | 1523.2 | 1497.6 | 1531.4 | 1931.5 | 1763.1 | 1821.7 | 85.0 | 60.0 | 63.6 |
| 70 | 1500.3 | 1407.7 | 1539.2 | 1959.0 | 1862.8 | 1862.3 | 85.0 | 44.0 | 67.9 |
| 71 | 1551.7 | 1452.7 | 1524.5 | 1900.6 | 1773.1 | 1850.9 | 74.5 | 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 | 1702.1 | 1785.3 | 82.5 | 51.5 | 64.0 |
| 76 | 1593.8 | 1426.9 | 1529.6 | 1897.2 | 1721.8 | 1798.6 | 97.5 | 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 | 1457.7 | 1213.9 | 1398.3 | 1754.2 | 1466.9 | 1672.9 | 85.5 | 33.5 | 51.1 |
| 90 | 1374.8 | 1284.9 | 1409.7 | 1788.8 | 1626.5 | 1729.6 | 92.5 | 24.5 | 60.9 |
| 96 | 1374.2 | 1131.9 | 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 | 1075.6 | 694.1 | 966.8 | 1441.9 | 1171.2 | 1349.2 | 125.0 | 60.0 | 87.6 |
| 120 | 923.3 | 547.2 | 776.6 | 1322.6 | 1063.5 | 1205.4 | 162.0 | 54.0 | 118.8 |
| 132 | 573.3 | 495.9 | 582.6 | 1042.8 | 792.0 | 871.2 | 152.0 | 103.0 | 130.5 |
| 139 | 567.8 | 441.8 | 512.5 | 1009.9 | 514.7 | 900.1 | 154.0 | 121.0 | 136.4 |

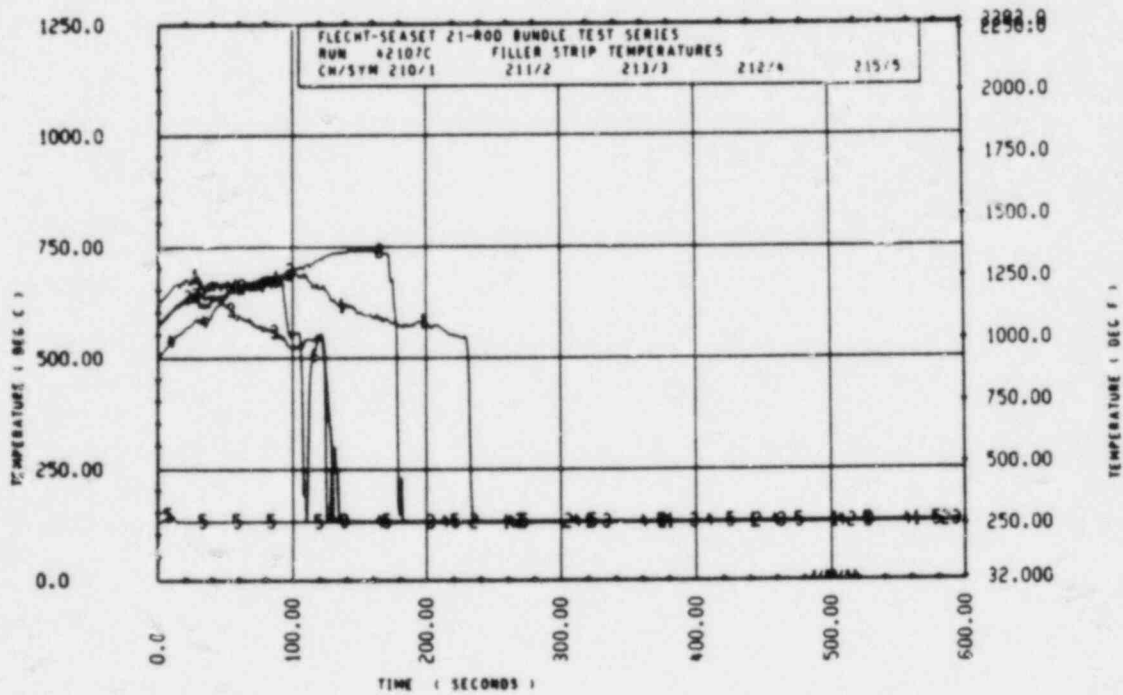
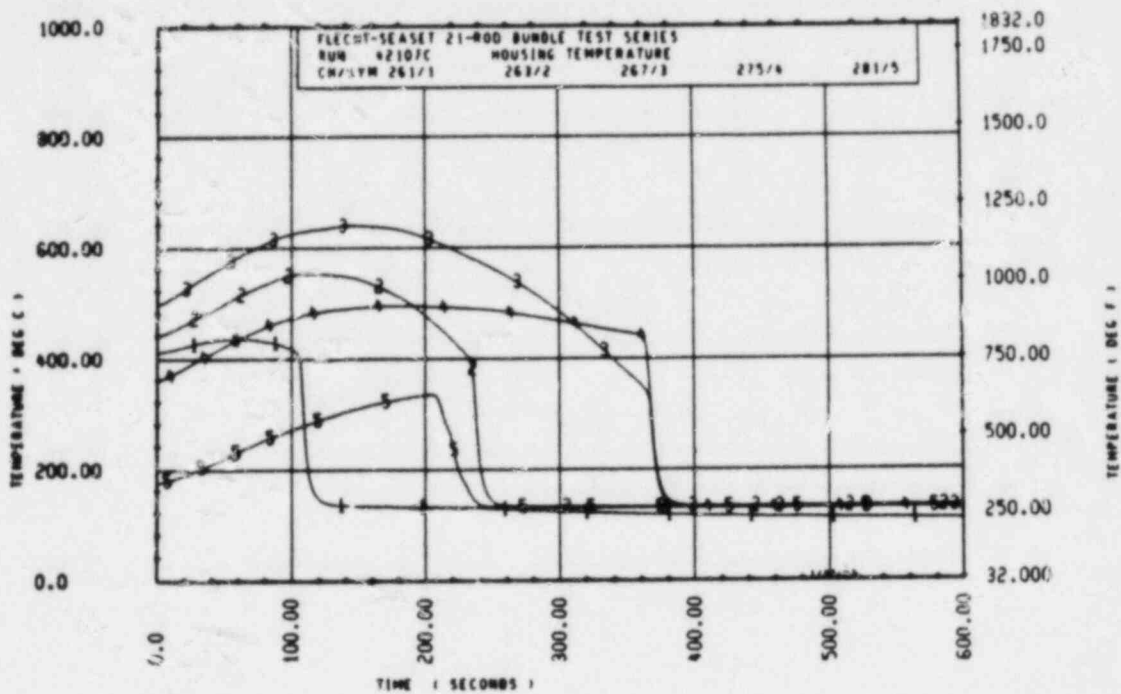
| FLEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|--------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 11.6 | 9.5 | 10.8 | 619.1 | 591.1 | 602.3 | 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 | 156.4 | 133.0 | 144.2 | 865.5 | 842.9 | 868.7 | 102.0 | 86.3 | 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 | 332.1 | 262.2 | 290.2 | 981.2 | 805.7 | 925.9 | 293.5 | 274.8 | 285.1 |
| 70 | 358.7 | 235.1 | 323.1 | 979.2 | 897.6 | 924.4 | 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 | 324.8 | 302.5 | 314.6 | 1003.7 | 964.7 | 980.7 | 325.6 | 324.7 | 325.2 |
| 74 | 262.0 | 220.5 | 234.6 | 1064.5 | 995.1 | 1024.3 | 378.0 | 344.2 | 353.9 |
| 75 | 309.7 | 185.9 | 261.3 | 1064.9 | 778.6 | 928.9 | 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 | 553.1 | 937.3 | 390.8 | 357.0 | 373.6 |
| 78 | 356.8 | 256.1 | 323.9 | 979.8 | 803.6 | 890.2 | 417.8 | 337.6 | 386.2 |
| 84 | 224.6 | 240.3 | 274.6 | 773.8 | 594.2 | 735.2 | 544.5 | 509.0 | 432.3 |
| 90 | 348.6 | 275.6 | 320.0 | 843.0 | 377.3 | 791.0 | 669.9 | 617.9 | 456.6 |
| 96 | 431.0 | 314.4 | 366.4 | 625.1 | 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 | 410.2 |
| 111 | 481.5 | 313.2 | 382.5 | 762.2 | 382.6 | 638.7 | 543.4 | 430.3 | 516.7 |
| 120 | 551.6 | 313.6 | 428.9 | 751.4 | 471.0 | 636.9 | 553.0 | 394.5 | 513.0 |
| 132 | 369.5 | 242.7 | 288.6 | 659.6 | 474.2 | 596.7 | 553.0 | 282.1 | 381.1 |
| 138 | 458.1 | 308.5 | 387.6 | 675.9 | 282.3 | 506.5 | 533.1 | 199.6 | 447.7 |

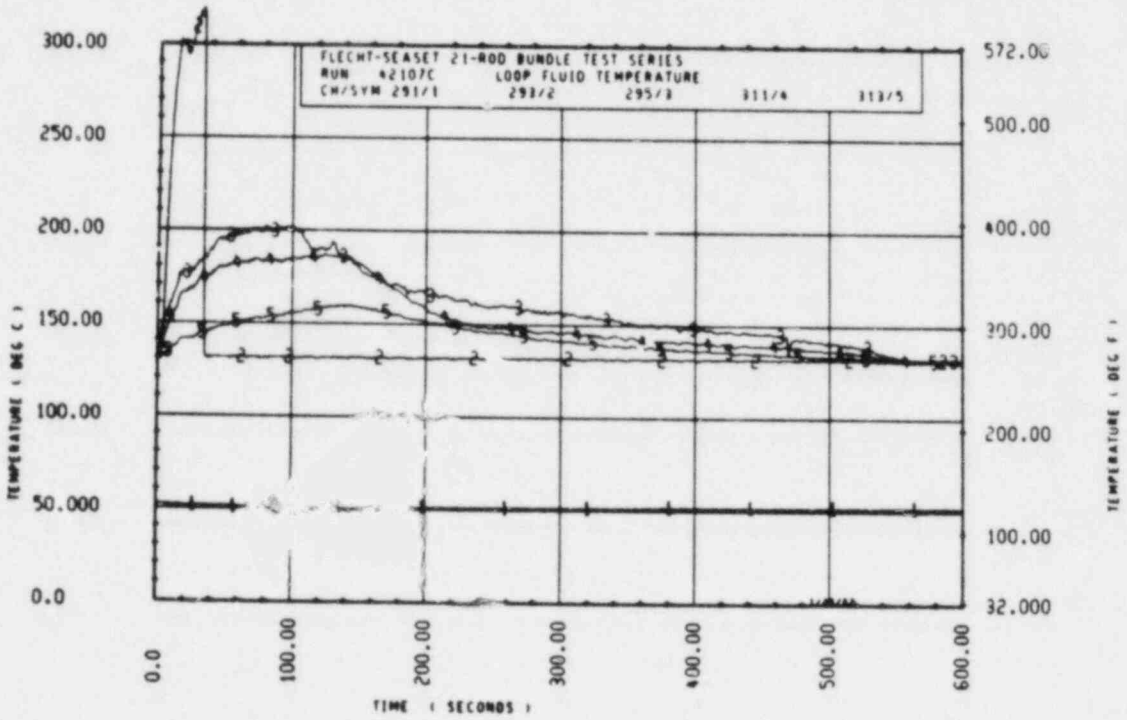
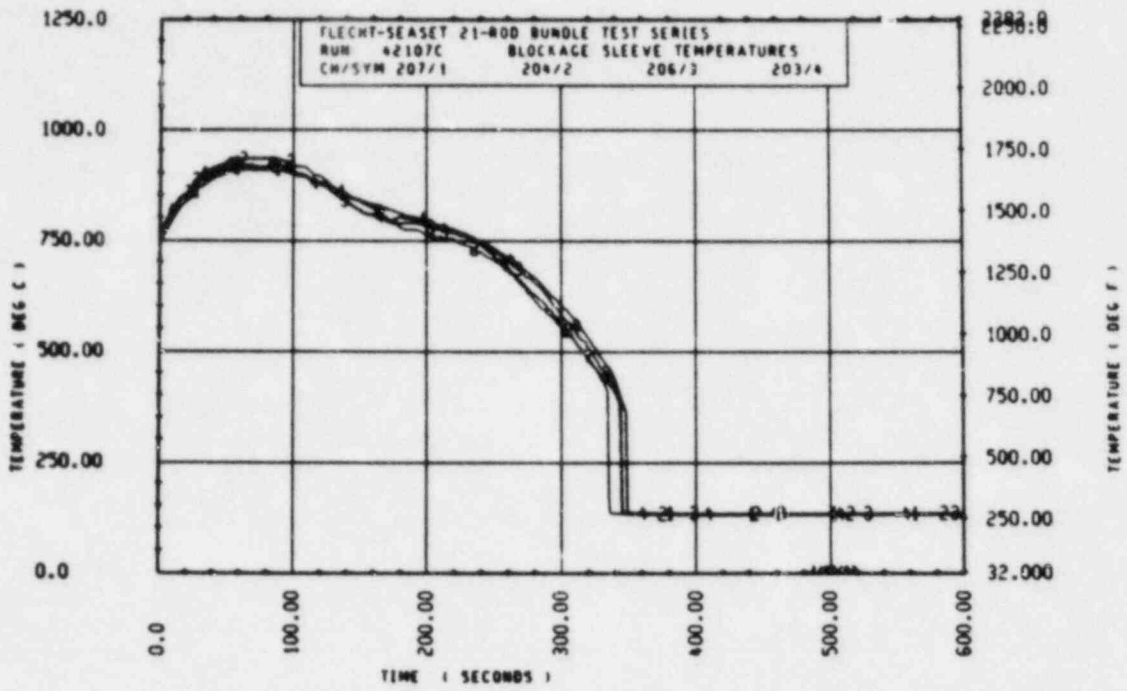


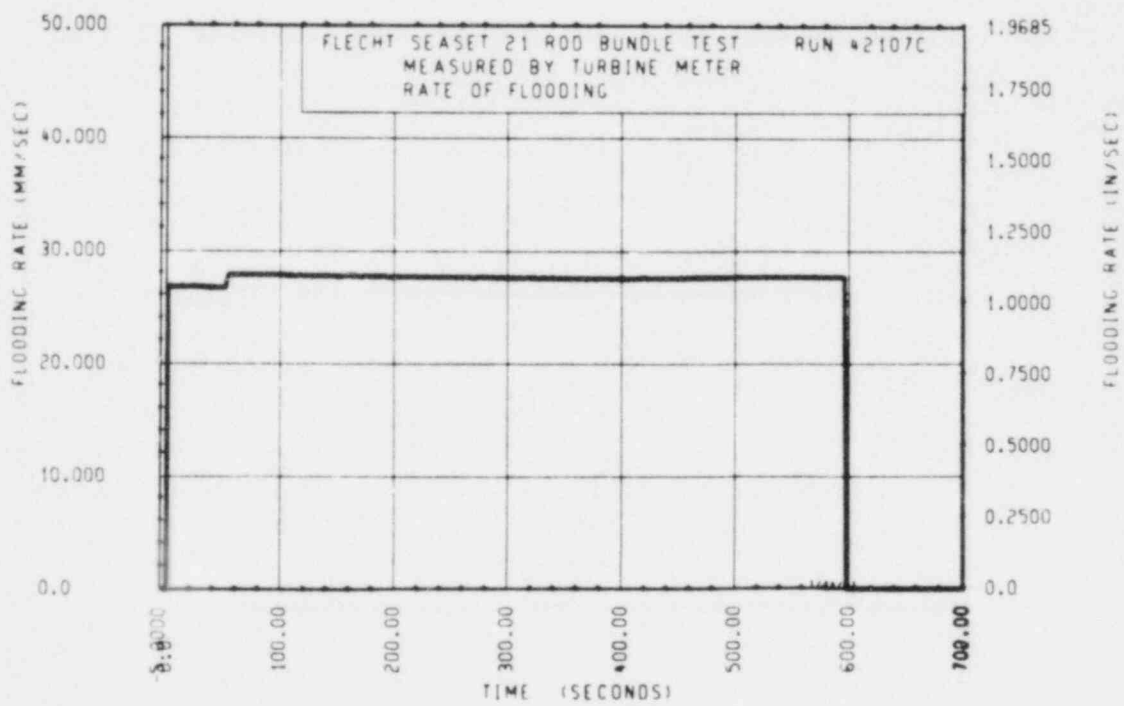
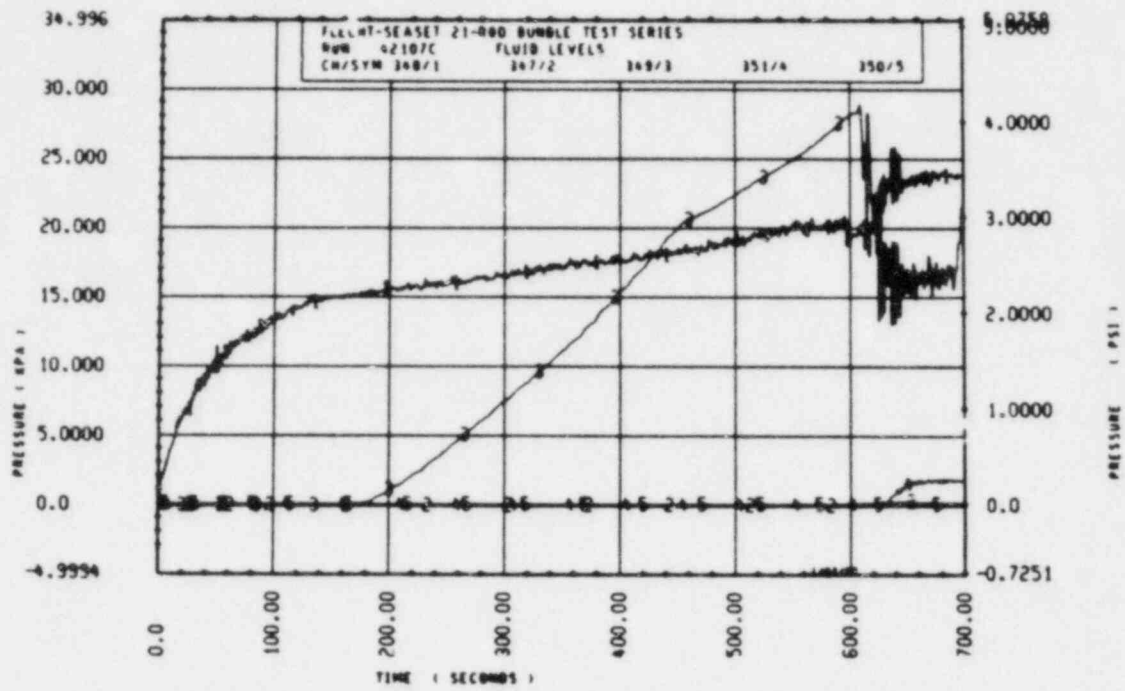


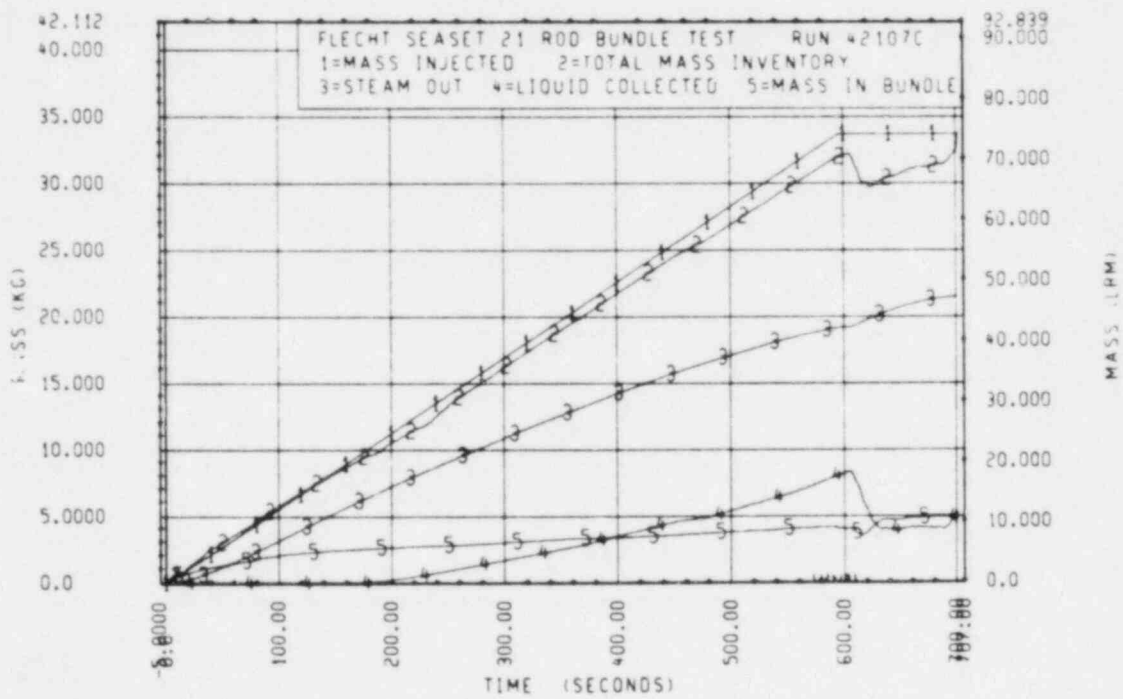
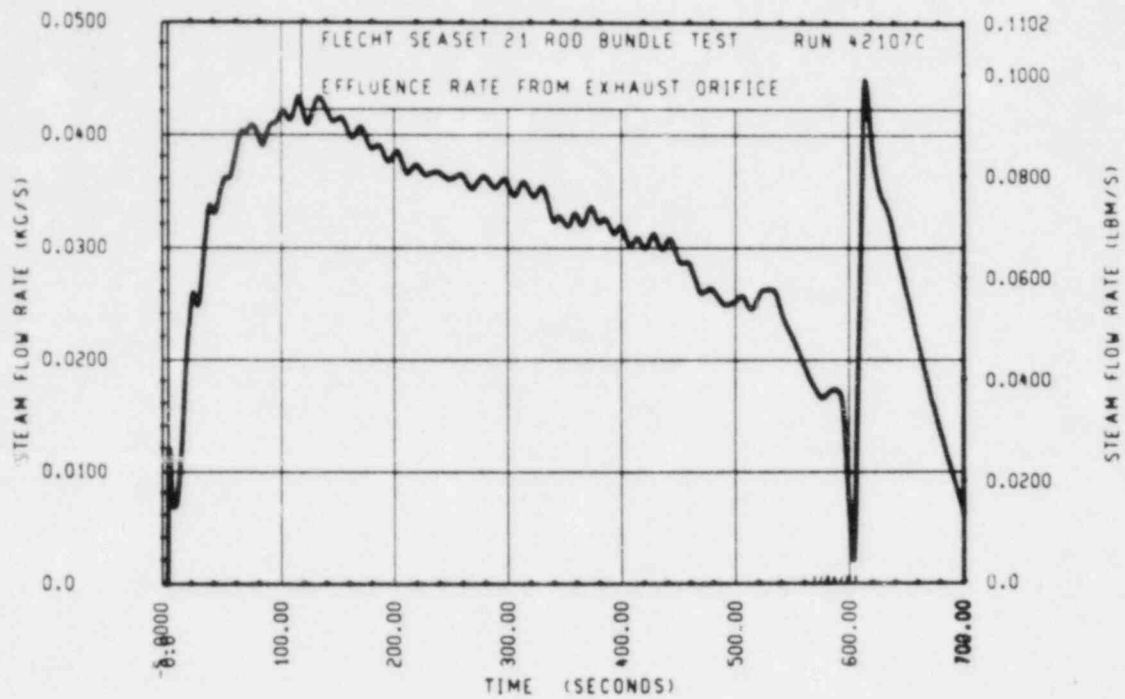


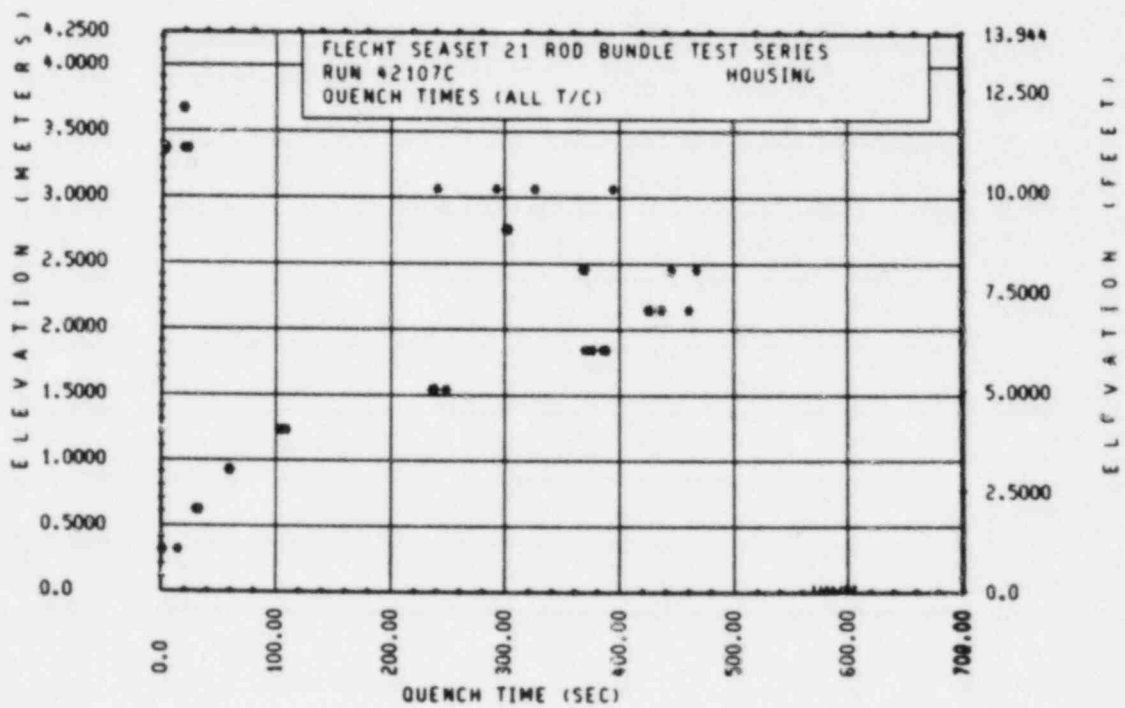
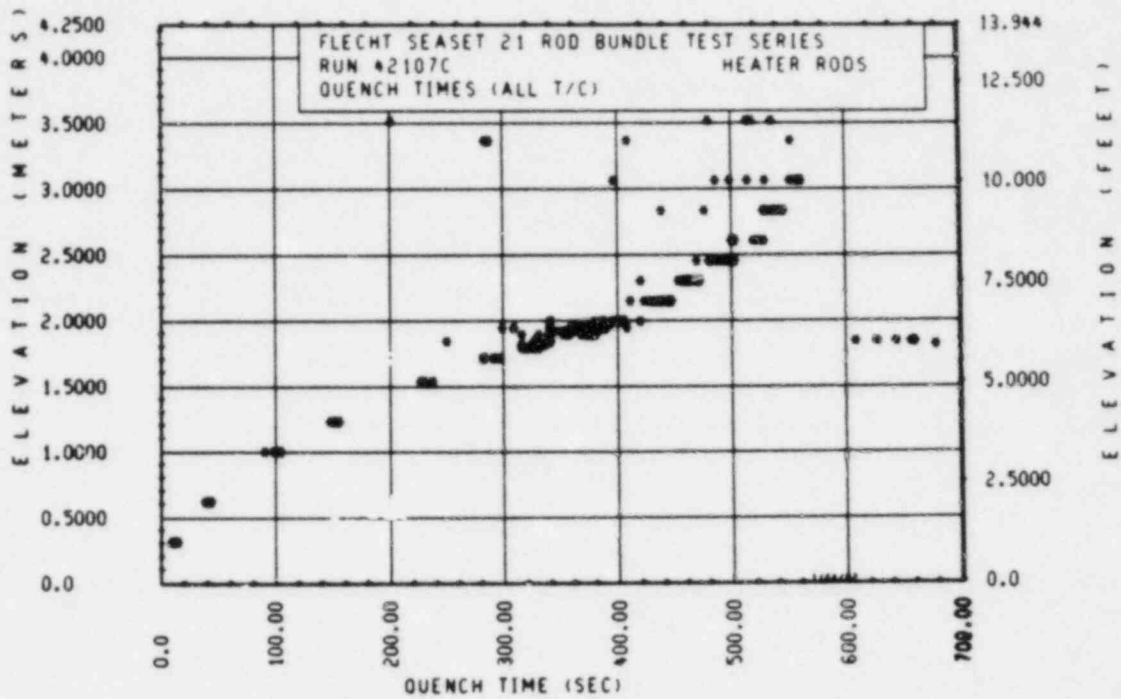


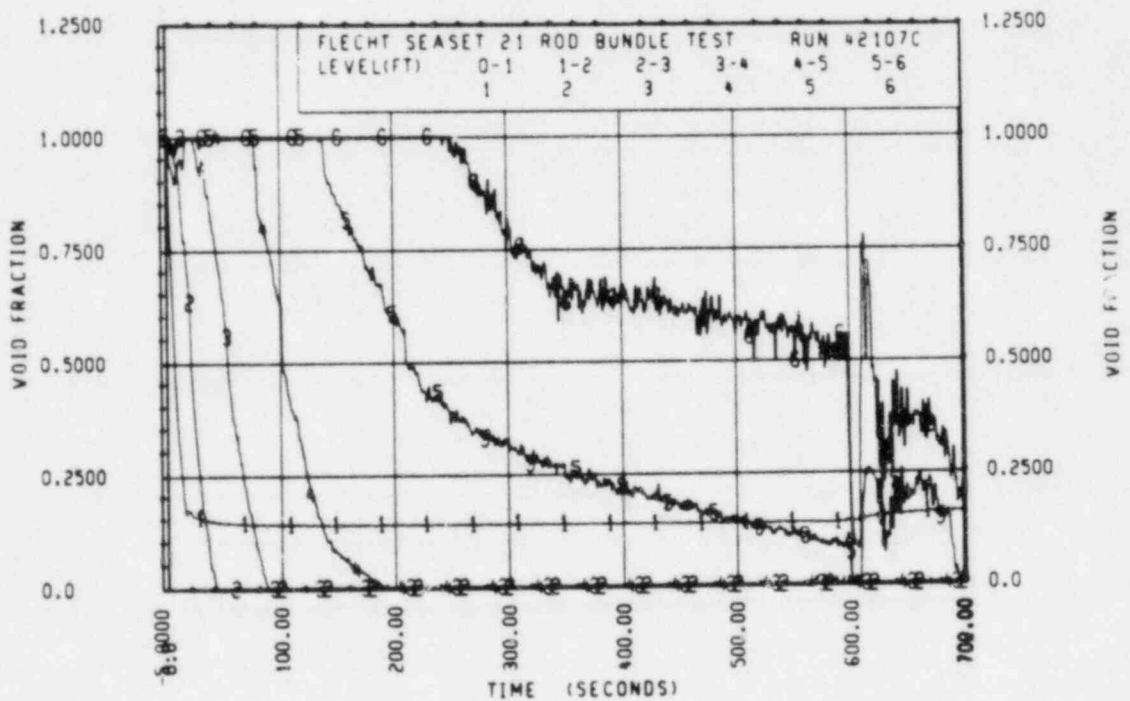
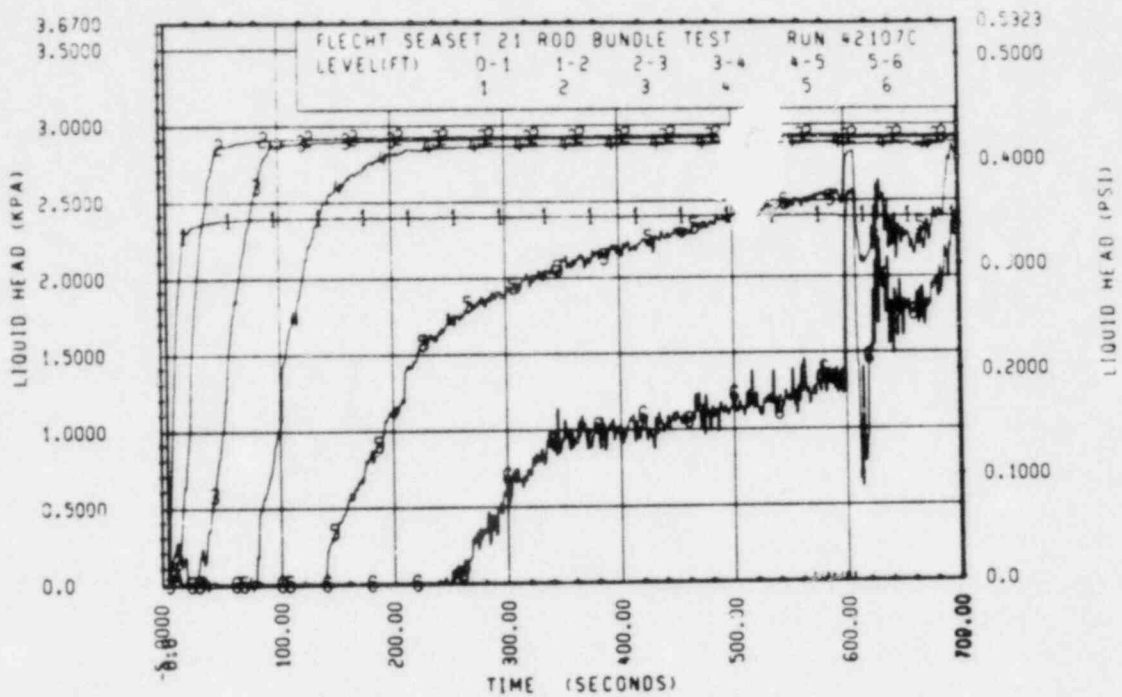


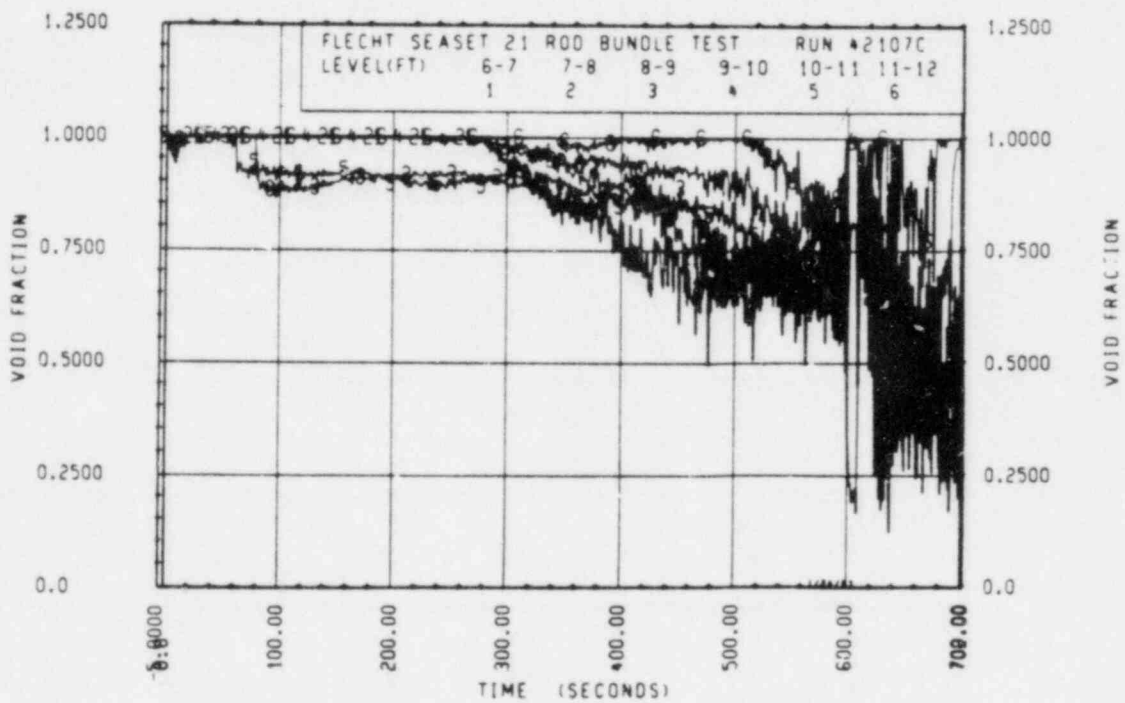
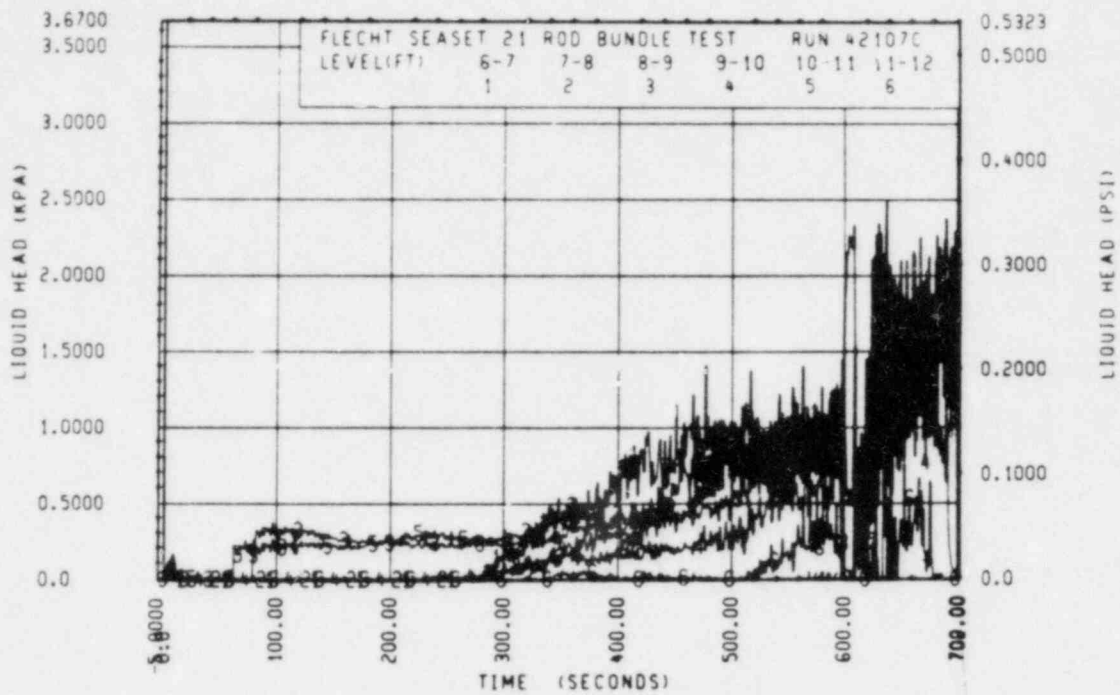












FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

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 $\pm 0.5\%$ oscillations^(a)
Total Power: -1% constant^(a)
Housing temperature at midplane: approximately -2% constant^(a)

a. Relative to run 43115D

FLECHT SEASET 21 ROD BUNJLE TEST SERIES

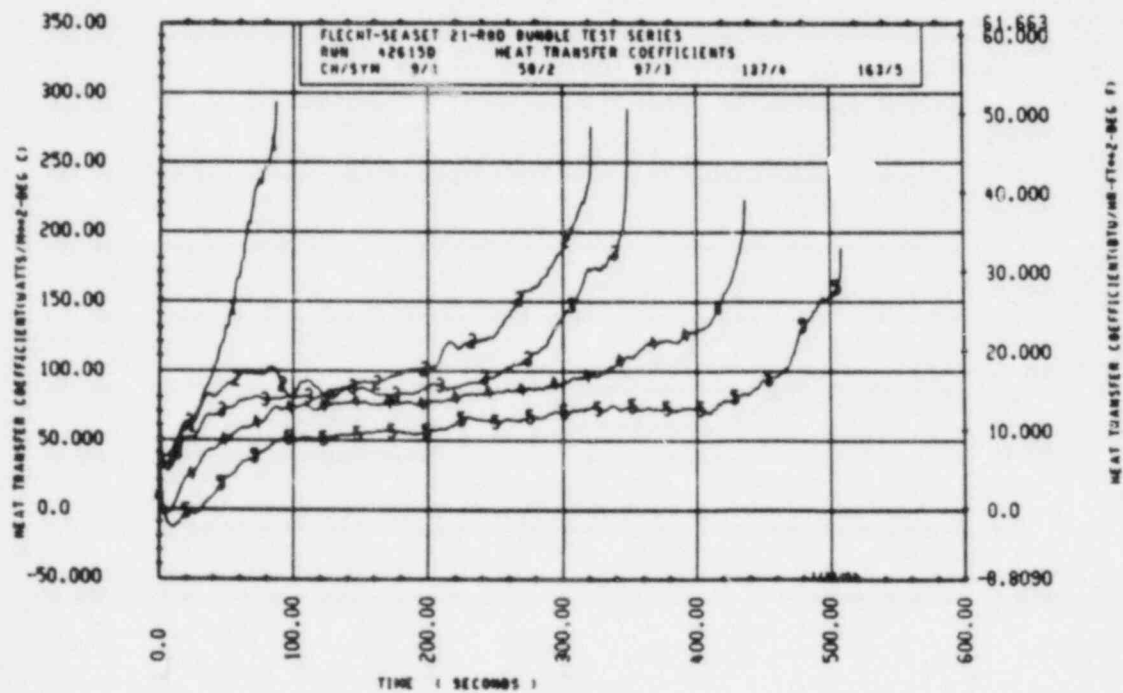
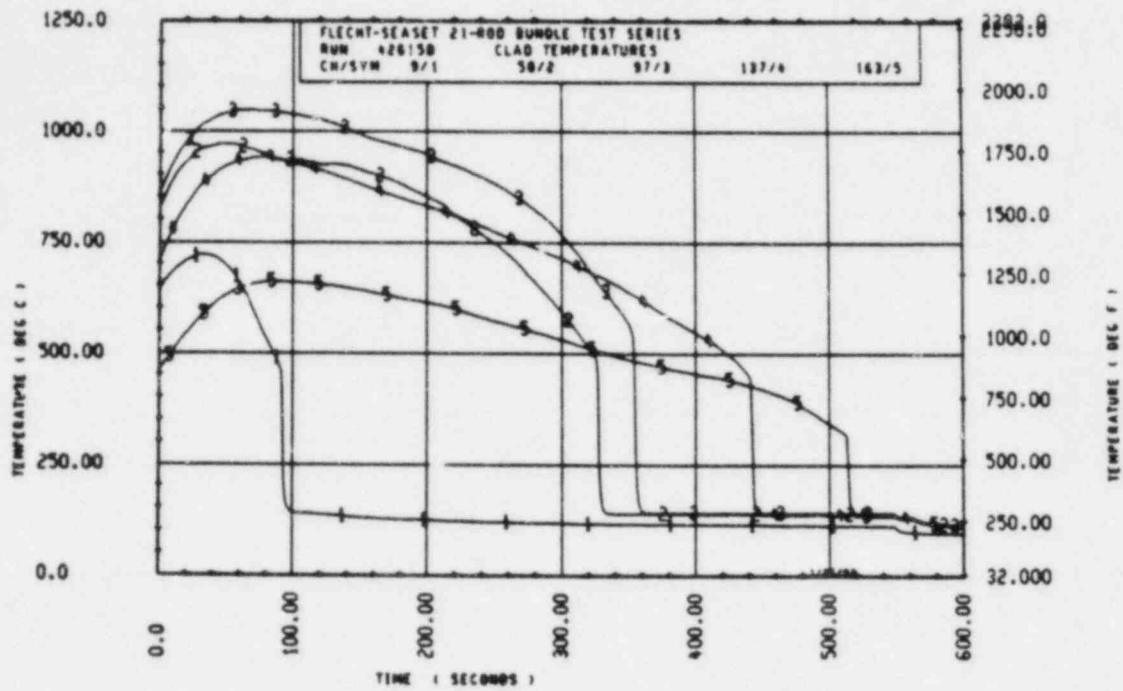
| ROD/ELEV | CHAM. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE AT (DEG F) | TURBIDITY TIME (SEC/MOS) | BENCH TEMPERATURE (DEG F) | BENCH TIME (SEC/MOS) |
|----------|----------|--------------------------------|-----------------------------------|------------------------------|--------------------------------|---------------------------------|----------------------------|
| 2A 3-3 | 7 | 1042. | 1224. | 142. | 34.0 | 849. | 92.9 |
| 4C 3-3 | 9 | 1200. | 1333. | 133. | 30.5 | 830. | 92.4 |
| 1C 4-0 | 10 | 1306. | 1462. | 150. | 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 |
| 20 6-2 | 20 | 1527. | 1764. | 257. | 46.0 | 849. | 326.8 |
| 30 5-2 | 55 | 1509. | 1829. | 321. | 50.5 | 248. | 501.0 |
| 5C 5-2 | 59 | 1535. | 1783. | 250. | 30.5 | 922. | 327.7 |
| 10 5-3 | 61 | 1479. | 1746. | 268. | 59.0 | 1008. | 311.8 |
| 4B 5-3 | 66 | 1546. | 1815. | 269. | 59.5 | 944. | 329.8 |
| 50 5-3 | 68 | 1466. | 1733. | 267. | 75.0 | 919. | 328.8 |
| 2A 6-4 | 70 | 1471. | 1749. | 277. | 50.0 | 1013. | 323.7 |
| 3B 6-4 | 82 | 1466. | 1748. | 281. | 79.5 | 947. | 327.6 |
| 10 5-5 | 32 | 1466. | 1748. | 281. | 79.5 | 947. | 327.6 |
| 20 5-5 | 82 | 1466. | 1748. | 281. | 79.5 | 947. | 327.6 |
| 3C 5-5 | 82 | 1500. | 1899. | 299. | 59.5 | 957. | 344.8 |
| 10 5-5 | 85 | 1502. | 1764. | 322. | 93.0 | 898. | 352.6 |
| 10 5-5 | 87 | 1589. | 1923. | 332. | 59.5 | 982. | 353.8 |
| 30 5-5 | 98 | 1569. | 1874. | 310. | 58.5 | 927. | 362.8 |
| 4A 5-5 | 100 | 1469. | 1776. | 309. | 59.0 | 931. | 367.9 |
| 4C 5-5 | 101 | 1570. | 1907. | 337. | 57.0 | 1020. | 352.9 |
| 5C 5-5 | 103 | 1532. | 1802. | 271. | 72.5 | 971. | 354.3 |
| 1C 7-0 | 111 | 1437. | 1669. | 232. | 30.5 | 752. | 389.9 |
| 2B 7-0 | 115 | 1467. | 1730. | 252. | 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. | 432.3 |
| 2E 7-6 | 123 | 1308. | 1596. | 250. | 49.0 | 817. | 417.0 |
| 3A 7-6 | 124 | 1441. | 1735. | 245. | 59.5 | 821. | 412.9 |
| 3B 7-6 | 125 | 1469. | 1765. | 317. | 58.0 | 856. | 406.0 |
| 4B 7-6 | 128 | 1457. | 1773. | 316. | 57.5 | 775. | 429.6 |
| 5C 7-6 | 129 | 1437. | 1722. | 285. | 57.5 | 815. | 412.0 |
| 1C 8-0 | 132 | 1169. | 1363. | 394. | 32.5 | 729. | 456.5 |
| 2E 8-0 | 134 | 1110. | 1402. | 353. | 78.0 | 727. | 439.0 |
| 3D 8-0 | 137 | 1317. | 1732. | 445. | 30.5 | 830. | 441.2 |
| 5B 8-0 | 139 | 1271. | 1599. | 328. | 40.5 | 694. | 462.7 |
| 5C 8-0 | 140 | 1348. | 1673. | 325. | 71.5 | 903. | 435.7 |
| 1C 8-6 | 141 | 993. | 1433. | 441. | 30.5 | 592. | 496.0 |
| 1D 8-6 | 142 | 859. | 1391. | 531. | 118.0 | 711. | 482.9 |
| 2C 8-6 | 143 | 1058. | 1488. | 430. | 33.0 | 586. | 481.0 |
| 4B 8-6 | 145 | 1160. | 1502. | 342. | 55.0 | 657. | 485.9 |
| 5D 8-6 | 148 | 1101. | 1493. | 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. | 33.5 | 634. | 483.0 |
| 1010-0 | 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 |
| 1011-6 | 170 | 289. | 778. | 489. | 143.0 | 588. | 468.0 |

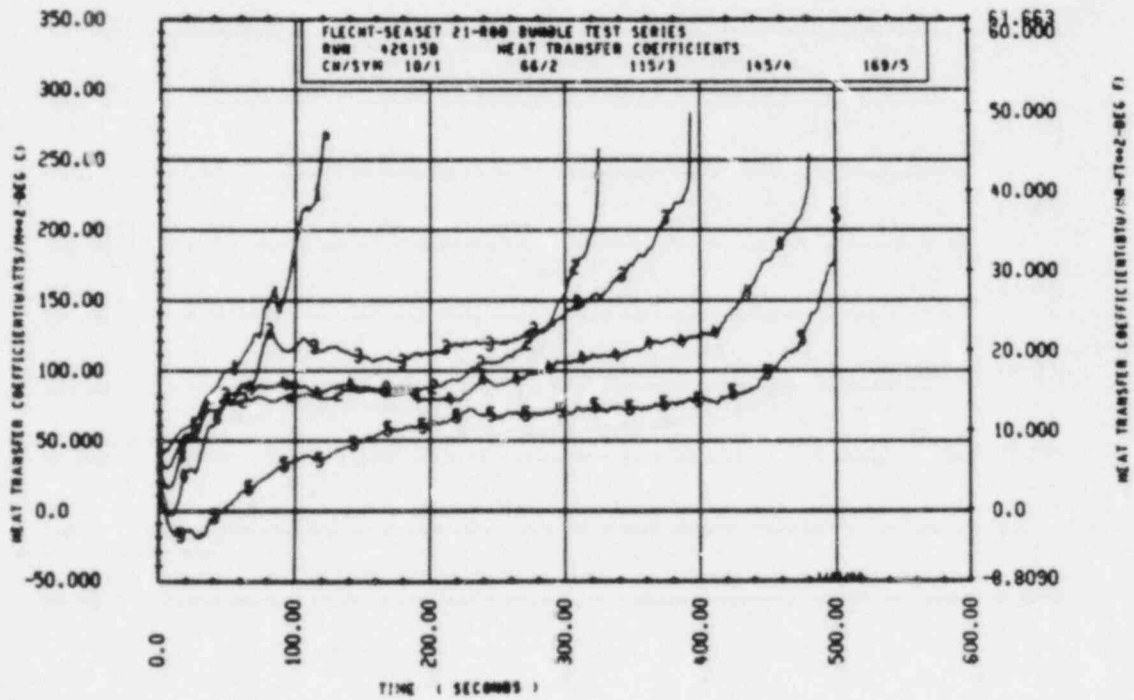
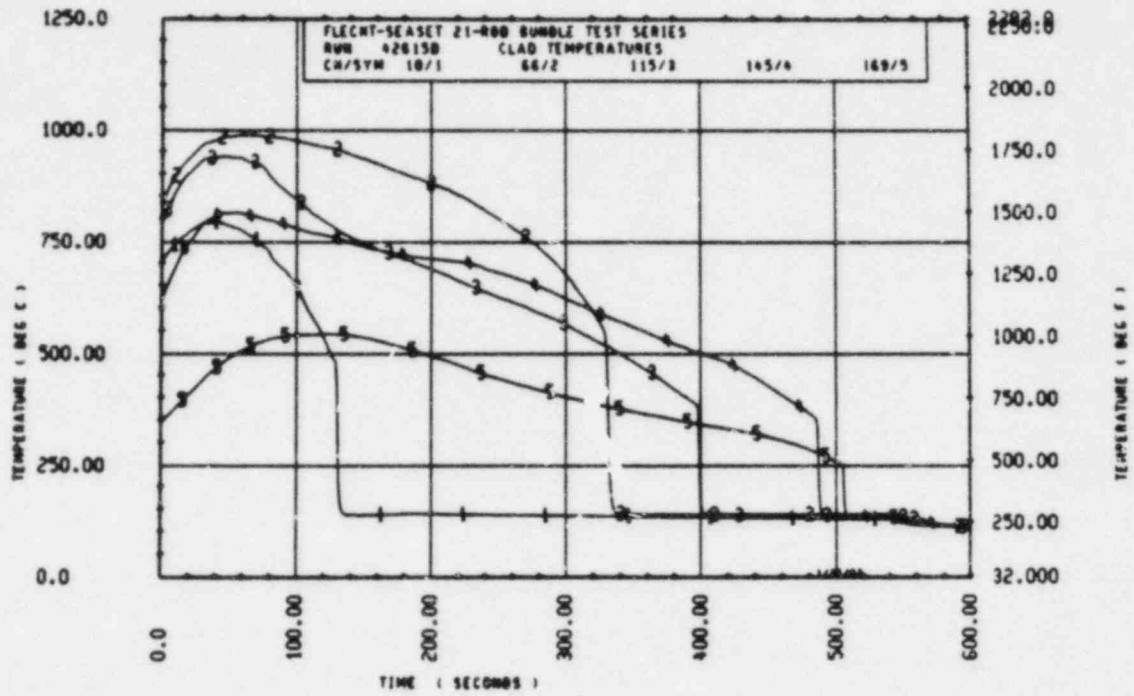
RUN 426150 HEATER KUD STATISTICAL DATA

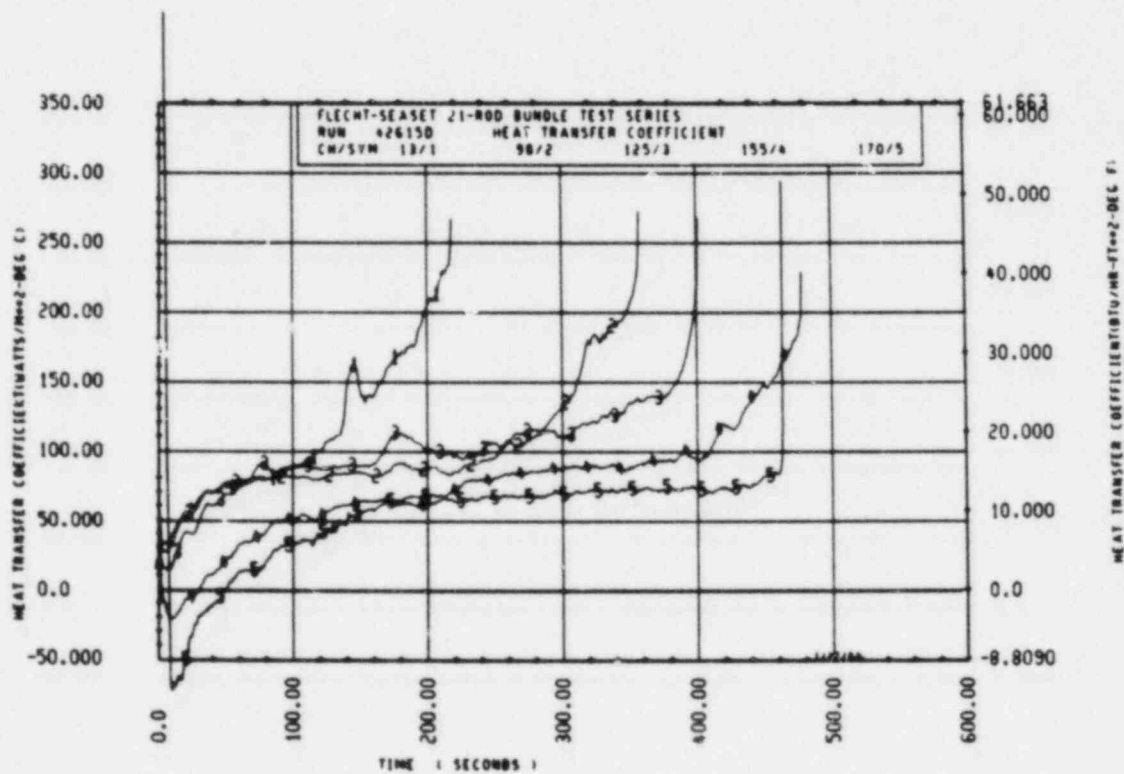
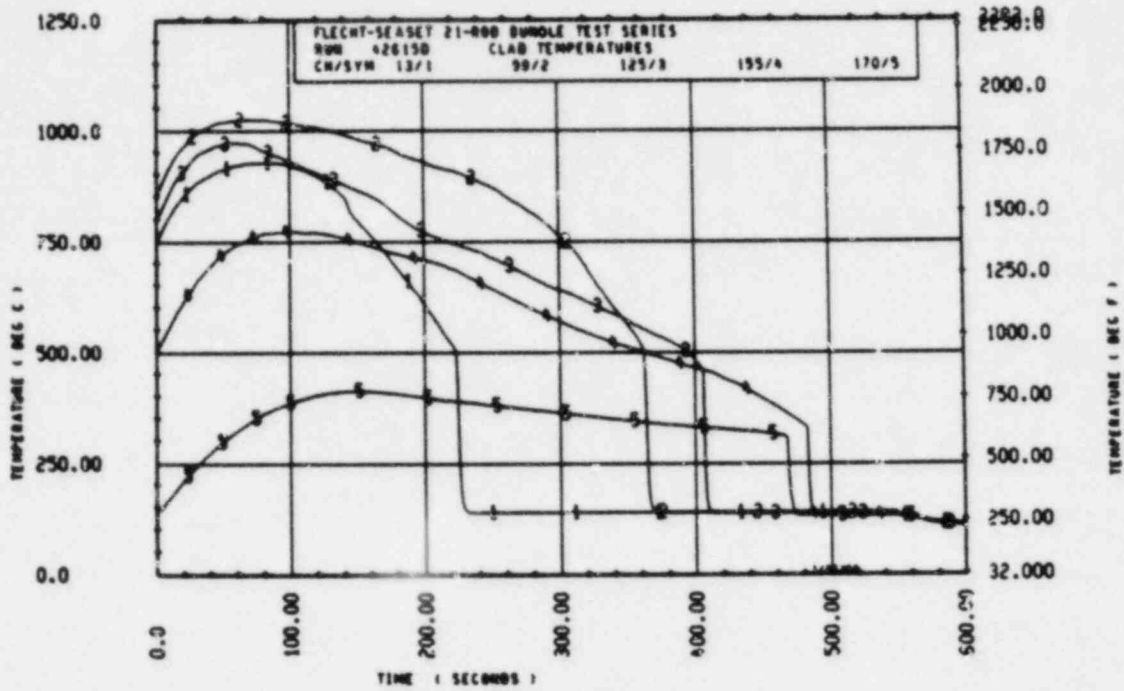
| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TJRYAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 648.8 | 597.5 | 614.9 | 661.2 | 613.1 | 629.6 | 6.5 | 5.5 | 6.0 |
| 14 | 824.0 | 798.7 | 812.3 | 861.3 | 846.6 | 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 | 41.0 |
| 60 | 1471.7 | 1365.0 | 1413.2 | 1775.4 | 1672.3 | 1716.9 | 70.5 | 70.0 | 70.5 |
| 77 | 1596.1 | 1466.0 | 1509.5 | 1872.3 | 1717.4 | 1772.7 | 57.0 | 46.0 | 51.2 |
| 70 | 1501.6 | 1520.5 | 1561.0 | 1884.7 | 1824.8 | 1854.7 | 50.0 | 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 | 1857.8 | 1651.6 | 1801.7 | 88.0 | 50.0 | 62.9 |
| 74 | 1562.2 | 1423.2 | 1509.1 | 1862.2 | 1726.3 | 1790.4 | 93.5 | 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 | 1724.6 | 1574.4 | 1669.2 | 80.5 | 30.5 | 48.8 |
| 90 | 1468.9 | 1307.7 | 1404.2 | 1765.4 | 1556.2 | 1692.8 | 81.5 | 45.0 | 57.8 |
| 96 | 1369.3 | 1109.9 | 1266.6 | 1764.2 | 1462.3 | 1620.2 | 82.5 | 61.0 | 73.9 |
| 102 | 1166.0 | 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 | 75.0 | 68.5 | 83.3 |
| 120 | 867.0 | 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 |

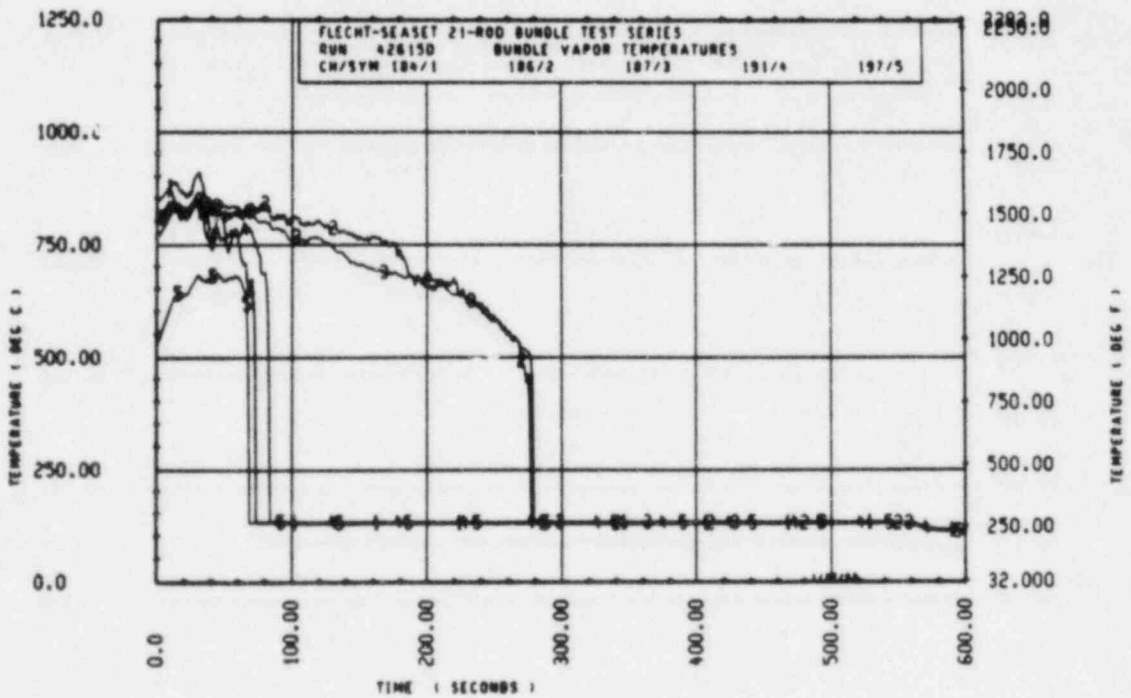
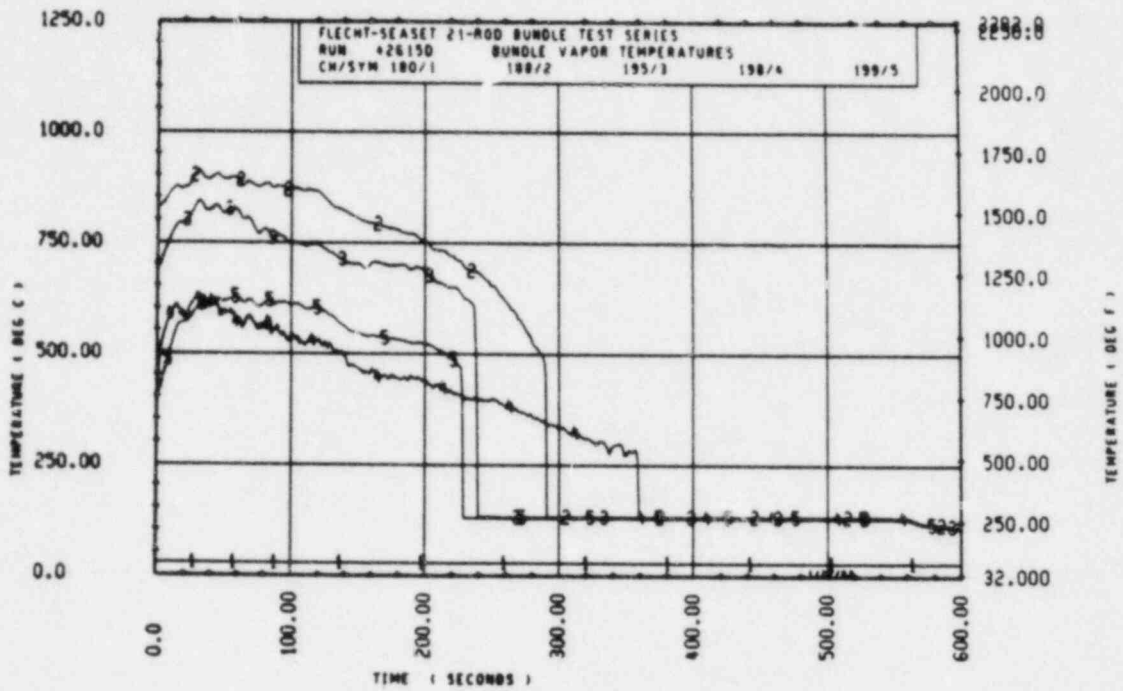
| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|--------|--------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 16.5 | 12.7 | 14.7 | 623.6 | 592.0 | 603.7 | 12.0 | 11.0 | 11.6 |
| 14 | 44.1 | 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 |
| 77 | 276.2 | 251.0 | 263.2 | 1022.1 | 908.6 | 953.0 | 274.9 | 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 | 245.1 | 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 | 209.7 | 288.5 | 856.4 | 718.5 | 795.8 | 437.9 | 386.4 | 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 | 514.8 | 323.7 | 428.6 | 641.2 | 281.3 | 573.9 | 523.0 | 358.3 | 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 |

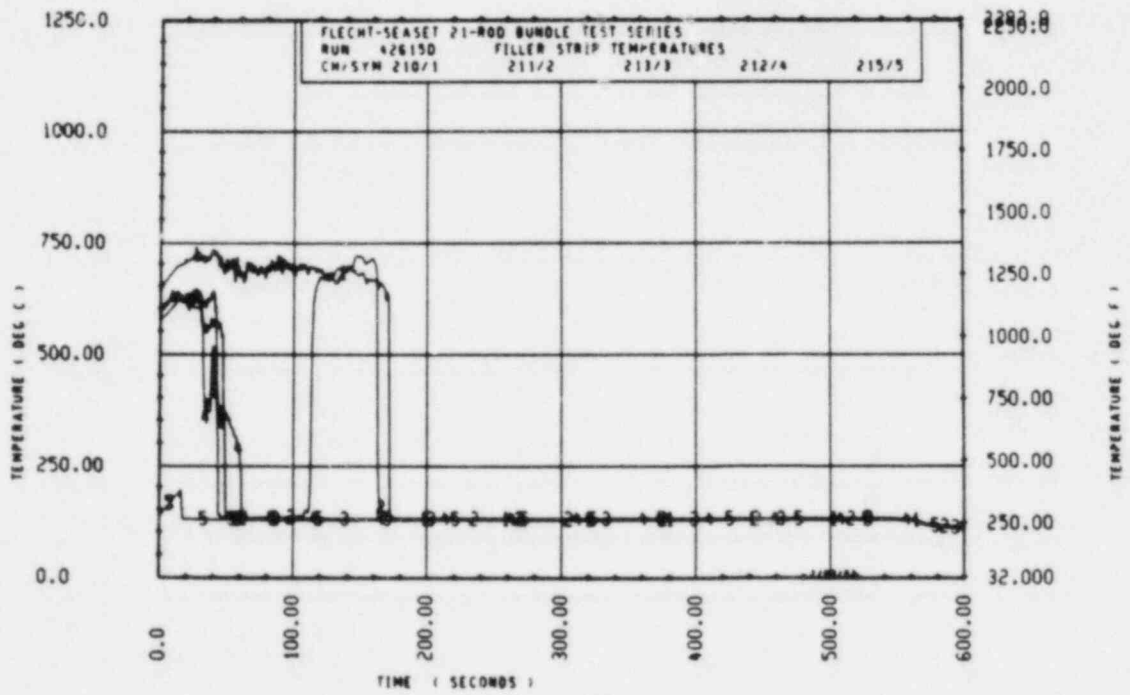
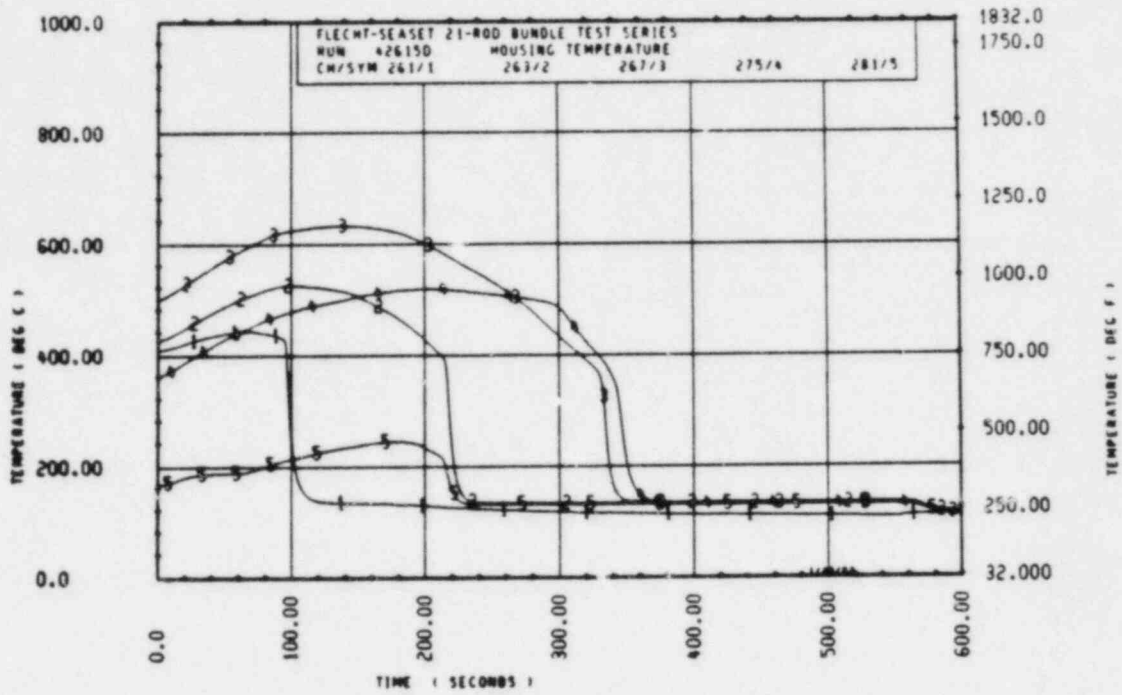
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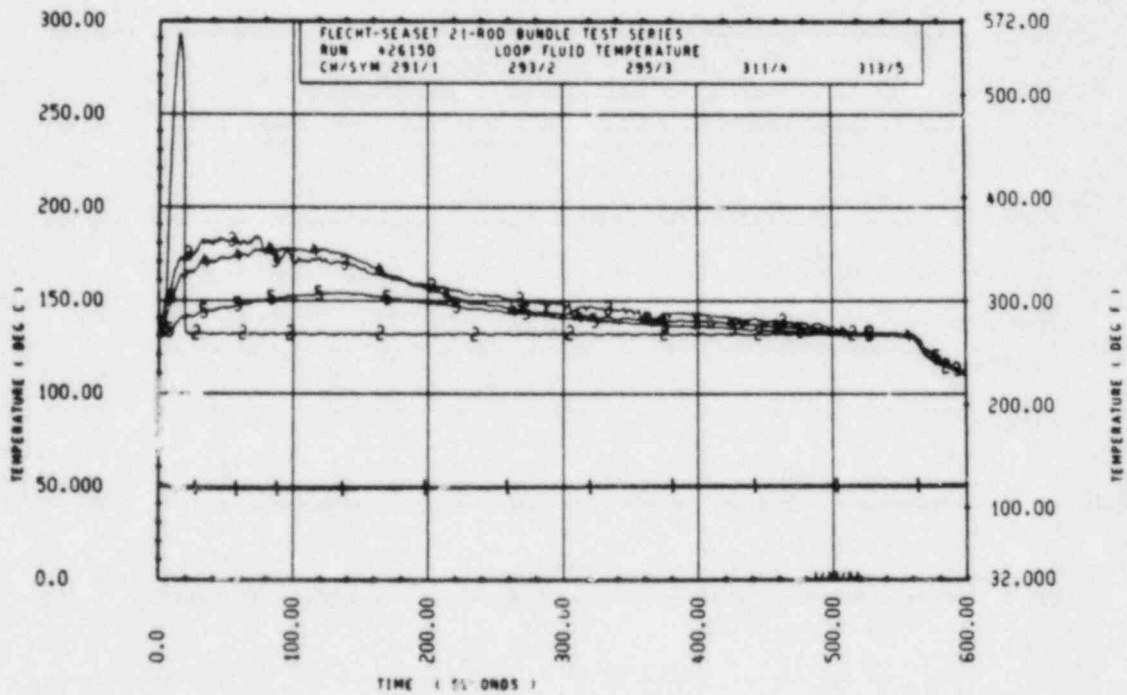
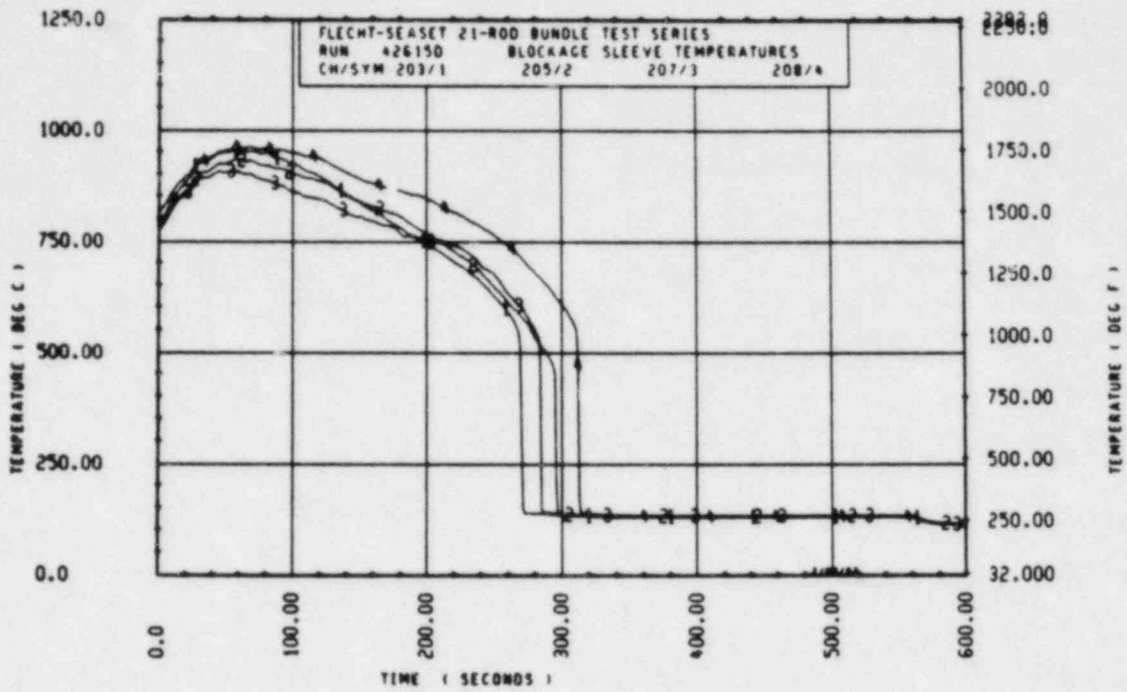


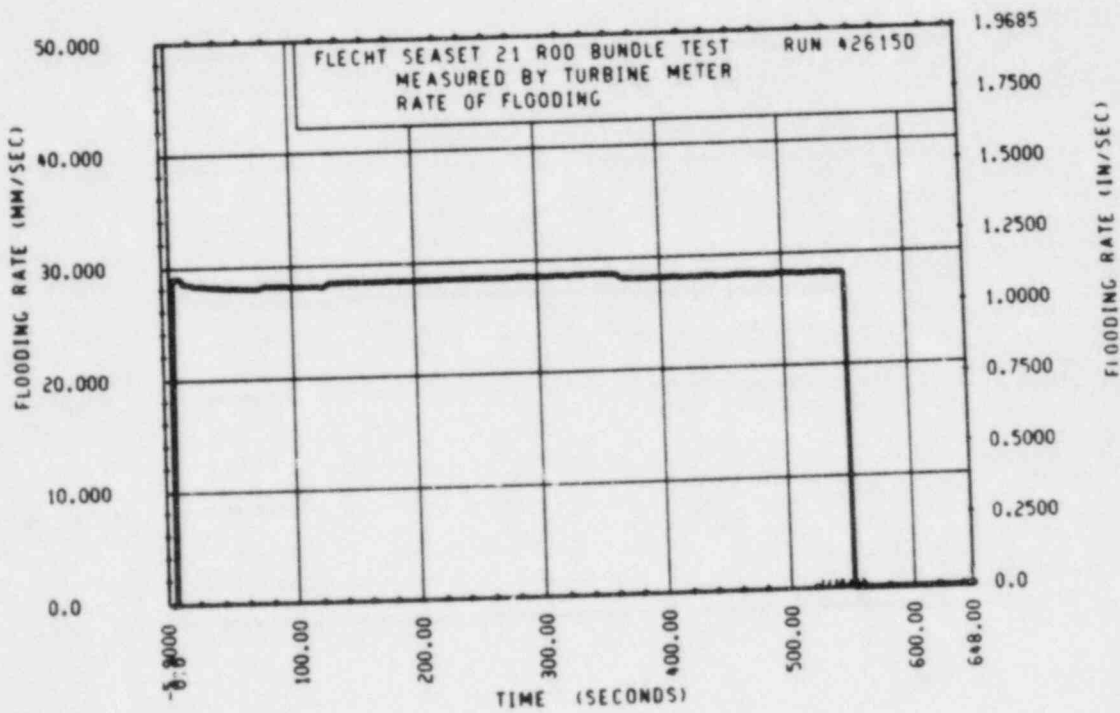
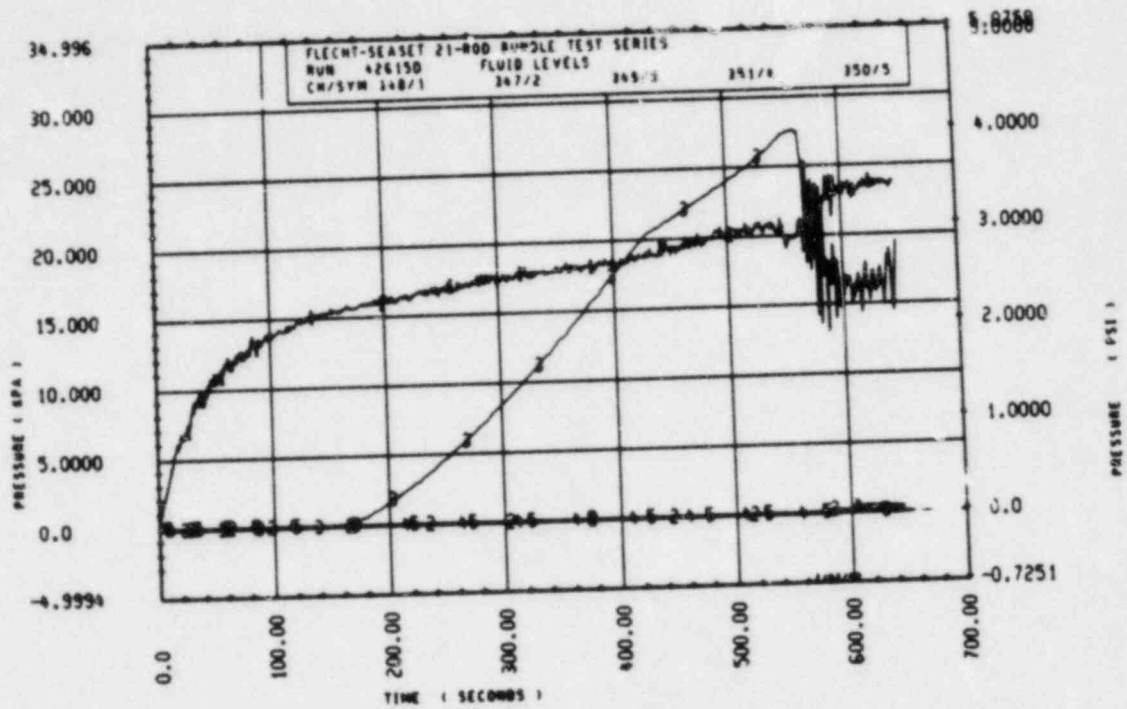


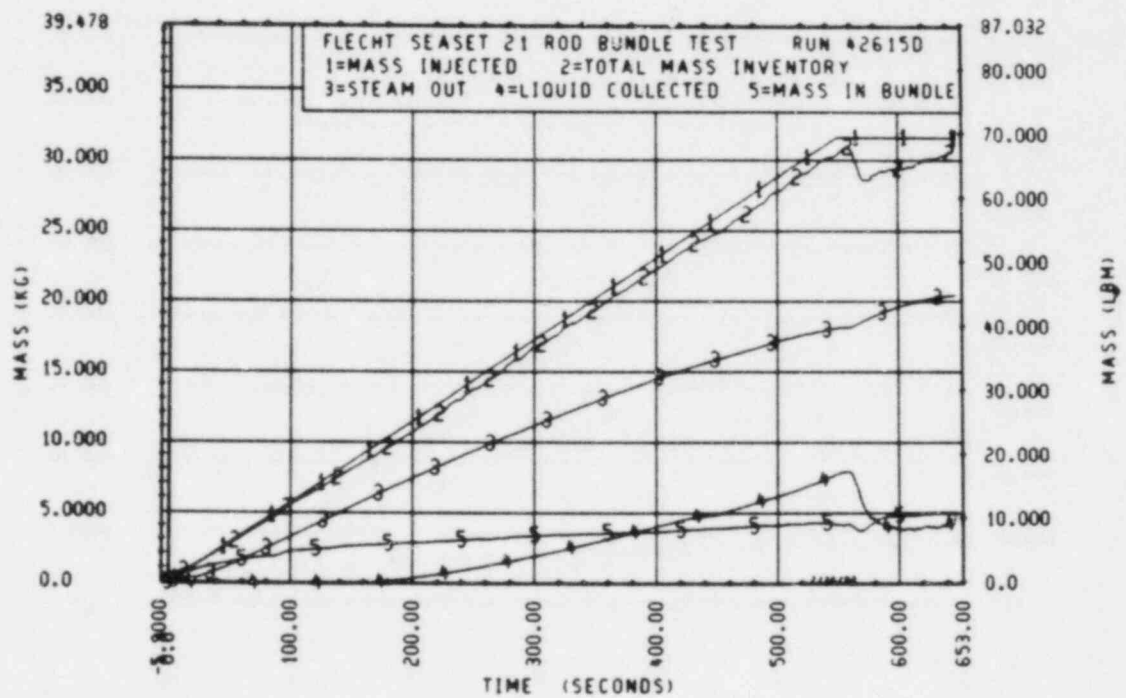
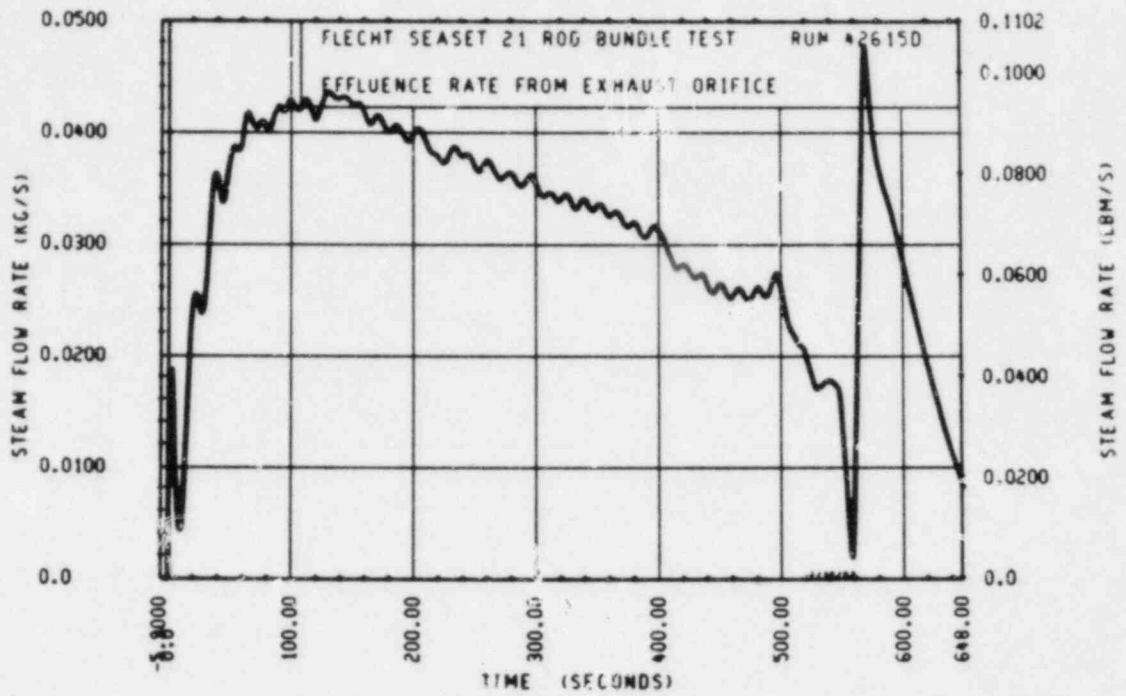


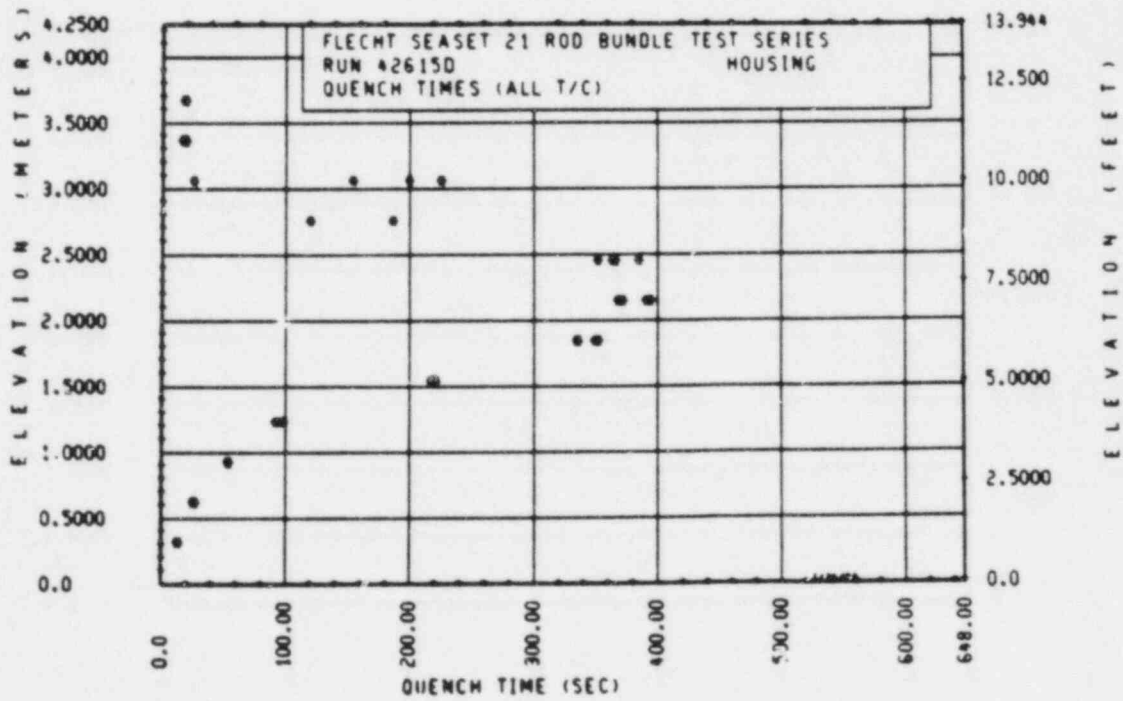
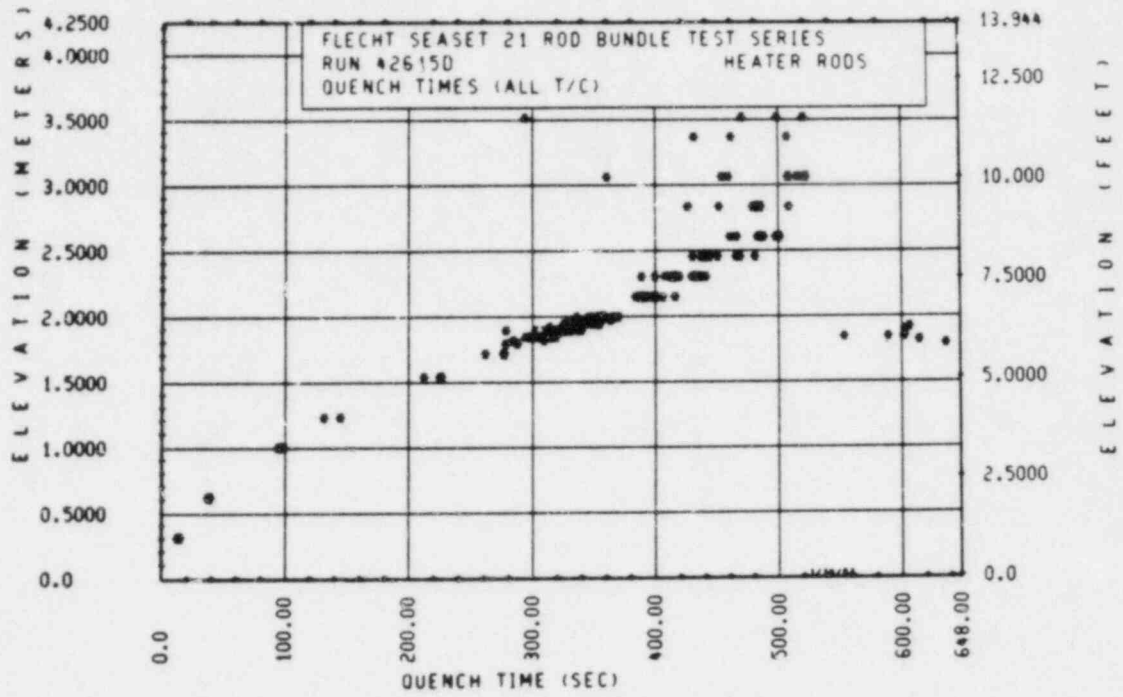


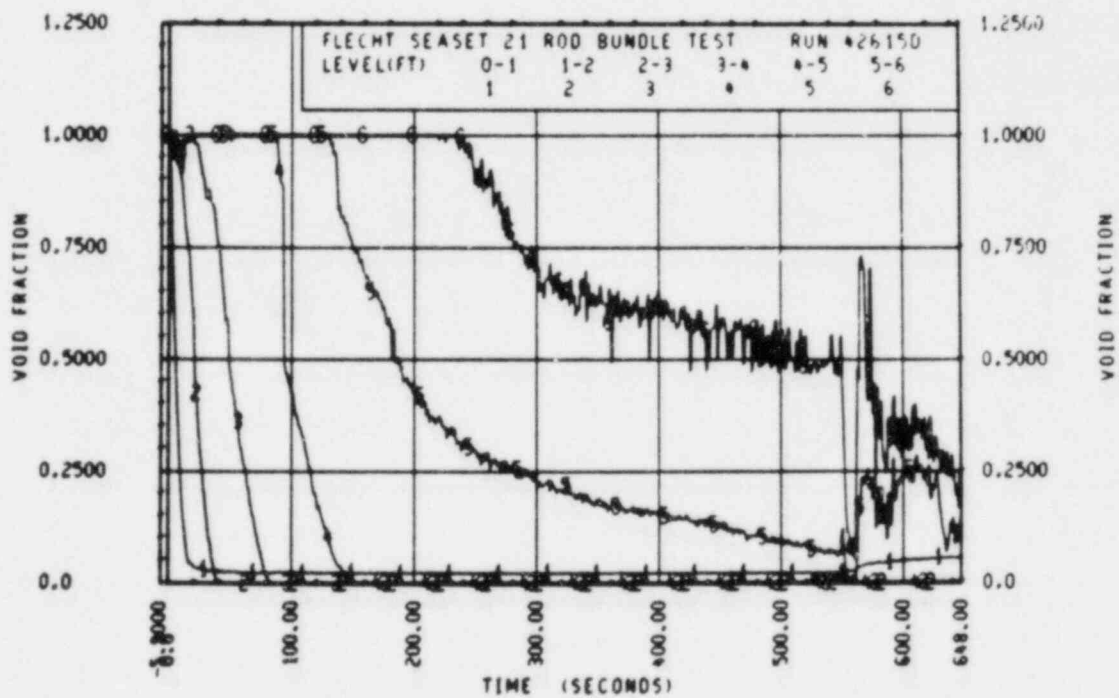
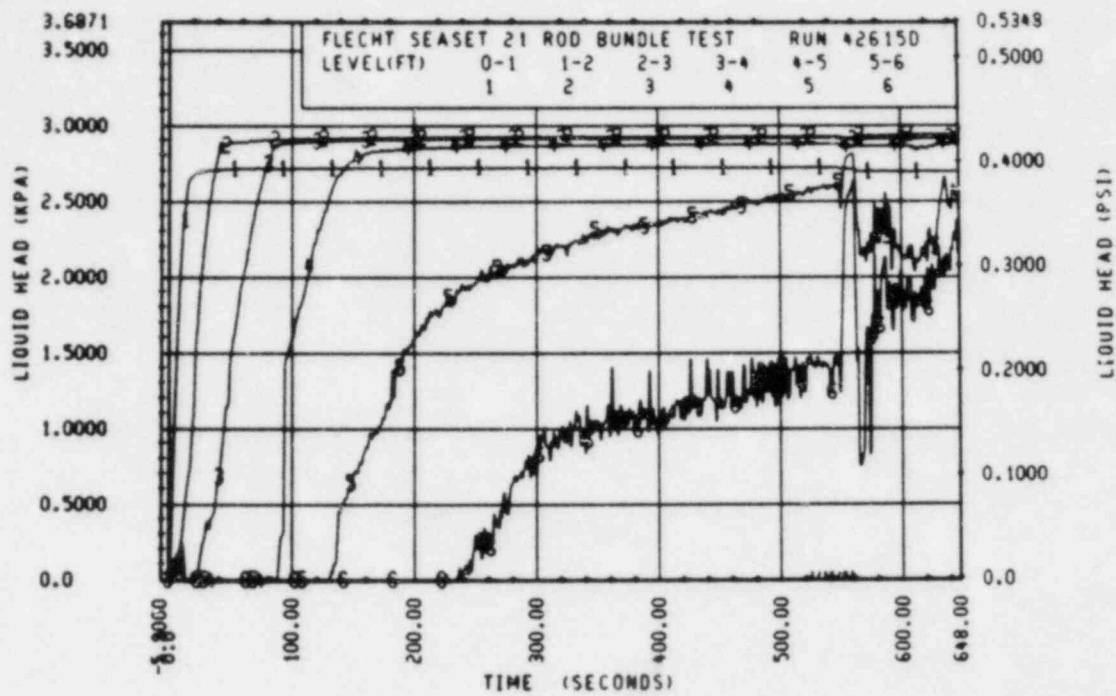


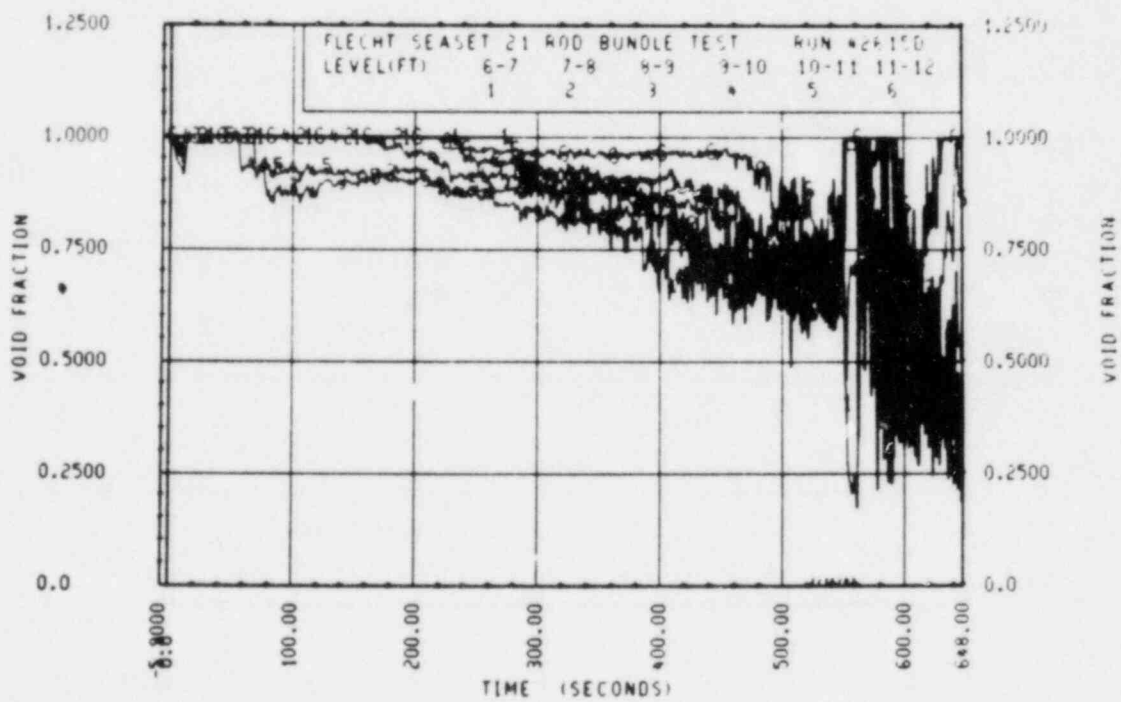
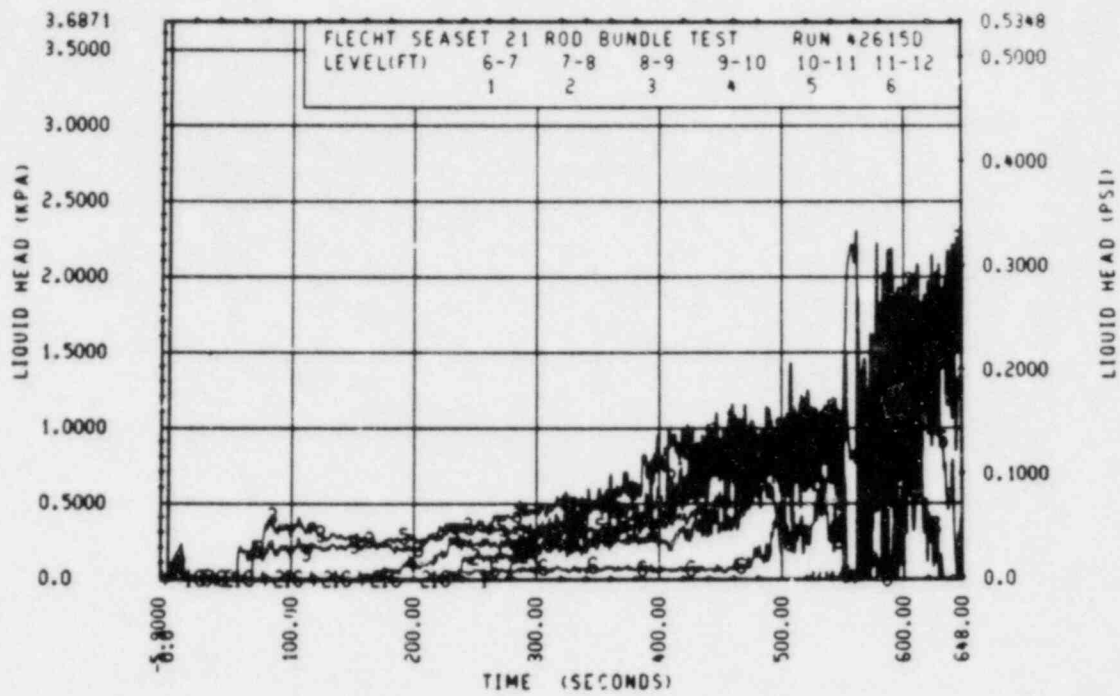












FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

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 $\pm 0.5\%$ oscillations^(a)
Housing temperature at midplane: $\pm 1\%$ throughout test^(a)

a. Relative to run 42215E

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 41515E

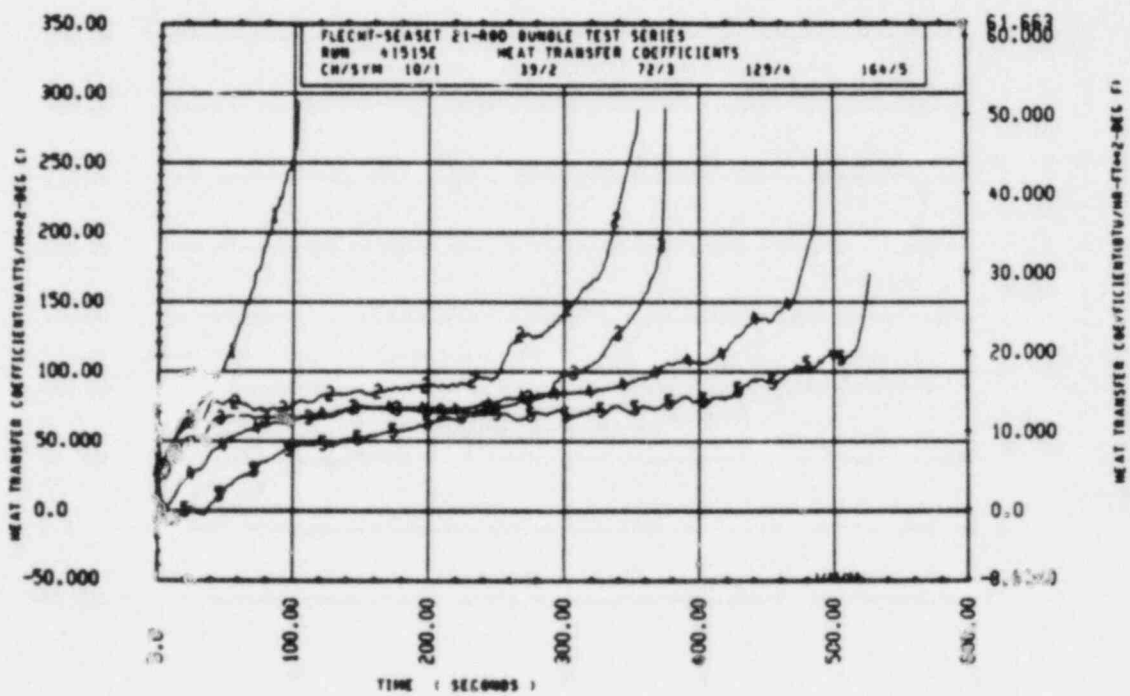
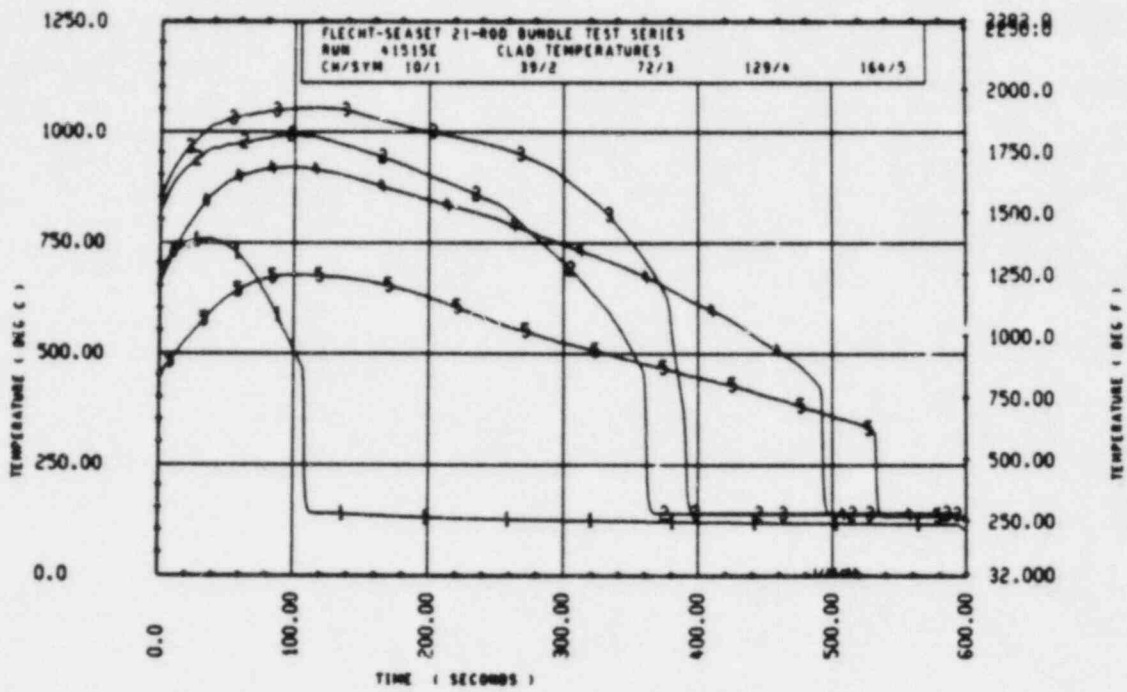
| ROD/ELEV | CHAN. | NU | INITIAL AT FLUO (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|---|-----|-------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | | 9 | 1201. | 1353. | 152. | 34.5 | 627. | 112.4 |
| 4C 3- 3 | | 10 | 1275. | 1397. | 122. | 30.5 | 604. | 107.8 |
| 1C 4- 0 | | 12 | 1363. | 1540. | 207. | 50.0 | 443. | 145.9 |
| 2A 5- 0 | | 16 | 1516. | 1812. | 295. | 61.5 | 426. | 246.7 |
| 2A 5- 7 | | 19 | 1533. | 1804. | 272. | 60.0 | 673. | 103.5 |
| 5C 6- 0 | | 36 | 1427. | 1766. | 339. | 99.5 | 1134. | 31.1 |
| 2D 6- 2 | | 39 | 1516. | 1820. | 304. | 95.0 | 617. | 366.4 |
| 1D 6- 4 | | 47 | 1460. | 1753. | 273. | 96.5 | 603. | 396.1 |
| 3D 6- 4 | | 50 | 1460. | 1864. | 423. | 103.0 | 254. | 644.0 |
| 4B 6- 4 | | 52 | 1532. | 1837. | 305. | 95.0 | 646. | 321.5 |
| 5C 6- 4 | | 54 | 1475. | 1804. | 330. | 101.0 | 1063. | 340.3 |
| 5D 6- 4 | | 55 | 1447. | 1752. | 255. | 98.5 | 672. | 356.6 |
| 1D 6- 5 | | 58 | 1450. | 1779. | 289. | 97.0 | 644. | 365.2 |
| 2A 6- 5 | | 59 | 1465. | 1774. | 289. | 98.5 | 752. | 409.4 |
| 2D 6- 5 | | 61 | 1533. | 1845. | 312. | 97.0 | 415. | 376.6 |
| 3B 6- 5 | | 63 | 1555. | 1871. | 316. | 97.0 | 741. | 364.6 |
| 3C 6- 6 | | 72 | 1569. | 1932. | 363. | 117.0 | 1127. | 376.5 |
| 4C 6- 6 | | 75 | 1574. | 1921. | 343. | 101.0 | 751. | 407.0 |
| 3C 6- 7 | * * * B A U T H E R M O C C O U P L E D A T A * * | | | | | | | |
| 3E 6- 7 | | 83 | 1455. | 1842. | 346. | 109.0 | 645. | 366.4 |
| 3D 6- 8 | | 86 | 1541. | 1941. | 400. | 102.0 | 666. | 416.5 |
| 4A 6- 8 | | 87 | 1447. | 1753. | 306. | 98.5 | 765. | 432.6 |
| 1C 7- 0 | | 93 | 1411. | 1656. | 245. | 59.5 | 751. | 413.8 |
| 2B 7- 0 | | 94 | 1452. | 1675. | 223. | 37.0 | 715. | 434.4 |
| 3D 7- 0 | | 98 | 1467. | 1730. | 263. | 39.0 | 767. | 446.7 |
| 5B 7- 0 | | 103 | 1364. | 1631. | 247. | 51.0 | 756. | 435.4 |
| 2B 7- 6 | | 110 | 1351. | 1736. | 345. | 70.0 | 774. | 473.6 |
| 2C 7- 6 | | 111 | 1429. | 1744. | 316. | 59.5 | 616. | 444.0 |
| 2E 7- 6 | | 113 | 1258. | 1596. | 338. | 59.5 | 726. | 470.3 |
| 3A 7- 6 | * * * B A U T H E R M O C C O U P L E D A T A * * | | | | | | | |
| 3B 7- 6 | | 115 | 1160. | 1615. | 494. | 93.0 | 701. | 512.0 |
| 4B 7- 6 | | 120 | 1425. | 1783. | 358. | 41.5 | 633. | 456.4 |
| 5C 7- 6 | | 122 | 1414. | 1723. | 309. | 42.5 | 622. | 455.5 |
| 1C 8- 0 | | 124 | 1166. | 1604. | 418. | 101.0 | 766. | 467.5 |
| 2E 8- 0 | | 126 | 1026. | 1409. | 390. | 113.0 | 646. | 443.7 |
| 3D 8- 0 | | 129 | 1223. | 1640. | 466. | 95.0 | 740. | 441.4 |
| 5B 8- 0 | | 133 | 1209. | 1582. | 373. | 79.5 | 606. | 466.1 |
| 5C 8- 0 | | 134 | 1265. | 1669. | 394. | 82.0 | 744. | 461.4 |
| 1C 8- 6 | | 135 | 963. | 1447. | 464. | 97.0 | 674. | 516.6 |
| 1D 8- 6 | | 136 | 670. | 1334. | 464. | 108.0 | 654. | 526.4 |
| 2C 9- 6 | | 138 | 1130. | 1647. | 517. | 97.5 | 734. | 516.1 |
| 4B 9- 6 | | 143 | 1111. | 1533. | 422. | 72.5 | 604. | 510.6 |
| 5D 9- 6 | | 145 | 1008. | 1408. | 399. | 75.5 | 761. | 462.3 |
| 3D 9- 3 | | 150 | 664. | 1353. | 484. | 112.0 | 633. | 523.3 |
| 4C 9- 3 | | 152 | 961. | 1421. | 439. | 97.5 | 617. | 526.0 |
| 101D- 0 | | 157 | 564. | 1048. | 514. | 150.0 | 263. | 559.0 |
| 4B10- 0 | | 164 | 846. | 1253. | 405. | 102.0 | 616. | 532.0 |
| 5D10- 0 | | 166 | 661. | 1039. | 358. | 130.0 | 746. | 405.6 |
| 2A11- 0 | | 168 | 563. | 766. | 203. | 99.0 | 516. | 341.0 |
| 4C11- 0 | | 169 | 657. | 1017. | 360. | 139.0 | 636. | 503.0 |
| 1011- 6 | | 171 | 245. | 774. | 479. | 160.0 | 546. | 424.0 |

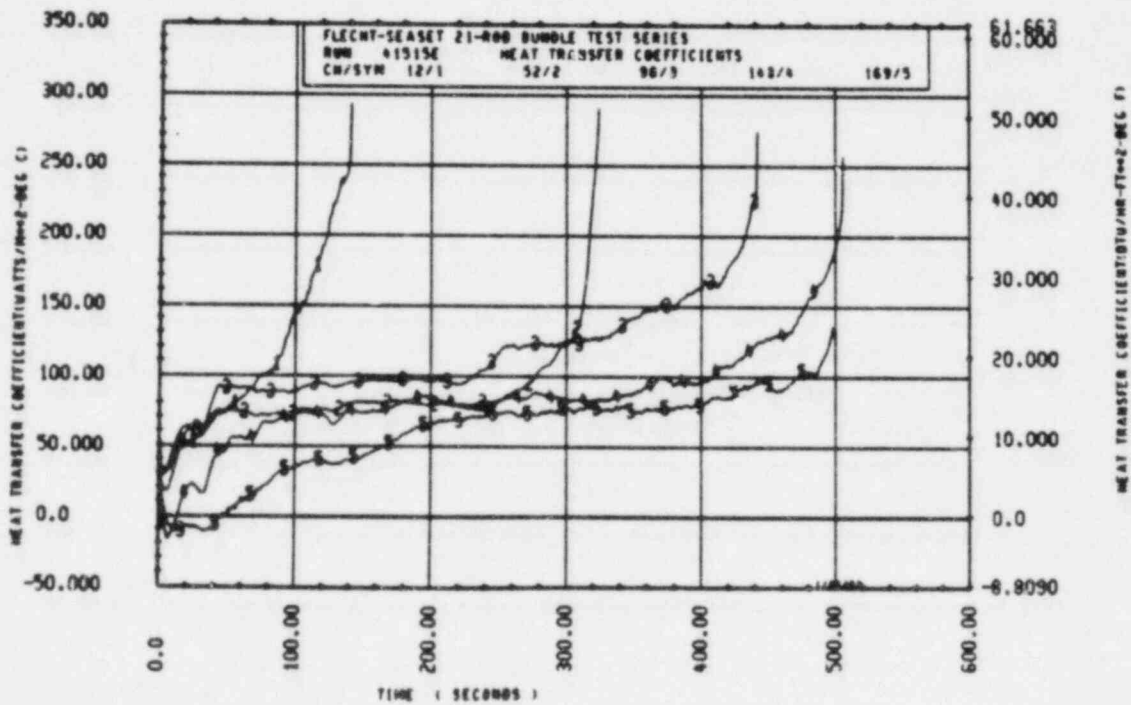
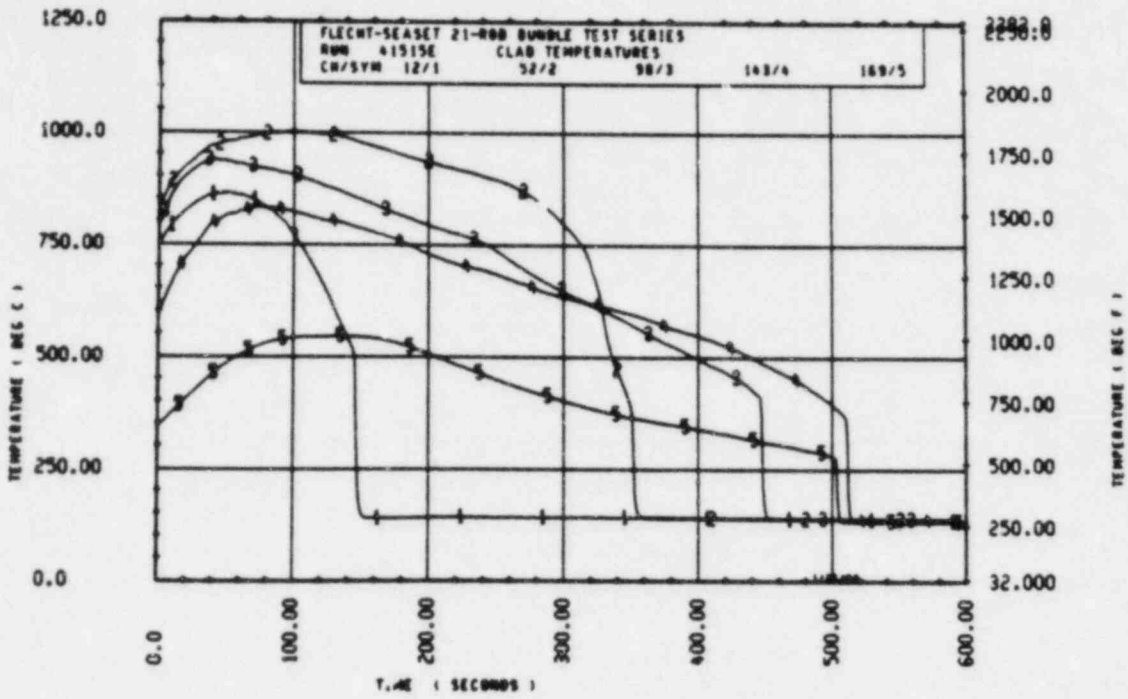
RUN 41515E HEATER ROD STATISTICAL DATA

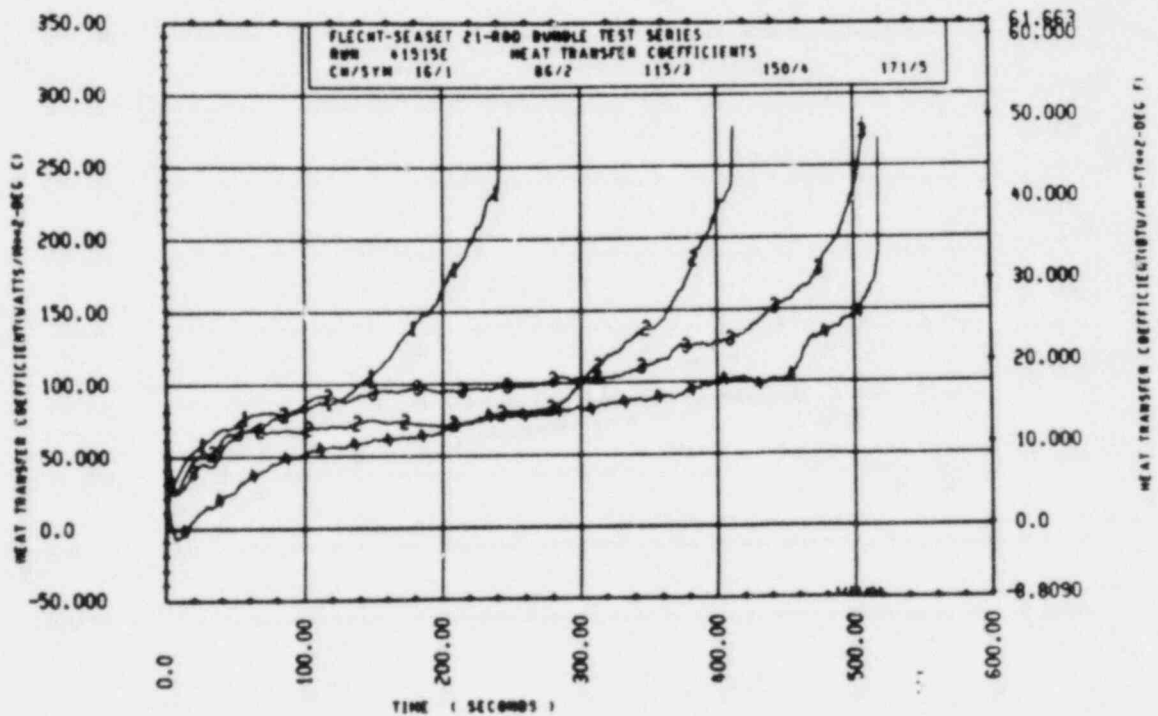
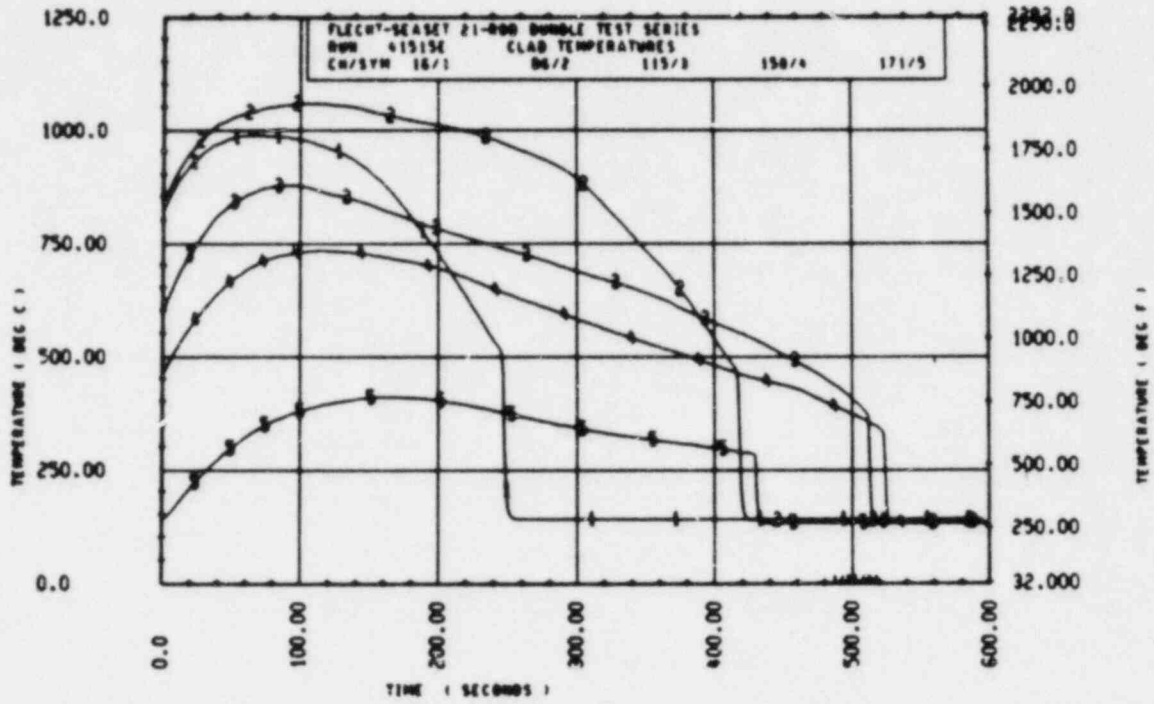
| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 662.5 | 631.5 | 651.5 | 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 | 13.5 |
| 34 | 1275.5 | 1181.1 | 1210.2 | 1397.0 | 1328.9 | 1352.5 | 36.5 | 36.5 | 33.8 |
| 48 | 1440.3 | 1360.3 | 1394.5 | 1631.5 | 1549.5 | 1590.3 | 51.0 | 46.5 | 49.8 |
| 60 | 1540.4 | 1500.8 | 1524.3 | 1814.0 | 1812.3 | 1813.1 | 82.5 | 81.5 | 71.2 |
| 67 | 1605.2 | 1544.1 | 1553.6 | 1937.4 | 1768.7 | 1845.5 | 102.0 | 46.5 | 70.2 |
| 70 | 1592.2 | 1544.6 | 1568.0 | 1894.5 | 1671.1 | 1879.8 | 87.5 | 82.5 | 84.5 |
| 73 | 1484.2 | 1464.2 | 1464.2 | 1794.3 | 1794.3 | 1794.3 | 96.5 | 96.5 | 96.5 |
| 74 | 1517.6 | 1510.6 | 1510.6 | 1840.6 | 1620.3 | 1830.4 | 95.0 | 82.5 | 80.0 |
| 75 | 1492.3 | 1465.5 | 1479.3 | 1770.9 | 1750.8 | 1763.4 | 107.0 | 96.6 | 99.5 |
| 76 | 1550.0 | 1474.0 | 1502.7 | 1867.8 | 1730.8 | 1790.9 | 101.0 | 94.0 | 96.8 |
| 77 | 1554.4 | 1464.2 | 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 | 1445.5 | 1530.0 | 1914.3 | 1794.3 | 1848.1 | 109.0 | 94.0 | 103.6 |
| 80 | 1540.0 | 1434.4 | 1488.5 | 1940.7 | 1753.1 | 1845.9 | 107.0 | 97.0 | 101.5 |
| 81 | 1526.8 | 1520.8 | 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 | 109.0 | 100.0 | 100.0 |
| 84 | 1491.2 | 1363.5 | 1439.0 | 1759.8 | 1611.7 | 1694.0 | 59.5 | 37.0 | 46.4 |
| 90 | 1469.1 | 1120.3 | 1352.5 | 1798.8 | 1525.7 | 1701.1 | 97.0 | 38.5 | 73.5 |
| 96 | 1245.4 | 1020.4 | 1217.2 | 1743.0 | 1408.7 | 1638.5 | 113.0 | 60.0 | 90.2 |
| 102 | 1433.5 | 787.2 | 1024.7 | 1794.3 | 1118.2 | 1455.8 | 113.0 | 56.0 | 87.6 |
| 111 | 961.0 | 710.3 | 834.5 | 1449.4 | 1050.3 | 1264.3 | 127.0 | 75.5 | 104.2 |
| 120 | 1057.8 | 574.3 | 766.3 | 1422.7 | 1038.7 | 1182.8 | 159.0 | 66.0 | 120.0 |
| 132 | 657.2 | 461.3 | 540.9 | 1017.1 | 734.9 | 819.1 | 151.0 | 94.0 | 127.6 |
| 138 | 508.7 | 254.7 | 441.7 | 627.1 | 774.2 | 800.6 | 160.0 | 121.0 | 145.5 |

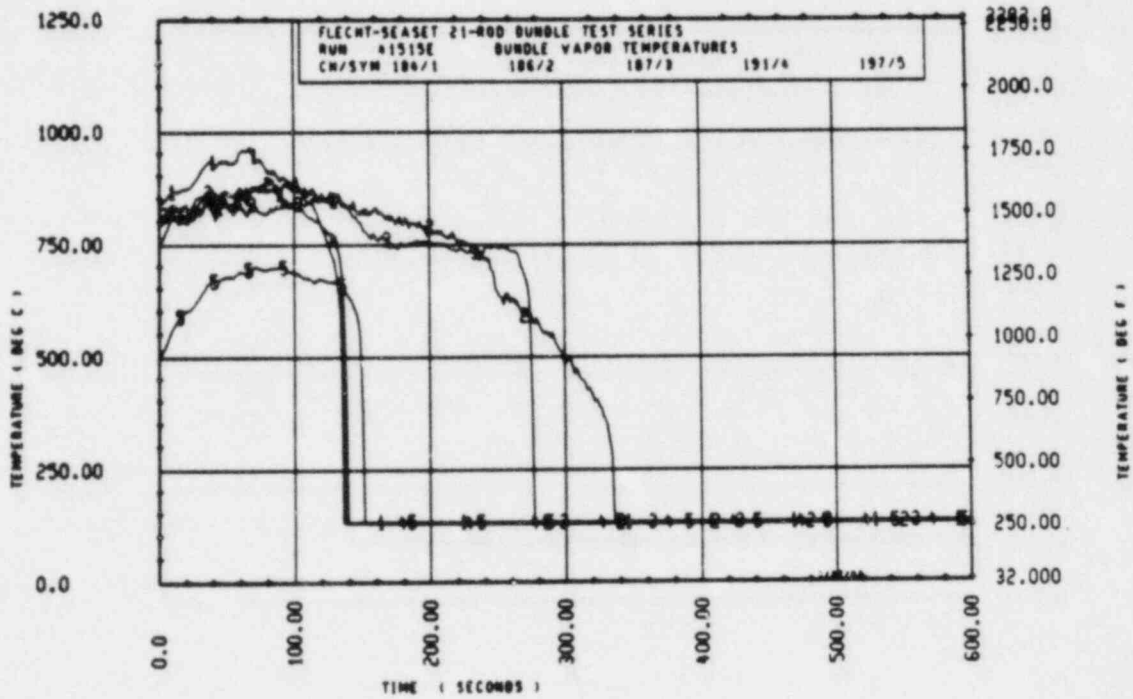
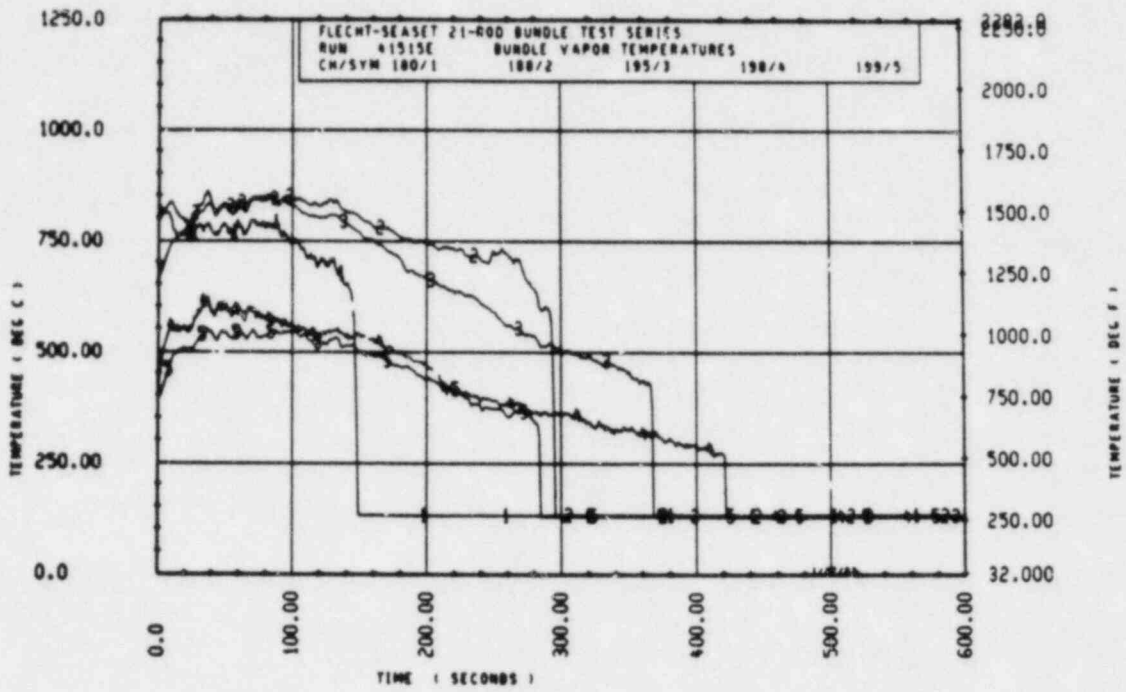
| ELEV | TEMP RATE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 16.3 | 13.6 | 14.9 | 621.3 | 593.1 | 608.1 | 18.5 | 16.5 | 17.3 |
| 24 | 43.4 | 33.4 | 38.6 | 766.3 | 743.9 | 757.6 | 43.9 | 43.4 | 43.7 |
| 34 | 151.6 | 121.5 | 142.3 | 914.0 | 827.4 | 861.2 | 112.9 | 94.4 | 106.2 |
| 48 | 206.7 | 189.2 | 195.8 | 959.8 | 929.2 | 944.0 | 149.8 | 144.0 | 146.0 |
| 60 | 305.5 | 260.2 | 288.8 | 970.5 | 928.4 | 944.5 | 246.7 | 233.3 | 239.2 |
| 67 | 310.1 | 248.4 | 291.8 | 1033.3 | 856.4 | 933.0 | 317.8 | 260.7 | 290.6 |
| 70 | 320.8 | 301.6 | 311.0 | 959.2 | 898.3 | 925.8 | 339.7 | 314.0 | 326.6 |
| 73 | 310.1 | 310.1 | 310.1 | 817.2 | 817.2 | 817.2 | 329.5 | 324.5 | 324.5 |
| 74 | 323.0 | 304.3 | 313.7 | 816.4 | 691.9 | 754.4 | 360.4 | 344.1 | 354.7 |
| 75 | 246.5 | 260.0 | 264.1 | 967.7 | 675.5 | 771.6 | 384.0 | 340.0 | 351.1 |
| 76 | 329.6 | 247.6 | 280.2 | 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 | 357.0 | 370.1 |
| 78 | 368.2 | 235.3 | 244.9 | 1126.6 | 730.0 | 885.8 | 414.7 | 368.3 | 380.7 |
| 79 | 357.3 | 254.0 | 317.5 | 945.6 | 805.7 | 896.8 | 393.9 | 373.0 | 386.5 |
| 80 | 413.0 | 286.7 | 357.4 | 943.8 | 763.4 | 874.5 | 432.6 | 384.2 | 404.0 |
| 81 | 425.3 | 425.3 | 425.3 | 840.2 | 840.2 | 840.2 | 422.7 | 422.7 | 422.7 |
| 82 | 392.5 | 342.5 | 352.5 | 891.8 | 691.8 | 891.8 | 405.5 | 405.5 | 405.5 |
| 84 | 290.0 | 221.7 | 255.0 | 806.3 | 680.0 | 763.8 | 459.0 | 413.0 | 433.0 |
| 90 | 444.2 | 242.5 | 340.6 | 846.9 | 700.7 | 780.9 | 512.0 | 444.0 | 467.6 |
| 96 | 466.3 | 372.7 | 421.3 | 807.7 | 695.9 | 769.2 | 506.2 | 466.1 | 466.4 |
| 102 | 542.5 | 320.5 | 420.1 | 802.1 | 658.7 | 715.3 | 528.9 | 342.5 | 464.3 |
| 111 | 500.6 | 337.3 | 424.8 | 665.7 | 522.5 | 601.8 | 552.0 | 463.0 | 521.3 |
| 120 | 513.0 | 284.6 | 414.5 | 741.8 | 283.4 | 599.4 | 555.0 | 260.4 | 457.2 |
| 132 | 359.6 | 202.8 | 278.2 | 567.4 | 510.4 | 540.7 | 503.0 | 381.4 | 421.0 |
| 138 | 479.5 | 230.4 | 350.9 | 542.8 | 524.8 | 533.8 | 460.0 | 424.0 | 444.5 |

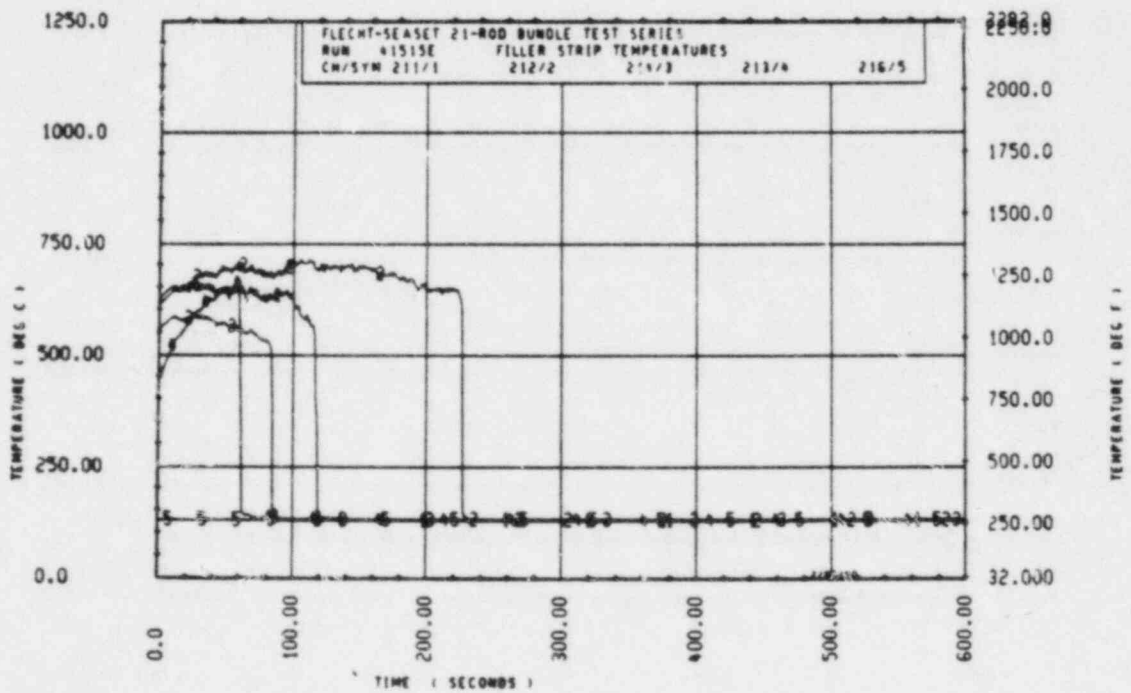
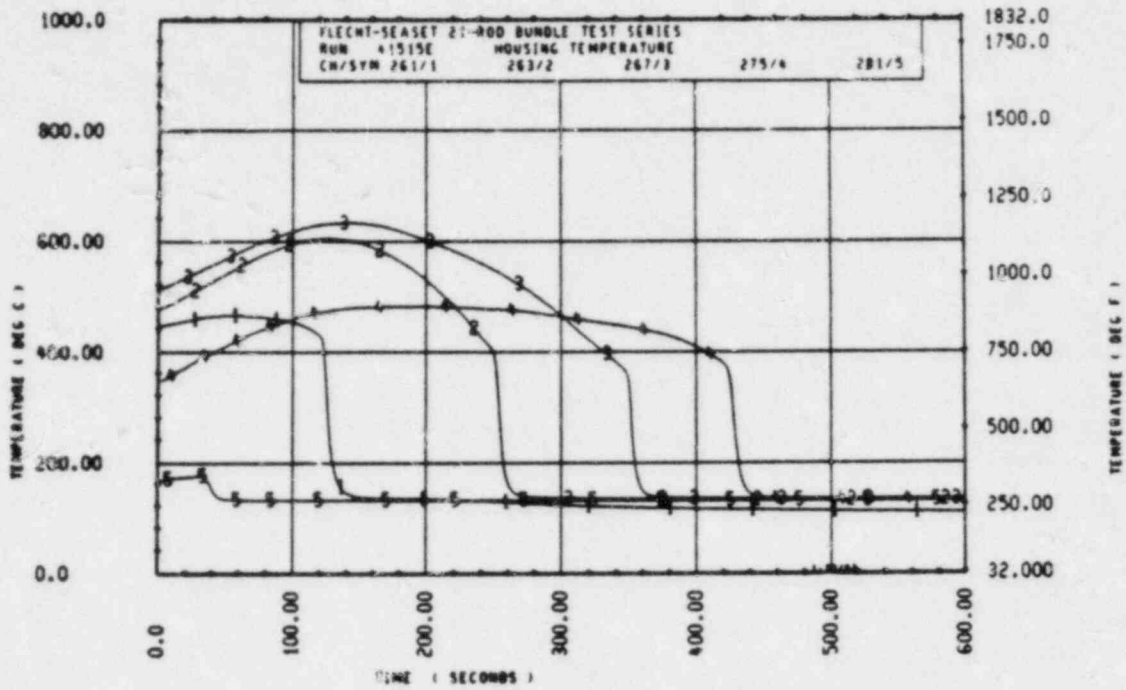
41515E-3

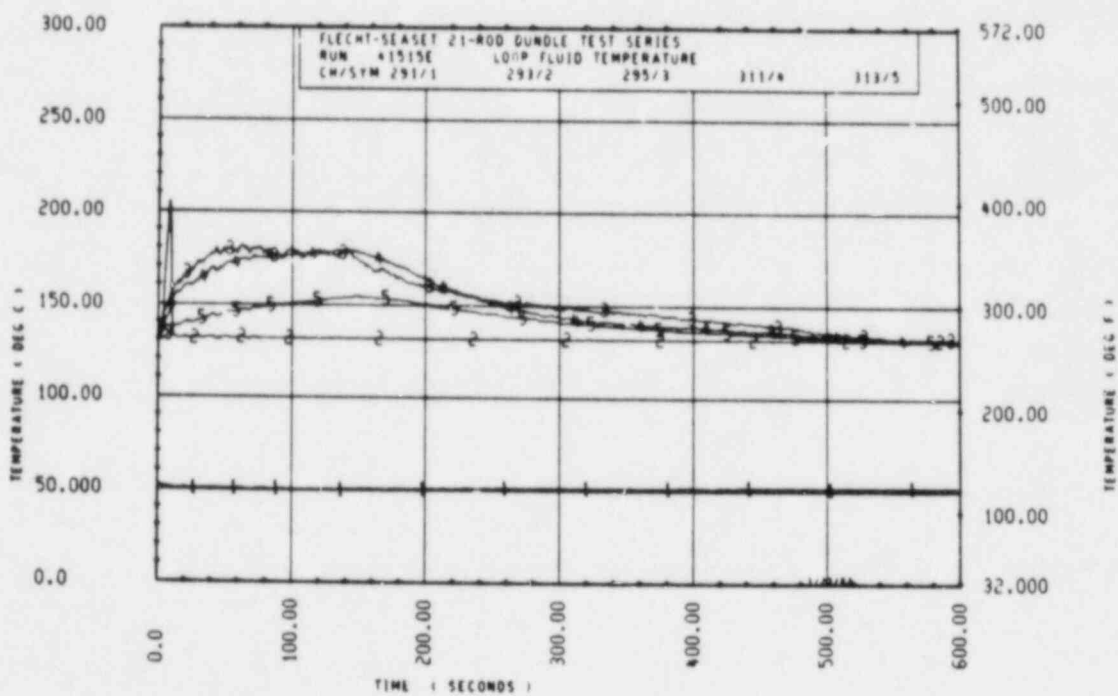
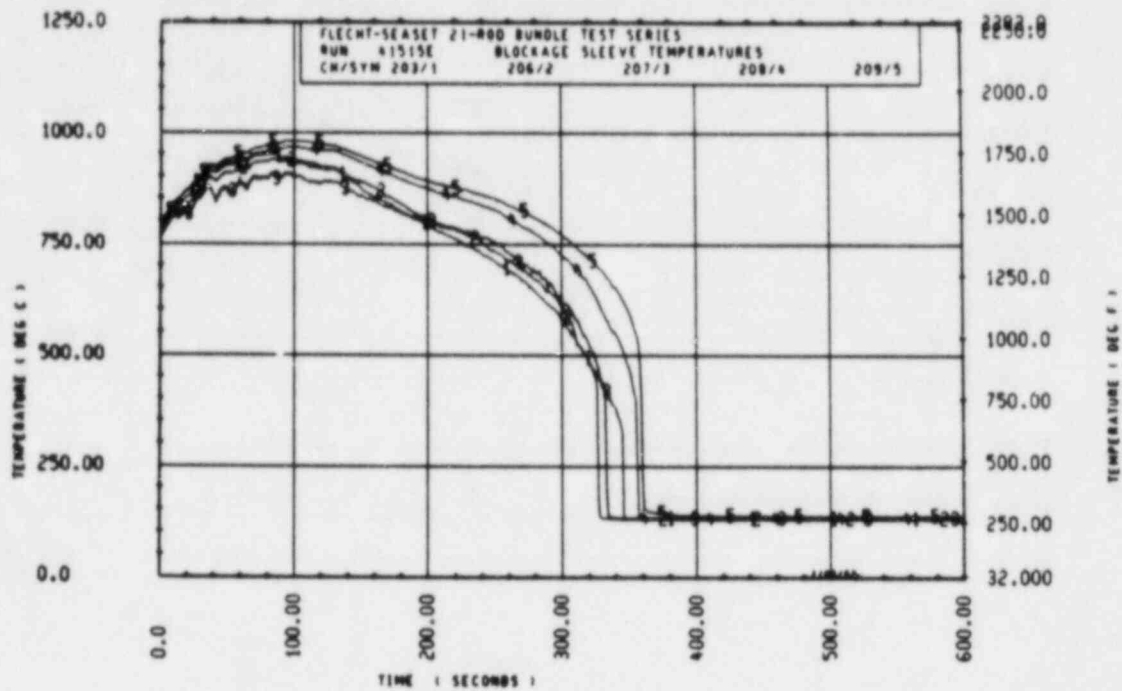


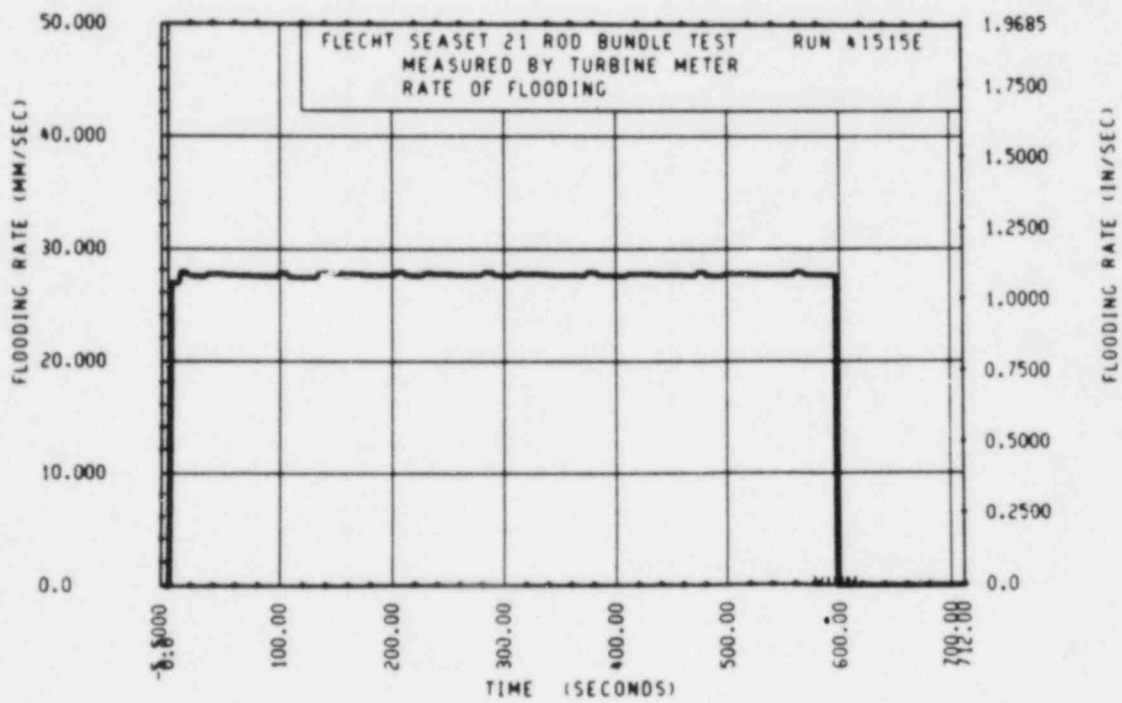
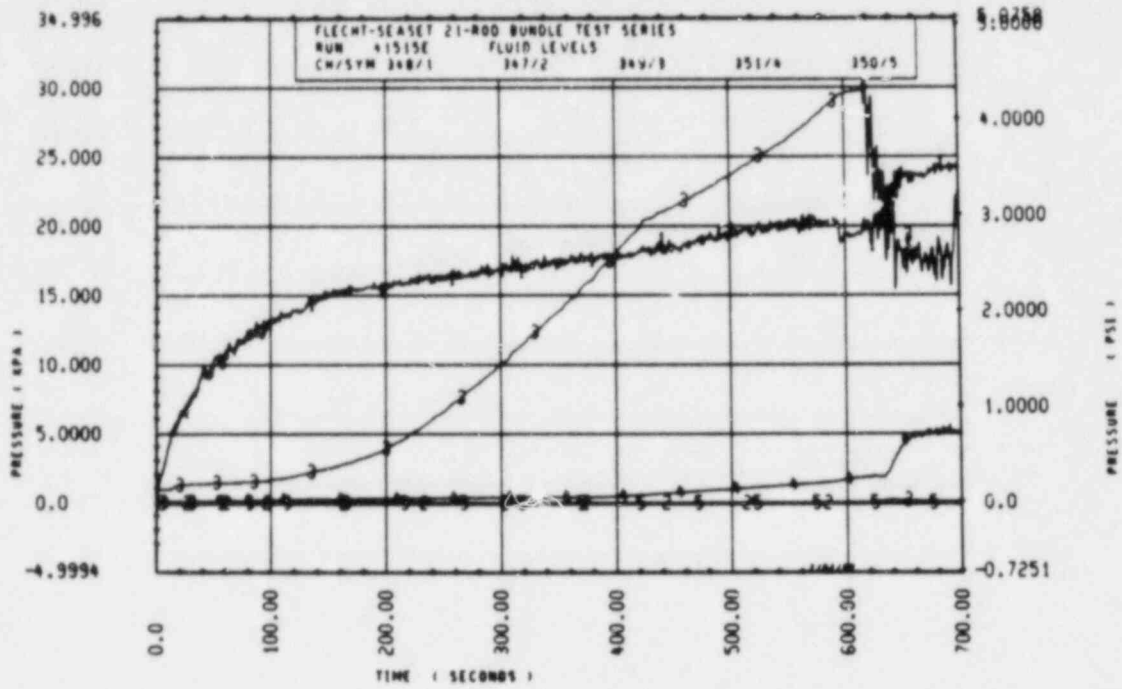


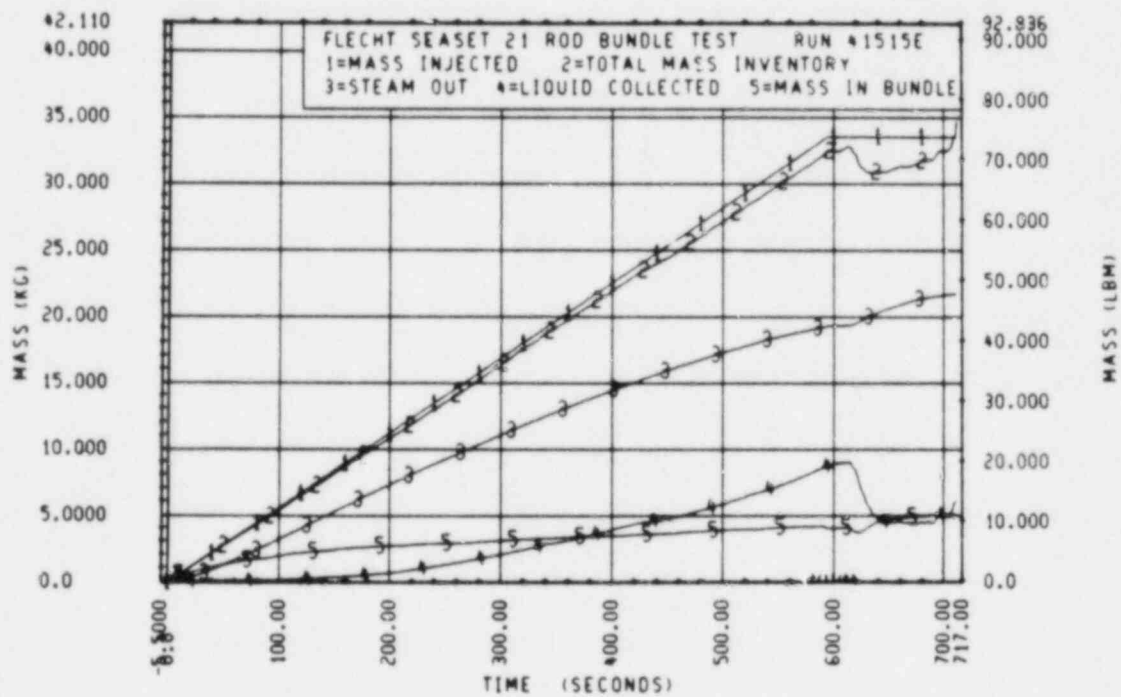
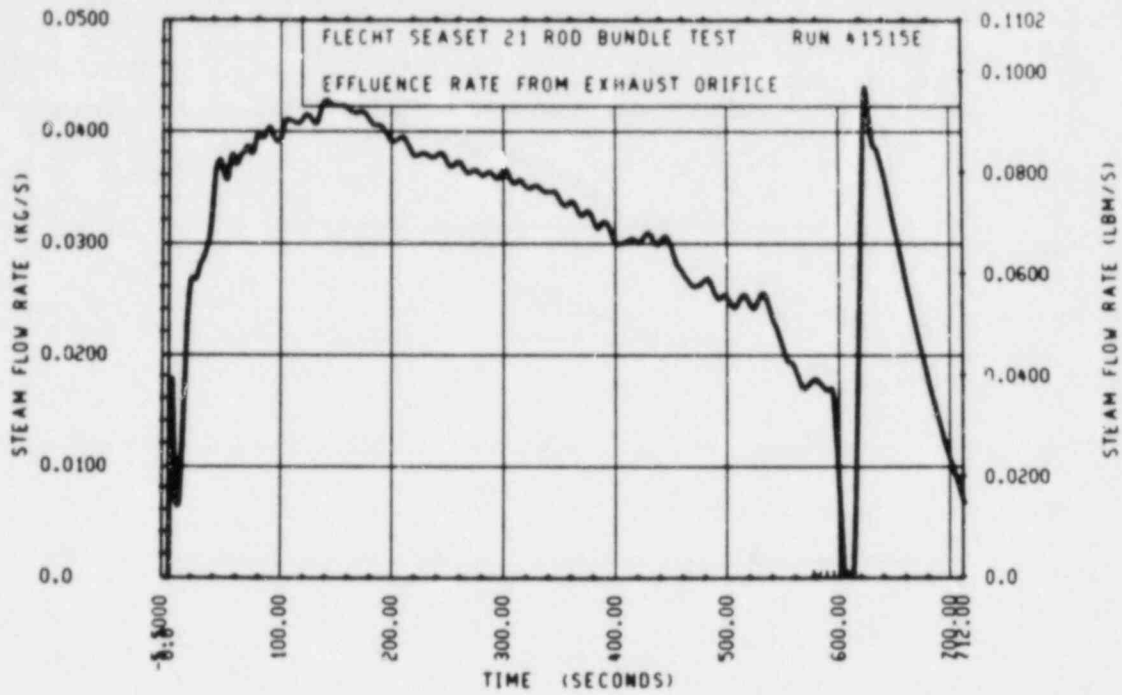


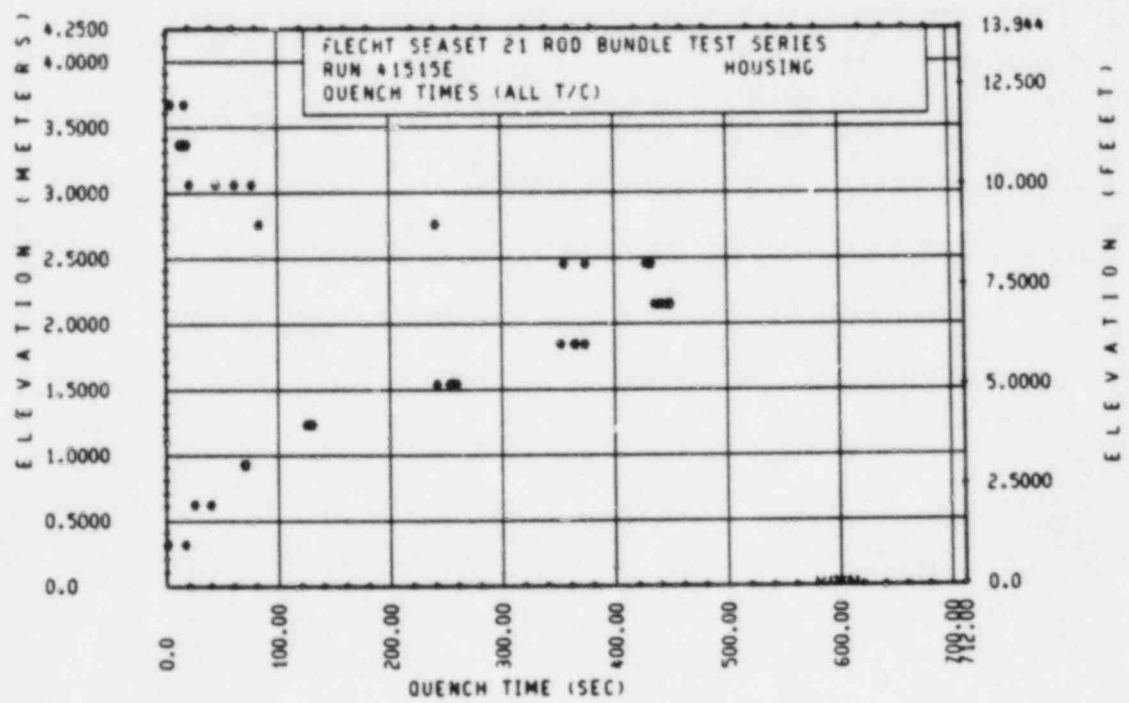
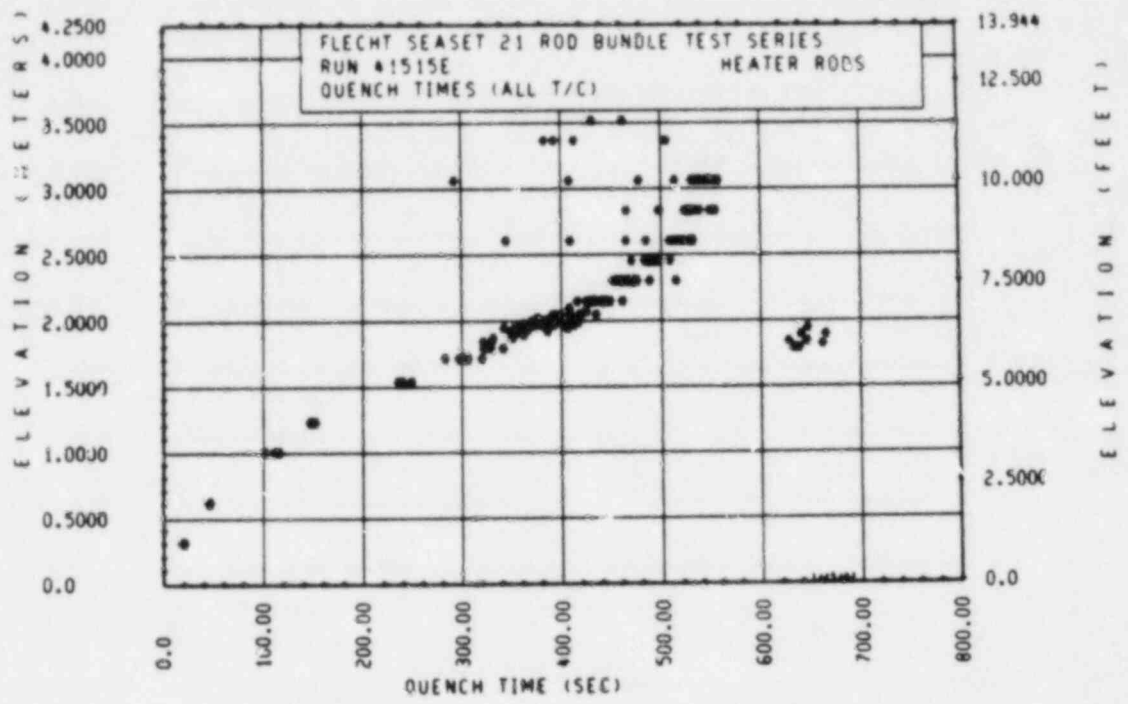


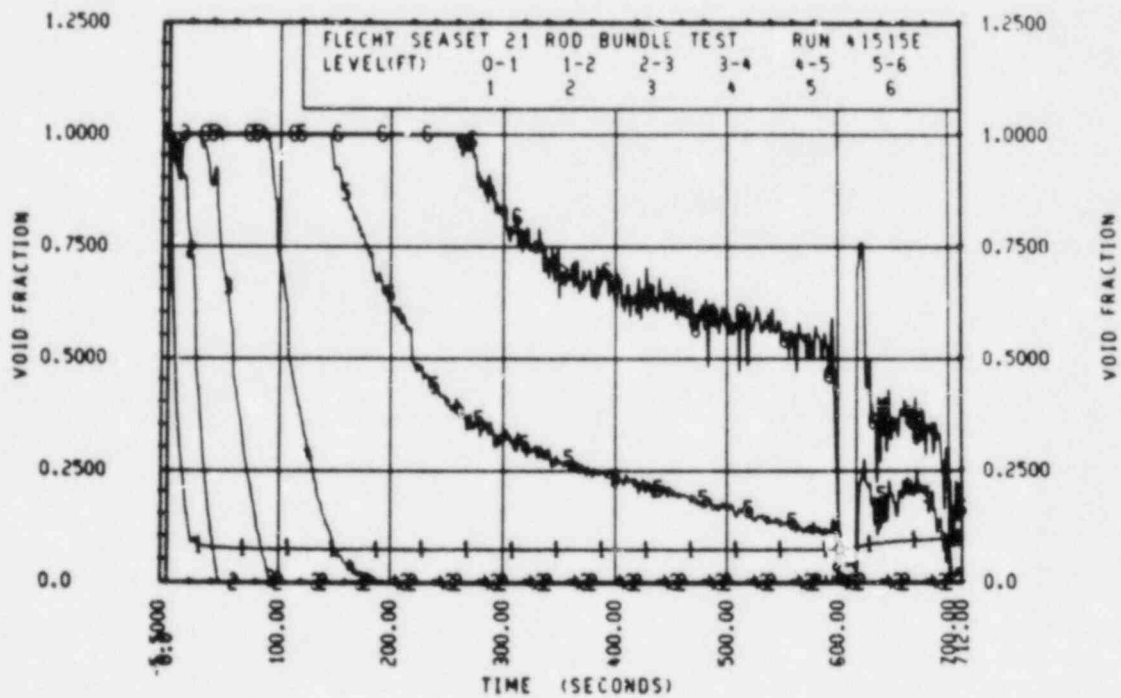
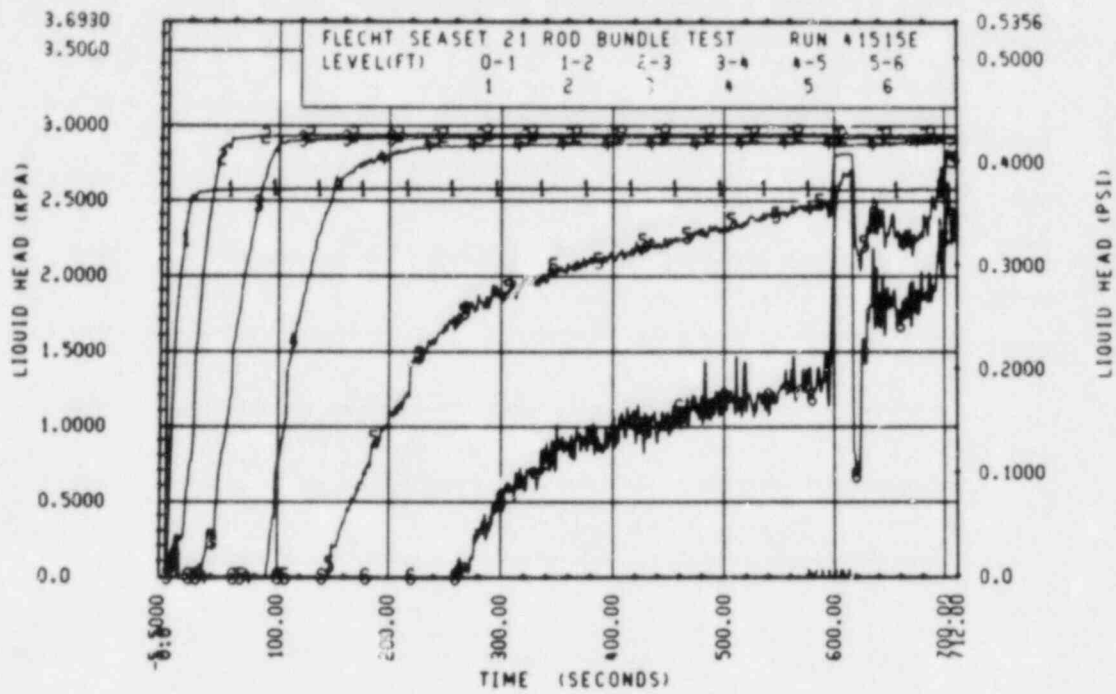


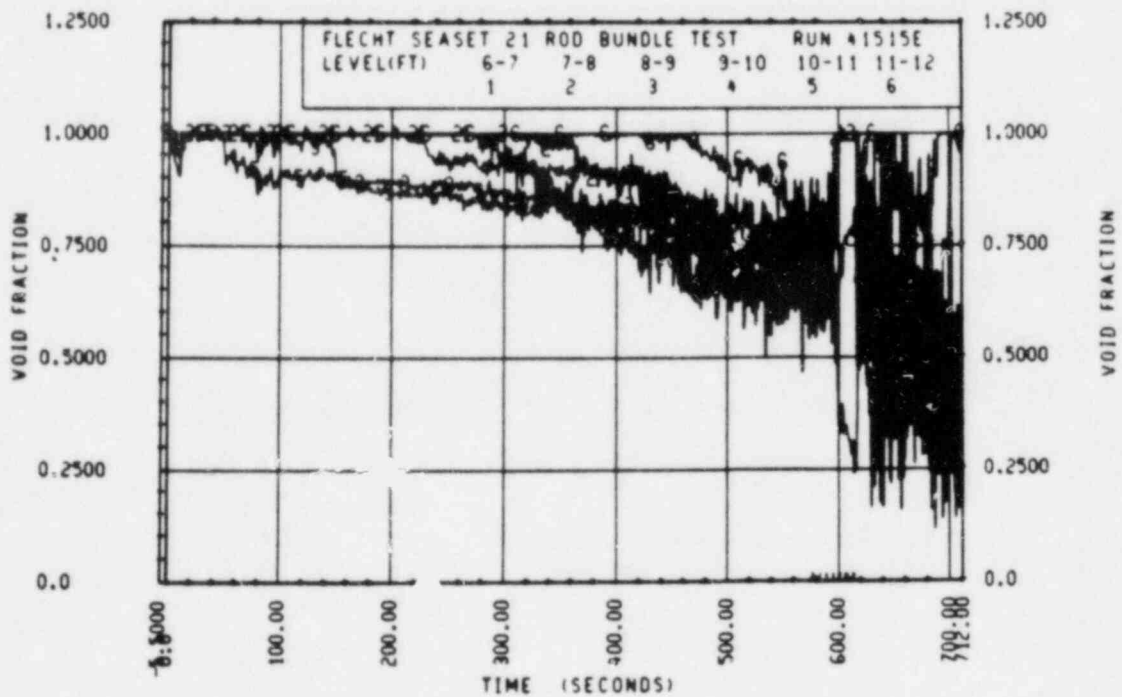
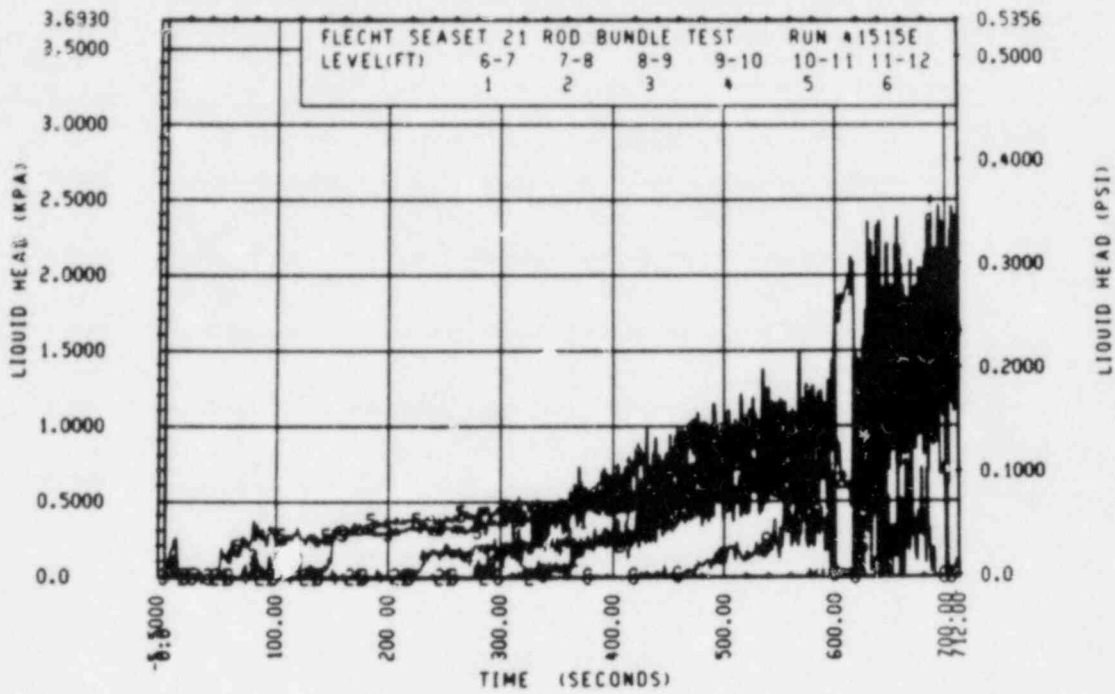












FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

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

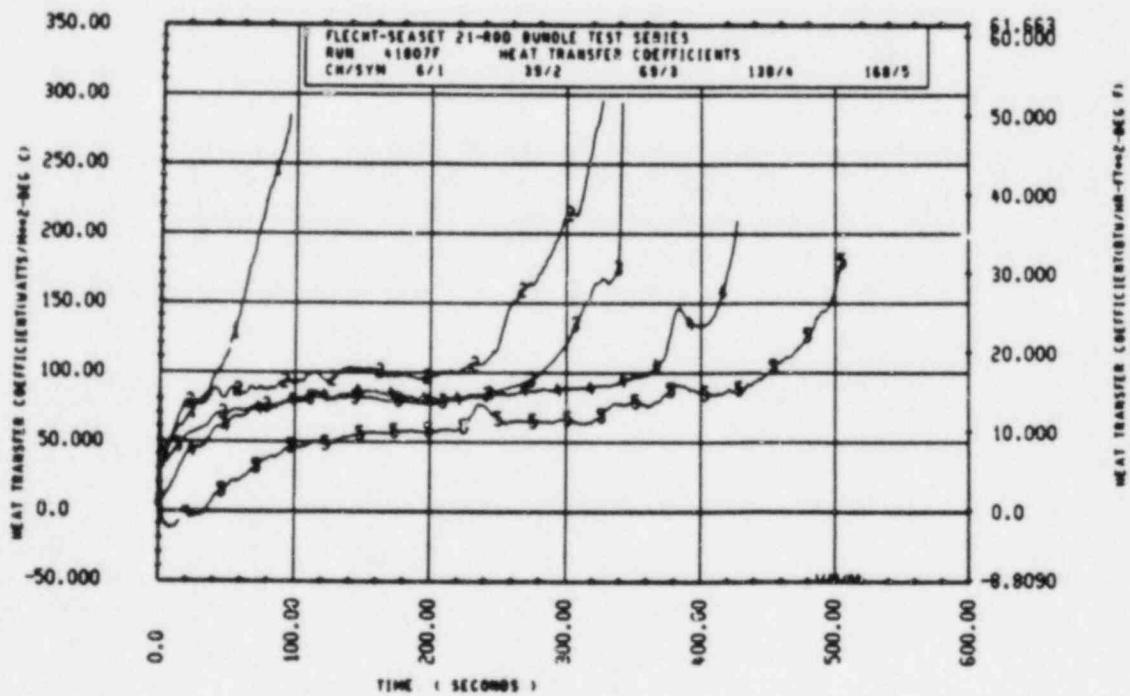
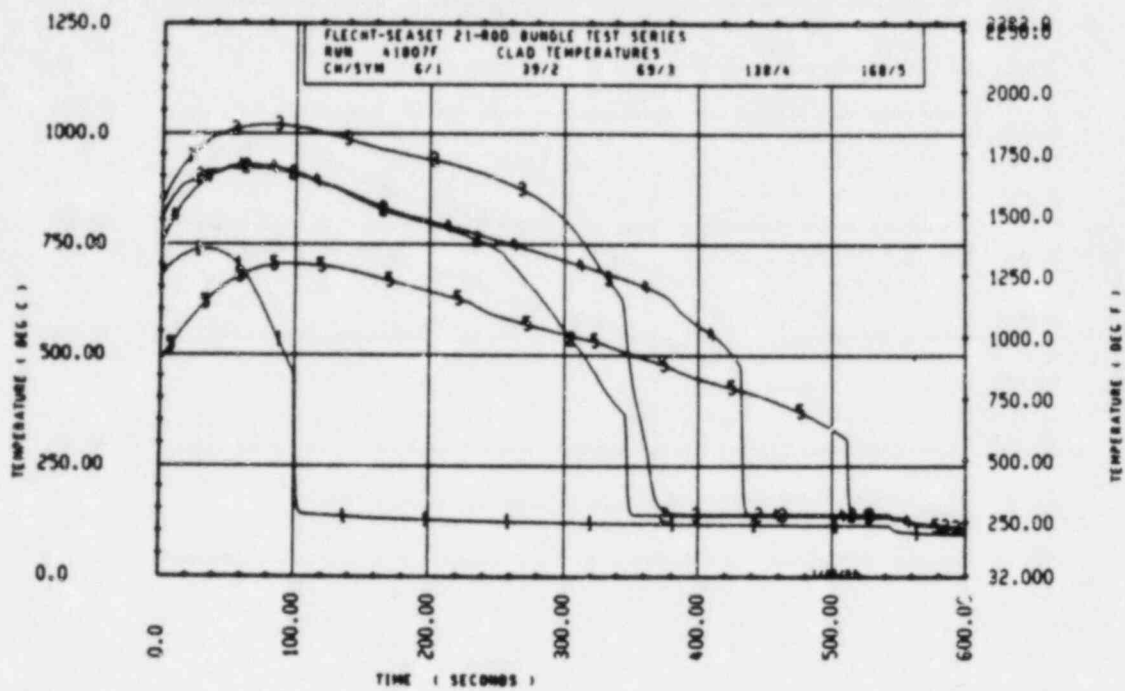
FLECHT SEA SET 21 RJD BUNDLE TEST SERIES
 RUN NUMBER 41807F

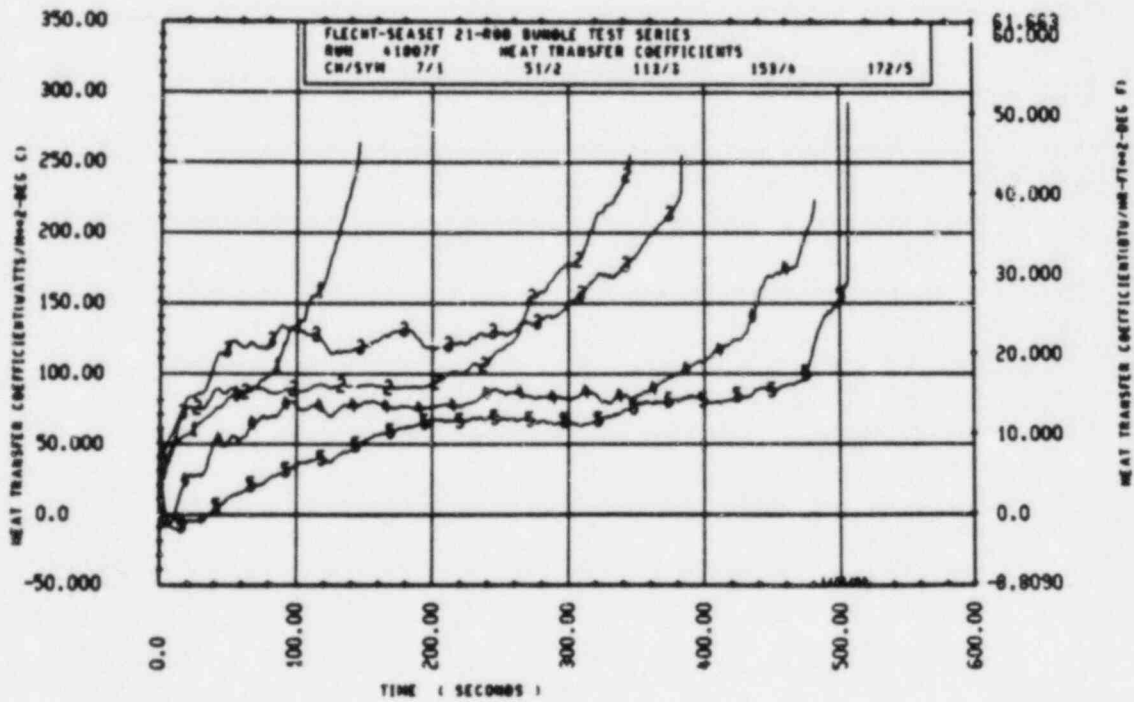
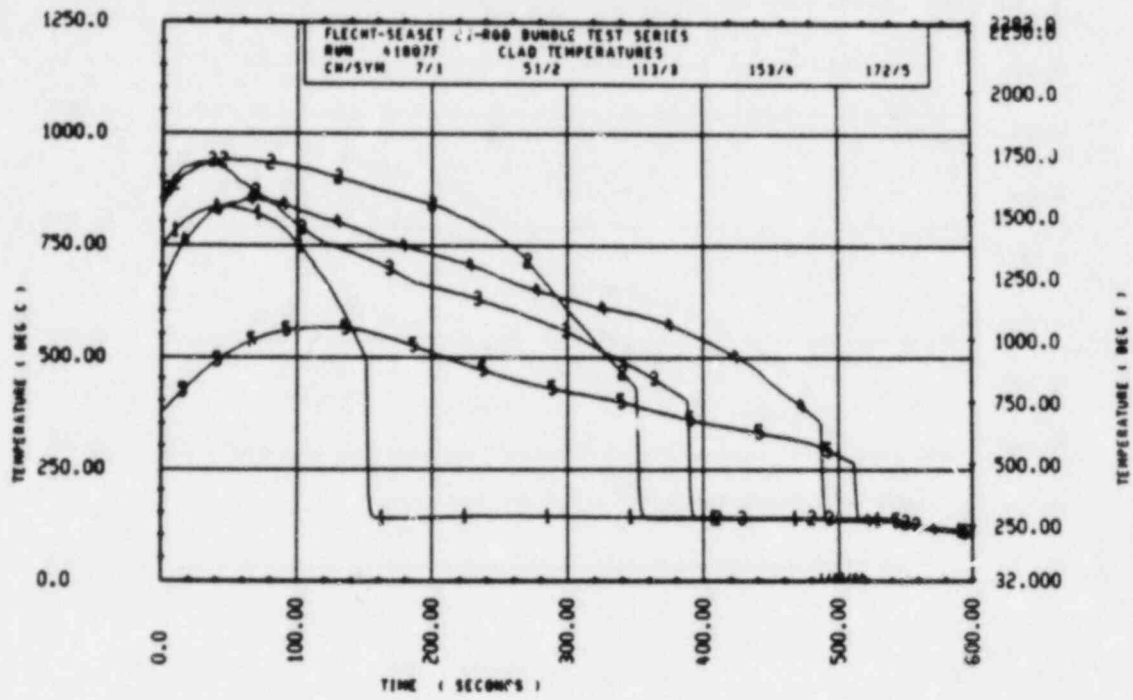
| ROD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|----------|--------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 5 | 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. | 191.4 |
| 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 |
| 4A 6- 4 | 51 | 1546. | 1730. | 184. | 50.0 | 691. | 350.2 |
| 5D 6- 4 | 56 | 1474. | 1654. | 180. | 50.0 | 705. | 350.0 |
| 1D 6- 5 | 58 | 1464. | 1684. | 220. | 50.5 | 961. | 313.7 |
| 2A 6- 5 | 59 | 1462. | 1700. | 238. | 53.0 | 861. | 300.9 |
| 2D 6- 5 | 62 | 1527. | 1739. | 211. | 52.0 | 749. | 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. | 35.0 | 925. | 362.9 |
| 4A 6- 8 | 95 | 1432. | 1704. | 272. | 35.0 | 901. | 317.7 |
| 1C 7- 0 | 109 | 1495. | 1684. | 189. | 36.5 | 697. | 418.0 |
| 2B 7- 0 | 111 | 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 | 658. | 428.0 |
| 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. | 59.5 | 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 |
| 1E 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. | 35.0 | 648. | 401.5 |
| 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. | 34.0 | 640. | 495.9 |
| 1D10- 0 | 164 | 656. | 1102. | 446. | 151.0 | 715. | 476.9 |
| 4B10- 0 | 168 | 914. | 1304. | 389. | 74.0 | 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 |

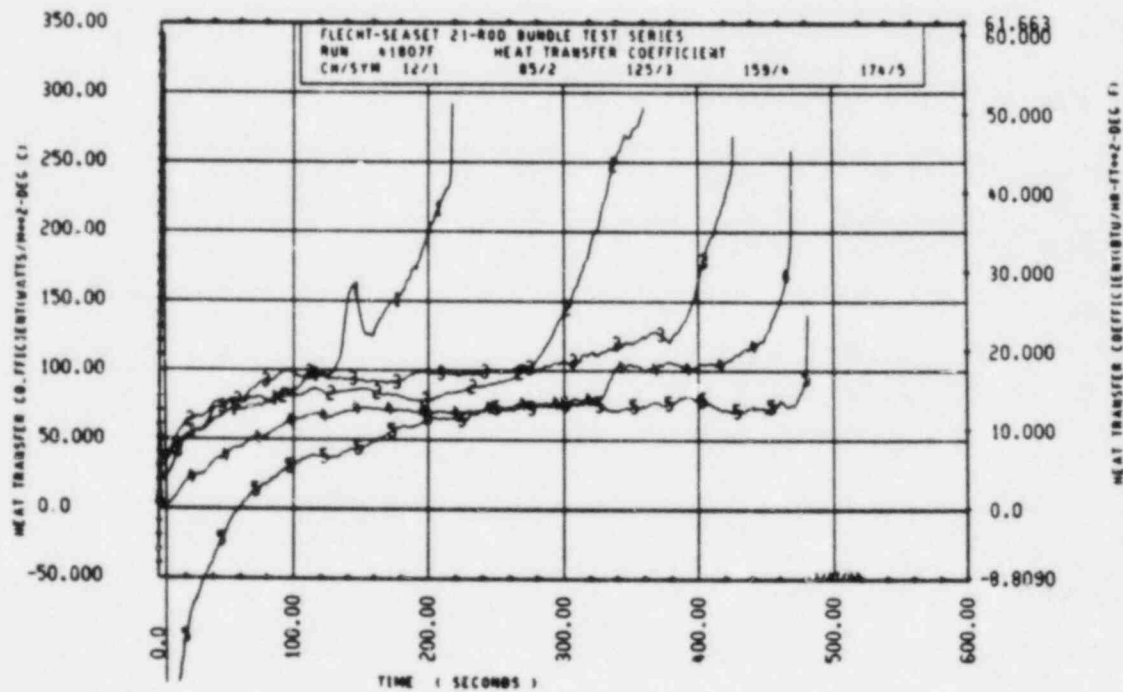
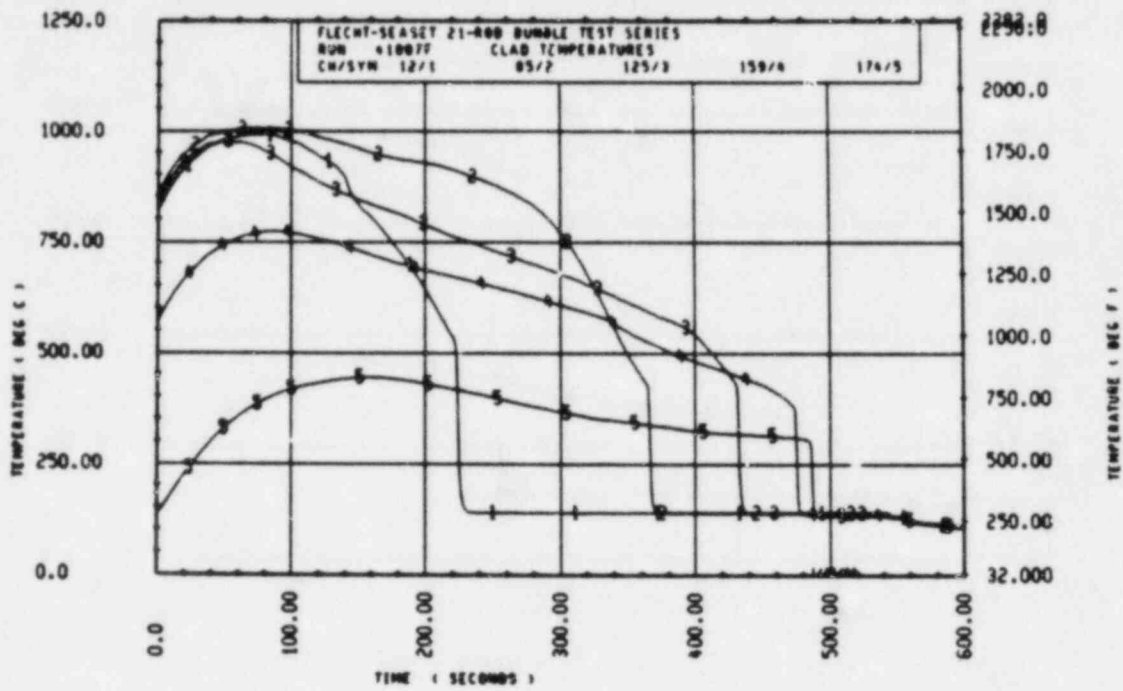
RJN 41807F HEATEK ROD STATISTICAL DATA

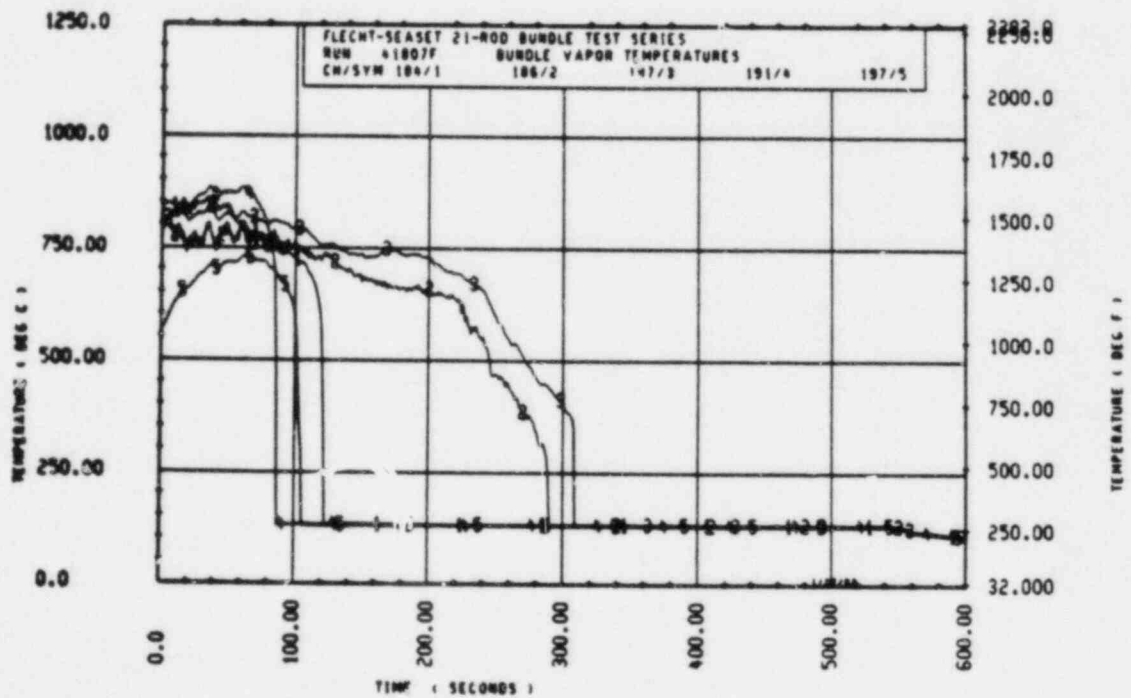
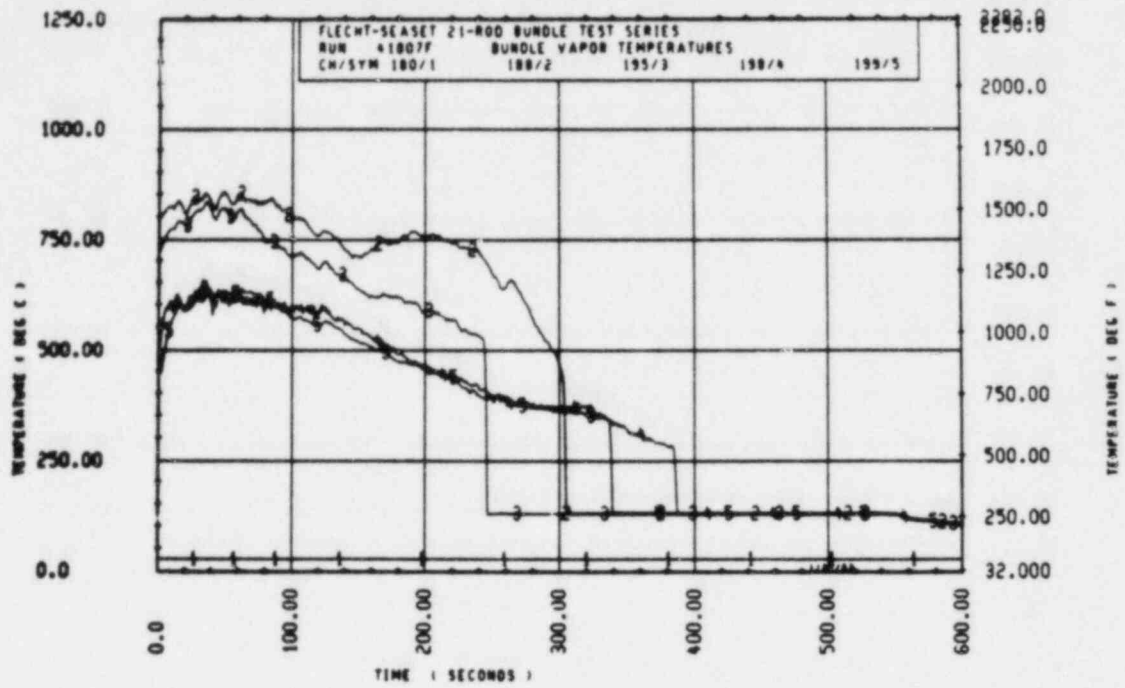
| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 731.8 | 678.5 | 705.1 | 746.1 | 692.6 | 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 | 33.5 | 33.0 | 36.8 |
| 48 | 1462.4 | 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 | 1472.8 | 1381.6 | 1414.7 | 1735.2 | 1657.0 | 1696.1 | 103.0 | 70.5 | 86.7 |
| 74 | 1487.4 | 1371.3 | 1446.7 | 1787.0 | 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 | 1860.7 | 1675.5 | 1735.2 | 86.5 | 60.5 | 71.1 |
| 78 | 1583.5 | 1445.7 | 1517.1 | 1868.9 | 1690.8 | 1752.2 | 85.0 | 50.5 | 65.3 |
| 79 | 1591.4 | 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 | 30.0 | 36.5 |
| 90 | 1413.5 | 1353.5 | 1403.1 | 1799.9 | 1574.4 | 1712.5 | 53.5 | 40.5 | 53.3 |
| 95 | 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 | 1242.9 | 1458.8 | 85.0 | 60.0 | 72.7 |
| 111 | 1104.2 | 953.5 | 1028.7 | 1477.3 | 1216.0 | 1334.7 | 98.5 | 60.0 | 72.7 |
| 120 | 917.4 | 655.5 | 621.2 | 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 | 932.5 | 155.0 | 126.0 | 136.7 |

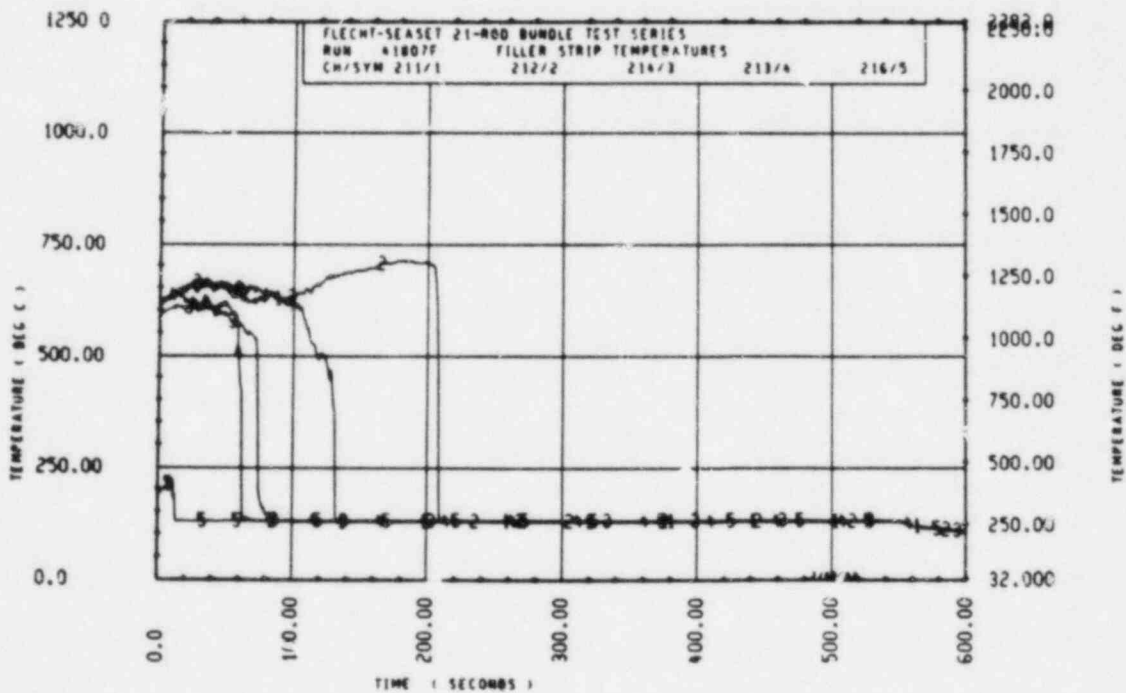
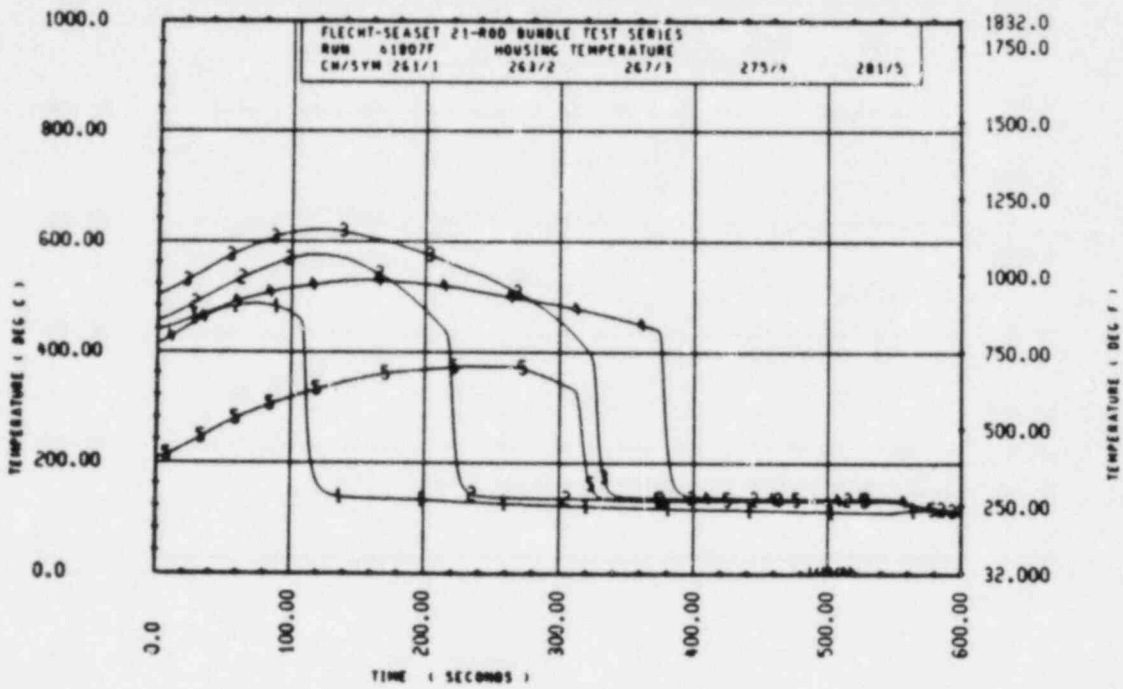
| ELEV | TEMP RISE (DEG F) | | | QJENCH TEMP (DEG F) | | | QJENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 13.5 | 12.3 | 12.9 | 628.3 | 632.6 | 642.2 | 17.0 | 10.7 | 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 | 890.7 | 907.3 | 131.4 | 138.0 | 145.6 |
| 60 | 307.0 | 257.9 | 277.1 | 928.8 | 832.5 | 894.4 | 237.6 | 222.8 | 231.4 |
| 67 | 271.2 | 215.2 | 243.4 | 1032.4 | 920.9 | 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 | 549.3 | 302.5 | 425.7 |
| 72 | 321.0 | 307.7 | 314.3 | 246.8 | 238.2 | 242.5 | 526.0 | 587.0 | 596.5 |
| 73 | 287.4 | 275.4 | 281.4 | 281.3 | 251.3 | 267.3 | 580.0 | 548.0 | 564.0 |
| 74 | 320.5 | 260.1 | 272.2 | 839.9 | 238.2 | 381.6 | 512.0 | 334.9 | 505.0 |
| 75 | 363.5 | 199.4 | 265.7 | 1230.3 | 231.6 | 578.5 | 625.0 | 208.1 | 432.6 |
| 76 | 347.2 | 150.2 | 240.4 | 1076.4 | 243.6 | 620.5 | 533.0 | 291.8 | 433.4 |
| 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 | 413.5 | 310.6 | 368.9 |
| 80 | 292.5 | 247.4 | 280.9 | 991.0 | 771.7 | 885.7 | 395.4 | 317.7 | 367.3 |
| 81 | 244.2 | 244.2 | 244.2 | 853.4 | 653.4 | 753.4 | 366.5 | 366.5 | 366.5 |
| 84 | 207.2 | 163.1 | 185.3 | 843.6 | 667.8 | 756.9 | 428.6 | 357.0 | 396.6 |
| 90 | 268.5 | 214.0 | 249.4 | 843.6 | 607.8 | 740.8 | 444.0 | 400.3 | 420.8 |
| 96 | 341.8 | 243.4 | 301.0 | 884.2 | 647.7 | 786.6 | 467.3 | 424.8 | 447.9 |
| 102 | 373.7 | 209.9 | 296.6 | 746.2 | 603.6 | 662.6 | 474.0 | 452.0 | 475.5 |
| 111 | 379.3 | 228.5 | 306.0 | 700.7 | 534.0 | 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 | 335.0 | 225.6 | 282.7 | 593.2 | 508.9 | 560.5 | 517.6 | 317.9 | 431.4 |
| 138 | 546.7 | 251.1 | 391.3 | 574.2 | 525.7 | 556.5 | 518.0 | 483.9 | 498.1 |

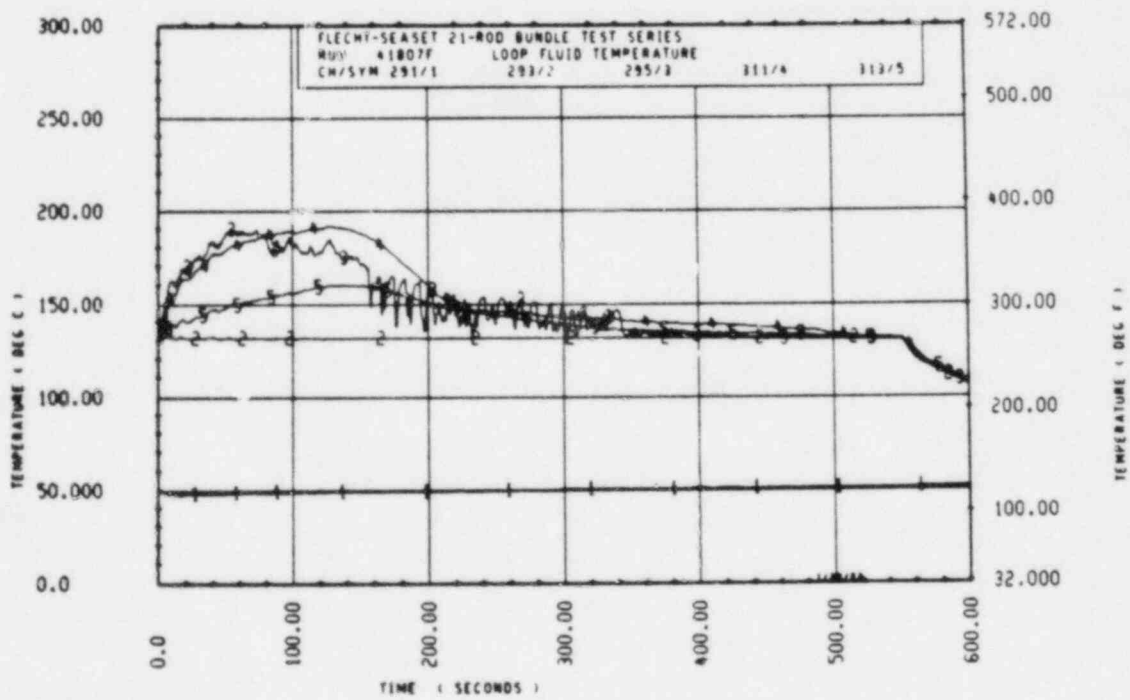
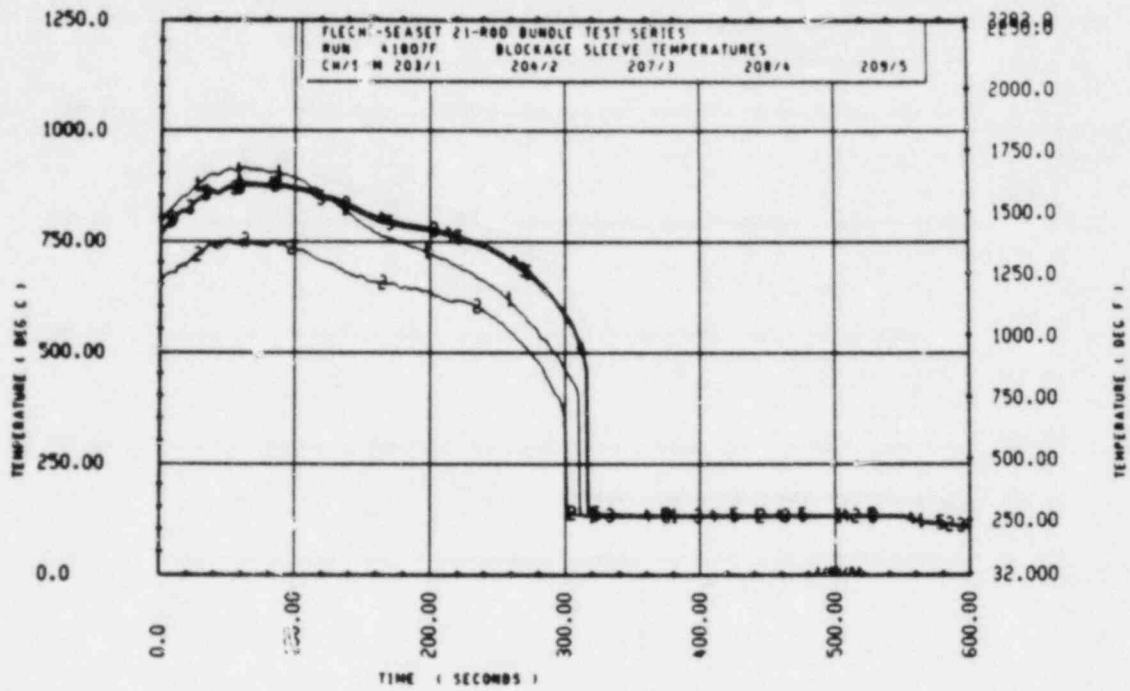


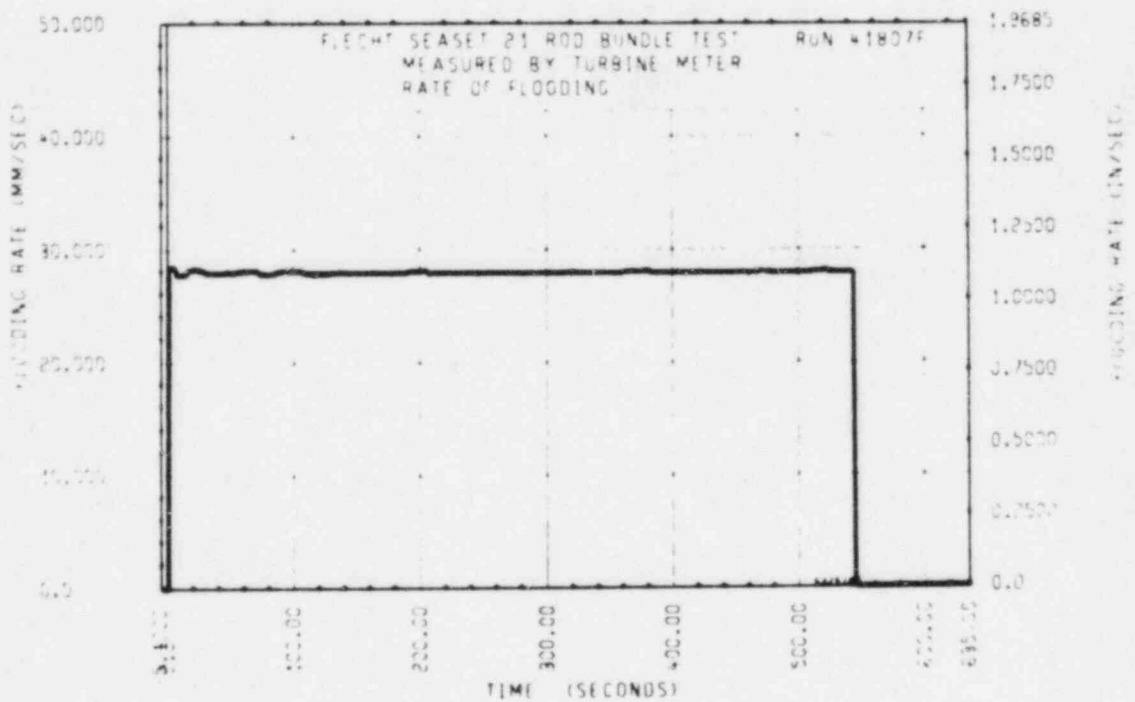
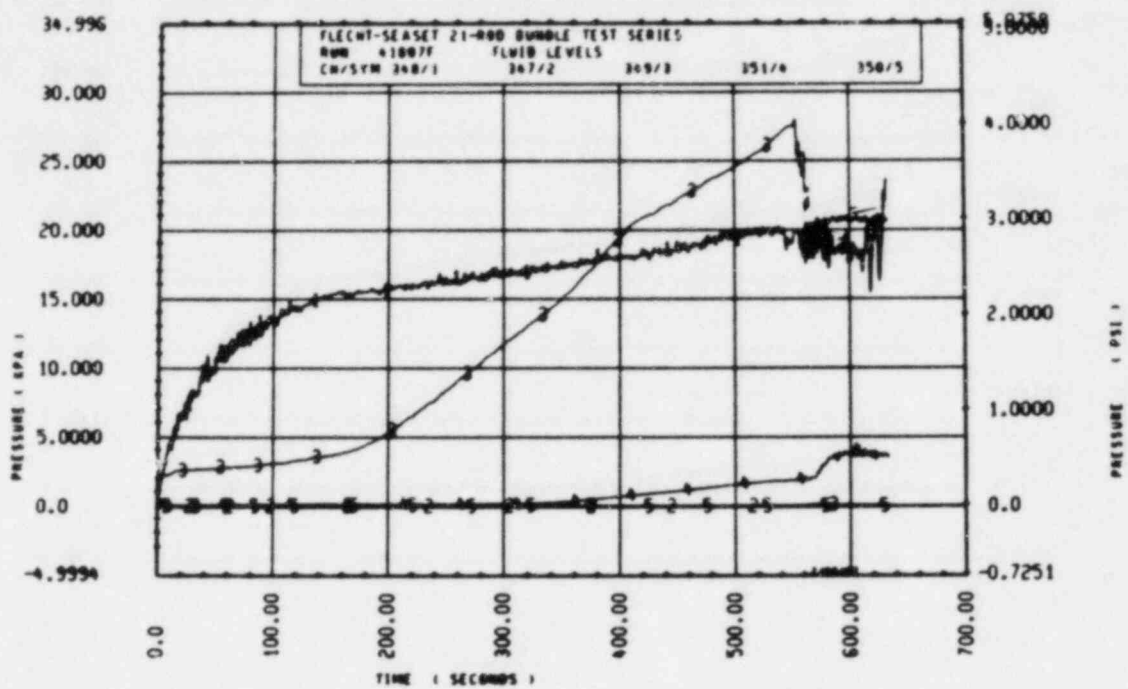


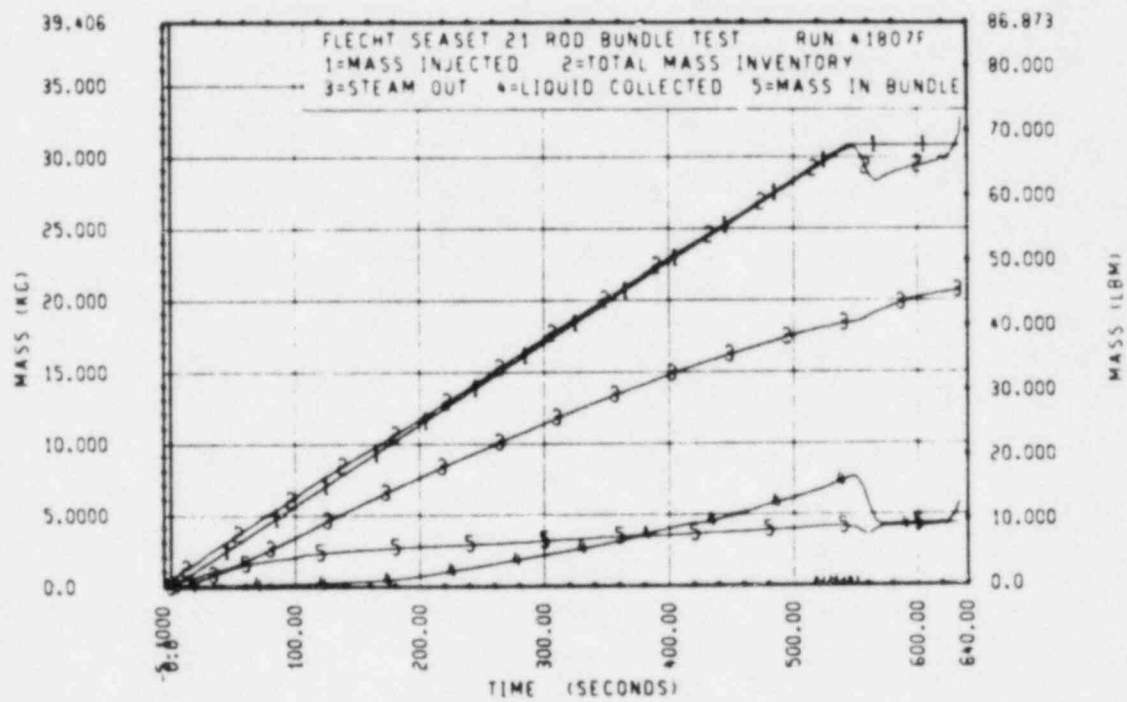
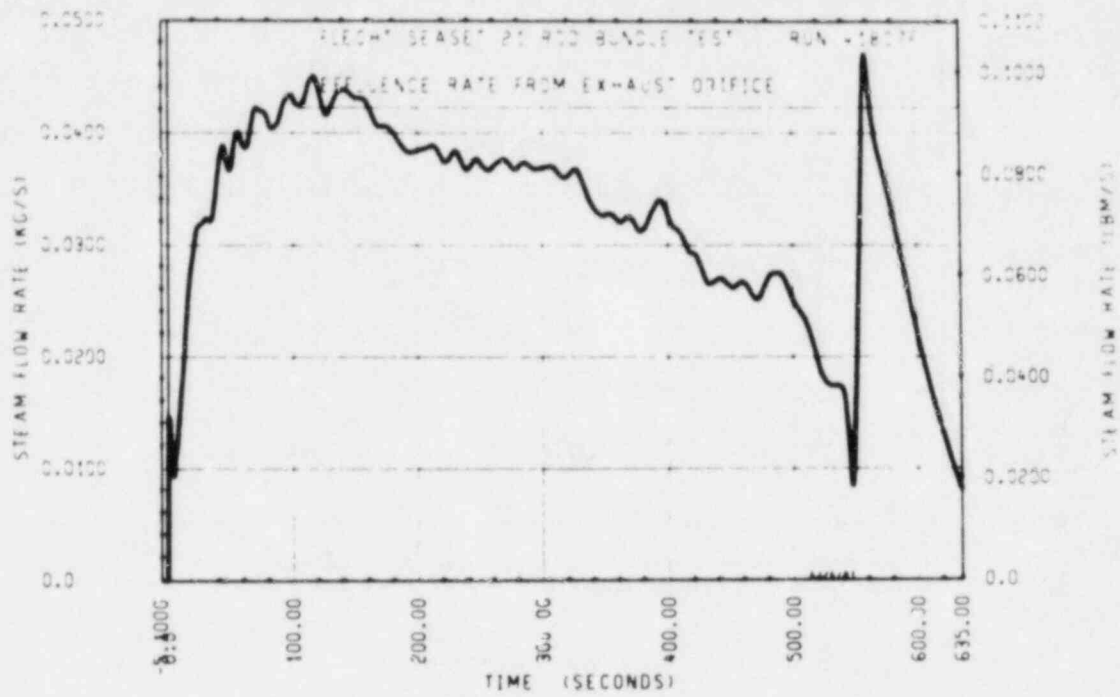


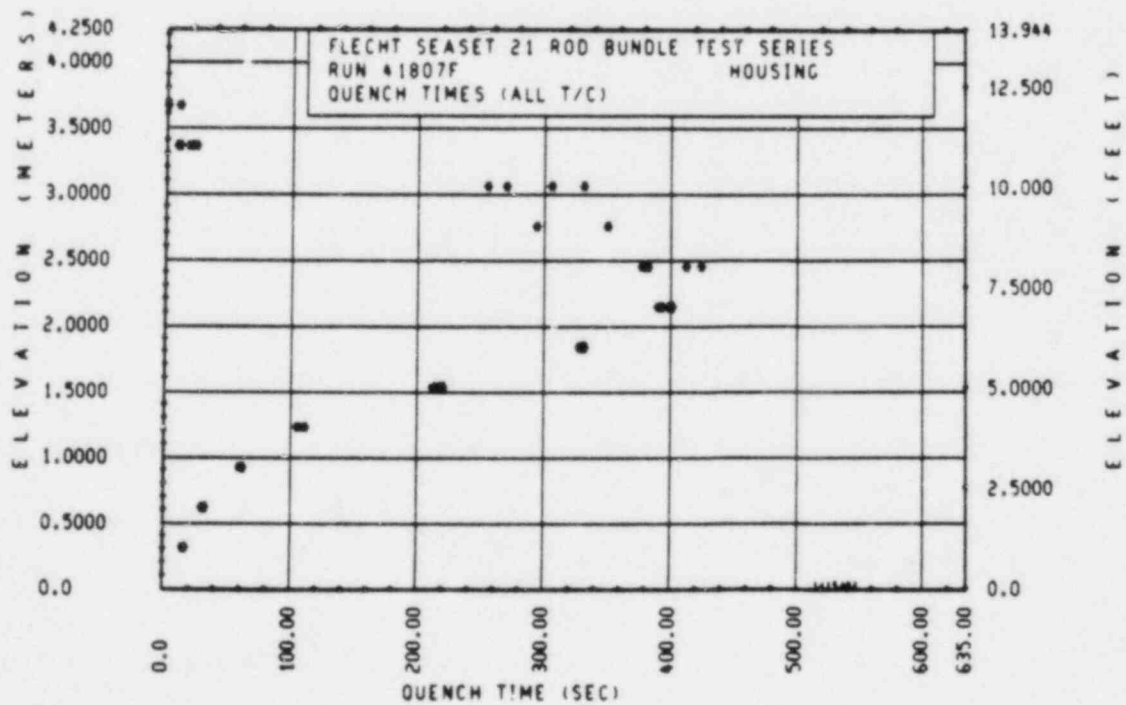
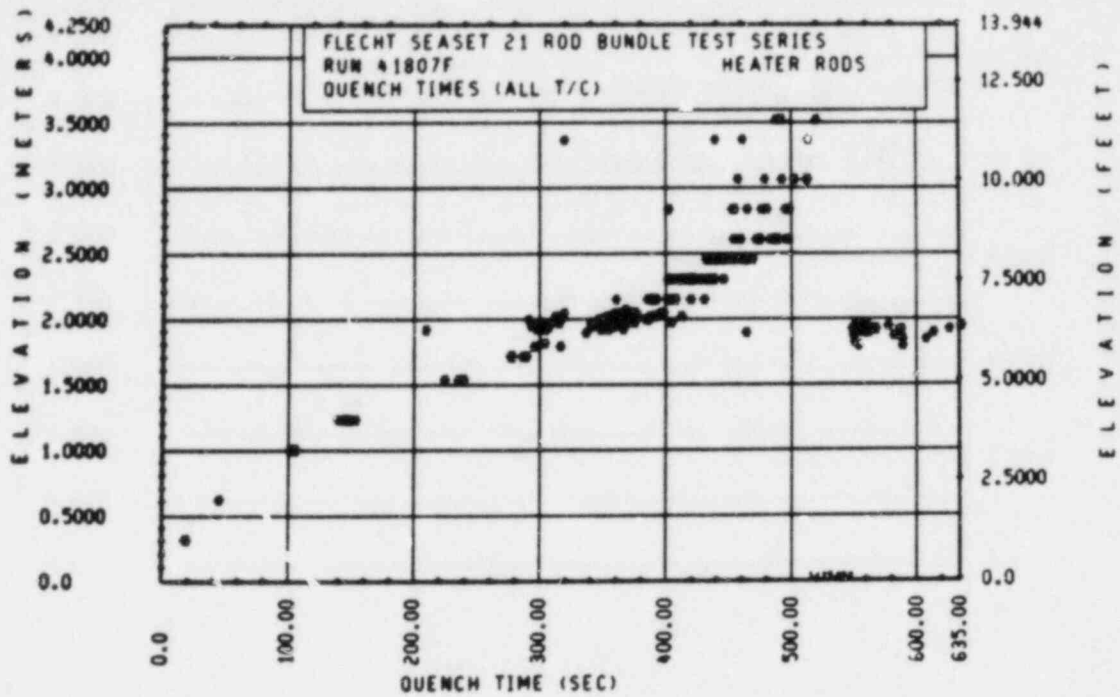


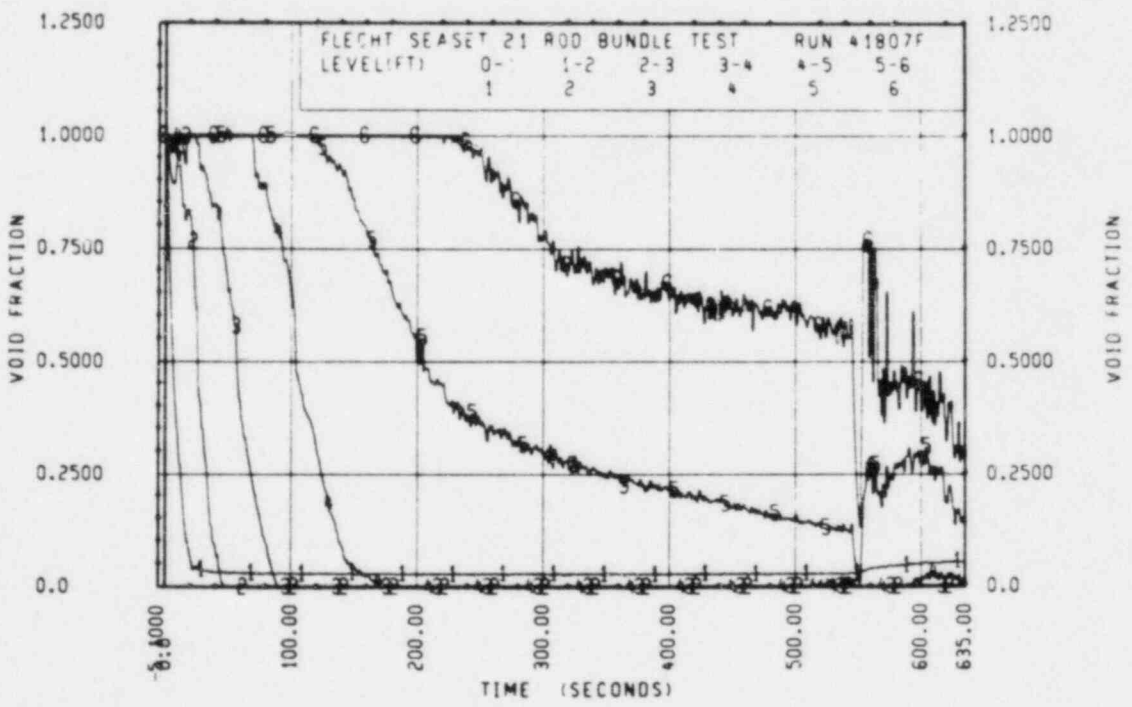
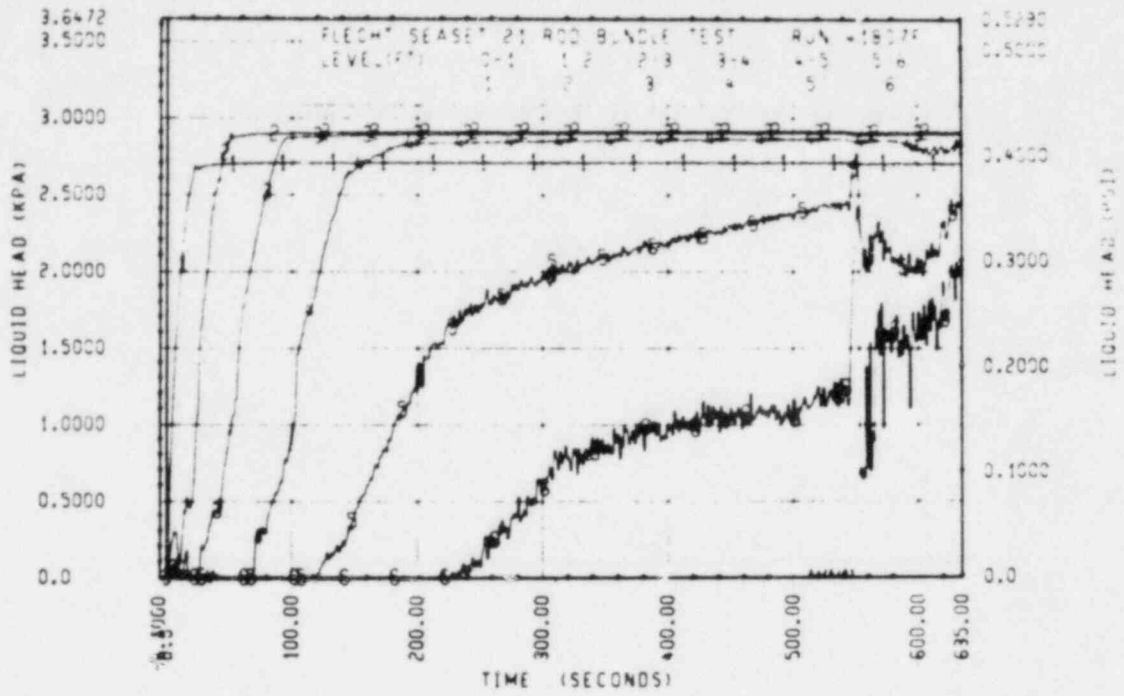


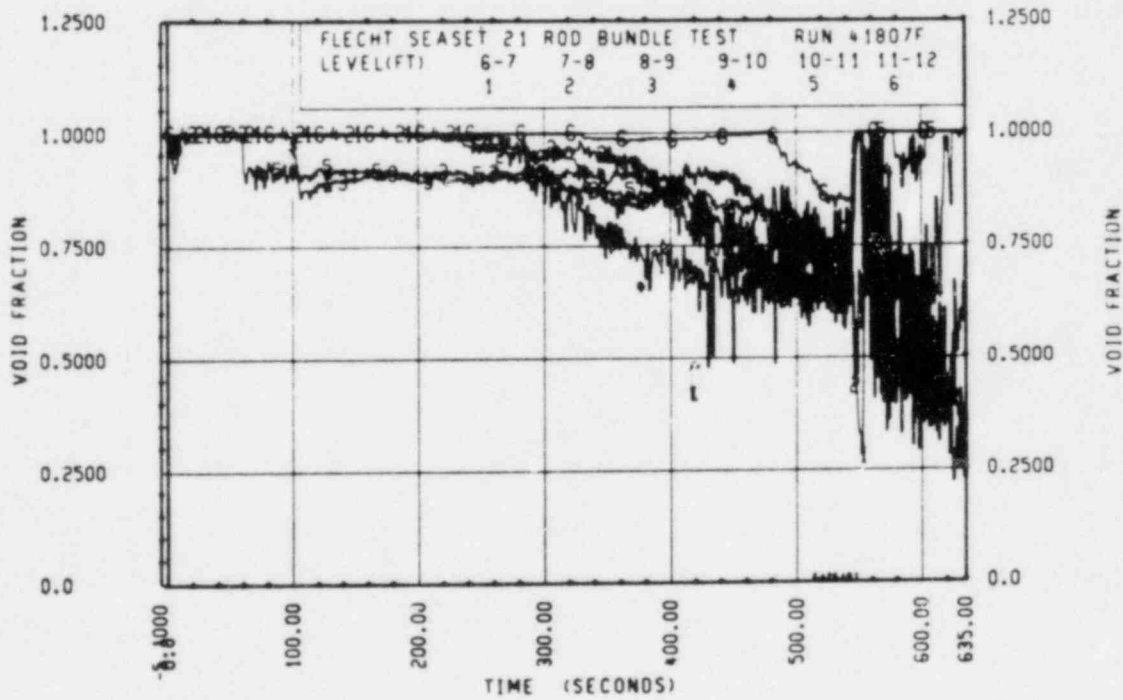
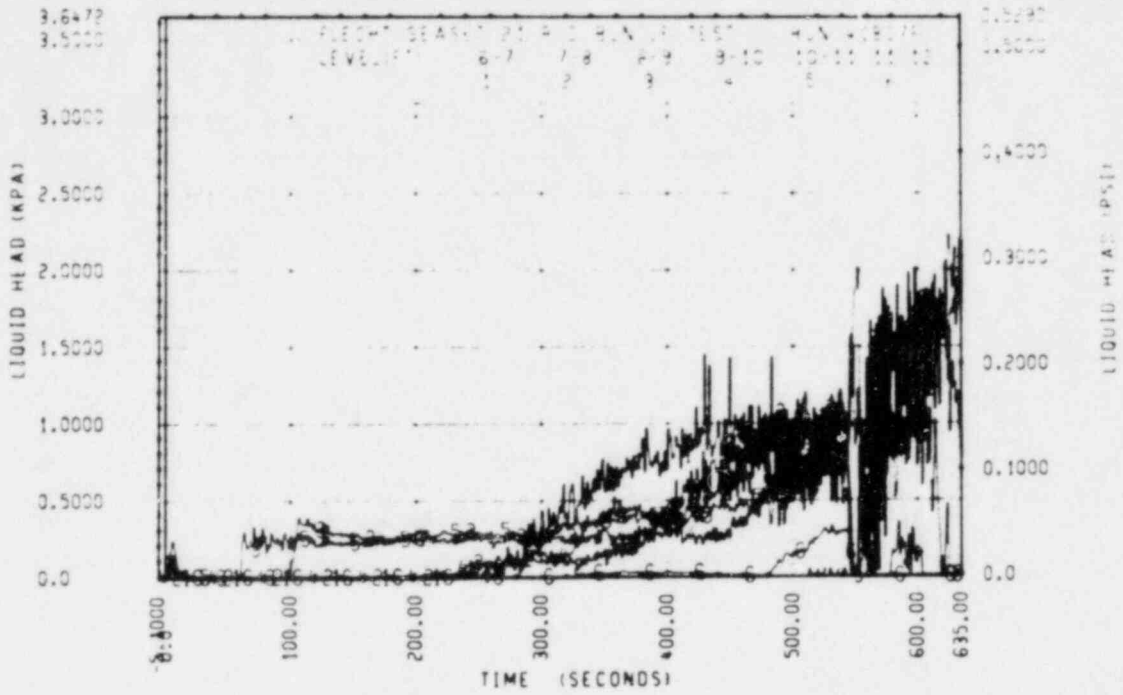












FLECHT SEASET 21-ROD BUNDLE FLOW BLOCKAGE TASK
SUMMARY AND COMMENT SHEET

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

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 42804

| ROD/ELEV | CHAN. NO | INITIAL AT FLCCD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | WLENH TEMPERATURE (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. | 155.5 |
| 2A 5- 0 | 17 | 1324. | 1444. | 115. | 58.5 | 706. | 218.0 |
| 2A 5- 7 | 21 | 1462. | 1578. | 116. | 59.5 | 892. | 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 | 56 | 1588. | 1780. | 191. | 79.5 | 853. | 317.8 |
| 5C 6- 2 | 61 | 1512. | 1643. | 131. | 58.0 | 924. | 298.9 |
| 1D 6- 3 | 63 | 1408. | 1623. | 165. | 112.0 | 917. | 320.8 |
| 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 | 856. | 328.5 |
| 3B 6- 4 | 75 | 1574. | 1777. | 202. | 79.5 | 893. | 328.8 |
| 3D 6- 6 | 79 | 1526. | 1773. | 239. | 96.5 | 826. | 346.8 |
| 2D 6- 5 | 84 | 1558. | 1755. | 198. | 93.0 | 824. | 333.9 |
| 3C 6- 5 | 85 | 1577. | 1802. | 225. | 95.5 | 757. | 338.7 |
| 3E 6- 5 | 86 | 1446. | 1675. | 179. | 94.0 | 906. | 330.9 |
| 3E 6- 6 | 89 | 1554. | 1798. | 234. | 96.5 | 794. | 340.7 |
| 4A 6- 6 | 87 | 1427. | 1623. | 196. | 128.0 | 872. | 336.1 |
| 3D 6- 0 | 88 | 1497. | 1612. | 115. | 179.0 | 727. | 448.9 |
| 5C 6- 6 | 101 | 1457. | 1590. | 132. | 58.5 | 906. | 327.3 |
| 1C 7- 0 | 110 | 1377. | 1618. | 240. | 115.0 | 754. | 360.7 |
| 2B 7- 0 | 121 | 1404. | 1605. | 201. | 98.0 | 597. | 376.0 |
| 3D 7- 0 | 115 | 1432. | 1704. | 272. | 114.0 | 734. | 375.0 |
| 5B 7- 0 | 117 | 1417. | 1605. | 228. | 131.0 | 775. | 367.6 |
| 2A 7- 6 | * * * S A L I N E R P C C D U P L E D A T A * * * | | | | | | |
| 2C 7- 6 | 121 | 1363. | 1679. | 315. | 131.0 | 764. | 408.8 |
| 2E 7- 6 | 122 | 1276. | 1533. | 257. | 179.0 | 785. | 364.7 |
| 3A 7- 6 | 123 | 1266. | 1532. | 257. | 160.0 | 837. | 400.7 |
| 3A 7- 6 | 124 | 1330. | 1643. | 301. | 160.0 | 764. | 410.8 |
| 4B 7- 6 | 127 | 1356. | 1656. | 298. | 161.0 | 726. | 412.2 |
| 5C 7- 6 | 126 | 1240. | 1471. | 231. | 130.0 | 814. | 391.1 |
| 1C 8- 0 | 131 | 1154. | 1515. | 361. | 179.0 | 774. | 442.8 |
| 2E 8- 0 | 133 | 874. | 1229. | 551. | 233.0 | 844. | 474.0 |
| 4C 8- 6 | 136 | 1545. | 1766. | 222. | 96.5 | 887. | 340.9 |
| 5B 8- 0 | 138 | 1156. | 1496. | 340. | 193.0 | 756. | 446.9 |
| 5C 8- 0 | 135 | 1163. | 1407. | 303. | 178.0 | 806. | 427.1 |
| 1C 9- 6 | 141 | 574. | 1439. | 459. | 211.0 | 553. | 466.0 |
| 1D 9- 6 | 142 | 829. | 1298. | 419. | 235.0 | 547. | 453.0 |
| 2C 9- 6 | 143 | 1041. | 1543. | 502. | 179.0 | 546. | 471.0 |
| 4B 9- 6 | 145 | 1052. | 1529. | 463. | 179.0 | 586. | 482.0 |
| 5D 9- 6 | 146 | 947. | 1425. | 477. | 194.0 | 526. | 474.0 |
| 3D 9- 3 | 154 | 825. | 1412. | 573. | 231.0 | 803. | 433.0 |
| 4C 9- 3 | 156 | 537. | 1427. | 490. | 198.0 | 706. | 440.0 |
| 1D10- 0 | 161 | 565. | 1002. | 437. | 182.0 | 566. | 501.0 |
| 4B10- 0 | 164 | 743. | 1230. | 437. | 240.0 | 859. | 516.0 |
| 5D10- 0 | 167 | 662. | 1103. | 420. | 192.0 | 741. | 469.0 |
| 2A11- 0 | 166 | 446. | 731. | 235. | 313.0 | 803. | 463.5 |
| 4C11- 0 | 170 | 614. | 973. | 354. | 196.0 | 564. | 525.0 |
| 1D11- 6 | 172 | 294. | 764. | 470. | 293.0 | 843. | 466.8 |

RUN 42804A HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | | MAX TEMP (DEG F) | | | | TURNAROUND TIME (SEC) | | | | |
|------|----------------------|--------|--------|--------|------------------|--------|--------|-------|-----------------------|-------|-------|-------|-------|
| | MAX | MIN | PEAK | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 490.2 | 473.3 | 482.8 | 500.8 | 514.0 | 491.5 | 500.8 | 16.5 | 15.0 | 16.1 | 16.5 | 15.0 | 16.1 |
| 24 | 791.7 | 722.0 | 758.6 | 785.6 | 814.7 | 754.5 | 785.6 | 34.6 | 31.6 | 34.6 | 34.6 | 31.6 | 34.6 |
| 34 | 1163.3 | 1046.7 | 1050.2 | 1148.7 | 1219.1 | 1112.0 | 1148.7 | 38.5 | 31.5 | 35.5 | 38.5 | 31.5 | 35.5 |
| 48 | 1320.4 | 1214.5 | 1271.2 | 1347.8 | 1404.4 | 1304.8 | 1347.8 | 57.0 | 37.0 | 43.3 | 57.0 | 37.0 | 43.3 |
| 60 | 1438.6 | 1293.6 | 1344.3 | 1471.8 | 1583.2 | 1418.4 | 1471.8 | 60.5 | 43.5 | 55.3 | 60.5 | 43.5 | 55.3 |
| 67 | 1558.5 | 1457.3 | 1485.0 | 1614.1 | 1706.2 | 1577.6 | 1614.1 | 77.0 | 55.0 | 63.9 | 77.0 | 55.0 | 63.9 |
| 70 | 1599.8 | 1461.4 | 1544.0 | 1688.8 | 1769.8 | 1618.8 | 1688.8 | 78.5 | 55.0 | 65.5 | 78.5 | 55.0 | 65.5 |
| 71 | 1600.2 | 1485.1 | 1548.8 | 1706.8 | 1779.8 | 1626.5 | 1706.8 | 80.0 | 54.0 | 73.1 | 80.0 | 54.0 | 73.1 |
| 72 | 1605.2 | 1474.4 | 1540.5 | 1693.4 | 1786.5 | 1611.2 | 1693.4 | 80.5 | 58.0 | 71.7 | 80.5 | 58.0 | 71.7 |
| 74 | 1593.7 | 1467.5 | 1541.9 | 1713.7 | 1794.3 | 1622.1 | 1713.7 | 113.0 | 58.0 | 80.5 | 113.0 | 58.0 | 80.5 |
| 75 | 1587.2 | 1458.4 | 1533.4 | 1715.8 | 1796.6 | 1623.2 | 1715.8 | 114.0 | 74.5 | 91.7 | 114.0 | 74.5 | 91.7 |
| 76 | 1584.0 | 1450.8 | 1531.2 | 1721.5 | 1799.9 | 1634.1 | 1721.5 | 115.0 | 74.5 | 92.6 | 115.0 | 74.5 | 92.6 |
| 77 | 1577.1 | 1431.6 | 1514.6 | 1714.4 | 1802.2 | 1626.5 | 1714.4 | 126.0 | 60.0 | 94.6 | 126.0 | 60.0 | 94.6 |
| 78 | 1559.1 | 1427.3 | 1468.5 | 1707.8 | 1797.7 | 1589.5 | 1707.8 | 128.0 | 54.5 | 101.0 | 128.0 | 54.5 | 101.0 |
| 84 | 1432.2 | 1288.7 | 1358.6 | 1613.9 | 1704.0 | 1505.2 | 1613.9 | 131.0 | 98.0 | 118.7 | 131.0 | 98.0 | 118.7 |
| 90 | 1394.7 | 1183.6 | 1304.4 | 1586.9 | 1693.0 | 1470.9 | 1586.9 | 179.0 | 130.0 | 147.4 | 179.0 | 130.0 | 147.4 |
| 90 | 1262.3 | 674.4 | 1124.4 | 1310.7 | 1650.5 | 1222.4 | 1310.7 | 233.0 | 174.0 | 180.2 | 233.0 | 174.0 | 180.2 |
| 102 | 1092.4 | 630.4 | 863.1 | 1449.6 | 1554.9 | 1257.8 | 1449.6 | 235.0 | 174.0 | 186.7 | 235.0 | 174.0 | 186.7 |
| 111 | 940.3 | 704.2 | 800.3 | 1322.5 | 1426.9 | 1192.0 | 1322.5 | 233.0 | 147.0 | 206.2 | 233.0 | 147.0 | 206.2 |
| 120 | 742.7 | 503.0 | 672.7 | 1151.5 | 1294.3 | 1001.5 | 1151.5 | 287.0 | 182.0 | 244.4 | 287.0 | 182.0 | 244.4 |
| 132 | 618.5 | 403.1 | 526.7 | 720.4 | 972.8 | 727.5 | 720.4 | 313.0 | 192.0 | 257.5 | 313.0 | 192.0 | 257.5 |
| 136 | 569.7 | 294.2 | 454.7 | 834.5 | 968.6 | 763.9 | 834.5 | 298.0 | 204.0 | 284.2 | 298.0 | 204.0 | 284.2 |

| ELEV | TEMP MIN. (DEG F) | | | | QUENCH TEMP (DEG F) | | | | QUENCH TIME (SEC) | | | | |
|------|-------------------|-------|-------|-------|---------------------|-------|-------|-------|-------------------|-------|-------|-------|-------|
| | MAX | MIN | MEAN | MIN | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 10.2 | 15.8 | 17.6 | 494.1 | 512.0 | 491.5 | 494.1 | 19.6 | 14.0 | 16.2 | 19.6 | 14.0 | 16.2 |
| 24 | 32.5 | 24.7 | 27.0 | 726.0 | 763.0 | 694.3 | 726.0 | 48.4 | 43.0 | 46.2 | 48.4 | 43.0 | 46.2 |
| 34 | 65.3 | 54.4 | 58.5 | 692.9 | 812.3 | 692.9 | 751.1 | 106.9 | 103.5 | 106.1 | 106.9 | 103.5 | 106.1 |
| 48 | 69.3 | 67.2 | 70.5 | 770.9 | 901.2 | 770.9 | 830.5 | 151.9 | 142.0 | 146.3 | 151.9 | 142.0 | 146.3 |
| 60 | 140.1 | 114.6 | 127.4 | 700.8 | 746.6 | 671.2 | 700.8 | 226.0 | 216.0 | 220.2 | 226.0 | 216.0 | 220.2 |
| 67 | 147.7 | 110.0 | 124.1 | 859.9 | 874.0 | 742.2 | 859.9 | 265.9 | 255.7 | 262.5 | 265.9 | 255.7 | 262.5 |
| 70 | 170.0 | 120.0 | 144.8 | 850.2 | 974.0 | 802.2 | 850.2 | 285.3 | 261.0 | 284.5 | 285.3 | 261.0 | 284.5 |
| 71 | 174.1 | 142.4 | 157.3 | 864.4 | 947.6 | 794.1 | 864.4 | 297.3 | 263.0 | 291.0 | 297.3 | 263.0 | 291.0 |
| 72 | 161.3 | 124.2 | 152.4 | 864.3 | 912.9 | 810.3 | 864.3 | 302.5 | 262.7 | 295.6 | 302.5 | 262.7 | 295.6 |
| 74 | 200.5 | 131.3 | 171.4 | 867.6 | 924.2 | 803.8 | 867.6 | 317.9 | 296.9 | 310.6 | 317.9 | 296.9 | 310.6 |
| 75 | 204.3 | 164.0 | 182.4 | 854.4 | 925.0 | 789.9 | 854.4 | 325.7 | 317.4 | 321.7 | 325.7 | 317.4 | 321.7 |
| 76 | 215.6 | 175.4 | 190.3 | 858.3 | 925.7 | 810.3 | 858.3 | 331.0 | 316.0 | 325.4 | 331.0 | 316.0 | 325.4 |
| 77 | 225.1 | 170.6 | 187.8 | 845.3 | 906.0 | 757.5 | 845.3 | 336.9 | 330.4 | 334.6 | 336.9 | 330.4 | 334.6 |
| 78 | 230.2 | 152.4 | 204.3 | 851.2 | 949.5 | 783.8 | 851.2 | 346.8 | 327.5 | 341.1 | 346.8 | 327.5 | 341.1 |
| 84 | 302.4 | 224.3 | 255.3 | 624.0 | 775.1 | 597.3 | 624.0 | 376.0 | 360.0 | 371.2 | 376.0 | 360.0 | 371.2 |
| 90 | 319.7 | 236.2 | 284.2 | 723.0 | 842.3 | 725.6 | 723.0 | 412.2 | 384.7 | 403.6 | 412.2 | 384.7 | 403.6 |
| 90 | 550.4 | 303.2 | 381.3 | 559.9 | 806.5 | 641.6 | 559.9 | 474.0 | 425.4 | 447.5 | 474.0 | 425.4 | 447.5 |
| 102 | 507.4 | 418.4 | 468.5 | 624.4 | 800.6 | 518.2 | 624.4 | 482.0 | 431.6 | 463.6 | 482.0 | 431.6 | 463.6 |
| 111 | 573.0 | 390.0 | 462.2 | 644.4 | 780.4 | 613.2 | 644.4 | 498.0 | 412.8 | 477.2 | 498.0 | 412.8 | 477.2 |
| 120 | 584.6 | 337.0 | 412.8 | 550.4 | 741.0 | 582.2 | 550.4 | 514.0 | 404.0 | 463.1 | 514.0 | 404.0 | 463.1 |
| 132 | 354.3 | 262.2 | 324.0 | 646.0 | 715.0 | 588.7 | 646.0 | 525.0 | 373.0 | 444.6 | 525.0 | 373.0 | 444.6 |
| 136 | 404.4 | 264.4 | 334.4 | 634.2 | 731.9 | 542.1 | 634.2 | 536.0 | 431.6 | 467.9 | 536.0 | 431.6 | 467.9 |

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 NUMBER 42204B

| 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 | 1106. | 1145. | 39.1 | 29.0 | 706. | 119.0 |
| 4C 3- 3 | 11 | 1253. | 1283. | 30.1 | 26.0 | 819. | 118.0 |
| 1C 4- 0 | 14 | 1321. | 1354. | 33.1 | 26.0 | 792. | 160.4 |
| 2A 5- 0 | 17 | 1364. | 1496. | 131.1 | 68.5 | 713. | 242.4 |
| 2A 5- 7 | 21 | 1471. | 1587. | 116.1 | 70.0 | 854. | 289.8 |
| 1D 6- 2 | 30 | 1419. | 1581. | 162.1 | 142.0 | 854. | 340.1 |
| 2D 6- 2 | 33 | 1510. | 1691. | 181.1 | 105.0 | 682. | 353.8 |
| 3D 6- 2 | 38 | 1547. | 1720. | 172.1 | 95.5 | 779. | 347.0 |
| 5C 6- 2 | 61 | 1477. | 1611. | 134.1 | 88.0 | 897. | 337.7 |
| 1D 6- 3 | 63 | 1431. | 1574. | 144.1 | 69.5 | 825. | 320.8 |
| 4B 6- 3 | 68 | 1534. | 1665. | 131.1 | 93.0 | 826. | 352.9 |
| 5D 6- 3 | 69 | 1418. | 1606. | 188.1 | 143.0 | 838. | 370.9 |
| 2A 6- 4 | 70 | 1417. | 1560. | 143.1 | 141.0 | 765. | 361.6 |
| 2D 6- 4 | 72 | 1534. | 1688. | 154.1 | 91.5 | 778. | 366.2 |
| 3B 6- 4 | 75 | 1566. | 1739. | 143.1 | 90.0 | 775. | 365.8 |
| 3C 6- 5 | 85 | 1600. | 1754. | 154.1 | 91.0 | 777. | 362.6 |
| 3E 6- 5 | 86 | 1468. | 1608. | 140.1 | 109.0 | 839. | 361.6 |
| 3C 6- 6 | 95 | 1579. | 1762. | 183.1 | 91.5 | 849. | 371.2 |
| 3D 6- 6 | 96 | 1541. | 1732. | 191.1 | 104.0 | 774. | 377.7 |
| 4A 6- 6 | 97 | 1411. | 1594. | 182.1 | 144.0 | 854. | 374.7 |
| 4C 6- 6 | 98 | 1551. | 1732. | 180.1 | 91.5 | 813. | 373.2 |
| 5C 6- 6 | 101 | 1454. | 1596. | 142.1 | 127.0 | 893. | 368.9 |
| 1C 7- 0 | 110 | 1412. | 1604. | 191.1 | 127.0 | 691. | 403.0 |
| 2B 7- 0 | 111 | 1444. | 1670. | 226.1 | 110.0 | 674. | 414.1 |
| 3D 7- 0 | 115 | 1484. | 1717. | 233.1 | 108.0 | 668. | 408.0 |
| 3B 7- 0 | 117 | 1339. | 1524. | 185.1 | 144.0 | 719. | 409.9 |
| 2B 7- 6 | 120 | 1409. | 1665. | 256.1 | 142.0 | 732. | 454.8 |
| 2C 7- 6 | 121 | 1419. | 1697. | 278.1 | 144.0 | 723. | 449.2 |
| 2E 7- 6 | 122 | 1228. | 1502. | 274.1 | 193.0 | 751. | 447.9 |
| 3A 7- 6 | 123 | 1387. | 1618. | 231.1 | 143.0 | 791. | 444.8 |
| 3B 7- 6 | 124 | 1436. | 1701. | 254.1 | 144.0 | 766. | 447.9 |
| 4B 7- 6 | 127 | 1443. | 1677. | 234.1 | 127.0 | 693. | 442.5 |
| 5C 7- 6 | 128 | 1400. | 1609. | 209.1 | 143.0 | 804. | 434.9 |
| 1C 8- 0 | 131 | 1175. | 1552. | 377. | 179.0 | 751. | 476.9 |
| 2E 8- 0 | 133 | 975. | 1474. | 499.1 | 245.0 | 681. | 484.8 |
| 3D 8- 0 | 136 | 1250. | 1629. | 378. | 162.0 | 728. | 476.9 |
| 3B 8- 0 | 138 | 1146. | 1486. | 340.1 | 225.0 | 704. | 491.5 |
| 5C 8- 0 | 139 | 1278. | 1565. | 287.1 | 193.0 | 752. | 472.8 |
| 1C 8- 6 | 141 | 985. | 1481. | 495.1 | 161.0 | 558. | 507.6 |
| 1D 8- 6 | 142 | 802. | 1355. | 553. | 244.0 | 563. | 505.8 |
| 2C 8- 6 | 143 | 1082. | 1582. | 500.1 | 161.0 | 565. | 517.6 |
| 4B 8- 6 | 145 | 1176. | 1600. | 425.1 | 210.0 | 652. | 511.8 |
| 5D 8- 6 | 148 | 1000. | 1438. | 437.1 | 228.0 | 509. | 512.0 |
| 3D 9- 3 | 154 | 917. | 1433. | 516. | 226.0 | 682. | 529.0 |
| 4C 9- 3 | 156 | 1009. | 1467. | 457.1 | 225.0 | 667. | 532.0 |
| 1D10- 0 | 161 | 598. | 1114. | 516.1 | 297.0 | 635. | 545.0 |
| 4B10- 0 | 164 | 879. | 1342. | 462.1 | 221.0 | 624. | 561.0 |
| 5D10- 0 | 167 | 711. | 1103. | 391.1 | 297.0 | 602. | 555.0 |
| 2A11- 0 | 168 | 552. | 784. | 232.1 | 352.0 | 601. | 537.0 |
| 4C11- 0 | 170 | 653. | 1068. | 415.1 | 214.0 | 569. | 571.9 |
| 1D11- 6 | 172 | 309. | 835. | 526. | 338.0 | 667. | 516.0 |

RUN 42204B HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 1371.1 | 1505.0 | 95.0 | 68.0 | 86.8 |
| 74 | 1551.9 | 1418.6 | 1495.7 | 1762.0 | 1580.9 | 1661.2 | 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 | 1661.3 | 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 | 1617.9 | 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 | 1359.1 | 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 | 1276.5 | 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 | 1039.0 | 774.2 | 894.6 | 338.0 | 228.0 | 288.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 882.1 | 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 | 309.0 | 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 |

42204B-3

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 BEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 42804C

| ROD/ELEV | CHAN. | NU | 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 | 1000. | 1125. | 44. | 45.5 | 614. | 108.8 |
| 4C 3- 3 | | 11 | 1220. | 1254. | 28. | 25.0 | 603. | 110.0 |
| 1C 4- 0 | | 14 | 1312. | 1402. | 50. | 43.0 | 702. | 163.4 |
| 2A 5- 0 | | 17 | 1344. | 1507. | 113. | 64.5 | 744. | 232.9 |
| 2A 5- 7 | | 21 | 1506. | 1604. | 98. | 64.5 | 656. | 275.6 |
| 1D 5- 2 | | 30 | 1465. | 1591. | 126. | 121.0 | 642. | 344.6 |
| 20 5- 2 | | 33 | 1446. | 1608. | 190. | 121.0 | 637. | 349.0 |
| 3J 5- 2 | | 36 | 1530. | 1710. | 152. | 86.5 | 604. | 353.1 |
| 4B 5- 2 | | 60 | 1505. | 1671. | 107. | 92.5 | 700. | 348.0 |
| 9C 5- 2 | | 61 | 1471. | 1640. | 175. | 106.0 | 1006. | 322.7 |
| 1D 5- 3 | | 63 | 1440. | 1594. | 145. | 121.0 | 661. | 350.4 |
| 5D 5- 3 | | 64 | 1400. | 1595. | 115. | 88.0 | 653. | 348.0 |
| 2A 5- 4 | | 70 | 1455. | 1583. | 128. | 87.0 | 650. | 325.5 |
| 3B 5- 4 | | 75 | 1577. | 1696. | 120. | 67.0 | 775. | 350.6 |
| 2J 5- 5 | | 64 | 1444. | 1645. | 151. | 87.5 | 780. | 361.4 |
| 3C 5- 5 | | 65 | 1541. | 1765. | 174. | 85.5 | 703. | 356.8 |
| 3E 5- 5 | | 66 | 1512. | 1608. | 96. | 82.5 | 650. | 303.8 |
| 3C 5- 6 | | 45 | 1504. | 1771. | 201. | 90.5 | 707. | 366.7 |
| 3D 5- 6 | | 46 | 1544. | 1736. | 193. | 88.0 | 700. | 372.8 |
| 4A 5- 6 | | 47 | 1457. | 1611. | 154. | 106.0 | 605. | 303.6 |
| 4C 5- 6 | | 48 | 1507. | 1745. | 179. | 86.5 | 602. | 353.5 |
| 5C 5- 6 | | 101 | 1532. | 1633. | 101. | 67.0 | 601. | 360.0 |
| 1C 7- 0 | | 110 | 1304. | 1605. | 241. | 121.0 | 601. | 384.0 |
| 2B 7- 0 | | 111 | 1403. | 1600. | 277. | 101.0 | 540. | 351.7 |
| 3J 7- 0 | | 115 | 1412. | 1712. | 300. | 104.0 | 710. | 360.9 |
| 5B 7- 0 | | 117 | 1324. | 1527. | 203. | 122.0 | 610. | 355.7 |
| 7A 7- 6 | | 120 | 1370. | 1649. | 273. | 172.0 | 735. | 421.4 |
| 2C 7- 6 | | 121 | 1307. | 1678. | 311. | 137.0 | 670. | 431.7 |
| 2E 7- 6 | | 122 | 1005. | 1497. | 412. | 179.0 | 647. | 419.4 |
| 3A 7- 6 | | 123 | 1373. | 1605. | 232. | 122.0 | 750. | 406.1 |
| 3B 7- 6 | | 124 | 1402. | 1601. | 279. | 121.0 | 720. | 420.8 |
| 4B 7- 6 | | 127 | 1341. | 1657. | 766. | 121.0 | 720. | 426.0 |
| 5C 7- 6 | | 128 | 1300. | 1595. | 215. | 122.0 | 737. | 405.4 |
| 1C 8- 0 | | 131 | 1154. | 1537. | 378. | 172.0 | 670. | 407.6 |
| 2E 9- 0 | | 133 | 450. | 1482. | 531. | 222.0 | 654. | 404.7 |
| 3D 9- 0 | | 136 | 1240. | 1637. | 397. | 209.0 | 670. | 400.3 |
| 5B 9- 0 | | 138 | 1153. | 1464. | 311. | 204.0 | 710. | 461.7 |
| 5C 9- 0 | | 139 | 1248. | 1565. | 267. | 156.0 | 707. | 437.8 |
| 1C 9- 6 | | 141 | 477. | 1487. | 510. | 157.0 | 500. | 404.8 |
| 1D 9- 6 | | 142 | 700. | 1303. | 617. | 187.0 | 452. | 469.4 |
| 2C 9- 6 | | 145 | 1100. | 1492. | 387. | 141.0 | 504. | 409.4 |
| 4B 9- 6 | | 146 | 944. | 1430. | 431. | 202.0 | 504. | 481.4 |
| 3D 9- 3 | | 154 | 900. | 1440. | 540. | 214.0 | 652. | 509.2 |
| 4C 9- 3 | | 156 | 903. | 1424. | 441. | 221.0 | 647. | 506.8 |
| 1010- 0 | | 161 | 542. | 982. | 390. | 283.0 | 640. | 504.6 |
| 4610- 0 | | 164 | 837. | 1249. | 462. | 259.0 | 610. | 536.0 |
| 5310- 0 | | 167 | 642. | 1003. | 392. | 213.0 | 714. | 477.1 |
| 2411- 0 | | 168 | 553. | 754. | 200. | 337.0 | 503. | 522.5 |
| 4011- 0 | | 170 | 640. | 1079. | 438. | 214.0 | 540. | 541.0 |
| 1611- 6 | | 172 | 200. | 761. | 475. | 316.0 | 507. | 550.6 |

* * * * * THERMOCOUPLE DATA * * * * *

KUN 42804C HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | PCAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 673.0 | 544.5 | 625.9 | 675.2 | 604.6 | 629.6 | 9.5 | 3.0 | 7.3 |
| 24 | 903.7 | 623.2 | 667.3 | 916.1 | 644.7 | 882.3 | 24.5 | 15.0 | 18.2 |
| 34 | 1225.5 | 1000.4 | 1130.0 | 1253.6 | 1124.5 | 1182.5 | 48.5 | 25.0 | 39.4 |
| 40 | 1374.7 | 1304.2 | 1335.9 | 1439.0 | 1364.5 | 1398.8 | 57.0 | 43.0 | 47.9 |
| 60 | 1344.0 | 1370.1 | 1340.5 | 1532.2 | 1507.4 | 1516.0 | 82.0 | 64.5 | 70.8 |
| 67 | 1604.5 | 1474.6 | 1514.7 | 1722.9 | 1592.7 | 1628.8 | 82.0 | 63.0 | 72.8 |
| 70 | 1544.2 | 1485.3 | 1500.0 | 1760.9 | 1628.7 | 1698.5 | 84.5 | 65.5 | 76.4 |
| 71 | 1552.7 | 1457.5 | 1522.9 | 1750.0 | 1622.1 | 1684.6 | 87.5 | 63.0 | 65.9 |
| 72 | 1512.7 | 1454.2 | 1500.0 | 1659.2 | 1647.2 | 1653.2 | 87.5 | 65.5 | 76.5 |
| 74 | 1574.2 | 1445.7 | 1515.0 | 1729.6 | 1573.3 | 1652.4 | 141.0 | 63.5 | 94.3 |
| 75 | 1544.0 | 1446.3 | 1533.9 | 1729.6 | 1590.5 | 1654.0 | 121.0 | 63.5 | 64.4 |
| 76 | 1600.3 | 1430.7 | 1530.0 | 1747.5 | 1583.0 | 1651.9 | 137.0 | 65.0 | 85.2 |
| 77 | 1541.1 | 1400.0 | 1521.1 | 1755.3 | 1594.9 | 1670.2 | 121.0 | 61.5 | 90.4 |
| 78 | 1564.5 | 1360.1 | 1500.0 | 1770.4 | 1594.2 | 1675.8 | 157.0 | 67.0 | 101.8 |
| 84 | 1433.5 | 1174.0 | 1355.5 | 1715.1 | 1423.7 | 1619.3 | 176.0 | 86.0 | 117.3 |
| 90 | 1402.3 | 1084.0 | 1330.0 | 1661.0 | 1496.6 | 1620.5 | 179.0 | 121.0 | 135.4 |
| 96 | 1300.3 | 950.1 | 1207.4 | 1647.2 | 1464.4 | 1563.1 | 222.0 | 136.0 | 175.1 |
| 102 | 1105.7 | 700.4 | 904.5 | 1558.2 | 1383.4 | 1473.7 | 205.0 | 141.0 | 162.3 |
| 111 | 944.5 | 740.3 | 832.6 | 1439.6 | 1246.3 | 1368.6 | 279.0 | 205.0 | 226.0 |
| 120 | 630.4 | 542.4 | 720.3 | 1305.8 | 982.5 | 1184.6 | 283.0 | 184.0 | 234.3 |
| 132 | 640.4 | 400.5 | 550.0 | 1078.4 | 753.5 | 853.6 | 337.0 | 210.0 | 265.8 |
| 136 | 622.5 | 400.0 | 475.0 | 972.6 | 760.7 | 850.6 | 316.0 | 200.0 | 267.4 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | PCAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 3.2 | 2.1 | 3.7 | 645.2 | 595.4 | 614.5 | 21.4 | 10.9 | 19.7 |
| 24 | 21.2 | 11.3 | 15.0 | 763.5 | 722.6 | 737.5 | 56.7 | 55.2 | 55.6 |
| 34 | 62.9 | 27.0 | 43.7 | 629.6 | 763.5 | 802.4 | 118.6 | 100.0 | 114.1 |
| 40 | 81.2 | 44.9 | 62.9 | 749.2 | 776.3 | 786.0 | 165.9 | 154.7 | 163.1 |
| 60 | 132.5 | 113.5 | 125.4 | 853.6 | 762.2 | 805.0 | 235.9 | 230.4 | 233.2 |
| 67 | 121.4 | 47.5 | 104.1 | 924.2 | 836.5 | 868.7 | 279.8 | 272.3 | 275.0 |
| 70 | 101.0 | 115.6 | 141.4 | 856.6 | 840.9 | 870.0 | 308.7 | 290.7 | 303.4 |
| 71 | 201.3 | 123.1 | 161.7 | 957.6 | 865.5 | 905.0 | 313.8 | 303.0 | 309.7 |
| 72 | 154.4 | 134.4 | 147.2 | 911.3 | 871.5 | 891.4 | 305.6 | 304.5 | 305.1 |
| 74 | 104.4 | 100.5 | 137.4 | 856.5 | 636.7 | 748.7 | 353.1 | 327.7 | 342.0 |
| 75 | 145.5 | 72.4 | 120.2 | 861.3 | 736.3 | 807.4 | 356.9 | 344.1 | 349.7 |
| 76 | 161.6 | 54.0 | 121.4 | 858.5 | 734.3 | 794.0 | 361.0 | 325.5 | 344.4 |
| 77 | 188.9 | 45.7 | 144.1 | 858.0 | 782.7 | 818.6 | 370.9 | 340.6 | 354.4 |
| 78 | 224.2 | 100.0 | 100.7 | 867.2 | 751.7 | 795.3 | 376.7 | 344.4 | 364.4 |
| 84 | 311.7 | 205.2 | 263.4 | 810.0 | 598.0 | 682.7 | 399.0 | 355.7 | 361.5 |
| 90 | 412.0 | 215.2 | 261.4 | 783.0 | 647.1 | 725.0 | 431.7 | 371.0 | 413.2 |
| 96 | 531.5 | 260.6 | 355.6 | 766.7 | 659.1 | 705.6 | 463.9 | 437.0 | 455.0 |
| 102 | 610.4 | 300.6 | 484.2 | 568.9 | 451.5 | 537.6 | 492.0 | 465.4 | 462.4 |
| 111 | 534.7 | 374.2 | 436.0 | 670.3 | 606.1 | 646.6 | 511.0 | 480.0 | 500.9 |
| 120 | 534.0 | 304.0 | 400.4 | 739.7 | 590.9 | 654.1 | 536.0 | 444.9 | 502.4 |
| 132 | 430.4 | 200.0 | 304.0 | 722.2 | 502.8 | 609.0 | 541.0 | 410.1 | 473.4 |
| 136 | 475.1 | 200.0 | 374.0 | 809.7 | 285.6 | 598.1 | 550.8 | 320.0 | 444.6 |

42804C-3

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 +4.7°C ^(~) |

a. Relative to run 42804 A

FLECHT SEASET 21 RJD BUNDLE TEST SERIES
 KJN NJM3EX42404D

| ROD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE AT QUENCH (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (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 5- 2 | 50 | 1539. | 1687. | 146. | 57.5 | 808. | 328.9 |
| 3D 5- 2 | 55 | 1530. | 1733. | 203. | 37.5 | 287. | 560.0 |
| 5C 5- 2 | 59 | 1531. | 1646. | 115. | 78.5 | 842. | 327.8 |
| 1D 5- 3 | 61 | 1481. | 1629. | 147. | 35.0 | 850. | 332.9 |
| 4B 5- 3 | 66 | 1549. | 1694. | 145. | 32.0 | 842. | 337.8 |
| 9D 5- 3 | 68 | 1465. | 1594. | 129. | 39.5 | 851. | 329.8 |
| 2A 5- 4 | 70 | 1469. | 1617. | 146. | 35.5 | 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. | 35.0 | 846. | 343.8 |
| 2D 6- 5 | 84 | 1547. | 1701. | 153. | 58.0 | 853. | 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. | 92.0 | 824. | 350.5 |
| 3D 6- 6 | 98 | 1563. | 1734. | 172. | 92.5 | 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. | 326.5 |
| 5C 6- 6 | 103 | 1520. | 1637. | 117. | 91.5 | 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. | 35.5 | 624. | 381.0 |
| 3D 7- 0 | 115 | 1431. | 1705. | 274. | 38.0 | 608. | 381.0 |
| 5B 7- 0 | 117 | 1306. | 1544. | 238. | 123.0 | 673. | 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. | 1462. | 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 | 759. | 408.2 |
| 4B 7- 6 | 128 | 1418. | 1672. | 254. | 126.0 | 724. | 421.9 |
| 5C 7- 6 | 129 | 1397. | 1664. | 206. | 126.0 | 766. | 399.9 |
| 1C 8- 0 | 132 | 1162. | 1469. | 327. | 176.0 | 746. | 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. | 150.0 | 719. | 445.4 |
| 5C 8- 0 | 140 | 1315. | 1582. | 267. | 144.0 | 765. | 431.0 |
| 1C 8- 6 | 141 | 977. | 1474. | 502. | 191.0 | 593. | 491.0 |
| 1D 8- 6 | 142 | 865. | 1476. | 611. | 191.0 | 650. | 481.9 |
| 2C 8- 6 | 143 | 1022. | 1566. | 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 | 665. | 500.0 |
| 4C 9- 3 | 157 | 962. | 1442. | 480. | 207.0 | 665. | 503.5 |
| 1310- 0 | 160 | 566. | 1067. | 501. | 248.0 | 287. | 510.0 |
| 4810- 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 | 546. | 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 42404D HEATER KUP STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | | MAX TEMP (DEG F) | | | | THERMADJ TIME (SEC) | | | |
|------|----------------------|--------|--------|--------|------------------|--------|--------|--------|---------------------|-------|-------|-------|
| | MAX | MIN | MEAN | MEAN | MAX | MIN | MEAN | MEAN | MAX | MIN | MEAN | MEAN |
| 12 | 590.8 | 627.2 | 647.2 | 631.0 | 681.5 | 632.0 | 631.0 | 631.0 | 8.0 | 5.5 | 5.2 | 5.2 |
| 24 | 851.3 | 927.5 | 839.2 | 857.5 | 901.3 | 850.9 | 857.5 | 857.5 | 26.5 | 14.0 | 21.0 | 21.0 |
| 34 | 1203.2 | 1094.8 | 1126.1 | 1172.7 | 1241.1 | 1132.9 | 1172.7 | 1172.7 | 48.5 | 36.5 | 43.5 | 43.5 |
| 48 | 1326.0 | 1288.8 | 1297.4 | 1339.3 | 1350.4 | 1327.6 | 1339.3 | 1339.3 | 45.5 | 40.0 | 42.8 | 42.8 |
| 60 | 1496.0 | 1361.1 | 1416.7 | 1538.7 | 1599.2 | 1490.2 | 1538.7 | 1538.7 | 76.5 | 53.0 | 66.0 | 66.0 |
| 67 | 1596.5 | 1467.8 | 1513.1 | 1649.5 | 1702.9 | 1576.5 | 1649.5 | 1649.5 | 82.0 | 64.5 | 75.5 | 75.5 |
| 70 | 1512.6 | 1522.6 | 1547.7 | 1699.5 | 1745.3 | 1653.7 | 1699.5 | 1699.5 | 87.5 | 65.0 | 76.2 | 76.2 |
| 71 | 1557.2 | 1557.2 | 1577.2 | 1727.4 | 1727.4 | 1727.4 | 1727.4 | 1727.4 | 81.5 | 81.5 | 81.5 | 81.5 |
| 72 | 1599.7 | 1381.4 | 1530.6 | 1677.4 | 1739.7 | 1561.4 | 1677.4 | 1677.4 | 99.0 | 67.0 | 82.6 | 82.6 |
| 74 | 1594.1 | 1435.7 | 1513.0 | 1660.1 | 1738.6 | 1590.1 | 1660.1 | 1660.1 | 126.0 | 67.5 | 91.8 | 91.8 |
| 75 | 1548.9 | 1464.6 | 1503.4 | 1647.4 | 1701.8 | 1593.8 | 1647.4 | 1647.4 | 99.5 | 82.0 | 90.1 | 90.1 |
| 76 | 1591.0 | 1468.9 | 1529.3 | 1676.0 | 1756.4 | 1599.2 | 1676.0 | 1676.0 | 101.0 | 84.0 | 90.9 | 90.9 |
| 77 | 1597.6 | 1459.2 | 1519.6 | 1673.4 | 1739.6 | 1541.7 | 1673.4 | 1673.4 | 101.0 | 88.0 | 85.7 | 85.7 |
| 78 | 1595.7 | 1452.8 | 1514.6 | 1683.3 | 1762.0 | 1511.2 | 1683.3 | 1683.3 | 127.0 | 80.5 | 93.9 | 93.9 |
| 79 | 1535.0 | 1476.5 | 1573.6 | 1623.3 | 1718.5 | 1512.8 | 1623.3 | 1623.3 | 129.0 | 93.0 | 102.6 | 102.6 |
| 84 | 1425.3 | 1213.7 | 1347.7 | 1595.4 | 1691.9 | 1461.6 | 1595.4 | 1595.4 | 143.0 | 124.0 | 134.9 | 134.9 |
| 90 | 1343.7 | 1112.2 | 1241.2 | 1471.1 | 1567.9 | 1429.9 | 1471.1 | 1471.1 | 193.0 | 143.0 | 163.9 | 163.9 |
| 95 | 1136.1 | 864.9 | 1002.8 | 1350.9 | 1267.4 | 1100.6 | 1350.9 | 1350.9 | 207.0 | 144.0 | 183.1 | 183.1 |
| 102 | 1131.6 | 891.5 | 891.5 | 1149.0 | 1470.9 | 1129.7 | 1350.9 | 1350.9 | 254.0 | 207.0 | 220.3 | 220.3 |
| 111 | 431.0 | 566.0 | 675.3 | 1149.0 | 1289.1 | 1005.7 | 1149.0 | 1149.0 | 299.0 | 205.0 | 250.9 | 250.9 |
| 120 | 640.2 | 552.8 | 583.4 | 924.0 | 1093.4 | 793.0 | 924.0 | 924.0 | 336.0 | 206.0 | 255.3 | 255.3 |
| 132 | 525.0 | 273.7 | 431.6 | 836.2 | 1027.4 | 718.1 | 836.2 | 836.2 | 335.0 | 278.0 | 302.5 | 302.5 |

| ELEV | TEMP RISE (DEG F) | | | | QUENCH TEMP (DEG F) | | | | QUENCH TIME (SEC) | | | |
|------|-------------------|-------|-------|-------|---------------------|-------|-------|-------|-------------------|-------|-------|-------|
| | MAX | MIN | MEAN | MEAN | MAX | MIN | MEAN | MEAN | MAX | MIN | MEAN | MEAN |
| 12 | 5.9 | 0.0 | 3.6 | 631.5 | 648.0 | 618.4 | 631.5 | 631.5 | 19.5 | 18.4 | 19.0 | 19.0 |
| 24 | 23.4 | 10.0 | 18.3 | 570.6 | 712.4 | 283.6 | 570.6 | 570.6 | 56.5 | 55.0 | 55.6 | 55.6 |
| 34 | 56.3 | 37.9 | 46.6 | 782.0 | 815.8 | 740.4 | 782.0 | 782.0 | 118.1 | 115.2 | 116.3 | 116.3 |
| 48 | 44.9 | 39.0 | 42.0 | 828.7 | 859.8 | 820.5 | 828.7 | 828.7 | 160.6 | 152.9 | 156.8 | 156.8 |
| 60 | 133.8 | 103.2 | 122.3 | 895.6 | 890.0 | 786.3 | 895.6 | 895.6 | 234.9 | 230.9 | 233.2 | 233.2 |
| 67 | 106.7 | 102.7 | 105.9 | 860.8 | 899.7 | 889.3 | 860.8 | 860.8 | 276.8 | 274.9 | 275.7 | 275.7 |
| 70 | 132.5 | 131.1 | 131.8 | 850.1 | 844.6 | 712.9 | 850.1 | 850.1 | 29.6 | 291.0 | 291.3 | 291.3 |
| 71 | 170.2 | 170.2 | 170.2 | 860.8 | 860.8 | 860.8 | 860.8 | 860.8 | 31.8 | 317.8 | 317.8 | 317.8 |
| 72 | 180.0 | 132.3 | 146.8 | 850.1 | 867.1 | 850.1 | 850.1 | 850.1 | 316.8 | 305.9 | 310.8 | 310.8 |
| 74 | 177.3 | 144.8 | 153.1 | 816.0 | 858.3 | 701.3 | 816.0 | 816.0 | 340.7 | 306.7 | 325.8 | 325.8 |
| 75 | 166.2 | 129.2 | 144.0 | 835.0 | 850.5 | 713.3 | 835.0 | 835.0 | 337.8 | 328.8 | 332.8 | 332.8 |
| 76 | 188.7 | 106.9 | 146.7 | 824.2 | 1008.2 | 808.2 | 824.2 | 824.2 | 350.7 | 331.7 | 341.2 | 341.2 |
| 77 | 197.0 | 125.6 | 153.8 | 849.3 | 870.9 | 812.5 | 849.3 | 849.3 | 359.6 | 337.7 | 346.4 | 346.4 |
| 78 | 185.7 | 117.0 | 161.0 | 833.3 | 871.2 | 790.4 | 833.3 | 833.3 | 360.4 | 335.3 | 351.3 | 351.3 |
| 84 | 262.5 | 170.1 | 249.7 | 740.5 | 738.2 | 587.7 | 740.5 | 740.5 | 381.0 | 356.9 | 376.0 | 376.0 |
| 93 | 310.7 | 206.4 | 247.7 | 732.3 | 600.8 | 533.7 | 732.3 | 732.3 | 435.7 | 372.1 | 406.1 | 406.1 |
| 96 | 344.7 | 266.5 | 309.4 | 501.4 | 765.3 | 672.9 | 501.4 | 501.4 | 465.2 | 431.0 | 445.8 | 445.8 |
| 102 | 611.3 | 362.1 | 468.2 | 501.4 | 650.4 | 531.9 | 501.4 | 501.4 | 491.0 | 474.7 | 483.8 | 483.8 |
| 111 | 591.2 | 314.2 | 459.4 | 280.3 | 666.7 | 581.5 | 280.3 | 280.3 | 512.8 | 493.6 | 500.2 | 500.2 |
| 120 | 544.3 | 395.0 | 473.7 | 268.5 | 703.7 | 286.7 | 268.5 | 268.5 | 535.0 | 489.9 | 519.3 | 519.3 |
| 132 | 453.2 | 240.2 | 345.6 | 548.2 | 642.8 | 548.2 | 548.2 | 548.2 | 543.0 | 497.4 | 529.0 | 529.0 |
| 138 | 444.4 | 328.3 | 404.6 | 442.9 | 625.4 | 442.9 | 442.9 | 442.9 | 543.1 | 428.8 | 512.2 | 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 42804 A

FLECHT SEAJET 21 RJD BUNDLE TEST SERIES
 RUN NUMBER 42704E

| 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 | 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. | 43.5 | 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. | 383.0 |
| 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. | 76.5 | 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 | 816. | 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 | 765. | 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. | 176.0 | 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 | 1104. | 1459. | 455. | 138.0 | 636. | 469.3 |
| 1D 8-6 | 136 | 913. | 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 | 816. | 468.6 |
| 5D 8-6 | 145 | 1013. | 1513. | 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 |
| 4D10-0 | 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. | 684. | 591. | 315.0 | 558. | 525.2 |

RUN 42704E HEATER RUD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 655.3 | 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 | 1451.6 | 1451.6 | 44.5 | 47.5 | 47.0 |
| 50 | 1531.0 | 1470.0 | 1495.9 | 1646.1 | 1576.5 | 1603.7 | 56.5 | 49.0 | 53.2 |
| 67 | 1616.0 | 1498.3 | 1552.9 | 1740.8 | 1616.7 | 1678.0 | 77.0 | 63.0 | 74.1 |
| 70 | 1544.8 | 1537.9 | 1567.5 | 1756.4 | 1728.5 | 1742.6 | 130.0 | 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 | 134.0 | 104.0 | 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 | 106.5 |
| 79 | 1536.6 | 1491.5 | 1513.8 | 1705.1 | 1599.2 | 1650.5 | 120.0 | 101.0 | 106.5 |
| 80 | 1544.4 | 1430.4 | 1483.9 | 1745.3 | 1597.1 | 1651.2 | 140.0 | 101.0 | 118.2 |
| 81 | 1533.6 | 1533.6 | 1533.6 | 1723.1 | 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 | 1395.7 | 1445.6 | 1760.9 | 1584.1 | 1665.0 | 103.0 | 90.0 | 100.1 |
| 90 | 1489.3 | 1442.3 | 1451.9 | 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 | 1333.6 | 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 | 627.0 | 572.2 | 1059.3 | 725.4 | 851.2 | 336.0 | 222.0 | 281.8 |
| 138 | 590.7 | 298.5 | 437.4 | 889.2 | 406.4 | 647.8 | 319.0 | 197.0 | 256.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 760.0 | 742.9 | 752.1 | 56.6 | 56.4 | 56.5 |
| 39 | 56.6 | 16.5 | 35.3 | 810.4 | 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 | 135.2 | 158.5 |
| 50 | 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 | 262.0 | 267.4 |
| 70 | 218.5 | 148.2 | 175.1 | 933.5 | 856.7 | 880.0 | 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 | 831.2 | 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 | 705.0 | 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 | 865.3 | 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 | 122.5 | 192.5 | 192.5 | 661.7 | 861.7 | 861.7 | 356.9 | 356.9 | 366.9 |
| 84 | 256.9 | 170.8 | 219.4 | 756.3 | 506.1 | 666.0 | 377.0 | 349.7 | 367.6 |
| 90 | 475.3 | 212.6 | 278.7 | 835.0 | 642.7 | 757.4 | 462.0 | 382.8 | 401.9 |
| 96 | 461.2 | 255.2 | 358.3 | 785.4 | 711.6 | 750.6 | 463.1 | 425.8 | 430.0 |
| 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 | 402.0 | 175.8 | 324.0 | 606.7 | 573.3 | 593.1 | 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 RJD BUNDLE TEST SERIES
 RUN NUMBER 43104F

| 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 | 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. | 73.5 | 790. | 323.9 |
| 1D 6- 4 | 46 | 1476. | 1985. | 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. | 77.0 | 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 | 769. | 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 | 142 | 1223. | 1464. | 241. | 177.0 | 625. | 447.7 |
| 5C 8- 0 | 144 | 1301. | 1555. | 254. | 173.0 | 777. | 447.9 |
| 1C 8- 6 | 147 | 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 | 570. | 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 TEMP (DEG F) | | | TURNS AROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-------------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 759.9 | 695.3 | 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 | 1616.5 | 1406.3 | 1476.0 | 1749.7 | 1573.3 | 1624.9 | 70.0 | 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 | 1558.2 | 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 | 1501.8 | 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 | 1350.1 | 1050.6 | 1271.0 | 1691.9 | 1425.9 | 1581.1 | 188.0 | 124.0 | 156.8 |
| 102 | 1194.4 | 833.7 | 1079.4 | 1607.4 | 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) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|--------|--------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 127.4 | 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 | 145.0 | 201.5 | 487.3 | 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 | 1012.6 | 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 | 695.8 | 317.4 | 371.7 |
| 79 | 193.3 | 77.0 | 118.3 | 1047.8 | 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 |
| 84 | 146.3 | 146.3 | 146.3 | 786.9 | 786.9 | 786.9 | 358.4 | 358.4 | 358.4 |
| 90 | 213.0 | 145.0 | 180.7 | 693.0 | 602.6 | 632.3 | 381.9 | 359.3 | 372.6 |
| 96 | 267.5 | 112.0 | 194.0 | 832.2 | 727.0 | 776.2 | 419.8 | 392.8 | 405.4 |
| 102 | 436.3 | 237.2 | 310.2 | 825.3 | 709.7 | 765.2 | 453.8 | 430.9 | 441.9 |
| 111 | 548.6 | 350.7 | 424.7 | 672.7 | 551.7 | 597.3 | 480.0 | 440.9 | 462.1 |
| 120 | 487.7 | 396.9 | 449.2 | 683.8 | 623.9 | 661.5 | 503.9 | 485.7 | 495.5 |
| 132 | 520.3 | 441.5 | 486.0 | 674.3 | 577.1 | 636.8 | 529.0 | 511.3 | 522.0 |
| 138 | 480.8 | 290.5 | 395.4 | 715.5 | 496.5 | 598.3 | 542.0 | 475.7 | 505.3 |
| | 514.1 | 356.7 | 435.4 | 651.0 | 616.2 | 633.6 | 555.0 | 539.0 | 547.0 |

43104F-3

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 ^o C (1603 ^o 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 ^o C (122 ^o F) |
| Average and range of initial 1.83 m (72 in.) housing temperature | 498 ^o C (489 ^o C - 504 ^o C) [928 ^o F (913 ^o F - 939 ^o 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

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES

RUN NUMBER 42705A

| ROD/ELEV | CHAN. | NU | INITIAL AT FLGJD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|-------|-----|--------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | | 9 | 1089. | 1153. | 64. | 27.0 | 797. | 91.4 |
| 4C 3- 3 | | 11 | 1155. | 1221. | 66.1 | 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. | 141.1 | 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 | 809. | 297.5 |
| 3D 6- 2 | | 58 | 1591. | 1850. | 259. | 85.0 | 912. | 298.8 |
| 5C 6- 2 | | 61 | 1526. | 1700. | 174. | 51.5 | 921. | 260.8 |
| 1D 6- 3 | | 63 | 1461. | 1683. | 222. | 97.5 | 959. | 306.9 |
| 4B 5- 3 | | 68 | 1554. | 1799. | 245. | 83.0 | 844. | 309.6 |
| 5D 5- 3 | | 69 | 1489. | 1720. | 231. | 89.0 | 859. | 300.7 |
| 2A 6- 4 | | 70 | 1456. | 1705. | 209. | 93.5 | 802. | 315.8 |
| 3B 5- 4 | | 75 | 1501. | 1846. | 265. | 79.5 | 897. | 310.7 |
| 3D 6- 6 | | 79 | 1542. | 1846. | 304. | 89.0 | 804. | 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. | 304.1 | 82.5 | 840. | 327.9 |
| 4A 5- 6 | | 97 | 1450. | 1692. | 236. | 94.5 | 873. | 320.5 |
| 3D 3- 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. | 241.1 | 92.0 | 721. | 351.0 |
| 2B 7- 0 | | 111 | 1426. | 1661. | 234. | 70.5 | 604. | 360.0 |
| 3D 7- 0 | | 115 | 1446. | 1727. | 281. | 85.5 | 600. | 356.5 |
| 5B 7- 0 | | 117 | 1346. | 1593. | 246. | 113.0 | 742. | 328.7 |
| 2B 7- 6 | | 121 | 1369. | 1716. | 347. | 94.5 | 744. | 362.0 |
| 2E 7- 6 | | 122 | 1227. | 1486. | 259. | 62.5 | 731. | 364.9 |
| 3A 7- 6 | | 123 | 1306. | 1572. | 267. | 109.0 | 775. | 366.0 |
| 3B 7- 6 | | 124 | 1410. | 1754. | 345. | 110.0 | 758. | 362.0 |
| 4B 7- 6 | | 127 | 1363. | 1721. | 338. | 109.0 | 704. | 367.0 |
| 5C 7- 6 | | 128 | 1273. | 1523. | 249. | 113.0 | 770. | 369.4 |
| 1C 5- 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. | 347.0 |
| 5C 8- 0 | | 139 | 1121. | 1445. | 324. | 146.0 | 703. | 348.0 |
| 1C 8- 6 | | 141 | 977. | 1447. | 470. | 131.0 | 525. | 425.0 |
| 1D 8- 6 | | 142 | 758. | 1290. | 492. | 122.0 | 506. | 410.0 |
| 2C 3- | | 143 | 1026. | 1534. | 508. | 128.0 | 614. | 422.8 |
| 4B 3- | | 145 | 1097. | 1526. | 429.1 | 113.0 | 571. | 431.5 |
| 5D 3- 6 | | 148 | 968. | 1416. | 428. | 137.0 | 556. | 421.3 |
| 3D 9- 3 | | 154 | 845. | 1409. | 564. | 167.0 | 617. | 438.0 |
| 4C 7- 3 | | 156 | 947. | 1404. | 458. | 154.0 | 626. | 433.4 |
| 1010- 0 | | 161 | 580. | 1032. | 451. | 209.0 | 661. | 369.9 |
| 4B10- 0 | | 164 | 804. | 1221. | 418. | 167.0 | 631. | 444.6 |
| 5010- 0 | | 167 | 704. | 1116. | 407. | 169.0 | 664. | 370.7 |
| 2A11- 0 | | 168 | 440. | 745. | 255. | 224.0 | 602. | 368.9 |
| 4C11- 0 | | 170 | 620. | 985. | 357. | 181.0 | 536. | 438.0 |
| 1D11- 6 | | 172 | 348. | 729. | 330. | 170.0 | 286. | 231.0 |

* * * B A D T H E R M O C O U * * * I E D A T A * * *

KUN 42705A HEATER RJD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 506.1 | 486.2 | 494.3 | 521.5 | 504.4 | 511.9 | 11.0 | 10.5 | 10.8 |
| 24 | 809.2 | 747.9 | 779.1 | 840.6 | 790.9 | 815.2 | 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 | 1364.0 | 1397.0 | 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 | 1681.3 | 1764.4 | 71.5 | 68.5 | 69.6 |
| 72 | 1603.4 | 1484.4 | 1546.1 | 1847.4 | 1667.9 | 1752.2 | 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 | 1476.2 | 1541.0 | 1870.0 | 1702.9 | 1790.0 | 94.0 | 70.5 | 86.6 |
| 77 | 1560.1 | 1437.9 | 1523.7 | 1875.7 | 1686.5 | 1795.3 | 106.0 | 84.5 | 92.2 |
| 78 | 1562.4 | 1455.7 | 1512.0 | 1866.6 | 1649.4 | 1768.2 | 114.0 | 52.5 | 89.0 |
| 84 | 1440.0 | 1244.7 | 1322.7 | 1733.0 | 1551.7 | 1644.7 | 113.0 | 70.5 | 94.6 |
| 90 | 1404.6 | 1143.4 | 1314.4 | 1754.2 | 1485.9 | 1621.8 | 113.0 | 62.5 | 102.3 |
| 96 | 1264.5 | 697.0 | 1144.4 | 1681.0 | 1236.9 | 1525.5 | 154.0 | 92.0 | 124.3 |
| 102 | 1097.2 | 797.6 | 674.7 | 1551.7 | 1290.1 | 1438.9 | 145.0 | 113.0 | 127.3 |
| 111 | 956.0 | 697.0 | 671.7 | 1410.9 | 1172.3 | 1301.0 | 184.0 | 147.0 | 162.4 |
| 120 | 803.5 | 580.3 | 670.9 | 1278.6 | 1031.5 | 1151.0 | 210.0 | 157.0 | 184.3 |
| 132 | 627.9 | 490.6 | 541.2 | 985.1 | 745.1 | 824.9 | 224.0 | 181.0 | 194.3 |
| 136 | 505.1 | 396.2 | 441.4 | 976.9 | 726.5 | 846.8 | 215.0 | 170.0 | 193.4 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 16.6 | 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 | 726.9 | 744.4 | 37.0 | 33.4 | 34.6 |
| 39 | 78.4 | 63.6 | 69.4 | 828.9 | 697.7 | 774.6 | 93.4 | 90.0 | 91.9 |
| 48 | 113.7 | 89.6 | 101.8 | 940.6 | 801.3 | 859.4 | 141.3 | 126.0 | 132.7 |
| 60 | 171.5 | 136.7 | 152.4 | 798.7 | 711.9 | 740.9 | 207.9 | 202.0 | 203.5 |
| 67 | 201.1 | 140.7 | 166.7 | 903.3 | 876.5 | 889.1 | 247.3 | 244.7 | 245.9 |
| 70 | 236.1 | 172.9 | 198.4 | 901.4 | 837.7 | 870.4 | 271.6 | 263.4 | 268.5 |
| 71 | 244.2 | 184.1 | 213.0 | 1023.3 | 831.9 | 892.0 | 279.9 | 266.8 | 273.9 |
| 72 | 247.2 | 184.7 | 204.2 | 931.9 | 844.3 | 887.9 | 284.9 | 266.4 | 278.7 |
| 74 | 264.2 | 174.0 | 230.3 | 959.4 | 784.4 | 877.1 | 302.2 | 280.8 | 293.8 |
| 75 | 274.8 | 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 | 304.7 |
| 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 | 579.0 | 667.2 | 360.0 | 326.7 | 352.4 |
| 90 | 359.2 | 244.4 | 307.4 | 831.6 | 703.7 | 768.0 | 387.0 | 364.9 | 379.3 |
| 96 | 534.9 | 262.4 | 381.1 | 771.3 | 646.8 | 716.2 | 410.7 | 396.6 | 403.4 |
| 102 | 564.5 | 326.6 | 454.2 | 617.7 | 505.6 | 554.6 | 431.5 | 410.0 | 420.6 |
| 111 | 563.7 | 296.6 | 424.4 | 751.3 | 484.1 | 619.8 | 438.0 | 373.0 | 414.7 |
| 120 | 622.7 | 314.4 | 472.1 | 854.5 | 591.4 | 655.4 | 451.9 | 316.9 | 410.0 |
| 132 | 357.2 | 241.5 | 283.7 | 634.9 | 537.7 | 580.4 | 438.0 | 287.1 | 354.2 |
| 136 | 444.8 | 243.5 | 355.5 | 723.9 | 285.6 | 559.0 | 440.9 | 231.0 | 354.0 |

42705A-3

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 42705 A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
 KUN NJMJEK421028

| ROD/ELEV | CHAV. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE AT (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 | 899. | 335.0 |
| 3D 6- 2 | 58 | 1536. | 1754. | 219. | 103.0 | 797. | 325.8 |
| 5C 6- 2 | 61 | 1491. | 1655. | 164. | 73.0 | 867. | 310.8 |
| 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. | 320.8 |
| 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. | 96.5 | 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. | 354.8 |
| 4A 6- 6 | 97 | 1413. | 1643. | 230. | 131.0 | 842. | 355.7 |
| 4C 6- 6 | 98 | 1550. | 1790. | 240. | 83.5 | 842. | 320.6 |
| 5C 6- 6 | 101 | 1462. | 1642. | 179. | 105.0 | 854. | 347.7 |
| 1C 7- 0 | 110 | 1329. | 1619. | 290. | 115.0 | 800. | 383.4 |
| 2B 7- 0 | 111 | 1397. | 1567. | 270. | 90.0 | 830. | 393.9 |
| 3D 7- 0 | 115 | 1429. | 1713. | 284. | 89.0 | 844. | 385.0 |
| 5B 7- 0 | 117 | 1332. | 1546. | 216. | 107.0 | 874. | 388.0 |
| 2B 7- 6 | 120 | 1363. | 1681. | 318. | 119.0 | 822. | 413.0 |
| 2C 7- 6 | 121 | 1345. | 1703. | 357. | 110.0 | 706. | 408.0 |
| 2E 7- 6 | 122 | 1063. | 1398. | 335. | 111.0 | 820. | 409.9 |
| 3A 7- 6 | 123 | 1364. | 1635. | 272. | 117.0 | 713. | 405.9 |
| 3B 7- 6 | 124 | 1396. | 1719. | 323. | 104.0 | 724. | 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. | 389. | 104.0 | 827. | 425.0 |
| 3D 8- 0 | 136 | 1212. | 1618. | 406. | 111.0 | 742. | 421.9 |
| 5B 8- 0 | 138 | 1105. | 1448. | 344. | 133.0 | 829. | 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. | 437.0 |
| 2C 8- 6 | 143 | 1021. | 1544. | 523. | 131.0 | 592. | 447.0 |
| 4B 8- 6 | 145 | 1138. | 1581. | 443. | 131.0 | 647. | 445.6 |
| 5D 8- 6 | 148 | 893. | 1289. | 397. | 89.5 | 509. | 436.8 |
| 3D 9- 3 | 154 | 889. | 1367. | 478. | 135.0 | 618. | 449.0 |
| 4C 9- 3 | 156 | 970. | 1397. | 427. | 154.0 | 617. | 450.0 |
| 1310- 0 | 161 | 645. | 1047. | 402. | 191.0 | 646. | 430.0 |
| 4B10- 0 | 164 | 837. | 1199. | 363. | 171.0 | 572. | 407.0 |
| 5D10- 0 | 167 | 706. | 1098. | 392. | 200.0 | 761. | 403.0 |
| 2A11- 0 | 168 | 556. | 740. | 184. | 199.0 | 676. | 324.0 |
| 4C11- 0 | 170 | 629. | 984. | 355. | 177.0 | 571. | 447.0 |
| 1D11- 6 | 172 | 311. | 602. | 491. | 235.0 | 577. | 357.0 |

BUN 42105B HEATER RJO STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TRYSURROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|------------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 665.7 | 610.2 | 631.7 | 673.1 | 623.6 | 648.9 | 10.0 | 7.0 | 8.5 |
| 24 | 920.8 | 851.5 | 877.4 | 879.1 | 823.6 | 851.3 | 22.5 | 16.1 | 19.3 |
| 39 | 1242.2 | 1112.9 | 1158.8 | 1301.6 | 1170.2 | 1233.6 | 39.5 | 26.5 | 33.1 |
| 48 | 1388.8 | 1264.9 | 1316.2 | 1480.5 | 1366.6 | 1403.3 | 55.0 | 34.5 | 42.1 |
| 60 | 1484.2 | 1357.7 | 1393.8 | 1647.2 | 1486.9 | 1540.4 | 55.0 | 38.5 | 44.5 |
| 67 | 1580.4 | 1461.7 | 1504.3 | 1734.2 | 1612.3 | 1660.0 | 84.5 | 57.0 | 71.5 |
| 70 | 1617.5 | 1440.3 | 1530.9 | 1810.1 | 1664.7 | 1704.2 | 85.5 | 55.0 | 74.6 |
| 71 | 1500.1 | 1351.4 | 1504.1 | 1614.6 | 1598.1 | 1706.6 | 123.0 | 58.5 | 86.0 |
| 72 | 1484.2 | 1417.1 | 1455.4 | 1678.8 | 1600.3 | 1641.1 | 156.0 | 62.5 | 83.0 |
| 74 | 1531.8 | 1376.2 | 1486.8 | 1845.6 | 1684.7 | 1761.5 | 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 | 1374.2 | 1497.7 | 1786.5 | 1603.6 | 1695.2 | 133.0 | 60.0 | 95.8 |
| 77 | 1594.4 | 1311.6 | 1483.6 | 1806.7 | 1602.8 | 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 |
| 94 | 1450.3 | 1261.0 | 1369.7 | 1717.4 | 1510.6 | 1631.4 | 131.0 | 83.5 | 101.1 |
| 90 | 1411.0 | 1063.3 | 1299.9 | 1718.5 | 1398.1 | 1602.4 | 112.0 | 75.5 | 106.7 |
| 96 | 1263.2 | 945.1 | 1171.0 | 1667.9 | 1327.9 | 1543.9 | 133.0 | 104.0 | 122.5 |
| 102 | 1138.1 | 826.0 | 951.2 | 1582.9 | 1161.9 | 1401.8 | 131.0 | 84.0 | 115.3 |
| 111 | 970.2 | 719.3 | 889.3 | 1397.0 | 1110.2 | 1274.8 | 211.0 | 101.0 | 134.9 |
| 120 | 936.6 | 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 | 1002.7 | 753.5 | 862.0 | 235.0 | 199.0 | 213.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 13.3 | 7.4 | 11.2 | 625.0 | 608.0 | 615.0 | 19.1 | 17.0 | 17.9 |
| 24 | 35.6 | 21.2 | 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 | 113.9 | 105.9 | 109.3 |
| 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 | 233.0 | 228.5 | 227.8 |
| 67 | 167.8 | 142.0 | 155.7 | 853.8 | 847.0 | 871.1 | 275.1 | 266.8 | 272.4 |
| 70 | 192.6 | 145.1 | 173.3 | 880.1 | 775.7 | 813.3 | 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 | 814.3 | 310.3 | 299.2 | 305.5 |
| 74 | 306.7 | 164.1 | 214.7 | 1013.5 | 647.0 | 811.9 | 339.9 | 305.7 | 326.1 |
| 75 | 225.5 | 169.8 | 194.8 | 880.2 | 781.3 | 829.2 | 350.8 | 303.7 | 332.6 |
| 76 | 249.4 | 153.5 | 197.4 | 906.1 | 766.7 | 826.4 | 353.7 | 333.4 | 339.6 |
| 77 | 244.2 | 183.4 | 225.6 | 887.2 | 795.7 | 821.4 | 354.3 | 337.5 | 344.7 |
| 78 | 283.3 | 179.3 | 240.4 | 884.1 | 759.4 | 827.4 | 364.3 | 340.7 | 354.2 |
| 84 | 290.2 | 216.2 | 261.6 | 699.2 | 628.4 | 658.3 | 393.9 | 378.0 | 385.2 |
| 90 | 384.3 | 226.7 | 302.6 | 754.0 | 613.8 | 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 | 599.3 | 443.0 | 408.9 | 437.8 |
| 111 | 477.9 | 286.8 | 385.3 | 762.9 | 584.1 | 622.8 | 458.0 | 409.0 | 449.7 |
| 120 | 516.8 | 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 | 231.1 | 372.7 | 701.4 | 520.1 | 593.7 | 460.9 | 260.8 | 348.9 |

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 42705 A

FLOCHT BEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 42605C

| 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 | 1097. | 1164. | 67. | 36.5 | 762. | 41.1 |
| 4C 3- 3 | 11 | 1242. | 1297. | 55. | 32.0 | 616. | 102.0 |
| 1C 4- 0 | 14 | 1365. | 1440. | 75. | 43.0 | 646. | 146.6 |
| 2A 5- 0 | 17 | 1414. | 1550. | 135. | 48.5 | 614. | 206.4 |
| 2A 5- 7 | 21 | 1523. | 1664. | 141. | 55.5 | 694. | 252.6 |
| 1D 5- 2 | 30 | 1434. | 1611. | 178. | 97.0 | 905. | 304.9 |
| 2D 5- 2 | 33 | 1463. | 1677. | 214. | 101.0 | 656. | 310.3 |
| 3D 6- 2 | 56 | 1550. | 1713. | 163. | 55.5 | 721. | 319.0 |
| 4B 6- 2 | 60 | 1564. | 1717. | 149. | 60.5 | 654. | 313.4 |
| 9C 6- 2 | 61 | 1473. | 1602. | 209. | 98.5 | 1073. | 295.4 |
| 1D 6- 3 | 63 | 1463. | 1615. | 212. | 105.0 | 406. | 312.7 |
| 5D 6- 3 | 64 | 1467. | 1642. | 154. | 70.0 | 666. | 320.6 |
| 2A 6- 4 | 70 | 1473. | 1633. | 160. | 74.5 | 446. | 256.3 |
| 3A 5- 4 | 75 | 1576. | 1749. | 170. | 60.0 | 616. | 326.4 |
| 2D 6- 5 | 74 | 1510. | 1731. | 221. | 101.0 | 606. | 325.5 |
| 3C 6- 5 | 65 | 1564. | 1617. | 233. | 75.0 | 655. | 325.3 |
| 3E 6- 5 | 66 | 1516. | 1646. | 129. | 118.0 | 672. | 326.4 |
| 3C 6- 6 | 45 | 1566. | 1625. | 259. | 75.0 | 666. | 332.6 |
| 3D 6- 6 | 46 | 1536. | 1783. | 251. | 95.0 | 794. | 340.6 |
| 4A 6- 6 | 47 | 1473. | 1671. | 199. | 77.5 | 405. | 314.6 |
| 4C 6- 6 | 48 | 1577. | 1807. | 229. | 72.0 | 632. | 334.4 |
| 5C 6- 6 | 101 | 1556. | 1642. | 136. | 55.5 | 647. | 332.4 |
| 1C 7- 0 | 110 | 1376. | 1568. | 210. | 74.0 | 654. | 362.6 |
| 23 7- 0 | 111 | 1415. | 1666. | 252. | 70.5 | 626. | 356.6 |
| 3D 7- 0 | 115 | 1466. | 1644. | 288. | 75.0 | 627. | 356.6 |
| 5B 7- 0 | 117 | 1355. | 1553. | 198. | 94.0 | 742. | 325.4 |
| 23 7- 6 | 120 | 1346. | 1609. | 271. | 84.0 | 733. | 365.4 |
| 2C 7- 6 | 121 | 1365. | 1648. | 313. | 98.5 | 715. | 396.7 |
| 26 7- 6 | 122 | 1657. | 1402. | 345. | 109.0 | 624. | 377.4 |
| 3A 7- 6 | 123 | 1344. | 1636. | 237. | 77.0 | 705. | 376.4 |
| 39 7- 6 | 124 | 1410. | 1709. | 292. | 82.0 | 717. | 369.6 |
| 43 7- 6 | 127 | 1414. | 1647. | 279. | 95.0 | 646. | 397.3 |
| 5C 7- 6 | 126 | 1464. | 1634. | 225. | 75.0 | 714. | 377.4 |
| 1C 8- 0 | 131 | 1143. | 1530. | 337. | 104.0 | 654. | 418.0 |
| 2E 8- 0 | 133 | 965. | 1407. | 442. | 120.0 | 666. | 464.6 |
| 3D 8- 0 | 136 | 1257. | 1636. | 379. | 116.0 | 736. | 413.5 |
| 5B 8- 0 | 136 | 1174. | 1446. | 267. | 87.5 | 676. | 346.1 |
| 5C 8- 0 | 134 | 1326. | 1548. | 272. | 98.5 | 726. | 401.3 |
| 1C 8- 6 | 141 | 1616. | 1446. | 430. | 101.0 | 511. | 428.6 |
| 1D 8- 6 | 142 | 666. | 1262. | 456. | 85.0 | 514. | 417.0 |
| 2C 8- 6 | * * * * * 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 | 146 | 474. | 1367. | 388. | 90.5 | 596. | 414.6 |
| 3D 9- 3 | 154 | 426. | 1396. | 468. | 143.0 | 606. | 442.0 |
| 4C 9- 3 | 155 | 444. | 1358. | 354. | 109.0 | 544. | 436.0 |
| 1010- 0 | 156 | 625. | 1042. | 416. | 206.0 | 726. | 461.6 |
| 4810- 0 | 157 | 644. | 1140. | 346. | 148.0 | 597. | 454.0 |
| 5010- 0 | 157 | 766. | 1053. | 346. | 167.0 | 754. | 366.3 |
| 2A11- 0 | 166 | 566. | 762. | 196. | 174.0 | 647. | 311.0 |
| 4C11- 0 | 170 | 666. | 1036. | 375. | 163.0 | 461. | 446.0 |
| 1011- 6 | 172 | 312. | 748. | 437. | 201.0 | 546. | 367.6 |

RUM 42605C HEATER RJD STATISTICAL DATA

| FILE# | IN-TIME TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|-------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 675.6 | 611.9 | 636.0 | 681.5 | 620.4 | 640.0 | 8.5 | 7.0 | 7.9 |
| 24 | 907.6 | 821.1 | 874.3 | 932.6 | 860.3 | 896.8 | 10.0 | 14.0 | 17.0 |
| 34 | 1242.3 | 1097.2 | 1170.0 | 1297.4 | 1164.0 | 1224.7 | 40.0 | 32.0 | 35.5 |
| 40 | 1369.5 | 1317.5 | 1347.7 | 1466.9 | 1408.7 | 1441.4 | 55.0 | 43.0 | 47.1 |
| 60 | 1410.4 | 1403.1 | 1411.3 | 1531.5 | 1549.5 | 1560.3 | 64.5 | 48.5 | 54.3 |
| 67 | 1623.5 | 1490.0 | 1560.2 | 1748.8 | 1637.4 | 1695.6 | 72.5 | 48.0 | 61.5 |
| 70 | 1600.5 | 1410.1 | 1544.1 | 1831.4 | 1544.1 | 1727.1 | 91.0 | 47.5 | 70.3 |
| 71 | 1557.6 | 1467.4 | 1530.3 | 1749.4 | 1671.2 | 1736.2 | 75.0 | 55.0 | 67.6 |
| 72 | 1526.6 | 1513.6 | 1519.5 | 1722.9 | 1706.2 | 1714.6 | 71.5 | 65.0 | 68.3 |
| 74 | 1574.6 | 1413.2 | 1500.6 | 1738.6 | 1597.1 | 1674.8 | 119.0 | 55.5 | 64.4 |
| 75 | 1542.4 | 1466.5 | 1525.5 | 1770.4 | 1614.5 | 1690.8 | 105.0 | 38.0 | 71.3 |
| 76 | 1544.4 | 1493.6 | 1528.1 | 1747.7 | 1628.7 | 1697.3 | 120.0 | 44.5 | 70.5 |
| 77 | 1564.2 | 1425.7 | 1510.2 | 1816.4 | 1610.1 | 1713.5 | 118.0 | 68.5 | 64.7 |
| 78 | 1571.3 | 1420.5 | 1509.0 | 1824.8 | 1640.7 | 1727.2 | 126.0 | 55.5 | 64.8 |
| 88 | 1452.3 | 1184.3 | 1324.2 | 1716.3 | 1411.9 | 1617.2 | 94.0 | 62.6 | 77.8 |
| 90 | 1410.6 | 1020.4 | 1234.4 | 1708.5 | 1402.3 | 1631.9 | 109.0 | 75.0 | 50.7 |
| 96 | 1323.4 | 967.8 | 1234.4 | 1673.4 | 1406.6 | 1562.2 | 120.0 | 67.5 | 101.6 |
| 102 | 1117.4 | 600.2 | 1061.1 | 1490.2 | 1261.9 | 1412.0 | 119.0 | 75.0 | 51.3 |
| 114 | 1007.6 | 614.5 | 860.3 | 1346.0 | 1123.4 | 1294.0 | 148.0 | 54.0 | 113.5 |
| 120 | 842.5 | 623.5 | 750.4 | 1280.7 | 1018.1 | 1147.0 | 208.0 | 64.5 | 161.5 |
| 132 | 660.3 | 502.4 | 574.3 | 1035.0 | 761.8 | 944.0 | 179.0 | 157.0 | 168.3 |
| 135 | 634.4 | 311.6 | 457.5 | 990.3 | 746.3 | 852.4 | 201.0 | 162.0 | 176.6 |

| FILE# | TEMP ABS. (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|-------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 174.6 | 60.5 | 74.0 | 634.7 | 611.0 | 620.8 | 16.9 | 13.5 | 14.5 |
| 24 | 241.2 | 15.3 | 24.5 | 750.2 | 720.3 | 730.7 | 43.0 | 42.4 | 44.4 |
| 34 | 671.0 | 52.1 | 67.7 | 835.6 | 782.4 | 804.8 | 102.0 | 91.1 | 97.8 |
| 40 | 111.0 | 72.1 | 93.7 | 883.0 | 826.6 | 867.8 | 147.9 | 141.9 | 145.3 |
| 60 | 165.4 | 135.2 | 149.8 | 892.1 | 774.0 | 828.5 | 215.9 | 206.4 | 211.2 |
| 67 | 169.5 | 140.6 | 149.3 | 946.2 | 864.5 | 902.4 | 255.9 | 250.7 | 253.7 |
| 70 | 231.1 | 120.0 | 163.0 | 942.1 | 838.6 | 898.2 | 284.9 | 278.3 | 280.2 |
| 71 | 257.8 | 153.8 | 205.9 | 961.1 | 842.5 | 909.9 | 290.7 | 274.7 | 285.7 |
| 72 | 204.5 | 160.2 | 185.0 | 960.0 | 934.0 | 947.0 | 284.5 | 282.7 | 283.6 |
| 74 | 214.5 | 133.6 | 160.0 | 957.0 | 804.9 | 878.5 | 319.0 | 265.5 | 305.5 |
| 75 | 212.0 | 90.2 | 102.2 | 906.0 | 790.3 | 853.0 | 322.7 | 312.7 | 317.4 |
| 76 | 235.6 | 61.1 | 106.2 | 966.7 | 793.6 | 862.8 | 328.6 | 256.3 | 308.6 |
| 77 | 250.4 | 127.7 | 203.3 | 888.7 | 806.1 | 850.6 | 337.6 | 315.6 | 327.3 |
| 78 | 246.2 | 135.7 | 214.3 | 924.5 | 791.4 | 844.2 | 340.8 | 290.6 | 328.5 |
| 84 | 290.6 | 157.6 | 220.0 | 792.4 | 624.8 | 671.4 | 371.8 | 325.9 | 354.6 |
| 90 | 345.4 | 213.5 | 277.5 | 733.3 | 623.8 | 707.4 | 308.7 | 351.0 | 362.4 |
| 96 | 441.8 | 266.4 | 331.2 | 737.6 | 654.1 | 704.1 | 418.8 | 398.1 | 400.9 |
| 102 | 455.7 | 355.6 | 440.4 | 1129.0 | 511.2 | 556.6 | 435.3 | 414.6 | 425.2 |
| 114 | 467.8 | 216.3 | 347.7 | 1129.0 | 581.4 | 634.6 | 443.0 | 345.0 | 415.6 |
| 120 | 474.1 | 262.6 | 346.6 | 1753.7 | 435.2 | 622.7 | 454.9 | 332.4 | 415.3 |
| 132 | 375.3 | 192.6 | 284.7 | 697.2 | 467.0 | 628.0 | 444.0 | 245.3 | 315.6 |
| 135 | 404.1 | 254.3 | 354.4 | 609.0 | 286.6 | 501.3 | 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 SEALET 21 RJD BUNDLE TEST SERIES
 RUN NUMBER 42305D

| ROD/ELEV | CHAM. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURBIDITY TIME (SECONDS) | QUENCH TEMPERATURE (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. | 93.0 | 919. | 271.8 |
| 2D 6-2 | 50 | 1542. | 1735. | 193. | 55.5 | 813. | 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. | 133.0 | 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 |
| ** B A J T H E R M O C O U P L E D A T A * | | | | | | | |
| 3B 5-4 | 82 | 1465. | 1669. | 204. | 133.0 | 870. | 337.6 |
| 1D 6-5 | 84 | 1551. | 1755. | 205. | 57.0 | 846. | 343.6 |
| 2D 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. | 1642. | 250. | 93.5 | 902. | 345.8 |
| 3D 6-6 | 98 | 1565. | 1798. | 232. | 155.0 | 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 | 111 | 1441. | 1734. | 294. | 84.0 | 864. | 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. | 94.0 | 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. | 96.5 | 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. | 134.0 | 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. | 39.5 | 733. | 432.9 |
| 5C 8-0 | 140 | 1337. | 1618. | 281. | 138.0 | 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 |
| 1010-0 | 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. | 185.0 | 655. | 378.7 |
| 4C11-0 | 169 | 671. | 1096. | 426. | 191.0 | 547. | 468.0 |
| 1011-6 | 170 | 321. | 742. | 421. | 240.0 | 603. | 385.9 |

SUN 423055 HEATER KJ3 STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 726.3 | 622.0 | 684.5 | 729.6 | 606.8 | 689.1 | 17.5 | 4.0 | 5.0 |
| 24 | 871.0 | 847.7 | 860.1 | 893.3 | 879.9 | 886.1 | 19.0 | 14.0 | 17.3 |
| 39 | 1242.3 | 1111.3 | 1156.5 | 1506.9 | 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 | 1571.1 | 1608.8 | 81.5 | 55.5 | 70.7 |
| 57 | 1500.5 | 1472.2 | 1518.5 | 1770.9 | 1637.4 | 1685.9 | 63.5 | 63.5 | 73.2 |
| 70 | 1612.5 | 1527.0 | 1569.8 | 1815.7 | 1733.0 | 1774.3 | 91.0 | 69.5 | 79.8 |
| 71 | 1552.4 | 1522.4 | 1522.4 | 1796.3 | 1794.3 | 1794.3 | 83.5 | 83.5 | 83.5 |
| 72 | 1597.8 | 1371.0 | 1528.5 | 1605.6 | 1600.3 | 1739.9 | 107.0 | 69.5 | 84.0 |
| 74 | 1561.0 | 1427.2 | 1513.5 | 1813.1 | 1637.4 | 1728.6 | 117.0 | 62.5 | 93.4 |
| 75 | 1545.9 | 1465.7 | 1502.1 | 1753.1 | 1639.6 | 1700.2 | 123.0 | 62.5 | 98.7 |
| 76 | 1580.5 | 1475.4 | 1531.3 | 1623.7 | 1663.6 | 1741.3 | 105.0 | 79.5 | 92.7 |
| 77 | 1601.0 | 1462.5 | 1523.5 | 1832.7 | 1640.1 | 1736.2 | 126.0 | 67.0 | 94.1 |
| 78 | 1593.9 | 1458.3 | 1534.7 | 1841.7 | 1670.1 | 1753.1 | 109.0 | 71.0 | 90.9 |
| 84 | 1466.8 | 1318.6 | 1399.1 | 1762.0 | 1517.1 | 1652.6 | 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 | 1327.2 | 932.2 | 955.2 | 1404.4 | 1377.5 | 1344.6 | 185.0 | 111.0 | 130.6 |
| 110 | 874.5 | 610.8 | 720.4 | 1307.9 | 1090.3 | 1183.3 | 221.0 | 163.0 | 187.8 |
| 112 | 670.8 | 581.1 | 612.1 | 1096.4 | 838.5 | 949.6 | 192.0 | 186.0 | 189.7 |
| 113 | 652.9 | 321.0 | 493.1 | 1051.1 | 742.0 | 849.4 | 240.0 | 189.0 | 209.3 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 5.9 | 3.3 | 4.0 | 661.2 | 629.1 | 642.0 | 16.5 | 14.6 | 15.5 |
| 24 | 32.2 | 17.2 | 26.0 | 720.7 | 704.4 | 714.9 | 47.3 | 43.2 | 46.4 |
| 39 | 80.3 | 64.6 | 74.3 | 864.5 | 824.2 | 839.9 | 135.8 | 103.9 | 104.9 |
| 48 | 79.4 | 73.5 | 76.5 | 909.9 | 873.4 | 891.6 | 156.6 | 142.8 | 146.7 |
| 60 | 192.8 | 148.4 | 167.2 | 909.6 | 824.5 | 867.4 | 231.0 | 225.6 | 226.8 |
| 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 | 288.3 | 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 | 299.9 | 305.8 |
| 74 | 258.1 | 158.4 | 215.2 | 927.6 | 699.2 | 841.5 | 339.9 | 292.5 | 318.0 |
| 75 | 224.8 | 173.8 | 198.1 | 933.5 | 662.4 | 880.5 | 333.8 | 314.8 | 323.1 |
| 76 | 272.9 | 154.7 | 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 | 699.6 | 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 | 443.0 | 386.6 | 425.9 |
| 102 | 486.3 | 311.5 | 392.5 | 657.7 | 530.8 | 585.2 | 463.0 | 428.1 | 449.9 |
| 111 | 473.3 | 247.5 | 349.4 | 776.8 | 527.6 | 620.0 | 491.0 | 374.9 | 444.7 |
| 110 | 569.5 | 364.4 | 462.9 | 774.7 | 552.4 | 653.0 | 461.0 | 352.7 | 436.1 |
| 112 | 424.6 | 254.2 | 337.5 | 654.7 | 534.1 | 578.7 | 468.0 | 378.7 | 466.0 |
| 113 | 421.0 | 286.1 | 356.3 | 603.2 | 281.3 | 463.0 | 444.0 | 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 42705 A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 41305E

| ROD/ELEV | CHAN. NU | INITIAL AT FLCCD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|---|--------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 9 | 1153. | 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 | 864. | 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 | 841. | 318.7 |
| 5C 6- 4 | 54 | 1459. | 1684. | 225. | 107.0 | 1072. | 304.2 |
| 5D 6- 4 | 55 | 1455. | 1654. | 159. | 105.0 | 834. | 312.7 |
| 1D 6- 5 | 58 | 1467. | 1653. | 166. | 89.5 | 865. | 290.4 |
| 2A 6- 5 | 59 | 1461. | 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 | 871. | 336.8 |
| 4C 6- 6 | 75 | 1583. | 1797. | 213. | 93.0 | 817. | 341.1 |
| 3C 6- 7 | * * * B A L T H E R P O U C C L P L E D A T A * * | | | | | | |
| 3E 6- 7 | 83 | 1457. | 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. | 356.6 |
| 1C 7- 0 | 93 | 1414. | 1598. | 184. | 59.0 | 864. | 359.0 |
| 2B 7- 0 | 94 | 1460. | 1681. | 221. | 78.0 | 661. | 368.2 |
| 3D 7- 0 | 96 | 1461. | 1744. | 283. | 78.0 | 766. | 349.9 |
| 5B 7- 0 | 103 | 1362. | 1596. | 214. | 79.0 | 624. | 371.0 |
| 2B 7- 6 | 110 | 1356. | 1679. | 283. | 87.5 | 712. | 401.7 |
| 2C 7- 6 | 111 | 1430. | 1709. | 279. | 86.5 | 727. | 374.6 |
| 2E 7- 6 | 113 | 1127. | 1473. | 346. | 79.0 | 670. | 392.5 |
| 3A 7- 6 | * * * B A L T H E R P O U C C L 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 | 714. | 357.0 |
| 5C 7- 6 | 122 | 1425. | 1667. | 242. | 102.0 | 762. | 388.5 |
| 1C 8- 0 | 124 | 1154. | 1469. | 335. | 116.0 | 700. | 426.0 |
| 2E 8- 0 | 126 | 972. | 1315. | 343. | 129.0 | 666. | 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 | 1265. | 1628. | 338. | 128.0 | 716. | 414.0 |
| 1C 8- 6 | 135 | 653. | 1404. | 451. | 116.0 | 540. | 448.0 |
| 1D 8- 6 | 136 | 850. | 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 | 694. | 419.0 |
| 3D 9- 3 | 150 | 854. | 1382. | 483. | 148.0 | 646. | 439.3 |
| 4C 9- 3 | 152 | 1000. | 1455. | 455. | 144.0 | 596. | 448.0 |
| 1010- 0 | 157 | 611. | 1082. | 451. | 191.0 | 563. | 460.8 |
| 4810- 0 | 164 | 665. | 1253. | 387. | 169.0 | 621. | 456.9 |
| 5010- 0 | 166 | 720. | 1072. | 352. | 188.0 | 754. | 349.2 |
| 2411- 0 | 168 | 572. | 745. | 174. | 217.0 | 516. | 340.4 |
| 4011- 0 | 169 | 668. | 1080. | 412. | 176.0 | 557. | 450.6 |
| 1011- 6 | 171 | 313. | 754. | 440. | 203.0 | 553. | 429.9 |

KUN 41305E HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 662.4 | 635.0 | 653.3 | 673.1 | 645.7 | 653.6 | 8.0 | 8.0 | 8.0 |
| 24 | 925.7 | 850.0 | 840.0 | 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 | 46.0 | 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 | 1767.4 | 1778.0 | 79.0 | 67.0 | 74.7 |
| 73 | 1484.6 | 1484.6 | 1464.6 | 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 | 1592.1 | 1459.3 | 1475.4 | 1655.9 | 1650.5 | 1654.0 | 117.0 | 103.0 | 107.5 |
| 76 | 1547.6 | 1459.3 | 1466.0 | 1769.8 | 1606.8 | 1680.4 | 107.0 | 76.5 | 97.7 |
| 77 | 1549.1 | 1480.7 | 1507.0 | 1763.1 | 1647.2 | 1705.9 | 106.0 | 66.0 | 95.5 |
| 78 | 1583.3 | 1440.0 | 1521.1 | 1801.0 | 1641.7 | 1720.6 | 105.0 | 76.0 | 88.8 |
| 74 | 1558.9 | 1490.0 | 1523.2 | 1787.6 | 1671.2 | 1728.4 | 105.0 | 76.5 | 68.7 |
| 80 | 1539.4 | 1432.5 | 1490.3 | 1811.2 | 1647.2 | 1720.8 | 111.0 | 103.0 | 106.8 |
| 81 | 1524.8 | 1524.6 | 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 | 54.0 | 75.3 |
| 90 | 1491.9 | 1126.6 | 1335.3 | 1783.2 | 1471.9 | 1648.1 | 135.0 | 75.0 | 97.0 |
| 96 | 1300.2 | 972.0 | 1200.4 | 1700.6 | 1315.2 | 1580.0 | 144.0 | 104.0 | 121.4 |
| 102 | 1442.6 | 790.5 | 1032.2 | 1749.7 | 1009.9 | 1440.1 | 142.0 | 84.5 | 119.2 |
| 111 | 999.6 | 766.7 | 870.1 | 1469.8 | 1119.3 | 1301.5 | 180.0 | 116.0 | 153.6 |
| 120 | 1073.5 | 620.2 | 743.6 | 1489.1 | 1001.6 | 1204.0 | 191.0 | 134.0 | 176.4 |
| 132 | 608.2 | 504.8 | 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 WISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 10.7 | 9.6 | 10.3 | 617.9 | 588.3 | 602.4 | 20.9 | 16.4 | 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 | 129.4 | 142.7 | 875.4 | 841.1 | 853.2 | 222.8 | 214.0 | 219.9 |
| 67 | 190.5 | 142.2 | 172.3 | 929.5 | 834.3 | 870.9 | 269.4 | 253.8 | 262.6 |
| 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 | 848.3 | 333.3 | 275.6 | 311.6 |
| 77 | 214.0 | 150.3 | 175.8 | 922.8 | 710.2 | 812.2 | 345.0 | 296.4 | 323.5 |
| 78 | 250.4 | 141.0 | 169.5 | 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 | 375.6 | 396.3 |
| 96 | 433.8 | 334.0 | 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 | 595.0 | 457.1 | 407.0 | 430.5 |
| 120 | 494.5 | 215.6 | 410.4 | 782.2 | 546.1 | 638.0 | 467.0 | 333.4 | 430.8 |
| 132 | 411.8 | 173.6 | 266.9 | 632.1 | 518.2 | 580.9 | 450.6 | 315.2 | 366.5 |
| 138 | 440.3 | 241.5 | 340.9 | 552.5 | 533.3 | 542.9 | 441.3 | 425.9 | 435.6 |

41305E-3

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 42705 A

FLECHT SEASET 21 RJD BUNDLE TEST SERIES

RUN NUMBER 42105F

| 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 | 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. | 38.0 | 287. | 382.0 |
| 2D 6- 3 | 39 | 1466. | 1653. | 187. | 86.5 | 815. | 283.7 |
| 17 6- 4 | 46 | 1419. | 1587. | 168. | 119.0 | 918. | 275.7 |
| 3D 6- 4 | 50 | 1458. | 1740. | 282. | 38.0 | 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. | 151.0 | 893. | 286.8 |
| 2A 6- 5 | 59 | 1457. | 1595. | 138. | 38.0 | 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. | 34.5 | 1093. | 310.4 |
| 3E 6- 6 | 70 | 1439. | 1615. | 176. | 110.0 | 1065. | 303.4 |
| 4C 6- 6 | 73 | 1572. | 1729. | 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. | 37.0 | 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. | 53.5 | 724. | 368.8 |
| 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 | 642. | 397.0 |
| 2E 8- 0 | 136 | 1058. | 1355. | 297. | 36.5 | 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. | 35.5 | 662. | 398.9 |
| 1C 8- 6 | 145 | 1024. | 1398. | 374. | 39.5 | 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 |
| 5B 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 TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 1450.2 | 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 | 73.5 | 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 | 73.5 | 75.5 | 77.0 |
| 72 | 1441.9 | 1346.7 | 1394.3 | 1707.3 | 1574.4 | 1640.8 | 79.0 | 91.5 | 95.3 |
| 73 | 1424.8 | 1360.3 | 1392.5 | 1666.8 | 1594.9 | 1630.8 | 107.0 | 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 | 1630.2 | 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 | 73.5 | 53.0 | 62.7 |
| 90 | 1486.9 | 1122.4 | 1386.0 | 1720.7 | 1531.0 | 1579.5 | 86.5 | 63.5 | 73.5 |
| 96 | 1348.8 | 1058.3 | 1251.6 | 1674.5 | 1447.8 | 1521.5 | 98.0 | 65.0 | 88.5 |
| 102 | 1173.3 | 834.4 | 1065.9 | 1554.9 | 1355.8 | 1408.5 | 124.0 | 66.0 | 100.7 |
| 111 | 1331.5 | 785.7 | 920.8 | 1426.9 | 1077.2 | 1252.4 | 176.0 | 126.0 | 149.6 |
| 120 | 881.0 | 636.2 | 789.8 | 1310.0 | 795.0 | 1165.1 | 188.0 | 141.0 | 161.5 |
| 132 | 692.0 | 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 | 191.0 | 180.0 | 180.5 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 859.4 | 897.1 | 252.5 | 240.6 | 247.3 |
| 70 | 197.8 | 134.4 | 159.9 | 906.3 | 286.6 | 592.7 | 535.0 | 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 | 274.4 | 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 | 415.7 | 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 | 343.7 | 573.2 | 550.3 | 561.8 | 448.0 | 436.9 | 442.4 |

42105F-3

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 | 1.273 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 NUMBER 42606A

| ROD - LEV | 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 | 1105. | 1265. | 161. | 45.5 | 900. | 98.9 |
| 4C 3- 3 | 11 | 1104. | 1306. | 142. | 33.0 | 944. | 95.9 |
| 1C 4- 0 | 14 | 1311. | 1532. | 221. | 54.0 | 903. | 159.6 |
| 2A 5- 0 | 17 | 1353. | 1667. | 314. | 86.5 | 853. | 251.9 |
| 2A 5- 7 | 21 | 1409. | 1795. | 327. | 88.5 | 981. | 313.6 |
| 13 5- 2 | 30 | 1401. | 1922. | 461. | 120.0 | 1002. | 341.6 |
| 23 5- 2 | 33 | 1574. | 2046. | 472. | 102.0 | 924. | 392.8 |
| 30 5- 2 | 38 | 1541. | 2082. | 491. | 96.5 | 945. | 356.6 |
| 5C 5- 2 | 51 | 1522. | 1886. | 364. | 70.5 | 997. | 372.6 |
| 13 5- 3 | 53 | 1440. | 1905. | 459. | 122.0 | 1009. | 404.8 |
| 48 5- 3 | 58 | 1514. | 2030. | 479. | 102.0 | 927. | 413.7 |
| 50 5- 3 | 59 | 1484. | 1948. | 458. | 103.0 | 940. | 403.6 |
| 2A 5- 4 | 70 | 1441. | 1927. | 436. | 105.0 | 934. | 419.7 |
| 33 5- 4 | 75 | 1500. | 2086. | 505. | 101.0 | 1030. | 410.4 |
| 33 5- 6 | 79 | 1542. | 2085. | 542. | 107.0 | 809. | 441.5 |
| 20 5- 5 | 84 | 1503. | 2068. | 505. | 104.0 | 847. | 425.7 |
| 3C 5- 5 | 85 | 1502. | 2115. | 533. | 98.5 | 951. | 424.6 |
| 32 5- 5 | 86 | 1514. | 1990. | 476. | 121.0 | 1014. | 414.7 |
| 3C 5- 6 | 89 | 1504. | 2108. | 544. | 106.0 | 930. | 436.7 |
| 4A 5- 6 | 97 | 1453. | 1945. | 492. | 120.0 | 967. | 437.4 |
| 30 6- 0 | 98 | 1202. | 1819. | 618. | 131.0 | 824. | 561.0 |
| 5C 6- 6 | 101 | 1481. | 1846. | 366. | 71.5 | 961. | 415.7 |
| 1C 7- 0 | 110 | 1405. | 1800. | 395. | 95.0 | 747. | 400.0 |
| 23 7- 0 | 111 | 1420. | 1764. | 338. | 57.5 | 704. | 407.8 |
| 30 7- 0 | 115 | 1440. | 1856. | 409. | 87.0 | 700. | 405.0 |
| 58 7- 0 | 117 | 1330. | 1775. | 445. | 121.0 | 777. | 476.7 |
| 23 7- 6 | 121 | 1377. | 1889. | 512. | 99.5 | 840. | 518.1 |
| 2C 7- 6 | 121 | 1377. | 1889. | 512. | 99.5 | 840. | 518.1 |
| 2E 7- 6 | 122 | 1141. | 1703. | 511. | 83.5 | 762. | 505.7 |
| 3A 7- 6 | 123 | 1209. | 1761. | 472. | 118.0 | 814. | 531.9 |
| 33 7- 6 | 124 | 1411. | 1945. | 534. | 105.0 | 835. | 523.7 |
| 43 7- 6 | 127 | 1374. | 1925. | 546. | 120.0 | 804. | 529.0 |
| 5C 7- 6 | 128 | 1251. | 1724. | 474. | 136.0 | 866. | 499.9 |
| 1C 8- 0 | 131 | 1154. | 1730. | 571. | 121.0 | 743. | 560.7 |
| 2E 8- 0 | 133 | 703. | 1324. | 621. | 154.0 | 672. | 569.0 |
| 4C 8- 6 | 136 | 1525. | 2092. | 536. | 103.0 | 931. | 434.6 |
| 58 8- 0 | 138 | 1140. | 1689. | 549. | 119.0 | 811. | 554.0 |
| 5C 8- 0 | 139 | 1104. | 1633. | 529. | 136.0 | 811. | 540.0 |
| 1C 8- 6 | 141 | 901. | 1547. | 566. | 103.0 | 811. | 504.0 |
| 10 8- 6 | 142 | 802. | 1391. | 548. | 74.5 | 811. | 500.0 |
| 2C 9- 6 | 143 | 1030. | 1632. | 602. | 103.0 | 692. | 574.0 |
| 48 9- 6 | 145 | 1096. | 1612. | 516. | 115.0 | 633. | 592.7 |
| 50 9- 6 | 148 | 955. | 1486. | 531. | 93.0 | 800. | 546.0 |
| 30 9- 3 | 154 | 851. | 1506. | 656. | 149.0 | 694. | 605.0 |
| 4C 9- 3 | 156 | 951. | 1527. | 576. | 136.0 | 700. | 598.0 |
| 1010- 0 | 161 | 551. | 1146. | 556. | 178.0 | 644. | 551.9 |
| 4410- 0 | 164 | 810. | 1356. | 540. | 137.0 | 610. | 631.9 |
| 5010- 0 | 167 | 704. | 1245. | 536. | 183.0 | 720. | 518.0 |
| 2411- 0 | 168 | 530. | 871. | 340. | 183.0 | 620. | 475.0 |
| 4C11- 0 | 170 | 626. | 1111. | 485. | 159.0 | 440. | 613.0 |
| 1311- 6 | 172 | 342. | 880. | 488. | 185.0 | 621. | 435.4 |

MUN 42606A HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 573.0 | 540.2 | 553.8 | 596.2 | 568.4 | 580.4 | 9.5 | 8.5 | 8.9 |
| 24 | 859.6 | 783.2 | 819.4 | 924.3 | 857.2 | 886.1 | 20.5 | 26.0 | 20.1 |
| 34 | 1164.1 | 1068.2 | 1112.4 | 1305.8 | 1229.6 | 1265.8 | 40.5 | 33.0 | 36.0 |
| 40 | 1322.7 | 1223.2 | 1273.5 | 1563.6 | 1474.1 | 1515.0 | 69.6 | 46.0 | 55.1 |
| 60 | 1434.2 | 1303.5 | 1359.2 | 1753.1 | 1591.7 | 1663.6 | 93.5 | 43.0 | 73.0 |
| 67 | 1556.1 | 1429.5 | 1488.2 | 1954.5 | 1795.4 | 1853.2 | 95.5 | 82.5 | 87.8 |
| 70 | 1543.9 | 1493.2 | 1566.2 | 2048.3 | 1894.9 | 1969.9 | 99.6 | 86.5 | 94.6 |
| 71 | 1569.3 | 1472.1 | 1547.4 | 2065.8 | 1894.4 | 1987.0 | 119.0 | 84.5 | 99.1 |
| 72 | 1600.8 | 1478.8 | 1539.9 | 2072.8 | 1835.0 | 1927.9 | 130.0 | 71.0 | 50.7 |
| 74 | 1590.7 | 1426.0 | 1543.8 | 2042.1 | 1845.1 | 1997.4 | 120.0 | 76.5 | 96.5 |
| 75 | 1586.4 | 1446.4 | 1537.4 | 2042.7 | 1905.1 | 2015.6 | 122.0 | 90.5 | 102.9 |
| 76 | 1584.2 | 1472.1 | 1530.3 | 2106.8 | 1926.9 | 2026.1 | 132.0 | 84.5 | 108.4 |
| 77 | 1562.4 | 1420.4 | 1523.7 | 2115.2 | 1912.0 | 2023.5 | 139.0 | 98.5 | 115.4 |
| 78 | 1564.6 | 1522.5 | 1510.7 | 2108.0 | 1846.3 | 2004.0 | 131.0 | 71.5 | 106.5 |
| 84 | 1447.7 | 1252.7 | 1360.2 | 1879.1 | 1635.4 | 1730.8 | 138.0 | 78.5 | 54.2 |
| 90 | 1411.2 | 1191.5 | 1308.1 | 1945.3 | 1675.5 | 1810.9 | 138.0 | 65.5 | 106.4 |
| 96 | 1266.4 | 702.7 | 1136.2 | 1871.1 | 1323.6 | 1699.7 | 194.0 | 81.5 | 120.6 |
| 102 | 1046.3 | 602.5 | 876.1 | 1669.0 | 1350.9 | 1524.4 | 136.0 | 61.0 | 94.8 |
| 111 | 963.1 | 704.8 | 877.4 | 1549.5 | 1270.3 | 1420.4 | 152.0 | 94.5 | 127.7 |
| 120 | 816.4 | 590.7 | 698.1 | 1381.3 | 1146.3 | 1276.7 | 186.0 | 132.0 | 168.8 |
| 132 | 626.3 | 493.5 | 551.7 | 1111.0 | 870.6 | 945.9 | 219.0 | 154.0 | 186.8 |
| 136 | 576.6 | 391.5 | 469.2 | 1065.5 | 874.9 | 971.6 | 200.0 | 166.0 | 185.4 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 26.2 | 23.2 | 26.7 | 594.8 | 567.1 | 578.7 | 17.5 | 10.1 | 10.3 |
| 24 | 74.0 | 61.5 | 66.7 | 813.9 | 759.4 | 778.3 | 39.9 | 34.9 | 36.5 |
| 34 | 161.1 | 141.7 | 154.4 | 943.8 | 814.6 | 886.1 | 99.9 | 55.9 | 98.2 |
| 48 | 267.0 | 220.7 | 237.5 | 1062.3 | 903.3 | 985.1 | 159.8 | 131.4 | 147.3 |
| 60 | 336.5 | 254.1 | 304.4 | 852.6 | 801.6 | 824.7 | 256.8 | 250.6 | 253.2 |
| 67 | 398.4 | 320.5 | 359.1 | 977.4 | 934.2 | 947.6 | 319.3 | 312.6 | 315.8 |
| 70 | 454.3 | 401.7 | 423.7 | 965.7 | 923.3 | 941.2 | 354.6 | 342.7 | 350.2 |
| 71 | 470.4 | 407.0 | 434.7 | 1034.0 | 895.9 | 939.4 | 369.6 | 344.6 | 356.8 |
| 72 | 472.6 | 331.8 | 414.0 | 1037.2 | 902.5 | 948.1 | 381.6 | 350.7 | 368.0 |
| 74 | 491.4 | 364.4 | 433.0 | 1034.8 | 826.3 | 900.7 | 401.8 | 372.6 | 386.1 |
| 75 | 500.3 | 428.4 | 470.2 | 1036.7 | 885.5 | 937.4 | 413.7 | 345.6 | 403.8 |
| 76 | 522.6 | 432.2 | 487.7 | 1038.5 | 899.6 | 949.6 | 419.7 | 343.8 | 412.6 |
| 77 | 532.6 | 474.9 | 501.9 | 1014.4 | 896.8 | 945.0 | 433.6 | 414.7 | 424.2 |
| 78 | 544.0 | 362.7 | 453.3 | 987.8 | 872.4 | 910.1 | 441.6 | 415.7 | 434.1 |
| 84 | 442.3 | 338.2 | 410.6 | 809.7 | 680.8 | 732.9 | 494.0 | 473.9 | 482.4 |
| 90 | 540.6 | 422.6 | 502.0 | 873.6 | 722.5 | 922.9 | 531.9 | 445.9 | 515.1 |
| 96 | 620.9 | 458.3 | 511.5 | 842.2 | 671.9 | 787.9 | 589.0 | 546.0 | 561.3 |
| 102 | 650.7 | 401.7 | 540.3 | 692.1 | 579.2 | 623.0 | 596.0 | 568.0 | 583.4 |
| 111 | 652.5 | 450.8 | 542.9 | 456.7 | 521.5 | 634.9 | 617.0 | 425.5 | 574.6 |
| 120 | 600.5 | 444.3 | 516.4 | 732.1 | 617.7 | 674.5 | 631.9 | 518.9 | 586.8 |
| 132 | 404.7 | 340.3 | 344.3 | 746.9 | 495.7 | 534.4 | 613.0 | 341.7 | 466.5 |
| 136 | 572.5 | 403.0 | 462.3 | 621.3 | 528.1 | 565.4 | 628.0 | 425.4 | 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 42606 A

FLECHT SEASET 21 KJG BUNDLE TEST SERIES

KJG NUMBER 42306B

| ROD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE AT (DEG F) | TRAVELING TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|----------|--------------------------------|-----------------------------------|------------------------------|--------------------------------|----------------------------------|-----------------------------|
| 2A 3-3 | 9 | 1092. | 1245. | 153. | 39.5 | 807. | 107.9 |
| 4C 3-3 | 11 | 1236. | 1374. | 138. | 32.5 | 882. | 105.0 |
| 1C 4-0 | 14 | 1310. | 1477. | 186. | 42.5 | 851. | 156.9 |
| 2A 5-0 | 17 | 1365. | 1680. | 315. | 73.0 | 768. | 266.9 |
| 2A 5-7 | 21 | 1478. | 1862. | 384. | 116.0 | 880. | 340.7 |
| 1C 6-2 | 50 | 1431. | 1806. | 375. | 106.0 | 898. | 404.7 |
| 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. | 326. | 100.0 | 875. | 380.6 |
| 4B 6-3 | 68 | 1532. | 1944. | 412. | 116.0 | 826. | 440.7 |
| 5D 6-3 | 69 | 1429. | 1845. | 466. | 149.0 | 857. | 476.6 |
| 2A 6-4 | 70 | 1439. | 1859. | 425. | 148.0 | 872. | 440.6 |
| 2D 6-4 | 72 | 1534. | 1948. | 413. | 106.0 | 883. | 421.6 |
| 3B 6-4 | 75 | 1564. | 1999. | 436. | 116.0 | 871. | 449.7 |
| 3C 6-5 | 85 | 1600. | 2048. | 448. | 116.0 | 721. | 449.4 |
| 3E 6-5 | 86 | 1475. | 1878. | 403. | 130.0 | 914. | 423.3 |
| 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 | 886. | 472.6 |
| 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 | 721. | 314.0 |
| 2B 7-0 | 111 | 1459. | 1804. | 346. | 103.0 | 741. | 325.6 |
| 3D 7-0 | 115 | 1498. | 1875. | 376. | 103.0 | 782. | 311.9 |
| 5B 7-0 | 117 | 1359. | 1735. | 376. | 115.0 | 721. | 320.4 |
| 2B 7-6 | 120 | 1474. | 1879. | 455. | 116.0 | 812. | 368.0 |
| 2C 7-6 | 121 | 1440. | 1913. | 473. | 113.0 | 810. | 362.8 |
| 2E 7-6 | 122 | 1270. | 1660. | 391. | 94.5 | 703. | 370.6 |
| 3A 7-6 | 123 | 1398. | 1840. | 442. | 116.0 | 840. | 350.5 |
| 3B 7-6 | 124 | 1446. | 1925. | 479. | 113.0 | 847. | 327.4 |
| 4B 7-6 | 127 | 1448. | 1901. | 433. | 113.0 | 830. | 357.5 |
| 5C 7-6 | 128 | 1407. | 1842. | 435. | 110.0 | 822. | 349.4 |
| 1C 8-0 | 131 | 1213. | 1753. | 540. | 118.0 | 784. | 341.9 |
| 2E 8-0 | 133 | 1070. | 1616. | 545. | 109.0 | 813. | 344.0 |
| 3D 8-0 | 136 | 1290. | 1621. | 561. | 116.0 | 822. | 362.0 |
| 5B 8-0 | 138 | 1171. | 1675. | 503. | 114.0 | 856. | 351.5 |
| 5C 8-0 | 139 | 1293. | 1780. | 487. | 127.0 | 784. | 367.1 |
| 1C 8-6 | 141 | 1033. | 1564. | 331. | 118.0 | 844. | 319.0 |
| 1D 8-6 | 142 | 789. | 1361. | 372. | 150.0 | 834. | 616.0 |
| 2C 8-6 | 143 | 1120. | 1666. | 346. | 116.0 | 852. | 323.0 |
| 4B 8-6 | 145 | 1208. | 1771. | 363. | 116.0 | 720. | 316.4 |
| 5D 8-6 | 148 | 1051. | 1467. | 416. | 94.0 | 533. | 635.4 |
| 3D 9-3 | 154 | 960. | 1523. | 550. | 137.0 | 708. | 623.8 |
| 4C 9-3 | 156 | 1051. | 1540. | 489. | 113.0 | 859. | 328.0 |
| 1D10-0 | 161 | 588. | 1211. | 623. | 199.0 | 875. | 664.0 |
| 4B10-0 | 164 | 912. | 1453. | 441. | 116.0 | 827. | 661.0 |
| 5D10-0 | 167 | 737. | 1252. | 514. | 232.0 | 752. | 615.9 |
| 2A11-0 | 168 | 573. | 843. | 270. | 138.0 | 845. | 322.8 |
| 4C11-0 | 170 | 688. | 1105. | 416. | 158.0 | 855. | 602.0 |
| 1D11-6 | 172 | 290. | 940. | 650. | 271.0 | 814. | 344.0 |

RUN 42306B HEATER K30 STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TIRNAKUNJ F.1.4E (DEG F) | | |
|------|----------------------|--------|--------|------------------|--------|--------|--------------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 615.1 | 563.6 | 582.0 | 638.1 | 284.8 | -03.6 | 3.5 | 8.0 | 0.3 |
| 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 | 1242.2 | 1290.2 | 38.5 | 30.5 | 35.0 |
| 48 | 1372.4 | 1264.0 | 1302.9 | 1592.2 | 1473.0 | 1521.7 | 54.0 | 42.5 | 47.8 |
| 60 | 1485.9 | 1350.8 | 1393.1 | 1778.7 | 1614.9 | 1681.4 | 88.5 | 59.5 | 78.8 |
| 67 | 1577.6 | 1465.2 | 1502.7 | 1956.7 | 1845.1 | 1882.1 | 118.0 | 93.0 | 104.1 |
| 70 | 1606.8 | 1435.5 | 1521.0 | 2031.9 | 1820.3 | 1924.3 | 138.0 | 97.0 | 113.2 |
| 71 | 1593.3 | 1415.7 | 1510.1 | 2038.9 | 1801.0 | 1920.2 | 132.0 | 94.5 | 113.9 |
| 72 | 1477.8 | 1420.5 | 1456.1 | 1902.9 | 1786.5 | 1847.2 | 137.0 | 103.9 | 115.6 |
| 74 | 1552.8 | 1430.7 | 1500.8 | 2021.4 | 1804.4 | 1920.5 | 134.0 | 105.0 | 118.0 |
| 75 | 1586.8 | 1429.0 | 1514.2 | 2002.7 | 1790.6 | 1922.5 | 147.0 | 100.0 | 117.4 |
| 76 | 1589.3 | 1433.3 | 1511.1 | 2013.2 | 1832.7 | 1930.0 | 143.0 | 108.0 | 121.9 |
| 77 | 1599.8 | 1432.8 | 1507.8 | 2048.3 | 1824.3 | 1949.0 | 143.0 | 105.0 | 127.0 |
| 78 | 1580.8 | 1406.5 | 1490.5 | 2003.4 | 1856.4 | 1956.1 | 167.0 | 114.0 | 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 | 1828.0 | 118.0 | 80.0 | 105.7 |
| 96 | 1318.9 | 1070.1 | 1240.5 | 1873.4 | 1615.6 | 1754.2 | 120.0 | 87.5 | 113.0 |
| 102 | 1207.6 | 784.3 | 1053.7 | 1770.9 | 1361.4 | 1562.0 | 152.0 | 84.0 | 109.6 |
| 111 | 1050.6 | 664.7 | 947.3 | 1539.8 | 1268.2 | 1414.5 | 173.0 | 94.0 | 148.9 |
| 120 | 912.4 | 588.2 | 745.1 | 1429.1 | 1210.6 | 1355.1 | 202.0 | 116.0 | 170.8 |
| 132 | 688.3 | 494.8 | 583.1 | 1104.7 | 831.3 | 923.4 | 215.0 | 168.0 | 190.3 |
| 138 | 672.0 | 269.9 | 474.6 | 1165.8 | 871.6 | 989.0 | 220.0 | 171.0 | 194.0 |

| ELEV | TEMP RISE (DEG F) | | | WUENCH TEMP (DEG F) | | | JJEEMH F.1.4E (DEG F) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 26.2 | 18.9 | 23.7 | 613.2 | 283.6 | 592.6 | 12.5 | 41.3 | 11.8 |
| 24 | 70.9 | 53.8 | 61.7 | 765.5 | 703.4 | 732.2 | 43.9 | 41.9 | 42.7 |
| 39 | 157.3 | 138.0 | 149.8 | 882.4 | 807.0 | 832.7 | 111.6 | 40.0 | 103.8 |
| 48 | 253.6 | 186.1 | 218.9 | 953.8 | 800.8 | 907.7 | 159.9 | 120.7 | 153.0 |
| 60 | 314.9 | 249.1 | 288.3 | 870.7 | 767.8 | 800.1 | 273.2 | 263.4 | 268.3 |
| 67 | 399.4 | 355.5 | 379.4 | 966.9 | 880.3 | 937.0 | 342.7 | 327.7 | 335.7 |
| 70 | 433.8 | 354.5 | 403.3 | 990.3 | 873.9 | 912.2 | 383.3 | 356.5 | 371.1 |
| 71 | 445.6 | 367.3 | 410.1 | 990.1 | 864.7 | 937.7 | 423.6 | 388.7 | 387.9 |
| 72 | 429.7 | 351.0 | 391.1 | 950.3 | 790.6 | 880.4 | 407.8 | 384.7 | 392.3 |
| 74 | 507.0 | 359.2 | 419.6 | 1099.2 | 865.4 | 865.8 | 436.2 | 403.0 | 424.2 |
| 75 | 465.9 | 356.3 | 408.2 | 971.9 | 852.2 | 892.0 | 476.6 | 380.0 | 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 | 826.6 | 887.5 | 463.3 | 440.6 | 454.4 |
| 78 | 496.1 | 421.9 | 465.6 | 943.6 | 830.9 | 894.4 | 473.7 | 450.7 | 468.2 |
| 84 | 406.8 | 323.1 | 369.8 | 787.6 | 727.6 | 753.9 | 527.0 | 500.2 | 518.8 |
| 90 | 478.9 | 390.5 | 439.4 | 846.7 | 898.7 | 799.0 | 573.5 | 544.4 | 524.9 |
| 96 | 560.6 | 487.1 | 523.7 | 824.3 | 610.0 | 752.5 | 533.6 | 581.0 | 581.3 |
| 102 | 572.1 | 415.5 | 508.3 | 719.7 | 552.0 | 627.3 | 535.9 | 607.4 | 623.2 |
| 111 | 610.6 | 351.0 | 467.1 | 767.1 | 542.9 | 653.2 | 550.9 | 590.3 | 581.8 |
| 120 | 690.0 | 435.3 | 560.0 | 762.0 | 375.2 | 640.7 | 573.0 | 615.4 | 655.4 |
| 132 | 420.3 | 235.4 | 340.4 | 733.7 | 554.7 | 630.6 | 562.0 | 280.0 | 508.0 |
| 138 | 649.9 | 361.5 | 514.4 | 648.5 | 511.1 | 575.0 | 577.0 | 379.7 | 398.0 |

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

PLUME JACKET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 42506C

| ROD/FLW | ORIGIN | RU | INITIAL -1 PLUMB (DEG F) | MAX. 10" TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|---------|--------|-----|--------------------------------|------------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | | 4 | 1070. | 1250. | 180. | 40.5 | 644. | 43.3 |
| 4C 3- 3 | | 11 | 1030. | 1304. | 146. | 31.5 | 600. | 104.0 |
| 1- 4- 0 | | 14 | 1044. | 1559. | 211. | 51.5 | 634. | 156.7 |
| 2A 5- 0 | | 17 | 1007. | 1710. | 303. | 65.0 | 600. | 240.8 |
| 2A 5- 7 | | 21 | 1512. | 1452. | 340. | 102.0 | 600. | 315.5 |
| 1D 5- 2 | | 20 | 1474. | 1770. | 291. | 98.0 | 620. | 348.2 |
| 2D 5- 2 | | 23 | 1444. | 1635. | 330. | 98.5 | 647. | 415.9 |
| 3D 5- 2 | | 26 | 1550. | 1647. | 291. | 99.0 | 744. | 414.0 |
| 4A 6- 2 | | 20 | 1500. | 1609. | 301. | 98.5 | 640. | 406.7 |
| 5C 6- 2 | | 21 | 1470. | 1670. | 302. | 104.0 | 644. | 413.1 |
| 1D 5- 3 | | 23 | 1400. | 1702. | 315. | 97.0 | 657. | 407.7 |
| 2D 5- 3 | | 24 | 1400. | 1614. | 326. | 100.0 | 643. | 415.6 |
| 2A 5- 4 | | 70 | 1400. | 1601. | 321. | 102.0 | 1021. | 340.5 |
| 3A 5- 4 | | 75 | 1370. | 1411. | 332. | 98.5 | 652. | 404.5 |
| 2D 5- 5 | | 24 | 1550. | 1412. | 360. | 98.5 | 637. | 432.7 |
| 3C 5- 5 | | 25 | 1550. | 1448. | 402. | 99.0 | 607. | 416.4 |
| 3E 5- 5 | | 26 | 1535. | 1845. | 311. | 98.0 | 677. | 420.8 |
| 3C 6- 0 | | 45 | 1580. | 2013. | 434. | 100.0 | 655. | 428.7 |
| 3D 6- 0 | | 46 | 1500. | 1901. | 425. | 99.5 | 600. | 440.5 |
| 4A 6- 0 | | 47 | 1470. | 1840. | 367. | 98.5 | 603. | 416.6 |
| 4C 6- 0 | | 48 | 1500. | 1777. | 417. | 98.0 | 640. | 440.6 |
| 5C 6- 0 | | 101 | 1514. | 1803. | 309. | 113.0 | 630. | 433.6 |
| 1C 7- 0 | | 110 | 1424. | 1731. | 302. | 55.0 | 700. | 474.5 |
| 2A 7- 0 | | 111 | 1450. | 1744. | 294. | 43.5 | 723. | 481.9 |
| 3D 7- 0 | | 115 | 1401. | 1797. | 335. | 56.0 | 710. | 440.9 |
| 3A 7- 0 | | 117 | 1370. | 1605. | 310. | 64.5 | 740. | 407.8 |
| 2B 7- 6 | | 120 | 1437. | 1813. | 381. | 70.0 | 742. | 528.7 |
| 2C 7- 6 | | 121 | 1443. | 1803. | 427. | 99.0 | 700. | 541.5 |
| 2E 7- 6 | | 126 | 1440. | 1651. | 261. | 64.5 | 670. | 223.0 |
| 3A 7- 6 | | 123 | 1421. | 1772. | 351. | 64.5 | 614. | 515.9 |
| 3B 7- 6 | | 124 | 1440. | 1837. | 392. | 65.5 | 740. | 524.7 |
| 4A 7- 6 | | 127 | 1440. | 1841. | 407. | 66.0 | 707. | 540.0 |
| 5C 7- 6 | | 128 | 1424. | 1741. | 357. | 81.0 | 604. | 512.7 |
| 1C 7- 0 | | 131 | 1214. | 1710. | 482. | 105.0 | 702. | 573.7 |
| 2E 7- 0 | | 133 | 1041. | 1614. | 527. | 98.5 | 744. | 509.7 |
| 3D 7- 0 | | 136 | 1274. | 1821. | 523. | 102.0 | 607. | 509.4 |
| 5B 7- 0 | | 138 | 1201. | 1624. | 423. | 100.0 | 724. | 502.0 |
| 5C 7- 0 | | 134 | 1330. | 1702. | 417. | 98.0 | 617. | 546.4 |
| 1C 7- 6 | | 141 | 1030. | 1594. | 516. | 100.0 | 574. | 544.0 |
| 1D 7- 6 | | 142 | 777. | 1346. | 571. | 122.0 | 504. | 508.0 |
| 2C 7- 6 | | 143 | 1030. | 1594. | 516. | 100.0 | 574. | 544.0 |
| 4A 7- 6 | | 145 | 1147. | 1500. | 413. | 66.0 | 631. | 606.0 |
| 5D 7- 6 | | 146 | 1047. | 1524. | 476. | 98.0 | 620. | 595.7 |
| 3D 7- 3 | | 154 | 412. | 1521. | 610. | 123.0 | 644. | 609.0 |
| 4C 7- 3 | | 156 | 1010. | 1483. | 467. | 91.0 | 643. | 603.0 |
| 1D10- 0 | | 161 | 964. | 1159. | 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 | 507. | 851. | 284. | 145.0 | 663. | 456.6 |
| 4C11- 0 | | 170 | 674. | 1116. | 442. | 143.0 | 604. | 624.0 |
| 1D11- 6 | | 172 | 301. | 644. | 594. | 186.0 | 502. | 573.4 |

* * * * * T H E R M O C O U P L E D A T A * * * * *

KUN #2500C HEATER RUN STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | | MAX TEMP (DEG F) | | | | TURNAROUND TIME (SEC) | | | |
|------|----------------------|--------|--------|--------|------------------|--------|--------|--------|-----------------------|-------|-------|-------|
| | MAX | MIN | MEAN | STAN | MAX | MIN | MEAN | STAN | MAX | MIN | MEAN | STAN |
| 12 | 647.0 | 502.0 | 541.3 | 541.3 | 650.4 | 583.4 | 610.1 | 610.1 | 9.5 | 7.0 | 7.8 | 7.8 |
| 24 | 896.7 | 610.1 | 756.3 | 756.3 | 956.3 | 675.8 | 815.4 | 815.4 | 14.5 | 14.5 | 16.7 | 16.7 |
| 34 | 1236.5 | 1044.2 | 1149.7 | 1149.7 | 1304.4 | 1257.8 | 1314.2 | 1314.2 | 43.5 | 31.5 | 39.3 | 39.3 |
| 48 | 1376.6 | 1305.6 | 1335.1 | 1335.1 | 1606.8 | 1536.5 | 1568.1 | 1568.1 | 86.0 | 51.5 | 56.1 | 56.1 |
| 60 | 1407.4 | 1342.6 | 1402.3 | 1402.3 | 1777.6 | 1709.6 | 1749.0 | 1749.0 | 99.5 | 65.0 | 83.3 | 83.3 |
| 67 | 1605.5 | 1466.6 | 1533.6 | 1533.6 | 1994.6 | 1840.6 | 1883.9 | 1883.9 | 102.0 | 51.5 | 56.3 | 56.3 |
| 70 | 1592.5 | 1462.9 | 1533.4 | 1533.4 | 2047.1 | 1689.7 | 1932.5 | 1932.5 | 111.0 | 53.5 | 52.5 | 52.5 |
| 71 | 1540.4 | 1400.2 | 1524.9 | 1524.9 | 1993.4 | 1666.6 | 1936.5 | 1936.5 | 106.0 | 52.0 | 101.0 | 101.0 |
| 72 | 1520.9 | 1511.6 | 1516.4 | 1516.4 | 1917.8 | 1915.1 | 1911.6 | 1911.6 | 103.0 | 102.0 | 103.5 | 103.5 |
| 74 | 1577.4 | 1454.6 | 1521.1 | 1521.1 | 1874.5 | 1748.6 | 1825.0 | 1825.0 | 109.0 | 54.0 | 100.1 | 100.1 |
| 75 | 1547.5 | 1467.5 | 1513.3 | 1513.3 | 1931.5 | 1765.3 | 1854.1 | 1854.1 | 100.0 | 77.5 | 94.6 | 94.6 |
| 76 | 1601.2 | 1450.6 | 1540.1 | 1540.1 | 1974.0 | 1783.2 | 1868.2 | 1868.2 | 113.0 | 57.5 | 100.3 | 100.3 |
| 77 | 1595.7 | 1439.4 | 1535.4 | 1535.4 | 1946.0 | 1601.0 | 1893.0 | 1893.0 | 105.0 | 56.0 | 54.3 | 54.3 |
| 78 | 1574.5 | 1410.9 | 1526.7 | 1526.7 | 2013.2 | 1827.0 | 1912.3 | 1912.3 | 113.0 | 66.5 | 55.6 | 55.6 |
| 84 | 1477.4 | 1440.6 | 1456.9 | 1456.9 | 1825.9 | 1539.7 | 1733.8 | 1733.8 | 98.5 | 43.5 | 63.6 | 63.6 |
| 96 | 1445.2 | 1407.6 | 1450.4 | 1450.4 | 1864.4 | 1650.5 | 1790.0 | 1790.0 | 89.5 | 65.5 | 77.5 | 77.5 |
| 102 | 1346.2 | 1094.4 | 1450.6 | 1450.6 | 1821.4 | 1618.4 | 1735.9 | 1735.9 | 104.0 | 64.0 | 166.4 | 166.4 |
| 111 | 1447.2 | 778.6 | 1127.5 | 1127.5 | 1616.4 | 1347.7 | 1530.3 | 1530.3 | 124.0 | 66.0 | 100.1 | 100.1 |
| 114 | 1040.0 | 624.4 | 857.5 | 857.5 | 1521.4 | 1302.7 | 1425.2 | 1425.2 | 146.0 | 81.5 | 104.4 | 104.4 |
| 120 | 905.6 | 563.6 | 754.4 | 754.4 | 1407.7 | 1159.4 | 1240.7 | 1240.7 | 253.0 | 71.0 | 154.7 | 154.7 |
| 132 | 674.4 | 476.3 | 575.3 | 575.3 | 1116.2 | 850.5 | 939.5 | 939.5 | 173.0 | 134.0 | 150.6 | 150.6 |
| 136 | 651.6 | 444.6 | 444.7 | 444.7 | 1103.7 | 850.1 | 960.6 | 960.6 | 5.0 | 144.0 | 165.4 | 165.4 |

| ELEV | TEMP MAX (DEG F) | | | | WUEGMENT TEMP (DEG F) | | | | QUELUM TIME (SEC) | | | |
|------|------------------|-------|-------|-------|-----------------------|-------|--------|--------|-------------------|-------|-------|-------|
| | MAX | MIN | MEAN | STAN | MAX | MIN | MEAN | STAN | MAX | MIN | MEAN | STAN |
| 12 | 21.4 | 13.4 | 16.6 | 16.6 | 637.2 | 263.4 | 606.1 | 606.1 | 12.0 | 6.0 | 10.1 | 10.1 |
| 24 | 60.7 | 54.1 | 54.1 | 54.1 | 765.7 | 736.1 | 759.2 | 759.2 | 42.0 | 31.5 | 40.7 | 40.7 |
| 34 | 100.0 | 145.9 | 104.0 | 104.0 | 888.4 | 643.5 | 870.7 | 870.7 | 105.8 | 53.3 | 100.3 | 100.3 |
| 48 | 204.4 | 210.5 | 207.7 | 207.7 | 965.1 | 684.3 | 923.7 | 923.7 | 162.8 | 124.5 | 157.0 | 157.0 |
| 60 | 370.4 | 366.9 | 368.7 | 368.7 | 916.2 | 841.2 | 857.2 | 857.2 | 256.8 | 246.6 | 252.7 | 252.7 |
| 67 | 307.1 | 337.7 | 366.1 | 366.1 | 1010.5 | 941.1 | 979.0 | 979.0 | 320.6 | 314.6 | 317.6 | 317.6 |
| 70 | 434.6 | 466.6 | 450.4 | 450.4 | 1056.3 | 834.4 | 947.0 | 947.0 | 365.6 | 356.6 | 356.6 | 356.6 |
| 71 | 440.5 | 349.6 | 414.6 | 414.6 | 1023.3 | 675.7 | 953.6 | 953.6 | 372.4 | 354.6 | 363.2 | 363.2 |
| 72 | 406.0 | 304.6 | 345.1 | 345.1 | 1017.5 | 984.2 | 1000.9 | 1000.9 | 350.5 | 356.6 | 354.1 | 354.1 |
| 74 | 334.6 | 240.5 | 287.0 | 287.0 | 1026.6 | 626.0 | 928.7 | 928.7 | 415.4 | 346.4 | 380.3 | 380.3 |
| 75 | 357.6 | 230.6 | 294.1 | 294.1 | 982.4 | 634.1 | 913.7 | 913.7 | 419.6 | 344.5 | 414.5 | 414.5 |
| 76 | 372.6 | 233.2 | 302.4 | 302.4 | 1027.7 | 623.4 | 924.6 | 924.6 | 441.6 | 411.6 | 425.6 | 425.6 |
| 77 | 402.3 | 310.4 | 362.6 | 362.6 | 976.9 | 600.5 | 934.5 | 934.5 | 447.7 | 354.1 | 436.6 | 436.6 |
| 78 | 433.7 | 244.7 | 339.0 | 339.0 | 963.2 | 610.7 | 910.4 | 910.4 | 500.9 | 464.4 | 480.4 | 480.4 |
| 84 | 437.3 | 344.4 | 374.4 | 374.4 | 976.4 | 704.3 | 957.0 | 957.0 | 541.5 | 487.4 | 524.2 | 524.2 |
| 96 | 527.6 | 416.6 | 465.4 | 465.4 | 1171.1 | 723.4 | 980.7 | 980.7 | 576.9 | 541.4 | 584.1 | 584.1 |
| 102 | 570.4 | 413.1 | 491.8 | 491.8 | 644.6 | 578.6 | 617.1 | 617.1 | 605.0 | 504.0 | 564.2 | 564.2 |
| 114 | 604.6 | 366.6 | 487.7 | 487.7 | 773.1 | 614.0 | 670.1 | 670.1 | 615.7 | 504.1 | 584.1 | 584.1 |
| 120 | 683.4 | 340.1 | 511.8 | 511.8 | 773.1 | 474.4 | 644.1 | 644.1 | 643.7 | 474.4 | 584.1 | 584.1 |
| 132 | 441.7 | 264.5 | 353.1 | 353.1 | 673.2 | 444.3 | 611.4 | 611.4 | 624.0 | 314.5 | 434.4 | 434.4 |
| 136 | 600.4 | 373.7 | 487.1 | 487.1 | 562.0 | 264.5 | 500.0 | 500.0 | 630.0 | 244.4 | 524.4 | 524.4 |

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 42606 A

FLIGHT SEASAT 21 RGD RINDLE TEST SERIES
 RUN NUMBER 22950

| RDD/FLV | CHAN. NO | INITIAL AT FLIGHT (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|---|----------|---------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 7 | 116. | 1267. | 191. | 43.5 | 860. | 104.6 |
| 4C 3- 3 | 9 | 1214. | 1349. | 175. | 41.5 | 807. | 102.5 |
| 1- 4- 0 | 10 | 1310. | 1524. | 205. | 45.5 | 962. | 144.6 |
| 2A 5- 0 | 13 | 1412. | 1700. | 369. | 96.5 | 936. | 261.6 |
| 2A 5- 7 | 10 | 1409. | 1628. | 339. | 105.0 | 926. | 329.7 |
| 23 5- 2 | 50 | 1543. | 1913. | 371. | 117.0 | 916. | 402.6 |
| 30 6- 2 | 55 | 1521. | 1942. | 472. | 94.5 | 1100. | 341.3 |
| 5C 6- 2 | 56 | 1516. | 1906. | 356. | 119.0 | 926. | 403.6 |
| 13 6- 3 | 61 | 1457. | 1677. | 379. | 123.0 | 946. | 406.6 |
| 43 6- 3 | 66 | 1561. | 1951. | 390. | 116.0 | 941. | 415.4 |
| 50 6- 3 | 68 | 1461. | 1644. | 368. | 126.0 | 800. | 416.6 |
| 24 6- 4 | 70 | 1414. | 1683. | 393. | 129.0 | 965. | 416.6 |
| * * * S A U T H E R N D O U B L E D A T A * * * | | | | | | | |
| 33 5- 4 | 52 | 1463. | 1863. | 380. | 132.0 | 970. | 423.7 |
| 10 6- 5 | 54 | 1562. | 1965. | 403. | 119.0 | 966. | 432.6 |
| 23 6- 5 | 55 | 1612. | 2061. | 449. | 114.0 | 956. | 420.7 |
| 3E 6- 5 | 56 | 1512. | 1847. | 385. | 118.0 | 864. | 435.6 |
| 3C 6- 6 | 47 | 1544. | 2072. | 472. | 116.0 | 961. | 432.6 |
| 3U 6- 6 | 48 | 1570. | 2037. | 459. | 119.0 | 945. | 430.7 |
| 4A 6- 6 | 109 | 1463. | 1914. | 431. | 117.0 | 800. | 457.6 |
| 41 6- 6 | 101 | 1561. | 2046. | 465. | 115.0 | 956. | 441.2 |
| 5C 6- 6 | 103 | 1547. | 1919. | 372. | 130.0 | 966. | 438.7 |
| 1C 7- 0 | 111 | 1446. | 1633. | 385. | 73.0 | 736. | 443.6 |
| 28 7- 0 | 111 | 1446. | 1633. | 385. | 73.0 | 736. | 443.6 |
| 30 7- 0 | 115 | 1465. | 1877. | 411. | 74.0 | 746. | 464.7 |
| 53 7- 0 | 117 | 1340. | 1704. | 364. | 95.0 | 844. | 444.9 |
| 23 7- 6 | 121 | 1464. | 1881. | 458. | 96.0 | 836. | 536.9 |
| 2C 7- 6 | 122 | 1371. | 1916. | 547. | 100.0 | 846. | 555.6 |
| 2E 7- 6 | 123 | 1274. | 1634. | 360. | 59.5 | 766. | 532.6 |
| 3A 7- 6 | 124 | 1464. | 1845. | 416. | 96.0 | 855. | 521.9 |
| 35 7- 6 | 125 | 1453. | 1922. | 469. | 96.0 | 836. | 525.9 |
| 4B 7- 6 | 126 | 1446. | 1913. | 467. | 96.0 | 767. | 551.6 |
| 5C 7- 6 | 129 | 1420. | 1844. | 416. | 97.0 | 850. | 517.9 |
| 1C 7- 0 | 132 | 1161. | 1690. | 529. | 112.0 | 745. | 542.9 |
| 2E 7- 0 | 134 | 1126. | 1544. | 418. | 95.0 | 814. | 570.0 |
| 2C 7- 0 | 137 | 1360. | 1852. | 546. | 94.5 | 850. | 570.0 |
| 53 7- 0 | 139 | 1252. | 1704. | 452. | 87.5 | 716. | 543.5 |
| 5C 7- 0 | 140 | 1217. | 1793. | 457. | 104.0 | 833. | 554.6 |
| 1C 7- 6 | 141 | 1006. | 1582. | 575. | 109.0 | 876. | 623.0 |
| 1D 7- 6 | 142 | 804. | 1554. | 689. | 131.0 | 892. | 612.6 |
| 2C 7- 6 | 143 | 1065. | 1659. | 594. | 106.0 | 804. | 611.0 |
| 4B 7- 6 | 145 | 1159. | 1629. | 470. | 75.0 | 874. | 615.3 |
| 57 7- 6 | 146 | 1072. | 1585. | 513. | 107.0 | 874. | 596.7 |
| 3D 7- 3 | 155 | 941. | 1588. | 647. | 116.0 | 886. | 616.0 |
| 4C 9- 3 | 157 | 1008. | 1559. | 551. | 106.0 | 886. | 619.0 |
| 1313- 0 | 160 | 831. | 1199. | 568. | 172.0 | 821. | 639.9 |
| 4313- 0 | 163 | 865. | 1360. | 495. | 119.0 | 824. | 651.0 |
| 5313- 0 | 166 | 713. | 1231. | 478. | 133.0 | 807. | 549.6 |
| 2411- 0 | 167 | 574. | 916. | 344. | 172.0 | 806. | 572.0 |
| 4C11- 0 | 169 | 656. | 1176. | 520. | 173.0 | 501. | 647.6 |
| 1011- 0 | 170 | 247. | 554. | 557. | 194.0 | 810. | 596.0 |

KOH 42206D HEATER R3D STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 643.4 | 593.4 | 610.5 | 661.5 | 614.1 | 630.3 | 8.0 | 7.5 | 7.7 |
| 24 | 832.8 | 800.2 | 817.4 | 866.1 | 869.1 | 878.9 | 17.5 | 15.5 | 16.5 |
| 34 | 1213.6 | 1040.0 | 1134.3 | 1308.6 | 1287.0 | 1321.9 | 44.5 | 41.5 | 43.2 |
| 40 | 1316.5 | 1241.5 | 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 | 1480.5 | 1527.4 | 1976.5 | 1820.3 | 1875.7 | 109.0 | 92.5 | 96.0 |
| 72 | 1544.2 | 1367.6 | 1535.9 | 2022.5 | 1788.8 | 1955.0 | 141.0 | 93.5 | 112.8 |
| 74 | 1571.5 | 1444.8 | 1523.0 | 2029.6 | 1859.9 | 1930.5 | 131.0 | 104.0 | 115.4 |
| 75 | 1566.7 | 1400.6 | 1517.0 | 1978.5 | 1848.5 | 1910.8 | 128.0 | 93.5 | 115.5 |
| 76 | 1592.0 | 1464.2 | 1543.0 | 2048.3 | 1864.4 | 1945.8 | 134.0 | 114.0 | 114.4 |
| 77 | 1612.2 | 1470.4 | 1537.1 | 2061.1 | 1862.1 | 1953.1 | 132.0 | 106.0 | 114.7 |
| 78 | 1600.5 | 1474.4 | 1543.0 | 2071.6 | 1864.7 | 1975.6 | 131.0 | 114.0 | 120.3 |
| 84 | 1465.4 | 1330.3 | 1400.6 | 1876.8 | 1704.0 | 1793.6 | 95.0 | 54.5 | 77.4 |
| 90 | 1453.0 | 1273.7 | 1364.3 | 1922.3 | 1634.1 | 1809.9 | 110.0 | 54.0 | 90.0 |
| 96 | 1357.5 | 1126.2 | 1255.4 | 1910.9 | 1544.1 | 1732.7 | 117.0 | 67.5 | 101.6 |
| 102 | 1156.5 | 864.3 | 1029.5 | 1659.2 | 1445.2 | 1567.4 | 131.0 | 75.0 | 100.2 |
| 111 | 1007.9 | 747.6 | 926.0 | 1568.4 | 1202.4 | 1410.8 | 129.0 | 90.0 | 111.5 |
| 120 | 804.4 | 623.7 | 712.3 | 1399.7 | 1199.3 | 1282.1 | 173.0 | 119.0 | 147.4 |
| 132 | 656.5 | 574.6 | 602.1 | 1176.4 | 916.1 | 1010.4 | 173.0 | 130.0 | 150.3 |
| 136 | 644.5 | 240.6 | 480.3 | 1045.4 | 854.5 | 941.0 | 194.0 | 175.0 | 186.3 |

| ELEV | TEMP RATE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | 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 | 34.7 | 40.8 |
| 34 | 141.5 | 170.0 | 162.6 | 1063.3 | 860.4 | 943.6 | 104.6 | 102.5 | 103.8 |
| 40 | 220.4 | 205.1 | 212.8 | 981.7 | 914.4 | 950.1 | 156.7 | 144.0 | 150.7 |
| 60 | 366.2 | 350.4 | 360.0 | 947.4 | 887.7 | 924.4 | 265.8 | 254.0 | 260.8 |
| 67 | 364.1 | 334.6 | 347.8 | 979.0 | 925.7 | 950.4 | 330.6 | 323.6 | 326.0 |
| 72 | 436.2 | 340.0 | 414.1 | 1020.0 | 852.0 | 907.3 | 384.6 | 360.6 | 377.5 |
| 74 | 456.1 | 350.1 | 406.6 | 980.2 | 853.5 | 853.8 | 421.3 | 372.2 | 403.0 |
| 75 | 443.6 | 367.4 | 395.2 | 948.4 | 854.9 | 906.4 | 416.8 | 406.6 | 412.9 |
| 76 | 461.0 | 345.5 | 403.3 | 1121.0 | 842.9 | 939.9 | 441.4 | 405.0 | 423.6 |
| 77 | 464.9 | 360.2 | 410.0 | 976.2 | 866.9 | 932.8 | 444.6 | 420.7 | 431.7 |
| 78 | 472.4 | 371.4 | 432.6 | 961.5 | 876.6 | 933.9 | 457.6 | 416.7 | 434.6 |
| 84 | 411.4 | 340.8 | 385.0 | 802.9 | 693.7 | 744.8 | 494.9 | 478.0 | 486.6 |
| 90 | 547.1 | 304.5 | 425.6 | 855.4 | 720.2 | 810.7 | 555.6 | 491.0 | 524.4 |
| 96 | 553.4 | 340.4 | 470.8 | 850.3 | 692.1 | 787.3 | 598.2 | 554.0 | 575.6 |
| 102 | 604.5 | 410.1 | 537.9 | 692.0 | 564.5 | 632.5 | 632.0 | 546.7 | 614.0 |
| 111 | 647.5 | 344.5 | 482.0 | 790.7 | 526.7 | 641.4 | 635.0 | 524.9 | 607.3 |
| 120 | 604.4 | 475.3 | 560.0 | 687.0 | 568.7 | 616.8 | 654.0 | 462.5 | 608.0 |
| 132 | 514.0 | 344.1 | 400.3 | 607.9 | 501.0 | 546.6 | 647.8 | 572.0 | 611.9 |
| 136 | 557.4 | 340.5 | 452.0 | 610.0 | 287.7 | 483.3 | 662.0 | 404.0 | 576.7 |

42206D-3

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 42606 A

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES

RUN NUMBER 41206E

| ROD/LEVEL | CHAN. | NO | INITIAL AT FLIGHT (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|-----------|-------|-----|---------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | | 9 | 1229. | 1414. | 185. | 43.5 | 829. | 129.2 |
| 4C 3- 3 | | 10 | 1309. | 1462. | 157. | 42.0 | 842. | 121.9 |
| 1C 4- 0 | | 12 | 1417. | 1648. | 232. | 53.0 | 978. | 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 | 1441. | 1922. | 482. | 133.0 | 764. | 426.5 |
| 1D 6- 4 | | 47 | 1434. | 1823. | 389. | 120.0 | 989. | 310.7 |
| 3D 6- 4 | | 50 | 1427. | 1977. | 551. | 133.0 | 1150. | 417.3 |
| 48 6- 4 | | 52 | 1513. | 1924. | 411. | 104.0 | 844. | 408.7 |
| 5C 6- 4 | | 54 | 1462. | 1905. | 443. | 133.0 | 1123. | 369.8 |
| 5D 6- 4 | | 55 | 1473. | 1846. | 373. | 131.0 | 955. | 385.7 |
| 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 |
| 38 6- 5 | | 62 | 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 | 961. | 443.9 |
| 3C 6- 7 | | 77 | 1434. | 1905. | 466. | 134.0 | 876. | 448.7 |
| 3E 6- 7 | | 83 | 1434. | 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 | 740. | 488.4 |
| 1C 7- 0 | | 93 | 1368. | 1704. | 336. | 75.0 | 753. | 474.9 |
| 28 7- 0 | | 94 | 1422. | 1752. | 330. | 71.0 | 713. | 493.2 |
| 3D 7- 0 | | 98 | 1427. | 1775. | 349. | 59.0 | 740. | 470.7 |
| 58 7- 0 | | 103 | 1359. | 1719. | 360. | 175.0 | 705. | 465.9 |
| 28 7- 6 | | 110 | 1357. | 1810. | 453. | 85.0 | 811. | 537.9 |
| 2C 7- 6 | | 111 | 1353. | 1815. | 422. | 78.5 | 826. | 500.7 |
| 2E 7- 6 | | 113 | 1206. | 1597. | 390. | 92.0 | 785. | 534.6 |
| 3A 7- 6 | | 115 | 1091. | 1713. | 622. | 103.0 | 705. | 582.0 |
| 38 7- 6 | | 115 | 1091. | 1713. | 622. | 103.0 | 705. | 582.0 |
| 48 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. | 504.8 |
| 2E 8- 0 | | 126 | 926. | 1491. | 566. | 116.0 | 741. | 504.4 |
| 3D 8- 0 | | 129 | 1150. | 1734. | 584. | 96.0 | 816. | 560.4 |
| 58 8- 0 | | 133 | 1161. | 1635. | 454. | 74.5 | 723. | 565.7 |
| 5C 8- 0 | | 134 | 1236. | 1721. | 482. | 94.5 | 753. | 550.4 |
| 1C 8- 6 | | 135 | 974. | 1526. | 554. | 103.0 | 875. | 546.0 |
| 1D 8- 6 | | 136 | 923. | 1460. | 537. | 125.0 | 857. | 598.2 |
| 2C 8- 6 | | 138 | 1101. | 1732. | 631. | 108.0 | 753. | 585.9 |
| 48 8- 6 | | 143 | 1091. | 1613. | 523. | 96.5 | 872. | 542.0 |
| 5D 8- 6 | | 145 | 920. | 1432. | 513. | 132.0 | 843. | 588.1 |
| 3D 8- 3 | | 150 | 889. | 1481. | 592. | 132.0 | 804. | 598.8 |
| 4C 9- 3 | | 152 | 991. | 1525. | 533. | 109.0 | 846. | 605.0 |
| 1010- 0 | | 157 | 800. | 1219. | 611. | 172.0 | 844. | 638.1 |
| 4810- 0 | | 164 | 830. | 1331. | 495. | 135.0 | 822. | 622.0 |
| 5010- 0 | | 166 | 884. | 1182. | 498. | 189.0 | 764. | 544.1 |
| 2411- 0 | | 168 | 546. | 860. | 315. | 219.0 | 882. | 536.0 |
| 4C11- 0 | | 169 | 639. | 1147. | 508. | 165.0 | 825. | 633.0 |
| 1011- 6 | | 171 | 302. | 871. | 569. | 202.0 | 854. | 604.4 |

RUN 41206E HEATLR RJD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | FEAR | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 709.2 | 672.8 | 652.0 | 725.4 | 692.0 | 712.5 | 7.0 | 6.5 | 6.7 |
| 24 | 990.0 | 911.7 | 548.9 | 1030.5 | 960.4 | 991.3 | 14.5 | 11.5 | 13.0 |
| 34 | 1305.3 | 1215.4 | 1241.5 | 1462.3 | 1394.9 | 1418.1 | 46.5 | 42.0 | 44.0 |
| 48 | 1460.0 | 1362.6 | 1422.8 | 1609.7 | 1609.0 | 1609.0 | 53.0 | 45.5 | 48.5 |
| 60 | 1500.2 | 1520.8 | 1535.8 | 1923.5 | 1880.2 | 1896.5 | 92.5 | 81.0 | 86.5 |
| 67 | 1602.4 | 1501.4 | 1552.9 | 1977.4 | 1840.6 | 1913.7 | 122.0 | 67.0 | 94.4 |
| 70 | 1563.5 | 1534.2 | 1558.6 | 1974.0 | 1949.9 | 1960.2 | 115.0 | 162.0 | 109.7 |
| 73 | 1477.8 | 1477.8 | 1477.8 | 1881.3 | 1881.3 | 1881.3 | 103.0 | 163.0 | 163.0 |
| 74 | 1497.1 | 1490.7 | 1453.9 | 1922.3 | 1910.9 | 1916.6 | 133.0 | 118.0 | 125.5 |
| 75 | 1467.8 | 1424.7 | 1440.0 | 1867.8 | 1841.7 | 1850.5 | 144.0 | 101.0 | 128.0 |
| 76 | 1521.6 | 1433.5 | 1477.0 | 1947.6 | 1821.4 | 1877.7 | 133.0 | 164.0 | 122.6 |
| 77 | 1523.4 | 1412.5 | 1464.4 | 1961.3 | 1841.7 | 1880.5 | 132.0 | 163.0 | 125.0 |
| 78 | 1545.4 | 1372.4 | 1460.4 | 2002.7 | 1851.9 | 1922.0 | 143.0 | 162.0 | 126.5 |
| 79 | 1521.9 | 1434.3 | 1484.7 | 1982.0 | 1905.1 | 1933.6 | 135.0 | 117.0 | 130.2 |
| 80 | 1504.6 | 1384.8 | 1444.4 | 2006.2 | 1854.2 | 1932.8 | 133.0 | 165.0 | 128.8 |
| 81 | 1462.4 | 1405.4 | 1465.4 | 2016.7 | 2016.7 | 2016.7 | 133.0 | 133.0 | 133.0 |
| 82 | 1408.7 | 1404.7 | 1404.7 | 1924.6 | 1424.6 | 1924.6 | 132.0 | 132.0 | 132.0 |
| 84 | 1436.8 | 1350.8 | 1404.3 | 1855.3 | 1704.0 | 1766.5 | 175.0 | 47.0 | 91.2 |
| 90 | 1436.8 | 1090.8 | 1313.4 | 1872.3 | 1574.4 | 1757.6 | 117.0 | 62.5 | 84.7 |
| 96 | 1250.3 | 425.6 | 1156.6 | 1822.5 | 1491.2 | 1692.5 | 116.0 | 74.5 | 96.6 |
| 102 | 1403.6 | 756.8 | 1105.6 | 1869.2 | 1144.2 | 1535.6 | 158.0 | 61.0 | 111.6 |
| 111 | 993.4 | 768.2 | 860.9 | 1504.6 | 1230.6 | 1403.8 | 149.0 | 109.0 | 131.7 |
| 120 | 1035.1 | 564.2 | 763.2 | 1494.4 | 1126.6 | 1796.6 | 189.0 | 73.5 | 151.0 |
| 132 | 634.1 | 454.5 | 531.5 | 1147.3 | 840.6 | 922.7 | 220.0 | 154.0 | 196.8 |
| 136 | 565.6 | 501.7 | 433.7 | 963.5 | 870.6 | 917.0 | 202.0 | 191.0 | 196.5 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | FEAR | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 14.2 | 10.2 | 17.6 | 637.4 | 611.4 | 603.3 | 25.4 | 21.5 | 23.1 |
| 24 | 46.7 | 30.0 | 42.4 | 787.7 | 747.6 | 769.6 | 52.4 | 51.4 | 52.1 |
| 34 | 167.4 | 177.0 | 176.6 | 952.1 | 829.4 | 884.9 | 129.2 | 112.9 | 123.0 |
| 48 | 231.5 | 223.4 | 220.2 | 1017.1 | 945.2 | 979.5 | 169.7 | 162.9 | 165.2 |
| 60 | 363.3 | 324.3 | 360.8 | 948.5 | 902.9 | 928.5 | 282.6 | 276.3 | 276.3 |
| 67 | 381.1 | 321.5 | 360.8 | 971.7 | 846.4 | 902.4 | 356.8 | 324.5 | 344.4 |
| 70 | 422.5 | 390.1 | 401.6 | 935.1 | 692.6 | 916.2 | 389.7 | 362.6 | 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 | 424.1 | 377.6 | 403.9 | 1061.1 | 731.1 | 840.1 | 426.9 | 365.7 | 385.6 |
| 76 | 443.3 | 362.5 | 406.8 | 1123.2 | 643.7 | 874.3 | 458.0 | 386.7 | 408.7 |
| 77 | 448.5 | 341.8 | 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 | 478.5 | 384.4 | 448.8 | 928.1 | 822.1 | 877.2 | 453.6 | 426.6 | 442.9 |
| 80 | 530.1 | 428.6 | 463.4 | 972.2 | 747.8 | 872.5 | 488.4 | 424.5 | 457.7 |
| 81 | 551.3 | 521.3 | 521.3 | 665.0 | 665.0 | 665.0 | 470.5 | 470.5 | 470.5 |
| 82 | 514.5 | 514.9 | 514.9 | 906.5 | 906.5 | 906.5 | 464.8 | 464.8 | 464.8 |
| 84 | 423.1 | 314.7 | 362.1 | 811.9 | 687.4 | 754.2 | 513.5 | 473.1 | 485.4 |
| 90 | 622.1 | 364.5 | 444.3 | 859.9 | 704.6 | 793.6 | 582.0 | 506.7 | 532.7 |
| 96 | 583.8 | 454.4 | 530.9 | 612.2 | 723.4 | 764.6 | 575.0 | 554.4 | 561.3 |
| 102 | 669.4 | 382.4 | 530.0 | 746.7 | 643.4 | 714.0 | 600.8 | 451.4 | 567.5 |
| 111 | 642.6 | 442.7 | 542.9 | 696.4 | 542.0 | 630.8 | 623.3 | 585.6 | 606.9 |
| 120 | 649.0 | 374.6 | 533.5 | 612.2 | 567.6 | 634.5 | 634.1 | 447.6 | 596.9 |
| 132 | 508.2 | 344.5 | 341.2 | 595.5 | 282.3 | 497.3 | 634.0 | 462.6 | 557.6 |
| 136 | 568.5 | 347.5 | 463.4 | 551.7 | 534.1 | 542.9 | 600.9 | 600.9 | 600.9 |

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 42606 A

FLECHT SEASET 21 ROD BUNDLE TEST SERIES

RUN NUMBER 42006F

| ROD/ELEV | CHAN. | KU | TEMPERATURE AT FLECHT (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|-------|-----|-------------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | | 5 | 1100. | 1301. | 181. | 42.5 | 645. | 109.4 |
| 4C 3- 3 | | 6 | 1201. | 1392. | 131. | 37.5 | 659. | 103.6 |
| 1C 4- 0 | | 7 | 1370. | 1573. | 195. | 49.0 | 544. | 104.0 |
| 2A 5- 0 | | 12 | 1519. | 1658. | 339. | 75.5 | 547. | 240.7 |
| 2A 5- 7 | | 14 | 1537. | 1843. | 306. | 73.0 | 512. | 306.0 |
| 5C 6- 2 | | 33 | 1451. | 1803. | 352. | 99.5 | 274. | 643.0 |
| 2D 6- 3 | | 34 | 1440. | 1798. | 307. | 89.5 | 751. | 301.3 |
| 1D 6- 4 | | 46 | 1462. | 1745. | 283. | 106.0 | 574. | 355.6 |
| 3D 6- 4 | | 50 | 1452. | 1925. | 432. | 94.5 | 646. | 724.0 |
| 4B 6- 4 | | 51 | 1542. | 1809. | 267. | 72.0 | 637. | 345.7 |
| 5D 6- 4 | | 56 | 1477. | 1739. | 261. | 93.0 | 700. | 404.5 |
| 1D 6- 5 | | 56 | 1459. | 1751. | 292. | 99.0 | 945. | 305.6 |
| 2A 6- 5 | | 59 | 1460. | 1765. | 305. | 91.0 | 557. | 315.6 |
| 2D 6- 5 | | 62 | 1500. | 1819. | 299. | 92.5 | 630. | 374.4 |
| 3B 6- 5 | | 63 | 1553. | 1866. | 335. | 79.0 | 554. | 411.6 |
| 3C 6- 6 | | 69 | 1545. | 1949. | 403. | 96.0 | 1100. | 375.3 |
| 3E 6- 6 | | 70 | 1470. | 1811. | 342. | 113.0 | 440. | 408.6 |
| 4C 6- 6 | | 73 | 1575. | 1901. | 326. | 82.0 | 617. | 402.0 |
| 5C 6- 6 | | 76 | 1527. | 1807. | 280. | 106.0 | 601. | 416.6 |
| 3D 6- 7 | | 85 | 1503. | 1933. | 370. | 91.5 | 704. | 420.7 |
| 3C 6- 8 | | 93 | 1581. | 1966. | 385. | 93.0 | 400. | 416.6 |
| 4A 6- 8 | | 95 | 1434. | 1762. | 328. | 106.0 | 540. | 396.6 |
| 1C 7- 0 | | 109 | 1434. | 1740. | 301. | 59.0 | 727. | 474.0 |
| 2B 7- 0 | | 110 | 1466. | 1755. | 287. | 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. | 472.6 |
| 2B 7- 6 | | 120 | 1443. | 1804. | 362. | 74.5 | 647. | 442.0 |
| 2C 7- 6 | | 121 | 1447. | 1833. | 385. | 74.5 | 602. | 400.6 |
| 2E 7- 6 | | 123 | 1241. | 1594. | 353. | 57.5 | 704. | 404.5 |
| 3A 7- 6 | | 124 | 1440. | 1719. | 279. | 59.0 | 600. | 479.0 |
| 3B 7- 6 | | 125 | 1500. | 1847. | 348. | 67.5 | 610. | 444.6 |
| 4B 7- 6 | | 129 | 1400. | 1814. | 349. | 73.5 | 621. | 444.6 |
| 5C 7- 6 | | 132 | 1424. | 1759. | 330. | 94.0 | 630. | 456.3 |
| 1C 8- 0 | | 133 | 1274. | 1671. | 398. | 97.5 | 700. | 528.0 |
| 2E 8- 0 | | 136 | 1136. | 1513. | 377. | 94.0 | 742. | 517.9 |
| 3D 8- 0 | | 138 | 1340. | 1743. | 445. | 91.5 | 660. | 507.4 |
| 5B 8- 0 | | 143 | 1210. | 1547. | 337. | 67.0 | 640. | 529.3 |
| 5C 8- 0 | | 144 | 1312. | 1701. | 389. | 92.0 | 700. | 532.6 |
| 1C 8- 6 | | 145 | 1090. | 1503. | 413. | 78.0 | 620. | 554.0 |
| 1D 8- 6 | | 146 | 983. | 1287. | 304. | 71.0 | 650. | 504.0 |
| 2C 8- 6 | | 148 | 1203. | 1701. | 497. | 92.0 | 705. | 537.4 |
| 4B 8- 6 | | 153 | 1157. | 1611. | 414. | 66.0 | 654. | 501.0 |
| 5D 8- 6 | | 155 | 1115. | 1513. | 398. | 99.0 | 540. | 520.4 |
| 3D 9- 3 | | 159 | 1007. | 1498. | 491. | 111.0 | 730. | 549.0 |
| 4C 9- 3 | | 161 | 1086. | 1559. | 493. | 112.0 | 604. | 506.0 |
| 1D10- 0 | | 164 | 663. | 1172. | 509. | 193.0 | 720. | 555.4 |
| 4B10- 0 | | 166 | 405. | 1422. | 517. | 142.0 | 620. | 541.0 |
| 5D10- 0 | | 169 | 712. | 1220. | 468. | 137.0 | 670. | 536.7 |
| 2A11- 0 | | 171 | 527. | 879. | 342. | 161.0 | 504. | 553.0 |
| 4C11- 0 | | 172 | 700. | 1192. | 492. | 152.0 | 530. | 544.4 |
| 1D11- 6 | | | | | | | | |

* * * B A L T H E R M O C J U P L E D A T A * *

KUN 42006F HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SECS) | | |
|------|----------------------|--------|--------|------------------|--------|--------|------------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 738.2 | 681.8 | 710.0 | 749.3 | 696.2 | 722.7 | 6.0 | 5.0 | 5.5 |
| 24 | 909.5 | 969.5 | 943.9 | 943.9 | 943.9 | 943.9 | 14.0 | 14.0 | 14.0 |
| 39 | 1260.8 | 1151.6 | 1199.6 | 1391.8 | 1325.7 | 1359.6 | 42.5 | 37.5 | 40.6 |
| 48 | 1445.6 | 1337.5 | 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 | 1566.4 | 1589.4 | 1951.0 | 1825.9 | 1875.0 | 92.5 | 84.5 | 77.3 |
| 71 | 1607.0 | 1466.8 | 1466.8 | 1956.7 | 1870.1 | 1775.4 | 105.0 | 71.5 | 51.1 |
| 71 | 1559.4 | 1516.5 | 1538.2 | 1830.4 | 1875.7 | 1903.0 | 89.0 | 82.0 | 85.2 |
| 72 | 1465.6 | 1373.6 | 1415.2 | 1897.0 | 1739.7 | 1813.3 | 104.0 | 95.5 | 94.9 |
| 73 | 1450.3 | 1380.1 | 1415.2 | 1821.4 | 1751.9 | 1786.6 | 113.0 | 93.5 | 102.3 |
| 74 | 1486.5 | 1384.1 | 1454.8 | 1883.6 | 1734.1 | 1818.6 | 112.0 | 84.0 | 94.3 |
| 75 | 1498.5 | 1356.5 | 1452.6 | 1916.6 | 1725.2 | 1801.7 | 114.0 | 81.5 | 50.3 |
| 76 | 1542.1 | 1411.0 | 1480.6 | 1424.6 | 1724.6 | 1804.6 | 111.0 | 72.0 | 95.5 |
| 77 | 1552.5 | 1450.5 | 1497.6 | 1688.1 | 1743.0 | 1809.0 | 111.0 | 75.0 | 52.9 |
| 78 | 1574.5 | 1442.5 | 1512.1 | 1948.7 | 1747.5 | 1824.0 | 113.0 | 72.0 | 51.0 |
| 79 | 1572.3 | 1444.7 | 1512.2 | 1932.7 | 1741.9 | 1836.8 | 135.0 | 73.5 | 40.0 |
| 80 | 1581.0 | 1433.5 | 1501.7 | 1905.9 | 1762.0 | 1866.9 | 106.0 | 52.5 | 58.7 |
| 81 | 1493.5 | 1453.5 | 1453.5 | 1837.2 | 1837.2 | 1837.2 | 102.0 | 102.0 | 102.0 |
| 84 | 1521.8 | 1376.2 | 1457.5 | 1816.5 | 1629.7 | 1742.0 | 71.0 | 47.5 | 55.7 |
| 90 | 1499.4 | 1241.2 | 1411.3 | 1876.8 | 1593.8 | 1762.2 | 94.0 | 57.5 | 70.0 |
| 96 | 1379.3 | 1136.1 | 1289.7 | 1840.6 | 1512.8 | 1695.9 | 103.0 | 67.0 | 50.1 |
| 102 | 1216.9 | 667.7 | 1113.6 | 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 | 904.5 | 663.2 | 600.6 | 1431.2 | 1170.3 | 1300.6 | 193.0 | 115.0 | 142.3 |
| 132 | 699.7 | 463.7 | 549.0 | 1192.0 | 752.4 | 935.6 | 161.0 | 125.0 | 147.3 |
| 138 | 633.7 | 602.7 | 619.7 | 1145.3 | 952.2 | 1045.7 | 164.0 | 130.0 | 101.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SECS) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|--------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 14.4 | 11.1 | 12.7 | 649.1 | 601.0 | 601.0 | 16.8 | 10.2 | 10.5 |
| 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 | 103.0 | 107.2 |
| 48 | 192.3 | 165.2 | 184.3 | 978.8 | 893.0 | 900.4 | 159.8 | 146.7 | 154.1 |
| 60 | 338.2 | 264.5 | 297.9 | 946.6 | 806.1 | 861.5 | 260.8 | 240.7 | 250.7 |
| 67 | 350.6 | 262.1 | 316.1 | 1028.2 | 911.7 | 974.6 | 320.6 | 300.0 | 312.5 |
| 71 | 371.0 | 244.7 | 300.6 | 945.3 | 249.0 | 607.6 | 688.0 | 325.0 | 505.1 |
| 71 | 371.0 | 350.6 | 364.9 | 973.1 | 282.3 | 627.7 | 645.0 | 345.7 | 555.3 |
| 72 | 425.4 | 365.5 | 354.1 | 264.0 | 244.7 | 254.3 | 698.0 | 675.0 | 685.5 |
| 73 | 371.6 | 371.1 | 371.4 | 1117.8 | 272.6 | 695.2 | 668.0 | 322.8 | 510.4 |
| 74 | 403.3 | 351.5 | 363.9 | 876.0 | 211.8 | 390.7 | 726.0 | 383.1 | 500.0 |
| 75 | 434.2 | 277.0 | 349.0 | 1446.5 | 211.8 | 597.6 | 728.0 | 306.4 | 478.2 |
| 76 | 432.2 | 230.1 | 324.1 | 1129.8 | 240.4 | 633.3 | 729.0 | 355.0 | 517.1 |
| 77 | 395.5 | 273.2 | 311.4 | 1103.3 | 523.6 | 832.5 | 437.0 | 311.0 | 341.9 |
| 78 | 403.4 | 262.1 | 311.9 | 1106.1 | 491.5 | 877.2 | 436.9 | 330.4 | 404.4 |
| 79 | 377.7 | 284.1 | 324.6 | 1059.7 | 789.2 | 888.8 | 447.4 | 386.7 | 419.6 |
| 80 | 364.5 | 320.5 | 325.2 | 942.4 | 803.0 | 874.9 | 448.0 | 390.0 | 426.0 |
| 81 | 343.7 | 343.7 | 343.7 | 889.3 | 889.3 | 889.3 | 423.7 | 423.7 | 423.7 |
| 84 | 308.7 | 253.5 | 284.5 | 845.6 | 706.8 | 762.0 | 475.1 | 432.5 | 457.0 |
| 90 | 399.6 | 270.5 | 350.9 | 921.8 | 771.4 | 839.5 | 502.8 | 468.7 | 487.2 |
| 96 | 461.3 | 337.6 | 400.1 | 863.1 | 642.2 | 787.5 | 532.8 | 503.2 | 519.1 |
| 102 | 497.3 | 304.1 | 409.4 | 863.1 | 595.6 | 658.8 | 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 | 467.5 | 500.0 | 721.6 | 620.5 | 668.4 | 591.0 | 536.7 | 565.3 |
| 132 | 492.3 | 280.7 | 380.0 | 582.1 | 492.9 | 542.6 | 594.9 | 521.9 | 501.0 |
| 138 | 511.6 | 340.5 | 429.1 | 566.5 | 553.4 | 565.9 | 603.3 | 584.0 | 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 SEAJET 21 RJD BUNDLE TEST SERIES
 RUN NUMBER 42207A

| ROD/ELEV | CHAV. 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 | 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. | 56.5 | 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 |
| 3E 6- 5 | 85 | 1601. | 1868. | 267. | 53.5 | 917. | 273.6 |
| 3E 6- 5 | 86 | 1486. | 1723. | 237. | 54.5 | 904. | 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. | 58.0 | 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 | 1296. | 1520. | 236. | 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. | 54.5 | 737. | 318.0 |
| 1C 8- 0 | 131 | 1251. | 1519. | 268. | 55.5 | 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. | 1568. | 351. | 98.0 | 801. | 330.8 |
| 5C 8- 0 | 139 | 1142. | 1419. | 278. | 80.0 | 710. | 341.9 |
| 1C 9- 6 | 141 | 1118. | 1364. | 246. | 41.5 | 592. | 369.0 |
| 1D 9- 6 | 142 | 1040. | 1230. | 190. | 41.5 | 555. | 362.9 |
| 2C 8- 6 | 143 | 1158. | 1436. | 279. | 40.5 | 707. | 350.9 |
| 4B 9- 6 | 145 | 1125. | 1417. | 292. | 41.5 | 622. | 377.0 |
| 5D 9- 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 |
| 1010- 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 |
| 1011- 6 | 172 | 491. | 792. | 301. | 117.0 | 646. | 278.5 |

RUN 42207A HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | | MAX TEMP (DEG F) | | | | TJRNAROUNJ TIME (SEC) | | | |
|------|----------------------|--------|--------|--------|------------------|--------|-------|------|-----------------------|-----|------|------|
| | MAX | MIN | MEAN | MEAN | MAX | MIN | MEAN | MEAN | MAX | MIN | MEAN | MEAN |
| 12 | 666.2 | 615.1 | 632.5 | 677.3 | 625.7 | 643.3 | 4.5 | 4.4 | | | | |
| 24 | 934.4 | 747.2 | 796.0 | 867.5 | 782.6 | 823.2 | 12.0 | 10.3 | | | | |
| 39 | 1195.7 | 1065.0 | 1122.8 | 1283.9 | 1164.0 | 1216.4 | 24.5 | 24.0 | | | | |
| 48 | 1326.2 | 1193.1 | 1260.4 | 1450.5 | 1327.8 | 1385.2 | 38.5 | 26.0 | | | | |
| 60 | 1499.1 | 1281.2 | 1357.1 | 1662.1 | 1504.1 | 1565.3 | 54.5 | 40.5 | | | | |
| 67 | 1557.6 | 1365.0 | 1416.2 | 1823.7 | 1724.2 | 1784.2 | 56.0 | 37.0 | | | | |
| 70 | 1593.8 | 1397.5 | 1498.2 | 1823.7 | 1622.1 | 1720.9 | 58.5 | 39.0 | | | | |
| 71 | 1595.4 | 1381.8 | 1504.0 | 1833.8 | 1629.7 | 1730.0 | 54.5 | 39.5 | | | | |
| 72 | 1500.8 | 1380.7 | 1492.9 | 1844.0 | 1689.5 | 1711.6 | 54.5 | 38.5 | | | | |
| 74 | 1593.8 | 1376.5 | 1508.8 | 1842.9 | 1605.8 | 1750.7 | 60.0 | 39.5 | | | | |
| 75 | 1594.3 | 1368.2 | 1504.6 | 1851.9 | 1650.5 | 1762.8 | 75.0 | 41.0 | | | | |
| 76 | 1598.1 | 1360.8 | 1492.3 | 1859.2 | 1696.0 | 1747.3 | 77.5 | 35.5 | | | | |
| 77 | 1500.9 | 1365.5 | 1502.4 | 1867.8 | 1675.5 | 1774.7 | 83.5 | 53.5 | | | | |
| 78 | 1587.3 | 1365.0 | 1482.7 | 1859.8 | 1654.8 | 1751.5 | 77.5 | 40.5 | | | | |
| 84 | 1460.1 | 1214.4 | 1348.8 | 1662.5 | 1421.6 | 1560.3 | 69.0 | 26.5 | | | | |
| 90 | 1445.7 | 1256.2 | 1359.2 | 1702.9 | 1496.6 | 1601.5 | 73.5 | 47.5 | | | | |
| 96 | 1317.8 | 942.3 | 1207.1 | 1611.2 | 1176.4 | 1496.2 | 98.0 | 53.5 | | | | |
| 102 | 1158.3 | 995.9 | 1078.7 | 1437.7 | 1224.6 | 1341.7 | 67.0 | 40.5 | | | | |
| 111 | 1154.2 | 916.0 | 993.1 | 1408.7 | 1105.8 | 1241.0 | 79.5 | 51.5 | | | | |
| 120 | 863.3 | 756.5 | 814.0 | 1188.9 | 1027.4 | 1100.5 | 98.5 | 73.0 | | | | |
| 132 | 680.4 | 624.6 | 643.6 | 924.3 | 755.5 | 811.7 | 82.5 | 63.5 | | | | |
| 139 | 557.3 | 491.0 | 606.6 | 907.8 | 791.9 | 836.2 | 119.0 | 90.5 | | | | |

| ELEV | TEMP RISE (DEG F) | | | | QUENCH TEMP (DEG F) | | | | QUENCH TIME (SEC) | | | |
|------|-------------------|-------|-------|--------|---------------------|-------|-------|-------|-------------------|-----|------|------|
| | MAX | MIN | MEAN | MEAN | MAX | MIN | MEAN | MEAN | MAX | MIN | MEAN | MEAN |
| 12 | 11.1 | 10.5 | 10.8 | 628.1 | 591.5 | 603.8 | 12.0 | 11.2 | | | | |
| 24 | 35.3 | 31.6 | 33.2 | 749.2 | 708.6 | 722.5 | 32.8 | 26.9 | | | | |
| 39 | 94.0 | 88.2 | 93.6 | 893.1 | 820.9 | 865.1 | 76.9 | 74.3 | | | | |
| 48 | 134.7 | 115.0 | 123.8 | 958.5 | 865.9 | 904.7 | 118.6 | 103.0 | | | | |
| 60 | 223.3 | 193.0 | 208.2 | 951.7 | 884.3 | 912.5 | 174.7 | 160.0 | | | | |
| 67 | 217.3 | 199.9 | 208.0 | 953.6 | 863.9 | 898.5 | 209.6 | 197.6 | | | | |
| 70 | 238.0 | 209.3 | 222.7 | 1005.4 | 912.8 | 948.4 | 229.9 | 215.9 | | | | |
| 71 | 255.6 | 205.1 | 232.0 | 1040.4 | 861.7 | 939.3 | 236.8 | 221.9 | | | | |
| 72 | 245.6 | 162.9 | 218.7 | 1039.5 | 859.8 | 926.3 | 244.7 | 226.6 | | | | |
| 74 | 276.7 | 191.3 | 241.8 | 1025.4 | 832.0 | 937.8 | 263.8 | 241.9 | | | | |
| 75 | 290.2 | 227.8 | 258.2 | 993.7 | 833.5 | 922.5 | 269.8 | 248.9 | | | | |
| 76 | 294.0 | 156.8 | 255.2 | 1017.8 | 878.7 | 928.0 | 269.3 | 256.8 | | | | |
| 77 | 310.0 | 236.5 | 272.3 | 964.2 | 825.7 | 909.2 | 282.5 | 262.7 | | | | |
| 78 | 316.4 | 188.8 | 268.8 | 989.9 | 867.2 | 930.4 | 281.8 | 272.7 | | | | |
| 84 | 257.1 | 192.5 | 217.5 | 759.9 | 621.6 | 686.8 | 313.0 | 297.5 | | | | |
| 90 | 270.6 | 219.3 | 242.3 | 668.5 | 721.3 | 786.4 | 329.2 | 310.0 | | | | |
| 96 | 350.6 | 234.0 | 289.1 | 877.9 | 639.3 | 779.5 | 352.0 | 343.1 | | | | |
| 102 | 310.9 | 189.9 | 263.0 | 707.2 | 555.0 | 613.3 | 380.0 | 350.9 | | | | |
| 111 | 299.0 | 176.8 | 248.0 | 816.7 | 483.9 | 655.7 | 385.0 | 302.0 | | | | |
| 120 | 358.6 | 237.0 | 286.5 | 826.7 | 466.8 | 653.0 | 396.0 | 281.7 | | | | |
| 132 | 243.8 | 130.9 | 168.2 | 627.6 | 278.0 | 532.1 | 357.0 | 192.9 | | | | |
| 139 | 300.9 | 167.2 | 229.6 | 646.3 | 493.6 | 577.0 | 383.0 | 246.4 | | | | |

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

FLIGHT SEASET 21 RD BUNDLE TEST SERIES

RUN NUMBER 42108A

| ROD/ELEV | CHRY. NO | INITIAL AT FLOOD (DEG F) | INITIAL TEMPERATURE (DEG F) | TEMPERATURE AT (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|----------|--------------------------------|-----------------------------------|------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3-3 | 9 | 1092. | 1191. | 58. | 15.5 | 809. | 61.2 |
| 4C 3-3 | 11 | 1171. | 1230. | 59. | 15.5 | 835. | 64.6 |
| 1C 4-0 | 14 | 1303. | 1381. | 78. | 23.0 | 845. | 78.5 |
| 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. | 1572. | 183. | 40.5 | 877. | 183.9 |
| 2D 6-2 | 53 | 1558. | 1717. | 159. | 34.0 | 909. | 186.8 |
| 3D 6-2 | 58 | 1588. | 1743. | 155. | 23.5 | 952. | 187.0 |
| 5C 6-2 | 61 | 1460. | 1607. | 127. | 24.0 | 848. | 185.7 |
| 1D 6-3 | 63 | 1383. | 1572. | 189. | 40.5 | 866. | 188.9 |
| 4B 6-3 | 58 | 1541. | 1700. | 158. | 38.0 | 860. | 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 | 967. | 192.0 |
| 3D 6-5 | 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. | 203.6 |
| 3E 6-5 | 86 | 1490. | 1642. | 152. | 39.0 | 912. | 200.2 |
| 3C 6-5 | 95 | 1584. | 1755. | 171. | 24.0 | 928. | 209.0 |
| 4A 6-5 | 97 | 1370. | 1560. | 190. | 40.0 | 871. | 199.0 |
| 3D 7-0 | 98 | 1302. | 1481. | 179. | 39.5 | 843. | 259.0 |
| 5C 7-0 | 101 | 1464. | 1586. | 122. | 24.0 | 1009. | 165.7 |
| 1C 7-0 | 110 | 1412. | 1530. | 118. | 23.0 | 891. | 235.0 |
| 2B 7-0 | 111 | 1407. | 1501. | 94. | 10.5 | 844. | 229.1 |
| 3D 7-0 | 115 | 1470. | 1587. | 117. | 23.0 | 708. | 225.0 |
| 5B 7-0 | 117 | 1294. | 1439. | 144. | 24.5 | 862. | 216.0 |
| 2B 7-6 | 120 | 1422. | 1566. | 144. | 23.5 | 716. | 242.5 |
| 2C 7-6 | 121 | 1449. | 1603. | 154. | 24.0 | 792. | 234.3 |
| 2E 7-6 | 122 | 1300. | 1441. | 141. | 24.5 | 750. | 235.7 |
| 2A 7-6 | 123 | 1300. | 1443. | 143. | 24.0 | 736. | 231.0 |
| 3B 7-6 | 124 | 1457. | 1617. | 159. | 23.5 | 744. | 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 4-0 | 133 | 945. | 1083. | 138. | 39.0 | 640. | 267.0 |
| 4C 6-6 | 136 | 1567. | 1736. | 169. | 37.5 | 939. | 206.1 |
| 5A 8-0 | 138 | 1152. | 1361. | 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 | 560. | 288.0 |
| 1D 8-6 | 142 | 1035. | 1149. | 114. | 24.5 | 594. | 272.9 |
| 2C 3-6 | 143 | 1158. | 1334. | 176. | 23.5 | 702. | 269.1 |
| 4B 3-6 | 145 | 1114. | 1304. | 185. | 24.0 | 630. | 293.9 |
| 5D 8-6 | 148 | 1008. | 1182. | 174. | 38.0 | 542. | 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. | 50.0 | 672. | 267.0 |
| 2A11-0 | 168 | 622. | 699. | 78. | 40.0 | 637. | 117.8 |
| 4C11-0 | 170 | 682. | 818. | 135. | 57.5 | 440. | 257.0 |
| 1D11-6 | 172 | 443. | 707. | 263. | 99.5 | 634. | 197.7 |

RUN 42108A HEATER MOD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|------|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 1227.6 | 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 | 1758.1 | 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 | 1583.9 | 1681.0 | 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 | 1.5 | 22.3 |
| 90 | 1457.3 | 1264.8 | 1368.4 | 1616.7 | 1401.2 | 1515.3 | 40.0 | 23.0 | 26.6 |
| 96 | 1319.7 | 945.4 | 1203.2 | 1500.9 | 1083.0 | 1380.0 | 59.0 | 25.0 | 40.0 |
| 102 | 1198.1 | 1000.3 | 1074.8 | 1334.1 | 1144.4 | 1238.6 | 38.0 | 23.0 | 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 | 36.0 | 36.2 |
| 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) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 8.9 | 6.1 | 6.5 | 599.4 | 553.7 | 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 | 862.0 | 777.8 | 820.0 | 66.3 | 61.2 | 64.0 |
| 48 | 87.0 | 77.9 | 82.1 | 887.3 | 816.3 | 853.3 | 98.5 | 88.0 | 92.7 |
| 60 | 153.2 | 137.4 | 150.5 | 914.0 | 850.0 | 881.9 | 139.9 | 130.0 | 136.6 |
| 67 | 139.2 | 122.1 | 131.7 | 904.8 | 826.9 | 869.6 | 161.7 | 153.7 | 158.6 |
| 70 | 148.2 | 133.1 | 140.7 | 903.2 | 840.9 | 880.0 | 179.9 | 166.8 | 172.9 |
| 71 | 161.6 | 132.9 | 149.5 | 937.6 | 768.1 | 863.2 | 194.6 | 172.3 | 177.7 |
| 72 | 155.0 | 107.5 | 139.8 | 957.6 | 784.5 | 815.1 | 189.0 | 171.5 | 180.3 |
| 74 | 135.9 | 126.5 | 156.3 | 966.4 | 784.5 | 838.3 | 199.0 | 183.0 | 188.0 |
| 75 | 195.1 | 144.5 | 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 | 169.7 | 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 | 200.6 | 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 | 214.3 | 137.6 | 176.3 | 850.9 | 623.8 | 763.7 | 270.2 | 237.0 | 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 | 760.0 | 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 | 487.5 | 583.3 | 257.0 | 117.8 | 185.7 |
| 138 | 263.3 | 100.8 | 161.0 | 633.9 | 282.3 | 516.1 | 281.0 | 194.9 | 231.1 |

42108A-3

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), 30 1.83 m (72 in.) <i>0.10</i> |
| 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

FLUENT SEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 43208A

| ROD/LEVEL | 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. | 1100. | 85. | 19.0 | 627. | 73.3 |
| 4C 3- 3 | 11 | 1124. | 1220. | 89. | 17.0 | 604. | 72.4 |
| 1C 4- 0 | 14 | 1313. | 1411. | 98. | 25.5 | 634. | 113.4 |
| 2A 5- 0 | 17 | 1342. | 1407. | 141. | 31.5 | 764. | 166.6 |
| 2A 5- 7 | 21 | 1404. | 1633. | 164. | 38.0 | 724. | 200.7 |
| 1D 5- 2 | 26 | 1404. | 1528. | 189. | 43.5 | 731. | 241.4 |
| 2J 5- 2 | 23 | 1573. | 1760. | 186. | 36.5 | 710. | 230.8 |
| 3J 5- 2 | 26 | 1541. | 1742. | 201. | 36.5 | 1035. | 235.4 |
| 5E 5- 2 | 31 | 1562. | 1665. | 163. | 35.5 | 914. | 233.4 |
| 1D 5- 3 | 33 | 1456. | 1643. | 187. | 38.5 | 946. | 249.2 |
| 4B 5- 3 | 38 | 1542. | 1748. | 205. | 54.5 | 667. | 247.4 |
| 5U 5- 3 | 39 | 1404. | 1666. | 192. | 40.0 | 883. | 222.4 |
| 2A 5- 4 | 70 | 1400. | 1647. | 187. | 53.0 | 901. | 259.3 |
| 3B 5- 4 | 75 | 1573. | 1802. | 230. | 53.0 | 1024. | 251.4 |
| 3O 5- 6 | 74 | 1535. | 1775. | 241. | 54.5 | 700. | 254.6 |
| 2D 5- 5 | 34 | 1500. | 1772. | 212. | 41.0 | 710. | 216.6 |
| 3E 5- 5 | 35 | 1577. | 1817. | 240. | 53.5 | 701. | 250.4 |
| 3E 5- 5 | 36 | 1400. | 1661. | 193. | 53.0 | 644. | 266.4 |
| 3E 5- 5 | 35 | 1500. | 1802. | 247. | 54.0 | 716. | 257.7 |
| 4A 5- 5 | 37 | 1412. | 1624. | 238. | 65.0 | 457. | 264.6 |
| 3J 5- 0 | 32 | 1103. | 1408. | 285. | 66.5 | 740. | 325.2 |
| 3E 5- 6 | 32 | 1103. | 1408. | 285. | 66.5 | 740. | 325.2 |
| 1C 7- 0 | 110 | 1407. | 1559. | 152. | 24.0 | 644. | 301.0 |
| 2A 7- 0 | 111 | 1401. | 1564. | 142. | 17.5 | 646. | 295.0 |
| 3J 7- 0 | 115 | 1453. | 1603. | 149. | 18.0 | 766. | 295.0 |
| 5B 7- 0 | 117 | 1324. | 1501. | 172. | 39.3 | 714. | 263.0 |
| 2A 7- 6 | 121 | 1304. | 1575. | 207. | 30.0 | 730. | 255.4 |
| 2C 7- 6 | 121 | 1304. | 1575. | 207. | 30.0 | 730. | 255.4 |
| 2A 7- 6 | 122 | 1280. | 1431. | 143. | 29.0 | 710. | 302.4 |
| 3A 7- 6 | 123 | 1315. | 1500. | 184. | 34.0 | 720. | 322.0 |
| 3A 7- 6 | 124 | 1414. | 1620. | 201. | 37.5 | 740. | 311.0 |
| 4A 7- 6 | 127 | 1344. | 1605. | 211. | 37.0 | 763. | 312.4 |
| 5E 7- 6 | 128 | 1284. | 1491. | 167. | 39.5 | 678. | 311.0 |
| 1C 7- 0 | 131 | 1131. | 1411. | 280. | 65.0 | 602. | 338.7 |
| 2C 7- 0 | 133 | 701. | 1091. | 390. | 114.0 | 700. | 334.0 |
| 4C 5- 6 | 136 | 1541. | 1742. | 241. | 54.0 | 681. | 255.0 |
| 5B 8- 0 | 138 | 1154. | 1461. | 262. | 69.5 | 693. | 319.0 |
| 5C 5- 0 | 139 | 1123. | 1352. | 229. | 67.5 | 626. | 331.5 |
| 1C 5- 6 | 141 | 469. | 1207. | 241. | 43.5 | 550. | 339.0 |
| 1D 5- 6 | 142 | 610. | 1060. | 251. | 54.5 | 541. | 315.8 |
| 2C 7- 6 | 143 | 1010. | 1264. | 248. | 34.5 | 743. | 302.6 |
| 4A 7- 6 | 145 | 1005. | 1291. | 206. | 29.5 | 600. | 304.4 |
| 5D 7- 6 | 146 | 450. | 1262. | 312. | 71.5 | 603. | 350.8 |
| 3D 7- 3 | 154 | 842. | 1101. | 339. | 87.5 | 622. | 353.0 |
| 4C 7- 3 | 156 | 544. | 1172. | 229. | 54.0 | 625. | 346.0 |
| 1D10- 0 | 161 | 547. | 888. | 291. | 96.5 | 624. | 274.4 |
| 4B10- 0 | 164 | 748. | 1013. | 215. | 64.0 | 414. | 366.4 |
| 5D10- 0 | 167 | 704. | 934. | 229. | 87.5 | 604. | 303.0 |
| 2A11- 0 | 168 | 535. | 667. | 132. | 64.0 | 614. | 166.3 |
| 4C11- 0 | 170 | 625. | 802. | 177. | 71.5 | 283. | 311.0 |
| 1D11- 6 | 172 | 200. | 616. | 326. | 107.0 | 263. | 209.0 |

KUN 43208A HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|------|------|
| | MAX | MIN | PEAK | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 500.6 | 534.6 | 540.5 | 577.0 | 546.0 | 558.6 | 5.5 | 4.5 | 5.1 |
| 24 | 846.4 | 769.0 | 807.2 | 876.8 | 807.5 | 839.3 | 12.0 | 11.0 | 11.3 |
| 39 | 1154.5 | 1044.9 | 1099.5 | 1220.2 | 1133.8 | 1177.9 | 19.0 | 17.0 | 17.8 |
| 48 | 1328.7 | 1225.3 | 1274.9 | 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 | 15.0 | 25.6 |
| 67 | 1569.4 | 1460.9 | 1494.8 | 1743.0 | 1633.0 | 1664.9 | 38.0 | 32.5 | 35.0 |
| 70 | 1599.7 | 1481.4 | 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 | 1450.0 | 1535.7 | 1810.1 | 1624.3 | 1709.5 | 42.5 | 34.0 | 37.6 |
| 74 | 1590.7 | 1460.4 | 1537.7 | 1796.6 | 1610.1 | 1726.5 | 46.5 | 35.5 | 39.4 |
| 75 | 1504.5 | 1455.7 | 1529.2 | 1834.4 | 1642.8 | 1730.5 | 58.5 | 30.0 | 43.9 |
| 76 | 1581.0 | 1440.2 | 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 | 1459.2 | 1802.2 | 1653.7 | 1736.8 | 65.0 | 41.0 | 56.1 |
| 84 | 1453.1 | 1265.2 | 1302.2 | 2604.7 | 2414.1 | 1534.4 | 39.5 | 17.5 | 25.0 |
| 90 | 1410.5 | 1114.4 | 1317.3 | 1614.9 | 1315.2 | 1511.4 | 53.0 | 20.0 | 37.4 |
| 96 | 1269.4 | 761.5 | 1130.0 | 1516.0 | 1011.3 | 1408.5 | 118.0 | 41.0 | 65.6 |
| 102 | 1005.0 | 604.7 | 903.0 | 1314.2 | 1005.4 | 1214.9 | 71.5 | 26.0 | 47.4 |
| 114 | 923.1 | 700.5 | 800.9 | 1180.0 | 986.0 | 1090.3 | 87.5 | 41.0 | 60.5 |
| 120 | 747.7 | 540.0 | 641.2 | 1031.5 | 800.2 | 967.5 | 115.0 | 65.0 | 86.7 |
| 132 | 625.2 | 444.6 | 540.4 | 802.3 | 664.7 | 734.3 | 94.5 | 54.0 | 73.5 |
| 136 | 594.0 | 267.7 | 457.1 | 769.0 | 615.2 | 698.8 | 107.0 | 70.0 | 69.7 |

| ELEV | TEMP RANGE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|--------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | PEAK | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 14.4 | 10.4 | 12.1 | 506.5 | 539.0 | 549.9 | 8.0 | 7.0 | 7.5 |
| 24 | 37.4 | 27.4 | 32.1 | 774.7 | 725.3 | 747.1 | 29.0 | 24.6 | 26.2 |
| 39 | 65.3 | 65.7 | 70.3 | 811.5 | 749.5 | 813.5 | 74.9 | 72.4 | 73.7 |
| 48 | 130.6 | 97.6 | 100.7 | 925.5 | 821.5 | 865.8 | 113.9 | 101.0 | 106.1 |
| 60 | 142.5 | 124.7 | 134.2 | 824.2 | 709.1 | 762.4 | 170.8 | 161.4 | 166.6 |
| 67 | 170.4 | 164.1 | 170.6 | 924.3 | 820.1 | 911.0 | 202.1 | 200.5 | 201.0 |
| 70 | 144.6 | 109.1 | 177.6 | 941.4 | 826.2 | 892.4 | 229.1 | 212.6 | 214.0 |
| 71 | 211.6 | 150.6 | 181.6 | 986.5 | 821.5 | 911.0 | 232.8 | 216.0 | 224.6 |
| 72 | 200.2 | 147.1 | 173.6 | 1037.6 | 778.5 | 918.8 | 240.3 | 216.0 | 227.0 |
| 74 | 210.2 | 143.7 | 188.8 | 1042.3 | 843.0 | 911.6 | 246.4 | 230.6 | 230.0 |
| 75 | 214.4 | 167.1 | 201.3 | 939.5 | 801.0 | 885.5 | 255.4 | 230.6 | 247.1 |
| 76 | 224.5 | 100.3 | 207.7 | 1029.3 | 892.4 | 953.8 | 259.3 | 242.0 | 240.7 |
| 77 | 239.9 | 142.4 | 210.5 | 944.3 | 870.6 | 924.8 | 266.4 | 230.0 | 255.5 |
| 78 | 222.2 | 114.7 | 237.0 | 998.8 | 881.3 | 934.9 | 271.7 | 255.0 | 262.3 |
| 84 | 171.4 | 134.1 | 192.2 | 767.9 | 625.7 | 701.6 | 301.0 | 283.0 | 291.2 |
| 90 | 214.4 | 143.0 | 194.1 | 930.1 | 647.8 | 757.8 | 322.0 | 255.4 | 306.5 |
| 96 | 340.0 | 220.6 | 271.7 | 795.7 | 585.5 | 703.8 | 338.7 | 314.0 | 328.8 |
| 102 | 326.3 | 170.2 | 251.3 | 742.6 | 541.4 | 602.2 | 354.9 | 302.6 | 333.1 |
| 114 | 330.6 | 167.1 | 224.4 | 721.2 | 450.5 | 591.1 | 363.0 | 249.0 | 325.0 |
| 120 | 375.4 | 210.0 | 270.2 | 879.5 | 414.1 | 572.7 | 366.9 | 250.4 | 321.6 |
| 132 | 177.1 | 131.4 | 190.4 | 632.0 | 233.4 | 525.0 | 311.0 | 166.3 | 213.6 |
| 136 | 325.5 | 161.4 | 241.7 | 647.6 | 263.4 | 414.0 | 320.0 | 144.0 | 246.8 |

43208A-3

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 NUMBER 41808B

| ROD/ELEV | CHAN. | MU | 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. | 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 | 827. | 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 |
| 2J 6- 2 | | 53 | 1514. | 1673. | 159. | 35.0 | 706. | 268.0 |
| 3J 6- 2 | | 58 | 1548. | 1689. | 140. | 22.0 | 847. | 252.0 |
| 5C 6- 2 | | 61 | 1446. | 1645. | 149. | 33.5 | 842. | 246.5 |
| 1D 6- 3 | | 63 | 1446. | 1598. | 150. | 38.5 | 848. | 230.4 |
| 4B 6- 3 | | 68 | 1532. | 1682. | 150. | 35.0 | 826. | 270.9 |
| 5D 6- 3 | | 69 | 1462. | 1646. | 184. | 53.5 | 741. | 268.5 |
| 2A 5- 4 | | 70 | 1434. | 1610. | 171. | 35.0 | 866. | 272.7 |
| 2D 6- 4 | | 72 | 1546. | 1713. | 167. | 37.5 | 870. | 277.4 |
| 3B 6- 4 | | 75 | 1562. | 1724. | 162. | 5.0 | 836. | 276.9 |
| 3C 6- 5 | | 65 | 1603. | 1775. | 173. | 37.0 | 847. | 272.1 |
| 3E 6- 5 | | 86 | 1464. | 1634. | 150. | 35.0 | 866. | 266.8 |
| 3C 6- 6 | | 95 | 1563. | 1750. | 197. | 38.0 | 904. | 278.0 |
| 3D 6- 6 | | 96 | 1545. | 1746. | 201. | 38.0 | 895. | 270.4 |
| 4A 6- 6 | | 97 | 1408. | 1625. | 217. | 71.0 | 813. | 269.7 |
| 4C 6- 6 | | 98 | 1557. | 1754. | 197. | 38.0 | 936. | 278.6 |
| 5C 6- 6 | | 101 | 1466. | 1644. | 157. | 39.0 | 876. | 277.7 |
| 1C 7- 0 | | 110 | 1451. | 1543. | 142. | 22.0 | 706. | 369.0 |
| 2B 7- 0 | | 111 | 1477. | 1611. | 134. | 19.5 | 655. | 322.0 |
| 3J 7- 0 | | 115 | 1505. | 1649. | 144. | 21.5 | 726. | 243.0 |
| 5J 7- 0 | | 117 | 1365. | 1443. | 133. | 22.0 | 806. | 309.0 |
| 2B 7- 6 | | 120 | 1451. | 1624. | 173. | 32.5 | 706. | 337.0 |
| 2C 7- 6 | | 121 | 1457. | 1642. | 185. | 32.0 | 666. | 346.0 |
| 2E 7- 6 | | 122 | 1241. | 1456. | 215. | 40.5 | 646. | 331.0 |
| 3A 7- 6 | | 123 | 1426. | 1603. | 175. | 34.5 | 746. | 315.7 |
| 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 | | 126 | 1436. | 1547. | 161. | 39.5 | 742. | 322.9 |
| 1C 8- 0 | | 131 | 1254. | 1485. | 231. | 51.5 | 707. | 338.0 |
| 2E 8- 0 | | 133 | 1063. | 1311. | 248. | 51.0 | 674. | 345.0 |
| 3D 8- 0 | | 136 | 1365. | 1536. | 231. | 47.0 | 606. | 321.9 |
| 5B 8- 0 | | 138 | 1274. | 1472. | 198. | 45.5 | 642. | 338.6 |
| 5C 8- 0 | | 139 | 1334. | 1539. | 205. | 57.0 | 746. | 343.0 |
| 1C 8- 6 | | 141 | 1062. | 1266. | 204. | 35.0 | 626. | 329.0 |
| 1D 8- 6 | | 142 | 670. | 1041. | 222. | 64.0 | 630. | 348.0 |
| 2C 8- 6 | | 143 | 1166. | 1368. | 210. | 33.0 | 626. | 376.0 |
| 4B 8- 6 | | 145 | 1235. | 1455. | 219. | 40.5 | 706. | 360.5 |
| 5J 8- 6 | | 148 | 1033. | 1200. | 167. | 25.0 | 504. | 371.9 |
| 3D 9- 3 | | 154 | 927. | 1144. | 237. | 59.5 | 674. | 346.0 |
| 4C 9- 3 | | 156 | 1074. | 1255. | 181. | 45.5 | 634. | 364.0 |
| 1D10- 0 | | 161 | 605. | 920. | 315. | 96.5 | 576. | 375.0 |
| 4B10- 0 | | 164 | 911. | 1095. | 184. | 59.5 | 506. | 383.0 |
| 5D10- 0 | | 167 | 719. | 991. | 279. | 99.0 | 725. | 324.5 |
| 2A11- 0 | | 168 | 544. | 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 | 445. | 336.3 |

KUM 41808B HEATER QJD STATISTICAL DATA

TURNAROUND TIME (SEC)

MAX TEMP (DEG F)

INITIAL TEMP (DEG F)

| ELEV | MAX | MIN | PEAK | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|------|------|
| 12 | 508.0 | 481.5 | 469.9 | 519.4 | 490.9 | 503.6 | 519.4 | 490.9 | 503.6 | 5.5 | 5.0 | 5.1 |
| 24 | 824.2 | 757.4 | 782.8 | 355.1 | 789.8 | 815.7 | 1300.6 | 1188.9 | 1225.9 | 11.0 | 10.0 | 10.5 |
| 34 | 1227.0 | 1103.0 | 1139.0 | 1476.2 | 1359.3 | 1410.5 | 1476.2 | 1359.3 | 1410.5 | 23.0 | 21.0 | 21.0 |
| 48 | 1370.3 | 1260.6 | 1307.2 | 1053.7 | 1524.4 | 1588.0 | 1053.7 | 1524.4 | 1588.0 | 29.5 | 26.0 | 23.0 |
| 60 | 1480.9 | 1365.1 | 1340.3 | 1718.5 | 1618.8 | 1651.4 | 1718.5 | 1618.8 | 1651.4 | 45.5 | 35.5 | 34.5 |
| 67 | 1565.0 | 1439.3 | 1405.0 | 1772.0 | 1590.0 | 1697.9 | 1772.0 | 1590.0 | 1697.9 | 42.5 | 34.0 | 30.2 |
| 70 | 1600.2 | 1390.1 | 1307.6 | 1770.9 | 1586.3 | 1682.9 | 1770.9 | 1586.3 | 1682.9 | 51.5 | 33.0 | 40.3 |
| 71 | 1585.7 | 1437.1 | 1378.5 | 1642.8 | 1506.8 | 1617.6 | 1642.8 | 1506.8 | 1617.6 | 66.0 | 35.0 | 37.4 |
| 72 | 1488.5 | 1375.1 | 1458.0 | 1699.5 | 1593.8 | 1662.1 | 1699.5 | 1593.8 | 1662.1 | 50.5 | 34.0 | 36.5 |
| 74 | 1554.0 | 1447.4 | 1509.9 | 1737.4 | 1598.1 | 1678.7 | 1737.4 | 1598.1 | 1678.7 | 57.0 | 22.0 | 30.2 |
| 75 | 1587.9 | 1447.8 | 1523.5 | 1749.7 | 1610.1 | 1677.7 | 1749.7 | 1610.1 | 1677.7 | 53.5 | 23.0 | 30.2 |
| 76 | 1599.1 | 1427.5 | 1514.7 | 1775.4 | 1603.6 | 1696.6 | 1775.4 | 1603.6 | 1696.6 | 45.0 | 34.0 | 43.0 |
| 77 | 1602.7 | 1422.1 | 1519.7 | 1779.8 | 1625.4 | 1696.1 | 1779.8 | 1625.4 | 1696.1 | 47.5 | 36.0 | 34.4 |
| 78 | 1582.9 | 1460.2 | 1452.9 | 1649.4 | 1497.6 | 1585.7 | 1649.4 | 1497.6 | 1585.7 | 93.5 | 37.0 | 50.7 |
| 84 | 1505.0 | 1365.1 | 1444.3 | 1547.2 | 1459.9 | 1577.7 | 1547.2 | 1459.9 | 1577.7 | 22.0 | 19.0 | 21.5 |
| 90 | 1473.5 | 1230.1 | 1394.8 | 1563.0 | 1311.0 | 1434.6 | 1563.0 | 1311.0 | 1434.6 | 43.0 | 30.0 | 45.9 |
| 96 | 1347.2 | 1062.9 | 1200.2 | 1454.8 | 1091.3 | 1279.6 | 1454.8 | 1091.3 | 1279.6 | 54.0 | 22.0 | 36.4 |
| 102 | 1235.3 | 869.7 | 1080.4 | 1254.6 | 906.8 | 1140.2 | 1254.6 | 906.8 | 1140.2 | 68.0 | 34.5 | 50.2 |
| 111 | 1073.9 | 622.7 | 750.6 | 1045.4 | 920.2 | 1010.8 | 1045.4 | 920.2 | 1010.8 | 98.0 | 54.5 | 61.4 |
| 120 | 914.1 | 607.4 | 742.3 | 829.2 | 647.8 | 704.7 | 829.2 | 647.8 | 704.7 | 73.0 | 51.5 | 66.5 |
| 132 | 661.9 | 595.0 | 550.8 | 798.2 | 673.1 | 720.0 | 798.2 | 673.1 | 720.0 | 124.0 | 64.5 | 43.0 |
| 138 | 642.3 | 313.1 | 472.8 | | | | | | | | | |

QUENCH TIME (SEC)

QUENCH TEMP (DEG F)

TEMP RISE (DEG F)

| ELEV | MAX | MIN | PEAK | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
|------|-------|-------|-------|--------|-------|-------|--------|-------|-------|-------|-------|-------|
| 12 | 15.4 | 11.4 | 13.7 | 507.4 | 491.4 | 496.4 | 507.4 | 491.4 | 496.4 | 8.1 | 6.9 | 7.5 |
| 24 | 30.3 | 24.5 | 32.9 | 723.5 | 682.9 | 699.4 | 723.5 | 682.9 | 699.4 | 30.0 | 26.0 | 26.0 |
| 34 | 94.4 | 73.0 | 80.1 | 820.0 | 792.4 | 804.2 | 820.0 | 792.4 | 804.2 | 78.8 | 76.3 | 76.0 |
| 48 | 126.2 | 80.7 | 103.4 | 858.5 | 284.5 | 564.2 | 858.5 | 284.5 | 564.2 | 118.0 | 113.0 | 113.4 |
| 60 | 100.1 | 156.3 | 169.6 | 948.7 | 860.8 | 884.6 | 948.7 | 860.8 | 884.6 | 170.4 | 163.7 | 163.4 |
| 67 | 179.5 | 152.4 | 162.8 | 951.3 | 837.8 | 892.9 | 951.3 | 837.8 | 892.9 | 210.9 | 194.0 | 202.4 |
| 70 | 217.0 | 144.4 | 160.3 | 916.0 | 843.5 | 886.2 | 916.0 | 843.5 | 886.2 | 284.6 | 271.0 | 270.7 |
| 71 | 185.4 | 149.0 | 165.4 | 989.8 | 835.8 | 917.3 | 989.8 | 835.8 | 917.3 | 258.4 | 241.3 | 231.7 |
| 72 | 191.7 | 139.6 | 154.6 | 953.5 | 830.2 | 872.6 | 953.5 | 830.2 | 872.6 | 238.8 | 226.9 | 232.5 |
| 74 | 185.0 | 139.6 | 152.5 | 1028.7 | 606.7 | 851.4 | 1028.7 | 606.7 | 851.4 | 306.0 | 243.7 | 250.6 |
| 75 | 183.9 | 132.0 | 155.2 | 948.7 | 675.3 | 832.2 | 948.7 | 675.3 | 832.2 | 303.7 | 230.4 | 238.5 |
| 76 | 190.3 | 142.2 | 162.9 | 940.1 | 775.4 | 874.8 | 940.1 | 775.4 | 874.8 | 293.0 | 255.5 | 259.0 |
| 77 | 189.8 | 149.0 | 174.8 | 996.9 | 710.9 | 848.3 | 996.9 | 710.9 | 848.3 | 312.0 | 266.0 | 274.7 |
| 78 | 218.4 | 157.5 | 160.2 | 929.8 | 608.6 | 864.4 | 929.8 | 608.6 | 864.4 | 301.0 | 276.9 | 281.7 |
| 84 | 152.3 | 132.5 | 141.4 | 726.4 | 655.1 | 689.6 | 726.4 | 655.1 | 689.6 | 322.0 | 293.0 | 300.1 |
| 90 | 234.3 | 160.6 | 182.9 | 799.1 | 612.1 | 714.7 | 799.1 | 612.1 | 714.7 | 346.0 | 305.0 | 322.4 |
| 96 | 246.1 | 152.4 | 184.4 | 601.7 | 674.0 | 740.0 | 601.7 | 674.0 | 740.0 | 353.0 | 321.9 | 331.9 |
| 102 | 221.0 | 167.4 | 184.1 | 700.4 | 553.7 | 618.2 | 700.4 | 553.7 | 618.2 | 376.0 | 346.0 | 360.5 |
| 111 | 244.1 | 146.2 | 189.7 | 716.0 | 281.4 | 588.4 | 716.0 | 281.4 | 588.4 | 390.6 | 304.0 | 321.9 |
| 120 | 350.7 | 104.3 | 160.0 | 724.6 | 557.8 | 633.5 | 724.6 | 557.8 | 633.5 | 395.0 | 324.0 | 360.3 |
| 132 | 102.7 | 114.6 | 147.4 | 594.8 | 572.7 | 581.7 | 594.8 | 572.7 | 581.7 | 315.0 | 136.2 | 250.4 |
| 138 | 361.0 | 155.4 | 247.2 | 552.5 | 368.6 | 492.2 | 552.5 | 368.6 | 492.2 | 356.8 | 200.3 | 310.5 |

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

| R30/ELPV | CHAN. NU | RUN NUMBER 42008C | | | | | | |
|----------|----------|--------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|--|
| | | INITIAL #1 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 | 1469. | 1591. | 182. | 39.5 | 911. | 167.9 | |
| 2A 5- 7 | 21 | 1512. | 1672. | 161. | 37.5 | 907. | 203.6 | |
| 1D 6- 2 | 30 | 1462. | 1584. | 103. | 25.0 | 1040. | 148.9 | |
| 2D 6- 2 | 33 | 1510. | 1599. | 90. | 24.0 | 550. | 265.6 | |
| 3D 6- 2 | 36 | 1560. | 1642. | 76. | 13.5 | 667. | 269.4 | |
| 4B 6- 2 | 60 | 1556. | 1671. | 113. | 25.0 | 1095. | 213.6 | |
| 5C 6- 2 | 61 | 1469. | 1621. | 136. | 36.5 | 1009. | 235.1 | |
| 1D 6- 3 | 63 | 1470. | 1598. | 128. | 36.5 | 1075. | 207.8 | |
| 5D 6- 3 | 69 | 1460. | 1567. | 127. | 28.0 | 1127. | 209.8 | |
| 2A 6- 4 | 70 | 1477. | 1612. | 135. | 26.0 | 1035. | 211.7 | |
| 33 6- 4 | 75 | 1590. | 1713. | 123. | 25.5 | 753. | 274.0 | |
| 2D 6- 5 | 84 | 1550. | 1689. | 130. | 25.0 | 700. | 290.0 | |
| 3C 6- 5 | 85 | 1559. | 1740. | 145. | 25.5 | 692. | 262.6 | |
| 3E 6- 5 | 86 | 1531. | 1631. | 100. | 23.5 | 742. | 279.0 | |
| 3C 6- 6 | 99 | 1577. | 1740. | 163. | 26.0 | 643. | 267.9 | |
| 3D 6- 6 | 96 | 1561. | 1724. | 163. | 33.5 | 766. | 269.8 | |
| 4A 6- 6 | 97 | 1459. | 1639. | 179. | 49.5 | 1065. | 191.5 | |
| 4C 6- 6 | 98 | 1576. | 1741. | 163. | 35.5 | 775. | 288.6 | |
| 5C 6- 6 | 101 | 1550. | 1683. | 127. | 26.0 | 745. | 293.0 | |
| 1C 7- 0 | 110 | 1423. | 1557. | 132. | 23.5 | 621. | 320.0 | |
| 2B 7- 0 | 111 | 1408. | 1568. | 110. | 13.5 | 694. | 302.6 | |
| 3D 7- 0 | 115 | 1461. | 1574. | 113. | 17.5 | 646. | 311.0 | |
| 5B 7- 0 | 117 | 1372. | 1449. | 127. | 23.5 | 666. | 266.0 | |
| 2B 7- 6 | 120 | 1432. | 1567. | 155. | 25.0 | 667. | 316.9 | |
| 2C 7- 6 | 121 | 1463. | 1567. | 184. | 36.5 | 754. | 307.0 | |
| 2E 7- 6 | 122 | 1643. | 1347. | 304. | 50.0 | 757. | 304.0 | |
| 3A 7- 6 | 123 | 1427. | 1579. | 152. | 26.5 | 620. | 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 | 643. | 329.9 | |
| 1C 8- 0 | 131 | 1216. | 1441. | 223. | 48.5 | 600. | 344.0 | |
| 2E 8- 0 | 133 | 915. | 1302. | 387. | 72.0 | 752. | 324.7 | |
| 3D 8- 0 | 136 | 1263. | 1506. | 224. | 47.5 | 664. | 340.0 | |
| 5B 8- 0 | 138 | 1205. | 1380. | 176. | 34.5 | 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. | 308.0 | |
| 1D 8- 6 | 142 | 752. | 1054. | 302. | 61.5 | 607. | 319.0 | |
| 2C 8- 6 | 143 | 1113. | 1332. | 219. | 39.0 | 706. | 338.9 | |
| 4B 8- 6 | 145 | 1154. | 1323. | 169. | 25.5 | 676. | 337.0 | |
| 5D 8- 6 | 148 | 1044. | 1222. | 178. | 27.5 | 666. | 311.1 | |
| 3D 8- 3 | 154 | 946. | 1136. | 240. | 65.5 | 561. | 366.3 | |
| 4C 8- 3 | 156 | 1043. | 1206. | 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. | 243.7 | |
| 2411- 0 | 168 | 556. | 704. | 146. | 75.0 | 575. | 259.6 | |
| 4C11- 0 | 170 | 654. | 822. | 168. | 52.0 | 406. | 329.7 | |
| 1D11- 0 | 172 | 466. | 641. | 225. | 98.5 | 546. | 266.0 | |

KON 42008C HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|------|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 634.1 | 565.2 | 568.0 | 639.4 | 571.6 | 594.4 | 3.5 | 1.0 | 2.4 |
| 24 | 896.5 | 818.4 | 811.0 | 918.1 | 844.7 | 881.9 | 9.0 | 7.0 | 7.8 |
| 34 | 1261.4 | 1105.7 | 1162.7 | 1332.0 | 1192.0 | 1241.1 | 26.0 | 17.5 | 22.0 |
| 40 | 1404.4 | 1324.7 | 1360.3 | 1503.0 | 1440.9 | 1462.3 | 26.5 | 22.5 | 24.6 |
| 60 | 1423.7 | 1400.7 | 1412.4 | 1634.1 | 1581.9 | 1602.2 | 49.5 | 39.5 | 45.7 |
| 67 | 1619.4 | 1497.0 | 1533.0 | 1772.0 | 1635.2 | 1687.7 | 44.5 | 36.0 | 38.6 |
| 70 | 1598.1 | 1413.0 | 1534.0 | 1779.8 | 1541.9 | 1707.8 | 49.5 | 27.5 | 38.3 |
| 71 | 1573.0 | 1404.4 | 1524.6 | 1728.5 | 1618.8 | 1683.3 | 38.5 | 29.0 | 35.6 |
| 72 | 1520.0 | 1514.4 | 1520.0 | 1688.6 | 1677.7 | 1683.1 | 38.5 | 37.0 | 37.8 |
| 74 | 1500.4 | 1463.4 | 1524.9 | 1671.2 | 1550.6 | 1614.2 | 25.0 | 12.5 | 21.3 |
| 75 | 1540.1 | 1460.2 | 1536.2 | 1715.1 | 1587.3 | 1649.9 | 36.5 | 17.0 | 25.5 |
| 76 | 1600.3 | 1470.0 | 1542.1 | 1735.2 | 1593.8 | 1663.4 | 38.5 | 21.0 | 26.5 |
| 77 | 1544.4 | 1444.1 | 1529.9 | 1739.7 | 1610.1 | 1673.0 | 48.0 | 23.5 | 32.1 |
| 78 | 1500.4 | 1417.2 | 1525.2 | 1746.4 | 1605.8 | 1684.6 | 48.0 | 25.5 | 35.9 |
| 84 | 1473.0 | 1200.0 | 1462.7 | 1549.2 | 1311.0 | 1532.7 | 36.5 | 13.5 | 23.3 |
| 90 | 1444.4 | 1042.0 | 1370.3 | 1611.2 | 1340.7 | 1544.7 | 50.0 | 24.5 | 31.4 |
| 96 | 1365.6 | 415.1 | 1244.4 | 1554.9 | 1301.6 | 1461.6 | 72.0 | 35.5 | 43.9 |
| 102 | 1153.0 | 752.4 | 1028.1 | 1332.0 | 1054.2 | 1237.5 | 61.5 | 25.5 | 37.9 |
| 111 | 1042.0 | 660.4 | 937.3 | 1218.1 | 932.6 | 1129.3 | 87.5 | 31.5 | 50.9 |
| 120 | 867.5 | 571.0 | 750.0 | 1041.3 | 855.1 | 984.3 | 105.0 | 31.5 | 72.9 |
| 132 | 654.1 | 461.0 | 562.9 | 822.0 | 615.2 | 707.9 | 75.0 | 52.0 | 65.9 |
| 136 | 624.0 | 465.0 | 511.2 | 785.7 | 653.1 | 712.3 | 98.5 | 71.5 | 79.8 |

| ELEV | TEMP RATE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | 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 |
| 34 | 40.4 | 70.1 | 75.4 | 852.6 | 769.2 | 818.9 | 81.0 | 73.5 | 78.1 |
| 40 | 116.2 | 80.3 | 102.0 | 860.4 | 851.1 | 865.5 | 117.0 | 114.7 | 116.4 |
| 60 | 210.4 | 160.7 | 160.3 | 918.5 | 838.0 | 899.0 | 175.8 | 167.9 | 170.8 |
| 67 | 173.6 | 132.2 | 154.6 | 926.5 | 824.7 | 892.7 | 213.6 | 200.1 | 206.7 |
| 70 | 142.4 | 120.4 | 160.0 | 984.5 | 888.2 | 893.2 | 234.6 | 220.0 | 226.4 |
| 71 | 174.7 | 140.2 | 153.0 | 994.4 | 794.0 | 927.4 | 229.9 | 221.3 | 227.2 |
| 72 | 173.7 | 150.4 | 162.3 | 1048.0 | 871.2 | 959.6 | 235.8 | 226.7 | 232.3 |
| 74 | 113.0 | 70.0 | 84.2 | 1094.9 | 556.4 | 803.3 | 311.0 | 196.6 | 247.4 |
| 75 | 142.4 | 67.0 | 113.0 | 1127.5 | 637.2 | 918.7 | 287.5 | 207.8 | 243.9 |
| 76 | 135.0 | 74.4 | 121.3 | 1130.7 | 648.8 | 831.9 | 314.0 | 156.5 | 257.5 |
| 77 | 173.3 | 94.7 | 143.1 | 1081.5 | 700.4 | 913.2 | 290.0 | 220.7 | 252.6 |
| 78 | 190.6 | 120.1 | 154.4 | 1084.7 | 678.3 | 825.7 | 319.0 | 191.5 | 272.1 |
| 84 | 157.1 | 104.4 | 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 | 240.3 | 329.6 |
| 102 | 301.0 | 164.0 | 204.4 | 699.8 | 570.5 | 642.5 | 358.0 | 311.1 | 335.7 |
| 111 | 272.2 | 157.0 | 142.0 | 706.7 | 501.6 | 585.3 | 383.9 | 284.0 | 350.7 |
| 120 | 260.0 | 172.3 | 227.7 | 746.2 | 494.7 | 644.7 | 381.0 | 270.5 | 330.5 |
| 132 | 167.4 | 133.2 | 145.1 | 575.0 | 405.7 | 519.0 | 329.7 | 202.0 | 250.3 |
| 136 | 277.3 | 161.1 | 201.0 | 575.6 | 283.4 | 495.6 | 306.0 | 121.6 | 246.0 |

42008C-3

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 43208 A

FLECHT BEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 419080

| 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 | 1059. | 1109. | 90. | 26.0 | 601. | 60.4 |
| 4C 3- 3 | 9 | 1230. | 1297. | 69. | 21.0 | 610. | 85.4 |
| 1C 4- 0 | 16 | 1325. | 1404. | 80. | 21.0 | 605. | 114.4 |
| 2A 5- 0 | 13 | 1417. | 1634. | 217. | 54.5 | 414. | 104.6 |
| 2A 5- 7 | 16 | 1462. | 1643. | 161. | 40.0 | 636. | 225.6 |
| 2D 6- 2 | 50 | 1521. | 1679. | 128. | 29.5 | 740. | 204.7 |
| 3D 6- 2 | 55 | 1513. | 1697. | 185. | 35.0 | 264. | 520.0 |
| 5C 6- 2 | 59 | 1526. | 1660. | 125. | 29.5 | 692. | 244.9 |
| 1D 6- 3 | 61 | 1441. | 1608. | 167. | 43.0 | 444. | 238.9 |
| 4B 6- 3 | 66 | 1534. | 1685. | 147. | 42.5 | 657. | 272.7 |
| 5D 6- 3 | 68 | 1446. | 1594. | 148. | 41.5 | 1014. | 233.7 |
| 2A 6- 4 | 70 | 1451. | 1653. | 202. | 53.0 | 447. | 253.6 |
| 3B 6- 4 | 75 | 1563. | 1741. | 149. | 32.0 | 641. | 207.9 |
| 1D 6- 5 | 62 | 1413. | 1590. | 177. | 50.0 | 452. | 251.7 |
| 2D 6- 5 | 64 | 1524. | 1679. | 144. | 32.0 | 765. | 301.6 |
| 3C 6- 5 | 65 | 1565. | 1740. | 155. | 41.0 | 484. | 266.6 |
| 3E 6- 5 | 66 | 1454. | 1584. | 130. | 40.0 | 416. | 270.9 |
| 3C 6- 6 | 97 | 1573. | 1761. | 188. | 42.5 | 467. | 277.6 |
| 3D 6- 6 | 98 | 1551. | 1722. | 171. | 43.0 | 752. | 306.6 |
| 4A 6- 6 | 100 | 1444. | 1647. | 203. | 55.5 | 617. | 305.2 |
| 4C 6- 6 | 101 | 1556. | 1743. | 185. | 44.5 | 660. | 260.2 |
| 5C 6- 6 | 103 | 1512. | 1659. | 143. | 43.0 | 431. | 273.9 |
| 1C 7- 0 | 110 | 1330. | 1491. | 161. | 42.5 | 704. | 305.0 |
| 2B 7- 0 | 111 | 1412. | 1577. | 165. | 31.0 | 654. | 372.4 |
| 3D 7- 0 | 115 | 1416. | 1567. | 147. | 23.0 | 650. | 333.7 |
| 5B 7- 0 | 117 | 1326. | 1461. | 136. | 31.0 | 705. | 241.4 |
| 2B 7- 6 | 121 | 1410. | 1608. | 208. | 43.5 | 616. | 306.0 |
| 2C 7- 6 | 122 | 1336. | 1575. | 236. | 43.0 | 740. | 341.0 |
| 2E 7- 6 | 123 | 1159. | 1346. | 187. | 50.0 | 606. | 337.0 |
| 3A 7- 6 | 124 | 1464. | 1502. | 178. | 43.5 | 732. | 304.6 |
| 3B 7- 6 | 125 | 1464. | 1616. | 187. | 34.0 | 714. | 341.0 |
| 4B 7- 6 | 126 | 1421. | 1591. | 170. | 31.0 | 740. | 324.0 |
| 5C 7- 6 | 129 | 1468. | 1566. | 158. | 31.5 | 704. | 322.0 |
| 1C 8- 0 | 132 | 1141. | 1429. | 288. | 84.5 | 781. | 307.4 |
| 2E 8- 0 | 134 | 1075. | 1348. | 273. | 75.5 | 737. | 305.0 |
| 3D 8- 0 | 137 | 1267. | 1530. | 263. | 55.5 | 705. | 300.6 |
| 5B 8- 0 | 134 | 1249. | 1459. | 210. | 56.0 | 760. | 346.0 |
| 5C 8- 0 | 140 | 1317. | 1506. | 189. | 46.0 | 760. | 340.4 |
| 1C 8- 6 | 141 | 980. | 1290. | 304. | 76.0 | 602. | 307.0 |
| 1D 8- 6 | 142 | 805. | 1260. | 454. | 96.0 | 745. | 356.4 |
| 2C 9- 6 | 143 | 1022. | 1291. | 269. | 53.5 | 544. | 304.0 |
| 4B 9- 6 | 145 | 1134. | 1327. | 193. | 42.5 | 676. | 304.4 |
| 5D 9- 6 | 148 | 974. | 1288. | 314. | 75.5 | 702. | 305.7 |
| 3D 9- 6 | 155 | 908. | 1199. | 292. | 76.0 | 536. | 404.0 |
| 4 | 157 | 962. | 1204. | 222. | 54.0 | 546. | 401.0 |
| 1 | 160 | 546. | 860. | 262. | 76.0 | 644. | 326.8 |
| 13 | 163 | 814. | 1042. | 223. | 76.0 | 540. | 411.0 |
| 5D | 166 | 670. | 916. | 240. | 86.0 | 660. | 305.4 |
| 2A11- 0 | 167 | 547. | 676. | 129. | 76.5 | 521. | 304.6 |
| 4C11- 0 | 169 | 617. | 805. | 188. | 76.0 | 435. | 377.4 |
| 1D11- 6 | 170 | 268. | 603. | 315. | 131.0 | 560. | 300.2 |

KOH 41808D HEATER RJD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|------|------|
| | MAX | MIN | PEAK | MAX | MIN | MEAN | MAX | MIN | PEAK |
| 12 | 659.4 | 605.7 | 620.4 | 664.7 | 612.0 | 632.0 | 3.0 | 2.5 | 2.7 |
| 24 | 850.2 | 823.6 | 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 |
| 46 | 1334.1 | 1324.7 | 1329.4 | 1416.2 | 1404.4 | 1410.3 | 24.0 | 21.0 | 22.5 |
| 60 | 1519.2 | 1464.4 | 1447.0 | 1671.9 | 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 | 35.0 | 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 | 1695.4 | 43.0 | 25.5 | 34.0 |
| 72 | 1604.7 | 1354.6 | 1528.5 | 1746.4 | 1498.7 | 1690.6 | 56.0 | 26.5 | 36.3 |
| 74 | 1564.6 | 1435.5 | 1514.7 | 1724.6 | 1578.7 | 1665.2 | 55.5 | 26.6 | 35.1 |
| 75 | 1543.6 | 1446.5 | 1447.7 | 1731.9 | 1569.0 | 1648.6 | 43.5 | 25.5 | 37.1 |
| 76 | 1592.7 | 1456.5 | 1525.6 | 1750.6 | 1610.1 | 1691.7 | 65.5 | 36.5 | 43.6 |
| 77 | 1505.2 | 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 | 23.5 | 33.1 |
| 90 | 1424.1 | 1150.8 | 1335.3 | 1615.6 | 1345.6 | 1514.3 | 57.0 | 26.5 | 34.4 |
| 96 | 1357.2 | 1074.6 | 1237.0 | 1566.3 | 1347.7 | 1465.4 | 84.5 | 37.5 | 57.0 |
| 102 | 1133.6 | 805.4 | 973.9 | 1326.8 | 1024.3 | 1236.7 | 96.0 | 32.5 | 43.2 |
| 111 | 982.0 | 614.7 | 854.5 | 1203.5 | 953.2 | 1096.7 | 85.0 | 34.5 | 52.0 |
| 120 | 816.5 | 586.6 | 687.6 | 1041.8 | 860.3 | 934.9 | 86.5 | 76.0 | 60.1 |
| 132 | 617.3 | 547.1 | 572.3 | 805.4 | 669.9 | 717.2 | 76.5 | 45.0 | 67.2 |
| 138 | 600.8 | 267.7 | 473.7 | 777.4 | 602.5 | 675.2 | 131.0 | 74.5 | 46.5 |

| ELEV | TEMP Rise (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | PEAK | MAX | MIN | MEAN | MAX | MIN | PEAK |
| 12 | 6.3 | 5.3 | 5.6 | 606.9 | 572.1 | 589.8 | 13.4 | 6.6 | 11.2 |
| 24 | 22.6 | 16.5 | 20.7 | 699.7 | 670.7 | 697.7 | 38.8 | 36.0 | 37.6 |
| 39 | 90.4 | 67.6 | 80.8 | 815.1 | 752.9 | 789.6 | 88.9 | 85.4 | 87.6 |
| 46 | 82.1 | 79.7 | 80.9 | 870.9 | 864.7 | 867.8 | 123.7 | 114.9 | 119.3 |
| 60 | 216.6 | 172.7 | 193.3 | 919.1 | 846.2 | 883.1 | 185.9 | 164.6 | 165.5 |
| 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 | 160.6 | 116.6 | 142.0 | 944.1 | 584.4 | 811.1 | 277.0 | 224.7 | 251.5 |
| 72 | 199.4 | 135.6 | 152.1 | 910.4 | 619.4 | 807.7 | 280.0 | 166.6 | 246.6 |
| 74 | 141.6 | 119.3 | 145.4 | 968.8 | 565.3 | 772.6 | 350.0 | 214.9 | 273.7 |
| 75 | 166.9 | 114.2 | 150.4 | 1014.1 | 757.7 | 870.4 | 295.9 | 233.7 | 268.7 |
| 76 | 202.1 | 133.6 | 166.1 | 996.6 | 536.6 | 808.5 | 353.0 | 253.6 | 266.1 |
| 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 | 273.0 | 291.6 |
| 84 | 190.6 | 135.5 | 171.6 | 732.2 | 650.1 | 687.6 | 372.9 | 251.4 | 316.1 |
| 90 | 236.6 | 137.5 | 179.1 | 823.9 | 616.2 | 720.1 | 386.0 | 243.6 | 331.1 |
| 96 | 288.0 | 171.5 | 220.4 | 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 | 157.3 | 623.6 | 474.2 | 544.9 | 429.0 | 251.7 | 376.6 |
| 120 | 244.4 | 200.4 | 247.2 | 715.3 | 477.2 | 597.6 | 411.0 | 255.9 | 346.2 |
| 132 | 186.1 | 117.5 | 144.9 | 520.8 | 435.5 | 476.9 | 377.9 | 305.6 | 335.5 |
| 138 | 314.6 | 150.8 | 261.5 | 559.7 | 275.9 | 457.9 | 361.0 | 240.0 | 309.8 |

41808D-3

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 $\pm 1\%$ oscillations^(a)

a. Relative to run 43208A

FLEIGHT SEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 41008E

| 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 | 1262. | 1285. | 83. | 21.0 | 626. | 86.4 |
| 4C 3- 3 | 10 | 1275. | 1340. | 65. | 18.0 | 628. | 85.6 |
| 1C 4- 0 | 12 | 1381. | 1488. | 107. | 31.5 | 900. | 114.4 |
| 2A 5- 0 | 16 | 1524. | 1709. | 185. | 41.0 | 714. | 177.4 |
| 2A 5- 7 | 19 | 1524. | 1671. | 147. | 32.5 | 645. | 218.4 |
| 5C 6- 0 | 36 | 1426. | 1581. | 154. | 38.0 | 1116. | 196.0 |
| 20 6- 2 | 39 | 1505. | 1617. | 112. | 20.0 | 714. | 241.4 |
| 10 6- 4 | 47 | 1464. | 1585. | 121. | 38.5 | 966. | 177.4 |
| 30 6- 4 | 50 | 1446. | 1654. | 208. | 39.0 | 252. | 445.0 |
| 43 6- 4 | 52 | 1525. | 1642. | 116. | 32.0 | 740. | 129.0 |
| 5C 6- 4 | 54 | 1474. | 1628. | 154. | 35.0 | 288. | 398.0 |
| 50 6- 4 | 55 | 1462. | 1592. | 110. | 32.5 | 663. | 212.4 |
| 10 6- 5 | 58 | 1471. | 1605. | 133. | 41.0 | 1016. | 165.0 |
| 2A 6- 5 | 59 | 1474. | 1645. | 171. | 47.5 | 672. | 147.7 |
| 2J 6- 5 | 61 | 1522. | 1634. | 112. | 31.5 | 748. | 249.6 |
| 38 6- 5 | 63 | 1540. | 1668. | 128. | 31.5 | 704. | 226.0 |
| 3C 6- 6 | 72 | 1557. | 1711. | 154. | 34.0 | 644. | 204.4 |
| 4C 6- 6 | 75 | 1571. | 1722. | 151. | 32.5 | 437. | 168.2 |
| 3C 6- 7 | * * * B A D T H E K M U C U P L E D A T A * | | | | | | |
| 3E 6- 7 | 83 | 1474. | 1630. | 151. | 40.0 | 624. | 243.0 |
| 30 6- 8 | 86 | 1518. | 1694. | 176. | 41.0 | 614. | 253.3 |
| 4A 6- 8 | 87 | 1441. | 1548. | 107. | 41.0 | 744. | 258.3 |
| 1C 7- 0 | 93 | 1465. | 1524. | 118. | 20.0 | 753. | 244.0 |
| 28 7- 0 | 94 | 1457. | 1561. | 105. | 17.5 | 747. | 258.4 |
| 30 7- 0 | 96 | 1454. | 1579. | 120. | 17.5 | 732. | 272.0 |
| 58 7- 0 | 103 | 1399. | 1510. | 115. | 20.5 | 634. | 205.0 |
| 28 7- 6 | 110 | 1408. | 1568. | 160. | 31.0 | 776. | 274.0 |
| 2C 7- 6 | 111 | 1425. | 1578. | 143. | 24.5 | 473. | 217.2 |
| 2E 7- 6 | 113 | 1231. | 1402. | 171. | 34.0 | 734. | 240.4 |
| 3A 7- 6 | * * * B A D T H E K M U C U P L E D A T A * | | | | | | |
| 33 7- 6 | 115 | 1165. | 1373. | 208. | 38.0 | 641. | 313.6 |
| 43 7- 6 | 120 | 1451. | 1611. | 160. | 32.5 | 657. | 258.0 |
| 5C 7- 6 | 122 | 1422. | 1566. | 143. | 32.5 | 651. | 257.0 |
| 1C 8- 0 | 124 | 1225. | 1421. | 196. | 42.0 | 777. | 257.4 |
| 2E 8- 0 | 126 | 1066. | 1288. | 220. | 58.5 | 713. | 307.0 |
| 30 8- 0 | 129 | 1246. | 1459. | 213. | 44.0 | 767. | 311.0 |
| 58 8- 0 | 133 | 1247. | 1407. | 160. | 36.5 | 616. | 273.7 |
| 5C 8- 0 | 134 | 1248. | 1467. | 199. | 41.5 | 600. | 278.4 |
| 1C 8- 6 | 135 | 1035. | 1261. | 226. | 44.5 | 664. | 321.5 |
| 10 8- 6 | 136 | 965. | 1189. | 224. | 56.5 | 724. | 316.3 |
| 2C 8- 6 | 138 | 1160. | 1428. | 248. | 54.0 | 641. | 268.1 |
| 43 8- 6 | 143 | 1156. | 1327. | 171. | 32.5 | 704. | 313.4 |
| 50 8- 6 | 145 | 960. | 1174. | 215. | 79.5 | 624. | 318.4 |
| 30 9- 3 | 150 | 926. | 1163. | 227. | 55.5 | 636. | 330.2 |
| 4C 9- 3 | 152 | 1031. | 1222. | 191. | 54.5 | 633. | 328.0 |
| 1010- 0 | 157 | 662. | 913. | 231. | 47.0 | 508. | 348.0 |
| 4310- 0 | 164 | 664. | 1044. | 180. | 62.0 | 602. | 346.2 |
| 5010- 0 | 166 | 696. | 906. | 210. | 48.0 | 712. | 266.4 |
| 2A11- 0 | 168 | 556. | 672. | 114. | 75.5 | 534. | 236.0 |
| 4C11- 0 | 169 | 616. | 614. | 154. | 75.5 | 500. | 301.6 |
| 1711- 6 | 171 | 360. | 632. | 252. | 42.5 | 535. | 233.6 |

RUN #1008 HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|------|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 895.0 | 925.2 | 882.0 | 915.7 | 8.5 | 7.0 | 7.5 |
| 39 | 1275.6 | 1181.1 | 1211.0 | 1340.4 | 1265.1 | 1290.7 | 23.5 | 18.0 | 20.6 |
| 48 | 1436.9 | 1354.3 | 1390.1 | 1529.0 | 1444.1 | 1487.0 | 31.5 | 26.5 | 24.2 |
| 60 | 1534.5 | 1500.8 | 1528.4 | 1722.9 | 1682.1 | 1704.6 | 45.5 | 40.0 | 42.2 |
| 67 | 1603.2 | 1494.8 | 1551.5 | 1737.4 | 1635.2 | 1691.8 | 40.0 | 35.0 | 37.2 |
| 70 | 1580.0 | 1534.2 | 1563.1 | 1718.5 | 1669.0 | 1694.2 | 31.0 | 26.0 | 27.7 |
| 73 | 1486.2 | 1486.2 | 1486.2 | 1612.3 | 1612.3 | 1612.8 | 31.5 | 31.5 | 31.5 |
| 74 | 1509.1 | 1506.6 | 1506.9 | 1637.4 | 1610.7 | 1627.0 | 31.0 | 26.0 | 25.5 |
| 75 | 1485.3 | 1447.8 | 1464.7 | 1622.1 | 1573.3 | 1591.7 | 43.5 | 31.0 | 35.3 |
| 76 | 1538.1 | 1403.5 | 1452.4 | 1655.9 | 1563.6 | 1610.9 | 38.5 | 26.0 | 31.6 |
| 77 | 1540.1 | 1471.4 | 1495.1 | 1607.9 | 1604.7 | 1629.9 | 47.5 | 31.5 | 37.2 |
| 78 | 1570.7 | 1425.2 | 1506.6 | 1721.8 | 1593.8 | 1653.9 | 44.0 | 32.0 | 36.4 |
| 79 | 1541.6 | 1478.5 | 1518.2 | 1700.6 | 1629.7 | 1661.1 | 40.0 | 26.5 | 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 | 1491.5 | 1354.6 | 1438.4 | 1610.1 | 1507.4 | 1558.9 | 20.5 | 14.5 | 16.3 |
| 90 | 1494.9 | 1164.7 | 1359.0 | 1629.7 | 1346.7 | 1518.9 | 41.5 | 26.0 | 30.0 |
| 96 | 1335.5 | 1060.1 | 1247.7 | 1529.0 | 1289.0 | 1443.0 | 59.5 | 33.4 | 41.9 |
| 102 | 1450.1 | 761.0 | 1057.2 | 1605.8 | 927.4 | 1268.9 | 79.5 | 31.6 | 50.1 |
| 111 | 1046.4 | 721.7 | 893.5 | 1246.0 | 947.0 | 1100.6 | 74.5 | 50.0 | 57.5 |
| 120 | 1089.4 | 569.1 | 763.8 | 1246.3 | 905.8 | 1005.0 | 117.0 | 22.0 | 71.5 |
| 132 | 659.7 | 469.2 | 563.0 | 913.7 | 611.0 | 584.8 | 83.0 | 46.0 | 70.0 |
| 138 | 582.5 | 374.0 | 481.2 | 700.4 | 632.0 | 666.2 | 92.5 | 61.5 | 77.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 14.3 | 22.1 | 726.5 | 695.3 | 713.5 | 37.4 | 36.4 | 37.1 |
| 39 | 91.3 | 65.4 | 79.6 | 843.0 | 814.2 | 826.4 | 87.4 | 81.1 | 82.1 |
| 48 | 189.6 | 168.4 | 176.1 | 906.0 | 893.9 | 899.9 | 114.9 | 113.0 | 114.2 |
| 60 | 157.6 | 123.0 | 140.3 | 963.4 | 914.4 | 938.7 | 177.9 | 168.8 | 174.8 |
| 67 | 133.3 | 129.8 | 131.2 | 904.0 | 802.8 | 861.0 | 218.9 | 156.8 | 209.4 |
| 70 | 126.1 | 126.1 | 126.1 | 879.9 | 808.8 | 842.2 | 225.0 | 225.0 | 225.0 |
| 74 | 126.3 | 112.0 | 119.2 | 883.6 | 683.6 | 683.6 | 226.0 | 226.0 | 226.0 |
| 75 | 140.2 | 99.8 | 120.0 | 713.6 | 687.2 | 700.4 | 241.9 | 235.4 | 236.9 |
| 76 | 154.1 | 92.2 | 118.5 | 802.6 | 650.0 | 728.4 | 239.0 | 173.0 | 214.0 |
| 77 | 171.5 | 112.0 | 134.8 | 967.9 | 285.6 | 712.0 | 398.0 | 154.0 | 230.9 |
| 79 | 162.0 | 168.7 | 147.3 | 1010.4 | 703.6 | 829.4 | 249.6 | 164.4 | 214.7 |
| 79 | 154.0 | 111.0 | 142.9 | 1062.0 | 694.0 | 841.5 | 250.0 | 165.2 | 217.0 |
| 80 | 220.3 | 136.2 | 178.5 | 896.7 | 764.0 | 830.5 | 250.0 | 175.0 | 223.2 |
| 81 | 195.8 | 195.8 | 195.8 | 1061.5 | 798.8 | 907.8 | 258.3 | 164.7 | 222.0 |
| 82 | 192.5 | 192.5 | 192.5 | 832.3 | 832.3 | 832.3 | 256.8 | 256.8 | 256.8 |
| 84 | 138.7 | 104.8 | 120.6 | 876.5 | 876.5 | 876.5 | 251.0 | 251.0 | 251.0 |
| 90 | 208.2 | 134.8 | 159.0 | 955.5 | 664.6 | 767.3 | 284.6 | 164.4 | 250.3 |
| 96 | 219.4 | 154.8 | 185.3 | 972.7 | 693.9 | 789.3 | 313.8 | 217.2 | 275.1 |
| 102 | 350.8 | 132.4 | 211.7 | 824.1 | 713.0 | 776.5 | 318.9 | 217.7 | 244.5 |
| 111 | 244.4 | 148.2 | 207.2 | 640.7 | 654.3 | 726.0 | 355.4 | 215.5 | 259.4 |
| 120 | 328.0 | 150.4 | 211.2 | 647.9 | 534.6 | 594.5 | 355.6 | 265.3 | 324.3 |
| 132 | 171.2 | 114.0 | 141.3 | 712.4 | 517.3 | 619.7 | 348.0 | 206.6 | 318.7 |
| 138 | 252.1 | 117.9 | 185.0 | 588.4 | 499.8 | 535.4 | 301.8 | 51.6 | 205.8 |
| | | | | 535.4 | 520.5 | 528.0 | 268.0 | 211.6 | 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

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES

RUN NUMBER 41608F

| ROD/ELEV | CHAN. | NU | INITIAL AT FLIGHT (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|-------|-----|---------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | | 5 | 1173. | 1286. | 113. | 34.0 | 620. | 69.4 |
| 4C 3- 3 | | 6 | 1270. | 1327. | 57. | 24.5 | 611. | 67.4 |
| 1C 4- 0 | | 7 | 1411. | 1491. | 80. | 21.0 | 663. | 124.0 |
| 2A 5- 0 | | 12 | 1544. | 1705. | 196. | 49.0 | 403. | 179.6 |
| 2A 5- 7 | | 14 | 1526. | 1656. | 128. | 27.5 | 650. | 211.6 |
| 5C 6- 2 | | 33 | 1454. | 1595. | 136. | 39.0 | 272. | 464.0 |
| 2D 6- 3 | | 35 | 1510. | 1586. | 76. | 12.5 | 665. | 257.0 |
| 1D 6- 4 | | 46 | 1454. | 1577. | 83. | 27.0 | 402. | 194.4 |
| 3J 6- 4 | | 50 | 1501. | 1690. | 189. | 39.0 | 241. | 527.0 |
| 4B 6- 4 | | 51 | 1555. | 1621. | 66. | 14.0 | 695. | 262.4 |
| 5D 6- 4 | | 56 | 1476. | 1550. | 71. | 25.5 | 672. | 219.0 |
| 1D 6- 5 | | 58 | 1476. | 1579. | 103. | 27.0 | 436. | 200.6 |
| 2A 6- 5 | | 59 | 1476. | 1605. | 129. | 38.0 | 1026. | 141.7 |
| 2D 6- 5 | | 62 | 1528. | 1613. | 86. | 27.0 | 687. | 262.4 |
| 3B 6- 5 | | 63 | 1566. | 1672. | 106. | 28.0 | 571. | 265.4 |
| 3C 6- 6 | | 69 | 1549. | 1706. | 158. | 38.5 | 266. | 262.0 |
| 3E 6- 6 | | 70 | 1467. | 1625. | 139. | 37.5 | 267. | 272.0 |
| 4C 6- 6 | | 73 | 1540. | 1683. | 94. | 28.0 | 742. | 244.6 |
| 5C 6- 6 | | 76 | 1533. | 1629. | 95. | 27.0 | 714. | 270.0 |
| 3D 6- 7 | | 85 | 1554. | 1681. | 122. | 37.5 | 734. | 258.0 |
| 3C 6- 8 | | 93 | 1574. | 1712. | 133. | 37.5 | 636. | 244.0 |
| 4A 6- 8 | | 95 | 1447. | 1601. | 154. | 37.5 | 1025. | 210.5 |
| 1C 7- 0 | | 109 | 1442. | 1533. | 91. | 16.5 | 660. | 275.0 |
| 2B 7- 0 | | 110 | 1566. | 1586. | 80. | 10.5 | 724. | 266.0 |
| 3D 7- 0 | | 113 | 1516. | 1596. | 78. | 11.5 | 661. | 271.0 |
| 5B 7- 0 | | 117 | 1373. | 1455. | 82. | 13.0 | 643. | 240.1 |
| 2B 7- 6 | | 120 | 1454. | 1582. | 128. | 37.0 | 765. | 260.2 |
| 2C 7- 6 | | 121 | 1453. | 1586. | 136. | 29.0 | 735. | 260.0 |
| 2E 7- 6 | | 123 | 1168. | 1318. | 130. | 26.0 | 763. | 252.7 |
| 3A 7- 6 | | 124 | 1452. | 1567. | 115. | 27.5 | 765. | 277.6 |
| 3B 7- 6 | | 125 | 1509. | 1630. | 121. | 25.5 | 644. | 303.0 |
| 4B 7- 6 | | 124 | 1477. | 1601. | 124. | 27.5 | 662. | 303.0 |
| 5C 7- 6 | | 132 | 1456. | 1550. | 113. | 29.0 | 716. | 303.4 |
| 1C 8- 0 | | 133 | 1250. | 1413. | 163. | 37.5 | 764. | 304.0 |
| 2E 8- 0 | | 136 | 1054. | 1206. | 146. | 40.5 | 632. | 271.0 |
| 3D 8- 0 | | 136 | 1342. | 1508. | 166. | 37.5 | 603. | 361.0 |
| 5B 8- 0 | | 143 | 1263. | 1418. | 136. | 38.5 | 665. | 302.6 |
| 5C 8- 0 | | 144 | 1314. | 1471. | 152. | 37.0 | 711. | 319.0 |
| 1C 8- 6 | | 145 | 1060. | 1247. | 187. | 42.0 | 627. | 332.4 |
| 1D 8- 6 | | 146 | 926. | 1072. | 144. | 38.5 | 666. | 296.7 |
| 2C 8- 6 | | 148 | 1174. | 1379. | 205. | 39.0 | 724. | 314.0 |
| 4B 8- 6 | | 153 | 1150. | 1357. | 167. | 37.5 | 666. | 334.0 |
| 5D 8- 6 | | 155 | 1077. | 1216. | 139. | 29.0 | 761. | 248.0 |
| 3D 9- 3 | | 159 | 954. | 1185. | 191. | 46.0 | 540. | 336.0 |
| 4C 9- 3 | | 161 | 1065. | 1247. | 182. | 46.0 | 601. | 332.0 |
| 1D10- 0 | | 164 | 652. | 931. | 279. | 85.0 | 646. | 269.1 |
| 4B10- 0 | | 166 | 875. | 1059. | 184. | 56.0 | 554. | 350.0 |
| 5D10- 0 | | 169 | 729. | 928. | 199. | 65.5 | 661. | 276.6 |
| 2A11- 0 | | 171 | 516. | 659. | 143. | 62.0 | 613. | 156.0 |
| 4C11- 0 | | 172 | 670. | 832. | 162. | 60.5 | 625. | 267.4 |
| 1D11- 6 | | 174 | 357. | 671. | 274. | 89.5 | 562. | 166.4 |

KUN 4160BF HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|------|------|
| | MAX | MIN | PEAK | MAX | MIN | MEAN | MAX | MIN | PEAK |
| 12 | 740.9 | 692.6 | 720.7 | 757.6 | 705.6 | 731.6 | 5.0 | 3.5 | 4.3 |
| 24 | 935.2 | 932.2 | 935.2 | 951.1 | 951.1 | 951.1 | 6.5 | 6.5 | 6.5 |
| 34 | 1270.1 | 1254.7 | 1260.9 | 1326.8 | 1257.8 | 1290.2 | 34.0 | 24.5 | 30.8 |
| 46 | 1463.5 | 1351.5 | 1467.5 | 1536.5 | 1422.7 | 1490.0 | 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 | 31.0 |
| 70 | 1607.0 | 1374.5 | 1462.6 | 1710.7 | 1506.3 | 1568.2 | 37.0 | 16.5 | 22.8 |
| 71 | 1573.1 | 1510.3 | 1545.7 | 1683.2 | 1607.9 | 1645.5 | 25.5 | 14.0 | 19.8 |
| 72 | 1450.6 | 1363.0 | 1406.8 | 1612.3 | 1516.0 | 1564.1 | 42.5 | 36.0 | 40.3 |
| 73 | 1476.2 | 1416.2 | 1440.2 | 1629.7 | 1580.9 | 1605.3 | 45.5 | 31.0 | 41.8 |
| 74 | 1505.0 | 1375.0 | 1460.3 | 1633.0 | 1513.9 | 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 | 33.6 |
| 76 | 1554.7 | 1403.2 | 1450.7 | 1689.7 | 1511.7 | 1604.8 | 42.0 | 11.5 | 26.9 |
| 77 | 1565.9 | 1470.1 | 1567.4 | 1672.3 | 1570.0 | 1615.7 | 46.0 | 27.0 | 34.6 |
| 78 | 1564.6 | 1440.2 | 1520.0 | 1706.2 | 1575.4 | 1630.2 | 38.5 | 25.5 | 31.6 |
| 79 | 1575.6 | 1344.5 | 1500.1 | 1687.5 | 1514.7 | 1627.0 | 38.0 | 27.5 | 32.6 |
| 80 | 1570.6 | 1441.8 | 1498.3 | 1711.6 | 1584.1 | 1641.6 | 43.5 | 25.0 | 37.3 |
| 81 | 1467.1 | 1467.1 | 1467.1 | 1606.8 | 1606.8 | 1606.8 | 29.0 | 26.0 | 26.0 |
| 84 | 1525.4 | 1372.8 | 1461.5 | 1619.4 | 1454.8 | 1547.3 | 19.0 | 16.5 | 13.6 |
| 90 | 1500.6 | 1180.0 | 1411.9 | 1629.7 | 1315.4 | 1539.6 | 37.5 | 25.5 | 24.1 |
| 96 | 1375.1 | 1054.5 | 1267.8 | 1548.4 | 1205.6 | 1447.2 | 46.0 | 37.0 | 36.7 |
| 102 | 1203.3 | 884.1 | 1040.1 | 1361.3 | 983.1 | 1246.5 | 42.0 | 14.5 | 33.7 |
| 111 | 1005.4 | 805.0 | 930.8 | 1253.6 | 934.8 | 1099.9 | 56.0 | 24.0 | 43.3 |
| 120 | 678.8 | 651.6 | 783.2 | 1100.6 | 916.1 | 991.8 | 85.0 | 54.0 | 63.9 |
| 132 | 670.2 | 660.5 | 653.8 | 632.3 | 557.8 | 681.7 | 79.0 | 34.0 | 54.0 |
| 136 | 544.7 | 340.7 | 524.6 | 608.5 | 671.0 | 727.7 | 89.5 | 62.5 | 74.5 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | PEAK | MAX | MIN | MEAN | MAX | MIN | PEAK |
| 12 | 13.0 | 6.7 | 10.9 | 645.9 | 607.4 | 626.6 | 19.9 | 16.5 | 14.2 |
| 24 | 15.9 | 15.9 | 15.9 | 721.7 | 721.7 | 721.7 | 43.5 | 43.5 | 43.5 |
| 34 | 113.0 | 50.7 | 84.3 | 636.7 | 610.9 | 624.6 | 90.6 | 67.4 | 65.3 |
| 46 | 60.5 | 65.5 | 72.5 | 672.5 | 636.5 | 654.0 | 129.0 | 116.0 | 123.4 |
| 60 | 145.6 | 150.7 | 172.8 | 602.5 | 695.1 | 698.4 | 145.4 | 174.0 | 162.9 |
| 67 | 135.9 | 84.1 | 114.0 | 627.9 | 722.1 | 695.1 | 218.8 | 206.4 | 212.9 |
| 70 | 160.4 | 66.5 | 105.6 | 634.1 | 242.5 | 520.8 | 522.0 | 213.0 | 350.1 |
| 71 | 110.1 | 67.6 | 84.8 | 664.8 | 281.3 | 573.1 | 460.0 | 222.5 | 341.3 |
| 72 | 161.7 | 153.6 | 157.3 | 249.0 | 246.8 | 247.9 | 513.0 | 504.0 | 511.0 |
| 73 | 162.7 | 151.5 | 157.1 | 279.1 | 256.5 | 267.8 | 488.0 | 465.0 | 473.5 |
| 74 | 151.6 | 111.7 | 132.1 | 666.5 | 247.9 | 445.2 | 513.0 | 176.7 | 376.9 |
| 75 | 140.4 | 71.4 | 124.3 | 1416.1 | 243.6 | 683.9 | 520.0 | 105.3 | 309.1 |
| 76 | 160.7 | 64.6 | 114.1 | 1259.7 | 241.4 | 679.5 | 527.0 | 162.1 | 314.1 |
| 77 | 157.0 | 65.7 | 108.2 | 1026.1 | 254.7 | 681.8 | 484.0 | 141.7 | 264.4 |
| 78 | 157.6 | 66.1 | 110.2 | 1050.7 | 286.6 | 768.1 | 282.0 | 157.5 | 240.1 |
| 79 | 140.6 | 41.7 | 118.8 | 1013.9 | 624.5 | 763.2 | 293.0 | 206.7 | 254.0 |
| 80 | 162.7 | 120.8 | 143.1 | 1024.6 | 723.3 | 857.0 | 297.0 | 210.5 | 251.4 |
| 81 | 119.7 | 114.7 | 119.7 | 785.8 | 785.8 | 785.8 | 256.0 | 256.0 | 256.0 |
| 84 | 94.4 | 70.2 | 85.0 | 744.1 | 643.1 | 708.1 | 290.5 | 234.0 | 264.5 |
| 90 | 140.3 | 113.1 | 127.6 | 623.4 | 602.9 | 735.4 | 303.4 | 256.7 | 284.2 |
| 96 | 173.3 | 135.7 | 154.4 | 336.5 | 684.8 | 759.4 | 319.8 | 271.0 | 301.2 |
| 102 | 205.0 | 114.0 | 150.4 | 723.7 | 547.4 | 665.6 | 336.0 | 296.7 | 314.5 |
| 111 | 196.5 | 167.3 | 161.0 | 672.2 | 583.0 | 622.2 | 336.0 | 252.0 | 241.8 |
| 120 | 278.9 | 163.1 | 200.6 | 661.3 | 558.8 | 594.5 | 353.0 | 276.0 | 224.1 |
| 132 | 181.1 | 47.3 | 145.9 | 613.0 | 284.5 | 487.4 | 287.9 | 61.0 | 143.6 |
| 136 | 274.3 | 120.3 | 203.1 | 582.3 | 474.5 | 529.3 | 332.0 | 106.4 | 266.3 |

4160BF-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 (5.9 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 NUMBER 41909A

| 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 | 1067. | 1099. | 11.1 | 2.5 | 926. | 21.5 |
| 4C 3- 3 | 11 | 1165. | 1176. | 13. | 2.0 | 904. | 23.5 |
| 1C 4- 0 | 14 | 1295. | 1307. | 12. | 2.0 | 842. | 34.9 |
| 2A 5- 0 | 17 | 1311. | 1335. | 25.1 | 3.5 | 807. | 47.7 |
| 2A 5- 7 | 21 | 1301. | 1400. | 19. | 3.5 | 804. | 55.4 |
| 1D 5- 2 | 50 | 1423. | 1441. | 18.1 | 2.5 | 846. | 67.4 |
| 2D 5- 2 | 53 | 1562. | 1582. | 20. | 2.5 | 808. | 64.9 |
| 3D 5- 2 | 58 | 1584. | 1604. | 19. | 2.5 | 850. | 67.3 |
| 5C 5- 2 | 61 | 1489. | 1505. | 17. | 2.5 | 743. | 65.4 |
| 1D 5- 3 | 63 | 1414. | 1436. | 22. | 3.0 | 866. | 68.8 |
| 4B 5- 3 | 68 | 1558. | 1578. | 19. | 3.0 | 858. | 67.2 |
| 5D 5- 3 | 69 | 1433. | 1456. | 23. | 3.0 | 874. | 67.7 |
| 2A 5- 4 | 70 | 1416. | 1434. | 18. | 3.0 | 857. | 67.4 |
| 3B 5- 4 | 75 | 1565. | 1609. | 20. | 3.0 | 854. | 69.4 |
| 3D 5- 6 | 79 | 1551. | 1574. | 24. | 3.0 | 815. | 72.5 |
| 2D 5- 5 | 84 | 1559. | 1580. | 21. | 3.0 | 871. | 66.5 |
| 3C 5- 5 | 85 | 1601. | 1622. | 21. | 2.5 | 855. | 71.5 |
| 3E 5- 5 | 86 | 1502. | 1520. | 18. | 3.0 | 804. | 64.5 |
| 3C 5- 6 | 95 | 1580. | 1609. | 23. | 2.5 | 854. | 73.0 |
| 4A 5- 6 | 97 | 1387. | 1406. | 18. | 2.5 | 813. | 71.1 |
| 3D 4- 0 | 98 | 1303. | 1325. | 22. | 2.5 | 724. | 42.3 |
| 5C 5- 6 | 101 | 1469. | 1485. | 16. | 2.0 | 270. | 74.0 |
| 1C 7- 0 | 110 | 1340. | 1414. | 18. | 2.0 | 754. | 74.3 |
| 2B 7- 0 | 111 | 1340. | 1415. | 18. | 2.0 | 714. | 77.8 |
| 3D 7- 0 | 115 | 1455. | 1473. | 18. | 2.0 | 804. | 76.5 |
| 5B 7- 0 | 117 | 1255. | 1314. | 19. | 3.0 | 846. | 70.5 |
| 2B 7- 6 | 120 | 1427. | 1445. | 18. | 2.5 | 754. | 64.4 |
| 2C 7- 6 | 121 | 1441. | 1462. | 21. | 2.5 | 701. | 65.4 |
| 2F 7- 6 | 122 | 1300. | 1321. | 20. | 3.0 | 851. | 83.5 |
| 3A 7- 6 | 123 | 1305. | 1322. | 16. | 2.5 | 710. | 55.0 |
| 3B 7- 6 | 124 | 1452. | 1472. | 20. | 2.5 | 840. | 65.4 |
| 4E 7- 6 | 127 | 1445. | 1434. | 20. | 2.5 | 747. | 65.4 |
| 5C 7- 6 | 128 | 1275. | 1292. | 17. | 2.5 | 804. | 64.3 |
| 1C 8- 0 | 131 | 1252. | 1271. | 19. | 2.5 | 713. | 42.3 |
| 2E 8- 0 | 133 | 937. | 952. | 16. | 3.0 | 624. | 75.0 |
| 4C 8- 6 | 136 | 1567. | 1588. | 22. | 2.5 | 814. | 72.8 |
| 5A 8- 0 | 138 | 1167. | 1187. | 20. | 3.0 | 841. | 91.5 |
| 5C 8- 0 | 139 | 1152. | 1159. | 17. | 3.0 | 821. | 90.8 |
| 1C 8- 6 | 141 | 1110. | 1126. | 18. | 2.5 | 805. | 94.5 |
| 1D 8- 6 | 142 | 1018. | 1031. | 12. | 2.5 | 610. | 75.8 |
| 2C 8- 6 | 143 | 1156. | 1174. | 18. | 2.5 | 808. | 97.8 |
| 4B 8- 6 | 145 | 1115. | 1137. | 22. | 3.0 | 855. | 90.9 |
| 5D 8- 6 | 148 | 954. | 1021. | 22. | 3.0 | 574. | 94.2 |
| 3D 4- 3 | 154 | 1035. | 1054. | 20. | 3.0 | 576. | 103.0 |
| 4C 9- 3 | 156 | 1033. | 1051. | 18. | 3.0 | 603. | 96.0 |
| 1010- 0 | 161 | 755. | 772. | 17. | 3.5 | 546. | 16.1 |
| 4810- 0 | 164 | 643. | 660. | 18. | 3.5 | 287. | 70.0 |
| 5010- 0 | 167 | 768. | 803. | 16. | 3.5 | 483. | 62.0 |
| 2A11- 0 | 168 | 618. | 626. | 9. | 3.5 | 557. | 16.0 |
| 4C11- 0 | 170 | 662. | 695. | 13. | 3.5 | 590. | 16.4 |
| 1011- 0 | 172 | 365. | 409. | 80. | 11.5 | 347. | 19.2 |

KUN 41909A HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-----|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 |
| 34 | 1164.5 | 1035.5 | 1098.0 | 1177.5 | 1050.1 | 1108.7 | 2.5 | 2.0 | 2.3 |
| 48 | 1317.2 | 1160.5 | 1251.7 | 1329.9 | 1198.3 | 1265.9 | 3.0 | 2.0 | 2.6 |
| 60 | 1456.0 | 1260.0 | 1332.6 | 1475.2 | 1288.0 | 1353.4 | 3.5 | 2.5 | 3.1 |
| 67 | 1547.4 | 1372.4 | 1422.6 | 1564.6 | 1393.9 | 1442.6 | 3.5 | 2.5 | 3.3 |
| 70 | 1593.3 | 1396.4 | 1510.5 | 1612.3 | 1413.0 | 1528.6 | 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 | 1385.4 | 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 | 2.6 |
| 76 | 1599.3 | 1360.4 | 1501.0 | 1619.9 | 1382.3 | 1521.8 | 3.5 | 2.5 | 3.0 |
| 77 | 1601.1 | 1403.4 | 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 | 1349.0 | 1473.0 | 1227.5 | 1368.2 | 3.0 | 2.0 | 2.4 |
| 90 | 1451.7 | 1275.0 | 1360.5 | 1471.9 | 1292.2 | 1385.0 | 3.0 | 2.5 | 2.5 |
| 96 | 1314.7 | 930.0 | 1203.0 | 1337.3 | 952.2 | 1223.1 | 3.0 | 2.5 | 2.9 |
| 102 | 1155.2 | 740.4 | 1006.2 | 1174.4 | 1016.1 | 1097.3 | 3.5 | 2.5 | 2.7 |
| 111 | 1146.2 | 914.4 | 964.7 | 1164.0 | 930.5 | 1006.3 | 3.5 | 2.5 | 3.1 |
| 120 | 856.4 | 755.3 | 809.2 | 873.7 | 772.2 | 826.5 | 4.0 | 3.5 | 3.6 |
| 132 | 662.3 | 616.4 | 641.0 | 695.2 | 625.7 | 652.6 | 3.5 | 2.5 | 3.3 |
| 136 | 667.6 | 389.1 | 574.3 | 678.3 | 468.8 | 601.3 | 11.5 | 2.5 | 5.8 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|-------|-------------------|------|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 2.6 | 1.4 | 2.1 | 637.9 | 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 | 7.4 | 10.0 |
| 34 | 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 | 32.0 | 33.5 |
| 60 | 24.7 | 17.2 | 20.6 | 911.4 | 787.7 | 862.2 | 48.4 | 47.4 | 46.0 |
| 67 | 21.7 | 17.2 | 19.4 | 889.2 | 860.6 | 877.6 | 56.9 | 55.4 | 56.3 |
| 70 | 14.6 | 16.1 | 17.0 | 876.3 | 852.1 | 864.1 | 61.9 | 54.7 | 60.6 |
| 71 | 20.5 | 16.2 | 19.4 | 896.9 | 814.2 | 853.6 | 63.4 | 60.9 | 62.2 |
| 72 | 21.7 | 13.4 | 16.2 | 876.3 | 692.2 | 815.9 | 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 | 16.4 | 20.7 | 874.5 | 626.4 | 854.6 | 68.8 | 67.2 | 67.5 |
| 76 | 23.5 | 16.1 | 20.2 | 867.3 | 725.7 | 835.1 | 70.5 | 64.6 | 68.4 |
| 77 | 26.3 | 16.5 | 22.0 | 873.1 | 821.8 | 851.3 | 71.9 | 66.4 | 70.7 |
| 78 | 23.7 | 15.6 | 20.1 | 854.1 | 276.0 | 769.7 | 74.0 | 65.2 | 71.8 |
| 84 | 24.5 | 15.1 | 19.4 | 753.6 | 670.5 | 706.6 | 80.0 | 74.0 | 76.3 |
| 90 | 20.4 | 14.0 | 18.5 | 750.0 | 650.6 | 708.1 | 86.9 | 83.5 | 85.4 |
| 96 | 22.6 | 15.0 | 19.2 | 724.3 | 598.2 | 663.5 | 92.5 | 75.0 | 90.2 |
| 102 | 22.3 | 12.5 | 17.1 | 694.0 | 523.2 | 608.9 | 69.5 | 75.0 | 61.6 |
| 111 | 14.7 | 13.7 | 16.6 | 612.2 | 406.6 | 544.5 | 103.0 | 56.5 | 89.3 |
| 120 | 22.0 | 14.6 | 17.5 | 596.4 | 282.3 | 407.1 | 78.0 | 16.1 | 61.7 |
| 132 | 12.4 | 4.1 | 10.8 | 548.5 | 550.6 | 577.5 | 19.0 | 16.4 | 17.7 |
| 136 | 74.7 | 4.4 | 30.1 | 579.5 | 397.5 | 514.3 | 21.2 | 14.2 | 20.2 |

41909A-3

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 KJ/B BUNDLE TEST SERIES
 RUN NUMBER 41709B

| ROD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TRAVELING TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|----------------------------|--------------------------------|-----------------------------------|--------------------------------|--------------------------------|----------------------------------|-----------------------------|
| 2A 3-3 | 9 | 1029. | 1043. | 14. | 3.5 | 799. | 22.9 |
| 4C 3-3 | 11 | 1205. | 1217. | 14. | 2.5 | 897. | 22.9 |
| 1C 4-0 | 14 | 1299. | 1316. | 17. | 3.5 | 804. | 33.0 |
| 2A 5-0 | 17 | 1318. | 1349. | 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 | ** BAD THERMOCOUPLE DATA * | | | | | | |
| 3B 6-4 | 75 | 1461. | 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 | 1337. | 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 41709B HEATER MOD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TUPAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|----------------------|-----|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 536.4 | 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 | 1023.6 | 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 | 1591.6 | 1364.0 | 1447.5 | 1604.7 | 1396.0 | 1473.6 | 4.5 | 3.5 | 4.0 |
| 70 | 1590.7 | 1317.4 | 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 | 1615.7 | 1368.6 | 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 | 925.3 | 1070.7 | 843.7 | 976.9 | 4.0 | 3.5 | 3.8 |
| 117 | 868.8 | 723.5 | 784.5 | 889.2 | 745.0 | 806.0 | 3.0 | 4.0 | 4.4 |
| 122 | 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) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 868.4 | 817.6 | 843.5 | 57.3 | 56.4 | 56.9 |
| 70 | 28.6 | 22.1 | 25.8 | 851.4 | 706.2 | 795.3 | 62.3 | 60.9 | 61.5 |
| 71 | 32.5 | 24.1 | 28.0 | 882.0 | 715.8 | 795.3 | 54.8 | 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 | 29.0 | 20.0 | 24.5 | 1083.8 | 757.6 | 848.7 | 69.2 | 39.4 | 62.6 |
| 77 | 29.7 | 23.5 | 25.4 | 1048.7 | 739.5 | 834.0 | 70.4 | 45.6 | 66.3 |
| 78 | 32.0 | 22.0 | 27.4 | 999.2 | 762.7 | 828.9 | 72.0 | 51.4 | 67.7 |
| 84 | 25.7 | 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 | 113.2 | 76.9 | 97.5 |
| 120 | 27.4 | 18.4 | 21.5 | 607.9 | 286.6 | 487.5 | 99.1 | 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 SEASE 21 RUD BUNDLE TEST SERIES

RUN NUMBER 41909C

| ROD/ELEV | CHAN. NO | INITIAL AF FLGCD (DEG F) | INITIAL TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURBIDITY TIME (SECONDS) | QUENCH TEMPERATURE (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 |
| 10 6-2 | 30 | 1390. | 1406. | 16. | 3.5 | 1013. | 35.9 |
| 20 6-2 | 53 | 1400. | 1422. | 22. | 2.5 | 838. | 64.5 |
| 30 6-2 | 58 | 1467. | 1510. | 22. | 2.5 | 715. | 64.6 |
| 48 6-2 | 60 | 1506. | 1526. | 19. | 2.5 | 810. | 65.9 |
| 5C 6-2 | 61 | 1382. | 1413. | 31. | 4.0 | 677. | 66.3 |
| 10 6-3 | 63 | 1405. | 1416. | 13. | 2.5 | 1026. | 40.9 |
| 50 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 |
| 20 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 6-5 | 95 | 1589. | 1617. | 27. | 3.5 | 992. | 48.9 |
| 30 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 | 717. | 76.0 |
| 30 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. | 1490. | 20. | 3.5 | 741. | 83.5 |
| 2C 7-6 | 121 | 1484. | 1510. | 26. | 3.5 | 753. | 84.9 |
| 2F 7-6 | 122 | 1344. | 1369. | 25. | 4.0 | 731. | 87.4 |
| 3A 7-6 | 123 | 1427. | 1423. | 25. | 3.5 | 725. | 83.4 |
| 3A 7-6 | 124 | 1471. | 1499. | 28. | 3.5 | 707. | 84.9 |
| 4B 7-6 | 127 | 1461. | 1487. | 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 |
| 30 8-0 | 136 | 1376. | 1406. | 29. | 3.5 | 691. | 92.5 |
| 5B 8-0 | 138 | 1137. | 1167. | 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 |
| 10 8-6 | 142 | 1015. | 1040. | 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 |
| 50 8-6 | 148 | 1049. | 1080. | 31. | 4.0 | 538. | 97.4 |
| 30 9-3 | 154 | 1048. | 1076. | 27. | 4.0 | 585. | 106.7 |
| 4C 9-3 | 156 | 1077. | 1103. | 26. | 4.0 | 559. | 105.8 |
| 1010-0 | 161 | 771. | 793. | 22. | 6.0 | 543. | 92.3 |
| 4310-0 | 164 | 871. | 897. | 25. | 5.0 | 499. | 81.0 |
| 5010-0 | 167 | 788. | 812. | 24. | 5.5 | 560. | 65.4 |
| 2411-0 | 168 | 655. | 668. | 13. | 5.5 | 551. | 31.1 |
| 4C11-0 | 170 | 699. | 717. | 18. | 4.0 | 587. | 20.6 |
| 1011-6 | 172 | 349. | 480. | 131. | 13.5 | 287. | 34.5 |

RJ4 4190C HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | YMRAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|----------------------|-----|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 567.8 | 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 | 2.3 | 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 | 1366.0 | 1376.7 | 4.5 | 4.5 | 4.5 |
| 67 | 1318.3 | 1424.2 | 1480.5 | 1643.9 | 1354.8 | 1506.9 | 4.5 | 4.0 | 4.1 |
| 70 | 1349.5 | 1324.4 | 1471.6 | 1281.9 | 1324.0 | 1501.4 | 5.0 | 4.0 | 4.2 |
| 71 | 1433.2 | 1348.2 | 1446.5 | 1513.8 | 1379.2 | 1477.5 | 4.5 | 3.5 | 4.0 |
| 72 | 1355.8 | 1431.6 | 1493.7 | 1485.9 | 1485.9 | 1485.9 | 5.5 | 4.0 | 6.3 |
| 74 | 1310.1 | 1347.7 | 1442.5 | 1532.2 | 1367.7 | 1463.2 | 3.5 | 2.5 | 2.7 |
| 75 | 1366.3 | 1390.2 | 1485.7 | 1589.5 | 1411.9 | 1505.2 | 3.5 | 2.5 | 3.1 |
| 76 | 1591.1 | 1309.8 | 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 | 1376.5 | 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 | 1509.2 | 1336.2 | 1455.3 | 4.0 | 3.5 | 3.6 |
| 96 | 1375.4 | 1136.9 | 1317.1 | 1425.9 | 1169.2 | 1349.5 | 4.5 | 3.5 | 3.9 |
| 102 | 1233.5 | 1315.0 | 1128.0 | 1234.8 | 1344.9 | 1137.9 | 4.0 | 3.5 | 3.9 |
| 111 | 1077.4 | 937.2 | 1020.0 | 1102.6 | 957.3 | 1043.5 | 4.0 | 4.0 | 5.0 |
| 120 | 941.8 | 770.6 | 845.9 | 966.6 | 793.0 | 871.4 | 5.0 | 4.0 | 5.5 |
| 132 | 599.3 | 635.1 | 637.6 | 717.1 | 619.9 | 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) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|-------|-------------------|------|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 5.2 | 2.0 | 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 | 26.0 | 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 | 902.4 | 34.2 | 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 | 860.3 | 578.2 | 770.1 | 64.5 | 62.2 | 63.4 |
| 71 | 33.3 | 24.0 | 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 | 54.6 | 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 | 69.5 | 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 | 76.0 | 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 | 30.5 | 19.0 | 23.5 | 603.5 | 528.5 | 576.9 | 106.7 | 84.0 | 99.9 |
| 120 | 27.3 | 22.4 | 25.5 | 593.1 | 377.2 | 512.9 | 92.9 | 52.3 | 77.0 |
| 132 | 17.7 | 11.6 | 14.3 | 580.9 | 247.1 | 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 NUMBER 43009D

| ROD/ELEV | CHAN. NO | INITIAL AT FLCC (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 | 705. | 24.0 |
| 4C 3- 3 | 9 | 1202. | 1212. | 10. | 2.5 | 634. | 24.5 |
| 1C 4- 0 | 10 | 1209. | 1279. | 10. | 2.5 | 601. | 35.4 |
| 2A 5- 0 | 13 | 1305. | 1389. | 23. | 4.0 | 601. | 50.9 |
| 2A 5- 7 | 16 | 1465. | 1424. | 18. | 3.0 | 602. | 54.0 |
| 20 6- 2 | 20 | 1450. | 1507. | 17. | 2.5 | 465. | 37.0 |
| 30 6- 2 | 25 | 1484. | 1515. | 31. | 4.0 | 511. | 73.5 |
| 5C 6- 2 | 29 | 1400. | 1497. | 17. | 2.5 | 407. | 64.4 |
| 10 6- 3 | 61 | 1402. | 1410. | 16. | 2.5 | 461. | 34.4 |
| 48 6- 3 | 66 | 1507. | 1523. | 15. | 2.5 | 1023. | 36.4 |
| 50 6- 3 | 66 | 1347. | 1417. | 19. | 3.0 | 451. | 44.4 |
| 2A 6- 4 | 70 | 1352. | 1409. | 17. | 2.5 | 1056. | 24.9 |
| 33 6- 4 | * * B A L T H E R M O C O U P L E R D A T A * | | | | | | |
| 10 6- 5 | 82 | 1354. | 1416. | 22. | 3.5 | 436. | 47.9 |
| 20 6- 5 | * * B A L T H E R M O C O U P L E R D A T A * | | | | | | |
| 30 6- 5 | 85 | 1600. | 1617. | 17. | 2.5 | 1099. | 27.4 |
| 3E 6- 5 | 86 | 1444. | 1463. | 14. | 2.5 | 425. | 45.3 |
| 3C 6- 6 | 97 | 1602. | 1619. | 16. | 2.5 | 1076. | 33.0 |
| 30 6- 6 | 98 | 1500. | 1583. | 17. | 2.5 | 1055. | 31.9 |
| 4A 6- 6 | 100 | 1425. | 1452. | 16. | 2.5 | 416. | 59.4 |
| 4C 6- 6 | 101 | 1574. | 1594. | 15. | 2.5 | 1040. | 34.4 |
| 5C 6- 6 | 103 | 1507. | 1519. | 12. | 2.5 | 624. | 60.2 |
| 1C 7- 0 | * * B A L T H E R M O C O U P L E R D A T A * | | | | | | |
| 29 7- 0 | 111 | 1441. | 1461. | 20. | 2.5 | 772. | 69.6 |
| 30 7- 0 | 115 | 1464. | 1482. | 17. | 2.5 | 607. | 51.6 |
| 58 7- 0 | 117 | 1301. | 1317. | 16. | 2.5 | 607. | 71.2 |
| 28 7- 6 | 121 | 1437. | 1456. | 19. | 2.5 | 725. | 74.0 |
| 2C 7- 6 | 122 | 1402. | 1402. | 19. | 2.5 | 722. | 82.6 |
| 2F 7- 6 | 123 | 1239. | 1256. | 21. | 3.0 | 650. | 79.4 |
| 3A 7- 6 | 124 | 1414. | 1430. | 16. | 2.5 | 710. | 80.0 |
| 39 7- 6 | 125 | 1400. | 1449. | 19. | 2.5 | 701. | 74.2 |
| 48 7- 6 | 126 | 1453. | 1472. | 19. | 2.5 | 740. | 79.3 |
| 5C 7- 6 | 129 | 1400. | 1427. | 19. | 2.5 | 713. | 77.9 |
| 1C 8- 0 | 132 | 1200. | 1204. | 18. | 3.0 | 600. | 64.4 |
| 2E 8- 0 | 134 | 1133. | 1157. | 24. | 3.5 | 647. | 86.0 |
| 3D 8- 0 | 137 | 1340. | 1410. | 20. | 2.5 | 707. | 82.8 |
| 5R 8- 0 | 139 | 1240. | 1260. | 20. | 3.0 | 666. | 87.6 |
| 5C 8- 0 | 140 | 1300. | 1309. | 19. | 3.0 | 606. | 80.5 |
| 1C 9- 6 | 141 | 1140. | 1163. | 23. | 3.0 | 644. | 46.6 |
| 1D 9- 6 | 142 | 1005. | 1106. | 23. | 3.0 | 621. | 46.3 |
| 2C 9- 6 | 143 | 1190. | 1217. | 21. | 2.5 | 564. | 47.4 |
| 48 9- 6 | 145 | 1221. | 1243. | 22. | 2.5 | 665. | 46.4 |
| 5D 9- 6 | 148 | 1131. | 1154. | 23. | 3.0 | 602. | 45.9 |
| 3D 9- 3 | 155 | 1104. | 1123. | 20. | 3.0 | 560. | 102.0 |
| 4C 9- 3 | 157 | 1045. | 1115. | 20. | 3.0 | 565. | 103.0 |
| 1010- 0 | 160 | 806. | 712. | 26. | 5.0 | 541. | 64.2 |
| 4810- 0 | 163 | 504. | 922. | 19. | 3.5 | 531. | 84.0 |
| 5010- 0 | 166 | 817. | 834. | 18. | 4.0 | 604. | 72.9 |
| 2A11- 0 | 167 | 638. | 649. | 11. | 3.0 | 565. | 20.0 |
| 4C11- 0 | 169 | 717. | 731. | 14. | 3.5 | 574. | 24.5 |
| 1011- 6 | 170 | 407. | 456. | 49. | 12.0 | 444. | 17.1 |

KUN 43009D HEATER RJD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-----|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 644.4 | 631.3 | 654.3 | 699.4 | 632.0 | 655.2 | 1.0 | 0.0 | .5 |
| 24 | 615.0 | 704.4 | 747.4 | 818.9 | 789.8 | 801.9 | 2.0 | 2.0 | 2.0 |
| 34 | 1202.3 | 1040.4 | 1095.0 | 1211.8 | 1054.2 | 1106.7 | 3.5 | 2.5 | 2.8 |
| 40 | 1265.8 | 1230.2 | 1244.5 | 1278.6 | 1240.0 | 1259.3 | 3.0 | 2.5 | 2.8 |
| 60 | 1501.0 | 1332.4 | 1344.0 | 1516.0 | 1351.9 | 1418.8 | 4.0 | 3.0 | 3.7 |
| 67 | 1500.2 | 1405.3 | 1400.3 | 1604.7 | 1423.7 | 1486.2 | 4.0 | 2.5 | 3.2 |
| 70 | 1545.0 | 1402.1 | 1520.0 | 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 | 1404.2 | 1504.1 | 1279.7 | 1485.2 | 3.5 | 2.0 | 2.6 |
| 74 | 1543.1 | 1323.0 | 1420.0 | 1559.2 | 1345.5 | 1458.8 | 3.0 | 2.5 | 2.6 |
| 75 | 1507.2 | 1340.0 | 1442.7 | 1522.5 | 1415.2 | 1459.1 | 3.0 | 2.5 | 2.6 |
| 76 | 1500.6 | 1341.4 | 1400.4 | 1580.9 | 1406.7 | 1506.9 | 3.5 | 2.5 | 2.7 |
| 77 | 1000.1 | 1344.0 | 1404.3 | 1616.7 | 1416.2 | 1506.6 | 3.5 | 2.5 | 2.8 |
| 78 | 1602.3 | 1412.0 | 1512.0 | 1618.8 | 1431.2 | 1528.3 | 3.0 | 2.5 | 2.6 |
| 84 | 1475.3 | 1200.0 | 1304.9 | 1494.4 | 1287.0 | 1403.7 | 3.0 | 2.5 | 2.6 |
| 90 | 1474.6 | 1234.7 | 1370.3 | 1440.7 | 1255.7 | 1396.6 | 3.5 | 2.5 | 2.6 |
| 96 | 1421.7 | 1133.0 | 1400.4 | 1443.0 | 1150.7 | 1308.8 | 4.0 | 2.5 | 3.0 |
| 102 | 1221.4 | 1052.7 | 1130.4 | 1243.2 | 1065.5 | 1157.4 | 3.0 | 2.5 | 2.8 |
| 111 | 1103.6 | 900.4 | 1020.7 | 1123.4 | 923.3 | 1044.8 | 3.5 | 2.5 | 2.9 |
| 120 | 903.6 | 605.0 | 821.2 | 922.3 | 711.9 | 840.4 | 5.0 | 2.5 | 3.5 |
| 132 | 710.0 | 037.0 | 605.0 | 730.0 | 643.9 | 678.0 | 3.5 | 3.0 | 3.3 |
| 136 | 704.2 | 400.7 | 500.0 | 718.1 | 455.9 | 591.0 | 12.0 | 3.0 | 6.1 |

| ELEV | TEMP RATE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|--------|-------------------|------|------|
| | MAX | MIN | PLAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 1.8 | 0.0 | 0.0 | 049.2 | 599.3 | 617.4 | 4.0 | 3.0 | 3.9 |
| 24 | 4.9 | 3.4 | 4.0 | 711.0 | 687.9 | 696.0 | 10.8 | 10.0 | 10.4 |
| 34 | 13.8 | 4.4 | 10.4 | 858.9 | 785.3 | 820.6 | 24.5 | 22.0 | 23.7 |
| 40 | 4.0 | 4.0 | 4.0 | 822.6 | 805.7 | 811.6 | 35.4 | 35.3 | 35.3 |
| 60 | 23.2 | 15.0 | 14.0 | 880.5 | 806.5 | 873.8 | 50.9 | 44.4 | 50.3 |
| 67 | 24.4 | 10.4 | 14.4 | 881.9 | 814.1 | 846.6 | 59.9 | 55.0 | 54.5 |
| 70 | 17.3 | 17.3 | 17.3 | 852.7 | 825.8 | 839.2 | 63.5 | 62.0 | 62.7 |
| 71 | 10.0 | 10.0 | 10.0 | 719.0 | 719.0 | 719.0 | 64.5 | 64.5 | 64.5 |
| 72 | 19.2 | 10.4 | 10.0 | 1077.1 | 784.7 | 911.5 | 63.9 | 27.4 | 49.0 |
| 74 | 21.8 | 12.2 | 17.7 | 1149.8 | 809.6 | 934.9 | 64.7 | 17.0 | 37.3 |
| 75 | 14.2 | 15.0 | 10.5 | 1022.7 | 951.3 | 979.9 | 44.9 | 35.4 | 34.7 |
| 76 | 23.0 | 13.3 | 10.1 | 1333.5 | 837.0 | 1015.2 | 65.7 | 12.0 | 39.4 |
| 77 | 22.2 | 14.1 | 17.3 | 1099.2 | 924.7 | 990.6 | 51.4 | 27.4 | 42.2 |
| 78 | 10.4 | 11.4 | 15.7 | 1070.2 | 823.6 | 962.1 | 68.2 | 31.9 | 40.7 |
| 84 | 21.5 | 15.0 | 10.4 | 506.5 | 684.4 | 730.5 | 73.1 | 51.0 | 66.5 |
| 90 | 21.0 | 14.0 | 10.2 | 747.8 | 658.2 | 700.1 | 82.6 | 72.5 | 78.5 |
| 96 | 24.1 | 17.0 | 20.4 | 787.1 | 630.6 | 684.4 | 90.9 | 82.0 | 87.5 |
| 102 | 23.0 | 12.0 | 21.0 | 665.3 | 564.1 | 616.3 | 98.5 | 45.9 | 57.0 |
| 111 | 20.0 | 15.0 | 10.1 | 547.0 | 535.3 | 567.7 | 103.0 | 71.3 | 94.2 |
| 120 | 20.3 | 10.7 | 14.2 | 711.5 | 530.5 | 583.9 | 108.0 | 15.0 | 74.2 |
| 132 | 14.0 | 11.3 | 14.8 | 573.8 | 550.2 | 562.4 | 28.0 | 20.0 | 24.2 |
| 136 | 44.2 | 12.4 | 24.0 | 544.2 | 437.6 | 493.4 | 48.5 | 17.1 | 29.3 |

43009D-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

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 42509E

| 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 | 1136. | 1152. | 15. | 3.5 | 882. | 25.5 |
| 4C 3- 3 | 10 | 1252. | 1266. | 14. | 2.5 | 889. | 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 |
| 9C 6- 0 | 36 | 1365. | 1351. | 46. | 6.5 | 593. | 74.4 |
| 2D 6- 2 | 39 | 1444. | 1408. | 23. | 3.0 | 867. | 55.4 |
| 1D 6- 4 | 47 | 1356. | 1413. | 17. | 2.5 | 847. | 55.4 |
| 3D 6- 4 | 50 | 1393. | 1434. | 41. | 5.0 | 1346. | 14.7 |
| 4B 6- 4 | 52 | 1409. | 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 | 56 | 1424. | 1444. | 21. | 3.5 | 868. | 58.8 |
| 2A 6- 5 | 59 | 1433. | 1455. | 22. | 3.5 | 731. | 87.0 |
| 2D 6- 5 | 61 | 1497. | 1517. | 20. | 3.0 | 888. | 62.4 |
| 3B 6- 5 | 63 | 1545. | 1566. | 20. | 2.5 | 879. | 37.5 |
| 3C 6- 6 | 72 | 1577. | 1621. | 30. | 4.0 | 1277. | 21.1 |
| 4C 6- 6 | 75 | 1577. | 1624. | 24. | 3.5 | 976. | 30.3 |
| 3C 6- 7 | ** B A U T H | | J U P L E D A T A * | | 20. | 402. | 45.3 |
| 3E 6- 7 | 83 | 1508. | 1508. | 20. | 3.0 | 402. | 45.3 |
| 3D 6- 8 | 86 | 1525. | 1610. | 25. | 3.5 | 972. | 41.9 |
| 4A 6- 8 | 87 | 1430. | 1452. | 22. | 3.5 | 735. | 72.7 |
| 1C 7- 0 | 93 | 1476. | 1494. | 18. | 2.5 | 763. | 85.1 |
| 2B 7- 0 | 94 | 1567. | 1529. | 22. | 2.5 | 775. | 87.8 |
| 3D 7- 0 | 98 | 1588. | 1591. | 23. | 2.5 | 853. | 81.0 |
| 5B 7- 0 | 103 | 1467. | 1427. | 19. | 2.5 | 745. | 73.3 |
| 2B 7- 6 | 110 | 1470. | 1493. | 24. | 3.5 | 888. | 84.0 |
| 2C 7- 6 | 111 | 1518. | 1539. | 21. | 2.5 | 882. | 81.2 |
| 2E 7- 6 | 113 | 1305. | 1330. | 25. | 3.5 | 873. | 82.5 |
| 3A 7- 6 | ** B A U T H T H E I M O U J U P L E D A T A * | | | | 29. | 592. | 94.5 |
| 3B 7- 6 | 115 | 1224. | 1293. | 29. | 3.5 | 592. | 94.5 |
| 4B 7- 6 | 120 | 1497. | 1517. | 25. | 3.5 | 775. | 81.5 |
| 5C 7- 6 | 122 | 1468. | 1490. | 24. | 3.5 | 728. | 83.5 |
| 1C 8- 0 | 124 | 1247. | 1211. | 24. | 4.0 | 871. | 91.4 |
| 2E 8- 0 | 126 | 1124. | 1150. | 28. | 4.0 | 821. | 84.5 |
| 3D 8- 0 | 129 | 1350. | 1383. | 28. | 3.5 | 877. | 92.8 |
| 5B 8- 0 | 133 | 1234. | 1259. | 25. | 4.0 | 855. | 93.8 |
| 5C 8- 0 | 134 | 1255. | 1379. | 24. | 3.5 | 881. | 91.1 |
| 1C 8- 6 | 135 | 1126. | 1155. | 28. | 4.0 | 834. | 101.0 |
| 1D 8- 6 | 136 | 1053. | 1080. | 27. | 4.0 | 843. | 99.8 |
| 2C 8- 6 | 138 | 1264. | 1217. | 28. | 4.0 | 830. | 98.5 |
| 4B 8- 6 | 143 | 1192. | 1218. | 26. | 3.5 | 878. | 100.0 |
| 5D 8- 6 | 145 | 1100. | 1131. | 30. | 4.5 | 801. | 99.8 |
| 3D 9- 3 | 150 | 1055. | 1079. | 24. | 3.5 | 872. | 106.9 |
| 4C 9- 3 | 152 | 1103. | 1128. | 24. | 4.0 | 873. | 106.7 |
| 1D10- 0 | 157 | 740. | 765. | 25. | 4.5 | 888. | 84.7 |
| 4B10- 0 | 164 | 888. | 911. | 23. | 4.5 | 816. | 91.7 |
| 5D10- 0 | 166 | 781. | 800. | 19. | 4.5 | 813. | 88.0 |
| 2A11- 0 | 168 | 833. | 845. | 12. | 4.0 | 892. | 28.3 |
| 4C11- 0 | 169 | 714. | 734. | 15. | 4.0 | 888. | 22.5 |
| 1D11- 6 | 171 | 260. | 363. | 73. | 13.0 | 244. | 16.0 |

MUM 42509E HEATER RJD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-----|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 662.4 | 622.4 | 644.7 | 665.7 | 626.8 | 648.5 | 1.5 | 3.0 | 1.5 |
| 24 | 924.2 | 814.6 | 869.1 | 930.5 | 823.0 | 876.1 | 2.5 | 2.0 | 2.3 |
| 39 | 1252.3 | 1114.4 | 1157.4 | 1266.1 | 1130.7 | 1173.6 | 4.0 | 2.0 | 3.4 |
| 46 | 1433.1 | 1298.3 | 1358.7 | 1452.7 | 1318.4 | 1378.9 | 4.0 | 1.5 | 3.6 |
| 60 | 1532.5 | 1450.3 | 1465.9 | 1554.9 | 1474.1 | 1511.8 | 4.5 | 2.5 | 3.3 |
| 67 | 1615.3 | 1439.0 | 1524.9 | 1637.4 | 1469.8 | 1552.5 | 4.0 | 3.0 | 3.8 |
| 70 | 1572.4 | 1466.3 | 1521.7 | 1596.0 | 1500.9 | 1549.5 | 4.0 | 1.0 | 3.5 |
| 73 | 1375.6 | 1275.6 | 1375.6 | 1399.1 | 1399.1 | 1399.1 | 3.5 | 3.0 | 3.5 |
| 74 | 1450.3 | 1344.3 | 1447.3 | 1476.2 | 1467.7 | 1471.9 | 3.5 | 3.0 | 3.3 |
| 75 | 1405.3 | 1354.4 | 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 | 1502.3 | 1624.3 | 1424.8 | 1527.1 | 4.0 | 2.0 | 3.2 |
| 79 | 1549.2 | 1400.0 | 1517.4 | 1572.2 | 1500.4 | 1538.4 | 3.5 | 2.0 | 3.1 |
| 80 | 1585.4 | 1422.4 | 1458.0 | 1610.1 | 1447.3 | 1520.1 | 3.5 | 3.0 | 3.3 |
| 81 | 1581.6 | 1381.6 | 1581.6 | 1610.1 | 1610.1 | 1610.1 | 3.5 | 3.0 | 3.5 |
| 82 | 1493.6 | 1493.6 | 1493.6 | 1516.0 | 1516.0 | 1516.0 | 3.5 | 3.0 | 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 | 2.0 | 3.4 |
| 96 | 1408.3 | 1124.3 | 1312.5 | 1434.4 | 1152.5 | 1338.5 | 4.0 | 3.0 | 3.6 |
| 102 | 1523.3 | 793.9 | 1132.9 | 1547.3 | 812.6 | 1159.4 | 4.5 | 3.0 | 4.0 |
| 111 | 1119.6 | 871.4 | 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 |
| 130 | 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 | 8.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|-------|-------------------|------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 4.4 | 0.3 | 3.8 | 624.1 | 570.7 | 603.7 | 5.6 | 4.9 | 5.3 |
| 24 | 8.4 | 0.3 | 7.0 | 741.3 | 714.7 | 754.8 | 12.0 | 11.5 | 11.6 |
| 39 | 20.0 | 13.6 | 16.2 | 842.9 | 854.2 | 874.6 | 27.4 | 24.3 | 26.0 |
| 46 | 20.8 | 14.6 | 20.2 | 863.9 | 855.2 | 859.4 | 37.5 | 36.4 | 37.1 |
| 60 | 31.4 | 22.4 | 25.9 | 971.8 | 880.6 | 924.4 | 52.9 | 49.7 | 51.0 |
| 67 | 31.3 | 22.4 | 27.5 | 882.4 | 795.2 | 853.6 | 64.0 | 55.4 | 61.4 |
| 70 | 34.6 | 23.6 | 27.8 | 856.0 | 812.2 | 837.7 | 63.9 | 46.6 | 57.7 |
| 73 | 23.3 | 23.3 | 23.3 | 715.0 | 714.0 | 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 | 14.0 | 20.9 | 838.0 | 694.4 | 750.0 | 66.9 | 46.9 | 56.7 |
| 76 | 35.0 | 18.3 | 22.5 | 1212.3 | 733.3 | 917.7 | 66.4 | 17.0 | 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 | 44.2 |
| 79 | 22.9 | 18.7 | 21.0 | 913.6 | 812.3 | 880.2 | 65.5 | 45.3 | 56.2 |
| 80 | 24.9 | 17.5 | 22.1 | 971.8 | 754.6 | 883.4 | 72.7 | 41.4 | 56.3 |
| 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 | 65.6 |
| 90 | 29.0 | 20.8 | 25.1 | 579.5 | 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 | 66.2 | 51.2 |
| 102 | 32.1 | 18.7 | 26.5 | 734.8 | 600.6 | 637.5 | 101.0 | 56.0 | 63.6 |
| 111 | 74.1 | 10.6 | 22.4 | 581.3 | 560.7 | 568.6 | 107.6 | 64.0 | 102.3 |
| 120 | 20.2 | 18.2 | 22.3 | 630.9 | 494.7 | 555.8 | 98.8 | 64.4 | 65.6 |
| 132 | 15.1 | 11.8 | 13.7 | 548.8 | 532.3 | 548.0 | 28.3 | 15.4 | 24.1 |
| 138 | 72.6 | 13.2 | 43.0 | 515.0 | 298.5 | 406.7 | 33.0 | 16.0 | 24.5 |

42509E-3

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

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES

(RUN NUMBER 41509F)

| ROD/ELEV | CHAN. | NU | 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 | 1153. | 1174. | 20. | 4.0 | 414. | 24.3 |
| 4C 3- 3 | | 6 | 1311. | 1322. | 10. | 2.0 | 622. | 26.1 |
| 1C 4- 0 | | 7 | 1381. | 1396. | 15. | 2.5 | 436. | 37.5 |
| 2A 5- 0 | | 12 | 1564. | 1569. | 20. | 3.5 | 666. | 53.5 |
| 2A 5- 7 | | 14 | 1450. | 1507. | 19. | 3.0 | 675. | 61.4 |
| 5C 5- 2 | | 33 | 1387. | 1421. | 33. | 5.0 | 607. | 60.5 |
| 2D 5- 3 | | 39 | 1490. | 1494. | 19. | 2.0 | 777. | 67.4 |
| 1D 5- 4 | | 46 | 1465. | 1421. | 15. | 2.0 | 746. | 51.4 |
| 3D 5- 4 | | 50 | 1457. | 1504. | 47. | 10.5 | 400. | 114.8 |
| 4B 5- 4 | | 51 | 1542. | 1555. | 13. | 2.0 | 731. | 66.6 |
| 5D 5- 4 | | 56 | 1421. | 1443. | 12. | 2.0 | 714. | 66.2 |
| 1D 5- 5 | | 58 | 1460. | 1423. | 16. | 2.5 | 634. | 55.4 |
| 2A 5- 5 | | 54 | 1413. | 1432. | 20. | 3.0 | 767. | 47.5 |
| 2D 5- 5 | | 62 | 1457. | 1512. | 15. | 2.5 | 746. | 64.4 |
| 3B 5- 5 | | 63 | 1554. | 1577. | 14. | 2.5 | 650. | 67.5 |
| 3C 5- 6 | | 64 | 1562. | 1590. | 27. | 4.0 | 1372. | 21.6 |
| 3E 5- 6 | | 70 | 1437. | 1469. | 31. | 4.5 | 1213. | 24.2 |
| 4C 5- 6 | | 73 | 1606. | 1622. | 16. | 2.0 | 772. | 37.4 |
| 5C 5- 6 | | 76 | 1522. | 1547. | 15. | 2.5 | 710. | 66.4 |
| 3D 5- 7 | | 65 | 1543. | 1610. | 17. | 2.0 | 764. | 24.2 |
| 3C 5- 8 | | 43 | 1613. | 1631. | 18. | 2.5 | 614. | 46.5 |
| 4A 5- 8 | | 45 | 1419. | 1438. | 19. | 3.0 | 664. | 61.4 |
| 1C 7- 0 | | 104 | 1467. | 1503. | 16. | 2.5 | 716. | 77.6 |
| 2B 7- 0 | | 110 | 1544. | 1561. | 17. | 2.0 | 776. | 74.6 |
| 3D 7- 0 | | 113 | 1571. | 1590. | 18. | 2.0 | 776. | 71.6 |
| 5B 7- 0 | | 117 | 1362. | 1381. | 19. | 2.5 | 664. | 76.7 |
| 2B 7- 6 | | 120 | 1441. | 1508. | 18. | 2.5 | 764. | 65.4 |
| 2C 7- 6 | | 121 | 1512. | 1530. | 18. | 2.5 | 666. | 64.6 |
| 2E 7- 6 | | 122 | 1144. | 1171. | 27. | 3.0 | 731. | 73.6 |
| 3A 7- 6 | | 124 | 1463. | 1492. | 19. | 2.5 | 704. | 55.6 |
| 3B 7- 6 | | 125 | 1550. | 1575. | 19. | 2.5 | 642. | 65.6 |
| 4B 7- 6 | | 129 | 1544. | 1523. | 18. | 2.5 | 666. | 59.4 |
| 5C 7- 6 | | 132 | 1451. | 1469. | 17. | 2.5 | 713. | 66.6 |
| 1- 8- 0 | | 133 | 1265. | 1335. | 20. | 3.0 | 666. | 44.6 |
| 2E 8- 0 | | 136 | 1021. | 1072. | 21. | 3.0 | 646. | 66.6 |
| 3D 8- 0 | | 138 | 1351. | 1414. | 23. | 3.0 | 674. | 44.6 |
| 5B 8- 0 | | 143 | 1254. | 1272. | 19. | 3.0 | 664. | 42.2 |
| 5C 8- 0 | | 144 | 1225. | 1345. | 19. | 2.5 | 665. | 44.5 |
| 1C 8- 6 | | 145 | 1062. | 1103. | 21. | 3.0 | 664. | 113.6 |
| 1D 8- 6 | | 146 | 966. | 987. | 22. | 3.0 | 556. | 78.4 |
| 2C 9- 6 | | 146 | 1268. | 1233. | 25. | 3.0 | 616. | 44.7 |
| 4B 9- 6 | | 153 | 1201. | 1222. | 21. | 2.5 | 692. | 101.2 |
| 5D 9- 6 | | 155 | 1041. | 1059. | 18. | 2.5 | 541. | 100.7 |
| 3D 9- 3 | | 159 | 1034. | 1058. | 19. | 3.0 | 556. | 106.6 |
| 4C 9- 3 | | 161 | 1056. | 1117. | 19. | 3.0 | 551. | 106.4 |
| 1010- 0 | | 164 | 645. | 714. | 19. | 4.0 | 526. | 60.5 |
| 4B10- 0 | | 166 | 874. | 899. | 19. | 3.5 | 467. | 68.7 |
| 5D10- 0 | | 169 | 767. | 783. | 15. | 3.0 | 564. | 61.6 |
| 2A11- 0 | | 171 | 560. | 572. | 11. | 4.0 | 516. | 14.4 |
| 4C11- 0 | | 172 | 646. | 710. | 12. | 3.5 | 561. | 22.5 |
| 1011- 6 | | 174 | 336. | 427. | 91. | 14.5 | 413. | 21.2 |

RUM 41509F HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | | MAX TEMP (DEG F) | | | | TURNAROUND TIME (SEC) | | | | |
|------|----------------------|--------|--------|--------|------------------|--------|--------|------|-----------------------|------|------|------|------|
| | MAX | MIN | PEAK | MEAN | MAX | MIN | MEAN | MAX | P-IN | PLAN | MAX | P-IN | PLAN |
| 12 | 741.6 | 677.5 | 769.7 | 713.8 | 745.1 | 682.6 | 713.8 | 1.5 | 3.5 | 1.5 | 3.5 | 1.5 | 3.5 |
| 24 | 937.6 | 937.6 | 937.6 | 942.9 | 942.9 | 942.9 | 942.9 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| 39 | 1311.1 | 1160.4 | 1564.1 | 1321.5 | 1321.5 | 1162.9 | 1219.6 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| 48 | 1465.5 | 1304.6 | 1581.2 | 1500.9 | 1325.7 | 1406.7 | 1406.7 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 60 | 1506.5 | 1405.2 | 1422.8 | 1528.0 | 1426.9 | 1475.8 | 1475.8 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| 67 | 1600.0 | 1434.1 | 1525.4 | 1622.1 | 1441.9 | 1545.8 | 1545.8 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| 70 | 1598.5 | 1210.6 | 1374.1 | 1617.8 | 1248.4 | 1399.3 | 1399.3 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| 71 | 1541.6 | 1464.1 | 1522.9 | 1565.7 | 1484.8 | 1525.2 | 1525.2 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 72 | 1385.2 | 1230.3 | 1310.7 | 1424.6 | 1280.7 | 1352.7 | 1352.7 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| 73 | 1381.6 | 1178.6 | 1370.8 | 1416.2 | 1302.7 | 1359.4 | 1359.4 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| 74 | 1458.7 | 1178.6 | 1377.6 | 1492.3 | 1217.1 | 1412.0 | 1412.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| 75 | 1484.9 | 1287.1 | 1388.8 | 1503.6 | 1317.3 | 1419.5 | 1419.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| 76 | 1511.6 | 1304.5 | 1437.2 | 1554.9 | 1325.7 | 1463.5 | 1463.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| 77 | 1559.3 | 1460.2 | 1471.3 | 1576.5 | 1422.7 | 1489.4 | 1489.4 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 78 | 1606.1 | 1466.7 | 1566.0 | 1622.1 | 1422.7 | 1523.8 | 1523.8 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| 79 | 1605.4 | 1344.7 | 1510.8 | 1623.2 | 1367.3 | 1527.7 | 1527.7 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 80 | 1613.1 | 1434.1 | 1513.3 | 1630.8 | 1437.7 | 1529.9 | 1529.9 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 81 | 1504.5 | 1504.5 | 1554.5 | 1521.4 | 1521.4 | 1521.4 | 1521.4 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| 84 | 1571.5 | 1362.5 | 1460.0 | 1589.5 | 1381.2 | 1507.2 | 1507.2 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| 90 | 1526.3 | 1144.1 | 1434.1 | 1575.4 | 1171.2 | 1458.1 | 1458.1 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 96 | 1422.3 | 1620.8 | 1360.4 | 1445.2 | 1071.7 | 1326.9 | 1326.9 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 102 | 1215.7 | 860.6 | 169.4 | 1239.0 | 902.7 | 1120.8 | 1120.8 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 111 | 1097.9 | 873.6 | 467.7 | 1117.2 | 892.3 | 985.6 | 985.6 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| 120 | 895.3 | 695.0 | 609.9 | 913.0 | 714.3 | 827.2 | 827.2 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| 132 | 698.2 | 526.7 | 580.6 | 709.8 | 530.3 | 598.0 | 598.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| 136 | 627.7 | 336.1 | 526.4 | 642.5 | 426.7 | 564.6 | 564.6 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 |

| ELEV | TEMP RISE (DEG F) | | | | QUENCH TEMP (DEG F) | | | | DULMCM TIME (SEC) | | | | |
|------|-------------------|------|------|--------|---------------------|-------|-------|-------|-------------------|------|-------|------|------|
| | MAX | MIN | PEAK | MEAN | MAX | MIN | MEAN | MAX | P-IN | PLAN | MAX | P-IN | PLAN |
| 12 | 5.1 | 3.2 | 4.2 | 694.6 | 603.7 | 635.5 | 659.6 | 6.0 | 3.2 | 3.2 | 6.0 | 3.2 | 3.2 |
| 24 | 5.3 | 5.3 | 5.3 | 805.7 | 805.7 | 805.7 | 805.7 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 |
| 39 | 19.7 | 10.4 | 15.5 | 922.3 | 882.7 | 908.0 | 908.0 | 26.1 | 24.3 | 24.3 | 26.1 | 24.3 | 24.3 |
| 48 | 16.7 | 13.6 | 15.3 | 938.4 | 855.5 | 886.3 | 886.3 | 38.0 | 36.5 | 36.5 | 38.0 | 36.5 | 36.5 |
| 60 | 27.1 | 20.5 | 23.1 | 892.6 | 846.5 | 874.7 | 874.7 | 54.0 | 53.2 | 53.2 | 54.0 | 53.2 | 53.2 |
| 67 | 22.8 | 17.6 | 20.4 | 875.4 | 727.0 | 788.8 | 788.8 | 63.1 | 61.4 | 61.4 | 63.1 | 61.4 | 61.4 |
| 70 | 36.4 | 17.1 | 25.2 | 780.7 | 428.0 | 582.3 | 582.3 | 85.7 | 85.4 | 85.4 | 85.7 | 85.4 | 85.4 |
| 71 | 24.1 | 20.7 | 22.4 | 684.8 | 544.1 | 614.4 | 614.4 | 71.4 | 68.4 | 68.4 | 71.4 | 68.4 | 68.4 |
| 72 | 44.4 | 34.6 | 42.0 | 1252.3 | 427.4 | 839.9 | 839.9 | 93.2 | 93.2 | 93.2 | 93.2 | 93.2 | 93.2 |
| 73 | 42.1 | 35.2 | 38.7 | 488.8 | 472.9 | 480.8 | 480.8 | 86.7 | 84.0 | 84.0 | 86.7 | 84.0 | 84.0 |
| 74 | 47.9 | 22.9 | 34.3 | 1154.0 | 284.5 | 591.7 | 591.7 | 84.7 | 84.7 | 84.7 | 84.7 | 84.7 | 84.7 |
| 75 | 67.6 | 12.7 | 20.7 | 777.4 | 286.6 | 561.3 | 561.3 | 91.4 | 45.7 | 45.7 | 91.4 | 45.7 | 45.7 |
| 76 | 47.5 | 11.7 | 20.3 | 667.3 | 412.0 | 618.4 | 618.4 | 114.8 | 26.3 | 26.3 | 114.8 | 26.3 | 26.3 |
| 77 | 36.6 | 11.7 | 18.1 | 1351.3 | 610.9 | 822.8 | 822.8 | 67.9 | 67.9 | 67.9 | 67.9 | 67.9 | 67.9 |
| 78 | 31.4 | 11.1 | 17.9 | 1343.4 | 710.7 | 885.2 | 885.2 | 71.0 | 21.6 | 21.6 | 71.0 | 21.6 | 21.6 |
| 79 | 10.7 | 11.8 | 16.9 | 915.3 | 590.7 | 769.1 | 769.1 | 72.5 | 33.9 | 33.9 | 72.5 | 33.9 | 33.9 |
| 80 | 18.6 | 12.2 | 16.5 | 945.7 | 738.6 | 849.0 | 849.0 | 72.5 | 34.4 | 34.4 | 72.5 | 34.4 | 34.4 |
| 81 | 16.9 | 16.9 | 16.9 | 878.9 | 878.9 | 878.9 | 878.9 | 46.9 | 46.9 | 46.9 | 46.9 | 46.9 | 46.9 |
| 84 | 19.5 | 15.4 | 17.1 | 822.4 | 684.2 | 739.9 | 739.9 | 79.0 | 56.0 | 56.0 | 79.0 | 56.0 | 56.0 |
| 90 | 22.9 | 17.3 | 19.0 | 841.7 | 675.4 | 712.3 | 712.3 | 88.0 | 72.0 | 72.0 | 88.0 | 72.0 | 72.0 |
| 96 | 22.9 | 18.7 | 20.5 | 762.8 | 668.1 | 690.4 | 690.4 | 96.0 | 65.5 | 65.5 | 96.0 | 65.5 | 65.5 |
| 102 | 24.7 | 17.9 | 21.4 | 691.3 | 522.6 | 622.6 | 622.6 | 103.0 | 78.9 | 78.9 | 103.0 | 78.9 | 78.9 |
| 111 | 20.6 | 15.7 | 18.1 | 604.9 | 514.0 | 562.9 | 562.9 | 108.9 | 51.7 | 51.7 | 108.9 | 51.7 | 51.7 |
| 120 | 19.2 | 15.2 | 17.4 | 609.9 | 472.3 | 517.9 | 517.9 | 96.0 | 60.2 | 60.2 | 96.0 | 60.2 | 60.2 |
| 132 | 11.6 | 9.3 | 10.9 | 561.1 | 410.2 | 502.6 | 502.6 | 22.5 | 19.4 | 19.4 | 22.5 | 19.4 | 19.4 |
| 136 | 90.6 | 9.2 | 36.2 | 507.6 | 413.3 | 474.4 | 474.4 | 28.5 | 21.3 | 21.3 | 28.5 | 21.3 | 21.3 |

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. At-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 NUMBER 43610A

| 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 | 1040. | 1151. | 60. | 43.5 | 601. | 156.6 |
| 4C 3- 3 | 11 | 1172. | 1222. | 51. | 41.5 | 712. | 157.4 |
| 1C 4- 0 | 14 | 1301. | 1359. | 58. | 50.0 | 747. | 227.9 |
| 2A 5- 0 | 17 | 1346. | 1409. | 119. | 84.0 | 691. | 317.6 |
| 2A 5- 7 | 21 | 1426. | 1595. | 139. | 120.0 | 636. | 392.7 |
| 1D 6- 2 | 20 | 1435. | 1617. | 182. | 177.0 | 660. | 464.7 |
| 2D 6- 2 | 23 | 1516. | 1736. | 179. | 120.0 | 604. | 460.6 |
| 3D 6- 2 | 24 | 1560. | 1779. | 199. | 120.0 | 776. | 472.6 |
| 5C 6- 2 | 61 | 1473. | 1603. | 130. | 82.5 | 672. | 450.6 |
| 1D 6- 3 | 63 | 1422. | 1612. | 190. | 189.0 | 627. | 477.7 |
| 4B 6- 3 | 66 | 1527. | 1721. | 193. | 119.0 | 756. | 462.6 |
| 5D 6- 3 | 69 | 1419. | 1639. | 200. | 179.0 | 766. | 472.6 |
| 2A 6- 4 | 70 | 1426. | 1622. | 196. | 188.0 | 646. | 486.6 |
| 3B 6- 4 | 75 | 1564. | 1770. | 206. | 120.0 | 747. | 493.5 |
| 3D 6- 6 | 79 | 1526. | 1756. | 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. | 453.6 |
| 3E 6- 5 | 86 | 1460. | 1649. | 190. | 183.0 | 624. | 500.4 |
| 3C 6- 6 | 95 | 1555. | 1794. | 239. | 120.0 | 616. | 504.6 |
| 4A 6- 6 | 97 | 1353. | 1631. | 238. | 194.0 | 625. | 513.3 |
| 3D 6- 0 | 96 | 1367. | 1629. | 321. | 214.0 | 674. | 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 | 626. | 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 | 744. | 572.2 |
| 3A 7- 6 | 123 | 1324. | 1568. | 243. | 238.0 | 706. | 606.7 |
| 33 7- 6 | 124 | 1440. | 1697. | 252. | 174.0 | 677. | 614.6 |
| 4B 7- 6 | 127 | 1412. | 1675. | 262. | 184.0 | 666. | 608.7 |
| 5C 7- 6 | 126 | 1261. | 1512. | 231. | 208.0 | 714. | 565.7 |
| 1C 8- 0 | 131 | 1251. | 1551. | 300. | 224.0 | 706. | 656.4 |
| 2E 8- 0 | 133 | 968. | 1362. | 374. | 287.0 | 676. | 662.6 |
| 4C 8- 6 | 136 | 1511. | 1754. | 223. | 120.0 | 604. | 506.6 |
| 5B 8- 0 | 138 | 1210. | 1559. | 350. | 285.0 | 654. | 652.6 |
| 5C 8- 0 | 139 | 1149. | 1462. | 313. | 270.0 | 672. | 641.1 |
| 1C 8- 6 | 141 | 1126. | 1473. | 345. | 242.0 | 513. | 666.5 |
| 1D 8- 6 | 142 | 1064. | 1383. | 314. | 280.0 | 446. | 663.6 |
| 2C 8- 6 | 143 | 1177. | 1559. | 382. | 246.0 | 552. | 640.6 |
| 4B 8- 6 | 145 | 1144. | 1545. | 396. | 271.0 | 501. | 649.1 |
| 5D 8- 6 | 146 | 1062. | 1471. | 409. | 232.0 | 662. | 662.6 |
| 3D 9- 3 | 154 | 1031. | 1447. | 416. | 281.0 | 604. | 714.6 |
| 4C 9- 3 | 156 | 1045. | 1438. | 393. | 271.0 | 634. | 705.6 |
| 1D10- 0 | 161 | 577. | 1110. | 533. | 377.0 | 664. | 630.4 |
| 4B10- 0 | 164 | 636. | 1246. | 413. | 271.0 | 567. | 740.6 |
| 5D10- 0 | 167 | 746. | 1126. | 377. | 301.0 | 726. | 601.5 |
| 2A11- 0 | 168 | 541. | 761. | 219. | 296.0 | 655. | 575.6 |
| 4C11- 0 | 170 | 606. | 1064. | 413. | 320.0 | 666. | 743.6 |
| 1D11- 6 | 172 | 266. | 693. | 425. | 257.0 | 246. | 365.0 |

RUN 43610A HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 614.0 | 560.0 | 579.0 | 622.5 | 570.6 | 587.8 | 16.5 | 6.0 | 12.9 |
| 24 | 656.0 | 754.3 | 803.9 | 872.7 | 783.6 | 825.8 | 37.5 | 16.5 | 28.4 |
| 34 | 1171.7 | 1050.1 | 1106.0 | 1222.3 | 1124.5 | 1165.8 | 54.5 | 41.5 | 46.5 |
| 40 | 1322.0 | 1221.7 | 1271.8 | 1396.0 | 1302.7 | 1342.5 | 78.5 | 50.0 | 65.7 |
| 60 | 1451.0 | 1297.4 | 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 | 1527.0 | 1778.7 | 1606.8 | 1683.4 | 120.0 | 111.0 | 116.2 |
| 71 | 1598.9 | 1450.4 | 1524.4 | 1787.6 | 1607.9 | 1695.6 | 120.0 | 85.5 | 111.6 |
| 72 | 1600.8 | 1424.5 | 1523.2 | 1742.1 | 1593.8 | 1691.0 | 167.0 | 84.0 | 125.9 |
| 74 | 1580.5 | 1434.9 | 1514.0 | 1746.6 | 1566.3 | 1699.6 | 180.0 | 82.5 | 130.7 |
| 75 | 1582.0 | 1422.5 | 1510.0 | 1796.6 | 1612.3 | 1705.4 | 189.0 | 116.0 | 145.9 |
| 76 | 1578.0 | 1425.3 | 1504.4 | 1799.9 | 1622.1 | 1709.2 | 196.0 | 114.0 | 146.5 |
| 77 | 1572.3 | 1404.4 | 1494.0 | 1801.0 | 1614.9 | 1704.1 | 204.0 | 116.0 | 151.1 |
| 78 | 1555.0 | 1342.7 | 1404.4 | 1794.3 | 1630.8 | 1712.9 | 205.0 | 120.0 | 154.9 |
| 84 | 1460.2 | 1264.7 | 1360.4 | 1645.2 | 1533.3 | 1610.9 | 192.0 | 126.0 | 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 | 1220.5 | 1661.4 | 1362.4 | 1556.4 | 287.0 | 201.0 | 245.1 |
| 102 | 1177.3 | 1052.0 | 1114.3 | 1575.4 | 1383.4 | 1430.0 | 290.0 | 132.0 | 250.3 |
| 111 | 1137.8 | 850.4 | 944.0 | 1447.3 | 1257.8 | 1351.2 | 249.0 | 144.0 | 262.0 |
| 120 | 836.3 | 570.0 | 740.0 | 1334.1 | 1073.8 | 1196.0 | 377.0 | 202.0 | 288.2 |
| 132 | 650.2 | 560.3 | 562.4 | 1063.5 | 760.7 | 848.0 | 382.0 | 246.0 | 327.0 |
| 138 | 543.2 | 267.7 | 452.7 | 446.5 | 693.1 | 849.5 | 419.0 | 237.0 | 344.4 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 10.4 | 3.5 | 6.1 | 541.1 | 553.9 | 568.1 | 26.2 | 25.7 | 25.9 |
| 24 | 24.3 | 14.7 | 21.9 | 737.7 | 662.1 | 688.7 | 73.9 | 65.6 | 68.5 |
| 34 | 60.4 | 50.6 | 54.1 | 712.1 | 624.5 | 674.1 | 157.9 | 155.0 | 156.9 |
| 40 | 40.4 | 37.0 | 37.3 | 857.2 | 746.7 | 789.0 | 227.9 | 208.7 | 215.8 |
| 60 | 130.5 | 110.0 | 130.4 | 694.2 | 667.3 | 685.2 | 330.8 | 317.0 | 323.3 |
| 67 | 153.8 | 130.5 | 140.4 | 836.4 | 775.8 | 813.1 | 397.8 | 341.7 | 364.9 |
| 70 | 170.3 | 143.2 | 155.0 | 876.5 | 797.3 | 842.6 | 427.6 | 416.5 | 423.0 |
| 71 | 166.7 | 152.7 | 160.2 | 966.5 | 751.0 | 822.8 | 441.7 | 427.6 | 433.8 |
| 72 | 141.3 | 124.0 | 167.8 | 438.3 | 764.8 | 839.3 | 451.5 | 431.8 | 442.4 |
| 74 | 200.1 | 124.0 | 180.0 | 408.9 | 760.0 | 828.0 | 473.5 | 443.6 | 463.1 |
| 75 | 214.6 | 163.7 | 194.9 | 541.9 | 732.0 | 793.4 | 487.4 | 472.0 | 478.7 |
| 76 | 221.1 | 174.3 | 199.2 | 875.9 | 731.4 | 807.6 | 497.8 | 463.7 | 465.6 |
| 77 | 220.7 | 184.4 | 210.2 | 828.6 | 750.4 | 780.3 | 507.4 | 441.0 | 447.8 |
| 78 | 234.3 | 201.4 | 220.5 | 642.2 | 707.0 | 789.5 | 521.6 | 504.6 | 511.0 |
| 84 | 271.2 | 141.4 | 230.0 | 663.5 | 538.4 | 625.3 | 560.8 | 530.3 | 551.8 |
| 90 | 262.1 | 170.0 | 233.5 | 776.5 | 666.2 | 717.6 | 614.6 | 572.2 | 601.2 |
| 96 | 374.3 | 244.7 | 327.8 | 708.2 | 658.5 | 679.1 | 682.8 | 641.1 | 656.4 |
| 102 | 417.2 | 313.4 | 370.7 | 551.3 | 457.3 | 495.9 | 700.6 | 630.6 | 680.2 |
| 111 | 410.0 | 244.5 | 350.4 | 740.7 | 532.2 | 619.7 | 715.0 | 627.0 | 686.8 |
| 120 | 540.4 | 312.0 | 447.2 | 728.4 | 540.9 | 609.4 | 742.0 | 601.5 | 646.3 |
| 132 | 413.3 | 214.1 | 305.7 | 660.1 | 468.3 | 608.2 | 743.0 | 442.7 | 583.2 |
| 138 | 510.7 | 254.6 | 343.7 | 634.3 | 245.7 | 425.9 | 752.8 | 326.0 | 585.3 |

43610A-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 NUMBER 42810B

| ROD/ELEV | CHAN. No | INITIAL AT FLOW (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 | 507. | 165.6 |
| 4C 3- 3 | 11 | 1220. | 1245. | 25. | 21.5 | 660. | 164.6 |
| 1C 4- 0 | 14 | 1300. | 1345. | 45. | 47.0 | 644. | 220.0 |
| 2A 5- 0 | 17 | 1370. | 1500. | 130. | 80.5 | 667. | 340.7 |
| 2A 5- 7 | 21 | 1404. | 1616. | 132. | 82.5 | 613. | 410.4 |
| 1D 5- 2 | 50 | 1414. | 1621. | 202. | 187.0 | 747. | 440.7 |
| 2D 5- 2 | 53 | 1512. | 1713. | 201. | 153.0 | 633. | 514.7 |
| 3D 5- 2 | 58 | 1555. | 1742. | 187. | 148.0 | 640. | 506.0 |
| 5C 5- 2 | 61 | 1474. | 1655. | 175. | 196.0 | 667. | 407.0 |
| 1D 6- 3 | 63 | 1439. | 1609. | 176. | 118.0 | 760. | 402.0 |
| 4B 6- 3 | 68 | 1504. | 1640. | 161. | 150.0 | 737. | 513.7 |
| 5D 5- 3 | 69 | 1410. | 1641. | 225. | 219.0 | 734. | 535.2 |
| 2A 6- 4 | 70 | 1434. | 1603. | 164. | 197.0 | 760. | 517.7 |
| 2D 6- 4 | 72 | 1524. | 1698. | 169. | 153.0 | 665. | 531.0 |
| 3B 6- 4 | 75 | 1565. | 1720. | 155. | 117.0 | 722. | 500.7 |
| 3C 6- 5 | 85 | 1548. | 1761. | 163. | 116.0 | 734. | 524.5 |
| 3E 6- 5 | 86 | 1403. | 1642. | 178. | 192.0 | 766. | 531.0 |
| 3C 6- 6 | 95 | 1500. | 1765. | 186. | 120.0 | 605. | 544.0 |
| 3D 6- 6 | 96 | 1542. | 1740. | 197. | 143.0 | 604. | 544.7 |
| 4A 6- 6 | 97 | 1422. | 1633. | 211. | 228.0 | 704. | 539.0 |
| 4C 6- 6 | 98 | 1552. | 1737. | 186. | 119.0 | 764. | 536.1 |
| 5C 6- 6 | 101 | 1452. | 1639. | 187. | 197.0 | 624. | 532.6 |
| 1C 7- 0 | 110 | 1424. | 1593. | 169. | 143.0 | 540. | 503.0 |
| 2B 7- 0 | 111 | 1464. | 1653. | 184. | 120.0 | 540. | 540.1 |
| 3D 7- 0 | 115 | 1442. | 1692. | 200. | 118.0 | 631. | 500.0 |
| 5B 7- 0 | 117 | 1307. | 1534. | 172. | 188.0 | 640. | 500.0 |
| 2B 7- 6 | 120 | 1417. | 1655. | 198. | 143.0 | 640. | 641.0 |
| 2C 7- 6 | 121 | 1479. | 1687. | 211. | 143.0 | 650. | 641.0 |
| 2E 7- 6 | 122 | 1274. | 1527. | 248. | 281.0 | 665. | 640.7 |
| 3A 7- 6 | 123 | 1425. | 1617. | 192. | 192.0 | 665. | 625.7 |
| 3B 7- 6 | 124 | 1470. | 1637. | 210. | 151.0 | 665. | 635.4 |
| 4B 7- 6 | 127 | 1400. | 1605. | 199. | 148.0 | 654. | 631.5 |
| 5C 7- 6 | 128 | 1415. | 1621. | 206. | 189.0 | 744. | 624.7 |
| 1C 8- 0 | 131 | 1312. | 1579. | 267. | 229.0 | 673. | 601.2 |
| 2E 8- 0 | 133 | 1194. | 1528. | 330. | 325.0 | 610. | 604.7 |
| 3D 8- 0 | 136 | 1357. | 1642. | 285. | 191.0 | 714. | 675.5 |
| 5B 8- 0 | 138 | 1103. | 1505. | 323. | 298.0 | 604. | 646.7 |
| 5C 8- 0 | 139 | 1313. | 1595. | 282. | 280.0 | 653. | 677.4 |
| 1C 8- 6 | 141 | 1400. | 1487. | 327. | 194.0 | 513. | 715.0 |
| 1D 8- 6 | 142 | 1040. | 1400. | 310. | 233.0 | 511. | 707.5 |
| 2C 8- 6 | 143 | 1231. | 1571. | 341. | 189.0 | 524. | 722.0 |
| 4B 8- 6 | 145 | 1236. | 1586. | 348. | 233.0 | 504. | 710.4 |
| 5D 8- 6 | 146 | 1115. | 1499. | 384. | 281.0 | 503. | 603.3 |
| 3D 9- 3 | 154 | 1005. | 1440. | 375. | 281.0 | 610. | 727.0 |
| 4C 9- 3 | 156 | 1042. | 1440. | 348. | 282.0 | 610. | 724.8 |
| 1D10- 0 | 161 | 544. | 1094. | 445. | 314.0 | 540. | 640.7 |
| 4B10- 0 | 164 | 400. | 1240. | 384. | 293.0 | 500. | 759.0 |
| 5D10- 0 | 167 | 750. | 1076. | 318. | 196.0 | 575. | 730.0 |
| 2A11- 0 | 166 | 556. | 805. | 250. | 383.0 | 640. | 595.0 |
| 4C11- 0 | 161 | 544. | 1094. | 445. | 314.0 | 540. | 640.7 |
| 1D11- 6 | 172 | 217. | 705. | 467. | 218.0 | 312. | 454.0 |

* * * BAD THERMOCOUPLE DATA *

MUN 42810B HEATER RJD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | PEAK | MAX C | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 620.9 | 540.7 | 574.0 | 632.0 | 551.4 | 580.8 | 10.5 | 2.5 | 13.4 |
| 24 | 871.0 | 700.0 | 800.0 | 888.2 | 797.1 | 828.9 | 43.0 | 20.5 | 30.5 |
| 39 | 1220.2 | 1073.6 | 1118.0 | 1245.2 | 1125.5 | 1165.6 | 50.5 | 21.5 | 40.5 |
| 48 | 1300.6 | 1240.4 | 1247.0 | 1431.2 | 1319.4 | 1363.3 | 77.0 | 47.0 | 54.5 |
| 60 | 1491.2 | 1343.5 | 1342.0 | 1614.5 | 1463.4 | 1515.1 | 83.0 | 54.5 | 74.3 |
| 67 | 1504.1 | 1473.0 | 1500.9 | 1720.7 | 1607.9 | 1640.7 | 115.0 | 72.0 | 90.5 |
| 70 | 1612.3 | 1470.4 | 1538.6 | 1765.3 | 1618.8 | 1685.3 | 117.0 | 61.4 | 94.9 |
| 71 | 1597.1 | 1409.4 | 1503.7 | 1764.2 | 1607.9 | 1681.3 | 193.0 | 61.5 | 131.1 |
| 72 | 1473.0 | 1413.0 | 1453.9 | 1650.5 | 1594.1 | 1632.6 | 151.0 | 117.0 | 136.8 |
| 74 | 1524.5 | 1413.4 | 1500.1 | 1775.4 | 1621.0 | 1697.2 | 200.0 | 126.0 | 164.5 |
| 75 | 1589.5 | 1410.6 | 1504.4 | 1751.9 | 1609.0 | 1682.5 | 219.0 | 118.0 | 152.4 |
| 76 | 1600.3 | 1430.6 | 1500.0 | 1754.2 | 1602.5 | 1674.2 | 208.0 | 117.0 | 159.3 |
| 77 | 1598.1 | 1378.4 | 1500.6 | 1760.9 | 1597.1 | 1692.8 | 204.0 | 116.0 | 164.6 |
| 78 | 1574.8 | 1410.9 | 1462.7 | 1765.3 | 1607.9 | 1679.1 | 224.0 | 114.0 | 160.3 |
| 84 | 1499.8 | 1338.3 | 1426.3 | 1694.1 | 1469.8 | 1608.3 | 192.0 | 65.5 | 143.4 |
| 90 | 1470.2 | 1270.6 | 1400.4 | 1686.5 | 1526.8 | 1622.8 | 281.0 | 143.0 | 140.6 |
| 96 | 1362.4 | 1182.7 | 1250.4 | 1649.4 | 1505.2 | 1587.2 | 325.0 | 196.0 | 244.2 |
| 102 | 1237.9 | 1080.1 | 1154.9 | 1546.3 | 1400.2 | 1497.8 | 299.0 | 184.0 | 237.1 |
| 111 | 1042.3 | 932.0 | 1025.0 | 1439.8 | 1287.3 | 1351.7 | 243.0 | 197.0 | 236.0 |
| 120 | 902.8 | 594.4 | 774.7 | 1345.6 | 1075.8 | 1199.8 | 317.0 | 190.0 | 284.6 |
| 132 | 504.4 | 510.4 | 552.1 | 805.4 | 743.3 | 771.8 | 383.0 | 154.0 | 255.3 |
| 138 | 624.9 | 437.1 | 433.3 | 945.4 | 704.6 | 851.7 | 443.0 | 216.0 | 352.2 |

| ELEV | TEMP RISE (DEG F) | | | JUEMPLD TEMP (DEG F) | | | DJEMPLD TIME (SEC) | | |
|------|-------------------|-------|-------|----------------------|-------|-------|--------------------|-------|-------|
| | MAX | MIN | PEAK | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 11.7 | 3.1 | 7.0 | 604.8 | 545.0 | 566.3 | 26.5 | 25.5 | 25.5 |
| 24 | 32.2 | 14.4 | 22.3 | 634.5 | 634.5 | 624.6 | 77.8 | 72.3 | 74.7 |
| 39 | 62.3 | 25.0 | 40.9 | 679.8 | 587.0 | 617.6 | 172.0 | 164.8 | 168.1 |
| 48 | 84.8 | 45.1 | 60.4 | 757.0 | 694.1 | 725.5 | 232.4 | 224.0 | 231.0 |
| 60 | 130.0 | 114.2 | 123.1 | 678.0 | 659.2 | 669.9 | 345.4 | 334.0 | 342.5 |
| 67 | 145.6 | 121.0 | 133.0 | 638.7 | 779.0 | 814.4 | 415.6 | 404.7 | 412.4 |
| 70 | 154.8 | 135.2 | 140.7 | 648.1 | 749.6 | 792.4 | 453.7 | 440.0 | 446.1 |
| 71 | 203.5 | 167.1 | 177.6 | 906.0 | 782.1 | 919.8 | 507.5 | 496.7 | 467.0 |
| 72 | 140.7 | 100.5 | 110.7 | 885.1 | 766.2 | 820.2 | 476.4 | 461.0 | 470.0 |
| 74 | 236.9 | 150.2 | 167.1 | 941.4 | 550.1 | 761.4 | 514.7 | 477.4 | 500.4 |
| 75 | 224.5 | 153.0 | 173.1 | 800.1 | 732.6 | 757.7 | 534.2 | 466.0 | 511.6 |
| 76 | 180.1 | 143.4 | 163.6 | 821.0 | 685.0 | 755.3 | 531.6 | 510.6 | 521.6 |
| 77 | 217.5 | 162.8 | 161.7 | 839.2 | 707.4 | 782.8 | 542.6 | 514.6 | 530.5 |
| 78 | 214.7 | 174.8 | 163.0 | 823.7 | 681.1 | 755.1 | 550.7 | 534.6 | 542.4 |
| 84 | 204.7 | 131.5 | 162.0 | 644.4 | 590.4 | 615.5 | 594.6 | 570.7 | 583.5 |
| 90 | 259.0 | 191.9 | 218.0 | 750.3 | 638.6 | 680.3 | 645.7 | 624.7 | 635.1 |
| 96 | 324.6 | 200.6 | 200.9 | 713.8 | 611.3 | 662.5 | 696.7 | 673.4 | 682.0 |
| 102 | 303.6 | 304.9 | 344.9 | 562.4 | 436.9 | 511.4 | 722.0 | 694.3 | 702.0 |
| 111 | 375.3 | 260.3 | 325.0 | 644.0 | 519.4 | 592.2 | 733.9 | 687.0 | 722.5 |
| 120 | 442.7 | 310.2 | 414.7 | 812.8 | 527.4 | 566.8 | 765.8 | 640.7 | 743.0 |
| 132 | 244.6 | 174.4 | 219.8 | 645.8 | 547.0 | 620.9 | 598.9 | 524.3 | 574.7 |
| 138 | 210.4 | 200.7 | 410.4 | 672.0 | 311.6 | 475.6 | 774.7 | 454.0 | 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

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 43110C

| ROD/ELEV | CHAN. NO | INITIAL AT FLUDD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|---|--------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 9 | 1050. | 1138. | 50. | 64.0 | 725. | 150.6 |
| 4C 3- 3 | 11 | 1200. | 1246. | 41.1 | 35.0 | 702. | 100.0 |
| 1C 4- 0 | 14 | 1342. | 1406. | 64. | 63.5 | 714. | 229.6 |
| 2A 5- 0 | 17 | 1371. | 1504. | 133. | 80.0 | 724. | 335.6 |
| 2A 5- 7 | 21 | 1408. | 1600. | 112. | 86.5 | 624. | 344.7 |
| 1D 5- 2 | 25 | 1454. | 1585. | 126. | 171.0 | 772. | 502.7 |
| 2D 5- 2 | 23 | 1442. | 1691. | 199. | 147.0 | 552. | 511.5 |
| 3D 5- 2 | 26 | 1551. | 1711. | 160. | 114.0 | 654. | 504.6 |
| 4B 6- 2 | 20 | 1500. | 1673. | 113. | 68.5 | 672. | 511.7 |
| 5C 6- 2 | 21 | 1400. | 1634. | 174. | 148.0 | 1030. | 471.5 |
| 1D 6- 3 | 23 | 1447. | 1587. | 140. | 164.0 | 700. | 514.6 |
| 5D 6- 3 | 24 | 1404. | 1587. | 119. | 201.0 | 732. | 515.7 |
| 2A 6- 4 | 70 | 1440. | 1579. | 130. | 136.0 | 760. | 495.7 |
| 3B 6- 4 | 75 | 1573. | 1697. | 124. | 71.5 | 707. | 513.7 |
| 2D 6- 5 | 24 | 1544. | 1684. | 140. | 121.0 | 700. | 529.7 |
| 3C 6- 5 | 35 | 1554. | 1755. | 162. | 115.0 | 723. | 524.7 |
| 3E 6- 5 | 26 | 1504. | 1547. | 93. | 197.0 | 620. | 513.9 |
| 3F 6- 6 | 95 | 1574. | 1763. | 189. | 117.0 | 713. | 535.3 |
| 3D 6- 6 | 26 | 1547. | 1723. | 176. | 115.0 | 710. | 540.7 |
| 4A 6- 6 | 27 | 1452. | 1615. | 163. | 131.0 | 715. | 530.3 |
| 4C 6- 6 | 28 | 1500. | 1735. | 167. | 115.0 | 760. | 531.8 |
| 5C 6- 6 | 101 | 1523. | 1620. | 97. | 79.0 | 700. | 524.7 |
| 1E 7- 0 | 110 | 1432. | 1634. | 171. | 148.0 | 543. | 505.8 |
| 2B 7- 0 | 111 | 1434. | 1657. | 218. | 129.0 | 522. | 573.7 |
| 3D 7- 0 | 115 | 1404. | 1695. | 227. | 120.0 | 535. | 573.0 |
| 5B 7- 0 | 117 | 1354. | 1552. | 197. | 192.0 | 674. | 546.0 |
| 2B 7- 6 | 120 | 1454. | 1659. | 206. | 131.0 | 650. | 609.7 |
| 2C 7- 6 | 121 | 1470. | 1692. | 214. | 35.0 | 621. | 625.3 |
| 2E 7- 6 | 122 | 1321. | 1518. | 198. | 259.0 | 543. | 617.4 |
| 3A 7- 6 | 123 | 1427. | 1617. | 190. | 135.0 | 644. | 541.4 |
| 3B 7- 6 | 124 | 1470. | 1693. | 223. | 132.0 | 600. | 610.8 |
| 4B 7- 6 | 127 | 1401. | 1678. | 217. | 127.0 | 616. | 625.2 |
| 5E 7- 6 | 126 | 1439. | 1610. | 171. | 122.0 | 657. | 500.7 |
| 1E 8- 0 | 131 | 1300. | 1570. | 271. | 189.0 | 633. | 652.7 |
| 2E 8- 0 | 133 | 1237. | 1531. | 294. | 277.0 | 630. | 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 | 650. | 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 | * * * S A U T H E R F O C U L P L E D A T A * * * | | | | | | |
| 4B 8- 6 | 145 | 1140. | 1487. | 342. | 136.0 | 462. | 676.7 |
| 5D 8- 6 | 146 | 1083. | 1478. | 395. | 292.0 | 576. | 647.9 |
| 3D 8- 3 | 154 | 432. | 1432. | 501.1 | 285.0 | 547. | 700.3 |
| 4C 9- 3 | 156 | 504. | 1379. | 390. | 230.0 | 550. | 689.0 |
| 1010- 0 | 161 | 545. | 1026. | 431. | 394.0 | 650. | 641.3 |
| 4810- 0 | 164 | 745. | 1231. | 436. | 229.0 | 536. | 710.7 |
| 5710- 0 | 167 | 602. | 1035. | 373. | 292.0 | 630. | 614.6 |
| 2411- 0 | 168 | 520. | 720. | 200. | 195.0 | 562. | 600.0 |
| 4C11- 0 | 170 | 530. | 981. | 451. | 217.0 | 441. | 714.9 |
| 1011- 6 | 172 | 455. | 692. | 237. | 311.0 | 548. | 600.0 |

KOH 43110C HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 624.0 | 540.2 | 575.0 | 629.9 | 557.8 | 582.7 | 17.0 | 5.0 | 11.5 |
| 24 | 661.0 | 603.3 | 642.4 | 696.6 | 630.2 | 665.4 | 36.0 | 27.5 | 30.5 |
| 34 | 1205.6 | 1050.3 | 1114.7 | 1246.3 | 1107.8 | 1172.0 | 67.0 | 35.0 | 51.6 |
| 40 | 1300.7 | 1207.0 | 1323.1 | 1344.1 | 1367.7 | 1402.0 | 70.0 | 63.0 | 66.5 |
| 60 | 1375.0 | 1364.0 | 1370.1 | 1532.2 | 1492.3 | 1509.5 | 87.5 | 86.0 | 83.0 |
| 67 | 1600.3 | 1450.0 | 1504.0 | 1725.2 | 1576.5 | 1623.7 | 110.0 | 70.0 | 92.6 |
| 70 | 1540.6 | 1402.3 | 1541.6 | 1759.8 | 1615.6 | 1689.0 | 120.0 | 97.0 | 104.9 |
| 71 | 1541.9 | 1434.0 | 1508.0 | 1751.9 | 1607.9 | 1674.0 | 124.0 | 105.0 | 113.0 |
| 72 | 1493.4 | 1403.7 | 1460.5 | 1662.5 | 1637.4 | 1649.9 | 119.0 | 66.0 | 102.5 |
| 74 | 1575.4 | 1430.7 | 1507.3 | 1737.4 | 1575.4 | 1656.8 | 227.0 | 66.5 | 147.4 |
| 75 | 1548.1 | 1447.3 | 1500.1 | 1730.8 | 1584.1 | 1650.0 | 201.0 | 67.0 | 132.9 |
| 76 | 1600.3 | 1437.7 | 1523.0 | 1739.7 | 1578.7 | 1648.3 | 221.0 | 70.0 | 119.1 |
| 77 | 1543.8 | 1410.2 | 1520.0 | 1755.3 | 1590.6 | 1662.9 | 197.0 | 76.5 | 144.2 |
| 78 | 1574.4 | 1400.2 | 1505.0 | 1763.1 | 1594.9 | 1658.0 | 219.0 | 75.0 | 137.3 |
| 84 | 1470.2 | 1221.2 | 1402.3 | 1702.9 | 1420.5 | 1612.1 | 192.0 | 117.0 | 144.0 |
| 90 | 1470.4 | 1320.5 | 1404.4 | 1643.0 | 1518.2 | 1633.9 | 259.0 | 122.0 | 154.8 |
| 96 | 1370.6 | 1217.1 | 1312.0 | 1662.5 | 1498.7 | 1589.2 | 278.0 | 141.0 | 204.4 |
| 102 | 1155.7 | 1034.0 | 1113.2 | 1558.2 | 1432.3 | 1499.0 | 292.0 | 136.0 | 226.5 |
| 111 | 1015.4 | 887.0 | 961.2 | 1432.3 | 1177.5 | 1340.1 | 285.0 | 195.0 | 232.8 |
| 120 | 422.3 | 540.1 | 723.4 | 1267.0 | 1026.4 | 1173.9 | 394.0 | 151.0 | 282.9 |
| 132 | 530.0 | 471.0 | 510.4 | 481.0 | 680.4 | 790.0 | 217.0 | 145.0 | 207.0 |
| 136 | 534.3 | 454.0 | 474.0 | 866.1 | 666.8 | 772.3 | 311.0 | 186.0 | 252.8 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | 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 | 26.0 |
| 24 | 20.9 | 15.5 | 20.0 | 659.4 | 628.6 | 646.4 | 78.9 | 74.4 | 77.1 |
| 34 | 73.7 | 40.7 | 52.4 | 724.9 | 633.8 | 690.6 | 166.8 | 150.0 | 160.0 |
| 40 | 90.5 | 64.6 | 79.1 | 714.2 | 698.6 | 709.6 | 231.8 | 224.7 | 229.4 |
| 60 | 157.2 | 127.8 | 134.4 | 773.6 | 720.6 | 739.5 | 335.6 | 326.8 | 333.1 |
| 67 | 124.9 | 112.3 | 119.0 | 907.4 | 789.2 | 836.0 | 399.7 | 342.7 | 397.4 |
| 70 | 169.2 | 123.6 | 147.9 | 399.1 | 814.6 | 848.5 | 446.6 | 429.7 | 440.0 |
| 71 | 210.0 | 120.2 | 165.0 | 897.3 | 735.5 | 816.4 | 456.7 | 446.0 | 451.4 |
| 72 | 170.0 | 144.0 | 161.4 | 914.1 | 836.7 | 902.9 | 447.3 | 441.4 | 444.4 |
| 74 | 140.5 | 113.1 | 149.5 | 795.6 | 553.0 | 687.1 | 511.7 | 492.0 | 502.0 |
| 75 | 140.0 | 81.1 | 121.9 | 774.6 | 676.3 | 725.9 | 524.7 | 456.4 | 513.6 |
| 76 | 150.3 | 71.4 | 124.0 | 787.7 | 693.7 | 728.8 | 523.7 | 455.7 | 514.4 |
| 77 | 174.4 | 93.0 | 142.1 | 525.6 | 690.1 | 728.7 | 544.3 | 513.4 | 520.0 |
| 78 | 204.9 | 97.4 | 163.6 | 748.3 | 643.3 | 727.1 | 550.7 | 523.6 | 534.4 |
| 84 | 250.2 | 171.3 | 204.0 | 674.1 | 521.6 | 594.7 | 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 | 224.3 | 270.7 | 676.6 | 602.0 | 637.6 | 666.7 | 631.7 | 651.1 |
| 102 | 402.5 | 341.0 | 385.4 | 576.4 | 460.6 | 495.7 | 592.3 | 547.9 | 670.1 |
| 111 | 500.8 | 266.6 | 378.4 | 634.3 | 524.7 | 574.5 | 700.3 | 635.0 | 671.3 |
| 120 | 551.1 | 344.0 | 450.0 | 650.1 | 354.2 | 549.0 | 721.0 | 602.0 | 670.5 |
| 132 | 451.0 | 144.0 | 274.5 | 552.4 | 441.0 | 538.2 | 714.9 | 486.4 | 572.8 |
| 136 | 307.6 | 260.0 | 282.0 | 547.8 | 242.5 | 363.2 | 704.0 | 346.0 | 554.4 |

43110C-3

FLECHT SEASET 21-RJD 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; $\pm 0.5\%$ 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 42910

| 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 | 1065. | 1116. | 51. | 51.5 | 711. | 150.8 |
| 4C 3- 3 | 9 | 1185. | 1231. | 45. | 46.0 | 706. | 151.5 |
| 1C 4- 0 | 10 | 1333. | 1360. | 27. | 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 | 20 | 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. | 440.8 |
| 4B 6- 3 | 66 | 1548. | 1689. | 141. | 101.0 | 782. | 475.2 |
| 5D 6- 3 | 68 | 1464. | 1592. | 128. | 167.0 | 790. | 472.8 |
| 2A 6- 4 | 70 | 1460. | 1617. | 156. | 134.0 | 773. | 480.4 |
| 3B 6- 4 | ** B A N D T H E R M O C O U P L E D A T A * | | | | | | |
| 1D 6- 5 | 82 | 1495. | 1519. | 154. | 169.0 | 907. | 476.7 |
| 2D 6- 5 | ** B A N 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 | 96 | 1495. | 1521. | 126. | 134.0 | 735. | 494.8 |
| 3C 6- 6 | 97 | 1539. | 1763. | 174. | 104.0 | 902. | 492.8 |
| 3D 6- 6 | 98 | 1556. | 1732. | 156. | 103.0 | 728. | 561.8 |
| 4A 6- 6 | 100 | 1466. | 1635. | 159. | 134.0 | 778. | 507.7 |
| 4C 6- 6 | 101 | 1570. | 1737. | 157. | 101.0 | 833. | 495.7 |
| 5C 6- 6 | 103 | 1521. | 1632. | 111. | 77.5 | 815. | 494.8 |
| 1C 7- 0 | ** B A N 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. | 1582. | 216. | 112.0 | 579. | 528.0 |
| 5B 7- 0 | 117 | 1340. | 1527. | 187. | 144.0 | 580. | 530.0 |
| 2B 7- 5 | 121 | 1459. | 1668. | 209. | 138.0 | 679. | 561.8 |
| 2C 7- 5 | 122 | 1475. | 1590. | 214. | 137.0 | 669. | 594.4 |
| 2E 7- 6 | 123 | 1331. | 1500. | 159. | 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 | 1272. | 1540. | 247. | 176.0 | 642. | 629.2 |
| 2E 8- 0 | 134 | 1254. | 1484. | 220. | 244.0 | 663. | 620.6 |
| 3D 8- 0 | 137 | 1396. | 1647. | 252. | 141.0 | 731. | 607.1 |
| 3B 8- 0 | 139 | 1288. | 1538. | 250. | 213.0 | 621. | 630.3 |
| 5C 8- 0 | 140 | 1359. | 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 | 596. | 649.8 |
| 2C 8- 6 | 143 | 1190. | 1555. | 395. | 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. | 1485. | 428. | 253.0 | 609. | 671.1 |
| 1010- 0 | 160 | 615. | 1075. | 459. | 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 |
| 2411- 0 | 167 | 548. | 803. | 256. | 196.0 | 576. | 617.7 |
| 4011- 0 | 169 | 629. | 1012. | 383. | 289.0 | 505. | 706.7 |
| 1011- 0 | 170 | 358. | 664. | 295. | 312.0 | 565. | 456.6 |

RIIM 42910D HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 1043.1 | 1104.6 | 1230.6 | 1114.1 | 1153.6 | 52.5 | 46.0 | 50.0 |
| 43 | 1303.3 | 1244.5 | 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 | 79.5 |
| 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 | 1599.4 | 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 | 1574.2 | 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 | 1545.7 | 169.0 | 101.0 | 135.2 |
| 76 | 1545.3 | 1460.3 | 1528.3 | 1759.8 | 1611.2 | 1578.7 | 169.0 | 96.5 | 122.4 |
| 77 | 1600.5 | 1453.0 | 1517.2 | 1763.1 | 1599.1 | 1672.8 | 178.0 | 104.0 | 125.3 |
| 73 | 1593.6 | 1447.2 | 1525.7 | 1763.1 | 1617.8 | 1584.8 | 169.0 | 77.5 | 118.3 |
| 94 | 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 |
| 95 | 1412.1 | 1245.2 | 1329.7 | 1674.5 | 1483.7 | 1574.3 | 282.0 | 137.0 | 191.3 |
| 102 | 1208.3 | 1107.2 | 1156.6 | 1554.9 | 1399.1 | 1488.3 | 247.0 | 138.0 | 189.9 |
| 111 | 1070.3 | 925.4 | 1016.0 | 1468.7 | 1177.5 | 1351.1 | 290.0 | 202.0 | 233.5 |
| 120 | 840.0 | 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 |
| 139 | 579.7 | 368.4 | 479.4 | 950.1 | 663.6 | 779.4 | 311.0 | 284.0 | 311.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 |
| 43 | 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 | 981.0 | 861.4 | 971.1 | 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 | 167.4 | 167.8 | 782.7 | 782.7 | 782.7 | 444.8 | 444.8 | 444.8 |
| 72 | 179.5 | 135.8 | 148.9 | 963.7 | 696.3 | 793.3 | 447.0 | 426.6 | 435.2 |
| 74 | 186.5 | 112.7 | 154.4 | 850.4 | 578.9 | 769.8 | 481.0 | 422.6 | 461.2 |
| 75 | 151.4 | 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 | 485.6 |
| 73 | 146.2 | 110.9 | 159.1 | 974.4 | 728.3 | 797.5 | 507.7 | 474.1 | 491.5 |
| 94 | 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 | 594.0 | 594.4 | 525.6 | 562.1 |
| 95 | 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 | 642.8 | 652.3 |
| 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 |
| 139 | 370.4 | 250.6 | 299.9 | 565.3 | 247.9 | 434.7 | 730.0 | 456.6 | 586.4 |

42910D-3

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 | 3 °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 NUMBER 41810E

| 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 | 1174. | 1230. | 55. | 56.5 | 600. | 106.6 |
| 4C 3-3 | 10 | 1250. | 1288. | 30. | 30.5 | 700. | 175.7 |
| 1C 4-0 | 12 | 1364. | 1431. | 67. | 69.0 | 702. | 226.7 |
| 2A 5-0 | 16 | 1448. | 1601. | 103. | 73.5 | 645. | 335.7 |
| 2A 5-7 | 19 | 1524. | 1630. | 106. | 95.0 | 743. | 407.5 |
| 5C 6-0 | 36 | 1430. | 1635. | 199. | 135.0 | 202. | 754.0 |
| 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 | 1451. | 1756. | 267. | 151.0 | 200. | 708.0 |
| 4B 6-4 | 52 | 1537. | 1723. | 186. | 142.0 | 200. | 515.4 |
| 5C 6-4 | 54 | 1484. | 1652. | 188. | 203.0 | 402. | 507.5 |
| 5D 6-4 | 55 | 1408. | 1648. | 161. | 218.0 | 757. | 536.0 |
| 1D 6-5 | 58 | 1465. | 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 | 1524. | 1749. | 179. | 135.0 | 644. | 542.9 |
| 3C 6-6 | 72 | 1550. | 1771. | 181. | 130.0 | 541. | 547.0 |
| 4C 6-6 | 75 | 1542. | 1752. | 160. | 136.0 | 731. | 559.0 |
| 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 | 1514. | 1687. | 173. | 196.0 | 761. | 559.5 |
| 3D 6-8 | 86 | 1570. | 1770. | 193. | 140.0 | 744. | 573.0 |
| 4A 6-8 | 87 | 1459. | 1630. | 171. | 198.0 | 705. | 573.0 |
| 1C 7-0 | 93 | 1462. | 1605. | 123. | 93.0 | 503. | 576.2 |
| 2B 7-0 | 94 | 1562. | 1672. | 171. | 89.5 | 564. | 564.9 |
| 3D 7-0 | 98 | 1523. | 1741. | 188. | 130.0 | 600. | 564.0 |
| 5B 7-0 | 103 | 1426. | 1599. | 173. | 127.0 | 506. | 556.0 |
| 2B 7-6 | 110 | 1460. | 1609. | 183. | 137.0 | 603. | 632.0 |
| 2C 7-6 | 111 | 1516. | 1694. | 178. | 137.0 | 653. | 601.7 |
| 2E 7-6 | 113 | 1400. | 1603. | 194. | 194.0 | 603. | 640.6 |
| 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 | 1251. | 1621. | 370. | 149.0 | 554. | 706.0 |
| 4B 7-6 | 120 | 1503. | 1711. | 208. | 136.0 | 675. | 622.0 |
| 5C 7-6 | 122 | 1445. | 1556. | 171. | 131.0 | 647. | 620.0 |
| 1C 8-0 | 124 | 1334. | 1574. | 235. | 200.0 | 674. | 670.0 |
| 2E 8-0 | 126 | 1271. | 1539. | 268. | 216.0 | 651. | 677.7 |
| 3D 8-0 | 129 | 1381. | 1675. | 293. | 152.0 | 697. | 663.0 |
| 5B 8-0 | 133 | 1308. | 1577. | 269. | 210.0 | 570. | 672.7 |
| 5C 8-0 | 134 | 1360. | 1635. | 249. | 169.0 | 648. | 601.7 |
| 1C 8-6 | 135 | 1177. | 1514. | 337. | 194.0 | 566. | 712.4 |
| 1D 8-6 | 136 | 1150. | 1490. | 340. | 199.0 | 513. | 726.0 |
| 2C 8-6 | 138 | 1240. | 1640. | 349. | 191.0 | 605. | 710.0 |
| 4B 8-6 | 143 | 1223. | 1592. | 369. | 140.0 | 537. | 713.7 |
| 5D 8-6 | 145 | 1175. | 1557. | 382. | 273.0 | 572. | 702.4 |
| 3D 9-3 | 150 | 1012. | 1437. | 425. | 210.0 | 612. | 710.0 |
| 4C 9-3 | 152 | 1065. | 1472. | 407. | 223.0 | 544. | 720.0 |
| 1010-0 | 157 | 669. | 1112. | 443. | 225.0 | 500. | 753.0 |
| 4B10-0 | 164 | 653. | 1310. | 457. | 253.0 | 544. | 752.4 |
| 5D10-0 | 166 | 667. | 1019. | 332. | 244.0 | 571. | 641.2 |
| 2A11-0 | 168 | 554. | 777. | 224. | 450.0 | 554. | 623.7 |
| 4C11-0 | 169 | 654. | 1084. | 430. | 323.0 | 441. | 752.0 |
| 1011-6 | 171 | 330. | 774. | 444. | 278.0 | 446. | 704.4 |

RUN 41810E HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 643.1 | 604.9 | 632.1 | 652.0 | 617.3 | 639.4 | 15.5 | 11.5 | 13.0 |
| 24 | 925.1 | 843.9 | 886.9 | 936.7 | 866.5 | 896.4 | 30.5 | 18.5 | 24.5 |
| 39 | 1258.1 | 1153.7 | 1187.2 | 1286.0 | 1195.2 | 1234.8 | 65.5 | 36.5 | 48.5 |
| 48 | 1426.8 | 1342.2 | 1378.4 | 1499.8 | 1424.1 | 1453.8 | 72.0 | 61.5 | 67.5 |
| 60 | 1545.0 | 1469.4 | 1510.8 | 1658.1 | 1601.4 | 1622.5 | 73.5 | 65.5 | 69.7 |
| 67 | 1605.0 | 1492.1 | 1549.8 | 1746.4 | 1624.7 | 1685.5 | 143.0 | 64.5 | 94.4 |
| 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 | 1577.9 | 1516.6 | 1517.3 | 1729.6 | 1728.5 | 1729.0 | 142.0 | 141.0 | 141.5 |
| 75 | 1460.5 | 1460.3 | 1470.0 | 1654.8 | 1630.8 | 1643.9 | 216.0 | 151.0 | 194.3 |
| 76 | 1450.3 | 1463.5 | 1490.6 | 1736.3 | 1634.1 | 1674.0 | 218.0 | 142.0 | 184.6 |
| 77 | 1554.3 | 1462.4 | 1511.4 | 1748.6 | 1614.9 | 1655.7 | 219.0 | 135.0 | 192.0 |
| 78 | 1592.0 | 1460.9 | 1532.3 | 1770.9 | 1640.7 | 1695.5 | 222.0 | 136.0 | 166.5 |
| 79 | 1583.4 | 1513.6 | 1543.9 | 1751.9 | 1655.9 | 1697.7 | 218.0 | 134.0 | 172.0 |
| 80 | 1576.4 | 1498.8 | 1508.7 | 1769.8 | 1624.7 | 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 | 157.0 | 157.0 |
| 84 | 1557.4 | 1416.0 | 1501.9 | 1751.9 | 1597.1 | 1675.6 | 143.0 | 66.5 | 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 | 176.9 |
| 102 | 1523.3 | 744.2 | 1187.4 | 1728.5 | 1150.5 | 1524.3 | 227.0 | 137.0 | 151.4 |
| 111 | 1090.0 | 904.5 | 999.8 | 1503.0 | 1257.8 | 1389.2 | 258.0 | 177.0 | 214.7 |
| 120 | 1157.5 | 544.1 | 605.5 | 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 | 324.8 |
| 136 | 573.3 | 330.5 | 451.9 | 838.5 | 774.2 | 806.3 | 366.0 | 276.0 | 322.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 8.9 | 5.6 | 7.3 | 542.4 | 535.6 | 571.6 | 31.7 | 30.9 | 31.7 |
| 24 | 22.6 | 11.6 | 15.5 | 663.5 | 620.3 | 639.0 | 80.7 | 74.4 | 80.0 |
| 39 | 63.6 | 24.9 | 47.7 | 737.1 | 594.9 | 666.5 | 186.8 | 164.4 | 177.0 |
| 48 | 86.9 | 66.9 | 74.9 | 762.0 | 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 | 105.8 | 135.7 | 881.0 | 743.2 | 815.1 | 424.8 | 401.0 | 414.9 |
| 70 | 221.9 | 156.0 | 181.9 | 863.5 | 829.6 | 855.4 | 470.8 | 445.7 | 454.4 |
| 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 | 644.9 | 524.0 | 584.5 | 528.4 | 520.2 | 524.3 |
| 75 | 164.5 | 150.5 | 173.9 | 830.8 | 564.8 | 683.0 | 524.1 | 455.5 | 512.6 |
| 76 | 188.1 | 160.5 | 175.5 | 982.1 | 555.6 | 745.2 | 537.0 | 507.5 | 526.2 |
| 77 | 174.3 | 124.8 | 154.3 | 764.2 | 624.6 | 717.8 | 562.9 | 524.7 | 543.4 |
| 78 | 198.6 | 110.9 | 163.2 | 824.2 | 591.0 | 728.0 | 561.1 | 526.6 | 547.5 |
| 79 | 172.9 | 120.7 | 153.8 | 780.1 | 740.0 | 759.2 | 560.8 | 542.4 | 553.4 |
| 80 | 209.1 | 128.8 | 174.0 | 776.8 | 682.8 | 734.2 | 585.2 | 560.7 | 570.0 |
| 81 | 202.0 | 202.0 | 202.0 | 746.5 | 746.5 | 746.5 | 569.6 | 569.6 | 569.6 |
| 82 | 186.4 | 166.4 | 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 | 564.0 | 567.0 |
| 90 | 364.8 | 170.6 | 266.5 | 696.8 | 559.0 | 648.4 | 706.8 | 601.7 | 624.0 |
| 96 | 293.5 | 235.3 | 271.2 | 697.0 | 570.3 | 636.0 | 688.9 | 661.7 | 672.4 |
| 102 | 362.0 | 205.2 | 336.9 | 695.3 | 513.5 | 591.2 | 726.0 | 626.6 | 641.5 |
| 111 | 424.9 | 346.4 | 389.5 | 612.3 | 537.8 | 569.0 | 734.4 | 664.1 | 715.3 |
| 120 | 505.7 | 332.2 | 443.2 | 673.9 | 505.8 | 557.0 | 756.2 | 636.7 | 723.4 |
| 132 | 424.8 | 223.7 | 280.0 | 588.4 | 490.6 | 545.1 | 752.0 | 576.0 | 634.3 |
| 136 | 443.7 | 265.2 | 354.4 | 496.2 | 481.7 | 489.0 | 750.0 | 704.4 | 727.4 |

41810E-3

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 RJD BUNDLE TEST SERIES

RJA NUMBER 42810F

| ROD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | INITIAL TEMPERATURE (DEG F) | TEMPERATURE AT (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|----------|--------------------------------|-----------------------------------|------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 5 | 1147. | 1183. | 35. | 44.0 | 646. | 171.8 |
| 4C 3- 3 | 6 | 1255. | 1269. | 14. | 73.9 | 733. | 164.9 |
| 1C 4- 0 | 7 | 1367. | 1401. | 34. | 54.0 | 812. | 230.7 |
| 2A 5- 0 | 12 | 1493. | 1568. | 76. | 68.5 | 724. | 321.6 |
| 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 5- 3 | 39 | 1494. | 1665. | 171. | 127.0 | 667. | 487.1 |
| 1D 5- 4 | 46 | 1466. | 1605. | 139. | 176.0 | 767. | 490.2 |
| 3D 5- 4 | 50 | 1510. | 1725. | 215. | 142.0 | 271. | 794.0 |
| 4A 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. | 136. | 171.0 | 707. | 498.8 |
| 2D 6- 5 | 62 | 1528. | 1671. | 143. | 141.0 | 682. | 505.6 |
| 3A 6- 5 | 63 | 1565. | 1694. | 129. | 124.0 | 542. | 505.0 |
| 3C 6- 6 | 69 | 1574. | 1734. | 160. | 124.0 | 243. | 507.3 |
| 3E 6- 6 | 70 | 1484. | 1634. | 150. | 131.0 | 425. | 517.1 |
| 4C 6- 6 | 73 | 1590. | 1709. | 119. | 35.0 | 707. | 514.7 |
| 5C 6- 6 | 76 | 1530. | 1625. | 95. | 90.0 | 727. | 524.8 |
| 3D 6- 7 | 85 | 1584. | 1726. | 142. | 118.0 | 609. | 540.3 |
| 7C 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 |
| 2A 7- 0 | 110 | 1526. | 1664. | 138. | 79.5 | 540. | 554.5 |
| 3D 7- 0 | 113 | 1566. | 1712. | 146. | 77.5 | 510. | 557.8 |
| 5A 7- 0 | 117 | 1416. | 1567. | 150. | 75.0 | 490. | 559.0 |
| 2A 7- 6 | 120 | 1511. | 1609. | 158. | 123.0 | 672. | 595.7 |
| 2C 7- 6 | 121 | 1539. | 1704. | 165. | 123.0 | 655. | 584.4 |
| 7E 7- 6 | 123 | 1402. | 1571. | 170. | 144.0 | 677. | 540.9 |
| 2A 7- 6 | 124 | 1409. | 1563. | 93. | 114.0 | 711. | 583.3 |
| 3A 7- 6 | 125 | 1548. | 1685. | 138. | 34.5 | 672. | 589.1 |
| 43 7- 6 | 129 | 1509. | 1659. | 140. | 37.5 | 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 |
| 5A 8- 0 | 143 | 1255. | 1479. | 224. | 259.0 | 691. | 650.7 |
| 5C 8- 0 | 144 | 1355. | 1354. | 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 |
| 4A 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. | 290.0 | 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 *

RUM 42810F HEATER RUD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TJRMAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 1500.6 | 1567.9 | 73.5 | 65.0 | 69.0 |
| 67 | 1599.6 | 1486.2 | 1549.6 | 1718.5 | 1609.0 | 1659.9 | 124.0 | 67.0 | 75.6 |
| 70 | 1609.4 | 1407.9 | 1472.4 | 1746.4 | 1572.2 | 1622.8 | 84.5 | 76.0 | 100.5 |
| 71 | 1553.1 | 1517.4 | 1535.2 | 1726.3 | 1705.0 | 1715.1 | 124.0 | 115.0 | 119.5 |
| 72 | 1474.3 | 1374.1 | 1424.2 | 1691.9 | 1585.2 | 1638.5 | 125.0 | 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 | 1634.4 | 192.0 | 124.0 | 159.7 |
| 76 | 1548.3 | 1423.9 | 1487.1 | 1728.5 | 1572.4 | 1638.2 | 227.0 | 90.0 | 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 | 1638.0 | 212.0 | 85.0 | 134.0 |
| 79 | 1582.0 | 1443.4 | 1524.9 | 1726.3 | 1580.9 | 1645.4 | 229.0 | 87.5 | 143.1 |
| 80 | 1604.1 | 1445.3 | 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 | 266.0 | 132.0 | 168.8 |
| 91 | 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 | 1613.9 | 1407.7 | 1513.8 | 373.0 | 128.0 | 169.4 |
| 111 | 1114.4 | 962.7 | 1045.1 | 1480.5 | 1281.0 | 1374.4 | 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 | 1113.3 | 653.7 | 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) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 50.1 | 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 | 746.8 | 853.0 | 542.0 | 419.4 | 479.2 |
| 71 | 186.6 | 173.2 | 179.9 | 837.5 | 287.9 | 542.7 | 505.0 | 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 | 427.6 | 579.7 |
| 75 | 215.3 | 91.6 | 151.1 | 923.6 | 244.7 | 537.0 | 744.0 | 481.5 | 561.1 |
| 77 | 185.4 | 99.5 | 125.2 | 794.8 | 247.9 | 611.1 | 523.0 | 466.7 | 509.3 |
| 78 | 150.4 | 70.1 | 112.2 | 791.1 | 242.5 | 680.2 | 535.3 | 507.0 | 519.3 |
| 79 | 153.7 | 84.0 | 120.5 | 607.7 | 507.0 | 713.9 | 540.3 | 498.5 | 524.1 |
| 80 | 160.7 | 118.3 | 139.3 | 779.4 | 645.5 | 718.0 | 545.8 | 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 | 146.4 | 595.4 | 489.5 | 544.4 | 565.3 | 534.5 | 555.4 |
| 90 | 181.9 | 93.4 | 151.1 | 723.1 | 634.6 | 681.5 | 509.2 | 571.8 | 591.6 |
| 96 | 252.5 | 203.7 | 228.8 | 712.8 | 612.1 | 668.0 | 551.7 | 622.8 | 637.0 |
| 102 | 331.5 | 281.0 | 311.3 | 610.5 | 424.9 | 528.9 | 584.0 | 642.1 | 663.1 |
| 111 | 366.1 | 269.6 | 327.4 | 611.4 | 481.3 | 572.2 | 701.9 | 678.2 | 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 | 314.1 | 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 1.76 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 (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 NUMB ER 43511A

| 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 | 1126. | 1208. | 81. | 49.5 | 696. | 143.1 |
| 4C 3- 3 | 11 | 1187. | 1240. | 62. | 30.0 | 743. | 142.8 |
| 1C 4- 0 | 14 | 1346. | 1443. | 97. | 54.0 | 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. | 439.5 |
| 1D 6- 3 | 63 | 1442. | 1688. | 246. | 123.0 | 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. | 131.0 | 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. | 156.0 | 805. | 486.6 |
| 3C 6- 6 | 95 | 1543. | 1873. | 331. | 115.0 | 835. | 487.8 |
| 4A 6- 6 | 97 | 1411. | 1704. | 298. | 133.0 | 823. | 499.5 |
| 3D 7- 0 | 98 | 1280. | 1630. | 350. | 159.0 | 678. | 612.3 |
| 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 | 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 | * * B A D | T H E R M O C O U P | L E D A T A * | | | | |
| 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 |
| 2 8- 6 | 143 | 1148. | 1517. | 369. | 124.0 | 514. | 632.5 |
| 4B 8- 6 | 145 | 1127. | 1464. | 337. | 134.0 | 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 |
| 1010- 0 | 161 | 582. | 1026. | 447. | 122.0 | 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 |
| 1011- 6 | 172 | 377. | 687. | 310. | 157.0 | 574. | 165.8 |

RUN 43511A HEATER KJD STATISTICAL DATA

INITIAL TEMP (DEG F)

MAX TEMP (DEG F)

TURNAROUND TIME (SEC)

| ELEV | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
|------|--------|--------|--------|--------|--------|--------|-------|-------|-------|
| 12 | 613.5 | 567.2 | 583.6 | 619.4 | 581.2 | 595.0 | 12.5 | 7.5 | 11.0 |
| 24 | 590.8 | 795.9 | 836.2 | 902.7 | 832.3 | 864.4 | 25.5 | 17.5 | 23.4 |
| 39 | 1185.6 | 1087.5 | 1133.5 | 1248.4 | 1170.2 | 1208.8 | 42.5 | 30.0 | 42.2 |
| 48 | 1360.5 | 1262.8 | 1313.6 | 1466.0 | 1380.2 | 1420.9 | 72.0 | 60.5 | 68.3 |
| 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 | 1502.6 | 1492.5 | 1549.7 | 1864.4 | 1690.8 | 1770.0 | 163.0 | 98.5 | 122.6 |
| 71 | 1598.9 | 1477.5 | 1546.4 | 1873.4 | 1670.6 | 1779.1 | 151.0 | 102.0 | 122.4 |
| 72 | 1506.0 | 1457.8 | 1534.0 | 1870.8 | 1663.6 | 1760.9 | 176.0 | 79.0 | 120.3 |
| 74 | 1580.5 | 1454.6 | 1524.7 | 1877.9 | 1657.6 | 1780.0 | 173.0 | 78.5 | 123.6 |
| 75 | 1572.3 | 1441.7 | 1516.3 | 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 | 1565.2 | 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 | 1705.5 | 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 | 1482.9 | 1612.1 | 157.0 | 98.5 | 125.4 |
| 96 | 1300.8 | 943.2 | 1204.5 | 1670.1 | 1271.3 | 1544.6 | 159.0 | 131.0 | 142.9 |
| 102 | 1148.2 | 1055.6 | 1096.0 | 1514.2 | 1241.1 | 1407.7 | 129.0 | 67.5 | 110.4 |
| 111 | 1104.6 | 878.2 | 968.0 | 1372.9 | 1139.6 | 1226.5 | 156.0 | 90.0 | 121.0 |
| 120 | 816.7 | 581.6 | 740.6 | 1245.2 | 1013.0 | 1120.8 | 244.0 | 148.0 | 161.0 |
| 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 | 165.2 |

TEMP RISE (DEG F)

QUENCH TEMP (DEG F)

QUENCH TIME (SEC)

| ELEV | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 51.9 | 52.4 | 56.4 |
| 39 | 82.7 | 61.8 | 75.3 | 743.0 | 682.2 | 693.9 | 143.1 | 141.8 | 142.6 |
| 48 | 131.1 | 94.9 | 107.3 | 674.6 | 713.6 | 708.7 | 212.7 | 188.5 | 197.5 |
| 60 | 169.0 | 156.3 | 162.1 | 709.0 | 677.3 | 694.2 | 313.7 | 299.9 | 305.6 |
| 67 | 216.0 | 187.8 | 201.8 | 805.4 | 808.6 | 811.3 | 382.6 | 374.7 | 378.4 |
| 70 | 261.8 | 196.0 | 220.4 | 925.9 | 779.6 | 866.6 | 414.7 | 402.7 | 408.8 |
| 71 | 274.5 | 199.0 | 232.6 | 928.6 | 777.0 | 830.2 | 429.7 | 413.6 | 419.1 |
| 72 | 276.8 | 166.8 | 226.9 | 977.6 | 742.2 | 871.2 | 434.6 | 407.7 | 425.3 |
| 74 | 299.0 | 179.2 | 250.2 | 917.7 | 764.5 | 839.6 | 459.8 | 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 | 325.7 | 249.8 | 286.5 | 841.2 | 764.8 | 804.8 | 493.8 | 475.4 | 482.9 |
| 78 | 350.7 | 289.7 | 307.1 | 851.3 | 760.0 | 808.7 | 501.8 | 487.8 | 495.9 |
| 84 | 285.8 | 210.6 | 249.9 | 658.3 | 511.9 | 610.7 | 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 | 768.9 | 802.9 | 517.9 | 536.8 | 595.0 |
| 102 | 386.7 | 174.2 | 311.7 | 810.8 | 689.5 | 750.9 | 642.0 | 488.8 | 591.9 |
| 111 | 388.0 | 213.3 | 286.5 | 673.0 | 435.3 | 538.5 | 644.0 | 491.0 | 585.9 |
| 120 | 471.6 | 255.5 | 380.2 | 753.1 | 389.6 | 574.1 | 553.0 | 353.5 | 526.9 |
| 132 | 290.4 | 184.3 | 219.0 | 582.3 | 244.7 | 450.7 | 584.9 | 233.0 | 399.5 |
| 138 | 435.2 | 224.2 | 310.2 | 626.9 | 245.7 | 478.8 | 512.0 | 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 $\pm 5\%$ 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 NUMBER 42711B

| ROD/ELEV | CHAN. | NO | INITIAL AT FLUOJ (DEG F) | MAXIML TEMPERATRE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|-------|-----|--------------------------------|---------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 3-3 | | 9 | 1061. | 1138. | 77. | 58.0 | 602. | 149.9 |
| 4C 3-3 | | 11 | 1149. | 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 | 1441. | 1649. | 158. | 98.5 | 649. | 352.5 |
| 10 6-2 | | 30 | 1431. | 1649. | 218. | 154.0 | 611. | 452.6 |
| 2D 6-2 | | 32 | 1508. | 1761. | 253. | 154.0 | 625. | 486.4 |
| 3D 6-2 | | 38 | 1522. | 1780. | 228. | 120.0 | 762. | 400.4 |
| 5C 6-2 | | 61 | 1441. | 1690. | 199. | 150.0 | 626. | 473.5 |
| 1D 6-3 | | 63 | 1445. | 1648. | 203. | 154.0 | 762. | 426.6 |
| 48 6-3 | | 68 | 1526. | 1734. | 199. | 130.0 | 733. | 473.7 |
| 5D 6-3 | | 69 | 1422. | 1646. | 225. | 117.0 | 732. | 506.6 |
| 2A 6-4 | | 70 | 1444. | 1646. | 197. | 174.0 | 773. | 452.6 |
| 2D 6-4 | | 72 | 1531. | 1751. | 220. | 122.0 | 691. | 476.5 |
| 33 6-4 | | 75 | 1566. | 1770. | 204. | 113.0 | 723. | 472.4 |
| 3C 6-5 | | 85 | 1547. | 1809. | 212. | 121.0 | 736. | 473.7 |
| 3E 6-5 | | 86 | 1472. | 1671. | 199. | 143.0 | 746. | 500.7 |
| 3C 6-6 | | 95 | 1573. | 1820. | 247. | 115.0 | 756. | 506.6 |
| 3D 6-6 | | 96 | 1536. | 1794. | 257. | 120.0 | 776. | 477.7 |
| 4A 6-6 | | 97 | 1424. | 1664. | 255. | 190.0 | 752. | 506.5 |
| 4C 6-6 | | 98 | 1546. | 1793. | 247. | 115.0 | 766. | 507.7 |
| 5C 6-6 | | 101 | 1456. | 1677. | 219. | 168.0 | 624. | 476.6 |
| 1C 7-0 | | 110 | 1423. | 1612. | 190. | 99.0 | 606. | 552.6 |
| 2B 7-0 | | 111 | 1454. | 1647. | 194. | 96.0 | 579. | 553.7 |
| 3D 7-0 | | 115 | 1463. | 1674. | 211. | 80.5 | 644. | 537.2 |
| 5B 7-0 | | 117 | 1354. | 1544. | 185. | 168.0 | 625. | 555.6 |
| 2B 7-6 | | 120 | 1440. | 1671. | 231. | 115.0 | 657. | 564.1 |
| 2C 7-6 | | 121 | 1457. | 1706. | 249. | 116.0 | 647. | 570.4 |
| 2E 7-6 | | 122 | 1242. | 1517. | 225. | 120.0 | 532. | 555.6 |
| 3A 7-6 | | 123 | 1413. | 1624. | 211. | 140.0 | 657. | 576.6 |
| 33 7-6 | | 124 | 1454. | 1704. | 250. | 112.0 | 669. | 533.1 |
| 48 7-6 | | 127 | 1451. | 1681. | 231. | 99.0 | 661. | 565.6 |
| 5C 7-6 | | 128 | 1406. | 1632. | 224. | 124.0 | 704. | 560.6 |
| 1C 8-0 | | 131 | 1247. | 1581. | 284. | 125.0 | 613. | 616.6 |
| 2E 8-0 | | 133 | 1200. | 1404. | 264. | 126.0 | 556. | 571.6 |
| 3D 8-0 | | 136 | 1333. | 1653. | 320. | 140.0 | 647. | 602.6 |
| 5B 8-0 | | 138 | 1159. | 1449. | 291. | 141.0 | 644. | 557.4 |
| 5C 8-0 | | 139 | 1301. | 1592. | 291. | 150.0 | 634. | 612.4 |
| 1C 8-6 | | 141 | 1133. | 1426. | 295. | 126.0 | 471. | 624.6 |
| 1D 8-6 | | 142 | 1069. | 1303. | 234. | 107.0 | 520. | 650.6 |
| 2C 8-6 | | 143 | 1164. | 1527. | 338. | 126.0 | 526. | 636.7 |
| 48 8-6 | | 145 | 1207. | 1565. | 358. | 139.0 | 569. | 634.8 |
| 5D 8-6 | | 146 | 1091. | 1399. | 308. | 106.0 | 544. | 576.3 |
| 3D 9-3 | | 154 | 543. | 1352. | 358. | 129.0 | 566. | 632.4 |
| 4C 9-3 | | 156 | 1046. | 1373. | 327. | 116.0 | 556. | 632.6 |
| 1D10-0 | | 161 | 562. | 973. | 391. | 134.0 | 474. | 544.6 |
| 4810-0 | | 164 | 670. | 1193. | 324. | 173.0 | 551. | 647.6 |
| 5D10-0 | | 167 | 703. | 1026. | 324. | 222.0 | 667. | 475.3 |
| 2A11-0 | | 168 | 545. | 728. | 183. | 197.0 | 544. | 434.5 |
| 4C11-0 | | 172 | 243. | 734. | 491. | 255.0 | 554. | 456.4 |
| 1D11-6 | | 172 | 243. | 734. | 491. | 255.0 | 554. | 456.4 |

* * * S A U T H T H E R M O C J U L P L E D A T A * * *

RUN 427118 HEATER ROD STATISTICAL DATA

TURBIDIMITY TIME (SEC)

MAX TEMP (DEG F)

INITIAL TEMP (DEG F)

| ELV | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
|-----|--------|--------|--------|--------|--------|--------|-------|-------|-------|
| 12 | 657.3 | 281.2 | 608.0 | 601.3 | 595.1 | 616.0 | 13.0 | 7.5 | 11.1 |
| 24 | 809.2 | 803.3 | 834.0 | 917.1 | 834.5 | 855.8 | 26.0 | 26.0 | 24.1 |
| 39 | 1199.3 | 8061.5 | 1110.0 | 1246.3 | 1135.0 | 1185.0 | 58.3 | 27.2 | 44.3 |
| 48 | 1759.3 | 1252.7 | 1497.0 | 1561.2 | 1351.0 | 1395.0 | 64.5 | 52.0 | 58.3 |
| 60 | 1461.2 | 1134.1 | 1300.0 | 1514.5 | 1466.6 | 1524.8 | 65.5 | 54.5 | 60.0 |
| 63 | 1575.4 | 1477.3 | 1504.0 | 1758.6 | 1448.3 | 1679.1 | 98.5 | 80.2 | 84.6 |
| 70 | 1607.9 | 1489.1 | 1531.5 | 1814.0 | 1667.0 | 1735.1 | 144.0 | 84.0 | 107.9 |
| 71 | 1591.8 | 1414.1 | 1503.8 | 1815.7 | 1625.4 | 1719.8 | 174.0 | 95.0 | 123.9 |
| 72 | 1481.0 | 1422.7 | 1463.0 | 1689.7 | 1607.9 | 1655.9 | 169.0 | 110.0 | 139.0 |
| 74 | 1553.8 | 1431.2 | 1503.0 | 1823.7 | 1649.4 | 1728.5 | 72.0 | 110.0 | 144.5 |
| 75 | 1589.5 | 1421.4 | 1515.7 | 1787.0 | 1646.1 | 1720.3 | 154.0 | 115.0 | 131.7 |
| 76 | 1600.3 | 1444.1 | 1514.5 | 1754.3 | 1646.1 | 1719.4 | 196.0 | 115.0 | 139.2 |
| 77 | 1597.1 | 1385.5 | 1504.4 | 1809.0 | 1614.5 | 1724.3 | 153.0 | 121.0 | 132.9 |
| 78 | 1573.3 | 1410.4 | 1487.7 | 1320.3 | 1336.3 | 1326.2 | 150.0 | 115.0 | 141.6 |
| 84 | 1482.9 | 1350.4 | 1419.9 | 1696.3 | 1534.4 | 1616.1 | 158.0 | 85.2 | 107.5 |
| 90 | 1450.9 | 1242.2 | 1394.5 | 1706.7 | 1517.1 | 1629.5 | 159.0 | 99.0 | 121.4 |
| 96 | 1334.1 | 1156.0 | 1245.0 | 1653.0 | 1494.5 | 1574.8 | 150.0 | 124.0 | 135.1 |
| 102 | 1206.5 | 1068.0 | 1124.0 | 1504.0 | 1302.7 | 1433.0 | 130.0 | 100.0 | 119.1 |
| 111 | 1045.8 | 723.3 | 864.9 | 1372.9 | 1074.8 | 1262.6 | 116.0 | 91.0 | 120.1 |
| 130 | 869.2 | 582.3 | 724.5 | 1255.7 | 972.8 | 1113.3 | 220.0 | 134.0 | 186.1 |
| 136 | 505.2 | 500.0 | 500.0 | 741.0 | 688.9 | 719.0 | 246.0 | 101.0 | 162.3 |
| 138 | 599.4 | 242.5 | 311.0 | 910.9 | 686.0 | 795.9 | 262.0 | 160.0 | 214.0 |

QUENCH TIME (SEC)

QUENCH TEMP (DEG F)

TEMP RISE (DEG F)

| ELV | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 12 | 13.9 | 4.2 | 10.9 | 610.3 | 573.2 | 587.6 | 22.1 | 15.9 | 20.9 |
| 24 | 38.3 | 23.8 | 30.5 | 651.6 | 605.1 | 626.8 | 63.4 | 62.0 | 65.0 |
| 39 | 84.2 | 42.0 | 69.0 | 703.9 | 602.4 | 646.1 | 154.9 | 140.0 | 151.9 |
| 48 | 120.4 | 72.3 | 98.0 | 760.1 | 669.7 | 706.0 | 211.8 | 206.2 | 209.8 |
| 60 | 157.5 | 132.5 | 144.8 | 883.0 | 657.2 | 673.8 | 310.2 | 315.7 | 314.4 |
| 67 | 183.2 | 153.5 | 169.0 | 853.0 | 772.5 | 818.3 | 388.7 | 376.7 | 382.1 |
| 70 | 206.7 | 170.3 | 194.0 | 822.9 | 762.7 | 785.5 | 421.4 | 413.7 | 419.3 |
| 71 | 224.5 | 194.5 | 212.1 | 819.8 | 737.1 | 774.5 | 463.6 | 463.7 | 435.2 |
| 72 | 210.9 | 185.2 | 199.5 | 811.2 | 704.1 | 759.6 | 445.3 | 448.7 | 434.2 |
| 74 | 310.9 | 161.0 | 224.9 | 975.4 | 589.7 | 761.6 | 480.9 | 442.7 | 464.5 |
| 75 | 224.5 | 185.0 | 204.6 | 826.8 | 708.3 | 758.1 | 506.6 | 426.8 | 477.3 |
| 76 | 223.9 | 184.6 | 202.7 | 825.6 | 691.1 | 763.0 | 498.5 | 474.7 | 465.7 |
| 77 | 236.5 | 194.3 | 219.9 | 795.8 | 735.7 | 763.0 | 504.6 | 460.6 | 455.1 |
| 78 | 210.7 | 211.9 | 230.4 | 824.2 | 697.7 | 760.2 | 517.6 | 446.6 | 507.7 |
| 84 | 223.1 | 142.5 | 180.2 | 849.1 | 584.5 | 614.0 | 561.6 | 537.2 | 540.0 |
| 90 | 200.3 | 203.1 | 230.0 | 707.4 | 531.9 | 648.8 | 598.7 | 504.4 | 583.1 |
| 96 | 322.4 | 261.6 | 294.9 | 694.7 | 550.5 | 632.5 | 616.0 | 564.9 | 604.8 |
| 102 | 338.0 | 234.1 | 304.1 | 569.0 | 470.9 | 516.9 | 623.7 | 552.6 | 612.1 |
| 111 | 358.5 | 221.0 | 292.0 | 643.2 | 501.2 | 573.5 | 624.4 | 526.7 | 609.9 |
| 120 | 491.5 | 291.1 | 370.8 | 667.2 | 463.4 | 574.0 | 658.0 | 475.3 | 615.0 |
| 137 | 234.4 | 123.7 | 160.2 | 568.2 | 493.5 | 543.4 | 633.7 | 214.4 | 364.2 |
| 138 | 491.2 | 260.2 | 344.3 | 554.4 | 242.5 | 431.0 | 629.0 | 334.0 | 523.6 |

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 SEASAT Z1 ROD BUNDLE TEST SERIES

RUN NUMBER 43211C

| ROD/ELEV | CHAN. No | INITIAL AT FLECHT (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (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 | 1346. | 1541. | 145. | 69.0 | 732. | 311.9 |
| 2A 5- 7 | 21 | 1504. | 1658. | 154. | 98.5 | 740. | 384.6 |
| 1D 5- 2 | 30 | 1476. | 1598. | 122. | 139.0 | 806. | 466.7 |
| 2D 5- 2 | 33 | 1450. | 1696. | 198. | 149.0 | 506. | 461.6 |
| 3D 5- 2 | 36 | 1555. | 1701. | 145. | 69.0 | 626. | 488.6 |
| 4d 5- 2 | 60 | 1566. | 1698. | 133. | 69.0 | 716. | 464.5 |
| 5C 5- 2 | 61 | 1466. | 1663. | 194. | 175.0 | 1024. | 444.5 |
| 13 5- 3 | 63 | 1463. | 1608. | 145. | 138.0 | 775. | 479.5 |
| 5D 5- 3 | 69 | 1462. | 1612. | 130. | 70.0 | 733. | 466.7 |
| 2A 5- 4 | 70 | 1465. | 1620. | 155. | 111.0 | 791. | 370.0 |
| 3B 5- 4 | 75 | 1575. | 1729. | 154. | 72.5 | 763. | 402.6 |
| 2D 5- 5 | 34 | 1555. | 1711. | 155. | 108.0 | 734. | 449.6 |
| 3C 5- 5 | 35 | 1576. | 1790. | 194. | 69.0 | 801. | 456.8 |
| 3E 5- 5 | 66 | 1527. | 1630. | 103. | 140.0 | 765. | 468.3 |
| 3C 5- 6 | 45 | 1560. | 1749. | 219. | 84.5 | 754. | 507.6 |
| 3D 5- 6 | 46 | 1526. | 1756. | 201. | 80.0 | 751. | 514.9 |
| 4A 5- 6 | 47 | 1472. | 1654. | 181. | 111.0 | 794. | 446.7 |
| 4C 5- 6 | 48 | 1561. | 1760. | 199. | 70.5 | 836. | 502.8 |
| 5C 5- 6 | 101 | 1543. | 1659. | 116. | 64.5 | 764. | 499.8 |
| 1C 7- 0 | 110 | 1416. | 1591. | 133. | 51.0 | 605. | 534.7 |
| 23 7- 0 | 111 | 1456. | 1609. | 151. | 43.5 | 570. | 534.6 |
| 3D 7- 0 | 115 | 1464. | 1670. | 186. | 69.0 | 561. | 549.0 |
| 51 7- 0 | 117 | 1344. | 1543. | 140. | 85.0 | 642. | 531.6 |
| 74 7- 6 | 120 | 1467. | 1648. | 181. | 91.0 | 635. | 575.7 |
| 2C 7- 6 | 121 | 1465. | 1667. | 201. | 91.0 | 545. | 548.3 |
| 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 | 1476. | 1609. | 211. | 84.5 | 653. | 500.2 |
| 4B 7- 6 | 127 | 1473. | 1655. | 212. | 84.0 | 616. | 547.0 |
| 5C 7- 6 | 128 | 1457. | 1619. | 162. | 70.0 | 650. | 561.6 |
| 1C 8- 0 | 131 | 1322. | 1566. | 244. | 115.0 | 586. | 613.9 |
| 2E 8- 0 | 132 | 1267. | 1467. | 199. | 109.0 | 600. | 564.5 |
| 3D 8- 0 | 136 | 1372. | 1637. | 265. | 107.0 | 664. | 616.9 |
| 53 8- 0 | 138 | 1443. | 1464. | 240. | 134.0 | 641. | 574.9 |
| 5C 8- 0 | 139 | 1367. | 1543. | 210. | 92.5 | 604. | 566.0 |
| 1C 8- 6 | 141 | 1163. | 1455. | 292. | 111.0 | 430. | 608.1 |
| 1D 8- 6 | 142 | 1062. | 1329. | 247. | 85.0 | 476. | 546.7 |
| 2C 8- 6 | 143 | 1163. | 1455. | 292. | 111.0 | 430. | 608.1 |
| 48 8- 6 | 145 | 1162. | 1436. | 253. | 77.5 | 244. | 621.0 |
| 5D 8- 6 | 146 | 1127. | 1395. | 268. | 97.5 | 566. | 541.6 |
| 3D 8- 3 | 154 | 1017. | 1352. | 335. | 111.0 | 464. | 648.0 |
| 4C 9- 3 | 156 | 1000. | 1346. | 286. | 98.0 | 493. | 626.0 |
| 1D10- 0 | 161 | 577. | 410. | 333. | 192.0 | 616. | 514.7 |
| 4310- 0 | 164 | 600. | 1158. | 328. | 122.0 | 574. | 622.3 |
| 5D10- 0 | 167 | 760. | 972. | 263. | 136.0 | 604. | 447.6 |
| 2411- 0 | 168 | 556. | 743. | 187. | 214.0 | 572. | 166.8 |
| 4C11- 0 | 170 | 637. | 739. | 302. | 128.0 | 364. | 616.0 |
| 1D11- 6 | 172 | 444. | 723. | 274. | 213.0 | 500. | 521.6 |

* * * S A L T H E R M O C O U P L E D A T A * * *

KUN 43211C HEATER RD STATISTICAL DATA

| ELCV | INITIAL TEMP (DEG F) | | | | MAX TEMP (DEG F) | | | | TURNAROUND TIME (SEC) | | | |
|------|----------------------|--------|--------|--------|------------------|--------|--------|--------|-----------------------|-------|-------|-------|
| | MAX | MIN | PCMB | PCMB | MAX | MIN | MEAN | MEAN | MAX | MIN | PLAN | PLAN |
| 12 | 621.1 | 244.0 | 570.7 | 570.7 | 625.7 | 555.6 | 579.3 | 579.3 | 11.5 | 5.2 | 8.8 | 8.8 |
| 24 | 872.6 | 661.9 | 851.4 | 851.4 | 922.3 | 835.4 | 879.2 | 879.2 | 21.5 | 16.3 | 16.3 | 16.3 |
| 34 | 1272.2 | 1071.9 | 1150.8 | 1150.8 | 1277.0 | 1141.1 | 1206.9 | 1206.9 | 53.5 | 21.0 | 42.4 | 42.4 |
| 40 | 1374.0 | 1240.2 | 1330.2 | 1330.2 | 1478.4 | 1399.1 | 1434.7 | 1434.7 | 74.5 | 56.4 | 56.4 | 56.4 |
| 60 | 1401.6 | 1342.5 | 1360.4 | 1360.4 | 1575.4 | 1523.6 | 1546.6 | 1546.6 | 76.0 | 64.5 | 70.5 | 70.5 |
| 67 | 1606.6 | 1461.3 | 1514.7 | 1514.7 | 1777.6 | 1613.4 | 1674.6 | 1674.6 | 105.0 | 71.5 | 80.1 | 80.1 |
| 70 | 1564.3 | 1477.6 | 1544.7 | 1544.7 | 1613.5 | 1667.9 | 1743.6 | 1743.6 | 115.0 | 83.5 | 101.5 | 101.5 |
| 71 | 1540.7 | 1422.3 | 1510.1 | 1510.1 | 1774.3 | 1634.1 | 1710.1 | 1710.1 | 168.0 | 83.5 | 118.9 | 118.9 |
| 74 | 1505.9 | 1454.7 | 1556.3 | 1556.3 | 1706.2 | 1677.7 | 1691.9 | 1691.9 | 111.0 | 76.5 | 93.7 | 93.7 |
| 75 | 1576.6 | 1463.1 | 1537.6 | 1537.6 | 1725.2 | 1584.1 | 1664.8 | 1664.8 | 230.0 | 84.5 | 129.4 | 129.4 |
| 79 | 1540.2 | 1463.1 | 1537.6 | 1537.6 | 1746.4 | 1600.3 | 1669.8 | 1669.8 | 179.0 | 84.5 | 103.4 | 103.4 |
| 70 | 1600.1 | 1492.9 | 1532.2 | 1532.2 | 1772.0 | 1639.0 | 1676.6 | 1676.6 | 189.0 | 85.2 | 101.0 | 101.0 |
| 77 | 1542.0 | 1437.4 | 1533.2 | 1533.2 | 1789.9 | 1615.6 | 1694.2 | 1694.2 | 180.0 | 85.0 | 104.9 | 104.9 |
| 75 | 1580.6 | 1426.0 | 1521.8 | 1521.8 | 1790.6 | 1633.0 | 1705.3 | 1705.3 | 175.0 | 85.5 | 102.5 | 102.5 |
| 84 | 1503.5 | 1421.2 | 1425.5 | 1425.5 | 1621.0 | 1388.6 | 1592.2 | 1592.2 | 106.0 | 43.5 | 69.0 | 69.0 |
| 90 | 1405.1 | 1345.3 | 1440.2 | 1440.2 | 1606.6 | 1490.2 | 1628.5 | 1628.5 | 91.0 | 56.5 | 79.2 | 79.2 |
| 90 | 1300.6 | 1243.3 | 1333.4 | 1333.4 | 1664.6 | 1466.6 | 1576.7 | 1576.7 | 134.0 | 46.5 | 114.1 | 114.1 |
| 102 | 1146.0 | 1062.2 | 1153.0 | 1153.0 | 1483.7 | 1325.9 | 1419.7 | 1419.7 | 111.0 | 84.0 | 102.6 | 102.6 |
| 111 | 1070.0 | 775.2 | 1031.1 | 1031.1 | 1364.8 | 1174.4 | 1294.8 | 1294.8 | 116.0 | 84.0 | 102.6 | 102.6 |
| 120 | 960.7 | 577.1 | 175.0 | 175.0 | 1233.8 | 909.9 | 1101.9 | 1101.9 | 201.0 | 108.0 | 151.6 | 151.6 |
| 132 | 830.5 | 460.3 | 562.3 | 562.3 | 936.6 | 667.8 | 776.8 | 776.8 | 214.0 | 113.0 | 164.0 | 164.0 |
| 130 | 504.6 | 444.2 | 484.1 | 484.1 | 664.2 | 662.6 | 770.5 | 770.5 | 213.0 | 114.0 | 171.6 | 171.6 |

| ELCV | TEMP WISE (DEG F) | | | | QUENCH TEMP (DEG F) | | | | QUENCH TIME (SEC) | | | |
|------|-------------------|-------|-------|-------|---------------------|-------|-------|-------|-------------------|-------|-------|-------|
| | MAX | MIN | MEAN | MEAN | MAX | MIN | MEAN | MEAN | MAX | MIN | PLAN | PLAN |
| 12 | 11.6 | 4.6 | 8.2 | 8.2 | 585.7 | 540.3 | 563.3 | 563.3 | 20.0 | 15.2 | 17.0 | 17.0 |
| 24 | 33.2 | 23.1 | 27.0 | 27.0 | 664.9 | 632.4 | 651.5 | 651.5 | 65.4 | 26.4 | 62.7 | 62.7 |
| 34 | 91.6 | 56.4 | 68.1 | 68.1 | 739.0 | 661.3 | 703.4 | 703.4 | 147.4 | 125.0 | 140.0 | 140.0 |
| 40 | 123.5 | 80.1 | 104.6 | 104.6 | 733.1 | 693.8 | 701.2 | 701.2 | 211.7 | 204.9 | 204.1 | 204.1 |
| 60 | 174.4 | 131.1 | 154.2 | 154.2 | 779.1 | 713.5 | 741.7 | 741.7 | 314.7 | 307.7 | 311.4 | 311.4 |
| 67 | 171.5 | 132.4 | 154.9 | 154.9 | 847.9 | 790.0 | 847.6 | 847.6 | 384.6 | 375.3 | 380.1 | 380.1 |
| 70 | 224.2 | 170.5 | 193.9 | 193.9 | 879.4 | 775.0 | 835.1 | 835.1 | 427.7 | 411.6 | 420.7 | 420.7 |
| 71 | 230.6 | 143.1 | 191.9 | 191.9 | 904.8 | 729.8 | 830.5 | 830.5 | 439.7 | 422.6 | 430.1 | 430.1 |
| 72 | 211.5 | 171.7 | 194.6 | 194.6 | 911.9 | 850.9 | 881.4 | 881.4 | 429.7 | 421.5 | 425.6 | 425.6 |
| 74 | 140.5 | 126.2 | 147.8 | 147.8 | 806.0 | 565.7 | 692.6 | 692.6 | 489.9 | 453.5 | 470.4 | 470.4 |
| 75 | 159.1 | 75.4 | 132.2 | 132.2 | 774.8 | 685.2 | 734.8 | 734.8 | 497.5 | 471.7 | 484.2 | 484.2 |
| 76 | 171.6 | 60.4 | 141.4 | 141.4 | 833.5 | 724.4 | 774.6 | 774.6 | 499.7 | 370.2 | 469.5 | 469.5 |
| 77 | 197.2 | 102.2 | 160.9 | 160.9 | 801.1 | 680.7 | 743.8 | 743.8 | 516.5 | 487.7 | 456.7 | 456.7 |
| 70 | 215.6 | 115.0 | 163.5 | 163.5 | 856.9 | 694.0 | 757.8 | 757.8 | 514.9 | 420.5 | 444.0 | 444.0 |
| 84 | 200.6 | 124.3 | 160.7 | 160.7 | 863.6 | 543.2 | 607.2 | 607.2 | 557.4 | 461.0 | 531.6 | 531.6 |
| 90 | 212.1 | 144.4 | 182.3 | 182.3 | 844.4 | 584.6 | 632.2 | 632.2 | 598.3 | 512.9 | 569.2 | 569.2 |
| 90 | 277.6 | 154.3 | 242.0 | 242.0 | 896.3 | 587.7 | 643.1 | 643.1 | 624.0 | 554.0 | 600.0 | 600.0 |
| 102 | 242.2 | 240.7 | 240.9 | 240.9 | 587.9 | 241.6 | 452.3 | 452.3 | 640.5 | 541.8 | 613.3 | 613.3 |
| 111 | 335.1 | 140.0 | 203.7 | 203.7 | 624.5 | 468.9 | 540.7 | 540.7 | 643.0 | 477.0 | 566.4 | 566.4 |
| 120 | 432.4 | 234.5 | 326.9 | 326.9 | 618.0 | 241.4 | 430.2 | 430.2 | 659.7 | 425.0 | 567.1 | 567.1 |
| 132 | 301.4 | 167.3 | 234.5 | 234.5 | 571.6 | 240.4 | 416.2 | 416.2 | 616.0 | 254.1 | 366.2 | 366.2 |
| 130 | 426.2 | 140.3 | 286.4 | 286.4 | 500.4 | 240.8 | 388.5 | 388.5 | 596.0 | 151.0 | 452.5 | 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 NUMBER 42711

| 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 | 1063. | 1147. | 85. | 50.0 | 628. | 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 |
| 20 6- 2 | 50 | 1531. | 1713. | 182. | 81.0 | 789. | 428.0 |
| 30 6- 2 | 55 | 1512. | 1761. | 249. | 103.0 | 236. | 655.0 |
| 5C 6- 2 | 59 | 1545. | 1702. | 157. | 96.0 | 829. | 433.9 |
| 10 6- 3 | 61 | 1495. | 1680. | 195. | 118.0 | 921. | 381.7 |
| 48 6- 3 | 66 | 1550. | 1739. | 189. | 84.5 | 805. | 444.7 |
| 50 6- 3 | 68 | 1476. | 1641. | 165. | 151.0 | 801. | 441.6 |
| 2A 6- 4 | 70 | 1474. | 1682. | 208. | 151.0 | 833. | 438.8 |
| 39 6- 4 | ** B A N D T H E R M O C O U P L E D A T A * | | | | | | |
| 10 6- 5 | 82 | 1465. | 1666. | 200. | 117.0 | 906. | 404.4 |
| 20 6- 5 | ** B A N D T H E R M O C O U P L E D A T A * | | | | | | |
| 3C 6- 5 | 85 | 1527. | 1808. | 211. | 88.0 | 758. | 457.8 |
| 3E 6- 5 | 86 | 1532. | 1670. | 158. | 152.0 | 731. | 466.8 |
| 3C 6- 6 | 97 | 1579. | 1814. | 235. | 87.5 | 756. | 468.7 |
| 30 6- 6 | 98 | 1553. | 1780. | 216. | 104.0 | 762. | 467.2 |
| 4A 6- 6 | 100 | 1470. | 1688. | 217. | 140.0 | 788. | 479.6 |
| 4C 6- 6 | 101 | 1553. | 1789. | 225. | 85.0 | 894. | 463.8 |
| 5C 6- 6 | 103 | 1534. | 1697. | 153. | 136.0 | 849. | 465.8 |
| 1C 7- 0 | ** B A N D T H E R M O C O U P L E D A T A * | | | | | | |
| 29 7- 0 | 111 | 1424. | 1653. | 229. | 72.5 | 601. | 498.5 |
| 30 7- 0 | 115 | 1460. | 1677. | 217. | 82.5 | 622. | 500.5 |
| 58 7- 0 | 117 | 1337. | 1524. | 186. | 82.0 | 572. | 505.9 |
| 29 7- 5 | 121 | 1457. | 1695. | 238. | 107.0 | 717. | 533.9 |
| 2C 7- 5 | 122 | 1458. | 1715. | 247. | 104.0 | 684. | 569.5 |
| 2E 7- 5 | 123 | 1347. | 1506. | 150. | 78.0 | 687. | 540.7 |
| 3A 7- 5 | 124 | 1455. | 1657. | 202. | 115.0 | 708. | 526.7 |
| 33 7- 5 | 125 | 1480. | 1719. | 238. | 98.0 | 733. | 529.9 |
| 48 7- 5 | 128 | 1469. | 1700. | 231. | 85.0 | 688. | 560.8 |
| 5C 7- 5 | 129 | 1444. | 1617. | 171. | 72.5 | 725. | 531.9 |
| 1C 8- 0 | 132 | 1395. | 1540. | 254. | 117.0 | 599. | 608.6 |
| 2E 8- 0 | 134 | 1282. | 1448. | 167. | 92.5 | 654. | 590.6 |
| 30 8- 0 | 137 | 1387. | 1659. | 272. | 102.0 | 726. | 574.9 |
| 58 8- 0 | 139 | 1296. | 1530. | 244. | 102.0 | 640. | 602.7 |
| 5C 8- 0 | 140 | 1370. | 1596. | 226. | 104.0 | 731. | 571.4 |
| 1C 8- 5 | 141 | 1105. | 1455. | 350. | 115.0 | 449. | 610.3 |
| 10 8- 5 | 142 | 1138. | 1440. | 332. | 98.0 | 674. | 556.6 |
| 2C 8- 5 | 143 | 1119. | 1502. | 383. | 117.0 | 452. | 619.9 |
| 48 8- 5 | 145 | 1179. | 1491. | 312. | 80.0 | 517. | 628.0 |
| 50 8- 5 | 148 | 1136. | 1428. | 292. | 103.0 | 537. | 581.3 |
| 30 9- 3 | 155 | 957. | 1354. | 397. | 119.0 | 473. | 612.0 |
| 4C 9- 3 | 157 | 1034. | 1358. | 354. | 127.0 | 494. | 613.0 |
| 1010- 0 | 160 | 602. | 1008. | 406. | 226.0 | 510. | 460.4 |
| 4910- 0 | 163 | 824. | 1172. | 349. | 131.0 | 519. | 625.9 |
| 5010- 0 | 166 | 739. | 1034. | 294. | 170.0 | 543. | 514.7 |
| 2411- 0 | 167 | 531. | 749. | 218. | 174.0 | 584. | 425.6 |
| 4C11- 0 | 169 | 591. | 935. | 343. | 217.0 | 443. | 592.0 |
| 1011- 5 | 170 | 416. | 691. | 275. | 227.0 | 555. | 445.9 |

RUN 427110 HEATER R3D STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 594.0 | 537.5 | 556.4 | 602.5 | 552.4 | 569.8 | 14.5 | 7.5 | 12.2 |
| 24 | 787.3 | 761.3 | 775.9 | 820.9 | 804.4 | 814.7 | 26.0 | 25.0 | 25.5 |
| 32 | 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 |
| 63 | 1481.7 | 1365.4 | 1408.4 | 1652.5 | 1553.8 | 1597.9 | 105.0 | 63.0 | 85.3 |
| 67 | 1600.5 | 1475.0 | 1518.6 | 1762.0 | 1634.1 | 1578.9 | 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 | 1594.2 | 166.0 | 84.5 | 121.7 |
| 76 | 1542.1 | 1474.2 | 1534.9 | 1809.0 | 1663.6 | 1734.7 | 151.0 | 87.5 | 117.5 |
| 77 | 1596.8 | 1465.4 | 1518.7 | 1907.8 | 1649.4 | 1723.6 | 152.0 | 80.0 | 116.7 |
| 78 | 1582.1 | 1455.3 | 1528.9 | 1913.5 | 1678.8 | 1739.6 | 151.0 | 85.0 | 114.9 |
| 84 | 1459.6 | 1321.3 | 1401.3 | 1697.4 | 1511.7 | 1511.3 | 135.0 | 50.0 | 83.3 |
| 90 | 1480.0 | 1345.5 | 1423.8 | 1718.5 | 1506.3 | 1620.3 | 118.0 | 50.0 | 90.2 |
| 96 | 1401.4 | 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 | 940.5 | 1359.3 | 1103.7 | 1267.3 | 130.0 | 97.0 | 114.0 |
| 120 | 423.6 | 402.1 | 423.3 | 1172.3 | 991.3 | 1078.6 | 226.0 | 118.0 | 179.3 |
| 132 | 571.5 | 531.1 | 555.1 | 834.6 | 749.3 | 811.1 | 217.0 | 131.0 | 174.0 |
| 138 | 563.1 | 415.4 | 490.4 | 877.9 | 683.6 | 743.4 | 231.0 | 132.0 | 200.5 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 |
| 32 | 31.3 | 84.7 | 87.6 | 734.3 | 646.6 | 593.0 | 140.6 | 137.8 | 138.8 |
| 48 | 93.5 | 87.7 | 90.3 | 762.4 | 731.4 | 746.9 | 201.8 | 189.3 | 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 | 140.3 | 946.2 | 842.2 | 944.5 | 362.8 | 355.6 | 360.4 |
| 70 | 200.1 | 189.6 | 194.9 | 888.8 | 816.9 | 952.8 | 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 | 194.6 | 195.2 | 917.7 | 747.7 | 911.5 | 415.4 | 391.9 | 405.5 |
| 74 | 240.5 | 142.3 | 196.9 | 913.0 | 605.2 | 766.2 | 447.9 | 317.6 | 421.2 |
| 75 | 202.8 | 164.6 | 185.7 | 920.6 | 764.5 | 920.1 | 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 | 912.2 | 470.8 | 404.4 | 452.2 |
| 78 | 246.5 | 152.7 | 210.7 | 894.4 | 756.1 | 923.0 | 479.6 | 440.7 | 442.2 |
| 84 | 246.4 | 135.6 | 210.0 | 674.1 | 571.9 | 515.6 | 523.6 | 490.4 | 503.4 |
| 90 | 247.3 | 151.3 | 196.6 | 732.5 | 633.3 | 589.2 | 569.5 | 487.6 | 534.4 |
| 96 | 302.2 | 166.7 | 248.9 | 737.1 | 599.1 | 574.3 | 608.6 | 564.9 | 579.4 |
| 102 | 352.9 | 225.0 | 304.2 | 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 | 284.7 | 384.7 | 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 | 509.5 |
| 138 | 314.8 | 204.0 | 263.0 | 554.8 | 432.0 | 486.9 | 616.0 | 285.6 | 476.0 |

427110-3

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 kv ² /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 - 527°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 NUMBER 41711E

| 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 | 1177. | 1263. | 96. | 55.5 | 646. | 164.0 |
| 4C 3- 3 | 10 | 1250. | 1302. | 52. | 42.0 | 736. | 155.5 |
| 1C 4- 0 | 12 | 1368. | 1479. | 112. | 65.5 | 612. | 205.8 |
| 2A 5- 0 | 16 | 1516. | 1658. | 142. | 73.5 | 626. | 312.7 |
| 2A 5- 7 | 19 | 1534. | 1678. | 143. | 79.5 | 776. | 377.7 |
| 5C 6- 0 | 36 | 1429. | 1600. | 231. | 106.0 | 234. | 713.6 |
| 2D 6- 2 | 39 | 1522. | 1758. | 235. | 128.0 | 656. | 462.3 |
| 1D 6- 4 | 47 | 1453. | 1678. | 185. | 163.0 | 732. | 467.4 |
| 3D 6- 4 | 50 | 1469. | 1795. | 326. | 156.0 | 236. | 704.6 |
| 4B 6- 4 | 52 | 1541. | 1758. | 217. | 130.0 | 571. | 468.6 |
| 5C 6- 4 | 54 | 1477. | 1689. | 211. | 191.0 | 434. | 462.3 |
| 5D 6- 4 | 55 | 1511. | 1676. | 165. | 183.0 | 751. | 466.4 |
| 1D 6- 5 | 58 | 1568. | 1689. | 181. | 166.0 | 786. | 477.5 |
| 2A 6- 5 | 59 | 1458. | 1643. | 195. | 169.0 | 656. | 508.3 |
| 2D 6- 5 | 61 | 1546. | 1756. | 211. | 190.0 | 766. | 447.7 |
| 3B 6- 5 | 63 | 1567. | 1734. | 217. | 127.0 | 675. | 443.0 |
| 3C 6- 6 | 72 | 1586. | 1816. | 229. | 174.0 | 522. | 508.5 |
| 4C 6- 6 | 75 | 1555. | 1745. | 200. | 130.0 | 746. | 515.1 |
| 3C 6- 7 | * * * 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 | 747. | 506.3 |
| 3D 6- 8 | 86 | 1572. | 1818. | 246. | 182.0 | 750. | 525.6 |
| 4A 6- 8 | 87 | 1466. | 1666. | 199. | 169.0 | 739. | 520.6 |
| 1C 7- 0 | 93 | 1487. | 1621. | 134. | 59.0 | 646. | 524.4 |
| 2B 7- 0 | 94 | 1455. | 1664. | 165. | 56.0 | 602. | 544.6 |
| 3D 7- 0 | 98 | 1547. | 1733. | 186. | 79.5 | 644. | 553.6 |
| 5B 7- 0 | 103 | 1426. | 1596. | 168. | 40.0 | 591. | 550.5 |
| 2B 7- 6 | 110 | 1474. | 1689. | 210. | 104.0 | 622. | 544.6 |
| 2C 7- 6 | 111 | 1569. | 1701. | 192. | 103.0 | 663. | 560.7 |
| 2E 7- 6 | 113 | 1416. | 1542. | 176. | 122.0 | 721. | 553.6 |
| 3A 7- 6 | * * * T H E R M O C O U P L E D A T A * | | | | | | |
| 3B 7- 6 | 115 | 1226. | 1603. | 374. | 116.0 | 564. | 643.6 |
| 4B 7- 6 | 120 | 1455. | 1727. | 228. | 98.5 | 644. | 576.7 |
| 5C 7- 6 | 122 | 1442. | 1669. | 177. | 89.5 | 671. | 563.6 |
| 1C 8- 0 | 124 | 1333. | 1570. | 237. | 116.0 | 667. | 620.3 |
| 2E 8- 0 | 126 | 1285. | 1512. | 227. | 105.0 | 636. | 606.2 |
| 3D 8- 0 | 129 | 1369. | 1682. | 313. | 122.0 | 672. | 625.6 |
| 5B 8- 0 | 133 | 1311. | 1573. | 262. | 114.0 | 776. | 574.6 |
| 5C 8- 0 | 134 | 1367. | 1642. | 295. | 122.0 | 616. | 616.6 |
| 1C 8- 6 | 135 | 1158. | 1478. | 321. | 117.0 | 574. | 651.6 |
| 1D 8- 6 | 136 | 1139. | 1421. | 281. | 86.5 | 534. | 662.9 |
| 2C 8- 6 | 138 | 1275. | 1635. | 360. | 119.0 | 624. | 651.6 |
| 43 8- 6 | 143 | 1265. | 1555. | 349. | 104.0 | 476. | 644.6 |
| 5D 8- 6 | 145 | 1170. | 1516. | 346. | 133.0 | 542. | 605.6 |
| 3D 9- 3 | 150 | 976. | 1376. | 400. | 130.0 | 501. | 651.6 |
| 4C 9- 3 | 152 | 1046. | 1414. | 368. | 121.0 | 502. | 641.6 |
| 1010- 0 | 157 | 574. | 1071. | 497. | 220.0 | 366. | 635.9 |
| 4810- 0 | 164 | 836. | 1197. | 361. | 134.0 | 573. | 638.6 |
| 5010- 0 | 166 | 655. | 1008. | 313. | 182.0 | 616. | 516.5 |
| 2A11- 0 | 168 | 546. | 722. | 177. | 227.0 | 247. | 455.6 |
| 4C11- 0 | 169 | 636. | 977. | 341. | 180.0 | 455. | 629.6 |
| 1011- 0 | 171 | 317. | 714. | 397. | 229.0 | 464. | 542.5 |

KON 41711E HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | PEAK | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 642.7 | 612.6 | 632.6 | 653.1 | 623.6 | 643.3 | 10.5 | 8.5 | 9.8 |
| 24 | 919.6 | 847.1 | 874.8 | 941.8 | 873.7 | 902.3 | 18.5 | 15.0 | 17.0 |
| 39 | 1249.9 | 1150.7 | 1180.5 | 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 | 1550.4 | 1789.9 | 1663.6 | 1728.2 | 129.0 | 63.0 | 91.4 |
| 70 | 1590.1 | 1540.8 | 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 | 1520.3 | 1522.3 | 1524.3 | 1760.9 | 1757.5 | 1759.2 | 128.0 | 128.0 | 128.0 |
| 75 | 1500.7 | 1470.1 | 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 | 130.0 | 156.5 |
| 77 | 1507.3 | 1497.5 | 1523.3 | 1784.3 | 1655.9 | 1705.5 | 193.0 | 127.0 | 170.7 |
| 78 | 1590.0 | 1477.2 | 1534.9 | 1815.7 | 1669.0 | 1735.5 | 193.0 | 117.0 | 162.6 |
| 79 | 1580.9 | 1524.1 | 1552.6 | 1799.9 | 1693.0 | 1743.3 | 188.0 | 128.0 | 164.6 |
| 80 | 1572.3 | 1466.5 | 1514.0 | 1818.0 | 1665.7 | 1727.2 | 196.0 | 130.0 | 175.2 |
| 81 | 1562.6 | 1502.6 | 1562.6 | 1819.1 | 1819.1 | 1819.1 | 129.0 | 125.0 | 125.0 |
| 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 | 1570.4 | 80.0 | 56.0 | 67.4 |
| 90 | 1560.3 | 1428.4 | 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 | 1413.3 | 1476.2 | 1745.3 | 1605.7 | 1477.0 | 139.0 | 86.5 | 110.7 |
| 111 | 1061.3 | 888.1 | 970.4 | 1458.0 | 1155.7 | 1304.7 | 161.0 | 90.5 | 123.9 |
| 120 | 1148.3 | 574.1 | 774.9 | 1436.6 | 1001.6 | 1172.5 | 220.0 | 103.0 | 170.6 |
| 132 | 830.0 | 453.9 | 520.2 | 976.9 | 666.8 | 771.5 | 236.0 | 160.0 | 210.6 |
| 138 | 565.4 | 317.1 | 441.3 | 772.2 | 714.0 | 743.1 | 229.0 | 171.0 | 200.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | PEAK | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 10.8 | 10.4 | 10.7 | 577.2 | 552.0 | 568.1 | 27.0 | 25.4 | 26.7 |
| 24 | 26.5 | 16.4 | 22.4 | 657.5 | 650.1 | 653.1 | 66.9 | 64.6 | 66.0 |
| 39 | 86.2 | 51.7 | 74.6 | 756.9 | 645.9 | 702.1 | 164.8 | 144.0 | 156.6 |
| 48 | 121.0 | 100.1 | 113.9 | 827.8 | 762.1 | 800.6 | 217.7 | 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 | 142.7 | 171.7 | 932.1 | 776.3 | 847.3 | 400.6 | 366.7 | 363.5 |
| 70 | 252.0 | 190.0 | 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 | 824.3 | 358.3 | 358.3 | 358.3 |
| 74 | 235.2 | 234.6 | 234.9 | 655.7 | 611.3 | 633.5 | 482.3 | 475.5 | 476.9 |
| 75 | 210.4 | 174.8 | 191.5 | 1003.3 | 595.7 | 760.3 | 476.8 | 377.6 | 424.5 |
| 76 | 216.6 | 165.0 | 195.1 | 939.7 | 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 | 414.4 | 485.4 |
| 78 | 234.6 | 151.6 | 195.6 | 871.9 | 521.5 | 757.0 | 515.1 | 409.8 | 493.3 |
| 79 | 219.0 | 136.6 | 190.5 | 819.7 | 727.4 | 773.7 | 515.9 | 448.9 | 485.6 |
| 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 | 198.6 | 133.4 | 164.5 | 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 | 226.4 | 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 | 421.6 | 607.0 |
| 111 | 406.5 | 214.8 | 334.3 | 629.8 | 448.2 | 513.7 | 668.8 | 530.8 | 624.0 |
| 120 | 490.6 | 232.8 | 357.6 | 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 | 487.6 |
| 138 | 396.4 | 200.8 | 301.8 | 484.3 | 473.2 | 478.8 | 576.3 | 542.5 | 554.4 |

41711E-3

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

FLCCH1 SEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 42711F

| ROD/ELEV | CHAN. NO | INITIAL AT FLCCG (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 | 640. | 152.2 |
| 4C 3- 3 | 6 | 1242. | 1276. | 33. | 26.0 | 740. | 144.5 |
| 1C 4- 0 | 7 | 1370. | 1441. | 71. | 54.0 | 740. | 209.6 |
| 2A 5- 0 | 12 | 1560. | 1625. | 126. | 55.5 | 730. | 251.5 |
| 2A 5- 7 | 14 | 1526. | 1657. | 122. | 73.0 | 650. | 342.6 |
| 5C 6- 2 | 33 | 1451. | 1632. | 181. | 144.0 | 244. | 440.6 |
| 2D 6- 3 | 39 | 1454. | 1608. | 174. | 139.0 | 404. | 360.5 |
| 1D 6- 4 | 46 | 1424. | 1620. | 136. | 150.0 | 603. | 377.4 |
| 3D 6- 4 | 50 | 1453. | 1750. | 256. | 128.0 | 243. | 600.6 |
| 4B 6- 4 | 51 | 1513. | 1672. | 120. | 75.0 | 774. | 455.6 |
| 5D 6- 4 | 56 | 1400. | 1583. | 97. | 143.0 | 700. | 472.6 |
| 1D 6- 5 | 58 | 1461. | 1613. | 133. | 151.0 | 604. | 344.5 |
| 2A 6- 5 | 59 | 1461. | 1596. | 116. | 150.0 | 770. | 430.4 |
| 2D 6- 5 | 62 | 1530. | 1681. | 151. | 139.0 | 634. | 344.5 |
| 3B 6- 5 | 63 | 1565. | 1717. | 153. | 111.0 | 500. | 454.0 |
| 3C 6- 6 | 69 | 1555. | 1766. | 212. | 108.0 | 476. | 450.4 |
| 3E 6- 6 | 70 | 1465. | 1656. | 171. | 156.0 | 244. | 474.0 |
| 4C 6- 6 | 73 | 1560. | 1735. | 146. | 73.5 | 732. | 407.0 |
| 5C 6- 6 | 75 | 1542. | 1657. | 115. | 65.5 | 750. | 474.3 |
| 3D 6- 7 | 85 | 1562. | 1752. | 170. | 111.0 | 670. | 442.0 |
| 3C 6- 8 | 93 | 1560. | 1783. | 185. | 104.0 | 615. | 471.6 |
| 4A 6- 8 | 95 | 1410. | 1601. | 143. | 91.0 | 774. | 404.7 |
| 1C 7- 0 | 106 | 1566. | 1643. | 137. | 54.0 | 610. | 515.7 |
| 2B 7- 0 | 110 | 1529. | 1655. | 126. | 47.0 | 500. | 513.0 |
| 3D 7- 0 | 113 | 1564. | 1694. | 131. | 64.0 | 500. | 515.1 |
| 5B 7- 0 | 117 | 1411. | 1554. | 143. | 65.5 | 541. | 513.5 |
| 2B 7- 6 | 120 | 1511. | 1677. | 166. | 76.5 | 640. | 549.6 |
| 2C 7- 6 | 121 | 1533. | 1703. | 170. | 74.0 | 700. | 533.1 |
| 2E 7- 6 | 123 | 1404. | 1536. | 133. | 72.5 | 645. | 535.5 |
| 3A 7- 6 | 124 | 1403. | 1578. | 95. | 65.5 | 700. | 524.4 |
| 3B 7- 6 | 125 | 1511. | 1707. | 157. | 68.0 | 704. | 544.6 |
| 4B 7- 6 | 129 | 1508. | 1673. | 165. | 71.0 | 644. | 550.6 |
| 5C 7- 6 | 132 | 1474. | 1620. | 146. | 70.5 | 710. | 552.6 |
| 1C 8- 0 | 133 | 1305. | 1586. | 222. | 104.0 | 653. | 503.3 |
| 2E 8- 0 | 136 | 1240. | 1405. | 188. | 78.5 | 600. | 573.0 |
| 3D 8- 0 | 136 | 1427. | 1679. | 252. | 109.0 | 710. | 572.6 |
| 5B 8- 0 | 143 | 1255. | 1411. | 156. | 110.0 | 684. | 500.0 |
| 5C 8- 0 | 144 | 1352. | 1561. | 210. | 92.0 | 622. | 509.1 |
| 1C 8- 6 | 145 | 1151. | 1446. | 296. | 105.0 | 505. | 543.1 |
| 1D 8- 6 | 146 | 1114. | 1334. | 220. | 76.5 | 344. | 500.2 |
| 2C 8- 6 | 148 | 1257. | 1591. | 334. | 109.0 | 610. | 557.5 |
| 4B 8- 6 | 153 | 1219. | 1514. | 295. | 89.0 | 532. | 611.0 |
| 5D 8- 6 | 155 | 1145. | 1417. | 268. | 143.0 | 551. | 579.4 |
| 3D 9- 3 | 159 | 1054. | 1370. | 316. | 131.0 | 575. | 605.5 |
| 4C 9- 3 | 161 | 1067. | 1414. | 327. | 127.0 | 544. | 614.0 |
| 1D10- 0 | 164 | 604. | 991. | 388. | 229.0 | 575. | 547.5 |
| 4B10- 0 | 166 | 861. | 1292. | 371. | 192.0 | 560. | 620.0 |
| 5D10- 0 | 169 | 712. | 1073. | 300. | 199.0 | 510. | 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 | | | | | | | |

* * * B A D T H E R M O C O U P L E D A T A * *

KUN 42711F HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 724.4 | 661.5 | 642.9 | 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 | 40.6 |
| 48 | 1440.9 | 1320.8 | 1376.1 | 1510.6 | 1401.2 | 1445.7 | 54.0 | 51.5 | 52.5 |
| 60 | 1499.6 | 1420.0 | 1457.3 | 1625.4 | 1573.3 | 1596.1 | 66.5 | 55.5 | 62.5 |
| 67 | 1600.3 | 1497.6 | 1555.0 | 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 | 53.5 |
| 71 | 1554.5 | 1504.5 | 1532.2 | 1755.3 | 1725.2 | 1740.2 | 112.0 | 102.0 | 107.0 |
| 72 | 1460.2 | 1370.6 | 1415.5 | 1720.7 | 1605.8 | 1663.2 | 138.0 | 112.0 | 125.0 |
| 73 | 1450.5 | 1390.6 | 1423.3 | 1685.4 | 1622.1 | 1653.7 | 151.0 | 141.0 | 146.0 |
| 74 | 1490.2 | 1376.1 | 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 | 1464.0 | 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 | 104.0 | 134.8 |
| 78 | 1584.5 | 1473.0 | 1528.5 | 1766.4 | 1589.5 | 1657.3 | 156.0 | 65.5 | 104.7 |
| 79 | 1591.7 | 1450.5 | 1524.4 | 1751.9 | 1597.1 | 1667.9 | 153.0 | 65.5 | 107.4 |
| 80 | 1596.1 | 1458.0 | 1524.2 | 1783.2 | 1601.4 | 1686.4 | 139.0 | 91.0 | 110.0 |
| 81 | 1511.7 | 1511.7 | 1511.7 | 1663.6 | 1663.6 | 1663.6 | 139.0 | 139.0 | 139.0 |
| 84 | 1563.6 | 1410.4 | 1502.6 | 1704.0 | 1553.8 | 1641.6 | 67.0 | 47.0 | 60.6 |
| 90 | 1554.9 | 1394.4 | 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 | 1170.8 | 1590.6 | 1291.2 | 1452.8 | 143.0 | 71.5 | 100.5 |
| 111 | 1087.2 | 928.4 | 1003.3 | 1440.9 | 1164.0 | 1289.6 | 151.0 | 66.5 | 124.1 |
| 120 | 681.0 | 603.6 | 793.7 | 1289.1 | 991.3 | 1157.5 | 229.0 | 181.0 | 192.8 |
| 132 | 683.6 | 474.6 | 545.1 | 1038.7 | 651.0 | 811.6 | 220.0 | 205.0 | 211.5 |
| 138 | 581.2 | 568.4 | 574.8 | 1004.7 | 658.2 | 931.4 | 218.0 | 216.0 | 217.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 7.4 | 4.1 | 5.8 | 632.4 | 617.0 | 624.7 | 24.2 | 21.6 | 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 | 144.4 | 144.2 |
| 48 | 74.4 | 55.2 | 67.6 | 821.8 | 705.6 | 780.3 | 209.8 | 194.4 | 204.2 |
| 60 | 145.4 | 125.6 | 138.8 | 737.5 | 664.8 | 702.2 | 302.8 | 291.4 | 296.2 |
| 67 | 156.3 | 121.5 | 140.2 | 880.6 | 817.9 | 851.0 | 365.7 | 342.6 | 356.5 |
| 70 | 162.4 | 141.0 | 161.1 | 904.4 | 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 | 512.0 |
| 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 | 498.0 | 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 | 124.4 | 192.3 | 1054.3 | 237.1 | 498.6 | 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 | 88.5 | 137.4 | 858.7 | 239.3 | 675.8 | 629.0 | 344.5 | 456.6 |
| 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 | 436.7 | 464.2 |
| 80 | 185.1 | 139.9 | 162.2 | 829.8 | 706.0 | 760.7 | 501.4 | 447.8 | 481.0 |
| 81 | 151.4 | 151.4 | 151.4 | 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 | 451.5 | 504.1 |
| 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 | 181.4 | 264.3 | 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 | 594.9 |
| 132 | 355.1 | 171.4 | 266.5 | 577.8 | 246.8 | 459.4 | 608.0 | 427.1 | 440.5 |
| 138 | 423.5 | 264.6 | 356.6 | 510.9 | 504.6 | 507.7 | 620.0 | 600.0 | 613.0 |

42711F-3

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 NUMBER 43112A

| ROD/ELEV | CHAN. NO | INITIAL AT FLUO (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|----------|-------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 9 | 940. | 1094. | 155. | 26.5 | 820. | 96.3 |
| 4C 3- 3 | 11 | 1010. | 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. | 266.0 |
| 2A 5- 7 | 21 | 1463. | 1798. | 334. | 81.5 | 955. | 375.6 |
| 10 6- 2 | 50 | 1463. | 1860. | 377. | 89.5 | 677. | 479.5 |
| 23 6- 2 | 53 | 1577. | 1968. | 392. | 88.0 | 863. | 463.5 |
| 30 6- 2 | 56 | 1540. | 2011. | 421. | 91.0 | 976. | 488.7 |
| 5C 6- 2 | 61 | 1513. | 1838. | 326. | 67.0 | 951. | 464.6 |
| 10 6- 3 | 63 | 1466. | 1832. | 366. | 89.0 | 996. | 496.6 |
| 43 6- 3 | 66 | 1545. | 1966. | 421. | 94.0 | 696. | 514.6 |
| 50 6- 3 | 69 | 1481. | 1886. | 405. | 98.0 | 697. | 498.6 |
| 2A 6- 4 | 70 | 1472. | 1862. | 390. | 102.0 | 946. | 516.6 |
| 39 6- 4 | 75 | 1567. | 2025. | 458. | 91.5 | 1011. | 509.6 |
| 30 6- 6 | 74 | 1529. | 2022. | 473. | 98.0 | 697. | 547.6 |
| 23 6- 5 | 64 | 1556. | 1940. | 434. | 98.0 | 644. | 528.5 |
| 3C 6- 5 | 85 | 1566. | 2048. | 480. | 99.5 | 927. | 529.6 |
| 3E 6- 5 | 86 | 1500. | 1910. | 410. | 95.5 | 956. | 525.4 |
| 3C 6- 6 | 95 | 1546. | 2027. | 481. | 101.0 | 918. | 545.6 |
| 4A 6- 6 | 97 | 1428. | 1866. | 438. | 104.0 | 914. | 534.6 |
| 3D 7- 0 | 98 | 1278. | 1630. | 352. | 82.5 | 754. | 661.0 |
| 5C 7- 6 | 101 | 1447. | 1780. | 333. | 71.5 | 662. | 520.7 |
| 1C 7- 0 | 110 | 1366. | 1660. | 273. | 54.0 | 732. | 617.5 |
| 23 7- 0 | 111 | 1410. | 1635. | 225. | 25.5 | 676. | 608.4 |
| 3D 7- 0 | 115 | 1437. | 1682. | 246. | 32.5 | 765. | 602.6 |
| 53 7- 0 | 117 | 1326. | 1649. | 322. | 95.5 | 772. | 562.3 |
| 28 7- 6 | 121 | 1406. | 1721. | 315. | 53.0 | 616. | 633.0 |
| 2C 7- 6 | 121 | 1406. | 1721. | 315. | 53.0 | 616. | 633.0 |
| 2E 7- 6 | 122 | 1264. | 1560. | 276. | 55.0 | 612. | 617.7 |
| 3A 7- 6 | 123 | 1304. | 1617. | 313. | 68.5 | 701. | 664.6 |
| 38 7- 6 | 124 | 1423. | 1752. | 329. | 53.0 | 766. | 639.6 |
| 48 7- 6 | 127 | 1396. | 1749. | 353. | 70.0 | 759. | 646.6 |
| 5C 7- 6 | 126 | 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 |
| 58 8- 0 | 138 | 1216. | 1609. | 391. | 97.0 | 774. | 645.4 |
| 5C 8- 0 | 139 | 1123. | 1471. | 348. | 96.5 | 647. | 657.6 |
| 1C 8- 6 | 141 | 1070. | 1357. | 288. | 53.5 | 556. | 720.0 |
| 10 8- 6 | 142 | 1019. | 1245. | 226. | 45.0 | 581. | 676.1 |
| 2C 8- 6 | 143 | 1117. | 1397. | 280. | 45.0 | 662. | 698.0 |
| 43 8- 6 | 145 | 1108. | 1374. | 266. | 36.5 | 604. | 726.3 |
| 50 8- 6 | 146 | 1038. | 1380. | 343. | 95.5 | 576. | 729.1 |
| 30 8- 3 | 154 | 922. | 1290. | 368. | 91.0 | 651. | 739.0 |
| 4C 9- 3 | 156 | 952. | 1260. | 308. | 67.0 | 661. | 724.0 |
| 1010- 0 | 161 | 510. | 938. | 429. | 120.0 | 247. | 723.0 |
| 4310- 0 | 164 | 731. | 1054. | 324. | 87.5 | 576. | 768.0 |
| 5010- 0 | 167 | 639. | 1017. | 378. | 131.0 | 505. | 752.0 |
| 2A11- 0 | 168 | 474. | 680. | 202. | 107.0 | 604. | 264.0 |
| 4C11- 0 | 170 | 559. | 802. | 244. | 96.5 | 249. | 73.0 |
| 1011- 6 | 172 | 367. | 707. | 340. | 137.0 | 247. | 298.0 |

* * * S A U T h e K N O C O U P L E D A T A * * *

RUN 43112A HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|------|-------|
| | 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 | 564.4 | 628.3 | 742.0 | 663.6 | 701.8 | 18.0 | 16.0 | 17.4 |
| 34 | 1016.1 | 893.4 | 949.8 | 1149.4 | 1038.7 | 1094.2 | 26.5 | 23.5 | 24.6 |
| 46 | 1200.2 | 1170.5 | 1224.9 | 1481.6 | 1389.7 | 1425.3 | 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 | 1490.7 | 1551.1 | 2003.8 | 1854.2 | 1922.9 | 85.5 | 62.0 | 63.6 |
| 71 | 1599.2 | 1494.8 | 1555.5 | 2028.4 | 1840.6 | 1936.4 | 94.0 | 60.5 | 65.4 |
| 72 | 1604.7 | 1485.4 | 1546.3 | 2027.2 | 1823.7 | 1914.8 | 100.0 | 70.0 | 67.3 |
| 74 | 1589.5 | 1482.7 | 1545.3 | 2017.9 | 1813.5 | 1939.2 | 97.5 | 67.0 | 90.1 |
| 75 | 1574.6 | 1465.5 | 1534.1 | 2034.2 | 1831.6 | 1950.3 | 98.0 | 64.0 | 94.8 |
| 76 | 1575.4 | 1464.4 | 1531.9 | 2045.9 | 1862.1 | 1959.7 | 102.0 | 61.5 | 95.8 |
| 77 | 1567.4 | 1433.4 | 1512.0 | 2048.3 | 1824.8 | 1948.9 | 101.0 | 61.0 | 97.0 |
| 78 | 1546.3 | 1420.0 | 1493.0 | 2027.2 | 1779.8 | 1936.8 | 107.0 | 71.5 | 97.0 |
| 84 | 1430.6 | 1252.5 | 1366.1 | 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 | 54.9 |
| 96 | 1298.5 | 864.6 | 1197.6 | 1672.3 | 1198.3 | 1562.4 | 97.0 | 64.0 | 64.3 |
| 102 | 1117.2 | 1010.1 | 1065.1 | 1422.7 | 1245.2 | 1342.2 | 95.5 | 36.5 | 50.7 |
| 111 | 1100.4 | 795.0 | 897.4 | 1396.0 | 1076.9 | 1199.7 | 107.0 | 54.0 | 71.0 |
| 120 | 730.6 | 504.8 | 651.5 | 1106.8 | 937.7 | 1033.8 | 148.0 | 67.5 | 112.2 |
| 132 | 558.6 | 470.4 | 458.1 | 802.3 | 680.4 | 719.0 | 145.0 | 46.5 | 114.1 |
| 136 | 523.6 | 360.6 | 444.2 | 774.2 | 701.5 | 733.5 | 145.0 | 97.0 | 125.6 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 25.9 | 17.1 | 22.9 | 504.5 | 483.0 | 491.1 | 9.0 | 6.9 | 9.0 |
| 24 | 74.2 | 67.4 | 73.3 | 702.0 | 635.7 | 662.6 | 32.9 | 24.9 | 27.4 |
| 34 | 154.6 | 133.3 | 144.4 | 857.1 | 761.6 | 811.4 | 106.6 | 46.3 | 102.0 |
| 46 | 213.4 | 203.6 | 210.4 | 914.6 | 757.0 | 837.1 | 187.6 | 151.7 | 165.4 |
| 60 | 262.4 | 210.0 | 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 | 424.2 | 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 | 433.6 | 325.6 | 393.9 | 1042.1 | 859.2 | 940.0 | 500.4 | 455.6 | 480.5 |
| 75 | 454.4 | 366.1 | 410.2 | 996.0 | 853.4 | 925.8 | 514.6 | 446.0 | 502.3 |
| 76 | 470.5 | 340.2 | 427.7 | 1011.0 | 860.3 | 931.0 | 528.6 | 462.6 | 511.0 |
| 77 | 480.4 | 391.4 | 436.9 | 999.2 | 844.3 | 919.9 | 539.7 | 523.0 | 526.2 |
| 78 | 480.9 | 332.5 | 443.8 | 988.6 | 862.6 | 913.9 | 559.6 | 526.7 | 541.7 |
| 84 | 321.6 | 225.4 | 266.6 | 785.0 | 640.9 | 718.4 | 621.1 | 562.3 | 601.4 |
| 90 | 352.6 | 270.4 | 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 | 595.9 | 729.1 | 673.4 | 707.2 |
| 111 | 367.8 | 254.0 | 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 | 724.6 |
| 132 | 243.5 | 201.8 | 220.4 | 603.6 | 249.0 | 483.4 | 573.0 | 264.0 | 435.0 |
| 136 | 340.1 | 224.4 | 289.3 | 599.3 | 246.8 | 318.2 | 555.0 | 296.0 | 434.8 |

43112A-3

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 RJD BUNDLE TEST SERIES

RUN NUMBER 43412B

| ROD/ELEV | CHAM. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE AT JE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|--|--------------------------|-----------------------------|---------------------------|---------------------------|----------------------------|-----------------------|
| 2A 3- 3 | 9 | 1103. | 1207. | 104. | 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 | 715. | 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. | 519.0 |
| 2D 6- 2 | 53 | 1510. | 1862. | 352. | 126.0 | 835. | 570.9 |
| 3D 6- 2 | 58 | 1556. | 1870. | 314. | 153.0 | 790. | 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. | 543.6 |
| 2A 6- 4 | 70 | 1446. | 1788. | 342. | 148.0 | 843. | 553.5 |
| 2D 6- 4 | 72 | 1530. | 1888. | 359. | 123.0 | 733. | 586.7 |
| 3B 6- 4 | 75 | 1563. | 1910. | 346. | 124.0 | 885. | 582.0 |
| 3C 6- 5 | 85 | 1595. | 1942. | 347. | 126.0 | 847. | 589.7 |
| 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. | 585.8 |
| 4C 6- 6 | 98 | 1547. | 1948. | 400. | 151.0 | 979. | 574.6 |
| 5C 6- 6 | 101 | 1459. | 1836. | 378. | 173.0 | 802. | 584.8 |
| 1C 7- 0 | 110 | 1429. | 1835. | 207. | 49.5 | 722. | 536.9 |
| 2A 7- 0 | 111 | 1458. | 1837. | 174. | 32.0 | 728. | 550.9 |
| 3D 7- 0 | 115 | 1493. | 1895. | 202. | 33.0 | 811. | 618.9 |
| 5B 7- 0 | 117 | 1378. | 1584. | 207. | 153.0 | 708. | 587.0 |
| 2B 7- 6 | 120 | 1446. | 1706. | 260. | 51.5 | 745. | 693.7 |
| 2C 7- 6 | 121 | 1464. | 1739. | 274. | 56.0 | 785. | 591.9 |
| 2E 7- 6 | 122 | 1313. | 1547. | 235. | 43.5 | 631. | 706.6 |
| 3A 7- 6 | 123 | 1420. | 1665. | 265. | 63.0 | 800. | 673.8 |
| 3B 7- 6 | 124 | 1463. | 1746. | 284. | 52.5 | 747. | 582.3 |
| 4B 7- 6 | 127 | 1462. | 1732. | 270. | 51.5 | 794. | 687.5 |
| 5C 7- 6 | 128 | 1421. | 1722. | 300. | 76.5 | 734. | 594.7 |
| 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 | 606. | 721.0 |
| 2C 8- 6 | 143 | 1194. | 1416. | 223. | 54.0 | 636. | 782.0 |
| 4B 8- 6 | 145 | 1214. | 1534. | 320. | 30.5 | 645. | 754.9 |
| 5D 8- 6 | 148 | 1096. | 1324. | 228. | 66.5 | 552. | 796.9 |
| 3D 9- 3 | 154 | 988. | 1302. | 313. | 79.0 | 604. | 760.0 |
| 4C 9- 3 | 156 | 1045. | 1322. | 276. | 67.0 | 678. | 755.0 |
| 1D10- 0 | 161 | 628. | 1043. | 415. | 125.0 | 449. | 517.9 |
| 4B10- 0 | 164 | 872. | 1159. | 287. | 30.5 | 593. | 614.9 |
| 5D10- 0 | 167 | 686. | 1012. | 325. | 125.0 | 588. | 735.9 |
| 2A11- 0 | 168 | 532. | 697. | 165. | 51.0 | 454. | 727.0 |
| 4C11- 0 | ** B A D T H E R M O C O U P L E D A T A * | | | | | | |
| 1D11- 6 | ** B A D T H E R M O C O U P L E D A T A * | | | | | | |

RUN 43412B HEATER KJ0 STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TJRYAKJUNG TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 600.2 | 535.1 | 557.9 | 614.1 | 556.7 | 576.6 | 7.5 | 0.5 | 7.3 |
| 24 | 879.7 | 791.0 | 823.7 | 931.5 | 848.9 | 874.9 | 17.5 | 10.0 | 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 | 63.0 | 47.0 | 55.1 |
| 60 | 1471.4 | 1354.9 | 1392.3 | 1685.4 | 1583.0 | 1641.5 | 112.0 | 40.0 | 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 | 90.0 | 120.0 |
| 72 | 1478.9 | 1424.3 | 1461.1 | 1837.2 | 1729.6 | 1788.9 | 155.0 | 122.0 | 135.6 |
| 74 | 1555.8 | 1420.2 | 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 | 1855.0 | 167.0 | 123.0 | 139.1 |
| 77 | 1594.7 | 1381.4 | 1503.2 | 1934.5 | 1751.9 | 1870.6 | 174.0 | 123.0 | 140.7 |
| 78 | 1571.4 | 1418.9 | 1486.6 | 1962.5 | 1777.6 | 1871.0 | 173.0 | 121.0 | 130.7 |
| 84 | 1493.2 | 1359.8 | 1429.3 | 1695.2 | 1558.2 | 1632.5 | 174.0 | 32.0 | 66.4 |
| 90 | 1464.3 | 1312.6 | 1414.3 | 1746.4 | 1547.3 | 1684.0 | 124.0 | 42.0 | 64.3 |
| 96 | 1346.2 | 1206.1 | 1294.6 | 1687.5 | 1540.9 | 1624.2 | 128.0 | 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 | 1521.5 | 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 | 643.7 | 720.2 | 780.2 | 153.0 | 114.0 | 128.3 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 687.8 | 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 | 861.6 | 897.4 | 434.6 | 407.3 | 422.3 |
| 70 | 371.6 | 335.6 | 356.2 | 1000.5 | 882.3 | 943.8 | 571.7 | 449.5 | 462.4 |
| 71 | 365.9 | 316.0 | 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 | 925.4 | 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 | 576.8 | 556.6 | 572.8 |
| 78 | 400.9 | 354.4 | 385.0 | 979.2 | 931.8 | 860.7 | 505.7 | 570.7 | 585.4 |
| 84 | 242.5 | 174.4 | 203.2 | 811.1 | 682.8 | 729.4 | 567.0 | 618.6 | 642.9 |
| 90 | 338.0 | 234.7 | 270.2 | 854.4 | 631.2 | 755.0 | 718.9 | 666.6 | 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 | 694.0 | 552.5 | 605.5 | 795.9 | 749.9 | 763.6 |
| 111 | 406.9 | 203.5 | 267.1 | 878.4 | 511.9 | 602.9 | 904.8 | 755.0 | 779.7 |
| 120 | 447.6 | 284.3 | 347.4 | 993.3 | 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 | 607.6 |
| 138 | 324.2 | 236.5 | 275.0 | 506.7 | 246.8 | 312.3 | 789.0 | 582.0 | 691.5 |

43412B-3

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

FLECHT SEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 42912C

| ROD/LEV | CHAN. NO | INITIAL AT FLUO (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|---------|------------------------------|-------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 9 | 1066. | 1234. | 168. | 42.0 | 940. | 117.5 |
| 4C 3- 3 | 11 | 1222. | 1333. | 111. | 39.0 | 700. | 136.8 |
| 1C 4- 0 | 14 | 1353. | 1565. | 212. | 58.0 | 730. | 215.7 |
| 2A 5- 0 | 17 | 1409. | 1704. | 295. | 97.0 | 705. | 335.8 |
| 2A 5- 7 | 21 | 1510. | 1830. | 313. | 89.5 | 622. | 439.8 |
| 1D 6- 2 | 50 | 1442. | 1693. | 201. | 112.0 | 644. | 598.6 |
| 2D 6- 2 | 53 | 1511. | 1751. | 240. | 120.0 | 567. | 540.5 |
| 3D 6- 2 | 56 | 1565. | 1736. | 172. | 118.0 | 600. | 598.0 |
| 4B 6- 2 | 60 | 1571. | 1778. | 206. | 54.0 | 843. | 569.5 |
| 5C 6- 2 | 61 | 1405. | 1788. | 302. | 137.0 | 1105. | 522.5 |
| 1D 6- 3 | 63 | 1479. | 1712. | 233. | 115.0 | 643. | 574.7 |
| 5D 6- 3 | 65 | 1445. | 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 | 651. | 575.7 |
| 2D 6- 5 | 64 | 1555. | 1815. | 260. | 69.0 | 761. | 613.5 |
| 3C 6- 5 | 65 | 1544. | 1878. | 284. | 68.0 | 955. | 587.6 |
| 3E 6- 5 | 66 | 1530. | 1744. | 214. | 61.5 | 416. | 561.6 |
| 3C 6- 6 | 95 | 1577. | 1808. | 311. | 89.5 | 640. | 605.8 |
| 3D 6- 6 | 46 | 1550. | 1858. | 302. | 66.5 | 620. | 639.6 |
| 4A 6- 6 | 47 | 1419. | 1766. | 299. | 67.5 | 614. | 606.6 |
| 4C 6- 6 | 98 | 1570. | 1806. | 310. | 65.0 | 677. | 616.6 |
| 5C 6- 6 | 101 | 1540. | 1781. | 233. | 65.5 | 635. | 600.7 |
| 1C 7- 0 | 110 | 1450. | 1620. | 163. | 39.0 | 675. | 600.3 |
| 2B 7- 0 | 111 | 1457. | 1583. | 126. | 15.5 | 626. | 609.4 |
| 3D 7- 0 | 115 | 1461. | 1635. | 155. | 32.5 | 670. | 645.9 |
| 5B 7- 0 | 117 | 1377. | 1558. | 181. | 50.5 | 754. | 607.9 |
| 2B 7- 6 | 120 | 1461. | 1673. | 213. | 40.5 | 740. | 732.8 |
| 2C 7- 6 | 121 | 1462. | 1727. | 245. | 53.0 | 741. | 742.6 |
| 2E 7- 6 | 122 | 1335. | 1596. | 261. | 69.5 | 650. | 721.6 |
| 3A 7- 6 | 123 | 1430. | 1665. | 229. | 50.0 | 720. | 707.7 |
| 3B 7- 6 | 124 | 1400. | 1700. | 232. | 50.0 | 764. | 723.0 |
| 4B 7- 6 | 127 | 1454. | 1710. | 256. | 52.5 | 733. | 742.6 |
| 5C 7- 6 | 128 | 1443. | 1670. | 227. | 54.0 | 754. | 700.2 |
| 1C 7- 0 | 131 | 1310. | 1612. | 297. | 79.0 | 605. | 761.7 |
| 2E 7- 0 | 133 | 1277. | 1559. | 292. | 118.0 | 645. | 756.8 |
| 3D 7- 0 | 136 | 1305. | 1660. | 296. | 67.5 | 730. | 776.1 |
| 5B 7- 0 | 138 | 1216. | 1525. | 309. | 92.0 | 655. | 759.7 |
| 5C 7- 0 | 139 | 1300. | 1640. | 272. | 65.0 | 772. | 739.9 |
| 1C 8- 6 | 141 | 1154. | 1379. | 225. | 51.5 | 565. | 614.0 |
| 1D 8- 6 | 142 | 1005. | 1309. | 224. | 55.5 | 561. | 604.5 |
| 2C 8- 6 | * * * THERMOCUPLE DATA * * * | | | | | | |
| 4B 8- 6 | 145 | 1104. | 1355. | 186. | 38.5 | 540. | 625.6 |
| 5D 8- 6 | 148 | 1114. | 1376. | 262. | 66.0 | 562. | 621.9 |
| 3D 7- 3 | 154 | 1020. | 1334. | 306. | 69.0 | 590. | 639.0 |
| 4C 7- 3 | 156 | 1046. | 1249. | 250. | 55.5 | 544. | 626.0 |
| 1D1D- 0 | 161 | 640. | 983. | 337. | 125.0 | 627. | 663.8 |
| 4B1D- 0 | 164 | 643. | 1128. | 284. | 68.5 | 554. | 666.0 |
| 5D1D- 0 | 167 | 644. | 1013. | 319. | 101.0 | 245. | 733.0 |
| 2A11- 0 | 168 | 547. | 742. | 195. | 93.0 | 466. | 559.3 |
| 4C11- 0 | 170 | 634. | 677. | 243. | 75.0 | 241. | 634.0 |
| 1D11- 6 | 172 | 410. | 722. | 306. | 142.0 | 400. | 633.0 |

KUN 42912C HEATER RJD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 633.7 | 536.4 | 564.6 | 640.4 | 549.2 | 579.7 | 5.5 | 4.0 | 4.8 |
| 24 | 672.2 | 775.4 | 826.3 | 915.1 | 629.2 | 870.3 | 16.5 | 14.0 | 15.2 |
| 34 | 1221.6 | 1665.7 | 1132.0 | 1333.1 | 1233.8 | 1286.8 | 42.0 | 36.0 | 39.6 |
| 46 | 1374.3 | 1310.9 | 1334.5 | 1600.3 | 1535.5 | 1572.7 | 77.5 | 55.5 | 64.3 |
| 60 | 1415.6 | 1400.8 | 1408.4 | 1786.5 | 1704.0 | 1757.1 | 114.0 | 47.0 | 105.0 |
| 67 | 1612.5 | 1443.4 | 1532.2 | 1961.3 | 1810.1 | 1854.4 | 107.0 | 67.0 | 95.9 |
| 70 | 1549.0 | 1448.2 | 1502.1 | 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 | 116.6 |
| 72 | 1525.9 | 1514.6 | 1519.9 | 1856.4 | 1828.2 | 1842.3 | 130.0 | 66.5 | 99.3 |
| 74 | 1566.4 | 1466.0 | 1524.5 | 1777.6 | 1662.5 | 1725.8 | 134.0 | 54.0 | 101.0 |
| 75 | 1600.1 | 1476.4 | 1542.1 | 1831.6 | 1679.9 | 1760.4 | 117.0 | 56.0 | 76.2 |
| 76 | 1601.2 | 1463.6 | 1540.9 | 1858.7 | 1712.9 | 1774.7 | 115.0 | 56.5 | 68.1 |
| 77 | 1544.6 | 1453.6 | 1537.6 | 1877.9 | 1717.4 | 1799.1 | 117.0 | 55.5 | 72.1 |
| 78 | 1577.4 | 1432.7 | 1525.1 | 1888.1 | 1740.8 | 1813.2 | 120.0 | 65.5 | 77.7 |
| 84 | 1491.7 | 1251.6 | 1422.0 | 1655.4 | 1409.8 | 1594.7 | 50.5 | 15.5 | 36.2 |
| 90 | 1462.4 | 1334.7 | 1436.3 | 1727.4 | 1553.9 | 1671.5 | 69.5 | 46.5 | 52.6 |
| 96 | 1374.5 | 1212.6 | 1324.6 | 1664.6 | 1524.6 | 1614.2 | 118.0 | 54.0 | 75.6 |
| 102 | 1166.7 | 1082.3 | 1142.1 | 1422.7 | 1302.0 | 1369.7 | 66.0 | 36.5 | 53.4 |
| 111 | 1063.3 | 953.4 | 1023.3 | 1334.1 | 1164.0 | 1271.9 | 69.0 | 54.0 | 60.1 |
| 120 | 963.3 | 846.3 | 775.2 | 1206.6 | 983.1 | 1106.3 | 126.0 | 56.5 | 100.2 |
| 132 | 633.7 | 434.5 | 550.0 | 676.8 | 710.8 | 775.2 | 115.0 | 75.0 | 90.3 |
| 138 | 577.2 | 412.0 | 402.4 | 343.7 | 703.6 | 769.0 | 142.0 | 93.5 | 117.7 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 12.6 | 6.7 | 10.2 | 587.2 | 544.3 | 561.2 | 15.4 | 6.7 | 11.1 |
| 24 | 53.3 | 32.7 | 43.4 | 594.1 | 646.5 | 675.2 | 53.9 | 45.4 | 50.0 |
| 34 | 170.7 | 111.3 | 154.3 | 947.8 | 677.6 | 900.2 | 136.8 | 117.5 | 130.4 |
| 46 | 275.5 | 211.7 | 233.2 | 792.3 | 724.6 | 759.9 | 215.7 | 207.7 | 212.2 |
| 60 | 360.1 | 242.1 | 340.7 | 655.5 | 736.2 | 792.2 | 346.6 | 335.6 | 341.7 |
| 67 | 346.8 | 302.4 | 322.2 | 964.5 | 822.4 | 884.3 | 446.4 | 433.4 | 440.0 |
| 70 | 366.4 | 327.4 | 374.5 | 981.4 | 841.5 | 876.6 | 502.7 | 481.4 | 493.8 |
| 71 | 357.1 | 314.4 | 334.9 | 915.6 | 805.4 | 861.2 | 515.6 | 444.6 | 505.4 |
| 72 | 332.5 | 314.2 | 322.4 | 945.0 | 908.7 | 926.8 | 501.4 | 447.5 | 499.4 |
| 74 | 234.7 | 162.2 | 197.3 | 929.9 | 560.2 | 747.6 | 598.0 | 527.6 | 564.9 |
| 75 | 264.5 | 146.1 | 210.4 | 922.1 | 745.1 | 857.8 | 595.7 | 566.7 | 577.1 |
| 76 | 257.5 | 176.4 | 233.4 | 1020.7 | 773.9 | 863.5 | 613.5 | 457.4 | 572.1 |
| 77 | 306.4 | 213.9 | 261.5 | 934.7 | 781.4 | 862.0 | 619.4 | 574.5 | 597.5 |
| 78 | 310.7 | 232.7 | 268.1 | 877.1 | 747.9 | 827.3 | 639.6 | 511.5 | 605.1 |
| 84 | 204.1 | 125.9 | 172.7 | 759.5 | 624.2 | 697.9 | 696.9 | 642.7 | 672.4 |
| 90 | 261.3 | 147.0 | 235.2 | 763.9 | 655.6 | 735.6 | 742.8 | 675.4 | 720.5 |
| 96 | 304.7 | 271.0 | 289.5 | 772.4 | 654.8 | 726.0 | 784.4 | 735.4 | 764.4 |
| 102 | 262.1 | 165.7 | 224.6 | 615.3 | 561.1 | 585.1 | 825.6 | 742.6 | 814.8 |
| 111 | 306.5 | 210.6 | 240.6 | 609.1 | 557.1 | 589.6 | 846.8 | 754.3 | 815.2 |
| 120 | 407.2 | 215.1 | 331.1 | 629.9 | 244.7 | 502.4 | 886.0 | 627.1 | 766.3 |
| 132 | 276.2 | 186.7 | 225.2 | 521.5 | 241.4 | 428.7 | 834.0 | 386.4 | 545.9 |
| 138 | 390.4 | 256.6 | 306.6 | 468.4 | 240.4 | 293.4 | 718.0 | 266.0 | 567.6 |

42912C-3

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: $\pm 2.5\%$ for 40 seconds and decreasing to $\pm 1\%$ for remainder of test^(a)

Total power: -0.5% ^(a)

a. Relative to run 43112A

FLECHT SEASET 21 KJ BUNDLE TEST SERIES

RJA NUM3E442512D

| ROD/ELEV | CHAL. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE AT (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (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. | 55.0 | 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 | 919. | 501.6 |
| 4B 6-3 | 66 | 1557. | 1816. | 209. | 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 | * * * B A D T H E R M J C O U P L E D A T A * | | | | | | |
| 1D 6-5 | 82 | 1477. | 1730. | 259. | 56.5 | 910. | 522.5 |
| 2D 6-5 | * * * B A D T H E R M J C O U P L E D A T A * | | | | | | |
| 3C 6-5 | 83 | 1599. | 1899. | 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 | 907. | 537.7 |
| 5C 6-6 | 103 | 1540. | 1826. | 286. | 105.0 | 898. | 545.7 |
| 1C 7-0 | * * * B A D T H E R M J C O U P L E D A T A * | | | | | | |
| 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 | 833. | 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. | 241. | 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 | 621. | 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 | 563. | 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. | 71.0 | 406. | 760.9 |
| 1D11-6 | 170 | 428. | 714. | 286. | 141.0 | 548. | 577.0 |

RUN 425120 HEATER RJD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNS AROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-------------------------|------|-------|
| | 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 | 804.5 | 791.9 | 803.3 | 18.5 | 10.0 | 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 | 55.0 | 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 | 1440.0 | 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 | 1595.9 | 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 | 1599.1 | 1473.5 | 1536.6 | 1909.7 | 1703.2 | 1842.4 | 105.0 | 59.5 | 73.6 |
| 74 | 1457.4 | 1332.3 | 1407.8 | 1681.0 | 1540.9 | 1617.0 | 58.0 | 32.5 | 39.9 |
| 90 | 1445.3 | 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 | 1240.3 | 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 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | 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 | 180.9 | 171.5 | 175.7 | 753.8 | 722.6 | 736.6 | 131.9 | 127.7 | 130.1 |
| 48 | 210.5 | 190.5 | 200.5 | 784.4 | 757.8 | 771.3 | 208.9 | 184.5 | 196.7 |
| 60 | 359.3 | 348.6 | 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 | 337.0 | 230.4 | 264.4 | 881.0 | 639.8 | 740.9 | 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 | 509.0 | 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 | 198.4 | 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 | 653.6 | 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 | 792.8 | 722.0 | 742.6 |
| 120 | 447.6 | 246.6 | 352.3 | 969.6 | 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 | 348.2 | 241.4 | 357.4 | 742.0 | 414.0 | 608.0 |

42512D-3

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 $\pm 0.5\%$ oscillations^(a)

a. Relative to run 43112A

FLECHT SEASET 21 RGD BUNDLE TEST SERIES
 RUN NUMBER 41612E

| 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. | 1368. | 184. | 44.5 | 725. | 152.7 |
| 4C 3- 3 | 10 | 1254. | 1395. | 141. | 42.0 | 807. | 148.4 |
| 1C 4- 0 | 12 | 1373. | 1620. | 246. | 63.5 | 856. | 206.8 |
| 2A 5- 0 | 16 | 1520. | 1859. | 339. | 91.0 | 850. | 352.6 |
| 2A 5- 7 | 19 | 1538. | 1811. | 273. | 75.5 | 834. | 442.6 |
| 5C 6- 0 | 36 | 1441. | 1753. | 312. | 148.0 | 1092. | 473.2 |
| 2D 6- 2 | 39 | 1528. | 1749. | 220. | 136.0 | 710. | 546.7 |
| 1D 6- 4 | 47 | 1498. | 1727. | 229. | 135.0 | 812. | 532.0 |
| 3D 6- 4 | 50 | 1475. | 1821. | 347. | 129.0 | 232. | 902.0 |
| 4B 6- 4 | 52 | 1547. | 1808. | 261. | 112.0 | 572. | 551.0 |
| 5C 6- 4 | 54 | 1465. | 1779. | 293. | 127.0 | 1048. | 511.2 |
| 5D 6- 4 | 55 | 1520. | 1724. | 204. | 64.0 | 776. | 561.3 |
| 1D 6- 5 | 58 | 1514. | 1749. | 235. | 98.5 | 844. | 544.6 |
| 2A 6- 5 | 59 | 1504. | 1775. | 272. | 128.0 | 854. | 559.1 |
| 2D 6- 5 | 61 | 1552. | 1804. | 253. | 102.7 | 824. | 570.7 |
| 3B 6- 5 | 63 | 1571. | 1834. | 263. | 131.0 | 865. | 570.4 |
| 3C 6- 6 | 72 | 1569. | 1878. | 289. | 144.0 | 504. | 542.4 |
| 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 | 1530. | 1802. | 273. | 143.0 | 864. | 567.7 |
| 3D 6- 8 | 86 | 1575. | 1888. | 313. | 130.0 | 846. | 617.7 |
| 4A 6- 8 | 87 | 1469. | 1748. | 278. | 98.0 | 714. | 675.7 |
| 1C 7- 0 | 93 | 1490. | 1834. | 144. | 28.5 | 864. | 625.5 |
| 2B 7- 0 | 94 | 1459. | 1624. | 125. | 17.0 | 808. | 648.5 |
| 3D 7- 0 | 98 | 1548. | 1685. | 137. | 26.5 | 767. | 664.0 |
| 5B 7- 0 | 103 | 1426. | 1592. | 165. | 49.5 | 707. | 659.0 |
| 2B 7- 6 | 110 | 1469. | 1712. | 223. | 49.0 | 735. | 717.7 |
| 2C 7- 6 | 111 | 1515. | 1695. | 180. | 41.0 | 776. | 674.6 |
| 2E 7- 6 | 113 | 1422. | 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 | 886. | 761.4 |
| 4B 7- 6 | 120 | 1561. | 1742. | 240. | 51.0 | 766. | 649.6 |
| 5C 7- 6 | 122 | 1453. | 1704. | 211. | 54.0 | 806. | 694.8 |
| 1C 8- 0 | 124 | 1342. | 1611. | 269. | 75.0 | 752. | 754.7 |
| 2E 8- 0 | 126 | 1253. | 1552. | 258. | 64.0 | 803. | 805.3 |
| 3D 8- 0 | 129 | 1369. | 1668. | 299. | 76.0 | 811. | 754.6 |
| 5B 8- 0 | 133 | 1309. | 1605. | 296. | 95.0 | 871. | 766.6 |
| 5C 8- 0 | 134 | 1328. | 1661. | 273. | 74.5 | 753. | 741.0 |
| 1C 8- 6 | 135 | 1135. | 1422. | 287. | 66.5 | 841. | 861.3 |
| 1D 8- 6 | 136 | 1069. | 1375. | 306. | 98.0 | 594. | 831.7 |
| 2C 8- 6 | 138 | 1257. | 1611. | 354. | 85.0 | 704. | 860.7 |
| 4B 8- 6 | 143 | 1261. | 1455. | 254. | 67.0 | 855. | 769.4 |
| 5D 8- 6 | 145 | 1161. | 1441. | 280. | 89.0 | 861. | 812.5 |
| 3D 9- 3 | 150 | 972. | 1324. | 351. | 97.0 | 814. | 866.6 |
| 4C 9- 3 | 152 | 1040. | 1377. | 337. | 88.5 | 586. | 818.2 |
| 1010- 0 | 157 | 867. | 1059. | 392. | 144.0 | 248. | 844.0 |
| 4810- 0 | 164 | 840. | 1197. | 358. | 91.0 | 567. | 827.6 |
| 5010- 0 | 166 | 869. | 935. | 246. | 76.0 | 247. | 816.0 |
| 2A11- 0 | 168 | 549. | 755. | 206. | 99.0 | 126. | 476.0 |
| 4C11- 0 | 169 | 641. | 923. | 282. | 109.0 | 472. | 758.0 |
| 1011- 6 | 171 | 271. | 735. | 464. | 144.0 | 466. | 442.8 |

NUM 4612E HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 645.5 | 614.4 | 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 |
| 46 | 1426.8 | 1346.3 | 1382.8 | 1654.8 | 1580.9 | 1618.8 | 75.0 | 62.5 | 67.5 |
| 60 | 1541.1 | 1507.4 | 1522.9 | 1858.7 | 1823.7 | 1846.7 | 108.0 | 91.0 | 96.2 |
| 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 | 1833.3 | 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 | 1526.4 | 1529.5 | 1791.0 | 1748.6 | 1769.8 | 136.0 | 96.5 | 117.3 |
| 75 | 1509.0 | 1482.1 | 1497.7 | 1748.6 | 1719.6 | 1734.9 | 143.0 | 75.0 | 121.0 |
| 76 | 1568.4 | 1465.3 | 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 | 116.7 |
| 78 | 1599.7 | 1484.3 | 1545.0 | 1877.9 | 1737.4 | 1800.3 | 144.0 | 66.5 | 123.1 |
| 79 | 1583.5 | 1524.5 | 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 | 56.0 | 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 | 1225.4 | 1462.0 | 1751.9 | 1537.6 | 1681.7 | 76.5 | 36.5 | 51.5 |
| 96 | 1407.6 | 1293.4 | 1360.1 | 1701.8 | 1551.7 | 1648.8 | 95.0 | 57.5 | 75.4 |
| 102 | 1521.2 | 784.0 | 1157.0 | 1750.8 | 1098.5 | 1435.5 | 98.0 | 44.0 | 75.5 |
| 111 | 1059.8 | 855.2 | 960.3 | 1384.4 | 1138.0 | 1276.7 | 99.0 | 77.5 | 86.5 |
| 120 | 1147.9 | 585.2 | 753.5 | 1394.9 | 934.6 | 1144.6 | 144.0 | 75.0 | 105.2 |
| 132 | 641.2 | 456.6 | 537.2 | 923.3 | 706.7 | 774.9 | 178.0 | 96.0 | 121.5 |
| 138 | 566.0 | 271.2 | 418.0 | 791.9 | 734.7 | 763.3 | 144.0 | 56.5 | 121.3 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 15.0 | 11.8 | 12.9 | 580.8 | 559.8 | 568.5 | 24.6 | 21.7 | 22.9 |
| 24 | 47.4 | 35.4 | 41.1 | 661.0 | 657.3 | 665.6 | 61.8 | 54.3 | 60.3 |
| 39 | 186.8 | 141.2 | 169.7 | 809.8 | 725.1 | 768.0 | 154.6 | 142.6 | 149.7 |
| 46 | 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 | 954.6 | 850.3 | 872.8 | 352.6 | 335.0 | 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 | 854.0 | 912.9 | 489.5 | 474.4 | 462.4 |
| 73 | 278.3 | 276.3 | 276.3 | 726.7 | 726.7 | 726.7 | 515.8 | 515.0 | 515.0 |
| 74 | 260.4 | 220.2 | 240.3 | 715.7 | 626.8 | 671.2 | 546.7 | 540.0 | 543.0 |
| 75 | 252.0 | 213.9 | 237.2 | 825.3 | 591.3 | 666.3 | 676.8 | 526.7 | 574.0 |
| 76 | 293.4 | 204.3 | 243.0 | 1047.6 | 572.1 | 784.8 | 640.7 | 511.2 | 554.4 |
| 77 | 271.8 | 215.5 | 243.7 | 644.1 | 647.8 | 758.7 | 599.1 | 544.6 | 572.0 |
| 78 | 290.0 | 210.2 | 255.3 | 697.6 | 504.5 | 757.7 | 685.8 | 564.7 | 597.0 |
| 79 | 285.3 | 206.6 | 253.9 | 904.6 | 747.6 | 833.6 | 596.5 | 563.6 | 565.1 |
| 80 | 314.2 | 237.7 | 251.6 | 909.7 | 719.4 | 807.8 | 675.7 | 566.0 | 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 | 715.0 | 712.7 | 625.5 | 652.4 |
| 90 | 311.7 | 174.7 | 219.7 | 877.6 | 682.7 | 756.2 | 781.9 | 674.6 | 717.5 |
| 96 | 324.0 | 256.3 | 288.7 | 810.6 | 593.2 | 743.4 | 905.3 | 746.6 | 754.1 |
| 102 | 353.9 | 184.3 | 278.6 | 804.2 | 563.1 | 640.3 | 854.5 | 472.6 | 755.0 |
| 111 | 351.4 | 241.2 | 306.4 | 614.2 | 511.8 | 565.2 | 857.6 | 706.3 | 605.5 |
| 120 | 348.9 | 245.6 | 251.1 | 604.8 | 246.8 | 480.8 | 855.0 | 445.2 | 767.6 |
| 132 | 282.1 | 205.5 | 237.7 | 525.8 | 394.7 | 473.6 | 758.0 | 455.4 | 566.6 |
| 138 | 463.5 | 225.9 | 344.7 | 466.3 | 466.8 | 476.6 | 599.0 | 442.8 | 545.4 |

41612E-3

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 RWJ BUNDLE TEST SERIES

RUN NUMBER 42612F

| 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 | 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. | 55.0 | 836. | 219.6 |
| 2A 5-0 | 12 | 1511. | 1809. | 298. | 73.5 | 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 5-4 | 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. | 60.5 | 788. | 447.4 |
| 2D 6-5 | 62 | 1539. | 1693. | 154. | 49.0 | 864. | 498.5 |
| 3B 6-5 | 63 | 1571. | 1750. | 179. | 48.3 | 554. | 337.9 |
| 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 | 748. | 572.7 |
| 3J 6-7 | 85 | 1587. | 1793. | 206. | 53.0 | 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 | 767. | 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. | 1642. | 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 | 730. | 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 9-6 | 146 | 1106. | 1237. | 131. | 30.5 | 627. | 655.6 |
| 2C 9-6 | 148 | 1246. | 1516. | 270. | 62.0 | 740. | 674.9 |
| 4B 9-6 | 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 | 589. | 915. | 327. | 137.0 | 633. | 690.5 |
| 4B10-0 | 168 | 872. | 1202. | 330. | 73.0 | 561. | 753.0 |
| 5D10-0 | 169 | 759. | 1024. | 295. | 31.0 | 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

| ELEV | INITIAL TEMP (DEG F) | | | | MAX TEMP (DEG F) | | | | TURNAROUND TIME (SEC) | | | |
|------|----------------------|--------|--------|--|------------------|--------|--------|--|-----------------------|-------|-------|--|
| | 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 | 32.0 | 35.0 | |
| 48 | 1455.3 | 1345.8 | 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 | | 71.5 | 76.0 | 81.8 | |
| 67 | 1599.9 | 1500.3 | 1557.4 | | 1879.1 | 1763.1 | 1812.3 | | 61.5 | 61.5 | 66.1 | |
| 70 | 1609.7 | 1414.3 | 1478.0 | | 1641.7 | 1599.2 | 1674.8 | | 63.0 | 62.5 | 66.9 | |
| 71 | 1556.5 | 1314.3 | 1335.4 | | 1791.0 | 1725.2 | 1758.1 | | 63.0 | 62.5 | 66.9 | |
| 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 | | 36.5 | 68.5 | 82.5 | |
| 74 | 1497.1 | 1392.3 | 1464.1 | | 1789.7 | 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 | 1358.7 | 1434.9 | 1497.0 | | 1781.6 | 1609.0 | 1692.9 | | 85.5 | 42.5 | 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 | | 1688.5 | 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 | 1378.4 | 916.4 | 1610.0 | | 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 | | 137.0 | 81.0 | 92.2 | |
| 132 | 584.9 | 479.8 | 544.5 | | 960.4 | 607.8 | 774.7 | | 106.0 | 73.5 | 94.5 | |
| 138 | 570.8 | 459.0 | 564.5 | | 939.8 | 794.0 | 866.9 | | 109.0 | 104.0 | 106.5 | |

| ELEV | TEMP RISE (DEG F) | | | | QUENCH TEMP (DEG F) | | | | QUENCH TIME (SEC) | | | |
|------|-------------------|-------|-------|--|---------------------|-------|-------|--|-------------------|-------|-------|--|
| | 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 | 750.6 | 817.2 | | 219.6 | 207.2 | 214.5 | |
| 50 | 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 | 82.8 | 901.7 | | 441.5 | 410.6 | 422.0 | |
| 70 | 235.1 | 155.8 | 196.8 | | 967.5 | 232.8 | 549.0 | | 316.0 | 437.7 | 633.1 | |
| 72 | 234.3 | 210.8 | 222.7 | | 1044.5 | 932.8 | 990.1 | | 484.3 | 460.7 | 472.5 | |
| 73 | 253.1 | 228.0 | 240.5 | | 322.6 | 231.8 | 277.2 | | 820.0 | 812.0 | 816.0 | |
| 74 | 248.1 | 201.3 | 225.4 | | 244.7 | 235.0 | 239.8 | | 310.0 | 794.0 | 802.0 | |
| 75 | 301.3 | 136.0 | 219.9 | | 1052.4 | 244.7 | 571.0 | | 820.0 | 488.3 | 680.8 | |
| 76 | 288.4 | 126.4 | 195.9 | | 1025.9 | 240.4 | 602.5 | | 320.0 | 460.6 | 637.1 | |
| 77 | 259.5 | 150.1 | 181.1 | | 960.4 | 243.6 | 688.1 | | 820.0 | 465.7 | 639.0 | |
| 78 | 250.3 | 147.3 | 182.5 | | 1134.0 | 733.8 | 860.1 | | 304.0 | 447.4 | 557.3 | |
| 79 | 230.0 | 167.1 | 192.8 | | 992.7 | 703.4 | 831.5 | | 579.8 | 458.6 | 543.4 | |
| 80 | 229.7 | 216.5 | 223.3 | | 890.3 | 762.6 | 816.2 | | 598.7 | 560.5 | 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 | | 594.0 | 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 | 293.0 | 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 NUMBER 43013A

| ROD/FLV | 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 | 1052. | 1182. | 89. | 20.5 | 821. | 104.6 |
| 4C 3- 3 | 11 | 1105. | 1239. | 74. | 19.5 | 850. | 95.4 |
| 1C 4- 0 | 14 | 1343. | 1481. | 137. | 38.5 | 840. | 173.8 |
| 2A 5- 0 | 17 | 1340. | 1555. | 209. | 58.0 | 772. | 276.9 |
| 2A 5- 7 | 21 | 1460. | 1719. | 252. | 61.5 | 960. | 336.8 |
| 1U 5- 2 | 50 | 1440. | 1775. | 330. | 75.5 | 911. | 428.7 |
| 2D 6- 2 | 53 | 1504. | 1892. | 332. | 59.5 | 843. | 414.7 |
| 3D 6- 2 | 58 | 1577. | 1932. | 354. | 61.0 | 950. | 410.5 |
| 5C 6- 2 | 61 | 1510. | 1789. | 279. | 58.0 | 930. | 398.3 |
| 10 6- 3 | 63 | 1420. | 1748. | 328. | 80.5 | 806. | 440.6 |
| 48 6- 3 | 68 | 1534. | 1894. | 355. | 78.5 | 854. | 437.7 |
| 5D 6- 3 | 69 | 1444. | 1809. | 365. | 83.0 | 774. | 440.7 |
| 2A 6- 4 | 70 | 1457. | 1793. | 336. | 78.0 | 891. | 436.6 |
| 38 6- 4 | 75 | 1506. | 1950. | 383. | 80.0 | 974. | 423.6 |
| 3D 6- 6 | 76 | 1453. | 1926. | 433. | 80.5 | 904. | 456.7 |
| 2D 6- 5 | 84 | 1531. | 1903. | 372. | 74.5 | 844. | 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. | 452.6 |
| 4A 6- 6 | 97 | 1417. | 1790. | 373. | 103.0 | 870. | 452.8 |
| 3D 6- 0 | 98 | 1119. | 1583. | 464. | 81.0 | 794. | 534.0 |
| 5C 6- 6 | 101 | 1451. | 1734. | 283. | 60.0 | 870. | 435.6 |
| 1C 7- 0 | 110 | 1305. | 1610. | 305. | 53.0 | 714. | 45.0 |
| 28 7- 0 | 111 | 1300. | 1577. | 216. | 25.0 | 605. | 406.0 |
| 3I 7- 0 | 115 | 1350. | 1657. | 307. | 54.5 | 723. | 488.0 |
| 5I 7- 0 | 117 | 1244. | 1612. | 318. | 84.0 | 675. | 481.0 |
| 29 7- 6 | 118 | 1244. | 1612. | 318. | 84.0 | 675. | 481.0 |
| 2C 7- 6 | 121 | 1283. | 1659. | 376. | 59.5 | 746. | 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 |
| 38 7- 6 | 124 | 1350. | 1714. | 358. | 61.0 | 764. | 498.0 |
| 48 7- 6 | 127 | 1334. | 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 |
| 58 8- 0 | 138 | 1107. | 1457. | 350. | 80.0 | 742. | 518.9 |
| 5C 8- 0 | 139 | 1002. | 1430. | 368. | 81.5 | 682. | 511.9 |
| 1C 9- 6 | 141 | 900. | 1283. | 374. | 78.0 | 560. | 557.0 |
| 1D 9- 6 | 142 | 840. | 1134. | 286. | 58.0 | 590. | 541.0 |
| 2C 9- 6 | 143 | 909. | 1367. | 397. | 59.5 | 600. | 531.0 |
| 48 9- 6 | 145 | 1012. | 1321. | 309. | 43.0 | 600. | 555.5 |
| 5D 9- 6 | 148 | 900. | 1367. | 458. | 105.0 | 574. | 575.8 |
| 3D 9- 3 | 154 | 843. | 1303. | 459. | 105.0 | 607. | 574.1 |
| 4C 9- 3 | 156 | 902. | 1269. | 368. | 80.5 | 680. | 560.0 |
| 1D10- 0 | 161 | 644. | 957. | 323. | 124.0 | 532. | 578.8 |
| 4D10- 0 | 164 | 650. | 1084. | 388. | 105.0 | 611. | 590.0 |
| 5D10- 0 | 167 | 600. | 1021. | 361. | 129.0 | 275. | 604.0 |
| 2A11- 0 | 168 | 536. | 721. | 186. | 105.0 | 645. | 266.0 |
| 4C11- 0 | 170 | 502. | 880. | 317. | 128.0 | 512. | 503.0 |
| 1D11- 6 | 172 | 244. | 707. | 413. | 147.0 | 200. | 474.0 |

* B A D I H E K M U C J U P L E D A T A *

RUN 43013A HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 592.7 | 549.0 | 569.6 | 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 |
| 34 | 1184.5 | 1033.1 | 1108.7 | 1239.0 | 1136.9 | 1185.8 | 20.5 | 15.5 | 20.0 |
| 40 | 1300.6 | 1251.4 | 1311.0 | 1509.5 | 1421.6 | 1458.8 | 44.5 | 36.0 | 38.8 |
| 60 | 1452.3 | 1316.8 | 1384.4 | 1643.9 | 1496.6 | 1555.0 | 58.0 | 31.5 | 41.6 |
| 67 | 1575.5 | 1459.8 | 1495.0 | 1855.3 | 1718.5 | 1759.1 | 61.5 | 55.0 | 58.1 |
| 70 | 1601.1 | 1489.6 | 1547.7 | 1932.7 | 1780.9 | 1851.3 | 76.0 | 56.0 | 64.0 |
| 71 | 1540.5 | 1478.5 | 1540.9 | 1952.2 | 1765.3 | 1851.1 | 74.5 | 55.0 | 62.1 |
| 72 | 1600.4 | 1460.7 | 1534.0 | 1951.0 | 1749.7 | 1841.8 | 79.5 | 58.0 | 67.3 |
| 74 | 1502.7 | 1445.7 | 1474.8 | 1939.5 | 1738.6 | 1822.0 | 79.0 | 58.0 | 69.3 |
| 75 | 1569.7 | 1420.6 | 1495.0 | 1954.5 | 1747.5 | 1868.9 | 83.0 | 61.0 | 76.6 |
| 77 | 1565.4 | 1430.2 | 1495.0 | 1961.3 | 1793.2 | 1878.6 | 86.0 | 64.5 | 76.1 |
| 78 | 1520.3 | 1367.3 | 1485.0 | 1964.8 | 1712.9 | 1862.2 | 82.0 | 64.0 | 76.9 |
| 78 | 1530.3 | 1400.7 | 1474.4 | 1955.6 | 1734.1 | 1863.5 | 103.0 | 60.0 | 78.3 |
| 84 | 1390.1 | 1071.6 | 1314.3 | 1681.0 | 1447.3 | 1599.0 | 84.0 | 25.0 | 56.6 |
| 90 | 1355.0 | 1012.0 | 1229.2 | 1724.1 | 1382.3 | 1581.9 | 81.5 | 54.5 | 69.9 |
| 96 | 1203.0 | 775.2 | 1003.2 | 1624.3 | 1143.2 | 1470.6 | 104.0 | 61.0 | 79.2 |
| 102 | 1011.6 | 643.6 | 821.7 | 1443.0 | 1116.2 | 1275.4 | 105.0 | 34.5 | 64.2 |
| 111 | 901.6 | 747.5 | 814.0 | 1302.7 | 979.0 | 1154.9 | 105.0 | 56.5 | 91.0 |
| 120 | 700.6 | 643.4 | 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 | 144.0 | 116.3 |
| 136 | 559.7 | 293.7 | 413.5 | 675.8 | 706.7 | 784.1 | 147.0 | 125.0 | 132.4 |

| ELEV | TEMP WISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 15.2 | 13.0 | 14.2 | 581.2 | 553.9 | 565.5 | 9.5 | 8.0 | 9.1 |
| 24 | 23.4 | 40.0 | 49.0 | 757.4 | 681.3 | 716.7 | 31.4 | 28.4 | 28.1 |
| 34 | 47.8 | 74.1 | 87.1 | 849.6 | 727.5 | 799.6 | 105.4 | 92.4 | 101.0 |
| 40 | 170.2 | 137.1 | 147.8 | 1033.3 | 886.3 | 929.1 | 173.8 | 147.0 | 160.5 |
| 60 | 200.7 | 170.3 | 190.0 | 804.9 | 705.9 | 755.5 | 285.9 | 276.9 | 280.9 |
| 67 | 274.8 | 254.5 | 260.1 | 965.8 | 852.7 | 909.9 | 346.5 | 336.8 | 343.1 |
| 70 | 331.0 | 289.2 | 304.5 | 925.3 | 791.5 | 871.8 | 390.8 | 369.5 | 378.2 |
| 71 | 353.3 | 280.9 | 314.2 | 1004.7 | 789.2 | 899.0 | 402.5 | 369.5 | 387.6 |
| 72 | 351.0 | 261.0 | 322.2 | 978.2 | 815.3 | 900.0 | 409.6 | 375.4 | 342.2 |
| 74 | 300.1 | 277.3 | 322.2 | 1317.6 | 827.3 | 906.2 | 428.7 | 394.3 | 412.8 |
| 75 | 304.8 | 327.5 | 322.8 | 925.8 | 774.3 | 875.2 | 440.8 | 417.9 | 430.4 |
| 76 | 307.0 | 320.2 | 322.8 | 974.1 | 838.0 | 892.3 | 444.8 | 414.0 | 432.4 |
| 77 | 400.5 | 345.6 | 377.2 | 925.0 | 795.1 | 877.7 | 458.7 | 435.8 | 448.0 |
| 78 | 432.6 | 203.1 | 389.0 | 956.0 | 812.4 | 889.5 | 464.8 | 435.6 | 452.9 |
| 84 | 375.5 | 210.1 | 247.7 | 758.0 | 641.0 | 690.2 | 506.0 | 478.0 | 490.1 |
| 90 | 419.6 | 309.5 | 361.6 | 825.2 | 621.7 | 752.8 | 522.0 | 490.0 | 566.6 |
| 96 | 472.2 | 349.6 | 407.5 | 819.0 | 659.9 | 736.9 | 554.7 | 511.9 | 531.4 |
| 102 | 460.6 | 234.2 | 353.0 | 805.8 | 534.7 | 597.5 | 575.8 | 531.0 | 552.8 |
| 111 | 459.5 | 220.3 | 340.5 | 717.1 | 503.7 | 636.2 | 580.0 | 484.0 | 543.2 |
| 120 | 471.8 | 294.8 | 374.8 | 672.1 | 274.8 | 548.4 | 606.0 | 464.0 | 570.7 |
| 132 | 317.5 | 184.5 | 221.9 | 644.6 | 480.7 | 544.5 | 593.0 | 280.0 | 420.4 |
| 136 | 413.0 | 202.0 | 304.6 | 596.2 | 285.6 | 479.8 | 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 NUMBER 435138

| 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 | 1080. | 1221. | 141. | 29.5 | 742. | 110.9 |
| 4C 3- 3 | 11 | 1204. | 1300. | 99. | 25.0 | 832. | 103.6 |
| 1C 4- 3 | 14 | 1293. | 1429. | 140. | 36.0 | 889. | 164.3 |
| 2A 5- 0 | 17 | 1357. | 1600. | 252. | 58.0 | 752. | 282.9 |
| 2A 5- 7 | 21 | 1452. | 1760. | 293. | 76.5 | 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. | 333. | 97.0 | 777. | 475.2 |
| 2A 6- 4 | 70 | 1419. | 1701. | 282. | 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 | 402. | 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. | 364.7 |
| 4A 6- 6 | 97 | 1406. | 1746. | 340. | 97.5 | 805. | 462.6 |
| 4C 6- 6 | 98 | 1550. | 1906. | 356. | 94.0 | 876. | 436.3 |
| 5C 6- 6 | 101 | 1445. | 1765. | 320. | 96.0 | 842. | 461.6 |
| 1C 7- 0 | 110 | 1424. | 1641. | 221. | 41.5 | 672. | 484.0 |
| 2B 7- 0 | 111 | 1463. | 1668. | 199. | 41.5 | 739. | 467.6 |
| 3D 7- 0 | 115 | 1500. | 1700. | 231. | 41.5 | 803. | 431.0 |
| 5B 7- 0 | 117 | 1353. | 1587. | 227. | 76.5 | 672. | 511.5 |
| 2B 7- 6 | 120 | 1445. | 1700. | 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. | 1700. | 305. | 59.5 | 817. | 502.8 |
| 4B 7- 6 | 127 | 1453. | 1756. | 297. | 60.5 | 820. | 506.8 |
| 5C 7- 6 | 128 | 1397. | 1721. | 324. | 91.0 | 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. | 546.0 |
| 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. | 76.0 | 746. | 506.3 |
| 1C 8- 6 | 141 | 1080. | 1397. | 317. | 59.5 | 554. | 554.3 |
| 1D 8- 6 | 142 | 901. | 1271. | 371. | 57.0 | 568. | 561.0 |
| 2C 8- 6 | 143 | 1162. | 1469. | 327. | 60.5 | 668. | 535.0 |
| 4B 8- 6 | 145 | 1222. | 1584. | 362. | 76.0 | 715. | 560.0 |
| 5D 8- 6 | 148 | 1082. | 1386. | 303. | 56.5 | 541. | 611.0 |
| 3D 9- 3 | 154 | 1060. | 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 |
| 4D10- 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 | | | | | | | |
| 1D11- 6 | | | | | | | |

* * * B A D T H E R M O C O U P L E D A T A *
 * * * B A D T H E R M O C O U P L E D A T A *

RUN 435138 HEATER RJD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 95.5 | 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 | 95.5 | 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 | 61.7 |
| 102 | 1222.1 | 900.8 | 1088.6 | 1584.1 | 1271.3 | 1417.3 | 76.5 | 56.5 | 62.9 |
| 111 | 1372.9 | 749.8 | 982.4 | 1390.7 | 1179.6 | 1285.8 | 137.0 | 46.0 | 60.6 |
| 120 | 918.9 | 559.5 | 779.9 | 1260.9 | 1096.4 | 1169.4 | 138.0 | 96.5 | 119.7 |
| 132 | 603.3 | 539.4 | 578.1 | 613.7 | 763.9 | 784.6 | 155.0 | 96.5 | 116.2 |
| 138 | 676.0 | 418.8 | 559.8 | 935.7 | 787.8 | 875.2 | 156.0 | 98.0 | 126.8 |

| ELEV | TEMP RISE (DEG F) | | | WENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|--------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 768.2 | 119.9 | 103.6 | 111.8 |
| 48 | 228.1 | 140.4 | 178.6 | 933.2 | 828.8 | 874.8 | 158.7 | 164.3 | 166.1 |
| 60 | 252.3 | 188.4 | 220.6 | 754.7 | 744.4 | 751.2 | 270.8 | 273.4 | 283.6 |
| 67 | 314.6 | 277.6 | 294.0 | 906.2 | 846.9 | 864.6 | 364.7 | 335.6 | 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 | 740.1 | 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 | 351.9 | 296.8 | 335.6 | 1207.2 | 784.9 | 890.2 | 471.5 | 275.0 | 426.9 |
| 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 | 415.5 | 321.3 | 358.2 | 868.4 | 662.5 | 763.8 | 550.3 | 490.9 | 533.4 |
| 102 | 370.5 | 296.7 | 328.8 | 715.0 | 539.6 | 621.6 | 511.0 | 430.3 | 551.3 |
| 111 | 429.8 | 219.4 | 303.4 | 620.6 | 580.2 | 660.8 | 609.9 | 469.8 | 559.7 |
| 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 |

435138-3

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 43013 A

FLECHT DUCASET 21 ROD BUNDLE TEST SERIES

RUN NUMBER 42413C

| 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 | 1644. | 1221. | 128. | 36.0 | 801. | 96.7 |
| 4C 3- 3 | 11 | 1254. | 1355. | 96. | 24.5 | 804. | 109.6 |
| 1C 4- 0 | 14 | 1352. | 1504. | 152. | 41.0 | 930. | 172.9 |
| 2A 5- 0 | 17 | 1464. | 1639. | 235. | 59.0 | 794. | 278.6 |
| 2A 5- 7 | 21 | 1562. | 1752. | 250. | 62.0 | 806. | 347.6 |
| 1D 5- 2 | 50 | 1343. | 1637. | 244. | 67.0 | 472. | 366.8 |
| 2D 5- 2 | 53 | 1420. | 1690. | 262. | 85.0 | 600. | 342.9 |
| 3D 6- 2 | 58 | 1522. | 1715. | 194. | 48.5 | 669. | 427.0 |
| 4B 6- 2 | 60 | 1555. | 1761. | 206. | 47.0 | 920. | 356.5 |
| 5C 6- 2 | 61 | 1440. | 1739. | 298. | 85.5 | 593. | 412.2 |
| 10 6- 3 | 63 | 1367. | 1656. | 269. | 84.5 | 455. | 376.5 |
| 5D 6- 3 | 69 | 1462. | 1675. | 213. | 48.5 | 960. | 393.6 |
| 2A 6- 4 | 70 | 1444. | 1693. | 244. | 66.0 | 1040. | 256.6 |
| 3A 6- 4 | 75 | 1576. | 1801. | 225. | 50.0 | 665. | 407.6 |
| 2D 6- 5 | 84 | 1515. | 1784. | 270. | 68.0 | 434. | 406.5 |
| 3C 6- 5 | 85 | 1549. | 1670. | 271. | 51.0 | 436. | 418.6 |
| 3E 6- 5 | 86 | 1515. | 1715. | 200. | 69.5 | 926. | 416.0 |
| 3C 6- 6 | 95 | 1500. | 1804. | 298. | 65.5 | 602. | 428.7 |
| 3D 6- 6 | 96 | 1550. | 1849. | 299. | 69.0 | 642. | 445.5 |
| 4A 6- 6 | 97 | 1461. | 1739. | 278. | 67.5 | 946. | 368.7 |
| 4C 6- 6 | 98 | 1541. | 1673. | 283. | 68.0 | 655. | 439.4 |
| 5C 6- 6 | 101 | 1557. | 1749. | 191. | 47.0 | 675. | 465.6 |
| 1C 7- 0 | 110 | 1343. | 1608. | 215. | 48.5 | 724. | 468.0 |
| 2B 7- 0 | 111 | 1434. | 1625. | 192. | 31.0 | 703. | 455.6 |
| 3D 7- 0 | 115 | 1430. | 1665. | 234. | 47.0 | 666. | 463.0 |
| 5B 7- 0 | 117 | 1360. | 1605. | 225. | 48.5 | 706. | 449.4 |
| 2B 7- 6 | 120 | 1419. | 1644. | 276. | 60.5 | 612. | 441.6 |
| 2C 7- 6 | 121 | 1410. | 1725. | 315. | 64.5 | 770. | 509.1 |
| 2F 7- 6 | 122 | 1132. | 1466. | 334. | 71.0 | 700. | 461.5 |
| 3A 7- 6 | 123 | 1415. | 1672. | 258. | 52.0 | 604. | 465.6 |
| 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. | 465.4 |
| 1C 8- 0 | 131 | 1109. | 1572. | 387. | 86.5 | 706. | 534.4 |
| 2E 8- 0 | 133 | 1042. | 1457. | 415. | 86.5 | 783. | 511.0 |
| 3D 8- 0 | 136 | 1254. | 1670. | 411. | 95.5 | 763. | 534.6 |
| 5B 8- 0 | 138 | 1141. | 1521. | 331. | 86.5 | 746. | 503.7 |
| 5C 8- 0 | 139 | 1327. | 1630. | 293. | 69.0 | 750. | 512.0 |
| 1C 9- 6 | 141 | 1020. | 1399. | 379. | 69.5 | 577. | 556.0 |
| 1D 9- 6 | 142 | 679. | 1252. | 373. | 46.5 | 607. | 534.0 |
| 2C 9- 6 | 145 | 1136. | 1423. | 287. | 46.0 | 625. | 557.9 |
| 4B 9- 6 | 148 | 475. | 1370. | 395. | 81.0 | 637. | 541.7 |
| 3D 9- 3 | 154 | 540. | 1368. | 429. | 87.0 | 617. | 574.0 |
| 4C 9- 3 | 156 | 1024. | 1331. | 307. | 69.5 | 630. | 562.0 |
| 1D10- 0 | 161 | 687. | 1043. | 356. | 137.0 | 642. | 538.3 |
| 4B10- 0 | 164 | 660. | 1189. | 329. | 87.5 | 622. | 540.5 |
| 5D10- 0 | 167 | 736. | 1074. | 335. | 123.0 | 646. | 551.6 |
| 2A11- 0 | 168 | 593. | 766. | 193. | 136.0 | 540. | 429.8 |
| 4C11- 0 | 170 | 664. | 456. | 288. | 87.5 | 474. | 566.0 |
| 1D11- 6 | 172 | 520. | 827. | 307. | 140.0 | 554. | 526.6 |

* * * D U C A S E T T H E R M O C O U P L E D A T A * * *

RUN 42413C HEATER ADD STATISTICAL DATA

| ELCV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | PEAK | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 690.4 | 617.2 | 644.7 | 694.3 | 620.8 | 653.0 | 5.0 | 5.0 | 4.0 |
| 24 | 911.1 | 824.5 | 810.0 | 942.9 | 859.2 | 901.9 | 12.0 | 5.5 | 11.2 |
| 34 | 1250.6 | 1093.6 | 1154.7 | 1355.1 | 1221.2 | 1278.4 | 36.0 | 24.5 | 32.1 |
| 40 | 1402.1 | 1293.1 | 1334.0 | 1546.3 | 1481.5 | 1510.4 | 56.0 | 36.5 | 46.0 |
| 60 | 1403.6 | 1392.3 | 1300.0 | 1691.9 | 1638.5 | 1558.5 | 82.5 | 58.0 | 70.3 |
| 67 | 1614.0 | 1404.3 | 1513.0 | 1808.1 | 1728.5 | 1778.4 | 69.5 | 62.0 | 66.2 |
| 70 | 1607.1 | 1300.0 | 1517.3 | 1821.2 | 1612.3 | 1822.8 | 84.5 | 41.5 | 89.7 |
| 71 | 1523.7 | 1420.4 | 1442.4 | 1853.3 | 1753.1 | 1813.1 | 85.5 | 66.0 | 74.6 |
| 72 | 1502.5 | 1450.3 | 1486.6 | 1793.2 | 1789.9 | 1791.5 | 83.0 | 64.0 | 72.5 |
| 74 | 1554.6 | 1307.6 | 1474.1 | 1700.9 | 1609.0 | 1689.9 | 86.5 | 47.0 | 82.6 |
| 75 | 1505.0 | 1307.0 | 1509.9 | 1812.3 | 1641.7 | 1729.8 | 84.5 | 46.5 | 58.1 |
| 76 | 1600.5 | 1374.2 | 1410.0 | 1851.9 | 1665.8 | 1748.2 | 85.5 | 48.0 | 60.2 |
| 77 | 1599.0 | 1320.6 | 1512.4 | 1870.0 | 1670.6 | 1772.5 | 85.0 | 48.5 | 64.9 |
| 78 | 1590.7 | 1347.3 | 1514.0 | 1803.6 | 1700.2 | 1791.3 | 86.0 | 41.0 | 87.5 |
| 84 | 1400.0 | 1180.8 | 1304.4 | 1744.0 | 1417.3 | 1611.1 | 68.0 | 31.0 | 62.9 |
| 90 | 1443.5 | 1131.4 | 1274.3 | 1725.2 | 1465.5 | 1661.5 | 82.5 | 46.5 | 59.3 |
| 98 | 1341.6 | 1042.6 | 1230.8 | 1676.6 | 1456.9 | 1596.8 | 86.5 | 65.0 | 78.4 |
| 102 | 1130.1 | 870.7 | 1100.2 | 1453.7 | 1251.5 | 1388.2 | 86.5 | 46.0 | 73.2 |
| 111 | 1035.5 | 870.2 | 870.2 | 1307.7 | 1172.3 | 1240.4 | 102.0 | 56.0 | 77.8 |
| 120 | 854.6 | 667.0 | 702.4 | 1261.9 | 1042.4 | 1137.8 | 137.0 | 45.5 | 100.7 |
| 132 | 688.6 | 552.4 | 580.0 | 956.3 | 771.1 | 826.0 | 136.0 | 66.5 | 103.5 |
| 136 | 650.5 | 475.0 | 555.0 | 957.3 | 780.5 | 861.8 | 140.0 | 107.0 | 132.8 |

| ELCV | TEMP ADD (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | PEAK | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 74.6 | 7.4 | 9.4 | 636.4 | 613.6 | 629.4 | 14.0 | 1.0 | 11.3 |
| 24 | 30.7 | 24.4 | 31.1 | 768.4 | 738.5 | 753.2 | 41.9 | 36.4 | 39.4 |
| 34 | 157.2 | 40.5 | 110.0 | 931.9 | 784.2 | 851.5 | 118.6 | 96.7 | 106.2 |
| 40 | 214.2 | 132.3 | 170.0 | 937.8 | 859.0 | 903.2 | 182.7 | 167.7 | 173.5 |
| 60 | 247.5 | 234.4 | 254.4 | 923.4 | 754.7 | 792.4 | 283.7 | 276.0 | 281.7 |
| 67 | 201.0 | 200.1 | 205.4 | 911.5 | 806.2 | 849.6 | 351.0 | 334.4 | 345.6 |
| 70 | 334.1 | 231.2 | 307.2 | 937.4 | 746.7 | 866.7 | 390.7 | 374.2 | 383.2 |
| 71 | 330.1 | 260.6 | 317.6 | 950.0 | 713.6 | 859.3 | 404.5 | 374.0 | 388.9 |
| 74 | 244.0 | 240.3 | 244.4 | 906.4 | 894.0 | 902.7 | 388.6 | 365.7 | 367.2 |
| 74 | 202.2 | 141.2 | 115.7 | 975.0 | 612.1 | 786.6 | 427.0 | 322.7 | 340.0 |
| 75 | 260.0 | 144.2 | 214.4 | 968.5 | 787.6 | 888.7 | 412.7 | 376.2 | 400.1 |
| 76 | 242.3 | 144.4 | 231.2 | 1048.0 | 807.2 | 901.1 | 435.9 | 256.6 | 388.4 |
| 77 | 317.6 | 144.6 | 250.1 | 1013.4 | 856.3 | 934.2 | 423.6 | 393.7 | 411.0 |
| 76 | 350.4 | 144.4 | 270.2 | 1027.4 | 841.6 | 930.5 | 449.5 | 244.0 | 410.7 |
| 84 | 240.7 | 141.4 | 227.7 | 507.1 | 667.9 | 739.9 | 494.9 | 410.0 | 457.5 |
| 90 | 330.6 | 22.2 | 67.2 | 830.3 | 694.9 | 779.8 | 509.1 | 455.0 | 451.2 |
| 98 | 430.7 | 242.4 | 360.0 | 821.7 | 706.0 | 761.6 | 538.9 | 456.4 | 520.1 |
| 102 | 432.0 | 200.2 | 374.1 | 836.8 | 576.9 | 617.9 | 567.7 | 534.0 | 550.1 |
| 111 | 420.1 | 211.4 | 310.3 | 839.9 | 602.6 | 623.6 | 578.0 | 534.3 | 554.4 |
| 120 | 507.5 | 304.7 | 372.4 | 642.3 | 513.2 | 630.0 | 600.5 | 446.7 | 554.8 |
| 132 | 267.5 | 142.6 | 226.0 | 545.6 | 377.3 | 507.0 | 586.0 | 261.5 | 402.7 |
| 136 | 370.1 | 231.2 | 300.4 | 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 | 29 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 RJD BUNDLE TEST SERIES

RUN NJ94CK438130

| ROL/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RAISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|---|--------------------------------|-----------------------------------|---------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 7 | 1069. | 1179. | 110. | 7.5 | 861. | 99.9 |
| 4C 3- 3 | 9 | 1200. | 1311. | 111. | 28. | 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. | 50.5 | 933. | 328.7 |
| 2D 5- 2 | 50 | 1509. | 1726. | 217. | 43.5 | 917. | 330.0 |
| 3D 5- 2 | 55 | 1491. | 1744. | 253. | 44.5 | 273. | 587.0 |
| 5C 5- 2 | 59 | 1514. | 1725. | 212. | 44.5 | 824. | 381.9 |
| 1D 5- 3 | 61 | 1449. | 1681. | 232. | 46.5 | 893. | 340.9 |
| 4B 5- 3 | 66 | 1536. | 1759. | 223. | 44.5 | 902. | 350.0 |
| 5D 5- 3 | 68 | 1438. | 1682. | 245. | 54.5 | 774. | 389.5 |
| 2A 5- 4 | 70 | 1428. | 1691. | 263. | 53.0 | 1100. | 220.8 |
| 3A 5- 4 | * * 3 A J T H E R M J C J J P L E D A T A * | | | | | | |
| 1D 5- 5 | 82 | 1440. | 1688. | 248. | 60.5 | 908. | 350.6 |
| 2D 5- 5 | * * 3 A J T H E R M J C J J P L E D A T A * | | | | | | |
| 3C 5- 5 | 85 | 1604. | 1837. | 233. | 43.5 | 997. | 307.6 |
| 3E 5- 5 | 86 | 1489. | 1685. | 197. | 44.5 | 1045. | 253.8 |
| 3C 5- 6 | 97 | 1549. | 1664. | 265. | 44.5 | 1003. | 315.8 |
| 3D 5- 6 | 98 | 1573. | 1819. | 240. | 43.5 | 1009. | 310.9 |
| 4A 5- 6 | 100 | 1456. | 1726. | 270. | 60.5 | 791. | 413.6 |
| 4C 5- 6 | 101 | 1580. | 1850. | 270. | 53.0 | 990. | 336.8 |
| 5C 5- 6 | 103 | 1527. | 1749. | 221. | 65.0 | 842. | 402.0 |
| 1C 7- 0 | * * 8 A J T H E R M D C J J P L E D A T A * | | | | | | |
| 2B 7- 0 | 111 | 1460. | 1667. | 207. | 27.5 | 838. | 292.8 |
| 3D 7- 0 | 115 | 1490. | 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 | 947. | 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 | 769. | 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. | 1430. | 281. | 48.0 | 972. | 338.9 |
| 3D 8- 0 | 137 | 1350. | 1688. | 337. | 62.0 | 855. | 408.6 |
| 5B 8- 0 | 139 | 1266. | 1501. | 235. | 56.5 | 689. | 496.9 |
| 5C 8- 0 | 140 | 1357. | 1637. | 281. | 53.0 | 765. | 471.9 |
| 1C 8- 6 | 141 | 1050. | 1368. | 318. | 65.0 | 540. | 496.0 |
| 1D 8- 6 | 142 | 935. | 1342. | 406. | 71.0 | 586. | 483.8 |
| 2C 9- 6 | 143 | 1121. | 1443. | 322. | 53.0 | 569. | 481.0 |
| 4B 9- 6 | 145 | 1198. | 1488. | 290. | 44.5 | 673. | 490.0 |
| 5D 9- 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. | 345.8 |
| 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. | 76.0 | 523. | 480.0 |
| 4C11- 0 | 169 | 685. | 987. | 302. | 77.5 | 533. | 501.0 |
| 1D11- 6 | 170 | 275. | 782. | 507. | 156.0 | 667. | 317.0 |

RUN 43813D HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNDOWN TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|---------------------|------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 385.5 | 582.3 | 583.9 | 599.4 | 596.2 | 597.8 | 6.5 | 5.5 | 6.0 |
| 24 | 317.4 | 790.4 | 805.0 | 855.1 | 835.4 | 847.8 | 14.0 | 12.0 | 13.2 |
| 39 | 1149.8 | 1068.3 | 1114.3 | 1311.0 | 1178.5 | 1228.6 | 33.3 | 27.5 | 29.7 |
| 48 | 1298.3 | 1276.4 | 1287.4 | 1445.2 | 1438.7 | 1441.9 | 42.5 | 34.0 | 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 | 1737.3 | 60.5 | 44.5 | 49.8 |
| 70 | 1600.5 | 1501.4 | 1551.0 | 1641.7 | 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 | 1749.9 | 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 | 1683.4 | 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 | 1738.3 | 1490.6 | 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 | 544.9 | 607.0 | 633.2 | 987.2 | 814.9 | 877.7 | 97.5 | 75.5 | 89.7 |
| 139 | 673.0 | 274.8 | 505.7 | 950.1 | 761.5 | 837.4 | 156.0 | 95.0 | 118.5 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | 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 | 126.5 | 109.7 | 113.8 | 884.1 | 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 | 298.0 | 320.7 |
| 70 | 261.7 | 241.2 | 251.4 | 998.4 | 808.2 | 903.6 | 344.7 | 311.7 | 328.2 |
| 72 | 249.3 | 249.3 | 249.3 | 834.5 | 834.5 | 834.5 | 348.8 | 348.8 | 348.8 |
| 74 | 278.6 | 194.4 | 234.0 | 982.4 | 813.4 | 897.8 | 376.4 | 248.9 | 325.1 |
| 75 | 274.5 | 201.2 | 229.6 | 1008.9 | 766.4 | 862.7 | 381.9 | 141.7 | 312.5 |
| 76 | 244.6 | 190.1 | 225.9 | 1113.5 | 774.4 | 933.7 | 389.5 | 240.4 | 317.8 |
| 77 | 263.3 | 199.3 | 230.6 | 1190.0 | 743.7 | 941.8 | 379.9 | 220.8 | 311.4 |
| 78 | 236.2 | 196.9 | 246.1 | 1044.8 | 813.0 | 924.1 | 396.9 | 253.8 | 339.4 |
| 84 | 303.4 | 206.9 | 253.2 | 1126.4 | 791.2 | 965.2 | 413.6 | 237.9 | 332.1 |
| 90 | 237.8 | 195.0 | 217.1 | 888.6 | 650.9 | 762.6 | 447.0 | 250.7 | 366.1 |
| 96 | 308.5 | 210.5 | 253.7 | 997.0 | 884.4 | 830.8 | 449.0 | 296.8 | 396.6 |
| 102 | 337.1 | 185.7 | 301.4 | 984.6 | 667.5 | 812.5 | 499.1 | 338.9 | 432.4 |
| 111 | 406.4 | 239.5 | 316.5 | 673.2 | 568.5 | 609.5 | 531.5 | 447.0 | 492.9 |
| 120 | 399.2 | 237.2 | 311.7 | 766.9 | 552.1 | 650.2 | 544.7 | 421.4 | 472.4 |
| 132 | 420.8 | 305.7 | 350.8 | 605.4 | 506.0 | 583.1 | 559.0 | 395.8 | 491.4 |
| 139 | 302.3 | 212.9 | 244.5 | 233.2 | 479.6 | 511.8 | 504.0 | 480.0 | 495.0 |
| 158 | 506.7 | 250.7 | 331.7 | 666.7 | 487.3 | 542.4 | 535.0 | 317.0 | 423.3 |

43813D-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

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 41913E

| ROD/ELEV | CHAN. NO | INITIAL AT FLOW (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (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. | 242.3 |
| 2A 5- 7 | 19 | 1514. | 1762. | 249. | 56.0 | 606. | 350.6 |
| 5C 6- 0 | 36 | 1364. | 1696. | 313. | 40.0 | 1141. | 361.5 |
| 2D 6- 2 | 39 | 1468. | 1730. | 242. | 68.0 | 804. | 394.6 |
| 1D 6- 4 | 47 | 1441. | 1670. | 230. | 69.0 | 741. | 386.0 |
| 3D 6- 4 | 50 | 1436. | 1784. | 348. | 75.5 | 264. | 674.0 |
| 4B 6- 4 | 52 | 1513. | 1760. | 247. | 67.0 | 661. | 379.4 |
| 5C 6- 4 | 54 | 1425. | 1729. | 304. | 80.5 | 766. | 377.6 |
| 5D 6- 4 | 55 | 1463. | 1673. | 210. | 70.5 | 666. | 367.4 |
| 1D 6- 5 | 58 | 1462. | 1700. | 238. | 67.5 | 654. | 392.1 |
| 2A 6- 5 | 59 | 1465. | 1706. | 241. | 65.0 | 703. | 414.3 |
| 2D 6- 5 | 61 | 1522. | 1763. | 241. | 67.5 | 665. | 406.7 |
| 3B 6- 5 | 63 | 1551. | 1793. | 242. | 66.5 | 624. | 400.6 |
| 3C 6- 6 | 72 | 1562. | 1864. | 282. | 67.0 | 706. | 422.4 |
| 4C 6- 6 | 75 | 1541. | 1847. | 256. | 63.5 | 452. | 367.6 |
| 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 | 672. | 417.4 |
| 3D 6- 8 | 86 | 1574. | 1861. | 287. | 64.5 | 613. | 450.6 |
| 4A 6- 8 | 87 | 1451. | 1700. | 248. | 64.5 | 622. | 424.6 |
| 1C 7- 0 | 93 | 1472. | 1625. | 154. | 36.0 | 737. | 426.5 |
| 2B 7- 0 | 94 | 1501. | 1667. | 166. | 35.0 | 674. | 466.2 |
| 3D 7- 0 | 96 | 1546. | 1735. | 190. | 36.0 | 734. | 475.0 |
| 5B 7- 0 | 103 | 1428. | 1620. | 192. | 37.0 | 676. | 469.4 |
| 2B 7- 6 | 110 | 1454. | 1715. | 261. | 53.0 | 783. | 477.6 |
| 2C 7- 6 | 111 | 1501. | 1725. | 225. | 49.5 | 607. | 470.6 |
| 2E 7- 6 | 113 | 1307. | 1545. | 279. | 66.0 | 667. | 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. | 64.5 | 644. | 526.7 |
| 4B 7- 6 | 120 | 1465. | 1762. | 277. | 52.5 | 664. | 470.4 |
| 5C 7- 6 | 122 | 1464. | 1710. | 246. | 53.5 | 625. | 462.4 |
| 1C 8- 0 | 124 | 1265. | 1565. | 300. | 64.5 | 601. | 513.4 |
| 2E 8- 0 | 126 | 1044. | 1402. | 359. | 83.0 | 636. | 464.6 |
| 3D 8- 0 | 129 | 1310. | 1666. | 355. | 64.0 | 786. | 522.0 |
| 5B 8- 0 | 133 | 1260. | 1593. | 333. | 91.0 | 765. | 505.6 |
| 5C 8- 0 | 134 | 1344. | 1656. | 312. | 64.5 | 756. | 504.6 |
| 1C 8- 6 | 135 | 1118. | 1438. | 319. | 54.5 | 674. | 545.2 |
| 1D 8- 6 | 136 | 1024. | 1360. | 331. | 64.0 | 632. | 500.4 |
| 2C 8- 6 | 138 | 1249. | 1627. | 377. | 67.0 | 723. | 543.6 |
| 4B 8- 6 | 143 | 1201. | 1523. | 321. | 69.0 | 701. | 521.6 |
| 5D 8- 6 | 145 | 1076. | 1490. | 415. | 90.0 | 635. | 550.4 |
| 3D 9- 3 | 150 | 1003. | 1337. | 384. | 92.0 | 646. | 556.0 |
| 4C 9- 3 | 152 | 1077. | 1428. | 351. | 74.0 | 677. | 533.0 |
| 1010- 0 | 157 | 656. | 1066. | 410. | 149.0 | 526. | 606.6 |
| 4B10- 0 | 164 | 510. | 1264. | 354. | 90.0 | 646. | 546.0 |
| 5010- 0 | 166 | 763. | 1043. | 280. | 113.0 | 574. | 484.1 |
| 2A11- 0 | 168 | 604. | 768. | 164. | 91.5 | 614. | 370.4 |
| 4C11- 0 | 169 | 714. | 1026. | 313. | 96.0 | 513. | 553.0 |
| 1011- 6 | 171 | 287. | 790. | 503. | 144.0 | 514. | 464.6 |

RUN 41913E HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 909.9 | 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 | 1545.9 | 1494.4 | 1542.7 | 46.0 | 37.5 | 42.0 |
| 60 | 1546.6 | 1445.1 | 1516.8 | 1717.1 | 1672.4 | 1752.7 | 65.0 | 36.0 | 56.0 |
| 67 | 1603.9 | 1475.9 | 1541.0 | 1811.9 | 1733.0 | 1799.2 | 67.0 | 50.5 | 59.0 |
| 70 | 1586.2 | 1510.4 | 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 | 1460.4 | 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 | 1424.4 | 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 | 1444.0 | 1518.6 | 1864.4 | 1686.5 | 1760.9 | 109.0 | 52.5 | 69.9 |
| 79 | 1578.0 | 1444.4 | 1536.4 | 1839.5 | 1717.4 | 1772.8 | 68.0 | 66.5 | 67.5 |
| 80 | 1574.3 | 1446.4 | 1505.0 | 1861.0 | 1699.5 | 1767.6 | 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 | 1464.5 | 1444.5 | 1459.5 | 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 | 1231.0 | 1418.2 | 1798.8 | 1567.9 | 1690.0 | 68.5 | 38.0 | 55.8 |
| 96 | 1376.6 | 1043.5 | 1265.7 | 1721.8 | 1402.3 | 1622.8 | 91.0 | 46.0 | 70.5 |
| 102 | 1501.9 | 818.7 | 1128.6 | 1776.5 | 1121.4 | 1461.0 | 108.0 | 52.0 | 70.3 |
| 111 | 1086.8 | 746.8 | 950.0 | 1444.1 | 1171.2 | 1322.1 | 113.0 | 56.0 | 90.4 |
| 120 | 1136.1 | 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 | 131.0 | 41.5 | 108.3 |
| 138 | 637.1 | 267.0 | 462.1 | 833.3 | 789.8 | 811.5 | 144.0 | 65.5 | 104.8 |

| ELEV | TEMP RATE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 104.8 | 120.0 |
| 48 | 182.9 | 167.6 | 173.2 | 980.9 | 887.5 | 935.9 | 172.6 | 161.8 | 166.0 |
| 60 | 273.3 | 180.0 | 235.9 | 879.7 | 845.5 | 857.5 | 292.3 | 278.4 | 285.5 |
| 67 | 298.6 | 234.1 | 259.2 | 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 | 366.4 | 371.7 |
| 73 | 261.1 | 261.1 | 261.1 | 800.4 | 800.4 | 800.4 | 353.0 | 353.0 | 353.0 |
| 74 | 272.8 | 241.4 | 257.4 | 803.7 | 653.4 | 728.5 | 400.0 | 354.6 | 357.3 |
| 75 | 260.4 | 222.8 | 236.5 | 939.0 | 641.0 | 801.6 | 385.9 | 283.9 | 354.3 |
| 76 | 303.6 | 209.4 | 239.4 | 865.6 | 681.3 | 784.3 | 410.0 | 377.0 | 388.6 |
| 77 | 242.3 | 209.7 | 229.7 | 964.0 | 676.8 | 828.3 | 428.1 | 376.7 | 402.6 |
| 78 | 282.1 | 147.8 | 242.3 | 1065.0 | 688.3 | 869.7 | 424.0 | 300.6 | 398.5 |
| 79 | 261.5 | 140.2 | 230.4 | 887.2 | 782.1 | 852.2 | 426.8 | 404.8 | 419.1 |
| 80 | 268.3 | 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 | 204.6 | 153.6 | 182.0 | 779.6 | 677.6 | 734.2 | 475.0 | 426.5 | 456.7 |
| 90 | 364.2 | 224.7 | 271.8 | 887.3 | 698.8 | 807.7 | 528.7 | 426.6 | 485.3 |
| 96 | 358.6 | 244.0 | 337.1 | 836.5 | 745.9 | 786.6 | 530.5 | 464.6 | 510.4 |
| 102 | 450.3 | 255.1 | 332.2 | 834.6 | 631.6 | 698.8 | 580.9 | 370.4 | 513.8 |
| 111 | 340.1 | 283.0 | 303.4 | 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 | 446.4 |
| 138 | 502.8 | 146.2 | 349.5 | 518.5 | 501.3 | 509.9 | 514.0 | 464.6 | 499.3 |

41913E-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 HJD BUNDLE TEST SERIES

RUN NUMBER 43813F

| ROD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNDOWN TIME (SECONDS) | QUENCH TEMPERATURE (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 | 923. | 216.1 |
| 2D 6- 5 | 62 | 1519. | 1671. | 152. | 36.0 | 857. | 326.7 |
| 3B 6- 5 | 63 | 1561. | 1722. | 160. | 35.0 | 656. | 354.5 |
| 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 | * * B A D T H E R M O C O U P L E D A T A * | | | | | | |
| 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 | 949. | 314.5 |
| 1C 7- 0 | 109 | 1518. | 1654. | 141. | 29.5 | 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 |
| 5A 7- 0 | 117 | 1412. | 1565. | 152. | 26.0 | 778. | 361.0 |
| 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. | 50.5 | 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 | 733. | 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- 6 | 161 | 1090. | 1398. | 308. | 57.0 | 633. | 488.0 |
| 1D10- 0 | 164 | 666. | 956. | 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 | * * B A D T H E R M O C O U P L E D A T A * | | | | | | |

RUN 43813F HEATER ROD - STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TJNRAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 1706.0 | 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 | 1506.8 | 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 | 1456.9 | 1496.6 | 1721.8 | 1570.0 | 1648.8 | 53.0 | 32.5 | 40.2 |
| 78 | 1558.7 | 1456.9 | 1521.0 | 1798.8 | 1619.9 | 1684.6 | 53.0 | 30.0 | 40.5 |
| 79 | 1506.3 | 1416.8 | 1428.8 | 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 | 1318.7 | 1319.7 | 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 | 1115.5 | 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 | 778.5 | 539.6 | 603.0 | 1044.9 | 706.7 | 865.7 | 121.0 | 85.5 | 104.4 |
| 139 | 615.0 | 652.0 | 662.5 | 1006.8 | 800.3 | 933.5 | 109.0 | 99.5 | 104.3 |

| ELEV | TEMP USE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|------------------|-------|-------|---------------------|--------|--------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 752.6 | 787.9 | 122.9 | 107.4 | 116.1 |
| 48 | 155.8 | 135.9 | 144.7 | 931.1 | 815.4 | 842.1 | 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 | 453.4 | 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 | 253.1 | 922.7 | 244.7 | 410.2 | 529.0 | 363.1 | 530.8 |
| 75 | 287.1 | 126.8 | 201.3 | 1129.5 | 238.2 | 712.9 | 645.0 | 204.1 | 382.0 |
| 76 | 259.1 | 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 | 653.6 | 892.8 | 371.8 | 210.1 | 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 | 1619.1 | 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 | 190.1 | 130.6 | 142.5 | 888.6 | 671.5 | 773.0 | 412.5 | 324.8 | 365.2 |
| 90 | 240.7 | 128.2 | 194.4 | 975.7 | 733.2 | 849.5 | 435.8 | 333.8 | 389.6 |
| 96 | 314.5 | 155.4 | 251.7 | 999.8 | 717.5 | 868.6 | 622.7 | 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 | 648.3 | 584.0 | 629.0 | 511.6 | 462.3 | 478.8 |
| 132 | 316.3 | 167.1 | 262.7 | 599.0 | 517.6 | 553.2 | 503.9 | 275.7 | 348.9 |
| 139 | 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 NUMBER 42514A

| ROD/ELEV | CHAN. NO | INITIAL AT FLECHT (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURBOPUMP TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|----------|---------------------------------|-----------------------------------|--------------------------------|--------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 9 | 969. | 1006. | 17. | 16.5 | 859. | 47.4 |
| 4C 3- 3 | 11 | 1053. | 1098. | 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 | 856. | 205.7 |
| 2A 5- 7 | 21 | 1455. | 1599. | 144. | 57.0 | 923. | 266.6 |
| 1D 6- 2 | 50 | 1469. | 1727. | 259.1 | 87.5 | 1007. | 344.5 |
| 2D 6- 2 | 53 | 1576. | 1803. | 228. | 68.0 | 966. | 335.5 |
| 3D 6- 2 | 58 | 1592. | 1939. | 263. | 83.3 | 965. | 341.6 |
| 5C 6- 2 | 61 | 1555. | 1647. | 142. | 71.0 | 1011. | 322.7 |
| 1D 6- 3 | 63 | 1456. | 1740. | 284. | 89.0 | 940. | 359.7 |
| 4B 6- 5 | 68 | 1553. | 1833. | 279. | 85.0 | 902. | 362.7 |
| 5D 6- 5 | 69 | 1481. | 1773. | 292. | 100.0 | 930. | 355.7 |
| 2A 6- 4 | 70 | 1485. | 1763. | 279. | 97.5 | 959. | 368.6 |
| 3B 6- 4 | 75 | 1582. | 1886. | 304. | 99.0 | 1001. | 352.7 |
| 3D 6- 6 | 79 | 1544. | 177. | 373. | 102.0 | 946. | 367.6 |
| 2D 6- 5 | 84 | 1586. | 1867. | 301. | 85.0 | 921. | 370.4 |
| 3C 6- 5 | 85 | 1564. | 1919. | 335. | 102.0 | 930. | 372.7 |
| 3E 6- 5 | 86 | 1512. | 1817. | 305. | 101.0 | 981. | 362.6 |
| 3F 6- 6 | 95 | 1566. | 1914. | 348. | 103.0 | 887. | 385.7 |
| 4A 6- 6 | 97 | 1426. | 1770. | 333. | 133.0 | 943. | 383.6 |
| 3D 7- 0 | 98 | 1148. | 1631. | 483. | 102.0 | 840. | 481.0 |
| 5C 6- 6 | 101 | 1465. | 1657. | 192. | 152.0 | 996. | 365.6 |
| 1C 7- 0 | 110 | 1345. | 1565. | 169. | 54.0 | 774. | 427.6 |
| 2E 7- 0 | 111 | 1423. | 1434. | 11. | 1.5 | 710. | 427.6 |
| 3D 7- 0 | 115 | 1445. | 1551. | 105. | 39.0 | 762. | 426.0 |
| 5A 7- 0 | 117 | 1313. | 1598. | 285. | 104.0 | 719. | 419.0 |
| 2E 7- 6 | 120 | 1388. | 1594. | 206.1 | 54.0 | 813. | 452.6 |
| 2C 7- 6 | 121 | 1350. | 1618. | 267. | 70.0 | 872. | 440.0 |
| 2E 7- 6 | 122 | 1167. | 1532. | 335. | 63.0 | 756. | 446.7 |
| 3A 7- 6 | 123 | 1277. | 1557. | 280. | 86.0 | 809. | 456.9 |
| 3B 7- 6 | 124 | 1443. | 1658. | 296. | 54.5 | 836. | 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 |
| 1E 8- 0 | 131 | 1115. | 1581. | 447. | 100.0 | 860. | 480.0 |
| 2F 8- 0 | 133 | 746. | 1122. | 416. | 114.0 | 695. | 509.0 |
| 4 6- 6 | 136 | 1559. | 1903. | 349. | 99.0 | 906. | 384.8 |
| 5B 8- 0 | 138 | 1143. | 1500. | 396. | 82.0 | 786. | 462.6 |
| 5C 8- 0 | 139 | 1086. | 1478. | 392. | 120.0 | 805. | 467.9 |
| 1C 8- 6 | 141 | 852. | 1359. | 507. | 104.0 | 816. | 501.0 |
| 1D 8- 6 | 142 | 786. | 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 | 842. | 519.0 |
| 5D 8- 6 | 148 | 661. | 1255. | 394. | 105.0 | 575. | 520.0 |
| 3D 9- 3 | 154 | 848. | 1378. | 530. | 149.0 | 719. | 526.1 |
| 4C 9- 3 | 155 | 930. | 1358. | 428. | 133.0 | 716. | 524.0 |
| 1D10- 0 | 161 | 940. | 1037. | 447. | 131.0 | 842. | 532.5 |
| 4B10- 0 | 164 | 786. | 1199. | 413.1 | 154.0 | 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 | 507. | 555.0 |
| 1D11- 6 | 172 | 456. | 843. | 386. | 182.0 | 367. | 417.3 |

RUN 42514A HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | | MAX TEMP (DEG F) | | | | TURNAROUND TIME (SEC) | | | |
|------|----------------------|--------|--------|-------|------------------|--------|--------|-------|-----------------------|-------|-------|-------|
| | MAX | MIN | MEAN | STDEV | MAX | MIN | MEAN | STDEV | MAX | MIN | MEAN | STDEV |
| 12 | 509.0 | 491.4 | 498.1 | 10.7 | 510.8 | 493.7 | 500.4 | 10.9 | 1.0 | 1.5 | 1.5 | 0.9 |
| 24 | 651.3 | 602.4 | 628.1 | 24.5 | 656.2 | 607.8 | 633.1 | 24.5 | 1.5 | 1.0 | 1.4 | 1.4 |
| 34 | 1052.4 | 948.6 | 956.8 | 54.8 | 1058.3 | 959.4 | 1007.8 | 58.9 | 16.5 | 1.0 | 6.3 | 6.3 |
| 48 | 1251.3 | 1144.0 | 1201.4 | 53.7 | 1321.5 | 1293.6 | 1295.2 | 53.7 | 38.0 | 26.0 | 33.4 | 33.4 |
| 60 | 1423.9 | 1307.1 | 1372.7 | 58.4 | 1492.5 | 1315.2 | 1413.4 | 58.4 | 53.0 | 1.5 | 34.4 | 34.4 |
| 67 | 1550.2 | 1440.4 | 1495.6 | 54.9 | 1675.5 | 1598.1 | 1519.0 | 54.9 | 59.5 | 34.5 | 49.8 | 49.8 |
| 70 | 1592.4 | 1476.4 | 1534.5 | 58.0 | 1776.5 | 1681.0 | 1731.6 | 58.0 | 70.5 | 54.0 | 63.5 | 63.5 |
| 71 | 1595.1 | 1472.2 | 1533.6 | 58.0 | 1803.3 | 1665.7 | 1736.2 | 58.0 | 70.5 | 67.0 | 69.3 | 69.3 |
| 72 | 1601.6 | 1462.5 | 1532.1 | 58.0 | 1824.8 | 1615.6 | 1725.0 | 58.0 | 100.0 | 52.0 | 70.6 | 70.6 |
| 75 | 1591.5 | 1447.5 | 1519.5 | 57.0 | 1855.3 | 1563.6 | 1773.3 | 57.0 | 98.0 | 34.5 | 74.1 | 74.1 |
| 75 | 1589.1 | 1450.1 | 1519.5 | 57.0 | 1874.5 | 1739.7 | 1817.3 | 57.0 | 100.0 | 64.5 | 88.1 | 88.1 |
| 76 | 1585.9 | 1443.5 | 1514.7 | 57.0 | 1897.2 | 1576.5 | 1806.0 | 57.0 | 125.0 | 56.0 | 90.3 | 90.3 |
| 77 | 1584.2 | 1430.7 | 1524.2 | 57.0 | 1918.9 | 1770.9 | 1846.6 | 57.0 | 117.0 | 65.0 | 94.2 | 94.2 |
| 77 | 1560.4 | 1430.3 | 1500.1 | 56.0 | 1916.6 | 1657.0 | 1831.1 | 56.0 | 152.0 | 63.5 | 110.3 | 110.3 |
| 84 | 1445.4 | 1260.6 | 1375.4 | 83.4 | 1598.1 | 1408.7 | 1520.7 | 83.4 | 104.0 | 1.5 | 50.2 | 50.2 |
| 90 | 1402.5 | 1157.2 | 1279.8 | 122.6 | 1694.1 | 1506.3 | 1551.8 | 122.6 | 90.0 | 54.0 | 74.6 | 74.6 |
| 90 | 1253.3 | 706.5 | 1115.3 | 277.0 | 1630.8 | 1122.4 | 1519.0 | 277.0 | 120.0 | 60.0 | 66.6 | 66.6 |
| 102 | 1004.7 | 785.4 | 893.3 | 109.7 | 1473.0 | 1080.2 | 1310.3 | 109.7 | 118.0 | 35.0 | 97.8 | 97.8 |
| 111 | 930.5 | 715.8 | 823.1 | 107.3 | 1383.4 | 1087.2 | 1253.1 | 107.3 | 166.0 | 14.0 | 130.7 | 130.7 |
| 120 | 780.0 | 590.1 | 682.9 | 90.0 | 1226.5 | 1026.4 | 1139.9 | 90.0 | 165.0 | 131.0 | 153.1 | 153.1 |
| 132 | 604.4 | 503.7 | 537.4 | 50.4 | 950.1 | 773.2 | 828.3 | 50.4 | 180.0 | 141.0 | 156.0 | 156.0 |
| 138 | 501.3 | 450.3 | 500.3 | 25.0 | 957.3 | 838.5 | 883.4 | 25.0 | 182.0 | 150.0 | 160.2 | 160.2 |

| ELEV | TEMP RISE (DEG F) | | | | QUENCH TEMP (DEG F) | | | | QUENCH TIME (SEC) | | | |
|------|-------------------|-------|-------|-------|---------------------|-------|-------|-------|-------------------|-------|-------|-------|
| | MAX | MIN | MEAN | STDEV | MAX | MIN | MEAN | STDEV | MAX | MIN | MEAN | STDEV |
| 12 | 2.2 | 1.8 | 2.3 | 0.4 | 498.0 | 294.2 | 445.5 | 54.4 | 3.5 | 1.1 | 2.3 | 0.6 |
| 24 | 5.0 | 4.9 | 4.9 | 0.1 | 646.7 | 597.1 | 614.9 | 24.9 | 8.0 | 4.0 | 5.3 | 1.3 |
| 39 | 17.1 | 5.4 | 11.0 | 6.4 | 860.9 | 766.3 | 835.4 | 44.8 | 48.8 | 46.8 | 47.7 | 1.0 |
| 40 | 104.6 | 56.0 | 83.6 | 24.3 | 1008.5 | 905.7 | 951.5 | 51.4 | 109.7 | 88.9 | 96.9 | 10.4 |
| 60 | 154.6 | 7.5 | 70.7 | 73.6 | 899.2 | 780.5 | 832.3 | 68.9 | 209.6 | 194.7 | 203.2 | 14.9 |
| 67 | 157.1 | 125.3 | 144.3 | 16.4 | 958.5 | 915.2 | 934.8 | 21.7 | 273.7 | 261.7 | 265.9 | 10.0 |
| 70 | 215.2 | 166.6 | 190.1 | 24.3 | 1000.6 | 915.2 | 951.8 | 43.2 | 303.7 | 288.4 | 296.3 | 10.0 |
| 71 | 213.2 | 153.5 | 202.6 | 30.0 | 1053.1 | 824.1 | 940.3 | 114.5 | 316.7 | 292.5 | 305.4 | 12.0 |
| 72 | 224.3 | 130.5 | 152.9 | 51.9 | 1060.0 | 824.9 | 933.9 | 119.6 | 326.5 | 302.0 | 315.0 | 12.0 |
| 74 | 263.4 | 116.0 | 232.0 | 73.7 | 1052.1 | 831.4 | 960.8 | 114.5 | 350.6 | 322.7 | 335.0 | 12.0 |
| 75 | 242.3 | 264.3 | 274.9 | 14.5 | 940.3 | 900.8 | 939.2 | 19.4 | 362.7 | 336.7 | 351.9 | 13.0 |
| 76 | 326.3 | 133.0 | 279.2 | 100.0 | 1000.9 | 912.1 | 951.4 | 44.6 | 368.6 | 343.8 | 357.5 | 12.0 |
| 77 | 335.1 | 300.6 | 322.3 | 17.3 | 980.6 | 915.3 | 939.6 | 37.1 | 384.5 | 355.8 | 372.7 | 14.0 |
| 78 | 372.9 | 141.7 | 325.0 | 116.6 | 995.7 | 886.5 | 929.0 | 54.6 | 390.8 | 362.8 | 382.0 | 14.0 |
| 84 | 604.7 | 111.5 | 345.3 | 246.6 | 787.8 | 698.6 | 730.8 | 44.6 | 439.7 | 415.0 | 427.0 | 12.0 |
| 86 | 482.7 | 266.0 | 304.2 | 108.4 | 884.2 | 755.8 | 823.2 | 64.2 | 458.0 | 435.3 | 449.2 | 12.0 |
| 90 | 482.7 | 353.0 | 403.7 | 65.4 | 818.6 | 696.4 | 795.2 | 111.4 | 509.0 | 462.9 | 460.4 | 12.0 |
| 102 | 553.3 | 256.3 | 397.0 | 148.5 | 782.3 | 558.0 | 627.3 | 112.2 | 520.0 | 487.0 | 504.1 | 12.0 |
| 111 | 530.0 | 273.7 | 351.1 | 128.2 | 771.5 | 550.4 | 696.8 | 110.6 | 535.0 | 453.9 | 503.4 | 12.0 |
| 120 | 522.2 | 374.0 | 450.0 | 43.0 | 712.1 | 593.2 | 656.2 | 56.5 | 556.0 | 440.3 | 526.0 | 12.0 |
| 132 | 345.7 | 224.1 | 280.9 | 60.8 | 739.9 | 503.3 | 621.9 | 116.3 | 555.0 | 176.5 | 386.0 | 12.0 |
| 138 | 451.0 | 324.5 | 383.1 | 63.3 | 592.0 | 285.6 | 476.7 | 153.2 | 547.7 | 414.0 | 451.2 | 12.0 |

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 SEAJET 21 KJG BUNDLE TEST SERIES
 RUN NUMBER 42014B

| ROD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE AT JET (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|--|--------------------------------|-----------------------------------|----------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3-3 | 9 | 1073. | 1080. | 7. | 2.0 | 803. | 79.0 |
| 4C 3-3 | 11 | 1222. | 1231. | 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. | 54.5 | 749. | 238.8 |
| 2A 5-7 | 21 | 1475. | 1680. | 205. | 66.5 | 725. | 305.5 |
| 1D 6-2 | 30 | 1419. | 1666. | 247. | 71.0 | 666. | 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. | 91.0 | 812. | 349.2 |
| 4B 6-3 | 68 | 1528. | 1761. | 232. | 106.0 | 861. | 392.4 |
| 9D 6-3 | 69 | 1411. | 1742. | 330. | 125.0 | 786. | 427.8 |
| 2A 6-4 | 70 | 1431. | 1723. | 292. | 136.0 | 849. | 409.8 |
| 2D 6-4 | 72 | 1535. | 1788. | 252. | 90.5 | 877. | 402.8 |
| 3B 6-4 | 75 | 1563. | 1816. | 253. | 108.0 | 873. | 402.3 |
| 3C 6-5 | 85 | 1600. | 1866. | 266. | 104.0 | 910. | 402.8 |
| 3E 6-5 | ** 8 A J T H E R M O C O U P L E J A T A * | | | | | | |
| 3C 6-6 | 95 | 1581. | 1695. | 314. | 106.0 | 897. | 414.8 |
| 3D 6-6 | 96 | 1544. | 1851. | 307. | 92.0 | 894. | 412.5 |
| 4A 6-6 | 97 | 1417. | 1766. | 300. | 154.0 | 822. | 433.4 |
| 4C 6-6 | 98 | 1551. | 1699. | 307. | 105.0 | 961. | 407.5 |
| 9C 6-6 | 101 | 1459. | 1716. | 257. | 122.0 | 893. | 420.2 |
| 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. | 306.8 |
| 2C 7-6 | 121 | 1437. | 1704. | 267. | 57.0 | 801. | 448.9 |
| 2E 7-6 | 122 | 1259. | 1524. | 264. | 83.0 | 713. | 503.8 |
| 3A 7-6 | 123 | 1402. | 1664. | 252. | 58.5 | 792. | 442.7 |
| 3B 7-6 | 124 | 1447. | 1735. | 288. | 81.0 | 860. | 491.0 |
| 4B 7-6 | 127 | 1452. | 1775. | 323. | 105.0 | 820. | 493.6 |
| 9C 7-6 | 128 | 1409. | 1716. | 307. | 74.0 | 795. | 447.2 |
| 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. | 453. | 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 | 705. | 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. | 688. | 602. | 200.0 | 262. | 596.0 |

RUN 42014B HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | MAX TEMP (DEG F) | | TURNAROUND TIME (SEC) | |
|------|----------------------|--------|------------------|--------|-----------------------|-------|
| | MAX | MIN | MAX | MIN | MAX | MIN |
| 12 | 588.7 | 543.2 | 588.7 | 546.0 | 1.0 | 0.0 |
| 12 | 875.0 | 798.4 | 878.9 | 831.0 | 2.0 | 1.5 |
| 24 | 1221.7 | 1079.3 | 1250.5 | 1146.9 | 20.0 | 14.3 |
| 39 | 1358.7 | 1247.6 | 1452.7 | 1386.8 | 51.5 | 35.0 |
| 48 | 1482.3 | 1352.8 | 1588.4 | 1485.8 | 64.5 | 2.0 |
| 60 | 1573.8 | 1451.0 | 1702.9 | 1669.0 | 68.0 | 51.3 |
| 67 | 1603.2 | 1423.2 | 1785.8 | 1647.2 | 80.5 | 71.2 |
| 70 | 1589.1 | 1409.1 | 1802.2 | 1653.7 | 90.5 | 67.0 |
| 72 | 1473.5 | 1403.9 | 1706.2 | 1618.8 | 107.0 | 79.0 |
| 74 | 1547.0 | 1418.9 | 1803.3 | 1665.7 | 135.0 | 82.0 |
| 75 | 1592.6 | 1411.4 | 1822.5 | 1631.7 | 125.0 | 81.0 |
| 76 | 1597.6 | 1426.4 | 1830.4 | 1693.0 | 135.0 | 90.5 |
| 77 | 1599.9 | 1395.2 | 1868.9 | 1798.9 | 131.0 | 92.5 |
| 78 | 1580.5 | 1407.1 | 1698.9 | 1716.3 | 154.0 | 92.0 |
| 84 | 1493.9 | 1351.6 | 1710.7 | 1525.7 | 123.0 | 51.3 |
| 90 | 1452.3 | 1259.3 | 1775.4 | 1523.6 | 106.0 | 67.0 |
| 96 | 1318.6 | 961.1 | 1702.9 | 1444.1 | 149.0 | 68.0 |
| 102 | 1200.9 | 831.8 | 1641.7 | 1224.4 | 168.0 | 67.5 |
| 111 | 1052.6 | 706.1 | 1433.4 | 1204.7 | 185.0 | 79.0 |
| 120 | 905.0 | 623.9 | 1316.3 | 1062.8 | 195.0 | 119.0 |
| 132 | 570.1 | 514.1 | 1049.0 | 787.8 | 159.0 | 139.0 |
| 138 | 649.2 | 286.6 | 1037.7 | 825.1 | 200.0 | 138.0 |

| ELEV | TEMP RISE (DEG F) | | QUENCH TEMP (DEG F) | | QUENCH TIME (SEC) | |
|------|-------------------|-------|---------------------|-------|-------------------|-------|
| | MAX | MIN | MAX | MIN | MAX | MIN |
| 12 | 2.8 | 0.0 | 565.3 | 537.5 | 4.0 | 3.0 |
| 24 | 6.9 | 3.9 | 799.8 | 692.7 | 24.5 | 21.1 |
| 39 | 28.8 | 7.0 | 854.4 | 785.8 | 64.4 | 76.4 |
| 48 | 143.1 | 48.7 | 926.3 | 860.9 | 130.7 | 128.5 |
| 60 | 191.1 | 12.1 | 895.3 | 733.8 | 240.4 | 235.2 |
| 67 | 205.3 | 129.1 | 1004.8 | 843.8 | 335.5 | 299.4 |
| 70 | 233.8 | 185.6 | 981.4 | 837.5 | 341.7 | 316.6 |
| 72 | 232.7 | 191.1 | 1003.7 | 787.4 | 393.7 | 348.9 |
| 74 | 236.5 | 203.3 | 923.6 | 781.0 | 359.5 | 328.2 |
| 75 | 330.5 | 193.9 | 1066.0 | 776.0 | 397.9 | 361.7 |
| 76 | 303.4 | 221.1 | 960.6 | 786.0 | 627.8 | 349.2 |
| 77 | 369.7 | 265.6 | 951.2 | 710.5 | 413.5 | 387.8 |
| 78 | 255.0 | 250.9 | 926.9 | 760.5 | 417.8 | 402.7 |
| 84 | 250.2 | 66.1 | 960.7 | 809.0 | 436.7 | 407.3 |
| 90 | 250.2 | 185.5 | 784.1 | 677.2 | 494.5 | 457.4 |
| 96 | 310.7 | 388.2 | 899.7 | 715.7 | 515.9 | 485.0 |
| 102 | 208.7 | 381.4 | 651.1 | 677.6 | 534.0 | 213.8 |
| 111 | 489.0 | 231.7 | 738.2 | 561.1 | 575.0 | 242.8 |
| 120 | 612.6 | 370.5 | 759.3 | 598.5 | 589.4 | 546.3 |
| 132 | 378.6 | 235.8 | 770.3 | 534.2 | 519.7 | 520.9 |
| 138 | 601.6 | 325.8 | 624.4 | 665.3 | 531.0 | 360.7 |
| | | | 550.8 | 264.3 | 519.0 | 443.3 |
| | | | 484.7 | | | 277.0 |

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 42314A

FLECHT SEASET 21 P70 BUNDLE TEST SERIES

RUN NUMBER 42314C

| 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 | 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 | 1538. | 1734. | 226. | 76.0 | 899. | 312.6 |
| 10 6- 2 | 50 | 1470. | 1658. | 159. | 88.5 | 916. | 385.8 |
| 20 6- 2 | 53 | 1490. | 1705. | 215. | 89.5 | 631. | 402.0 |
| 30 6- 2 | 58 | 1550. | 1681. | 131. | 88.5 | 709. | 409.0 |
| 43 6- 2 | 60 | 1562. | 1734. | 173. | 76.5 | 943. | 384.6 |
| 5C 6- 2 | 61 | 1472. | 1733. | 251. | 89.0 | 282. | 664.0 |
| 10 6- 3 | 63 | 1459. | 1680. | 221. | 88.5 | 987. | 393.9 |
| 50 6- 3 | 69 | 1476. | 1690. | 213. | 99.0 | 1018. | 376.5 |
| 2A 6- 4 | 70 | 1474. | 1678. | 203. | 73.0 | 1034. | 293.5 |
| 3A 6- 4 | 75 | 1574. | 1766. | 190. | 75.5 | 865. | 404.5 |
| 20 6- 5 | 84 | 1551. | 1789. | 237. | 89.0 | 884. | 416.7 |
| 3C 6- 5 | 85 | 1527. | 1856. | 250. | 88.5 | 963. | 407.8 |
| 3E 6- 5 | 86 | 1536. | 1730. | 193. | 89.5 | 908. | 417.8 |
| 3C 6- 6 | 95 | 1532. | 1976. | 224. | 88.5 | 944. | 419.6 |
| 30 6- 6 | 96 | 1554. | 1861. | 303. | 103.0 | 795. | 437.8 |
| 4A 6- 6 | 97 | 1471. | 1727. | 257. | 88.5 | 1014. | 348.3 |
| 4C 6- 6 | 98 | 1543. | 1971. | 298. | 88.5 | 868. | 432.3 |
| 5C 6- 6 | 101 | 1557. | 1763. | 206. | 89.5 | 906. | 417.8 |
| 1C 7- 0 | 110 | 1424. | 1599. | 171. | 76.0 | 760. | 470.6 |
| 2A 7- 0 | 111 | 1445. | 1550. | 104. | 50.0 | 705. | 471.2 |
| 30 7- 0 | 115 | 1457. | 1656. | 199. | 76.0 | 701. | 477.9 |
| 5B 7- 0 | 117 | 1369. | 1592. | 223. | 136.0 | 725. | 457.9 |
| 2A 7- 5 | 120 | 1424. | 1648. | 220. | 63.0 | 811. | 515.6 |
| 2C 7- 5 | 121 | 1414. | 1723. | 305. | 76.0 | 724. | 524.5 |
| 2E 7- 6 | 122 | 1097. | 1553. | 456. | 101.0 | 745. | 509.8 |
| 3A 7- 6 | 123 | 1415. | 1531. | 216. | 63.0 | 756. | 502.6 |
| 3B 7- 6 | 124 | 1430. | 1674. | 237. | 62.5 | 817. | 514.9 |
| 4A 7- 6 | 127 | 1436. | 1711. | 274. | 75.0 | 816. | 520.5 |
| 5C 7- 6 | 128 | 1424. | 1692. | 254. | 89.0 | 720. | 493.9 |
| 1C 8- 0 | 131 | 1229. | 1594. | 365. | 99.0 | 723. | 559.2 |
| 2E 8- 0 | 133 | 957. | 1514. | 559. | 118.0 | 741. | 554.7 |
| 30 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 | 1334. | 1657. | 320. | 102.0 | 774. | 531.0 |
| 1C 8- 6 | 141 | 1036. | 1432. | 396. | 89.0 | 587. | 586.0 |
| 10 8- 6 | 142 | 792. | 1227. | 435. | 129.0 | 573. | 583.0 |
| 2C 8- 6 | 145 | 1134. | 1417. | 279. | 75.5 | 645. | 587.0 |
| 4A 8- 6 | 148 | 1043. | 1350. | 307. | 104.0 | 640. | 569.8 |
| 30 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 |
| 4410- 0 | 164 | 859. | 1270. | 406. | 162.0 | 605. | 655.9 |
| 5010- 0 | 167 | 714. | 1194. | 480. | 198.0 | 750. | 591.3 |
| 2411- 0 | 168 | 554. | 941. | 277. | 208.0 | 603. | 459.2 |
| 4C11- 0 | 170 | 652. | 1082. | 420. | 147.0 | 510. | 622.0 |
| 1011- 6 | 172 | 417. | 944. | 527. | 175.0 | 595. | 597.8 |

*** R A D T H E R M O C O U P L E D A T A ***

RUN 42314C HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 657.7 | 586.4 | 610.4 | 658.3 | 587.6 | 611.4 | .5 | .5 | .5 |
| 24 | 709.2 | 622.0 | 669.2 | 709.9 | 627.1 | 670.6 | 2.0 | .5 | 1.0 |
| 39 | 1251.3 | 1102.0 | 1161.2 | 1284.9 | 1149.4 | 1207.7 | 31.5 | 21.0 | 26.0 |
| 49 | 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 |
| 73 | 1593.5 | 1408.0 | 1535.4 | 1861.0 | 1552.7 | 1778.9 | 86.5 | 48.5 | 72.8 |
| 71 | 1547.6 | 1457.9 | 1522.6 | 1818.0 | 1724.1 | 1761.3 | 89.5 | 46.5 | 88.4 |
| 72 | 1521.6 | 1512.4 | 1517.0 | 1775.4 | 1773.1 | 1774.2 | 89.5 | 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 | 1458.9 | 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 | 1896.4 | 1711.9 | 1777.6 | 98.0 | 47.0 | 89.9 |
| 78 | 1583.3 | 1414.0 | 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 | 1438.0 | 1086.7 | 1377.7 | 1757.5 | 1552.7 | 1573.5 | 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 | 791.4 | 1014.0 | 1535.5 | 1226.5 | 1405.0 | 129.0 | 75.5 | 102.3 |
| 111 | 1029.2 | 695.0 | 925.1 | 1449.4 | 1159.8 | 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 | 490.0 | 573.7 | 1082.0 | 837.5 | 902.5 | 208.0 | 147.0 | 171.3 |
| 134 | 638.7 | 416.8 | 501.9 | 1048.0 | 864.4 | 953.6 | 179.0 | 165.0 | 173.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 710.0 | 717.2 | 730.4 | 26.6 | 20.5 | 24.2 |
| 39 | 59.4 | 33.6 | 46.5 | 987.8 | 833.7 | 955.5 | 86.9 | 71.9 | 81.1 |
| 49 | 161.7 | 95.6 | 121.5 | 942.3 | 875.7 | 908.2 | 145.8 | 138.5 | 141.7 |
| 60 | 273.8 | 177.1 | 224.7 | 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 | 237.4 | 254.7 | 1027.8 | 850.4 | 944.8 | 365.6 | 347.7 | 356.9 |
| 72 | 260.7 | 253.9 | 257.3 | 946.3 | 937.8 | 942.1 | 357.7 | 355.6 | 356.6 |
| 74 | 215.2 | 130.4 | 170.4 | 950.9 | 810.2 | 790.6 | 409.0 | 312.8 | 383.7 |
| 75 | 277.2 | 114.1 | 187.9 | 1017.6 | 792.9 | 910.4 | 407.0 | 376.5 | 395.0 |
| 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 | 341.5 | 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 | 529.7 | 546.3 |
| 102 | 490.8 | 279.0 | 390.1 | 644.7 | 572.8 | 618.8 | 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 | 619.8 | 622.0 | 290.8 | 421.7 |
| 134 | 527.2 | 345.4 | 451.7 | 594.6 | 283.4 | 509.7 | 624.8 | 249.0 | 517.5 |

42314C-3

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 42514.

FLECHT BEAKER 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 42014D

| ROD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TRIP POINT TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|----------|--------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 7 | 1092. | 1143. | 54. | 32.0 | 824. | 85.3 |
| 4C 3- 3 | 9 | 1216. | 1259. | 42. | 20.0 | 877. | 80.9 |
| 1C 4- 0 | 10 | 1303. | 1300. | 77. | 35.0 | 986. | 120.8 |
| 2A 5- 0 | 13 | 1414. | 1689. | 272. | 82.0 | 834. | 241.7 |
| 2A 5- 7 | 16 | 1476. | 1654. | 178. | 70.0 | 804. | 308.5 |
| 2D 6- 2 | 30 | 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. | 1763. | 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. | 77.0 | 853. | 394.7 |
| 5D 6- 3 | 68 | 1464. | 1712. | 248. | 100.0 | 923. | 366.6 |
| 2A 6- 4 | 70 | 1476. | 1744. | 268. | 111.0 | 870. | 412.4 |
| 3B 6- 4 | 75 | 1600. | 1618. | 218. | 84.5 | 928. | 397.4 |
| 1D 6- 5 | 82 | 1463. | 1737. | 275. | 112.0 | 914. | 405.8 |
| 2D 6- 5 | 94 | 1557. | 1606. | 449. | 128.0 | 416. | 408.6 |
| 3C 6- 5 | 95 | 1605. | 1671. | 266. | 77.0 | 1024. | 390.7 |
| 3E 6- 5 | 86 | 1493. | 1726. | 233. | 99.0 | 882. | 402.5 |
| 3C 6- 6 | 97 | 1598. | 1698. | 300. | 97.5 | 1018. | 401.8 |
| 3D 6- 6 | 98 | 1574. | 1644. | 275. | 97.0 | 876. | 412.8 |
| 4A 6- 6 | 100 | 1475. | 1760. | 285. | 99.0 | 824. | 435.6 |
| 4C 6- 6 | 101 | 1590. | 1660. | 300. | 96.0 | 954. | 413.8 |
| 5C 6- 6 | 103 | 1540. | 1784. | 240. | 97.0 | 869. | 414.5 |
| 1C 7- 0 | 110 | 1384. | 1366. | 134. | 73.5 | 736. | 456.0 |
| 2B 7- 0 | 111 | 1456. | 1640. | 184. | 62.0 | 746. | 462.8 |
| 3D 7- 0 | 115 | 1464. | 1635. | 171. | 52.5 | 790. | 457.9 |
| 5B 7- 0 | 117 | 1344. | 1593. | 249. | 96.5 | 716. | 451.9 |
| 2B 7- 6 | 121 | 1446. | 1603. | 217. | 73.0 | 748. | 507.5 |
| 3C 7- 6 | 122 | 1418. | 1741. | 322. | 75.0 | 818. | 520.7 |
| 2E 7- 6 | 123 | 1313. | 1409. | 177. | 75.0 | 739. | 514.6 |
| 3A 7- 6 | 124 | 1435. | 1677. | 241. | 75.0 | 740. | 494.6 |
| 3B 7- 6 | 125 | 1472. | 1714. | 242. | 93.0 | 830. | 494.0 |
| 4B 7- 6 | 128 | 1458. | 1710. | 252. | 51.5 | 773. | 517.6 |
| 5C 7- 6 | 129 | 1440. | 1683. | 243. | 77.5 | 796. | 492.8 |
| 1C 8- 0 | 132 | 1176. | 1554. | 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. | 96.0 | 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. | 1407. | 270. | 97.5 | 662. | 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 42014D HEATCK KJD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TIRYARDUNG TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 1663.6 | 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 | 1554.1 | 1426.4 | 1517.3 | 1845.1 | 1673.4 | 1756.6 | 99.0 | 75.0 | 90.6 |
| 75 | 1573.8 | 1463.9 | 1518.2 | 1828.7 | 1707.3 | 1755.1 | 132.0 | 87.5 | 101.9 |
| 76 | 1600.3 | 1476.2 | 1540.8 | 1858.7 | 1714.0 | 1747.0 | 111.0 | 84.5 | 96.0 |
| 77 | 1504.6 | 1461.7 | 1527.1 | 1881.3 | 1722.9 | 1790.1 | 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 |
| 93 | 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 | 1176.2 | 886.6 | 1072.5 | 1499.0 | 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 | 997.0 | 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) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 52.4 | 42.3 | 52.7 | 877.1 | 815.2 | 836.6 | 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 | 277.1 | 156.6 | 227.6 | 980.8 | 767.1 | 889.1 | 365.9 | 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 | 845.0 | 420.9 | 382.7 | 404.2 |
| 77 | 328.0 | 233.5 | 269.0 | 1023.7 | 802.0 | 945.3 | 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 | 524.8 | 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 | 504.0 | 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 | 349.9 | 606.7 | 496.0 | 536.8 | 623.0 | 534.0 | 580.0 |
| 138 | 375.8 | 353.4 | 368.8 | 585.8 | 437.3 | 513.3 | 537.0 | 99.7 | 414.6 |

42014D-3

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

FLIGHT SAFETY 21 ROD BUNDLE TEST SERIES
 RIN NUPFR42014E

| 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 | 117A. | 1247. | 51. | 70.5 | 802. | 107.8 |
| 4C 3- 3 | 10 | 127A. | 1289. | 13. | 22.5 | 857. | 57.9 |
| 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. | 288. | 100.0 | 233. | 687.0 |
| 2D 6- 2 | 39 | 1428. | 1792. | 274. | 96.5 | 763. | 385.7 |
| 1D 6- 4 | 47 | 1467. | 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. | 383.5 |
| 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 | 1478. | 1648. | 173. | 52.0 | 768. | 407.2 |
| 2D 6- 5 | 61 | 1524. | 1789. | 265. | 95.0 | 872. | 398.5 |
| 3B 6- 5 | 63 | 1550. | 1804. | 254. | 92.5 | 788. | 389.7 |
| 3C 6- 6 | 72 | 1549. | 1892. | 322. | 106.0 | 658. | 407.4 |
| 4C 6- 6 | 75 | 1540. | 1872. | 292. | 103.0 | 873. | 403.7 |
| 3C 6- 7 | * * * R A D T H E R M O C O U P L E D A T A * * | | | | | | |
| 3E 6- 7 | 83 | 1492. | 1753. | 251. | 97.5 | 892. | 400.2 |
| 3D 6- 8 | 86 | 1543. | 1804. | 351. | 99.5 | 849. | 433.9 |
| 4A 6- 8 | 87 | 1446. | 1705. | 259. | 91.5 | 747. | 437.8 |
| 1C 7- 0 | 93 | 1416. | 1557. | 136. | 62.5 | 747. | 417.9 |
| 2B 7- 0 | 94 | 1447. | 1478. | 16. | 2.0 | 643. | 446.6 |
| 3D 7- 0 | 98 | 1440. | 1572. | 92. | 61.5 | 763. | 484.0 |
| 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 | * * * R A D T H E R M O C O U P L E D A T A * * | | | | | | |
| 3B 7- 6 | 115 | 1178. | 1520. | 443. | 97.5 | 708. | 532.0 |
| 4B 7- 6 | 120 | 1449. | 1782. | 313. | 92.0 | 865. | 471.7 |
| 5C 7- 6 | 122 | 1435. | 1734. | 299. | 98.0 | 811. | 483.1 |
| 1C 8- 0 | 124 | 1209. | 1588. | 375. | 109.0 | 805. | 509.8 |
| 2E 8- 0 | 128 | 974. | 1428. | 454. | 107.0 | 807. | 482.6 |
| 3D 8- 0 | 129 | 1248. | 1682. | 434. | 106.0 | 808. | 516.0 |
| 5B 8- 0 | 133 | 1244. | 1545. | 301. | 85.0 | 732. | 513.9 |
| 5C 8- 0 | 134 | 1318. | 1677. | 359. | 92.5 | 754. | 510.8 |
| 1C 8- 6 | 135 | 1058. | 1459. | 401. | 109.0 | 695. | 543.9 |
| 1D 8- 6 | 136 | 981. | 1368. | 385. | 111.0 | 663. | 560.9 |
| 2C 8- 6 | 138 | 1183. | 1630. | 456. | 110.0 | 752. | 538.0 |
| 4B 8- 6 | 143 | 1154. | 1530. | 375. | 81.0 | 719. | 527.9 |
| 5D 8- 6 | 145 | 1027. | 1528. | 499. | 141.0 | 657. | 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 |
| 1010- 0 | 157 | 845. | 1217. | 372. | 188.0 | 586. | 601.0 |
| 4B10- 0 | 164 | 846. | 1269. | 423. | 154.0 | 681. | 564.3 |
| 5D10- 0 | 168 | 709. | 1143. | 434. | 153.0 | 712. | 507.1 |
| 2A11- 0 | 168 | 565. | 805. | 241. | 206.0 | 529. | 476.3 |
| 4C11- 0 | 169 | 647. | 1104. | 436. | 147.0 | 534. | 582.0 |
| 1D11- 6 | 171 | 304. | 859. | 555. | 149.0 | 561. | 573.3 |

PHN 42014E HEATFR ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 693.6 | 648.3 | 671.5 | 685.7 | 652.0 | 674.1 | 1.5 | 1.0 | 1.2 |
| 24 | 955.2 | 878.3 | 913.3 | 960.4 | 893.0 | 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 | 1391.0 | 1557.1 | 1463.4 | 1511.4 | 53.5 | 43.5 | 49.3 |
| 60 | 1533.3 | 1496.0 | 1517.5 | 1776.5 | 1639.5 | 1722.3 | 78.0 | 54.5 | 69.7 |
| 67 | 1500.3 | 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 | 1711.6 | 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 | 1904.4 | 1634.1 | 1721.5 | 110.0 | 43.5 | 81.7 |
| 78 | 1590.3 | 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 | 116.0 | 82.0 | 94.4 |
| 80 | 1543.0 | 1430.1 | 1489.7 | 1893.6 | 1705.1 | 1786.6 | 124.0 | 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 | 1268.7 | 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 | 149.0 | 65.5 | 142.1 |
| 132 | 667.3 | 471.5 | 552.0 | 1103.7 | 805.4 | 898.9 | 206.0 | 136.0 | 162.8 |
| 138 | 595.5 | 304.4 | 445.0 | 859.2 | 857.2 | 858.2 | 154.0 | 149.0 | 151.5 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 3.7 | 2.1 | 2.8 | 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 | 143.8 | 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 | 188.4 | 219.7 | 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 | 218.6 | 243.4 | 1078.9 | 660.1 | 965.9 | 343.1 | 216.8 | 302.7 |
| 76 | 304.2 | 289.8 | 297.4 | 1075.8 | 666.6 | 840.8 | 406.9 | 354.6 | 375.5 |
| 77 | 264.7 | 163.2 | 222.0 | 1159.4 | 720.3 | 860.1 | 467.2 | 296.8 | 377.5 |
| 78 | 322.0 | 180.9 | 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 | 956.4 | 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 | 817.8 | 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 | 482.8 | 507.9 |
| 102 | 523.5 | 288.1 | 399.8 | 827.8 | 652.1 | 728.6 | 560.9 | 417.6 | 515.4 |
| 111 | 543.1 | 294.9 | 448.9 | 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 | 345.0 | 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 |

42014E-3

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 42514 A

FLECHT SCASET 21 ROD BUNDLE TEST SERIES

RUN NUMBER 41914F

| ROD/ELEV | CHAN. NO | INITIAL AT FLCUD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|----------|--------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 5 | 116C. | 1248. | 68. | 32.5 | 622. | 90.6 |
| 4C 3- 3 | 6 | 1265. | 1295. | 27. | 23.0 | 657. | 64.4 |
| 1C 4- 0 | 7 | 1364. | 1461. | 72. | 47.0 | 919. | 138.5 |
| 2A 5- 0 | 12 | 1521. | 1758. | 237. | 59.5 | 941. | 222.0 |
| 2A 5- 7 | 14 | 1535. | 1642. | 107. | 37.5 | 662. | 278.6 |
| 5C 6- 2 | 33 | 1439. | 1634. | 195. | 95.5 | 280. | 572.0 |
| 2D 6- 3 | 39 | 1476. | 1596. | 120. | 76.5 | 763. | 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. | 353.6 |
| 5D 6- 4 | 56 | 1464. | 1493. | 30. | 80.5 | 912. | 307.6 |
| 1D 6- 5 | 58 | 1434. | 1632. | 193. | 97.5 | 1016. | 281.6 |
| 2A 6- 5 | 59 | 1451. | 1625. | 174. | 84.5 | 672. | 275.6 |
| 2D 6- 5 | 62 | 1510. | 1655. | 145. | 83.5 | 660. | 338.7 |
| 3B 6- 5 | 63 | 1546. | 1711. | 165. | 90.0 | 557. | 371.6 |
| 3C 6- 6 | 69 | 1536. | 1778. | 241. | 98.5 | 1157. | 337.4 |
| 3E 6- 6 | 70 | 1460. | 1634. | 174. | 91.5 | 267. | 363.6 |
| 4C 6- 6 | 73 | 1570. | 1714. | 144. | 90.0 | 750. | 362.0 |
| 5C 6- 6 | 76 | 1521. | 1652. | 131. | 91.0 | 797. | 376.9 |
| 3D 6- 7 | 85 | 1557. | 1751. | 194. | 95.0 | 789. | 364.4 |
| 3C 6- 8 | 93 | 1575. | 1784. | 209. | 91.0 | 900. | 359.3 |
| 4A 6- 8 | 95 | 1421. | 1633. | 212. | 95.0 | 983. | 303.4 |
| 1C 7- 0 | 109 | 1454. | 1538. | 83. | 67.0 | 664. | 420.0 |
| 2B 7- 0 | 110 | 1462. | 1505. | 13. | 1.5 | 722. | 402.0 |
| 3D 7- 0 | 113 | 1527. | 1542. | 15. | 1.5 | 712. | 351.6 |
| 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. | 468.5 |
| 2E 7- 6 | 123 | 1242. | 1393. | 151. | 76.5 | 641. | 391.6 |
| 3A 7- 6 | 124 | 1436. | 1529. | 93. | 70.5 | 641. | 410.6 |
| 3B 7- 6 | 125 | 1496. | 1647. | 151. | 68.5 | 786. | 426.9 |
| 4B 7- 6 | 129 | 1461. | 1618. | 157. | 67.5 | 776. | 423.0 |
| 5C 7- 6 | 132 | 1422. | 1607. | 185. | 94.0 | 740. | 435.6 |
| 1C 8- 0 | 133 | 1244. | 1525. | 261. | 93.0 | 755. | 456.0 |
| 2E 8- 0 | 136 | 1121. | 1360. | 239. | 90.5 | 762. | 426.4 |
| 3D 8- 0 | 136 | 1336. | 1616. | 280. | 93.0 | 679. | 424.9 |
| 5B 8- 0 | 143 | 1157. | 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 | 146 | 1160. | 1513. | 332. | 97.5 | 767. | 460.7 |
| 4B 8- 6 | 153 | 1185. | 1507. | 322. | 92.5 | 681. | 463.0 |
| 5D 8- 6 | 155 | 1057. | 1392. | 295. | 80.5 | 674. | 461.2 |
| 3D 9- 3 | 159 | 1062. | 1326. | 324. | 97.5 | 737. | 476.9 |
| 4C 9- 3 | 161 | 1061. | 1422. | 361. | 97.5 | 660. | 495.5 |
| 1010- 0 | 164 | 620. | 1001. | 381. | 178.0 | 726. | 479.9 |
| 4B10- 0 | 168 | 655. | 1302. | 407. | 121.0 | 626. | 519.0 |
| 5D10- 0 | 169 | 753. | 1102. | 349. | 117.0 | 704. | 467.1 |
| 2A11- 0 | 171 | 536. | 310. | 274. | 127.0 | 566. | 466.0 |
| 4C11- 0 | 172 | 646. | 1058. | 363. | 125.0 | 531. | 526.0 |
| 1011- 6 | 174 | 361. | 634. | 534. | 149.0 | 567. | 504.6 |

RUN 41914F HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 727.7 | 670.5 | 703.1 | 730.6 | 681.5 | 706.0 | 1.0 | 1.0 | 1.0 |
| 24 | 925.6 | 920.0 | 925.0 | 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 | 1343.0 | 1394.0 | 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 | 1477.3 | 1550.4 | 1725.2 | 1633.0 | 1667.6 | 70.5 | 37.0 | 54.3 |
| 70 | 1599.9 | 1362.0 | 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 | 1400.0 | 1652.6 | 1562.5 | 1607.5 | 97.5 | 61.5 | 69.5 |
| 73 | 1431.7 | 1354.5 | 1393.1 | 1643.9 | 1604.7 | 1624.3 | 106.0 | 63.5 | 94.7 |
| 74 | 1475.7 | 1361.4 | 1439.0 | 1678.8 | 1579.8 | 1625.4 | 98.5 | 70.0 | 86.7 |
| 75 | 1400.2 | 1304.7 | 1437.9 | 1739.7 | 1553.8 | 1623.9 | 119.0 | 70.5 | 92.0 |
| 76 | 1538.1 | 1392.3 | 1467.8 | 1744.1 | 1483.7 | 1613.0 | 101.0 | 26.5 | 83.7 |
| 77 | 1545.7 | 1439.2 | 1485.0 | 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 | 1500.2 | 1434.6 | 1504.5 | 1750.8 | 1600.8 | 1682.8 | 112.0 | 64.0 | 84.7 |
| 80 | 1574.4 | 1421.0 | 1495.2 | 1784.3 | 1610.1 | 1696.2 | 95.0 | 54.0 | 80.4 |
| 81 | 1491.7 | 1491.7 | 1451.7 | 1657.0 | 1657.0 | 1657.0 | 93.5 | 42.5 | 63.5 |
| 84 | 1527.3 | 1360.6 | 1462.0 | 1563.6 | 1474.1 | 1521.7 | 95.5 | 1.5 | 52.8 |
| 90 | 1496.2 | 1241.0 | 1407.0 | 1657.0 | 1392.8 | 1564.7 | 94.0 | 61.5 | 75.1 |
| 96 | 1360.3 | 1120.0 | 1279.7 | 1648.3 | 1360.3 | 1549.1 | 155.0 | 74.0 | 103.7 |
| 102 | 1198.6 | 848.5 | 1055.7 | 1512.8 | 1005.7 | 1349.0 | 123.0 | 77.0 | 90.5 |
| 111 | 1060.9 | 874.2 | 968.0 | 1421.6 | 1060.6 | 1277.4 | 121.0 | 75.0 | 103.3 |
| 120 | 894.4 | 619.7 | 793.7 | 1309.0 | 1000.6 | 1156.7 | 178.0 | 117.0 | 124.5 |
| 132 | 695.5 | 479.0 | 560.4 | 1056.3 | 781.5 | 872.7 | 131.0 | 125.0 | 127.8 |
| 138 | 620.1 | 300.6 | 509.5 | 1025.3 | 830.2 | 896.6 | 149.0 | 125.0 | 137.7 |

| ELEV | TEMP WISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 3.0 | 2.4 | 3.0 | 677.8 | 639.8 | 668.8 | 5.0 | 4.4 | 4.7 |
| 24 | 3.9 | 3.4 | 3.9 | 731.8 | 731.8 | 731.8 | 30.0 | 30.0 | 30.0 |
| 39 | 60.3 | 26.6 | 42.9 | 857.3 | 821.8 | 842.5 | 90.9 | 84.4 | 86.0 |
| 48 | 72.2 | 40.6 | 59.3 | 921.2 | 840.9 | 900.0 | 138.5 | 125.6 | 133.4 |
| 60 | 236.6 | 102.8 | 155.4 | 941.1 | 840.6 | 886.0 | 234.8 | 222.6 | 230.1 |
| 67 | 135.7 | 94.6 | 111.1 | 1004.1 | 869.0 | 943.0 | 293.8 | 275.6 | 283.2 |
| 70 | 173.4 | 20.4 | 105.2 | 1415.0 | 256.5 | 793.7 | 613.0 | 6.2 | 300.1 |
| 71 | 136.1 | 120.4 | 132.3 | 1003.3 | 292.3 | 642.8 | 574.0 | 303.6 | 438.6 |
| 72 | 209.2 | 264.6 | 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 | 576.0 | 569.5 |
| 74 | 218.1 | 132.2 | 185.6 | 775.7 | 236.1 | 371.8 | 646.0 | 336.0 | 510.3 |
| 75 | 281.2 | 84.1 | 186.0 | 1456.1 | 231.8 | 608.2 | 658.0 | 216.5 | 441.0 |
| 76 | 268.4 | 24.6 | 145.3 | 1034.9 | 231.8 | 625.4 | 663.0 | 276.7 | 441.3 |
| 77 | 246.4 | 136.4 | 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 | 160.6 | 201.0 | 982.8 | 798.4 | 883.3 | 398.9 | 306.4 | 364.4 |
| 81 | 165.3 | 165.3 | 165.3 | 830.6 | 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 | 234.5 | 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 | 169.4 | 307.4 | 778.5 | 540.8 | 666.3 | 519.0 | 426.8 | 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 | 533.6 | 230.4 | 387.1 | 586.7 | 551.4 | 574.3 | 535.0 | 504.6 | 517.8 |

41914F-3

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 NUMBER 42907A

| 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. | 1212. | 108. | 28.5 | 873. | 87.4 |
| 4C 3- 3 | 11 | 1166. | 1270. | 104. | 23.0 | 907. | 85.4 |
| 1C 4- 0 | 14 | 1314. | 1490. | 171. | 40.5 | 878. | 140.9 |
| 2A 5- 0 | 17 | 1340. | 1579. | 233.1 | 59.5 | 800. | 216.4 |
| 2A 5- 7 | 21 | 1475. | 1746. | 272. | 59.5 | 1024. | 265.7 |
| 10 6- 2 | 50 | 1439. | 1810. | 371. | 79.5 | 951. | 334.7 |
| 20 6- 2 | 53 | 1567. | 1940. | 373. | 75.5 | 875. | 332.7 |
| 30 6- 2 | 58 | 1579. | 1974. | 395. | 75.5 | 984. | 335.7 |
| 5C 6- 2 | 61 | 1520. | 1811. | 291. | 56.0 | 974. | 314.3 |
| 10 6- 3 | 63 | 1401. | 1782. | 381. | 90.5 | 994. | 345.8 |
| 48 6- 3 | 68 | 1543. | 1928. | 385. | 89.0 | 919. | 352.8 |
| 50 6- 3 | 69 | 1471. | 1840. | 368. | 87.5 | 881. | 341.6 |
| 2A 6- 4 | 70 | 1472. | 1336. | 364. | 83.5 | 954. | 355.7 |
| 33 6- 4 | 75 | 1506. | 1984. | 418. | 86.5 | 1004. | 350.7 |
| 33 6- 6 | 79 | 1500. | 1967. | 467. | 86.0 | 943. | 374.7 |
| 20 6- 5 | 84 | 1522. | 1948. | 426. | 79.5 | 869. | 361.6 |
| 3C 6- 5 | 85 | 1558. | 2006. | 449. | 79.5 | 947. | 382.7 |
| 3E 6- 5 | 86 | 1472. | 1867. | 394. | 82.5 | 1013. | 353.8 |
| 0C 6- 6 | 45 | 1535. | 1996. | 461. | 84.5 | 922. | 373.7 |
| 4A 6- 6 | 97 | 1426. | 1825. | 397. | 88.5 | 967. | 364.6 |
| 30 8- 0 | 98 | 1105. | 1649. | 544. | 105.0 | 807. | 479.4 |
| 5C 8- 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 | 842. | 413.2 |
| 30 7- 0 | 115 | 1366. | 1692. | 326. | 59.5 | 744. | 410.0 |
| 5B 7- 0 | 117 | 1301. | 1643. | 341. | 90.0 | 888. | 403.7 |
| 23 7- 6 | * * * 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 | 900. | 423.0 |
| 2E 7- 6 | 122 | 1057. | 1452. | 355. | 80.0 | 735. | 425.0 |
| 3A 7- 6 | 123 | 1264. | 1612. | 348. | 84.5 | 741. | 444.0 |
| 3B 7- 6 | 124 | 1300. | 1758. | 398. | 70.0 | 793. | 431.0 |
| 4B 7- 6 | 127 | 1338. | 1758. | 420. | 76.5 | 777. | 435.0 |
| 5C 7- 6 | 128 | 1214. | 1501. | 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 | 900. | 366.7 |
| 5B 8- 0 | 138 | 1113. | 1440. | 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. | 402.8 |
| 10 8- 6 | 142 | 769. | 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 | 620. | 491.0 |
| 5J 8- 6 | 148 | 874. | 1413. | 534. | 115.0 | 601. | 493.0 |
| 30 7- 3 | 154 | 820. | 1342. | 522. | 130.0 | 609. | 499.0 |
| 4C 9- 3 | 156 | 900. | 1333. | 433. | 108.0 | 606. | 491.0 |
| 1010- 0 | 161 | 544. | 1032. | 433. | 134.0 | 706. | 437.8 |
| 4810- 0 | 164 | 762. | 1159. | 396. | 109.0 | 619. | 517.0 |
| 5010- 0 | 167 | 667. | 1041. | 353. | 121.0 | 759. | 369.5 |
| 2A11- 0 | 168 | 503. | 740. | 237. | 104.0 | 656. | 264.0 |
| 4C11- 0 | 170 | 568. | 934. | 345. | 116.0 | 454. | 503.8 |
| 1011- 6 | 172 | 318. | 786. | 467. | 144.0 | 286. | 358.0 |

NUN 42907A HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | 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 | 545.6 | 780.0 | 612.5 | 896.5 | 839.6 | 865.7 | 17.0 | 14.5 | 16.0 |
| 34 | 1100.2 | 1060.4 | 1112.0 | 1270.3 | 1188.9 | 1223.7 | 28.5 | 23.0 | 25.0 |
| 46 | 1337.4 | 1235.7 | 1288.9 | 1521.4 | 1438.7 | 1474.8 | 51.0 | 40.0 | 43.8 |
| 60 | 1435.6 | 1293.1 | 1350.6 | 1664.6 | 1525.7 | 1578.3 | 59.5 | 36.5 | 47.1 |
| 67 | 1505.1 | 1405.9 | 1455.4 | 1877.9 | 1747.5 | 1784.6 | 63.0 | 54.0 | 60.8 |
| 70 | 1548.6 | 1495.6 | 1551.4 | 1964.8 | 1809.0 | 1885.1 | 77.0 | 67.0 | 71.5 |
| 71 | 1547.5 | 1488.3 | 1521.6 | 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 | 1438.4 | 1530.0 | 1978.5 | 1779.8 | 1899.4 | 87.0 | 56.0 | 76.9 |
| 75 | 1571.5 | 1401.4 | 1515.6 | 1992.3 | 1782.1 | 1907.4 | 90.5 | 76.5 | 82.6 |
| 76 | 1505.4 | 1450.6 | 1520.3 | 2002.7 | 1836.1 | 1920.4 | 90.5 | 77.5 | 82.6 |
| 77 | 1557.5 | 1350.3 | 1480.2 | 2006.2 | 1775.4 | 1908.0 | 105.0 | 76.5 | 88.2 |
| 78 | 1534.8 | 1415.3 | 1480.5 | 1995.7 | 1754.2 | 1902.3 | 99.6 | 60.0 | 82.6 |
| 84 | 1400.6 | 1117.4 | 1215.5 | 1715.1 | 1537.6 | 1639.3 | 90.0 | 33.5 | 64.5 |
| 90 | 1354.7 | 1030.1 | 1240.1 | 1757.5 | 1451.6 | 1640.0 | 114.0 | 70.0 | 86.1 |
| 96 | 1215.1 | 714.4 | 1071.7 | 1698.4 | 1150.5 | 1543.3 | 132.0 | 79.5 | 103.2 |
| 102 | 1037.3 | 784.0 | 849.9 | 1509.5 | 1108.9 | 1329.8 | 144.0 | 35.5 | 84.2 |
| 111 | 904.4 | 786.6 | 831.0 | 1379.2 | 1032.5 | 1224.1 | 130.0 | 74.5 | 103.5 |
| 120 | 762.4 | 548.4 | 632.2 | 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 | 310.2 | 477.4 | 899.6 | 776.3 | 830.0 | 144.0 | 126.0 | 135.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 24.2 | 20.7 | 23.1 | 560.0 | 540.1 | 547.8 | 8.5 | 7.4 | 8.4 |
| 24 | 54.6 | 40.1 | 53.2 | 800.6 | 753.2 | 758.8 | 32.4 | 28.7 | 29.9 |
| 34 | 122.5 | 104.1 | 111.6 | 907.2 | 761.3 | 847.2 | 88.8 | 65.4 | 87.2 |
| 46 | 211.6 | 170.4 | 185.5 | 1012.6 | 877.8 | 931.4 | 140.9 | 121.3 | 129.9 |
| 60 | 251.0 | 147.7 | 227.6 | 865.3 | 775.4 | 808.8 | 219.7 | 213.6 | 216.8 |
| 67 | 312.6 | 272.2 | 289.1 | 1023.5 | 909.1 | 957.2 | 270.6 | 265.7 | 268.4 |
| 70 | 306.2 | 313.4 | 333.7 | 954.8 | 892.4 | 933.0 | 303.8 | 294.6 | 298.9 |
| 71 | 341.4 | 312.1 | 347.2 | 1041.5 | 877.7 | 946.2 | 313.7 | 293.7 | 305.2 |
| 72 | 365.5 | 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 | 430.6 | 364.0 | 400.1 | 1004.1 | 903.7 | 950.6 | 358.7 | 336.7 | 350.6 |
| 77 | 440.6 | 344.2 | 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 | 364.8 |
| 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 | 753.0 | 481.0 | 444.0 | 458.4 |
| 102 | 553.7 | 269.5 | 429.4 | 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 | 403.4 | 468.4 |
| 120 | 554.9 | 350.9 | 435.5 | 758.9 | 287.7 | 600.9 | 517.0 | 384.5 | 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 | 477.7 | 511.0 | 341.0 | 426.1 |

42907A-3

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 $\pm 0.4\%$ variation^(a)

a. Relative to specified conditions

FLECHT SEASET 21 RJ0 BUNDLE TEST SERIES

RUN NUMBER 43715A

| ROD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNDOWN TIME (SECONDS) | QUENCH TEMPERATURE (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. | 1787. | 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. | 93.0 | 978. | 338.7 |
| 5C 6- 2 | 61 | 1492. | 1777. | 284. | 57.0 | 958. | 319.4 |
| 1D 6- 3 | 63 | 1440. | 1770. | 330. | 59.5 | 989. | 342.6 |
| 4B 6- 3 | 68 | 1535. | 1898. | 364. | 83.5 | 917. | 349.8 |
| 5D 6- 3 | 69 | 1457. | 1793. | 336. | 93.0 | 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. | 1841. | 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 | * * B A D T H E R M J C O U P L E U A T A * | | | | | | |
| 1C 7- 0 | 110 | 1421. | 1687. | 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 | * * B A D T H E R M J C O U P L E U A T A * | | | | | | |
| 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. | 137.0 | 652. | 502.0 |
| 4C 9- 3 | 156 | 1030. | 1308. | 307. | 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. | 106.0 | 494. | 493.3 |
| 1D11- 6 | 172 | 343. | 825. | 482. | 152.0 | 288. | 329.0 |

RUN 43715A HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 923.2 | 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 | 1566.4 | 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 | 1215.6 | 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) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 250.6 | 195.8 | 228.1 | 821.2 | 769.3 | 800.9 | 223.7 | 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 | 853.6 | 933.5 | 328.5 | 303.5 | 316.4 |
| 74 | 396.7 | 283.7 | 352.4 | 991.8 | 880.4 | 945.9 | 343.8 | 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 | 367.2 | 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 | 467.0 | 449.6 | 461.8 |
| 102 | 405.7 | 280.3 | 350.5 | 885.0 | 765.2 | 807.3 | 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 |

43715A-3

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 RJO BUNDLE TEST SERIES
 RUN NUMBER 42415B

| ROD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE ATISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|----------|--------------------------------|-----------------------------------|---------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 9 | 1057. | 1192. | 130. | 28.5 | 805. | 94.9 |
| 4C 3- 3 | 11 | 1198. | 1311. | 113. | 25.5 | 848. | 91.9 |
| 1C 4- 0 | 14 | 1303. | 1451. | 148. | 33.6 | 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. | 36.0 | 918. | 341.6 |
| 2D 6- 2 | 53 | 1513. | 1849. | 336. | 39.0 | 754. | 356.0 |
| 3D 6- 2 | 58 | 1554. | 1867. | 313. | 92.0 | 924. | 342.9 |
| 9C 6- 2 | 61 | 1494. | 1800. | 306. | 88.5 | 1011. | 333.8 |
| 1D 6- 3 | 63 | 1447. | 1749. | 302. | 90.0 | 869. | 319.8 |
| 4B 6- 3 | 68 | 1540. | 1855. | 315. | 97.0 | 893. | 363.5 |
| 9D 6- 3 | 69 | 1428. | 1797. | 369. | 125.0 | 830. | 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. | 386.8 |
| 3D 6- 6 | 96 | 1533. | 1942. | 408. | 90.5 | 961. | 376.8 |
| 4A 6- 6 | 97 | 1423. | 1810. | 387. | 113.0 | 800. | 391.8 |
| 4C 6- 6 | 98 | 1544. | 1951. | 407. | 91.0 | 918. | 382.7 |
| 9C 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. | 1756. | 283. | 73.0 | 781. | 415.0 |
| 5B 7- 0 | 117 | 1347. | 1641. | 274. | 112.0 | 893. | 441.4 |
| 2F 7- 6 | 120 | 1393. | 1752. | 359. | 93.0 | 809. | 404.9 |
| 2C 7- 6 | 121 | 1405. | 1787. | 381. | 90.0 | 764. | 406.8 |
| 2E 7- 6 | 122 | 1238. | 1571. | 333. | 53.0 | 800. | 465.9 |
| 3A 7- 6 | 123 | 1377. | 1731. | 354. | 99.0 | 910. | 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 |
| 9C 7- 6 | 128 | 1392. | 1760. | 373. | 111.0 | 842. | 445.8 |
| 1C 8- 0 | 131 | 1155. | 1616. | 461. | 96.0 | 749. | 480.1 |
| 2E 8- 0 | 133 | 870. | 1392. | 222. | 75.0 | 596. | 461.0 |
| 3D 8- 0 | 136 | 1226. | 1722. | 496. | 95.0 | 840. | 462.9 |
| 5B 8- 0 | 138 | 1148. | 1590. | 441. | 116.0 | 806. | 483.7 |
| 9C 8- 0 | 139 | 1269. | 1706. | 437. | 113.0 | 786. | 475.8 |
| 1C 8- 6 | 141 | 974. | 1400. | 426. | 91.0 | 810. | 500.0 |
| 1D 8- 6 | 142 | 778. | 1160. | 387. | 98.0 | 849. | 490.7 |
| 2C 8- 6 | 143 | 1059. | 1499. | 440. | 98.0 | 850. | 508.0 |
| 4B 8- 6 | 145 | 1156. | 1652. | 496. | 112.0 | 724. | 504.0 |
| 9D 8- 6 | 148 | 1014. | 1381. | 367. | 98.0 | 860. | 518.0 |
| 3D 9- 3 | 154 | 897. | 1348. | 450. | 118.0 | 898. | 500.0 |
| 4C 9- 3 | 156 | 985. | 1390. | 405. | 95.0 | 861. | 510.5 |
| 1010- 0 | 161 | 605. | 1139. | 534. | 192.0 | 851. | 526.9 |
| 4B10- 0 | 164 | 864. | 1242. | 378. | 124.0 | 823. | 539.0 |
| 5D10- 0 | 167 | 693. | 1056. | 363. | 127.0 | 756. | 466.8 |
| 2A11- 0 | 168 | 554. | 739. | 185. | 99.5 | 802. | 436.0 |
| 4C11- 0 | 172 | 303. | 614. | 510. | 179.0 | 279. | 526.0 |
| 1011- 6 | | | | | | | |

* * B A D T H E R M O C O U P L E D A T A *

RUN 424158 HEATER RWD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 522.3 | 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 |
| 73 | 1508.0 | 1488.5 | 1543.8 | 1949.9 | 1788.8 | 1871.1 | 93.5 | 76.0 | 85.0 |
| 71 | 1511.5 | 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 | 1719.0 | 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 | 125.9 | 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 | 1606.7 | 1571.1 | 1727.3 | 139.0 | 63.0 | 91.0 |
| 96 | 1280.2 | 870.2 | 1183.1 | 1724.2 | 1391.8 | 1639.2 | 129.0 | 72.0 | 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 | 90.0 | 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 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | 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 | 94.6 |
| 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 | 297.7 | 271.6 | 280.4 |
| 70 | 341.9 | 291.3 | 327.3 | 1003.4 | 978.6 | 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 | 869.5 | 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 | 479.6 | 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 | 624.9 | 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 | 645.5 | 545.0 | 460.8 | 528.4 |
| 132 | 311.3 | 173.5 | 223.3 | 695.6 | 594.2 | 631.5 | 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 |

424158-3

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), 300 1.78 m (70 in.) |
| Initial peak rod power | 2.6 kW/m (0.79 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 (948°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 NUMBER 42915B

| 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 | 1075. | 1212. | 137.1 | 31.5 | 765.1 | 98.4 |
| 4C 3- 3 | 11 | 1217. | 1315. | 98. | 25.0 | 866. | 95.4 |
| 1C 4- 0 | 14 | 1300.1 | 1448. | 149.1 | 32.0 | 811. | 141.0 |
| 2A 5- 0 | 17 | 1370. | 1625. | 255.1 | 59.0 | 794. | 228.9 |
| 2A 5- 7 | 21 | 1483. | 1790. | 306.1 | 86.5 | 938. | 291.6 |
| 10 0- 2 | 30 | 1424. | 1740. | 315.1 | 78.0 | 911.1 | 354.7 |
| 20 6- 2 | 53 | 1509.1 | 1844. | 335.1 | 87.0 | 693. | 380.1 |
| 30 6- 2 | 58 | 1552. | 1856. | 304.1 | 86.5 | 878. | 350.5 |
| 9C 6- 2 | 61 | 1485. | 1801. | 316.1 | 87.0 | 983. | 347.0 |
| 10 6- 3 | 63 | 1436. | 1751. | 315.1 | 87.0 | 863.1 | 331.3 |
| 4B 6- 3 | 68 | 1530.1 | 1847. | 317.1 | 87.0 | 874. | 369.7 |
| 50 6- 3 | 69 | 1421. | 1802. | 381.1 | 122.0 | 848. | 403.7 |
| 2A 6- 4 | 70 | 1446. | 1762. | 316.1 | 93.0 | 824. | 381.8 |
| 20 6- 4 | 72 | 1530. | 1870. | 340.1 | 79.5 | 848. | 391.6 |
| 3B 6- 4 | 75 | 1563. | 1909. | 345.1 | 86.5 | 917. | 378.9 |
| 3C 6- 5 | 85 | 1599. | 1942. | 343.1 | 87.0 | 884. | 385.6 |
| 3E 6- 5 | 86 | 1470. | 1798. | 328.1 | 89.5 | 894. | 391.8 |
| 3C 6- 6 | 93 | 1580. | 1966. | 386.1 | 89.0 | 930. | 399.7 |
| 30 6- 6 | 96 | 1544. | 1938. | 395.1 | 87.0 | 947. | 384.6 |
| 4A 6- 6 | 97 | 1430. | 1800. | 370.1 | 96.0 | 818. | 402.6 |
| 4C 6- 6 | 98 | 1552. | 1946. | 394.1 | 96.0 | 961. | 391.8 |
| 9C 6- 6 | 101 | 1460. | 1809. | 349.1 | 109.0 | 951. | 386.7 |
| 1C 7- 0 | 110 | 1431. | 1681. | 250.1 | 56.5 | 724.1 | 442.9 |
| 2B 7- 0 | 111 | 1470. | 1690. | 220. | 35.5 | 775. | 437.0 |
| 30 7- 0 | 115 | 1497. | 1752. | 255.1 | 38.0 | 817. | 422.0 |
| 5B 7- 0 | 117 | 1369. | 1634. | 265.1 | 75.0 | 744. | 449.0 |
| 2B 7- 6 | 120 | 1454. | 1774. | 320.1 | 80.0 | 818. | 472.7 |
| 2C 7- 6 | 121 | 1471. | 1804. | 334. | 72.5 | 775. | 477.9 |
| 2E 7- 6 | 122 | 1288. | 1572. | 284.1 | 57.5 | 665.1 | 485.5 |
| 3A 7- 6 | 123 | 1422. | 1737. | 316. | 83.0 | 799. | 460.6 |
| 3B 7- 6 | 124 | 1471. | 1817. | 346.1 | 74.5 | 844. | 466.9 |
| 4B 7- 6 | 127 | 1464. | 1798. | 334.1 | 74.5 | 810. | 471.2 |
| 9C 7- 6 | 128 | 1413. | 1753. | 340.1 | 86.5 | 887. | 468.9 |
| 1C 8- 0 | 131 | 1286. | 1665. | 378.1 | 85.5 | 742. | 505.8 |
| 2E 8- 0 | 133 | 1172. | 1526. | 354.1 | 65.0 | 689. | 498.0 |
| 30 8- 0 | 136 | 1337. | 1759. | 422.1 | 96.5 | 854. | 483.9 |
| 9B 8- 0 | 138 | 1194. | 1599. | 405.1 | 117.0 | 683. | 512.3 |
| 9C 8- 0 | 139 | 1309. | 1707. | 398.1 | 115.0 | 786. | 504.9 |
| 1C 8- 6 | 141 | 1054. | 1437. | 382.1 | 80.0 | 607. | 530.0 |
| 10 8- 6 | 142 | 806. | 1261. | 455.1 | 54.5 | 627. | 519.0 |
| 2C 8- 6 | 143 | 1143. | 1525. | 382.1 | 77.0 | 648. | 531.0 |
| 4B 8- 6 | 145 | 1227. | 1645. | 418.1 | 87.0 | 730. | 522.9 |
| 50 8- 6 | 148 | 1090. | 1429. | 339.1 | 66.5 | 617. | 525.8 |
| 30 9- 3 | 154 | 985. | 1425. | 439.1 | 117.0 | 693. | 522.0 |
| 4C 9- 3 | 156 | 1066. | 1438. | 372. | 89.5 | 662. | 532.0 |
| 1010- 0 | 161 | 579. | 1118. | 539. | 151.0 | 633. | 550.0 |
| 4B10- 0 | 164 | 921. | 1275. | 353.1 | 97.5 | 634. | 554.0 |
| 5010- 0 | 167 | 732. | 1142. | 410.1 | 124.0 | 745. | 477.0 |
| 2A11- 0 | 169 | 582. | 802. | 220.1 | 116.0 | 637. | 469.0 |
| 4C11- 0 | 172 | 281. | 849. | 568.1 | 166.0 | 498. | 539.9 |
| 1011- 6 | | | | | | | |

* * * A D T H E R M O C O U P L E D A T A * * *

RUN 42915B HEATER POD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 1246.1 | 1293.3 | 1550.6 | 1420.3 | 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 | 1474.6 | 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 | 112.2 |
| 76 | 1600.1 | 1443.3 | 1512.1 | 1914.3 | 1762.0 | 1842.6 | 96.5 | 79.5 | 89.8 |
| 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) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 39.3 |
| 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 | 251.0 | 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 | 377.7 |
| 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 | 720.3 | 588.8 | 629.1 | 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 | 272.2 | 399.7 |
| 138 | 568.1 | 267.2 | 422.0 | 539.6 | 468.6 | 500.7 | 569.0 | 377.7 | 519.4 |

42915B-3

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, +3.3% 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 RJD BUNDLE TEST SERIES

RUN NUMBER 42715C

| ROD/ELEV | CHAM. 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 | 1072. | 1222. | 151. | 39.0 | 813. | 86.7 |
| 4C 3- 3 | 11 | 1236. | 1361. | 125. | 27.5 | 840. | 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 | 30 | 1476. | 1704. | 228. | 55.5 | 976. | 340.7 |
| 2D 6- 2 | 33 | 1497. | 1746. | 250. | 80.5 | 636. | 367.9 |
| 3D 6- 2 | 38 | 1556. | 1761. | 205. | 30.0 | 51. | 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. | 59.5 | 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 5- 5 | 97 | 1465. | 1770. | 304. | 57.0 | 950. | 362.7 |
| 4C 6- 6 | 98 | 1574. | 1903. | 329. | 79.5 | 928. | 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 | 744. | 419.4 |
| 3D 7- 0 | 115 | 1459. | 1721. | 262. | 36.5 | 676. | 431.4 |
| 5B 7- 0 | 117 | 1357. | 1590. | 233. | 41.0 | 768. | 418.2 |
| 2B 7- 6 | 120 | 1428. | 1730. | 302. | 55.0 | 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. | 31.0 | 736. | 478.9 |
| 3D 8- 0 | 136 | 1294. | 1713. | 419. | 86.5 | 738. | 486.5 |
| 5B 9- 0 | 138 | 1197. | 1542. | 345. | 72.0 | 730. | 473.0 |
| 5C 9- 0 | 139 | 1336. | 1661. | 326. | 79.5 | 786. | 470.9 |
| 1C 9- 6 | 141 | 1035. | 1440. | 405. | 88.5 | 547. | 512.1 |
| 1D 9- 6 | 142 | 773. | 1249. | 477. | 112.0 | 606. | 492.0 |
| 2C 9- 6 | * * B A D T H E R M O C O U P L E D A T A * | | | | | | |
| 4B 8- 6 | 145 | 1154. | 1457. | 303. | 43.0 | 612. | 523.0 |
| 5D 8- 6 | 148 | 1058. | 1424. | 365. | 72.0 | 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. | 73.0 | 447. | 538.0 |
| 5D11- 6 | 172 | 321. | 823. | 502. | 152.0 | 575. | 426.0 |

RUN 42715C HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 15.5 | 15.5 |
| 39 | 1236.4 | 1071.7 | 1141.7 | 1361.4 | 1222.3 | 1284.7 | 37.0 | 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 | 1710.3 | 1655.9 | 1684.1 | 85.5 | 56.0 | 71.8 |
| 67 | 1606.3 | 1483.7 | 1520.1 | 1923.5 | 1778.7 | 1819.9 | 77.5 | 62.0 | 69.6 |
| 73 | 1590.5 | 1500.2 | 1528.2 | 1960.2 | 1653.7 | 1864.0 | 84.5 | 45.5 | 73.6 |
| 71 | 1547.3 | 1452.1 | 1518.1 | 1899.4 | 1783.2 | 1850.0 | 86.0 | 79.3 | 81.5 |
| 72 | 1509.0 | 1497.6 | 1503.3 | 1825.9 | 1825.9 | 1825.9 | 87.5 | 67.0 | 77.3 |
| 74 | 1576.8 | 1455.3 | 1518.4 | 2792.1 | 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 | 1600.3 | 1452.6 | 1534.6 | 1883.6 | 1722.9 | 1788.7 | 57.5 | 61.5 | 56.8 |
| 77 | 1593.3 | 1436.0 | 1513.3 | 1900.6 | 1728.5 | 1812.2 | 79.0 | 45.3 | 67.7 |
| 78 | 1576.0 | 1421.0 | 1518.5 | 1914.3 | 1760.9 | 1828.4 | 95.0 | 42.0 | 70.9 |
| 84 | 1475.1 | 1216.0 | 1399.4 | 1743.0 | 1450.5 | 1625.5 | 71.5 | 28.0 | 42.9 |
| 90 | 1444.1 | 1291.7 | 1464.5 | 1776.5 | 1565.7 | 1703.7 | 90.0 | 45.3 | 55.2 |
| 66 | 1345.1 | 1030.1 | 1255.6 | 1712.9 | 1500.9 | 1637.3 | 83.0 | 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 | 850.3 | 984.7 | 1398.1 | 1228.5 | 1328.8 | 120.0 | 57.0 | 80.2 |
| 120 | 849.1 | 516.0 | 757.3 | 1283.1 | 1061.4 | 1184.5 | 163.0 | 61.0 | 119.5 |
| 122 | 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 | 743.0 | 870.5 | 157.0 | 116.0 | 134.2 |

| ELEV | TEMP (ISE (DEG F) | | | WJENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|--------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 17.3 | 11.7 | 14.4 | 633.1 | 589.8 | 605.9 | 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 | 674.2 | 612.8 | 638.9 | 97.4 | 86.7 | 92.8 |
| 48 | 227.9 | 175.8 | 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 | 296.8 | 970.6 | 942.6 | 958.0 | 283.7 | 272.7 | 277.4 |
| 70 | 359.6 | 253.5 | 336.4 | 1022.9 | 898.7 | 943.4 | 315.7 | 303.7 | 309.1 |
| 71 | 352.0 | 310.8 | 331.9 | 1062.0 | 844.2 | 964.0 | 320.8 | 307.7 | 314.2 |
| 72 | 328.3 | 310.9 | 326.6 | 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 | 243.3 | 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 | 1085.5 | 831.4 | 922.7 | 393.4 | 321.7 | 374.6 |
| 84 | 231.9 | 232.9 | 251.1 | 792.4 | 906.0 | 744.9 | 435.0 | 402.0 | 419.5 |
| 90 | 347.2 | 251.2 | 301.2 | 832.5 | 740.7 | 789.6 | 463.9 | 416.9 | 450.2 |
| 76 | 500.8 | 325.7 | 381.7 | 788.4 | 722.4 | 766.8 | 493.0 | 469.8 | 480.2 |
| 102 | 478.7 | 302.8 | 390.7 | 640.2 | 387.3 | 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 |
| 122 | 333.6 | 214.6 | 261.8 | 664.0 | 447.3 | 593.6 | 588.0 | 244.9 | 357.0 |
| 138 | 501.5 | 261.3 | 392.8 | 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 m ³ /sec (1.11 in. ³ /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: -0.5% 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 NUMBER 43315C

| 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 | 1031. | 1213. | 134.1 | 36.5 | 870. | 87.0 |
| 4C 3- 3 | 11 | 1245. | 1346. | 100.1 | 25.5 | 841. | 99.4 |
| 1C 4- 0 | 14 | 1351. | 1520. | 159.1 | 44.5 | 868. | 151.8 |
| 2A 5- 0 | 17 | 1433. | 1644. | 241.1 | 54.0 | 852. | 229.9 |
| 2A 5- 7 | 21 | 1429. | 1785. | 297.1 | 64.0 | 925. | 288.7 |
| 10 6- 2 | 50 | 1457. | 1693. | 226.1 | 79.0 | 962. | 359.9 |
| 20 6- 2 | 53 | 1436. | 1756. | 260.1 | 86.0 | 851. | 373.0 |
| 30 6- 2 | 58 | 1553. | 1754. | 231.1 | 64.0 | 895. | 380.7 |
| 4B 6- 2 | 60 | 1559. | 1784. | 225.1 | 64.0 | 935. | 366.8 |
| 5C 6- 2 | 61 | 1461. | 1763. | 322.1 | 93.0 | 548. | 369.8 |
| 10 6- 3 | 63 | 1455. | 1711. | 256.1 | 86.0 | 985. | 368.9 |
| 50 6- 3 | 69 | 1475. | 1706. | 232.1 | 49.5 | 938. | 371.7 |
| 2A 6- 4 | 70 | 1453. | 1723. | 270.1 | 62.5 | 1011. | 301.6 |
| 3A 6- 4 | 75 | 1572. | 1826. | 254.1 | 54.0 | 903. | 370.7 |
| 20 6- 5 | 84 | 1552. | 1836. | 284.1 | 82.0 | 859. | 389.1 |
| 3C 6- 5 | 85 | 1527. | 1901. | 324.1 | 64.0 | 972. | 376.7 |
| 3E 6- 5 | 86 | 1519. | 1748. | 229.1 | 81.5 | 946. | 375.7 |
| 3C 6- 6 | 95 | 1533. | 1913. | 330.1 | 81.0 | 962. | 387.7 |
| 30 6- 6 | 96 | 1557. | 1886. | 327.1 | 82.0 | 818. | 408.5 |
| 4A 6- 6 | 97 | 1465. | 1754. | 299.1 | 62.5 | 908. | 386.6 |
| 4C 6- 6 | 98 | 1532. | 1897. | 315.1 | 78.0 | 924. | 394.6 |
| 5C 6- 6 | 101 | 1537. | 1758. | 221.1 | 49.5 | 925. | 387.9 |
| 1C 7- 0 | 110 | 1438. | 1651. | 212.1 | 49.0 | 775. | 432.9 |
| 2A 7- 0 | 111 | 1452. | 1659. | 238.1 | 28.5 | 716. | 429.7 |
| 30 7- 0 | 115 | 1477. | 1711. | 234.1 | 30.5 | 639. | 445.0 |
| 5A 7- 0 | 117 | 1394. | 1613. | 229.1 | 51.5 | 789. | 425.9 |
| 2A 7- 6 | 120 | 1444. | 1722. | 276.1 | 52.0 | 818. | 469.4 |
| 2C 7- 6 | 121 | 1457. | 1772. | 315.1 | 62.5 | 797. | 483.7 |
| 2E 7- 6 | 122 | 1225. | 1536. | 241.1 | 63.5 | 723. | 460.5 |
| 3A 7- 6 | 123 | 1426. | 1709. | 292.1 | 52.0 | 798. | 458.7 |
| 3B 7- 6 | 124 | 1463. | 1763. | 320.1 | 51.5 | 812. | 471.8 |
| 4B 7- 6 | 127 | 1457. | 1770. | 313.1 | 62.5 | 740. | 481.9 |
| 5C 7- 6 | 129 | 1440. | 1711. | 270.1 | 56.5 | 778. | 454.1 |
| 1C 8- 0 | 131 | 1254. | 1633. | 369.1 | 84.0 | 746. | 516.9 |
| 2E 8- 0 | 133 | 1039. | 1541. | 452.1 | 91.0 | 797. | 498.9 |
| 30 8- 0 | 136 | 1327. | 1730. | 432.1 | 82.0 | 833. | 509.8 |
| 5A 8- 0 | 138 | 1226. | 1567. | 340.1 | 86.5 | 719. | 495.4 |
| 5C 8- 0 | 139 | 1351. | 1679. | 318.1 | 81.5 | 801. | 485.9 |
| 1C 8- 6 | 141 | 1086. | 1448. | 352.1 | 62.5 | 578. | 544.6 |
| 10 8- 6 | 142 | 827. | 1295. | 398.1 | 52.0 | 593. | 527.7 |
| 2C 8- 6 | 145 | 1170. | 1459. | 299.1 | 49.5 | 610. | 543.9 |
| 4B 8- 6 | 148 | 1076. | 1460. | 354.1 | 93.5 | 653. | 529.9 |
| 30 9- 3 | 154 | 952. | 1430. | 458.1 | 93.5 | 588. | 552.0 |
| 4C 9- 3 | 156 | 1045. | 1376. | 331.1 | 64.0 | 581. | 542.0 |
| 1010- 0 | 161 | 589. | 1078. | 499.1 | 155.0 | 283. | 482.0 |
| 4310- 0 | 164 | 825. | 1235. | 340.1 | 95.5 | 603. | 569.0 |
| 5010- 0 | 167 | 722. | 1073. | 351.1 | 97.0 | 585. | 460.2 |
| 2A11- 0 | 168 | 538. | 812. | 224.1 | 121.0 | 618. | 387.0 |
| 4C11- 0 | 170 | 730. | 1001. | 320.1 | 93.5 | 435. | 558.0 |
| 1011- 6 | 172 | 419. | 831. | 413.1 | 146.0 | 588. | 438.0 |

* * * * * THERMOCOUPLE DATA * * * * *

RUN 43315C HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 684.6 | 600.4 | 629.6 | 695.2 | 613.1 | 641.0 | 6.0 | 5.0 | 5.6 |
| 24 | 906.2 | 813.6 | 863.3 | 930.1 | 862.3 | 905.0 | 15.0 | 13.0 | 14.0 |
| 33 | 1245.2 | 1080.9 | 1151.6 | 1345.6 | 1215.0 | 1274.9 | 36.5 | 25.5 | 32.6 |
| 49 | 1381.2 | 1307.2 | 1346.8 | 1560.3 | 1520.3 | 1537.6 | 58.5 | 38.5 | 47.2 |
| 63 | 1428.1 | 1398.5 | 1403.4 | 1708.5 | 1643.9 | 1573.4 | 84.0 | 54.0 | 69.3 |
| 67 | 1609.0 | 1478.9 | 1517.5 | 1921.2 | 1769.0 | 1812.9 | 81.0 | 64.0 | 72.5 |
| 73 | 1592.5 | 1470.3 | 1547.4 | 1962.5 | 1821.6 | 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 | 1809.6 | 1807.4 | 92.5 | 63.0 | 77.8 |
| 74 | 1576.5 | 1442.5 | 1511.4 | 1784.3 | 1665.8 | 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 |
| 73 | 1593.0 | 1417.9 | 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 | 1548.2 | 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 |
| 95 | 1370.8 | 1088.7 | 1287.6 | 1730.5 | 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 | 1436.2 | 1215.0 | 1332.4 | 93.8 | 56.5 | 72.1 |
| 123 | 916.0 | 589.2 | 772.4 | 1307.9 | 1072.7 | 1190.1 | 155.0 | 56.5 | 115.2 |
| 132 | 700.4 | 483.4 | 592.8 | 1000.6 | 801.3 | 862.7 | 134.0 | 83.0 | 107.9 |
| 139 | 672.5 | 418.6 | 516.3 | 988.2 | 774.2 | 877.7 | 146.0 | 112.0 | 129.8 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 |
| 33 | 149.9 | 100.4 | 127.4 | 876.0 | 807.1 | 848.5 | 99.4 | 87.0 | 94.4 |
| 49 | 274.3 | 168.9 | 190.7 | 900.7 | 868.3 | 880.7 | 152.9 | 146.8 | 150.5 |
| 63 | 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 |
| 73 | 369.8 | 333.4 | 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 | 925.6 | 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 | 228.9 | 277.8 | 971.6 | 858.8 | 919.4 | 398.6 | 369.5 | 383.1 |
| 73 | 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 |
| 95 | 452.2 | 318.0 | 361.3 | 870.6 | 718.0 | 792.4 | 516.9 | 485.9 | 501.1 |
| 102 | 454.1 | 289.5 | 373.1 | 653.3 | 579.4 | 614.2 | 546.0 | 527.7 | 537.0 |
| 111 | 467.7 | 263.2 | 331.1 | 648.8 | 561.0 | 593.0 | 552.0 | 422.8 | 520.6 |
| 123 | 592.6 | 296.4 | 417.7 | 778.2 | 283.4 | 581.9 | 572.5 | 380.5 | 513.9 |
| 132 | 317.9 | 223.2 | 269.9 | 642.2 | 435.3 | 574.0 | 554.0 | 267.2 | 371.9 |
| 139 | 421.4 | 271.4 | 361.4 | 587.6 | 285.6 | 477.0 | 531.0 | 180.5 | 412.1 |

43315C-3

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

KUM NUMBER 43115D

| ROD/ELEV | CHAN. NO | INITIAL AT FLUO (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|--|-------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 7 | 1070. | 1205. | 134. | 31.0 | 850. | 90.3 |
| 4C 3- 3 | 9 | 1140. | 1323. | 133. | 34.5 | 847. | 90.4 |
| 1C 4- 0 | 10 | 1309. | 1463. | 159. | 35.5 | 908. | 128.8 |
| 2A 5- 0 | 13 | 1389. | 1680. | 295. | 70.5 | 883. | 225.6 |
| 2A 5- 7 | 16 | 1477. | 1744. | 267. | 60.0 | 908. | 261.8 |
| 2D 6- 2 | 50 | 1527. | 1795. | 268. | 49.0 | 926. | 316.8 |
| 3D 6- 2 | 55 | 1513. | 1828. | 315. | 58.0 | 268. | 804.0 |
| 5C 6- 2 | 59 | 1541. | 1795. | 255. | 70.0 | 874. | 338.4 |
| 1D 6- 3 | 61 | 1481. | 1761. | 279. | 69.5 | 1052. | 291.6 |
| 43 6- 3 | 66 | 1544. | 1832. | 283. | 57.5 | 962. | 331.6 |
| 5D 6- 3 | 68 | 1474. | 1758. | 283. | 71.5 | 924. | 338.6 |
| 2A 6- 4 | 70 | 1470. | 1765. | 295. | 66.0 | 1037. | 313.6 |
| 33 6- 4 | ** D A W 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. | 317.7 |
| 2D 6- 5 | ** D A W T H E R M O C O U P L E D A T A * | | | | | | |
| 3C 6- 5 | 85 | 1600. | 1934. | 304. | 57.5 | 921. | 349.7 |
| 3E 6- 5 | 86 | 1500. | 1791. | 251. | 72.0 | 896. | 343.6 |
| 3C 6- 6 | 87 | 1586. | 1926. | 338. | 58.5 | 914. | 358.7 |
| 3D 6- 6 | 88 | 1566. | 1879. | 313. | 58.5 | 898. | 359.4 |
| 4A 6- 6 | 100 | 1476. | 1744. | 318. | 59.0 | 893. | 374.3 |
| 4C 6- 6 | 101 | 1571. | 1921. | 350. | 82.5 | 1026. | 353.6 |
| 5C 6- 6 | 103 | 1536. | 1818. | 280. | 93.0 | 950. | 361.6 |
| 1C 7- 0 | ** D A W T H E R M O C O U P L E D A T A * | | | | | | |
| 28 7- 0 | 111 | 1449. | 1713. | 268. | 38.5 | 781. | 371.0 |
| 3D 7- 0 | 115 | 1471. | 1748. | 276. | 48.5 | 736. | 343.6 |
| 58 7- 0 | 117 | 1359. | 1636. | 251. | 47.5 | 897. | 408.6 |
| 28 7- 6 | 121 | 1440. | 1755. | 315. | 48.5 | 897. | 405.7 |
| 2C 7- 6 | 122 | 1424. | 1792. | 368. | 72.0 | 867. | 441.4 |
| 2E 7- 6 | 123 | 1309. | 1568. | 259. | 49.0 | 819. | 420. |
| 3A 7- 6 | 124 | 1430. | 1739. | 302. | 58.5 | 809. | 421.0 |
| 33 7- 6 | 125 | 1466. | 1790. | 322. | 58.5 | 868. | 408.9 |
| 43 7- 6 | 126 | 1457. | 1789. | 331. | 57.5 | 807. | 434.9 |
| 5C 7- 6 | 129 | 1436. | 1725. | 290. | 57.5 | 844. | 410.9 |
| 1C 8- 0 | 132 | 1209. | 1586. | 382. | 81.0 | 736. | 477.4 |
| 2E 8- 0 | 134 | 1120. | 1443. | 323. | 62.0 | 726. | 446.9 |
| 3D 8- 0 | 137 | 1329. | 1741. | 412. | 71.5 | 837. | 445.6 |
| 58 8- 0 | 134 | 1271. | 1611. | 340. | 71.5 | 844. | 471.9 |
| 5C 8- 0 | 140 | 1340. | 1684. | 336. | 72.0 | 809. | 441.4 |
| 1C 8- 6 | 141 | 1010. | 1441. | 431. | 82.5 | 849. | 510.0 |
| 1D 8- 6 | 142 | 865. | 1822. | 557. | 92.5 | 714. | 464.7 |
| 2C 8- 6 | 143 | 1091. | 1900. | 409. | 83.0 | 888. | 490.0 |
| 43 8- 6 | 145 | 1174. | 1527. | 348. | 49.0 | 873. | 493.0 |
| 5D 8- 6 | 146 | 1115. | 1490. | 375. | 80.0 | 867. | 476.6 |
| 3D 8- 3 | 155 | 960. | 1456. | 476. | 98.0 | 862. | 491.0 |
| 4C 8- 3 | 157 | 1014. | 1426. | 407. | 84.0 | 870. | 491.9 |
| 1010- 0 | 160 | 611. | 1126. | 515. | 138.0 | 1098. | 463.6 |
| 4810- 0 | 163 | 872. | 1236. | 364. | 92.5 | 804. | 527.0 |
| 5010- 0 | 166 | 744. | 1121. | 378. | 115.0 | 848. | 476.8 |
| 2411- 0 | 167 | 576. | 832. | 256. | 121.0 | 841. | 441.6 |
| 4C11- 0 | 164 | 674. | 1041. | 366. | 114.0 | 468. | 520.0 |
| 1011- 6 | 170 | 281. | 744. | 513. | 142.0 | 847. | 460.0 |

KUN 431150 HEATER RJD STATISTICAL DATA

| LEVEL | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|-------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | 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 | 774.3 | 763.4 | 771.3 | 833.3 | 816.8 | 825.0 | 13.5 | 13.5 | 13.5 |
| 34 | 1164.8 | 1064.4 | 1100.1 | 1322.6 | 1204.5 | 1246.7 | 34.5 | 31.0 | 32.7 |
| 40 | 1304.8 | 1204.0 | 1254.7 | 1463.4 | 1463.4 | 1463.4 | 47.0 | 35.5 | 41.3 |
| 60 | 1441.4 | 1372.0 | 1410.2 | 1763.1 | 1658.1 | 1700.4 | 71.0 | 54.0 | 66.8 |
| 67 | 1544.4 | 1477.4 | 1514.4 | 1863.6 | 1744.1 | 1791.7 | 60.0 | 46.5 | 53.0 |
| 70 | 1602.6 | 1524.5 | 1563.0 | 1400.6 | 1833.8 | 1867.2 | 64.5 | 48.5 | 54.0 |
| 71 | 1539.4 | 1537.4 | 1534.4 | 1640.6 | 1640.6 | 1640.6 | 49.0 | 49.0 | 49.0 |
| 72 | 1504.5 | 1374.2 | 1522.1 | 1676.8 | 1673.4 | 1803.5 | 81.0 | 46.5 | 56.8 |
| 74 | 1564.8 | 1414.3 | 1512.1 | 1877.9 | 1733.0 | 1794.1 | 79.5 | 44.0 | 62.0 |
| 75 | 1540.8 | 1474.2 | 1505.5 | 1831.6 | 1735.7 | 1781.5 | 71.5 | 57.5 | 65.3 |
| 76 | 1583.1 | 1464.4 | 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 | 1508.8 | 1454.2 | 1532.2 | 1425.8 | 1748.6 | 1846.9 | 83.0 | 57.5 | 65.4 |
| 84 | 1471.8 | 1335.0 | 1415.2 | 1753.1 | 1605.8 | 1690.0 | 71.5 | 38.0 | 44.6 |
| 90 | 1467.8 | 1304.1 | 1405.0 | 1742.1 | 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 | 1174.1 | 864.6 | 1054.5 | 1526.8 | 1332.0 | 1451.8 | 92.5 | 44.0 | 72.7 |
| 111 | 1023.1 | 802.4 | 972.7 | 1455.9 | 1183.7 | 1329.6 | 98.0 | 66.5 | 81.3 |
| 120 | 872.2 | 604.8 | 715.0 | 1245.2 | 1120.3 | 1173.0 | 154.0 | 96.0 | 122.3 |
| 132 | 674.4 | 576.5 | 615.4 | 1040.8 | 832.3 | 908.7 | 121.0 | 92.5 | 104.2 |
| 136 | 653.7 | 261.3 | 487.4 | 477.4 | 794.0 | 862.5 | 142.0 | 121.0 | 130.3 |

| LEVEL | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|-------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 10.4 | 12.0 | 14.4 | 606.3 | 560.3 | 581.4 | 10.1 | 7.4 | 9.0 |
| 24 | 54.0 | 53.4 | 53.7 | 729.8 | 717.3 | 723.6 | 32.9 | 32.4 | 32.6 |
| 34 | 140.5 | 132.0 | 136.5 | 850.2 | 797.6 | 831.4 | 93.4 | 40.3 | 91.5 |
| 40 | 170.6 | 150.0 | 160.7 | 905.8 | 858.5 | 882.1 | 140.9 | 128.6 | 134.8 |
| 60 | 244.6 | 271.7 | 264.1 | 962.7 | 833.0 | 893.0 | 231.8 | 211.6 | 223.0 |
| 67 | 264.2 | 260.1 | 272.3 | 1026.3 | 896.6 | 943.7 | 284.7 | 263.7 | 276.8 |
| 70 | 304.3 | 247.4 | 303.6 | 1043.7 | 915.7 | 979.7 | 293.7 | 274.0 | 266.7 |
| 71 | 305.7 | 300.7 | 300.7 | 966.1 | 966.1 | 966.1 | 307.9 | 307.9 | 307.9 |
| 72 | 244.2 | 250.5 | 261.4 | 940.1 | 834.3 | 905.6 | 326.4 | 245.6 | 307.6 |
| 74 | 310.1 | 246.2 | 282.1 | 1049.2 | 776.3 | 897.3 | 351.7 | 246.5 | 315.0 |
| 75 | 244.5 | 234.4 | 270.0 | 1052.0 | 931.2 | 959.8 | 338.8 | 241.6 | 322.9 |
| 76 | 317.7 | 240.2 | 287.0 | 1037.3 | 859.6 | 916.4 | 361.0 | 313.6 | 340.2 |
| 77 | 304.0 | 251.2 | 302.1 | 1059.1 | 845.8 | 953.3 | 363.5 | 308.7 | 343.4 |
| 78 | 344.4 | 262.0 | 314.7 | 1028.2 | 875.9 | 953.3 | 374.3 | 331.9 | 354.4 |
| 84 | 244.5 | 250.4 | 274.0 | 816.3 | 646.7 | 751.3 | 413.7 | 371.0 | 390.4 |
| 90 | 300.2 | 220.0 | 290.0 | 897.5 | 759.2 | 816.8 | 441.4 | 362.0 | 417.7 |
| 96 | 411.0 | 307.2 | 354.2 | 873.0 | 670.6 | 763.8 | 487.6 | 431.0 | 454.3 |
| 102 | 557.0 | 264.0 | 342.3 | 713.9 | 537.6 | 631.6 | 510.0 | 476.0 | 452.7 |
| 111 | 476.0 | 254.5 | 350.4 | 678.3 | 541.8 | 628.8 | 521.1 | 471.0 | 491.6 |
| 120 | 574.4 | 334.0 | 457.4 | 1048.0 | 573.8 | 693.3 | 537.0 | 367.4 | 484.4 |
| 132 | 300.4 | 255.0 | 292.0 | 591.4 | 488.2 | 533.0 | 520.0 | 441.5 | 476.8 |
| 136 | 512.7 | 323.4 | 374.0 | 608.3 | 493.8 | 559.2 | 532.0 | 314.5 | 458.6 |

431150-3

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 R7D BUNDLE TEST SERIES
 RUN NUMBER 43215D

| 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 | 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 |
| 20 6- 2 | 50 | 1533. | 1777. | 243. | 47.0 | 944. | 315.3 |
| 37 6- 2 | 55 | 1516. | 1809. | 293. | 59.0 | 260. | 600.0 |
| 5C 6- 2 | 59 | 1535. | 1779. | 243. | 64.0 | 891. | 344.9 |
| 17 6- 3 | 61 | 1491. | 1743. | 262. | 69.5 | 920. | 329.4 |
| 49 6- 3 | 66 | 1547. | 1816. | 259. | 68.0 | 936. | 338.4 |
| 57 6- 3 | 68 | 1471. | 1734. | 253. | 70.5 | 874. | 353.7 |
| 2A 6- 4 | 70 | 1463. | 1753. | 290. | 66.5 | 954. | 321.8 |
| 33 6- 4 | ** B A D T H E R M O C O U P L E D A T A * | | | | | | |
| 10 6- 5 | 82 | 1444. | 1740. | 276. | 71.0 | 953. | 343.8 |
| 27 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. | 352.0 |
| 3E 6- 5 | 86 | 1493. | 1731. | 238. | 69.5 | 936. | 320.8 |
| 3C 6- 6 | 97 | 1589. | 1913. | 324. | 65.5 | 925. | 361.4 |
| 37 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 * | | | | | | |
| 29 7- 0 | 111 | 1442. | 1703. | 261. | 45.5 | 926. | 352.8 |
| 37 7- 0 | 115 | 1463. | 1722. | 259. | 46.5 | 757. | 391.0 |
| 59 7- 0 | 117 | 1346. | 1585. | 239. | 45.0 | 701. | 414.0 |
| 29 7- 6 | 121 | 1432. | 1742. | 310. | 55.0 | 939. | 398.8 |
| 2C 7- 6 | 122 | 1414. | 1778. | 354. | 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 |
| 39 7- 6 | 125 | 1460. | 1773. | 313. | 66.5 | 881. | 416.9 |
| 49 7- 6 | 128 | 1449. | 1774. | 325. | 66.5 | 831. | 450.9 |
| 5C 7- 6 | 129 | 1424. | 1709. | 284. | 64.5 | 870. | 427.9 |
| 1C 8- 3 | 132 | 1201. | 1566. | 355. | 92.0 | 759. | 486.8 |
| 2E 8- 0 | 134 | 1131. | 1447. | 316. | 92.0 | 749. | 467.0 |
| 37 8- 3 | 137 | 1330. | 1715. | 385. | 71.0 | 856. | 456.9 |
| 59 8- 0 | 139 | 1264. | 1597. | 331. | 68.0 | 693. | 489.9 |
| 5C 8- 3 | 140 | 1346. | 1667. | 321. | 67.0 | 837. | 460.0 |
| 1C 8- 6 | 141 | 1009. | 1415. | 410. | 94.0 | 605. | 519.0 |
| 10 8- 6 | 142 | 858. | 1390. | 531. | 101.0 | 654. | 517.5 |
| 2C 8- 6 | 143 | 1081. | 1490. | 409. | 88.5 | 585. | 505.8 |
| 48 8- 6 | 145 | 1174. | 1518. | 344. | 57.0 | 661. | 513.0 |
| 50 8- 6 | 148 | 1137. | 1446. | 309. | 68.5 | 661. | 502.3 |
| 37 9- 3 | 155 | 995. | 1436. | 450. | 96.5 | 640. | 502.0 |
| 4C 9- 3 | 157 | 1021. | 1422. | 400. | 89.0 | 634. | 509.6 |
| 1010- 3 | 160 | 924. | 1112. | 518. | 161.0 | 640. | 518.9 |
| 4910- 0 | 163 | 877. | 1235. | 358. | 89.0 | 587. | 543.9 |
| 5010- 0 | 166 | 748. | 1112. | 354. | 119.0 | 672. | 483.7 |
| 2A11- 0 | 167 | 580. | 831. | 252. | 123.0 | 573. | 457.9 |
| 4C11- 0 | 169 | 674. | 1033. | 358. | 119.0 | 489. | 531.0 |
| 1011- 6 | 170 | 271. | 798. | 527. | 159.0 | 585. | 490.9 |

RIJN 43215D HEATER R7D STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 696.7 | 633.6 | 556.2 | 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 |
| 32 | 1213.9 | 1091.3 | 1133.4 | 1337.3 | 1222.3 | 1264.8 | 35.0 | 31.5 | 33.5 |
| 44 | 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 | 1593.8 | 76.5 | 61.0 | 69.3 |
| 67 | 1595.9 | 1470.3 | 1515.1 | 1862.1 | 1729.5 | 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 | 1599.5 | 1474.4 | 1524.6 | 1854.2 | 1664.6 | 1786.0 | 92.0 | 47.5 | 63.3 |
| 74 | 1564.1 | 1418.9 | 1511.6 | 1856.4 | 1709.5 | 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 | 1463.2 | 1519.5 | 1896.0 | 1730.8 | 1809.0 | 86.5 | 67.0 | 72.0 |
| 78 | 1599.5 | 1453.2 | 1531.2 | 1913.2 | 1731.9 | 1832.4 | 89.5 | 56.0 | 63.8 |
| 84 | 1466.6 | 1325.7 | 1406.3 | 1731.2 | 1583.0 | 1571.1 | 66.5 | 45.0 | 49.3 |
| 90 | 1460.1 | 1292.7 | 1393.5 | 1777.6 | 1531.1 | 1582.7 | 88.0 | 43.0 | 61.8 |
| 95 | 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 | 1317.2 | 1429.2 | 101.0 | 57.0 | 74.1 |
| 111 | 1021.2 | 857.1 | 945.9 | 1435.5 | 1142.4 | 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 |
| 139 | 655.1 | 291.5 | 481.6 | 973.8 | 798.2 | 955.3 | 159.0 | 122.0 | 135.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 10.6 | 7.9 | 9.5 | 642.6 | 610.4 | 523.9 | 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 |
| 32 | 139.9 | 123.4 | 131.4 | 932.1 | 827.1 | 929.8 | 99.4 | 97.2 | 98.7 |
| 44 | 168.2 | 152.2 | 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 | 249.5 | 260.9 | 1023.2 | 891.7 | 936.5 | 292.7 | 270.8 | 284.4 |
| 70 | 297.3 | 269.9 | 283.6 | 999.3 | 935.9 | 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 | 292.6 | 318.3 |
| 75 | 278.9 | 226.7 | 259.8 | 1022.3 | 874.1 | 931.9 | 353.7 | 298.4 | 330.4 |
| 76 | 299.9 | 230.5 | 271.8 | 1160.3 | 695.7 | 912.3 | 363.0 | 282.8 | 339.4 |
| 77 | 352.4 | 238.0 | 297.5 | 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 |
| 95 | 385.1 | 278.4 | 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 | 528.5 | 526.9 | 497.9 | 511.6 |
| 111 | 450.4 | 271.7 | 351.5 | 670.3 | 285.6 | 577.3 | 535.0 | 466.5 | 497.8 |
| 120 | 545.3 | 319.5 | 448.9 | 719.4 | 572.9 | 622.7 | 547.0 | 390.5 | 504.6 |
| 132 | 354.4 | 251.7 | 287.7 | 572.9 | 489.3 | 526.5 | 531.0 | 457.9 | 495.0 |
| 139 | 506.7 | 218.7 | 373.6 | 584.8 | 488.9 | 534.2 | 544.8 | 325.3 | 468.6 |

43215D-3

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 RJD BUNDLE TEST SERIES

RUN NUMBER 42215E

| RJD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURBIDITY TIME (SECONDS) | QUENCH TEMPERATURE (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. | 139.0 | 1157. | 355.3 |
| 4B 6- 4 | 52 | 1537. | 1826. | 289. | 98.0 | 668. | 37.8 |
| 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 | 640. | 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 |
| 1- 7- 0 | 93 | 1453. | 1653. | 200. | 48.5 | 764. | 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 | 718. | 465.5 |
| 2E 8- 0 | 126 | 915. | 1323. | 407. | 70.5 | 750. | 450.8 |
| 3D 8- 0 | 129 | 1173. | 1669. | 496. | 98.0 | 780. | 475.0 |
| 5B 8- 0 | 133 | 1193. | 1556. | 363. | 70.5 | 840. | 449.7 |
| 5C 8- 0 | 134 | 1263. | 1679. | 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 9- 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. | 139.0 | 634. | 500.0 |
| 1D10- 0 | 157 | 802. | 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 KWD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TJRWOUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|---------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 697.1 | 658.6 | 682.9 | 707.7 | 674.1 | 696.2 | 6.0 | 5.0 | 5.5 |
| 14 | 967.0 | 897.4 | 929.2 | 999.6 | 937.7 | 963.2 | 13.5 | 12.5 | 13.2 |
| 24 | 1276.6 | 1188.0 | 1213.6 | 1346.7 | 1317.3 | 1330.4 | 35.5 | 18.0 | 28.8 |
| 39 | 1449.1 | 1366.3 | 1403.7 | 1636.3 | 1549.5 | 1595.0 | 48.5 | 47.5 | 48.2 |
| 48 | 1531.0 | 1490.9 | 1510.0 | 1796.6 | 1738.6 | 1771.7 | 64.0 | 46.0 | 57.5 |
| 60 | 1607.8 | 1501.6 | 1554.7 | 1885.9 | 1776.5 | 1834.1 | 75.0 | 60.5 | 68.6 |
| 67 | 1895.2 | 1539.0 | 1568.7 | 1871.1 | 1837.2 | 1851.5 | 83.5 | 58.0 | 67.3 |
| 70 | 1480.6 | 1480.6 | 1480.6 | 1750.8 | 1750.8 | 1750.8 | 96.0 | 96.0 | 96.0 |
| 73 | 1523.2 | 1515.7 | 1519.4 | 1805.6 | 1780.9 | 1793.2 | 96.5 | 72.5 | 84.5 |
| 74 | 1490.9 | 1469.4 | 1479.4 | 1749.7 | 1707.3 | 1730.2 | 101.0 | 72.0 | 91.6 |
| 75 | 1556.3 | 1467.3 | 1506.1 | 1825.9 | 1707.3 | 1764.7 | 99.0 | 71.0 | 90.6 |
| 76 | 1563.9 | 1468.6 | 1514.3 | 1853.1 | 1728.5 | 1774.5 | 104.0 | 71.0 | 95.3 |
| 77 | 1585.4 | 1466.2 | 1530.9 | 1914.3 | 1738.6 | 1812.2 | 109.0 | 96.0 | 99.8 |
| 78 | 1560.7 | 1509.2 | 1534.8 | 1861.0 | 1760.9 | 1803.5 | 105.0 | 100.0 | 102.0 |
| 79 | 1561.3 | 1450.2 | 1503.2 | 1904.0 | 1759.8 | 1816.7 | 109.0 | 96.0 | 101.0 |
| 80 | 1550.5 | 1350.5 | 1550.5 | 1921.2 | 1921.2 | 1921.2 | 98.0 | 98.0 | 98.0 |
| 81 | 1492.6 | 1492.6 | 1492.6 | 1816.9 | 1816.9 | 1816.9 | 109.0 | 109.0 | 109.0 |
| 82 | 1517.4 | 1400.9 | 1473.1 | 1739.7 | 1622.1 | 1692.0 | 49.5 | 37.0 | 42.4 |
| 84 | 1505.1 | 1086.8 | 1354.2 | 1804.4 | 1511.7 | 1686.8 | 87.0 | 42.5 | 65.9 |
| 90 | 1270.6 | 915.3 | 1167.9 | 1728.5 | 1422.6 | 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 | 548.1 | 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) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 15.5 | 10.6 | 13.3 | 634.4 | 612.0 | 623.3 | 20.4 | 17.5 | 18.8 |
| 14 | 40.3 | 29.1 | 34.0 | 760.8 | 751.5 | 755.1 | 45.4 | 45.0 | 45.8 |
| 24 | 138.8 | 70.1 | 116.8 | 879.4 | 808.1 | 841.1 | 113.9 | 101.4 | 109.4 |
| 39 | 203.5 | 183.2 | 191.3 | 943.1 | 895.5 | 918.7 | 150.7 | 145.8 | 147.7 |
| 48 | 288.9 | 207.6 | 261.7 | 920.5 | 876.4 | 905.1 | 238.9 | 231.2 | 234.9 |
| 60 | 327.1 | 248.3 | 279.3 | 1005.0 | 842.5 | 941.5 | 325.7 | 274.8 | 289.7 |
| 67 | 298.2 | 274.4 | 282.8 | 949.5 | 941.6 | 945.7 | 326.7 | 308.7 | 317.7 |
| 70 | 270.2 | 270.2 | 270.2 | 876.0 | 876.0 | 876.0 | 281.1 | 281.1 | 281.1 |
| 73 | 282.4 | 265.2 | 273.8 | 787.8 | 649.5 | 718.7 | 155.1 | 151.3 | 153.2 |
| 74 | 280.3 | 220.7 | 250.8 | 1044.7 | 644.3 | 862.7 | 350.0 | 287.9 | 317.0 |
| 75 | 310.3 | 211.1 | 258.5 | 1117.3 | 648.1 | 839.5 | 397.7 | 335.7 | 336.3 |
| 76 | 289.2 | 230.8 | 260.2 | 1076.7 | 715.8 | 862.5 | 386.0 | 312.8 | 359.2 |
| 77 | 334.2 | 225.1 | 281.3 | 1073.2 | 690.2 | 885.2 | 407.8 | 307.5 | 366.6 |
| 78 | 300.3 | 215.4 | 268.7 | 894.6 | 870.4 | 885.0 | 383.7 | 372.7 | 379.4 |
| 80 | 342.7 | 254.1 | 313.5 | 891.8 | 720.0 | 805.5 | 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 | 734.5 | 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 | 723.8 | 518.9 | 338.5 | 464.3 |
| 111 | 532.4 | 313.5 | 422.9 | 642.5 | 579.1 | 605.6 | 523.0 | 447.0 | 476.6 |
| 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 KJD BUNDLE TEST SERIES

RJA NUMBER 42315E

| ROD/ELEV | CHAN. NO | INITIAL AT FLOOD (DEG F) | INITIAL TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (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 | 17 | 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. | 31.0 | 810. | 347.8 |
| 1D 6- 4 | 47 | 1468. | 1715. | 247. | 91.0 | 886. | 327.0 |
| 3D 6- 4 | 50 | 1454. | 1847. | 344. | 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 | * * S A D T H E R M O C O U P L E D A T A * | | | | | | |
| 3E 5- 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. | 31.5 | 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 |
| 5A 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. | 36.5 | 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. | 37.5 | 775. | 462.2 |
| 2E 8- 0 | 126 | 973. | 1383. | 411. | 31.0 | 768. | 441.9 |
| 3D 8- 0 | 129 | 1197. | 1676. | 478. | 91.5 | 777. | 468.2 |
| 5B 8- 0 | 133 | 1226. | 1560. | 341. | 73.5 | 769. | 447.8 |
| 5C 8- 0 | 134 | 1294. | 1670. | 376. | 98.0 | 730. | 460.0 |
| 1C 8- 6 | 135 | 982. | 1434. | 452. | 38.0 | 666. | 491.0 |
| 1D 9- 6 | 136 | 823. | 1349. | 526. | 101.0 | 674. | 503.9 |
| 2C 9- 6 | 138 | 1117. | 1639. | 522. | 37.5 | 734. | 487.0 |
| 4B 9- 6 | 143 | 1118. | 1518. | 400. | 59.5 | 709. | 472.0 |
| 5D 9- 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. | 37.5 | 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. | 149.0 | 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. | 426. | 141.0 | 286. | 439.0 |

RUN 42315E HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TJMRROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 577.2 | 648.3 | 657.8 | 691.0 | 654.1 | 672.5 | 5.5 | 5.0 | 5.3 |
| 24 | 725.7 | 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 | 1493.5 | 1359.3 | 1395.9 | 1631.9 | 1552.7 | 1591.4 | 58.0 | 45.0 | 50.0 |
| 60 | 1531.1 | 1484.2 | 1505.2 | 1705.4 | 1737.4 | 1729.7 | 58.0 | 47.0 | 57.8 |
| 67 | 1505.2 | 1503.0 | 1553.0 | 1841.3 | 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 | 1519.5 | 1505.7 | 1510.6 | 1805.6 | 1764.3 | 1784.9 | 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 | 1759.8 | 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 |
| 90 | 1549.0 | 1439.2 | 1491.7 | 1904.0 | 1747.5 | 1808.1 | 105.0 | 90.5 | 98.8 |
| 91 | 1546.8 | 1540.8 | 1540.8 | 1929.1 | 1920.1 | 1920.1 | 101.0 | 101.0 | 101.0 |
| 92 | 1492.6 | 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 | 1629.4 | 1691.9 | 47.0 | 36.0 | 43.8 |
| 80 | 1499.8 | 1134.3 | 1354.2 | 1606.7 | 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 | 1640.9 | 769.0 | 1024.3 | 1792.1 | 1075.8 | 1446.3 | 134.0 | 42.5 | 85.6 |
| 111 | 988.7 | 708.7 | 871.1 | 1452.7 | 1101.6 | 1284.4 | 156.0 | 70.5 | 102.5 |
| 120 | 1074.8 | 587.6 | 771.0 | 1404.4 | 1366.0 | 1176.4 | 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 | 809.4 | 768.0 | 787.2 | 141.0 | 125.0 | 133.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 19.7 | 13.8 | 14.8 | 647.2 | 605.9 | 611.5 | 17.4 | 15.5 | 17.4 |
| 24 | 42.3 | 31.9 | 36.3 | 784.3 | 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 | 142.0 | 145.2 |
| 60 | 289.1 | 208.3 | 254.5 | 940.5 | 876.9 | 910.1 | 233.8 | 226.0 | 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 | 655.2 | 737.7 | 347.8 | 347.8 | 347.8 |
| 75 | 279.9 | 226.7 | 252.9 | 1020.7 | 678.5 | 801.4 | 326.7 | 269.6 | 306.7 |
| 76 | 313.9 | 218.8 | 263.1 | 1120.1 | 645.1 | 823.4 | 390.0 | 327.0 | 346.0 |
| 77 | 293.4 | 237.3 | 262.9 | 1058.0 | 717.8 | 877.0 | 379.0 | 322.8 | 352.7 |
| 78 | 343.9 | 231.0 | 286.3 | 1138.5 | 638.7 | 888.8 | 308.9 | 287.0 | 308.3 |
| 79 | 316.4 | 225.3 | 277.3 | 924.2 | 871.4 | 900.3 | 381.7 | 364.9 | 374.1 |
| 90 | 355.0 | 264.6 | 316.4 | 954.7 | 753.9 | 851.7 | 414.0 | 369.8 | 388.3 |
| 91 | 379.3 | 379.3 | 379.3 | 824.1 | 824.1 | 824.1 | 403.7 | 403.7 | 403.7 |
| 92 | 328.5 | 328.5 | 328.5 | 867.2 | 867.2 | 867.2 | 395.7 | 395.7 | 395.7 |
| 94 | 246.4 | 202.0 | 223.6 | 813.5 | 669.0 | 737.9 | 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 | 765.7 | 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 | 526.7 | 616.7 | 515.0 | 446.0 | 493.5 |
| 120 | 420.9 | 328.4 | 407.4 | 730.5 | 528.3 | 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 RJJ BUNJLE TEST SERIES

RUN NUMBER 42415E

| 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 | 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 | 1549. | 1821. | 273. | 89.0 | 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 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 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 | 564. | 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 TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 55.5 | 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 | 1716.7 | 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 | 105.0 | 94.0 | 98.5 |
| 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 | 55.5 | 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 | 777.6 | 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 | 191.0 | 107.0 | 129.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 300.2 | 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 | 898.3 | 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 | 958.8 | 851.5 | 896.6 | 384.1 | 359.6 | 374.5 |
| 80 | 339.5 | 222.4 | 283.2 | 937.9 | 776.2 | 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 | 429.9 |
| 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 |

42415E-3

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 $\pm 0.5\%$ 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 RJU BUNDLE TEST SERIES

RUN NUMBER 42215F

| ROD/ELEV | CHAN. NO | INITIAL AT FLOW (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (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 | 805. | 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 | 820. | 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 | 822. | 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 | 679. | 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. | 1644. | 202. | 47.0 | 828. | 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. | 92.5 | 757. | 462.0 |
| 2F 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. | 465.6 |
| 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. | 470.0 |
| 5D 8- 6 | 155 | 1052. | 1366. | 314. | 59.5 | 613. | 467.8 |
| 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 RJO STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TJRNKOUNG TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 574.6 | 654.6 | 674.6 | 716.0 | 678.3 | 697.1 | 5.0 | 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 | 1603.3 | 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 | 70.0 | 83.8 |
| 73 | 1441.1 | 1380.6 | 1410.8 | 1730.2 | 1687.5 | 1711.3 | 83.5 | 69.0 | 76.5 |
| 74 | 1480.3 | 1372.7 | 1447.0 | 1785.4 | 1662.5 | 1729.8 | 95.5 | 63.0 | 75.6 |
| 75 | 1493.7 | 1392.1 | 1451.4 | 1818.0 | 1635.2 | 1719.6 | 84.5 | 50.0 | 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 | 61.0 | 72.4 |
| 78 | 1580.5 | 1461.6 | 1516.3 | 1851.9 | 1689.7 | 1747.8 | 92.0 | 46.0 | 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 | 35.0 | 36.5 |
| 90 | 1503.3 | 1176.1 | 1405.1 | 1787.6 | 1516.0 | 1681.8 | 65.5 | 42.0 | 51.7 |
| 96 | 1361.6 | 1073.0 | 1267.0 | 1738.6 | 1397.0 | 1606.1 | 82.5 | 65.0 | 70.6 |
| 112 | 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) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 23.7 | 21.4 | 22.6 | 659.4 | 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 | 461.9 | 261.9 | 529.9 | 610.0 | 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 | 631.0 | 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 | 1050.0 | 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 | 332.8 | 715.8 | 675.0 | 307.4 | 428.0 |
| 77 | 312.6 | 187.4 | 229.6 | 1199.7 | 556.5 | 845.2 | 383.0 | 274.4 | 342.9 |
| 78 | 307.6 | 191.9 | 231.5 | 1157.2 | 756.6 | 786.5 | 388.9 | 291.5 | 354.6 |
| 79 | 282.6 | 212.0 | 240.6 | 1099.6 | 783.1 | 893.8 | 397.9 | 341.4 | 372.2 |
| 80 | 291.5 | 250.5 | 280.3 | 863.8 | 819.7 | 846.1 | 433.6 | 354.7 | 376.7 |
| 81 | 250.1 | 250.1 | 250.1 | 822.4 | 862.4 | 862.4 | 390.6 | 380.0 | 380.6 |
| 84 | 226.4 | 181.0 | 202.6 | 816.5 | 608.3 | 735.7 | 420.0 | 383.5 | 402.0 |
| 90 | 339.9 | 201.8 | 273.7 | 922.8 | 643.1 | 801.9 | 436.8 | 407.3 | 421.5 |
| 96 | 377.0 | 284.4 | 339.1 | 863.6 | 678.8 | 785.3 | 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 |

42215F-3

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 $\pm 0.5\%$ 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 RJD BUNJLE TEST SERIES

RUN NUMBER 42915F

| 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 | 1140. | 1294. | 113. | 29.0 | 811. | 99.3 |
| 4C 3-3 | 6 | 1240. | 1305. | 65. | 18.5 | 807. | 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 |
| 20 6-3 | 39 | 1499. | 1680. | 181. | 43.5 | 852. | 298.8 |
| 10 6-4 | 46 | 1485. | 1600. | 161. | 84.5 | 1059. | 276.8 |
| 30 6-4 | 50 | 1497. | 1809. | 312. | 63.5 | 236. | 623.0 |
| 49 6-4 | 51 | 1551. | 1716. | 165. | 42.5 | 840. | 331.3 |
| 50 6-4 | 56 | 1485. | 1640. | 155. | 42.5 | 857. | 325.8 |
| 10 6-5 | 58 | 1481. | 1680. | 198. | 52.5 | 1017. | 287.8 |
| 2A 6-5 | 59 | 1473. | 1666. | 193. | 48.0 | 954. | 259.8 |
| 20 6-5 | 62 | 1533. | 1729. | 195. | 54.5 | 928. | 311.8 |
| 39 6-5 | 63 | 1565. | 1771. | 206. | 56.0 | 676. | 334.0 |
| 3C 6-6 | 69 | 1556. | 1837. | 281. | 52.0 | 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 |
| 30 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 |
| 29 7-0 | 110 | 1517. | 1663. | 146. | 21.5 | 708. | 379.3 |
| 30 7-0 | 113 | 1557. | 1717. | 160. | 29.0 | 667. | 385.0 |
| 59 7-0 | 117 | 1403. | 1595. | 192. | 42.5 | 741. | 368.9 |
| 28 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 |
| 39 7-6 | 125 | 1520. | 1761. | 241. | 44.0 | 837. | 397.5 |
| 48 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 |
| 30 9-0 | 138 | 1334. | 1698. | 365. | 67.5 | 828. | 418.0 |
| 59 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 |
| 10 9-6 | 146 | 913. | 1176. | 264. | 44.0 | 650. | 427.0 |
| 2C 9-6 | 148 | 1166. | 1566. | 400. | 65.5 | 762. | 436.0 |
| 49 8-6 | 153 | 1181. | 1521. | 340. | 62.0 | 636. | 467.0 |
| 50 8-6 | 155 | 1103. | 1428. | 325. | 88.0 | 605. | 453.2 |
| 30 9-3 | 159 | 922. | 1340. | 418. | 90.5 | 650. | 453.5 |
| 4C 9-3 | 161 | 1016. | 1431. | 415. | 88.5 | 622. | 470.0 |
| 1010-0 | 164 | 604. | 1024. | 420. | 131.0 | 683. | 410.3 |
| 4810-0 | 168 | 874. | 1311. | 437. | 113.0 | 578. | 485.0 |
| 5010-0 | 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 |
| 1011-6 | | | | | | | |

* * * B A D T H E R M O C O U P L E D A T A * *

RUN 42915F HEATER MOD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TJRYAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 727.4 | 678.3 | 702.8 | 736.8 | 689.9 | 713.3 | 5.0 | 4.5 | 4.8 |
| 14 | 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 | 30.3 | 18.5 | 25.8 |
| 48 | 1441.4 | 1328.0 | 1378.5 | 1587.3 | 1483.7 | 1526.3 | 40.5 | 40.5 | 42.9 |
| 60 | 1492.8 | 1427.5 | 1454.7 | 1699.5 | 1636.3 | 1673.7 | 57.5 | 40.0 | 52.7 |
| 67 | 1599.8 | 1496.6 | 1555.8 | 1855.3 | 1735.2 | 1792.5 | 58.5 | 45.0 | 51.7 |
| 70 | 1513.2 | 1405.8 | 1478.7 | 1647.4 | 1616.7 | 1689.3 | 50.5 | 41.5 | 45.5 |
| 71 | 1598.0 | 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 | 1748.5 | 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 | 93.0 | 43.5 | 62.2 |
| 76 | 1551.1 | 1438.0 | 1490.0 | 1809.0 | 1629.7 | 1704.0 | 87.0 | 42.5 | 62.1 |
| 77 | 1564.8 | 1472.9 | 1510.5 | 1794.3 | 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 | 1526.2 | 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 | 1549.9 | 1609.5 | 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 | 1544.8 | 92.0 | 58.0 | 66.8 |
| 102 | 1194.6 | 803.9 | 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) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|--------|--------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 282.6 | 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 | 517.0 | 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 | 1244.5 | 233.9 | 759.8 | 526.0 | 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 | 810.4 | 937.5 | 393.2 | 271.6 | 330.5 |
| 79 | 254.5 | 189.5 | 219.9 | 1153.5 | 761.7 | 927.3 | 365.0 | 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 | 350.9 | 375.2 |
| 90 | 300.7 | 175.0 | 238.5 | 885.8 | 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 | 442.0 | 444.6 |
| 120 | 441.9 | 354.3 | 410.9 | 686.2 | 578.1 | 640.4 | 495.0 | 410.3 | 454.2 |
| 132 | 393.8 | 211.2 | 296.5 | 701.0 | 281.3 | 520.4 | 479.3 | 160.0 | 311.1 |
| 138 | 418.8 | 270.2 | 344.5 | 580.2 | 330.0 | 555.1 | 481.0 | 433.0 | 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 - 535°C) [980°F (950°F - 997°F)] |
| Initial bundle water level | 40.1 mm (1.58 in.) |

B. Summary Results:

C. Comments:

FLECHT SEAJET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 43915F

| 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 | 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 |
| 4A 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 J 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 | 518. | 371.0 |
| 5B 7- 0 | 117 | 1412. | 1598. | 186. | 44.5 | 740. | 376.6 |
| 1B 7- 6 | 120 | 1465. | 1682. | 217. | 44.5 | 744. | 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. | 53.5 | 761. | 422.0 |
| 2E 8- 0 | 136 | 1064. | 1393. | 329. | 63.0 | 731. | 407.0 |
| 3D 8- 6 | 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. | 39.5 | 608. | 444.0 |
| 3D 9- 3 | 159 | 918. | 1354. | 436. | 39.5 | 675. | 448.0 |
| 4C 9- 3 | 161 | 1016. | 1416. | 401. | 98.5 | 633. | 469.9 |
| 1D10- 0 | 164 | 516. | 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 J T H E R M O C O U P L E D A T A * | | | | | | |

RUN 43915F HEATER ADD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 1468.6 | 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 | 1511.7 | 1663.7 | 45.5 | 44.5 | 45.1 |
| 71 | 1555.4 | 1511.1 | 1533.3 | 1789.9 | 1733.2 | 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 | 1455.7 | 1407.1 | 1431.2 | 1674.5 | 1629.7 | 1652.1 | 73.0 | 56.0 | 64.5 |
| 74 | 1500.2 | 1365.8 | 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 | 1476.0 | 1530.7 | 1816.1 | 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 | 1551.1 | 1515.4 | 1628.2 | 1603.6 | 1722.0 | 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 | 1521.3 | 1412.4 | 1492.5 | 1684.3 | 1598.1 | 1643.7 | 48.0 | 17.5 | 31.4 |
| 90 | 1516.7 | 1285.2 | 1433.9 | 1760.9 | 1534.4 | 1663.8 | 55.0 | 43.5 | 47.2 |
| 96 | 1371.3 | 1064.0 | 1272.0 | 1716.3 | 1592.8 | 1574.7 | 55.0 | 34.5 | 58.6 |
| 102 | 1175.9 | 795.6 | 1053.2 | 1544.1 | 1123.4 | 1388.2 | 89.5 | 46.0 | 62.2 |
| 111 | 1315.5 | 786.4 | 903.2 | 1416.2 | 1100.6 | 1265.0 | 125.0 | 72.0 | 94.2 |
| 120 | 854.4 | 616.4 | 751.1 | 1276.6 | 995.4 | 1153.2 | 120.0 | 97.0 | 110.7 |
| 132 | 671.2 | 469.6 | 553.5 | 1080.0 | 727.5 | 894.4 | 140.0 | 100.0 | 123.3 |
| 138 | 523.7 | 593.7 | 610.2 | 1035.6 | 886.1 | 960.6 | 123.3 | 123.0 | 123.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|--------|--------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 3.4 | 45.4 | 45.4 |
| 39 | 120.8 | 58.2 | 93.6 | 869.6 | 780.1 | 816.7 | 108.1 | 101.6 | 102.1 |
| 48 | 147.9 | 137.9 | 142.9 | 923.4 | 841.5 | 913.2 | 151.9 | 143.9 | 147.3 |
| 60 | 225.8 | 179.3 | 204.0 | 803.7 | 784.2 | 794.5 | 284.8 | 224.9 | 230.7 |
| 67 | 238.5 | 202.3 | 218.1 | 1044.3 | 842.1 | 967.8 | 281.8 | 268.9 | 276.5 |
| 70 | 236.5 | 155.8 | 190.0 | 1165.6 | 813.3 | 750.5 | 323.0 | 257.0 | 351.6 |
| 71 | 234.5 | 224.1 | 229.3 | 1154.2 | 971.2 | 1062.7 | 298.6 | 204.5 | 296.7 |
| 72 | 295.6 | 236.6 | 266.1 | 1176.0 | 1070.7 | 1123.3 | 288.4 | 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 | 250.6 | 365.2 |
| 77 | 259.3 | 122.6 | 168.3 | 1209.6 | 649.7 | 883.4 | 339.0 | 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 | 379.9 | 273.7 | 330.4 |
| 90 | 242.1 | 208.4 | 226.7 | 924.4 | 860.7 | 898.8 | 393.2 | 308.7 | 341.7 |
| 91 | 220.7 | 220.7 | 220.7 | 827.6 | 967.6 | 967.6 | 330.8 | 330.8 | 330.8 |
| 84 | 185.7 | 125.3 | 151.2 | 827.6 | 697.5 | 760.4 | 373.5 | 334.0 | 364.5 |
| 90 | 300.1 | 165.8 | 229.9 | 960.6 | 744.4 | 840.7 | 414.8 | 362.0 | 390.2 |
| 66 | 354.8 | 172.9 | 302.7 | 923.4 | 860.7 | 796.1 | 443.3 | 392.0 | 415.6 |
| 112 | 410.8 | 273.0 | 335.0 | 778.2 | 570.6 | 654.8 | 488.0 | 360.3 | 436.0 |
| 111 | 436.4 | 220.3 | 361.8 | 702.7 | 537.4 | 612.3 | 469.9 | 47.0 | 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 | 400.0 | 400.0 | 448.4 |
| 138 | 414.8 | 286.3 | 350.6 | 584.4 | 554.6 | 569.5 | 482.0 | 488.0 | 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

RUN NUMBER 4415F

| ROD/ELEV | CHAN. NO | INITIAL AT FLIGHT (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|----------|---------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 24 3- 3 | 5 | 1156. | 1255. | 109. | 25.0 | 773. | 98.3 |
| 42 3- 3 | 6 | 1200. | 1314. | 64. | 18.0 | 802. | 96.8 |
| 12 4- 1 | 7 | 1386. | 1534. | 154. | 42.0 | 937. | 142.8 |
| 24 5- 0 | 12 | 1402. | 1657. | 175. | 41.5 | 663. | 214.6 |
| 24 5- 7 | 14 | 1533. | 1755. | 222. | 43.0 | 983. | 261.6 |
| 50 5- 2 | 33 | 1438. | 1605. | 167. | 74.5 | 960. | 308.8 |
| 20 5- 3 | 34 | 1447. | 1600. | 169. | 42.0 | 740. | 289.4 |
| 10 5- 4 | 40 | 1405. | 1639. | 154. | 49.0 | 975. | 260.0 |
| 30 5- 4 | 50 | 1442. | 1742. | 100. | 61.0 | 835. | 360.0 |
| 48 5- 4 | 54 | 1548. | 1691. | 143. | 40.5 | 821. | 322.8 |
| 50 5- 4 | 56 | 1403. | 1653. | 170. | 41.5 | 1040. | 265.8 |
| 10 5- 5 | 58 | 1477. | 1646. | 169. | 49.0 | 1053. | 266.6 |
| 24 5- 5 | 59 | 1485. | 1647. | 162. | 41.5 | 992. | 203.8 |
| 23 5- 5 | 62 | 1533. | 1700. | 173. | 49.5 | 850. | 300.1 |
| 33 5- 5 | 63 | 1500. | 1735. | 189. | 42.0 | 847. | 308.0 |
| 35 5- 5 | 64 | 1502. | 1843. | 291. | 62.5 | 811. | 295.1 |
| 15 5- 6 | 70 | 1463. | 1717. | 235. | 59.5 | 1003. | 301.2 |
| 42 5- 6 | 73 | 1545. | 1783. | 188. | 42.0 | 820. | 320.0 |
| 50 5- 6 | 74 | 1500. | 1800. | 300. | 53.5 | 809. | 328.9 |
| 30 5- 6 | 75 | 1507. | 1800. | 293. | 53.5 | 809. | 328.9 |
| 30 5- 6 | 76 | 1507. | 1800. | 293. | 53.5 | 809. | 328.9 |
| 44 5- 6 | 78 | 1509. | 1673. | 164. | 40.0 | 753. | 363.8 |
| 10 5- 6 | 109 | 1509. | 1673. | 164. | 40.0 | 753. | 363.8 |
| 23 5- 6 | 110 | 1509. | 1673. | 164. | 40.0 | 753. | 363.8 |
| 30 7- 1 | 113 | 1573. | 1712. | 139. | 28.5 | 764. | 345.5 |
| 33 7- 1 | 117 | 1427. | 1610. | 183. | 41.5 | 731. | 362.3 |
| 23 7- 1 | 126 | 1508. | 1724. | 218. | 42.0 | 800. | 366.6 |
| 21 7- 1 | 124 | 1524. | 1730. | 206. | 42.3 | 902. | 353.8 |
| 34 7- 1 | 123 | 1344. | 1574. | 234. | 50.0 | 880. | 366.7 |
| 34 7- 1 | 124 | 1400. | 1646. | 186. | 41.5 | 880. | 350.4 |
| 33 7- 1 | 125 | 1330. | 1777. | 227. | 42.5 | 879. | 370.0 |
| 43 7- 1 | 129 | 1507. | 1721. | 214. | 42.5 | 772. | 344.3 |
| 30 7- 1 | 132 | 1404. | 1713. | 249. | 59.0 | 810. | 399.8 |
| 10 7- 1 | 133 | 1278. | 1501. | 323. | 59.5 | 753. | 415.5 |
| 25 7- 1 | 136 | 1124. | 1436. | 312. | 54.5 | 753. | 342.0 |
| 30 7- 1 | 138 | 1370. | 1705. | 335. | 59.0 | 856. | 393.0 |
| 33 8- 1 | 143 | 1204. | 1538. | 215. | 40.0 | 768. | 414.7 |
| 30 8- 1 | 144 | 1334. | 1618. | 284. | 74.0 | 750. | 427.9 |
| 10 8- 1 | 148 | 1040. | 1601. | 361. | 61.5 | 808. | 442.0 |
| 10 8- 1 | 140 | 048. | 1248. | 300. | 49.0 | 820. | 409.2 |
| 30 8- 1 | 146 | 1102. | 1577. | 395. | 62.0 | 770. | 414.0 |
| 43 8- 1 | 153 | 1207. | 1514. | 307. | 59.0 | 844. | 407.0 |
| 30 8- 1 | 155 | 1228. | 1440. | 328. | 84.0 | 834. | 424.0 |
| 30 8- 1 | 159 | 478. | 1373. | 401. | 87.0 | 840. | 434.0 |
| 40 9- 1 | 161 | 1057. | 1440. | 383. | 85.0 | 651. | 450.4 |
| 1013- 1 | 164 | 599. | 1062. | 464. | 159.0 | 729. | 391.8 |
| 4813- 1 | 168 | 882. | 1272. | 390. | 96.0 | 586. | 479.0 |
| 5013- 1 | 169 | 700. | 1169. | 423. | 112.0 | 710. | 420.9 |
| 2411- 1 | 171 | 542. | 874. | 332. | 138.0 | 569. | 421.0 |
| 4211- 1 | 172 | 644. | 1389. | 395. | 112.0 | 528. | 470.0 |
| 1011- 1 | 173 | 644. | 1389. | 395. | 112.0 | 528. | 470.0 |

* * * S A U T H E R N C O U P L E D A T A * * *

KJ4 44015F HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 750.5 | 685.0 | 717.0 | 758.7 | 696.2 | 727.4 | 5.0 | 3.0 | 4.0 |
| 24 | 919.0 | 847.0 | 883.0 | 944.9 | 844.9 | 894.9 | 10.0 | 1.0 | 10.0 |
| 39 | 1249.9 | 1150.0 | 1199.7 | 1314.2 | 1265.1 | 1296.4 | 28.0 | 10.0 | 23.7 |
| 48 | 1450.4 | 1320.2 | 1385.0 | 1506.8 | 1477.3 | 1538.2 | 49.0 | 42.0 | 44.8 |
| 60 | 1481.5 | 1447.8 | 1463.7 | 1575.5 | 1557.0 | 1564.6 | 50.0 | 41.0 | 44.7 |
| 67 | 1500.0 | 1491.2 | 1503.0 | 1637.2 | 1609.7 | 1659.7 | 52.0 | 42.0 | 45.8 |
| 70 | 1507.9 | 1472.3 | 1490.0 | 1638.4 | 1593.8 | 1668.8 | 51.5 | 42.0 | 48.1 |
| 72 | 1548.4 | 1500.7 | 1527.1 | 1747.7 | 1730.3 | 1757.0 | 50.0 | 44.0 | 49.8 |
| 74 | 1450.9 | 1350.0 | 1400.0 | 1757.5 | 1594.9 | 1676.2 | 63.0 | 50.0 | 59.3 |
| 73 | 1440.9 | 1401.7 | 1425.3 | 1804.3 | 1634.1 | 1659.7 | 62.0 | 54.0 | 58.6 |
| 74 | 1491.2 | 1300.0 | 1400.3 | 1753.1 | 1631.9 | 1694.0 | 77.0 | 43.0 | 54.9 |
| 75 | 1503.0 | 1400.0 | 1450.0 | 1746.6 | 1587.3 | 1678.0 | 85.0 | 41.0 | 54.6 |
| 76 | 1507.9 | 1400.0 | 1487.3 | 1794.3 | 1618.8 | 1692.9 | 75.0 | 40.0 | 50.2 |
| 77 | 1500.3 | 1477.0 | 1512.4 | 1757.6 | 1614.5 | 1699.6 | 63.0 | 41.0 | 46.3 |
| 78 | 1594.9 | 1478.0 | 1526.0 | 1842.9 | 1601.4 | 1722.9 | 62.0 | 41.0 | 46.5 |
| 79 | 1542.2 | 1474.9 | 1508.0 | 1820.3 | 1642.8 | 1734.2 | 61.0 | 41.0 | 48.4 |
| 80 | 1603.5 | 1496.9 | 1525.9 | 1832.7 | 1671.2 | 1751.2 | 58.0 | 42.0 | 51.4 |
| 81 | 1515.0 | 1510.0 | 1515.0 | 1737.4 | 1737.4 | 1737.4 | 49.0 | 44.0 | 49.5 |
| 84 | 1573.3 | 1447.0 | 1512.2 | 1712.9 | 1610.1 | 1677.7 | 42.0 | 24.0 | 33.0 |
| 90 | 1550.9 | 1400.0 | 1481.5 | 1736.0 | 1574.4 | 1705.8 | 73.0 | 41.0 | 48.0 |
| 96 | 1410.2 | 1127.0 | 1310.8 | 1753.1 | 1435.5 | 1611.4 | 74.0 | 33.0 | 54.0 |
| 102 | 1210.0 | 797.1 | 1007.5 | 1575.5 | 1140.4 | 1413.6 | 44.0 | 40.0 | 47.6 |
| 111 | 1037.2 | 837.0 | 960.3 | 1439.8 | 1121.4 | 1288.9 | 108.0 | 53.0 | 60.1 |
| 120 | 882.0 | 540.0 | 784.8 | 1292.2 | 1062.4 | 1191.3 | 159.0 | 84.0 | 110.3 |
| 132 | 694.1 | 400.7 | 504.0 | 1059.2 | 749.3 | 903.2 | 138.0 | 112.0 | 125.0 |
| 138 | 630.2 | 622.5 | 629.4 | 1047.0 | 694.6 | 973.3 | 118.0 | 117.0 | 117.5 |

| ELEV | TEMP K15C (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|--------|--------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 12.0 | 8.0 | 10.4 | 673.7 | 647.5 | 650.6 | 16.1 | 14.9 | 15.0 |
| 24 | 20.3 | 20.3 | 20.3 | 774.5 | 774.5 | 774.5 | 41.4 | 41.4 | 41.4 |
| 39 | 131.0 | 84.3 | 101.8 | 862.0 | 773.2 | 907.4 | 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 | 170.0 | 200.4 | 812.0 | 798.9 | 804.8 | 223.3 | 214.0 | 219.9 |
| 67 | 236.8 | 198.4 | 216.7 | 1325.5 | 779.5 | 944.5 | 269.4 | 257.7 | 250.0 |
| 70 | 230.0 | 183.0 | 201.8 | 1165.9 | 284.5 | 750.0 | 570.0 | 254.3 | 356.4 |
| 71 | 249.2 | 230.0 | 239.9 | 1133.0 | 926.6 | 1029.8 | 295.5 | 273.7 | 279.6 |
| 72 | 301.1 | 234.3 | 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 | 368.6 |
| 74 | 272.4 | 219.9 | 243.7 | 979.9 | 244.7 | 460.7 | 632.0 | 308.0 | 476.5 |
| 75 | 300.0 | 130.0 | 217.2 | 1299.1 | 238.2 | 762.6 | 649.0 | 172.0 | 348.6 |
| 76 | 360.4 | 130.3 | 265.0 | 1388.5 | 235.0 | 824.9 | 660.0 | 238.8 | 359.7 |
| 77 | 260.8 | 154.0 | 177.2 | 1243.9 | 647.3 | 935.7 | 325.0 | 203.8 | 286.0 |
| 78 | 281.0 | 150.9 | 194.4 | 1131.8 | 511.1 | 902.4 | 333.9 | 212.6 | 302.9 |
| 79 | 238.9 | 161.7 | 204.2 | 1165.5 | 631.3 | 894.1 | 341.5 | 254.8 | 314.2 |
| 80 | 244.1 | 112.3 | 225.4 | 959.9 | 71.6 | 788.5 | 508.0 | 294.8 | 348.1 |
| 84 | 221.9 | 221.9 | 221.9 | 891.4 | 891.4 | 891.4 | 327.2 | 327.2 | 327.2 |
| 84 | 187.9 | 137.0 | 158.0 | 837.5 | 72.4 | 763.5 | 363.8 | 316.0 | 344.8 |
| 90 | 257.0 | 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 | 344.9 | 275.2 | 320.1 | 777.7 | 573.0 | 656.4 | 457.8 | 409.1 | 428.6 |
| 111 | 401.2 | 203.8 | 328.0 | 705.2 | 358.8 | 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 | 208.0 | 348.7 | 508.5 | 527.8 | 546.8 | 470.0 | 389.0 | 433.3 |
| 138 | 410.8 | 277.0 | 343.9 | 612.0 | 553.6 | 582.8 | 469.0 | 420.0 | 444.5 |

44015F-3

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 | INITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE AT (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (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. | 51.0 | 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 |
| 7D 6- 5 | 62 | 1522. | 1697. | 175. | 51.0 | 812. | 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. | 56.0 | 1081. | 300.2 |
| 4C 6- 6 | 73 | 1579. | 1780. | 201. | 47.0 | 816. | 331.0 |
| 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 | 1560. | 1812. | 252. | 50.5 | 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. | 1702. | 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 | 806. | 384.1 |
| 5C 7- 6 | 132 | 1433. | 1657. | 226. | 54.5 | 801. | 395.7 |
| 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 | 828. | 388.3 |
| 5B 8- 0 | 143 | 1260. | 1532. | 272. | 75.5 | 761. | 402.4 |
| 5C 8- 0 | 144 | 1299. | 1608. | 309. | 74.5 | 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. | 76.5 | 687. | 427.0 |
| 4C 9- 3 | 161 | 1048. | 1463. | 415. | 95.0 | 617. | 450.0 |
| 1010- 0 | 164 | 594. | 1071. | 477. | 154.0 | 685. | 366.1 |
| 4B10- 0 | 168 | 886. | 1327. | 441. | 118.0 | 578. | 467.3 |
| 5D10- 0 | 169 | 755. | 1164. | 409. | 128.0 | 660. | 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 | ** B A D T H E R M O C O U P L E D A T A * | | | | | | |

RUN 43631F HEATER RUD STATISTICS, CAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURBACQUOND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|------------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 14.0 | 25.5 |
| 48 | 1466.0 | 1360.8 | 1409.0 | 1542.7 | 1422.3 | 1532.7 | 46.5 | 34.5 | 42.5 |
| 60 | 1496.6 | 1460.7 | 1478.7 | 1671.2 | 1648.3 | 1657.4 | 62.0 | 45.0 | 46.0 |
| 77 | 1601.9 | 1518.7 | 1562.9 | 1830.4 | 1720.7 | 1780.9 | 56.0 | 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 | 1799.4 | 1760.6 | 1780.4 | 56.5 | 56.0 | 56.3 |
| 72 | 1466.7 | 1382.8 | 1414.8 | 1764.2 | 1642.8 | 1703.5 | 67.5 | 62.0 | 64.8 |
| 73 | 1439.8 | 1408.7 | 1424.2 | 1691.0 | 1631.9 | 1650.4 | 88.0 | 62.5 | 75.3 |
| 74 | 1493.9 | 1375.5 | 1453.9 | 1746.4 | 1607.9 | 1647.3 | 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 | 1765.1 | 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 | 46.2 | 54.2 |
| 90 | 1372.7 | 1473.0 | 1514.2 | 1839.5 | 1671.2 | 1745.6 | 67.5 | 53.0 | 57.5 |
| 91 | 1499.2 | 1499.2 | 1499.2 | 1727.4 | 1727.4 | 1727.4 | 57.0 | 55.0 | 55.0 |
| 84 | 1538.2 | 1421.6 | 1490.3 | 1767.3 | 1605.8 | 1685.9 | 47.5 | 33.0 | 40.0 |
| 96 | 1509.5 | 1328.3 | 1443.0 | 1782.1 | 1513.8 | 1668.2 | 62.0 | 32.0 | 49.8 |
| 102 | 1363.4 | 1114.1 | 1282.1 | 1739.6 | 1414.1 | 1601.4 | 95.5 | 63.0 | 77.5 |
| 111 | 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 | 385.6 | 594.0 | 761.0 | 1334.1 | 1070.7 | 1211.7 | 164.0 | 115.0 | 128.8 |
| 132 | 697.3 | 661.8 | 545.1 | 1117.2 | 672.0 | 898.9 | 160.0 | 99.0 | 134.3 |
| 138 | 637.3 | 608.9 | 623.1 | 1078.9 | 714.0 | 906.4 | 135.0 | 131.0 | 133.5 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|--------|--------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 928.4 | 876.3 | 924.5 | 146.2 | 137.9 | 141.5 |
| 60 | 182.3 | 150.0 | 178.6 | 778.4 | 766.1 | 771.7 | 223.4 | 212.9 | 219.1 |
| 67 | 234.7 | 202.0 | 217.9 | 982.3 | 893.9 | 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 | 296.7 | 248.2 | 267.5 |
| 73 | 241.2 | 223.2 | 232.2 | 1152.1 | 991.0 | 1071.5 | 271.4 | 257.8 | 264.6 |
| 74 | 249.1 | 230.2 | 243.4 | 1060.8 | 235.0 | 710.1 | 564.0 | 291.6 | 392.9 |
| 75 | 308.4 | 116.7 | 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 | 1181.2 | 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 |
| 90 | 266.6 | 193.3 | 231.4 | 923.9 | 884.2 | 917.6 | 346.5 | 301.8 | 325.5 |
| 91 | 228.1 | 228.1 | 228.1 | 890.5 | 890.5 | 890.5 | 331.7 | 331.7 | 331.7 |
| 94 | 132.2 | 149.7 | 175.5 | 801.5 | 704.6 | 747.1 | 360.3 | 328.0 | 350.1 |
| 96 | 375.2 | 212.7 | 319.3 | 698.0 | 705.6 | 763.3 | 395.9 | 353.7 | 374.0 |
| 102 | 412.2 | 205.5 | 330.7 | 745.1 | 554.3 | 640.3 | 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 | 409.3 | 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 | 501.2 | 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 DEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 43432F

| ROD/ELEV | CHAN. NU | INITIAL AT FLCC (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|-----------------------------|-------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 5 | 1169. | 1308. | 138. | 38.5 | 746. | 112.7 |
| 4C 3- 3 | 6 | 1227. | 1326. | 99. | 33.5 | 673. | 105.9 |
| 1C 4- 0 | 7 | 1378. | 1550. | 172. | 49.5 | 943. | 163.5 |
| 2A 5- 0 | 12 | 1452. | 1713. | 221. | 47.5 | 724. | 246.3 |
| 2A 5- 7 | 14 | 1557. | 1833. | 276. | 74.5 | 925. | 308.7 |
| 5C 6- 2 | 33 | 1451. | 1780. | 329. | 102.0 | 1021. | 361.9 |
| 2D 6- 3 | 39 | 1459. | 1795. | 296. | 83.0 | 776. | 361.6 |
| 1J 6- 4 | 46 | 1511. | 1725. | 214. | 101.0 | 1061. | 263.6 |
| 3D 6- 4 | 50 | 1476. | 1914. | 436. | 93.5 | 264. | 704.0 |
| 43 6- 4 | 51 | 1555. | 1801. | 246. | 67.5 | 643. | 366.5 |
| 5D 6- 4 | 56 | 1510. | 1716. | 207. | 92.5 | 644. | 367.6 |
| 1D 6- 5 | 58 | 1504. | 1730. | 225. | 105.0 | 1075. | 294.6 |
| 2A 5- 5 | 59 | 1458. | 1717. | 219. | 92.5 | 600. | 371.6 |
| 2D 6- 5 | 62 | 1532. | 1820. | 288. | 95.0 | 660. | 373.6 |
| 3B 6- 5 | 63 | 1557. | 1856. | 300. | 76.0 | 626. | 397.0 |
| 3C 6- 6 | 69 | 1519. | 1935. | 416. | 93.0 | 444. | 396.5 |
| 3E 6- 6 | 70 | 1464. | 1814. | 330. | 102.0 | 485. | 395.7 |
| 4C 6- 6 | 73 | 1560. | 1688. | 308. | 76.0 | 794. | 411.9 |
| 5C 6- 6 | ** BAL THERMO COUPLE DATA * | | | | | | |
| 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 | 661. | 419.5 |
| 1C 7- 0 | 105 | 1457. | 1762. | 265. | 64.5 | 724. | 454.0 |
| 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 | 634. | 461.9 |
| 2C 7- 6 | 121 | 1469. | 1852. | 362. | 76.0 | 676. | 462.6 |
| 2E 7- 6 | 123 | 1336. | 1671. | 333. | 82.5 | 772. | 479.1 |
| 3A 7- 6 | 124 | 1463. | 1660. | 217. | 62.0 | 653. | 467.6 |
| 3B 7- 6 | 125 | 1522. | 1850. | 327. | 64.5 | 644. | 476.7 |
| 4B 7- 6 | 129 | 1466. | 1780. | 294. | 61.0 | 604. | 465.9 |
| 5C 7- 6 | 132 | 1452. | 1763. | 311. | 73.5 | 765. | 447.6 |
| 1C 8- 0 | 133 | 1270. | 1696. | 426. | 90.5 | 771. | 514.9 |
| 2E 8- 0 | 136 | 1116. | 1540. | 422. | 75.5 | 716. | 512.0 |
| 3D 8- 0 | 138 | 1337. | 1835. | 498. | 92.5 | 646. | 501.0 |
| 5B 8- 0 | 143 | 1276. | 1643. | 365. | 136.0 | 721. | 517.6 |
| 5C 8- 0 | 144 | 1319. | 1729. | 409. | 106.0 | 716. | 538.7 |
| 1C 8- 6 | 145 | 1034. | 1932. | 498. | 97.0 | 603. | 551.0 |
| 1D 8- 6 | 146 | 665. | 1280. | 394. | 47.5 | 607. | 532.5 |
| 2C 8- 6 | 146 | 1163. | 1726. | 564. | 93.0 | 752. | 530.9 |
| 4B 8- 6 | 153 | 1167. | 1687. | 499. | 106.0 | 632. | 563.9 |
| 5D 8- 6 | 155 | 1121. | 1515. | 394. | 108.0 | 633. | 553.9 |
| 3D 9- 3 | 159 | 950. | 1404. | 533. | 125.0 | 714. | 540.9 |
| 4C 9- 3 | 161 | 1021. | 1581. | 550. | 128.0 | 634. | 567.6 |
| 1D10- 0 | 164 | 590. | 1165. | 575. | 212.0 | 667. | 560.0 |
| 4B10- 0 | 168 | 676. | 1468. | 589. | 145.0 | 664. | 587.4 |
| 5D10- 0 | 169 | 737. | 1260. | 523. | 189.0 | 655. | 537.6 |
| 2A11- 0 | 171 | 536. | 912. | 374. | 173.0 | 612. | 568.7 |
| 4C11- 0 | 172 | 667. | 1244. | 557. | 158.0 | 546. | 546.0 |
| 1D11- 6 | ** BAL THERMO COUPLE DATA * | | | | | | |

KUN 43432F HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 735.9 | 670.5 | 707.2 | 750.3 | 698.3 | 724.3 | 91.5 | 61.5 | 76.5 |
| 24 | 908.7 | 900.7 | 904.7 | 950.1 | 950.1 | 950.1 | 21.5 | 21.5 | 21.5 |
| 39 | 1220.7 | 1160.4 | 1188.2 | 1332.0 | 1307.9 | 1321.9 | 45.5 | 33.5 | 39.2 |
| 48 | 1439.4 | 1350.5 | 1394.0 | 1624.3 | 1511.7 | 1557.4 | 61.0 | 42.0 | 54.1 |
| 60 | 1491.9 | 1445.6 | 1468.3 | 1730.8 | 1702.9 | 1715.5 | 73.0 | 47.5 | 61.2 |
| 67 | 1594.7 | 1514.2 | 1551.7 | 1916.6 | 1796.6 | 1857.4 | 90.5 | 64.5 | 72.6 |
| 70 | 1600.4 | 1414.7 | 1507.7 | 1947.6 | 1699.5 | 1776.6 | 93.0 | 64.5 | 75.6 |
| 71 | 1551.7 | 1490.3 | 1525.0 | 1924.6 | 1881.3 | 1902.9 | 91.5 | 77.5 | 84.5 |
| 72 | 1448.0 | 1374.5 | 1411.7 | 1898.1 | 1730.8 | 1809.4 | 95.5 | 77.0 | 86.2 |
| 73 | 1442.0 | 1413.7 | 1428.2 | 1818.0 | 1744.1 | 1781.0 | 104.0 | 94.0 | 99.0 |
| 74 | 1490.2 | 1393.1 | 1441.9 | 1873.4 | 1720.7 | 1808.1 | 107.0 | 74.0 | 93.0 |
| 75 | 1510.0 | 1414.3 | 1462.1 | 1891.5 | 1672.3 | 1780.7 | 105.0 | 63.0 | 84.5 |
| 76 | 1554.5 | 1443.7 | 1499.1 | 1914.3 | 1716.3 | 1790.9 | 109.0 | 62.5 | 93.8 |
| 77 | 1561.4 | 1467.2 | 1514.1 | 1874.5 | 1687.5 | 1780.5 | 105.0 | 74.0 | 84.5 |
| 78 | 1579.6 | 1483.7 | 1530.1 | 1935.0 | 1726.3 | 1806.5 | 104.0 | 63.5 | 83.4 |
| 79 | 1567.5 | 1461.5 | 1515.0 | 1928.1 | 1741.9 | 1822.8 | 102.0 | 74.5 | 81.0 |
| 80 | 1574.6 | 1479.0 | 1526.1 | 1960.2 | 1746.6 | 1846.6 | 101.0 | 65.0 | 84.5 |
| 81 | 1511.7 | 1311.7 | 1411.7 | 1837.2 | 1837.2 | 1837.2 | 92.5 | 64.5 | 82.5 |
| 84 | 1547.7 | 1422.2 | 1485.9 | 1826.3 | 1694.5 | 1775.9 | 65.0 | 47.5 | 55.0 |
| 89 | 1522.5 | 1337.5 | 1430.8 | 1904.0 | 1602.5 | 1774.9 | 87.5 | 46.0 | 64.0 |
| 90 | 1370.6 | 1117.6 | 1245.3 | 1873.4 | 1539.8 | 1727.6 | 138.0 | 77.5 | 99.0 |
| 96 | 1144.4 | 767.0 | 955.7 | 1726.3 | 1245.2 | 1547.4 | 150.0 | 94.5 | 124.1 |
| 102 | 1030.7 | 659.1 | 845.8 | 1589.5 | 1249.4 | 1441.3 | 212.0 | 140.0 | 160.2 |
| 110 | 878.4 | 569.6 | 724.4 | 1471.9 | 1165.0 | 1330.6 | 213.0 | 150.0 | 164.8 |
| 132 | 666.6 | 464.6 | 565.0 | 1244.2 | 897.5 | 1003.0 | 181.0 | 174.0 | 160.0 |
| 136 | 629.4 | 462.7 | 546.0 | 1204.5 | 990.3 | 1097.4 | 181.0 | 174.0 | 160.0 |

| ELEV | TEMP (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|--------------|-------|-------|---------------------|--------|--------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 19.2 | 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 | 163.0 | 54.0 | 133.7 | 872.5 | 797.0 | 827.7 | 113.9 | 105.4 | 110.0 |
| 48 | 184.9 | 161.5 | 173.4 | 976.4 | 824.8 | 920.0 | 163.5 | 154.0 | 154.0 |
| 60 | 263.6 | 224.0 | 243.8 | 1139.2 | 1028.8 | 1084.0 | 260.4 | 248.3 | 254.4 |
| 67 | 350.0 | 276.0 | 313.0 | 1052.7 | 834.3 | 933.4 | 329.2 | 302.6 | 315.4 |
| 70 | 347.2 | 251.4 | 299.3 | 1196.7 | 1047.9 | 1122.3 | 636.0 | 311.5 | 404.8 |
| 71 | 383.0 | 372.5 | 377.8 | 1196.7 | 981.6 | 1089.2 | 362.9 | 331.0 | 347.2 |
| 72 | 440.1 | 351.3 | 395.7 | 1032.7 | 246.8 | 639.8 | 672.0 | 356.6 | 45.6 |
| 73 | 375.4 | 350.4 | 362.9 | 948.0 | 281.3 | 614.7 | 643.0 | 343.2 | 46.1 |
| 75 | 401.5 | 327.0 | 364.3 | 1059.1 | 232.8 | 646.0 | 694.0 | 362.5 | 46.0 |
| 76 | 420.4 | 191.5 | 312.6 | 1139.2 | 242.5 | 733.0 | 704.0 | 273.5 | 423.2 |
| 77 | 436.3 | 200.5 | 318.4 | 1131.2 | 253.2 | 716.1 | 704.0 | 243.6 | 463.2 |
| 78 | 407.3 | 182.7 | 295.0 | 1227.0 | 620.4 | 886.3 | 402.0 | 296.6 | 366.6 |
| 79 | 416.5 | 216.1 | 276.4 | 997.1 | 449.0 | 805.3 | 419.6 | 362.6 | 403.8 |
| 80 | 385.4 | 269.6 | 325.5 | 947.9 | 784.0 | 853.9 | 425.9 | 346.6 | 403.0 |
| 81 | 311.1 | 243.3 | 279.0 | 810.4 | 810.4 | 810.4 | 433.7 | 370.5 | 414.5 |
| 84 | 424.2 | 191.0 | 307.6 | 763.9 | 654.8 | 718.6 | 418.6 | 418.6 | 418.6 |
| 90 | 502.0 | 307.9 | 434.2 | 877.7 | 772.2 | 825.9 | 454.8 | 432.4 | 445.9 |
| 96 | 563.6 | 393.0 | 478.3 | 871.4 | 699.6 | 774.6 | 528.7 | 495.4 | 513.0 |
| 102 | 580.4 | 376.6 | 478.5 | 752.2 | 563.1 | 639.6 | 570.0 | 546.0 | 543.2 |
| 110 | 628.7 | 222.4 | 425.6 | 711.3 | 524.8 | 637.8 | 574.6 | 524.0 | 511.2 |
| 132 | 557.3 | 374.4 | 465.8 | 685.2 | 601.8 | 654.0 | 580.0 | 497.4 | 526.7 |
| 136 | 575.1 | 367.0 | 471.1 | 590.4 | 567.5 | 583.4 | 595.8 | 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

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES

RUN NUMBER 43333F

| 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 | 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. | 156.4 |
| 2A 5- 0 | 12 | 1463. | 1615. | 151. | 53.0 | 675. | 222.0 |
| 2A 5- 7 | 14 | 1541. | 1678. | 137. | 72.5 | 454. | 263.6 |
| 5C 6- 2 | 33 | 1444. | 1655. | 211. | 114.0 | 1076. | 326.6 |
| 2D 6- 3 | 39 | 1469. | 1705. | 236. | 111.0 | 704. | 327.5 |
| 1D 6- 4 | 46 | 1476. | 1627. | 151. | 110.0 | 631. | 345.0 |
| 3D 6- 4 | 50 | 1488. | 1768. | 280. | 115.0 | 244. | 604.0 |
| 4B 6- 4 | 51 | 1546. | 1705. | 159. | 78.5 | 625. | 343.6 |
| 5D 6- 4 | 56 | 1472. | 1610. | 138. | 114.0 | 606. | 349.0 |
| 1D 6- 5 | 56 | 1472. | 1623. | 151. | 110.0 | 642. | 351.4 |
| 2A 6- 5 | 59 | 1475. | 1610. | 135. | 106.0 | 636. | 332.5 |
| 2D 6- 5 | 62 | 1520. | 1714. | 194. | 113.0 | 657. | 340.6 |
| 3B 6- 5 | 63 | 1556. | 1746. | 188. | 87.5 | 663. | 346.2 |
| 3C 6- 6 | 65 | 1545. | 1804. | 259. | 110.0 | 1162. | 317.6 |
| 3E 6- 6 | 70 | 1473. | 1663. | 210. | 115.0 | 1041. | 336.2 |
| 4C 6- 6 | 73 | 1540. | 1766. | 226. | 87.0 | 611. | 353.0 |
| 5C 6- 6 | | | | | | | |
| 3D 6- 7 | 85 | 1547. | 1792. | 225. | 110.0 | 605. | 354.4 |
| 3C 6- 8 | 93 | 1545. | 1816. | 234. | 92.5 | 674. | 344.7 |
| 4A 6- 8 | 95 | 1454. | 1630. | 176. | 88.0 | 656. | 365.5 |
| 1C 7- 0 | 109 | 1460. | 1682. | 202. | 86.0 | 676. | 351.5 |
| 2B 7- 0 | 110 | 1512. | 1721. | 209. | 74.5 | 646. | 367.0 |
| 3D 7- 0 | 113 | 1539. | 1769. | 230. | 73.0 | 626. | 362.0 |
| 5B 7- 0 | 117 | 1466. | 1624. | 218. | 77.0 | 594. | 374.5 |
| 2B 7- 6 | 120 | 1467. | 1722. | 255. | 90.0 | 724. | 410.6 |
| 2C 7- 6 | 121 | 1466. | 1755. | 270. | 90.5 | 667. | 404.6 |
| 2E 7- 6 | 123 | 1326. | 1584. | 257. | 112.0 | 752. | 416.4 |
| 3A 7- 6 | 124 | 1441. | 1590. | 149. | 73.0 | 700. | 400.7 |
| 3B 7- 6 | 125 | 1510. | 1742. | 232. | 85.5 | 704. | 411.4 |
| 4B 7- 6 | 125 | 1475. | 1692. | 216. | 74.5 | 717. | 421.2 |
| 5C 7- 6 | 132 | 1435. | 1644. | 209. | 87.0 | 755. | 414.4 |
| 1C 8- 0 | 133 | 1270. | 1616. | 346. | 130.0 | 746. | 452.4 |
| 2E 8- 0 | 136 | 1140. | 1518. | 378. | 114.0 | 726. | 451.4 |
| 3D 8- 0 | 136 | 1344. | 1730. | 381. | 129.0 | 767. | 443.6 |
| 5B 8- 0 | 143 | 1246. | 1525. | 278. | 180.0 | 604. | 452.7 |
| 5C 8- 0 | 144 | 1311. | 1609. | 298. | 143.0 | 776. | 457.7 |
| 1C 8- 6 | 145 | 1626. | 1493. | 468. | 129.0 | 556. | 462.0 |
| 1D 8- 6 | 146 | 670. | 1366. | 498. | 130.0 | 564. | 464.1 |
| 2C 8- 6 | 148 | 1171. | 1652. | 481. | 131.0 | 640. | 474.6 |
| 4B 8- 6 | 153 | 1162. | 1607. | 425. | 145.0 | 541. | 441.5 |
| 5D 8- 6 | 155 | 1108. | 1507. | 400. | 173.0 | 631. | 453.2 |
| 3D 9- 3 | 156 | 576. | 1446. | 468. | 174.0 | 665. | 445.0 |
| 4C 9- 3 | 161 | 1047. | 1525. | 478. | 174.0 | 675. | 500.0 |
| 1D10- 0 | 164 | 546. | 1126. | 524. | 264.0 | 664. | 507.0 |
| 4B10- 0 | 168 | 663. | 1386. | 502. | 189.0 | 646. | 514.0 |
| 5D10- 0 | 169 | 746. | 1222. | 477. | 192.0 | 706. | 469.4 |
| 2A11- 0 | 171 | 532. | 852. | 320. | 196.0 | 556. | 512.0 |
| 4C11- 0 | 172 | 643. | 1181. | 487. | 214.0 | 566. | 527.6 |
| 1D11- 6 | | | | | | | |

* * * B A U T H E R M O C U L P L E D A T A * * *

* * * B A U T H E R M O C U L P L E D A T A * * *

KUN 4333F HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 741.6 | 674.4 | 710.5 | 746.2 | 691.0 | 718.6 | 11.5 | 4.5 | 6.0 |
| 24 | 920.9 | 920.4 | 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 | 1440.5 | 1330.7 | 1382.7 | 1519.2 | 1414.1 | 1455.9 | 50.5 | 34.5 | 44.6 |
| 60 | 1483.4 | 1437.3 | 1450.4 | 1618.8 | 1591.7 | 1608.3 | 65.5 | 53.0 | 58.3 |
| 67 | 1594.5 | 1497.8 | 1555.7 | 1780.9 | 1663.6 | 1714.3 | 74.5 | 50.0 | 64.0 |
| 70 | 1606.5 | 1400.9 | 1478.6 | 1810.1 | 1614.5 | 1671.0 | 114.0 | 76.5 | 84.1 |
| 71 | 1547.0 | 1564.9 | 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 | 1302.6 | 1444.1 | 1772.0 | 1606.8 | 1696.6 | 130.0 | 80.5 | 103.6 |
| 75 | 1498.4 | 1402.5 | 1457.7 | 1769.8 | 1591.7 | 1676.3 | 116.0 | 106.0 | 112.1 |
| 76 | 1545.9 | 1414.1 | 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 | 67.5 | 105.1 |
| 78 | 1580.0 | 1405.2 | 1517.6 | 1804.4 | 1612.3 | 1686.0 | 115.0 | 74.0 | 95.6 |
| 79 | 1577.9 | 1430.9 | 1516.2 | 1742.1 | 1622.1 | 1698.2 | 130.0 | 74.5 | 103.4 |
| 80 | 1585.4 | 1453.9 | 1510.7 | 1819.1 | 1629.7 | 1716.8 | 114.0 | 80.6 | 103.5 |
| 81 | 1492.0 | 1492.0 | 1492.0 | 1702.9 | 1702.9 | 1702.9 | 113.0 | 113.0 | 113.0 |
| 84 | 1539.0 | 1466.3 | 1483.6 | 1776.5 | 1624.3 | 1705.3 | 87.0 | 73.0 | 74.4 |
| 90 | 1515.2 | 1327.5 | 1443.4 | 1742.1 | 1541.9 | 1577.9 | 117.0 | 71.0 | 80.6 |
| 96 | 1383.6 | 1134.7 | 1242.2 | 1753.1 | 1462.3 | 1631.5 | 205.0 | 113.0 | 130.3 |
| 102 | 1193.8 | 810.6 | 1077.9 | 1651.6 | 1355.1 | 1526.2 | 173.0 | 115.0 | 139.6 |
| 111 | 1046.7 | 841.8 | 957.8 | 1535.5 | 1279.7 | 1396.5 | 203.0 | 136.0 | 176.5 |
| 120 | 803.2 | 546.3 | 766.1 | 1415.2 | 1125.5 | 1283.6 | 264.0 | 189.0 | 204.2 |
| 132 | 693.1 | 467.8 | 540.2 | 1180.6 | 777.4 | 921.4 | 259.0 | 196.0 | 224.0 |
| 138 | 637.3 | 666.6 | 622.1 | 1145.3 | 961.4 | 1053.3 | 274.0 | 263.0 | 268.5 |

| ELEV | TEMP MADE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|--------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 11.6 | 4.6 | 0.1 | 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 | 104.1 | 112.7 |
| 48 | 83.4 | 64.2 | 73.2 | 934.6 | 617.7 | 897.9 | 159.4 | 151.0 | 155.1 |
| 60 | 164.3 | 131.1 | 144.9 | 731.9 | 675.4 | 705.6 | 230.0 | 222.0 | 226.6 |
| 67 | 184.7 | 137.1 | 150.6 | 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 | 200.1 | 334.8 |
| 71 | 264.9 | 241.8 | 253.3 | 1059.9 | 970.3 | 1015.1 | 307.0 | 304.0 | 305.4 |
| 72 | 294.3 | 267.3 | 280.8 | 1045.1 | 244.7 | 644.9 | 572.0 | 316.0 | 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 | 216.6 | 1059.5 | 233.9 | 722.8 | 609.0 | 316.7 | 375.0 |
| 76 | 299.3 | 127.1 | 198.7 | 994.3 | 243.6 | 617.1 | 609.0 | 255.3 | 416.7 |
| 77 | 266.5 | 110.6 | 167.9 | 1135.0 | 663.0 | 847.1 | 351.4 | 326.4 | 341.1 |
| 78 | 259.0 | 113.6 | 166.4 | 1182.1 | 783.7 | 892.6 | 369.0 | 117.0 | 350.2 |
| 79 | 233.8 | 136.6 | 162.0 | 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 | 184.2 | 221.7 | 715.3 | 594.5 | 659.9 | 391.9 | 371.0 | 382.8 |
| 90 | -3 | 140.9 | 234.5 | 839.2 | 716.8 | 764.8 | 424.9 | 357.3 | 411.7 |
| 96 | 2 | 252.4 | 334.4 | 809.1 | 712.3 | 758.4 | 464.8 | 430.3 | 450.8 |
| 102 | 556.5 | 374.9 | 440.3 | 889.8 | 502.5 | 600.2 | 491.5 | 453.2 | 475.0 |
| 111 | 503.6 | 375.3 | 436.7 | 692.8 | 597.3 | 653.5 | 500.0 | 476.0 | 467.0 |
| 120 | 578.4 | 476.5 | 517.5 | 699.8 | 641.5 | 664.4 | 519.0 | 404.9 | 510.6 |
| 132 | 487.5 | 304.6 | 373.2 | 671.0 | 542.8 | 597.4 | 527.3 | 423.3 | 474.3 |
| 138 | 508.0 | 354.6 | 421.3 | 549.9 | 507.6 | 593.7 | 539.2 | 531.0 | 537.1 |

4333F-3

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 ^o C (1604 ^o 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 ^o C (88 ^o F) |
| Average and range of initial 1.83 m (72 in.) housing temperature | 511 ^o C (494 ^o C - 518 ^o C) [951 ^o F (922 ^o F - 964 ^o 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 NUMBER 43534F

| ROD/ELEV | CHAN. | NU | 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 | 117C. | 1285. | 115. | 30.5 | 727. | 145.7 |
| 4C 3- 3 | | 6 | 1225. | 1296. | 71. | 19.0 | 796. | 137.7 |
| 1C 4- 0 | | 7 | 1360. | 1543. | 163. | 61.0 | 662. | 207.7 |
| 2A 5- 0 | | 12 | 1474. | 1653. | 173. | 58.5 | 730. | 305.7 |
| 2A 5- 7 | | 14 | 1554. | 1766. | 213. | 61.0 | 649. | 379.5 |
| 5C 6- 2 | | 33 | 1456. | 1698. | 202. | 61.0 | 971. | 471.2 |
| 2D 6- 3 | | 39 | 1503. | 1612. | 109. | 29.5 | 657. | 412.8 |
| 1D 6- 4 | | 46 | 1514. | 1603. | 93. | 28.5 | 425. | 364.8 |
| 3D 6- 4 | | 50 | 1475. | 1746. | 271. | 69.0 | 326. | 726.0 |
| 4B 6- 4 | | 51 | 1565. | 1677. | 112. | 32.0 | 760. | 460.5 |
| 5D 6- 4 | | 56 | 1514. | 1617. | 103. | 32.5 | 604. | 465.4 |
| 1D 6- 5 | | 58 | 1511. | 1608. | 97. | 57.5 | 464. | 354.6 |
| 2A 6- 5 | | 59 | 1507. | 1621. | 114. | 57.5 | 657. | 352.6 |
| 2D 6- 5 | | 62 | 1539. | 1660. | 122. | 57.5 | 462. | 429.7 |
| 3B 6- 5 | | 63 | 1565. | 1717. | 153. | 58.0 | 542. | 467.0 |
| 3C 6- 5 | | 69 | 1525. | 1781. | 256. | 63.5 | 425. | 478.1 |
| 3E 6- 6 | | 70 | 1450. | 1677. | 186. | 59.5 | 424. | 443.6 |
| 4C 6- 6 | | 73 | 1540. | 1736. | 147. | 34.0 | 732. | 446.9 |
| 5C 6- 6 | | 75 | 1574. | 1772. | 198. | 59.5 | 716. | 514.0 |
| 3D 6- 7 | | 89 | 1574. | 1772. | 198. | 59.5 | 716. | 514.0 |
| 3C 6- 8 | | 93 | 1563. | 1802. | 219. | 59.0 | 663. | 477.9 |
| 4A 6- 8 | | 95 | 1487. | 1649. | 163. | 57.0 | 646. | 511.7 |
| 1C 7- 0 | | 105 | 1514. | 1636. | 123. | 27.0 | 646. | 529.0 |
| 2B 7- 0 | | 110 | 1533. | 1642. | 108. | 16.0 | 654. | 531.9 |
| 3D 7- 0 | | 113 | 1561. | 1663. | 101. | 15.5 | 619. | 538.0 |
| 5B 7- 0 | | 117 | 1426. | 1542. | 114. | 27.5 | 667. | 524.9 |
| 2B 7- 6 | | 120 | 1501. | 1663. | 162. | 34.0 | 737. | 523.9 |
| 2C 7- 6 | | 121 | 1510. | 1687. | 171. | 34.0 | 796. | 530.0 |
| 2E 7- 6 | | 123 | 1406. | 1531. | 126. | 34.5 | 722. | 517.5 |
| 3A 7- 6 | | 124 | 1464. | 1578. | 94. | 24.0 | 776. | 532.9 |
| 3B 7- 6 | | 125 | 1544. | 1702. | 158. | 35.5 | 764. | 520.3 |
| 4B 7- 6 | | 129 | 1504. | 1649. | 145. | 32.5 | 710. | 566.9 |
| 5C 7- 6 | | 132 | 1472. | 1631. | 159. | 43.5 | 666. | 567.0 |
| 1C 8- 0 | | 133 | 1317. | 1555. | 238. | 59.5 | 666. | 606.0 |
| 2E 8- 0 | | 136 | 1241. | 1438. | 197. | 59.5 | 711. | 545.0 |
| 3D 8- 0 | | 138 | 1379. | 1647. | 268. | 59.0 | 756. | 575.0 |
| 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 | 664. | 634.4 |
| 1D 8- 6 | | 146 | 1610. | 1145. | 135. | 23.0 | 664. | 564.0 |
| 2C 8- 6 | | 148 | 1184. | 1491. | 308. | 61.5 | 720. | 566.1 |
| 4B 8- 6 | | 153 | 1166. | 1439. | 253. | 59.5 | 595. | 647.9 |
| 5D 8- 6 | | 155 | 1130. | 1318. | 189. | 57.5 | 656. | 636.0 |
| 3D 9- 3 | | 159 | 944. | 1257. | 313. | 76.5 | 602. | 626.0 |
| 4C 9- 3 | | 161 | 1023. | 1337. | 314. | 76.0 | 562. | 654.0 |
| 1D10- 0 | | 164 | 595. | 938. | 343. | 129.0 | 624. | 664.2 |
| 4B10- 0 | | 168 | 865. | 1191. | 326. | 101.0 | 515. | 675.0 |
| 5D10- 0 | | 169 | 744. | 1004. | 260. | 85.5 | 526. | 566.6 |
| 2A11- 0 | | 171 | 524. | 775. | 252. | 132.0 | 492. | 627.7 |
| 4C11- 0 | | 172 | 677. | 944. | 267. | 95.5 | 466. | 625.6 |
| 1D11- 6 | | 172 | 677. | 944. | 267. | 95.5 | 466. | 625.6 |

* * B A D T H E R M O C O U P L E C A T A * *

* * B A D T H E R M O C O U P L E C A T A * *

RUN 43534F HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 1160.1 | 1167.9 | 1297.4 | 1234.9 | 1292.9 | 31.5 | 19.0 | 27.0 |
| 48 | 1443.0 | 1330.3 | 1380.7 | 1603.6 | 1505.2 | 1549.0 | 64.0 | 52.5 | 59.1 |
| 60 | 1479.4 | 1440.4 | 1463.0 | 1678.8 | 1634.1 | 1655.2 | 63.0 | 57.5 | 59.7 |
| 67 | 1600.3 | 1514.2 | 1562.2 | 1829.3 | 1700.6 | 1770.3 | 63.5 | 57.0 | 59.4 |
| 70 | 1603.6 | 1420.5 | 1442.5 | 1811.2 | 1590.5 | 1651.2 | 59.0 | 32.0 | 51.4 |
| 71 | 1553.6 | 1490.7 | 1520.2 | 1755.3 | 1705.1 | 1730.2 | 60.0 | 57.0 | 56.5 |
| 72 | 1449.4 | 1303.4 | 1410.4 | 1718.5 | 1597.1 | 1657.8 | 67.5 | 62.0 | 64.8 |
| 73 | 1443.0 | 1410.2 | 1424.6 | 1626.5 | 1589.5 | 1608.0 | 69.0 | 60.5 | 64.8 |
| 74 | 1500.9 | 1304.4 | 1450.5 | 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 | 26.5 | 51.2 |
| 77 | 1571.1 | 1470.9 | 1520.2 | 1729.6 | 1601.4 | 1658.9 | 77.0 | 24.0 | 50.6 |
| 78 | 1589.5 | 1490.2 | 1530.0 | 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 | 1503.0 | 1406.6 | 1529.1 | 1802.2 | 1644.4 | 1718.1 | 59.0 | 41.0 | 55.4 |
| 81 | 1520.3 | 1520.3 | 1520.3 | 1654.3 | 1684.3 | 1684.3 | 58.0 | 50.5 | 58.0 |
| 84 | 1561.4 | 1420.0 | 1504.3 | 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 | 22.0 | 33.5 |
| 96 | 1396.0 | 1241.1 | 1333.3 | 1679.4 | 1400.2 | 1559.5 | 60.0 | 30.5 | 57.0 |
| 102 | 1193.1 | 930.7 | 1113.2 | 1491.2 | 1103.7 | 1331.5 | 61.5 | 23.0 | 52.3 |
| 111 | 1023.3 | 838.5 | 940.1 | 1337.3 | 1093.4 | 1217.0 | 98.5 | 61.5 | 81.2 |
| 120 | 865.4 | 590.1 | 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) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|-------|-------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 12.7 | 11.5 | 12.1 | 643.6 | 640.0 | 641.8 | 20.9 | 18.6 | 19.8 |
| 24 | 29.6 | 29.6 | 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 | 150.6 | 162.2 | 882.2 | 725.4 | 815.5 | 207.7 | 197.7 | 203.4 |
| 60 | 179.6 | 173.2 | 172.2 | 753.7 | 729.5 | 743.3 | 320.8 | 305.7 | 315.4 |
| 67 | 129.0 | 181.4 | 168.1 | 959.9 | 745.0 | 879.5 | 408.3 | 370.0 | 368.4 |
| 70 | 207.6 | 122.1 | 158.6 | 928.2 | 229.6 | 502.8 | 717.0 | 394.4 | 501.6 |
| 71 | 206.4 | 201.5 | 204.0 | 1026.2 | 937.8 | 982.0 | 440.3 | 421.3 | 430.0 |
| 72 | 264.1 | 213.7 | 241.4 | 1028.3 | 253.3 | 640.8 | 728.0 | 430.1 | 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 | 440.1 | 560.3 |
| 75 | 268.8 | 90.7 | 174.2 | 1009.2 | 229.6 | 616.4 | 729.0 | 300.6 | 522.2 |
| 76 | 271.2 | 83.3 | 162.8 | 974.6 | 229.6 | 591.4 | 728.0 | 307.6 | 559.6 |
| 77 | 258.7 | 87.6 | 133.7 | 1119.5 | 541.8 | 811.1 | 504.5 | 352.0 | 446.4 |
| 78 | 256.3 | 112.0 | 147.6 | 1038.4 | 424.0 | 758.4 | 521.3 | 302.6 | 402.9 |
| 79 | 224.2 | 124.4 | 164.7 | 968.8 | 549.4 | 801.3 | 526.9 | 345.0 | 490.3 |
| 80 | 219.2 | 162.5 | 189.0 | 863.0 | 759.1 | 813.2 | 534.5 | 406.7 | 508.8 |
| 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 | 140.9 | 832.6 | 664.8 | 749.0 | 587.8 | 504.0 | 544.5 |
| 96 | 283.9 | 123.6 | 226.2 | 840.7 | 614.4 | 719.0 | 628.4 | 545.0 | 579.0 |
| 102 | 307.5 | 135.4 | 210.3 | 719.6 | 529.2 | 597.3 | 665.4 | 504.0 | 614.0 |
| 111 | 330.4 | 175.2 | 268.9 | 651.5 | 449.9 | 581.6 | 654.0 | 512.7 | 595.7 |
| 120 | 348.4 | 254.6 | 320.4 | 624.2 | 515.0 | 553.3 | 675.0 | 569.0 | 626.6 |
| 132 | 313.1 | 120.9 | 230.1 | 511.1 | 469.2 | 494.6 | 625.6 | 220.7 | 450.0 |
| 138 | 356.8 | 229.6 | 293.4 | 522.2 | 457.0 | 489.6 | 634.0 | 570.1 | 602.1 |

43534F-3

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:

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 43916A

| ROD/LEVEL | CAN. 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 | 1121. | 1130. | 9. | 2.0 | 846. | 34.9 |
| 4C 3- 3 | 11 | 1193. | 1199. | 7. | 2.0 | 804. | 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 | 20 | 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. | 173.6 |
| 5C 6- 2 | 61 | 1458. | 1510. | 11. | 2.0 | 880. | 173.0 |
| 1D 6- 3 | 63 | 1440. | 1456. | 16. | 3.5 | 843. | 180.6 |
| 4B 6- 3 | 66 | 1527. | 1550. | 12. | 2.0 | 870. | 180.0 |
| 5D 6- 3 | 69 | 1462. | 1477. | 15. | 3.5 | 822. | 185.5 |
| 2A 6- 4 | 70 | 1451. | 1466. | 14. | 3.5 | 829. | 186.6 |
| 33 6- 4 | 75 | 1571. | 1584. | 13. | 2.0 | 947. | 186.0 |
| 3D 6- 6 | 79 | 1535. | 1551. | 15. | 2.0 | 920. | 191.6 |
| 2D 6- 5 | 84 | 1557. | 1570. | 13. | 2.0 | 920. | 184.0 |
| 3C 6- 5 | 85 | 1577. | 1592. | 14. | 2.0 | 953. | 185.8 |
| 3E 6- 5 | 86 | 1478. | 1489. | 11. | 2.0 | 837. | 196.8 |
| 3C 6- 6 | 95 | 1554. | 1573. | 14. | 2.0 | 941. | 190.6 |
| 4A 6- 6 | 97 | 1421. | 1433. | 12. | 2.0 | 833. | 195.6 |
| 3D 6- 0 | 98 | 1288. | 1283. | 15. | 2.0 | 771. | 240.0 |
| 5C 6- 6 | * * B A D T H E R M O C U P L E D A T A * | | | | | | |
| 1C 7- 0 | 110 | 1420. | 1431. | 11. | 2.0 | 872. | 225.0 |
| 2B 7- 0 | 111 | 1436. | 1446. | 8. | 1.0 | 867. | 213.0 |
| 3D 7- 0 | 115 | 1470. | 1479. | 9. | 2.0 | 717. | 210.0 |
| 33 7- 0 | 117 | 1323. | 1345. | 12. | 2.0 | 827. | 206.0 |
| 0* 7- 0 | * * B A D T H E R M O C 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 |
| 34 7- 6 | 124 | 1442. | 1455. | 13. | 2.0 | 701. | 233.0 |
| 4B 7- 6 | 127 | 1405. | 1418. | 13. | 2.0 | 716. | 226.6 |
| 5C 7- 6 | 128 | 1288. | 1300. | 12. | 2.0 | 800. | 230.0 |
| 1C 8- 0 | 131 | 1211. | 1228. | 16. | 3.5 | 642. | 251.0 |
| 2E 8- 0 | 133 | 658. | 743. | 45. | 62.5 | 564. | 199.5 |
| 4C 8- 6 | 136 | 1543. | 1558. | 16. | 2.0 | 935. | 188.0 |
| 5A 8- 0 | 136 | 1181. | 1197. | 16. | 3.5 | 722. | 210.0 |
| 5C 8- 0 | 139 | 1134. | 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 | 1047. | 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 | 540. | 253.7 |
| 3D 8- 3 | 154 | 906. | 924. | 18. | 3.5 | 540. | 265.0 |
| 4C 9- 3 | 156 | 649. | 1012. | 13. | 2.0 | 565. | 262.0 |
| 1010- 0 | 161 | 577. | 592. | 15. | 2.5 | 267. | 171.0 |
| 4310- 0 | 164 | 852. | 865. | 13. | 3.5 | 425. | 220.0 |
| 5310- 0 | 167 | 720. | 736. | 16. | 3.5 | 629. | 271.0 |
| 2411- 0 | 168 | 554. | 562. | 8. | 3.5 | 516. | 16.4 |
| 4C11- 0 | 170 | 662. | 671. | 9. | 3.5 | 602. | 14.5 |
| 1011- 6 | 172 | 339. | 359. | 20. | 18.5 | 266. | 23.0 |

KUN 43916A HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-----|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 686.1 | 623.0 | 645.0 | 689.9 | 625.7 | 646.7 | 1.0 | .5 | .6 |
| 24 | 685.3 | 767.2 | 834.2 | 889.2 | 794.0 | 839.8 | 2.0 | 2.0 | 2.0 |
| 39 | 1142.5 | 1040.8 | 1137.3 | 1199.3 | 1107.8 | 1145.6 | 2.0 | 2.0 | 2.0 |
| 40 | 1339.9 | 1240.9 | 1292.5 | 1349.8 | 1263.0 | 1303.2 | 3.5 | 2.0 | 2.4 |
| 60 | 1470.3 | 1320.3 | 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 | 1549.9 | 1474.4 | 1540.6 | 1612.3 | 1489.1 | 1551.5 | 2.0 | 2.0 | 2.0 |
| 71 | 1597.6 | 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 | 1567.0 | 1452.1 | 1532.1 | 1579.2 | 1464.4 | 1544.6 | 3.5 | 2.0 | 2.1 |
| 75 | 1562.6 | 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 | 1500.2 | 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 | 1260.7 | 1355.1 | 1479.4 | 1281.8 | 1405.6 | 2.0 | 1.0 | 1.9 |
| 90 | 1441.6 | 1267.7 | 1367.8 | 1454.8 | 1299.5 | 1380.1 | 3.5 | 2.0 | 2.2 |
| 96 | 1306.3 | 697.0 | 1161.8 | 1320.5 | 743.1 | 1180.7 | 62.5 | 2.0 | 10.3 |
| 102 | 1123.9 | 910.4 | 1041.1 | 1136.0 | 924.3 | 1055.8 | 3.5 | 2.0 | 2.2 |
| 114 | 1079.6 | 811.1 | 946.5 | 1099.5 | 830.2 | 961.1 | 3.5 | 2.0 | 2.9 |
| 120 | 652.3 | 577.3 | 713.0 | 665.4 | 571.9 | 735.4 | 18.0 | 2.5 | 6.5 |
| 132 | 661.6 | 465.4 | 565.4 | 671.0 | 499.1 | 576.2 | 3.5 | 3.5 | 3.5 |
| 136 | 625.0 | 336.4 | 492.0 | 635.2 | 358.9 | 505.6 | 18.5 | 3.5 | 6.1 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 1.4 | 1.7 | 1.6 | 634.0 | 272.6 | 514.8 | 6.0 | 2.0 | 3.6 |
| 24 | 6.6 | 3.4 | 5.1 | 832.0 | 666.9 | 723.2 | 13.0 | 4.6 | 9.1 |
| 39 | 4.0 | 6.6 | 6.3 | 846.3 | 754.0 | 801.4 | 40.5 | 34.4 | 37.4 |
| 40 | 14.1 | 8.1 | 10.8 | 882.1 | 748.1 | 812.5 | 70.4 | 61.9 | 66.3 |
| 60 | 10.0 | 5.4 | 8.5 | 756.3 | 726.5 | 744.5 | 119.0 | 113.0 | 115.8 |
| 67 | 17.8 | 11.4 | 14.5 | 919.5 | 869.8 | 894.7 | 144.4 | 143.0 | 143.5 |
| 70 | 12.4 | 4.2 | 10.9 | 923.6 | 898.1 | 911.6 | 167.9 | 153.5 | 157.6 |
| 71 | 23.1 | 4.2 | 13.2 | 972.3 | 802.8 | 893.5 | 164.4 | 157.7 | 163.3 |
| 72 | 17.6 | 7.0 | 12.6 | 982.2 | 871.1 | 906.8 | 178.0 | 162.9 | 167.1 |
| 74 | 16.6 | 10.2 | 12.5 | 973.7 | 815.1 | 896.5 | 182.9 | 171.1 | 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 | 176.2 | 183.1 |
| 77 | 16.5 | 11.3 | 14.3 | 933.4 | 797.8 | 880.8 | 196.8 | 184.0 | 186.8 |
| 78 | 15.6 | 12.4 | 14.2 | 942.3 | 824.1 | 895.7 | 195.9 | 186.0 | 192.5 |
| 84 | 13.1 | 0.0 | 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 | 226.3 |
| 96 | 45.4 | 12.0 | 16.9 | 771.2 | 583.6 | 696.6 | 251.0 | 194.5 | 234.1 |
| 102 | 15.2 | 12.9 | 14.0 | 672.0 | 534.5 | 604.7 | 266.4 | 191.9 | 241.4 |
| 114 | 14.9 | 11.0 | 14.6 | 737.2 | 406.7 | 566.5 | 269.2 | 91.5 | 216.3 |
| 120 | 43.9 | 13.1 | 22.3 | 628.8 | 281.3 | 402.8 | 252.0 | 88.8 | 204.1 |
| 132 | 13.7 | 0.2 | 10.8 | 601.7 | 483.8 | 535.9 | 17.5 | 4.5 | 14.5 |
| 136 | 20.0 | 10.2 | 13.6 | 574.8 | 285.6 | 466.0 | 23.0 | 12.0 | 17.4 |

43916A-3

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 SEADEF 21 WJO BUNDLE TEST SERIES

RUN NUM3EX43816B

| ROD/ELEV | CHAV. NO | TINITIAL AT FLOOD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE AT TIME (DEG F) | TURNDOWN TIME (SECONDS) | QUENCH TEMPERATURE (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 | 822. | 150.0 |
| 10 6- 2 | 50 | 1458. | 1472. | 14. | 2.0 | 701. | 175.6 |
| 20 6- 2 | 53 | 1516. | 1531. | 15. | 2.0 | 732. | 125.9 |
| 30 6- 2 | 58 | 1558. | 1572. | 14. | 2.0 | 1065. | 29.7 |
| 5C 6- 2 | 61 | 1517. | 1531. | 14. | 2.0 | 861. | 181.1 |
| 10 6- 3 | 63 | 1473. | 1486. | 13. | 2.0 | 815. | 106.0 |
| 4B 6- 3 | 68 | 1541. | 1559. | 18. | 3.0 | 1006. | 88.4 |
| 50 6- 3 | 69 | 1446. | 1470. | 24. | 4.5 | 730. | 201.0 |
| 2A 6- 4 | 70 | 1468. | 1484. | 15. | 3.0 | 758. | 189.0 |
| 20 6- 4 | 72 | 1529. | 1552. | 22. | 3.0 | 941. | 136.3 |
| 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. | 51.7 |
| 30 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. | 57.7 |
| 5C 6- 6 | 101 | 1473. | 1490. | 17. | 3.0 | 763. | 196.0 |
| 1C 7- 0 | 110 | 1406. | 1422. | 16. | 2.0 | 664. | 214.0 |
| 29 7- 0 | 111 | 1432. | 1447. | 16. | 2.0 | 830. | 119.5 |
| 30 7- 0 | 115 | 1466. | 1484. | 18. | 2.0 | 908. | 94.0 |
| 5B 7- 0 | 117 | 1370. | 1384. | 14. | 2.0 | 682. | 213.0 |
| 29 7- 6 | 120 | 1381. | 1400. | 20. | 3.0 | 859. | 143.9 |
| 2C 7- 6 | 121 | 1361. | 1384. | 24. | 3.0 | 862. | 124.0 |
| 2E 7- 6 | 122 | 1232. | 1255. | 22. | 4.5 | 734. | 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 | 600. | 242.0 |
| 2E 8- 0 | 133 | 928. | 972. | 44. | 18.0 | 756. | 174.7 |
| 30 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 |
| 10 8- 6 | 142 | 791. | 820. | 28. | 3.0 | 547. | 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 |
| 50 8- 6 | 148 | 1024. | 1042. | 17. | 2.0 | 687. | 165.7 |
| 30 9- 3 | 154 | 889. | 912. | 23. | 3.0 | 688. | 175.0 |
| 4C 9- 3 | 156 | 992. | 1011. | 18. | 3.0 | 644. | 173.2 |
| 1010- 0 | 161 | 610. | 634. | 24. | 4.5 | 407. | 213.1 |
| 4010- 0 | 164 | 864. | 880. | 16. | 3.0 | 547. | 226.0 |
| 5010- 0 | 167 | 712. | 732. | 19. | 4.5 | 462. | 72.4 |
| 2A11- 0 | 168 | 558. | 567. | 10. | 3.0 | 525. | 20.0 |
| 4C11- 0 | | | | | | | |
| 1011- 6 | | | | | | | |

** BAD THERMOCOUPLE DATA *

RUN 438168 HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TJRYAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-----|------|
| | 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 | 886.2 | 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 | 1371.3 | 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 | 1467.8 | 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 | 1443.0 | 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 | 2.5 | 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 | 963.6 | 609.6 | 713.0 | 874.9 | 634.1 | 736.2 | 115.0 | 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 | 507.8 | 549.4 | 4.5 | 3.0 | 4.1 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|-------|-------------------|-------|-------|
| | 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 | 266.6 | 624.5 | 79.5 | 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 | 637.8 | 856.3 | 151.8 | 144.0 | 149.1 |
| 70 | 20.2 | 16.2 | 18.6 | 698.4 | 464.0 | 878.6 | 162.2 | 154.7 | 159.1 |
| 71 | 21.9 | 16.8 | 19.7 | 966.6 | 593.2 | 817.6 | 179.0 | 157.7 | 166.6 |
| 72 | 17.8 | 12.3 | 15.4 | 897.6 | 326.1 | 846.9 | 175.9 | 170.7 | 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 | 125.0 |
| 77 | 25.0 | 16.5 | 20.6 | 1130.1 | 731.8 | 927.3 | 196.9 | 43.7 | 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 | 92.4 | 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 | 302.2 | 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 |

438168-3

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 NUMBER 43716C

| ROD/ELEV | CHAN. NU | INITIAL AT FLUCD (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|---|--------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | 9 | 1064. | 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 | 1461. | 1413. | 12. | 2.0 | 792. | 119.9 |
| 2A 5- 7 | 21 | 1505. | 1520. | 11. | 2.0 | 666. | 149.8 |
| 1J 5- 2 | 20 | 1476. | 1486. | 8. | 2.0 | 422. | 113.7 |
| 2J 5- 2 | 53 | 1457. | 1506. | 10. | 2.0 | 647. | 36.3 |
| 3D 6- 2 | 26 | 1556. | 1565. | 9. | 2.0 | 600. | 109.0 |
| 4I 5- 2 | 60 | 1525. | 1574. | 10. | 2.0 | 744. | 179.6 |
| 5C 6- 2 | 61 | 1466. | 1482. | 13. | 2.0 | 574. | 74.5 |
| 1D 6- 3 | 63 | 1462. | 1470. | 8. | 2.0 | 937. | 119.8 |
| 5D 5- 3 | 64 | 1476. | 1491. | 13. | 2.0 | 903. | 137.9 |
| 2A 6- 4 | 70 | 1454. | 1472. | 13. | 2.0 | 984. | 41.6 |
| 35 6- 4 | 75 | 1576. | 1587. | 12. | 2.0 | 1047. | 45.4 |
| 2D 6- 5 | 64 | 1555. | 1568. | 12. | 2.0 | 1114. | 55.3 |
| 3C 6- 5 | 69 | 1545. | 1610. | 16. | 2.0 | 1005. | 53.2 |
| 3E 6- 5 | 66 | 1525. | 1534. | 9. | 2.0 | 634. | 126.0 |
| 3C 6- 6 | 45 | 1575. | 1591. | 16. | 2.0 | 1001. | 60.9 |
| 3D 6- 6 | 46 | 1554. | 1568. | 14. | 2.0 | 411. | 126.0 |
| 4A 6- 6 | 47 | 1462. | 1476. | 14. | 2.0 | 622. | 179.0 |
| 4C 6- 6 | 46 | 1577. | 1542. | 15. | 2.0 | 1004. | 63.4 |
| 5C 6- 6 | 101 | 1524. | 1552. | 13. | 2.0 | 1037. | 91.7 |
| 1C 7- 0 | 110 | 1424. | 1436. | 12. | 2.0 | 775. | 140.9 |
| 23 7- 0 | 111 | 1431. | 1443. | 12. | 2.0 | 744. | 126.0 |
| 3D 7- 6 | 115 | 1454. | 1468. | 14. | 2.0 | 716. | 153.0 |
| 55 7- 0 | 117 | 1369. | 1377. | 12. | 2.0 | 706. | 160.0 |
| 23 7- 6 | 120 | 1417. | 1430. | 13. | 2.0 | 636. | 149.4 |
| 2C 7- 6 | 121 | 1402. | 1418. | 16. | 2.0 | 757. | 160.7 |
| 2E 7- 6 | 122 | 1403. | 1126. | 22. | 3.5 | 744. | 166.9 |
| 3A 7- 6 | 123 | 1416. | 1430. | 15. | 2.0 | 709. | 165.0 |
| 3B 7- 6 | 124 | 1406. | 1453. | 15. | 2.0 | 902. | 126.7 |
| 4B 7- 6 | 127 | 1426. | 1452. | 16. | 2.0 | 657. | 214.7 |
| 5C 7- 6 | 128 | 1425. | 1440. | 15. | 2.0 | 849. | 141.7 |
| 1C 4- 0 | 131 | 1210. | 1229. | 18. | 3.5 | 736. | 192.4 |
| 2E 5- 0 | 133 | 964. | 1025. | 61. | 72.0 | 757. | 146.3 |
| 3D 5- 0 | 136 | 1263. | 1281. | 18. | 3.5 | 731. | 193.0 |
| 53 3- 0 | 136 | 1161. | 1204. | 22. | 5.0 | 672. | 143.0 |
| 5C 6- 0 | 139 | 1340. | 1354. | 14. | 2.0 | 603. | 165.9 |
| 1C 6- 6 | 141 | 1026. | 1044. | 18. | 2.0 | 606. | 214.2 |
| 1D 6- 6 | 142 | 603. | 631. | 28. | 3.5 | 565. | 226.0 |
| 2C 5- 6 | * * S A U I T H E R M O C O U P L E D A T A * | | | | | | |
| 4B 3- 6 | 145 | 1125. | 1139. | 14. | 2.0 | 564. | 244.0 |
| 5D 3- 6 | 146 | 1046. | 1065. | 18. | 2.0 | 647. | 144.6 |
| 3D 4- 3 | 154 | 642. | 911. | 19. | 3.5 | 584. | 221.0 |
| 4C 3- 3 | 156 | 940. | 1004. | 14. | 2.0 | 626. | 164.0 |
| 1D10- 0 | 161 | 663. | 637. | 14. | 3.5 | 427. | 67.6 |
| 4B10- 0 | 164 | 657. | 671. | 13. | 3.5 | 550. | 241.7 |
| 5D10- 0 | 167 | 713. | 728. | 15. | 3.5 | 621. | 56.3 |
| 2411- 0 | 166 | 566. | 577. | 9. | 3.5 | 535. | 20.2 |
| 4C11- 0 | 170 | 657. | 667. | 10. | 3.5 | 563. | 16.0 |
| 1011- 6 | 172 | 474. | 489. | 11. | 3.5 | 474. | 12.0 |

RUN 43716C HEATER RJD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-----|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 855.3 | 591.7 | 613.4 | 656.2 | 593.0 | 614.3 | .5 | .5 | .5 |
| 24 | 902.4 | 623.0 | 660.2 | 907.8 | 828.2 | 870.9 | 2.0 | 2.0 | 2.0 |
| 34 | 1223.9 | 1089.4 | 1143.0 | 1230.6 | 1092.3 | 1151.5 | 2.0 | 2.0 | 2.0 |
| 40 | 1370.6 | 1305.7 | 1335.0 | 1337.6 | 1315.2 | 1346.4 | 2.0 | 2.0 | 2.0 |
| 60 | 1402.2 | 1344.0 | 1411.1 | 1417.3 | 1413.0 | 1414.4 | 2.0 | 2.0 | 2.0 |
| 67 | 1611.9 | 1484.2 | 1524.9 | 1624.3 | 1490.7 | 1537.7 | 2.0 | 2.0 | 2.0 |
| 70 | 1545.0 | 1482.1 | 1500.0 | 1607.9 | 1497.6 | 1569.8 | 2.0 | 2.0 | 2.0 |
| 71 | 1556.1 | 1455.2 | 1522.1 | 1570.0 | 1465.6 | 1535.8 | 2.0 | 2.0 | 2.0 |
| 72 | 1500.5 | 1444.4 | 1504.2 | 1521.4 | 1513.8 | 1517.6 | 2.0 | 2.0 | 2.0 |
| 74 | 1577.7 | 1444.3 | 1516.0 | 1586.3 | 1459.1 | 1525.1 | 2.0 | 2.0 | 2.0 |
| 75 | 1547.1 | 1482.2 | 1530.9 | 1609.0 | 1469.8 | 1547.1 | 2.0 | 2.0 | 2.0 |
| 76 | 1600.4 | 1440.7 | 1534.0 | 1614.5 | 1460.2 | 1546.1 | 2.0 | 2.0 | 2.0 |
| 77 | 1594.5 | 1430.6 | 1530.0 | 1610.1 | 1441.9 | 1542.7 | 2.0 | 2.0 | 2.0 |
| 78 | 1576.6 | 1411.0 | 1517.2 | 1591.7 | 1425.9 | 1531.8 | 3.5 | 2.0 | 2.1 |
| 84 | 1489.9 | 1210.0 | 1344.4 | 1483.7 | 1229.6 | 1407.6 | 2.0 | 2.0 | 2.0 |
| 90 | 1437.0 | 1103.3 | 1300.1 | 1452.7 | 1125.5 | 1392.0 | 3.5 | 2.0 | 2.2 |
| 96 | 1334.9 | 904.2 | 1234.0 | 1354.0 | 1025.3 | 1260.9 | 72.0 | 2.0 | 10.1 |
| 102 | 1125.4 | 803.4 | 940.3 | 1139.0 | 831.3 | 1017.9 | 3.5 | 2.0 | 2.3 |
| 111 | 1011.6 | 700.7 | 830.8 | 1025.3 | 811.6 | 952.3 | 3.5 | 2.0 | 3.1 |
| 120 | 864.0 | 622.0 | 750.2 | 847.5 | 637.3 | 769.9 | 120.0 | 2.0 | 10.8 |
| 132 | 657.0 | 564.0 | 570.5 | 666.8 | 520.4 | 596.6 | 3.5 | 3.5 | 3.5 |
| 136 | 639.7 | 470.7 | 520.3 | 648.9 | 489.4 | 535.9 | 3.5 | 3.0 | 3.4 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 1.3 | 0.0 | .3 | 602.8 | 575.9 | 592.4 | 3.1 | 1.6 | 2.4 |
| 24 | 5.4 | 4.4 | 4.7 | 867.0 | 805.3 | 838.4 | 5.1 | 5.0 | 5.0 |
| 34 | 10.9 | 0.7 | 8.0 | 772.3 | 276.9 | 519.0 | 41.5 | 37.0 | 40.3 |
| 40 | 13.1 | 4.5 | 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 | 116.0 | 120.5 |
| 67 | 14.5 | 10.4 | 12.0 | 867.5 | 829.3 | 862.2 | 151.8 | 145.0 | 148.1 |
| 70 | 15.5 | 12.4 | 13.0 | 910.0 | 857.4 | 884.0 | 163.8 | 145.9 | 150.3 |
| 71 | 14.0 | 11.0 | 13.4 | 900.9 | 821.5 | 866.4 | 170.0 | 161.0 | 164.5 |
| 72 | 13.4 | 12.4 | 13.4 | 697.3 | 696.5 | 696.8 | 168.1 | 167.0 | 167.6 |
| 74 | 2.0 | 7.0 | 8.5 | 1066.7 | 659.7 | 843.0 | 179.6 | 31.4 | 103.5 |
| 75 | 13.4 | 5.0 | 10.1 | 1105.6 | 750.3 | 926.3 | 183.0 | 34.4 | 112.9 |
| 76 | 14.1 | 7.0 | 12.2 | 1109.7 | 842.3 | 996.4 | 170.2 | 45.4 | 89.5 |
| 77 | 15.0 | 4.2 | 12.7 | 1119.4 | 753.5 | 927.9 | 184.0 | 53.2 | 121.0 |
| 78 | 17.7 | 12.4 | 14.6 | 1095.7 | 822.0 | 991.3 | 179.0 | 54.4 | 102.2 |
| 84 | 14.4 | 11.0 | 12.7 | 895.3 | 707.6 | 790.2 | 180.0 | 56.4 | 132.7 |
| 90 | 22.2 | 12.0 | 17.8 | 902.3 | 657.3 | 769.7 | 219.7 | 126.7 | 168.4 |
| 96 | 01.1 | 13.7 | 21.1 | 867.6 | 672.1 | 775.3 | 200.0 | 151.8 | 177.3 |
| 102 | 27.9 | 13.0 | 19.0 | 673.3 | 565.3 | 614.3 | 244.0 | 144.8 | 200.0 |
| 111 | 22.9 | 12.4 | 15.5 | 841.5 | 536.9 | 596.6 | 231.0 | 140.1 | 197.0 |
| 120 | 30.0 | 15.1 | 10.0 | 620.5 | 297.7 | 456.3 | 245.0 | 56.3 | 100.6 |
| 132 | 11.4 | 8.0 | 10.1 | 533.5 | 507.6 | 543.0 | 24.5 | 6.0 | 17.2 |
| 136 | 12.0 | 4.1 | 10.0 | 568.4 | 362.3 | 472.3 | 23.5 | 11.4 | 14.7 |

43716C-3

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

KUN NUMBER 441160

| ROD/ELEV | CHASS. NO | INITIAL AT FLCCO (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|---|--------------------------|-----------------------------|--------------------------|---------------------------|----------------------------|-----------------------|
| 2A 3-3 | 7 | 1060. | 1084. | 4. | 1.0 | 729. | 40.5 |
| 4C 3-3 | 9 | 1262. | 1208. | 5. | 2.5 | 765. | 39.1 |
| 1C 4-0 | 10 | 1314. | 1323. | 9. | 2.5 | 780. | 66.4 |
| 2A 5-0 | 13 | 1370. | 1384. | 15. | 2.5 | 794. | 119.0 |
| 2A 5-7 | 16 | 1470. | 1487. | 17. | 4.0 | 855. | 146.4 |
| 23 6-2 | 20 | 1532. | 1540. | 8. | 1.0 | 1014. | 52.0 |
| 3J 6-2 | 55 | 1549. | 1557. | 8. | 2.5 | 775. | 70.2 |
| 5C 6-2 | 59 | 1529. | 1548. | 9. | 2.5 | 865. | 170.0 |
| 10 6-3 | 61 | 1463. | 1494. | 11. | 2.5 | 1047. | 53.3 |
| 44 6-3 | 66 | 1552. | 1561. | 10. | 2.5 | 1098. | 49.2 |
| 50 6-3 | 68 | 1472. | 1486. | 14. | 4.0 | 826. | 105.0 |
| 26 6-4 | 70 | 1456. | 1468. | 12. | 4.0 | 1074. | 36.9 |
| 34 6-4 | * * * * * T H E R M O C O U P L E D A T A * * * * * | | | | | | |
| 13 6-5 | * * * * * T H E R M O C O U P L E D A T A * * * * * | | | | | | |
| 23 6-5 | * * * * * T H E R M O C O U P L E D A T A * * * * * | | | | | | |
| 3C 6-5 | 89 | 1600. | 1613. | 13. | 2.5 | 1122. | 39.9 |
| 3E 6-5 | 96 | 1494. | 1510. | 11. | 2.5 | 949. | 62.9 |
| 3C 6-6 | 97 | 1568. | 1601. | 13. | 2.5 | 1136. | 46.9 |
| 30 6-6 | 96 | 1569. | 1581. | 12. | 2.5 | 935. | 69.4 |
| 4A 6-6 | 100 | 1470. | 1483. | 12. | 2.5 | 976. | 43.3 |
| 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 | * * * * * T H E R M O C O U P L E D A T A * * * * * | | | | | | |
| 28 7-0 | 111 | 1495. | 1494. | 9. | 2.5 | 766. | 111.0 |
| 30 7-0 | 115 | 1470. | 1479. | 9. | 2.5 | 702. | 118.0 |
| 58 7-0 | 117 | 1545. | 1355. | 10. | 2.5 | 694. | 171.0 |
| 28 7-6 | 121 | 1436. | 1424. | 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 | 864. | 127.9 |
| 34 7-6 | * * * * * T H E R M O C O U P L E D A T A * * * * * | | | | | | |
| 38 7-6 | 125 | 1466. | 1478. | 13. | 2.5 | 909. | 106.9 |
| 43 7-6 | 126 | 1452. | 1466. | 13. | 2.5 | 864. | 136.9 |
| 5C 7-6 | 129 | 1452. | 1445. | 13. | 2.5 | 891. | 206.1 |
| 1C 8-0 | 132 | 1210. | 1230. | 19. | 4.0 | 735. | 172.9 |
| 2E 8-0 | 134 | 1150. | 1149. | 19. | 4.0 | 765. | 151.0 |
| 3J 8-0 | 137 | 1326. | 1344. | 18. | 2.5 | 807. | 157.8 |
| 58 8-0 | 139 | 1278. | 1295. | 17. | 4.0 | 676. | 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 |
| 10 8-6 | 142 | 900. | 947. | 47. | 68.5 | 700. | 172.5 |
| 2C 8-6 | 143 | 1067. | 1105. | 18. | 2.5 | 862. | 161.0 |
| 48 8-6 | 145 | 1175. | 1190. | 15. | 2.5 | 712. | 162.0 |
| 50 8-6 | 146 | 1122. | 1140. | 18. | 2.5 | 856. | 220.0 |
| 3J 8-3 | 155 | 940. | 959. | 20. | 4.0 | 841. | 196.9 |
| 4C 9-3 | 157 | 1013. | 1031. | 18. | 4.0 | 685. | 130.9 |
| 1010-0 | 160 | 819. | 862. | 43. | 75.5 | 619. | 82.9 |
| 4810-0 | 162 | 873. | 886. | 15. | 4.0 | 594. | 217.0 |
| 5010-0 | 166 | 757. | 773. | 16. | 6.0 | 862. | 169.6 |
| 2A11-0 | 167 | 576. | 587. | 10. | 2.5 | 541. | 20.9 |
| 4C11-0 | 169 | 680. | 670. | 16. | 2.5 | 591. | 21.0 |
| 1011-6 | 170 | 267. | 247. | 10. | 2.5 | 294. | 3.0 |

KUN 44116D HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-----|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 620.4 | 615.1 | 617.7 | 621.5 | 617.3 | 619.4 | 1.0 | 1.0 | 1.0 |
| 24 | 853.6 | 850.2 | 843.4 | 856.1 | 833.3 | 846.1 | 1.0 | 1.0 | 1.0 |
| 34 | 1202.3 | 1060.2 | 1120.4 | 1207.7 | 1084.1 | 1131.5 | 2.5 | 1.0 | 2.0 |
| 40 | 1314.0 | 1301.4 | 1307.7 | 1322.6 | 1309.0 | 1315.8 | 2.5 | 2.5 | 2.5 |
| 60 | 1402.6 | 1304.0 | 1407.4 | 1409.1 | 1377.1 | 1416.9 | 2.5 | 1.0 | 2.0 |
| 67 | 1600.5 | 1470.3 | 1510.7 | 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 | 1500.0 | 1367.1 | 1511.7 | 1587.3 | 1398.1 | 1521.6 | 4.0 | 1.0 | 2.5 |
| 74 | 1570.2 | 1422.1 | 1511.9 | 1500.9 | 1432.3 | 1521.8 | 2.5 | 1.0 | 2.2 |
| 75 | 1551.6 | 1471.0 | 1511.1 | 1561.4 | 1465.9 | 1521.4 | 4.0 | 2.5 | 2.8 |
| 76 | 1505.7 | 1455.7 | 1534.2 | 1542.7 | 1467.7 | 1545.0 | 4.0 | 1.0 | 2.5 |
| 77 | 1600.5 | 1467.1 | 1524.2 | 1613.4 | 1483.7 | 1542.8 | 4.0 | 2.5 | 2.9 |
| 78 | 1500.0 | 1430.2 | 1530.1 | 1602.5 | 1454.8 | 1542.9 | 4.0 | 2.5 | 2.7 |
| 84 | 1464.5 | 1337.5 | 1411.8 | 1479.4 | 1348.8 | 1422.5 | 2.5 | 2.5 | 2.5 |
| 90 | 1465.7 | 1294.3 | 1348.0 | 1478.4 | 1315.2 | 1411.7 | 4.0 | 2.5 | 2.7 |
| 96 | 1370.3 | 1130.2 | 1277.0 | 1344.9 | 1144.4 | 1296.0 | 6.0 | 2.5 | 3.6 |
| 102 | 1175.2 | 900.4 | 1164.1 | 1190.0 | 947.5 | 1084.1 | 68.5 | 2.5 | 10.0 |
| 111 | 1017.3 | 647.0 | 657.4 | 1031.5 | 665.4 | 974.4 | 4.0 | 2.5 | 3.6 |
| 120 | 673.2 | 613.3 | 707.9 | 688.2 | 633.1 | 731.9 | 83.0 | 2.5 | 22.9 |
| 132 | 654.6 | 575.4 | 667.0 | 669.4 | 586.6 | 618.3 | 4.0 | 2.5 | 3.0 |
| 136 | 640.7 | 267.3 | 474.5 | 657.3 | 297.4 | 492.2 | 4.0 | 2.5 | 3.6 |

| ELEV | TEMP K13C (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|--------|-------------------|-------|-------|
| | 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 |
| 34 | 5.4 | 3.4 | 5.1 | 765.5 | 722.0 | 738.7 | 40.5 | 35.1 | 39.8 |
| 40 | 6.5 | 7.0 | 6.1 | 781.7 | 779.9 | 780.7 | 64.5 | 66.4 | 67.4 |
| 60 | 14.7 | 6.3 | 4.5 | 571.0 | 733.7 | 814.9 | 119.0 | 113.9 | 117.3 |
| 67 | 20.5 | 10.7 | 15.9 | 895.3 | 835.5 | 861.2 | 149.0 | 140.3 | 145.2 |
| 70 | 12.3 | 4.0 | 11.0 | 901.8 | 805.5 | 853.6 | 159.5 | 151.0 | 155.2 |
| 71 | 4.5 | 4.5 | 4.5 | 675.9 | 675.9 | 675.9 | 159.8 | 159.8 | 159.8 |
| 72 | 15.4 | 6.7 | 4.6 | 1009.3 | 343.3 | 859.6 | 396.0 | 36.9 | 146.2 |
| 74 | 12.5 | 5.5 | 3.9 | 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 | 45.2 | 75.1 |
| 76 | 12.6 | 7.0 | 10.6 | 1150.0 | 920.8 | 1020.7 | 128.9 | 34.9 | 66.5 |
| 77 | 16.6 | 10.4 | 13.6 | 1121.6 | 799.4 | 999.6 | 170.0 | 34.4 | 63.3 |
| 78 | 16.6 | 10.2 | 12.8 | 1136.0 | 734.4 | 991.4 | 182.0 | 46.9 | 63.9 |
| 84 | 13.5 | 4.1 | 10.7 | 875.2 | 646.3 | 774.6 | 196.0 | 75.6 | 125.4 |
| 90 | 15.9 | 11.7 | 13.7 | 412.4 | 686.7 | 814.0 | 203.1 | 108.9 | 146.9 |
| 96 | 25.1 | 14.6 | 16.5 | 681.4 | 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 | 147.9 |
| 111 | 20.4 | 14.2 | 17.0 | 665.1 | 531.0 | 605.4 | 245.0 | 186.4 | 198.3 |
| 120 | 40.2 | 10.2 | 24.0 | 661.8 | 240.3 | 468.0 | 227.0 | 0.0 | 130.2 |
| 132 | 12.6 | 10.3 | 11.3 | 590.8 | 541.2 | 562.2 | 24.5 | 26.9 | 23.4 |
| 136 | 17.1 | 10.1 | 12.7 | 567.3 | 294.2 | 457.6 | 29.0 | 3.0 | 14.5 |

44116D-3

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 KJD BUNDLE TEST SERIES
 RUN NUMBER 43616E

| 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 | 1173. | 1180. | 6. | 3.0 | 795. | 52.0 |
| 4C 3-3 | 10 | 1254. | 1259. | 5. | 1.0 | 803. | 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 | 1452. | 1494. | 38. | 8.5 | 1377. | 25.7 |
| 4B 6-4 | 52 | 1518. | 1536. | 18. | 3.0 | 424. | 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 | * * * B A D T H E R M O C O U P L E D A T A * * * | | | | | | |
| 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. | 67.3 |
| 2E 7-6 | 113 | 1273. | 1296. | 23. | 4.5 | 778. | 100.7 |
| 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 | 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 | 861. | 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 TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-----|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 650.7 | 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 | 1.0 | 1.0 | 1.5 |
| 39 | 1254.1 | 1150.9 | 1187.8 | 1298.8 | 1158.8 | 1192.0 | 3.0 | 1.0 | 2.5 |
| 48 | 1438.2 | 1353.0 | 1396.5 | 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 | 1525.2 | 1555.9 | 1622.1 | 1525.7 | 1578.3 | 4.5 | 3.0 | 4.1 |
| 70 | 1586.8 | 1517.3 | 1559.2 | 1622.5 | 1550.6 | 1577.3 | 4.5 | 3.0 | 3.5 |
| 73 | 1611.2 | 1461.2 | 1461.2 | 1476.4 | 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 | 1566.3 | 1455.9 | 1504.3 | 4.5 | 3.0 | 4.3 |
| 81 | 1525.2 | 1525.2 | 1525.2 | 1522.7 | 1522.7 | 1522.7 | 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 | 1384.7 | 4.5 | 3.0 | 3.9 |
| 96 | 1328.8 | 1059.3 | 1249.0 | 1333.0 | 1083.0 | 1273.8 | 4.5 | 4.5 | 4.5 |
| 102 | 1450.5 | 797.1 | 1052.7 | 1470.9 | 815.5 | 1081.9 | 50.5 | 3.0 | 11.4 |
| 111 | 1017.0 | 705.6 | 891.3 | 1039.8 | 747.2 | 918.9 | 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 | 545.1 | 681.5 | 474.2 | 559.0 | 12.0 | 3.0 | 8.8 |
| 138 | 591.9 | 312.7 | 452.3 | 601.5 | 324.8 | 463.1 | 3.0 | 3.0 | 3.0 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|--------|--------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 1.6 | 1.1 | 1.2 | 642.5 | 612.4 | 627.7 | 2.7 | 2.5 | 2.6 |
| 24 | 4.2 | 3.1 | 3.8 | 854.6 | 780.9 | 795.9 | 15.0 | 11.9 | 13.9 |
| 39 | 9.9 | 4.7 | 7.2 | 863.5 | 750.2 | 786.0 | 52.4 | 48.5 | 51.2 |
| 48 | 18.9 | 15.5 | 17.4 | 788.1 | 774.3 | 783.1 | 81.7 | 79.4 | 81.5 |
| 60 | 23.8 | 11.9 | 16.9 | 878.9 | 847.7 | 866.0 | 142.8 | 137.0 | 139.3 |
| 67 | 28.0 | 18.0 | 22.5 | 937.2 | 749.3 | 864.6 | 169.2 | 129.6 | 160.2 |
| 70 | 27.3 | 15.1 | 18.0 | 938.2 | 792.2 | 815.6 | 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 | 854.2 | 828.2 | 173.0 | 61.6 | 98.1 |
| 77 | 18.2 | 14.5 | 16.8 | 1004.8 | 887.7 | 827.7 | 131.8 | 65.8 | 95.0 |
| 78 | 26.5 | 15.6 | 18.8 | 1320.0 | 847.3 | 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 |
| 90 | 23.8 | 18.9 | 21.2 | 1061.7 | 153.7 | 953.5 | 188.6 | 58.2 | 102.9 |
| 81 | 27.5 | 21.5 | 24.5 | 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 | 20.1 | 12.4 | 16.2 | 930.3 | 639.4 | 808.5 | 203.0 | 67.4 | 115.1 |
| 90 | 28.6 | 18.3 | 21.6 | 938.9 | 672.5 | 868.2 | 217.3 | 87.3 | 147.0 |
| 96 | 28.7 | 24.6 | 26.8 | 880.5 | 821.1 | 766.2 | 184.6 | 134.0 | 165.9 |
| 102 | 60.0 | 18.1 | 28.2 | 817.0 | 638.2 | 714.2 | 215.9 | 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
R'IN NUMBER 44117A

| 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 | 1118. | 1134. | 15. | 3.0 | 544. | 55.6 |
| 4C 3- 3 | 11 | 1261. | 1212. | 11. | 3.0 | 747. | 54.6 |
| 1C 4- 0 | 14 | 1310. | 1333. | 17. | 6.0 | 766. | 103.7 |
| 2A 5- 0 | 17 | 1372. | 1390. | 17. | 6.0 | 736. | 179.8 |
| 2A 5- 7 | 21 | 1473. | 1500. | 27. | 9.0 | 782. | 228.7 |
| 1D 6- 2 | 50 | 1439. | 1462. | 23. | 9.0 | 836. | 276.8 |
| 2D 6- 2 | 53 | 1566. | 1588. | 21. | 3.0 | 996. | 261.3 |
| 3D 6- 2 | 58 | 1561. | 1599. | 19. | 3.0 | 1013. | 265.9 |
| 5C 6- 2 | 61 | 1450. | 1508. | 19. | 3.0 | 812. | 273.7 |
| 10 6- 3 | 63 | 1431. | 1456. | 25. | 7.5 | 816. | 284.8 |
| 43 6- 3 | 66 | 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 | 826. | 288.7 |
| 33 6- 4 | 75 | 1565. | 1596. | 31. | 80.5 | 1602. | 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 L T H E R P O C 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 L T H E R P O C C O U P L E D A T A * | | | | | | |
| 2C 7- 6 | 121 | 1446. | 1466. | 17. | 3.0 | 745. | 354.0 |
| 2E 7- 6 | 122 | 1339. | 1356. | 17. | 3.0 | 674. | 341.7 |
| 3A 7- 6 | 123 | 1341. | 1358. | 17. | 3.0 | 654. | 375.1 |
| 3B 7- 6 | 124 | 1450. | 1474. | 18. | 3.0 | 732. | 352.0 |
| 43 7- 6 | 127 | 1415. | 1433. | 18. | 3.0 | 759. | 346.0 |
| 5C 7- 6 | 128 | 1267. | 1303. | 15. | 3.0 | 562. | 363.9 |
| 1C 8- 0 | 131 | 1278. | 1296. | 18. | 3.0 | 680. | 400.1 |
| 2E 8- 0 | 133 | 962. | 995. | 13. | 3.0 | 601. | 293.6 |
| 4C 8- 6 | 136 | 1540. | 1566. | 26. | 9.0 | 952. | 283.4 |
| 53 8- 0 | 138 | 1191. | 1211. | 20. | 6.0 | 748. | 340.6 |
| 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 |
| 43 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 | 246. | 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 | 662. | 694. | 12. | 3.0 | 604. | 22.5 |
| 1D11- 6 | 172 | 418. | 436. | 19. | 9.0 | 410. | 22.1 |

KUN 44117A HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-----|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 649.9 | 574.8 | 590 | 652.0 | 579.1 | 602.0 | 1.5 | 1.0 | 1.4 |
| 24 | 672.6 | 750.1 | 613.0 | 877.9 | 765.9 | 820.4 | 3.0 | 2.0 | 2.8 |
| 34 | 1200.9 | 1092.2 | 1137.2 | 1211.8 | 1106.8 | 1150.8 | 3.0 | 3.0 | 3.0 |
| 40 | 1338.9 | 1249.2 | 1269.9 | 1354.0 | 1273.4 | 1308.7 | 6.0 | 3.0 | 5.3 |
| 60 | 1400.0 | 1339.2 | 1353.6 | 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 | 2.0 | 6.0 |
| 71 | 1590.8 | 1442.5 | 1531.1 | 1622.1 | 1461.2 | 1555.8 | 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 | 1583.6 | 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 | 1622.5 | 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 | 1554.0 | 1417.8 | 1497.4 | 1581.9 | 1448.4 | 1523.4 | 87.0 | 6.0 | 18.4 |
| 84 | 1473.9 | 1287.8 | 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 | 1127.3 | 1205.6 | 1089.2 | 1140.9 | 3.0 | 2.0 | 2.7 |
| 111 | 1174.9 | 910.0 | 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 | 577.8 | 3.0 | 3.0 | 3.0 |
| 136 | 633.0 | 417.6 | 501.6 | 644.7 | 436.4 | 518.8 | 10.5 | 3.0 | 6.9 |

| ELEV | TEMP RATE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|-------|-------------------|-------|-------|
| | 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 | 4.8 | 5.3 | 7.4 | 815.8 | 597.7 | 700.7 | 10.5 | 4.1 | 7.0 |
| 34 | 15.4 | 10.9 | 13.6 | 747.4 | 540.7 | 670.8 | 55.6 | 54.0 | 54.6 |
| 40 | 24.1 | 15.1 | 18.6 | 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 | 223.4 | 227.7 |
| 70 | 24.3 | 18.3 | 20.8 | 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 | 888.6 | 273.6 | 247.0 | 256.9 |
| 74 | 30.2 | 18.2 | 21.7 | 1012.7 | 812.3 | 905.6 | 276.6 | 254.6 | 268.1 |
| 75 | 28.4 | 14.3 | 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 | 264.0 | 276.4 |
| 77 | 24.5 | 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 | 263.4 | 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 | 14.6 | 13.1 | 17.5 | 770.4 | 548.5 | 696.0 | 400.1 | 293.6 | 366.6 |
| 102 | 14.1 | 12.5 | 15.6 | 645.4 | 516.0 | 589.8 | 425.3 | 294.4 | 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 | 84.5 | 223.6 |
| 132 | 12.1 | 10.4 | 11.4 | 603.5 | 520.3 | 552.9 | 27.9 | 22.5 | 24.0 |
| 136 | 25.4 | 11.7 | 17.1 | 571.6 | 410.0 | 488.1 | 27.0 | 21.5 | 25.1 |

44117A-3

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 43717B

| 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 | 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. | 68.5 |
| 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 | 683. | 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. | 5.0 | 760. | 257.8 |
| 3B 6- 4 | 75 | 1564. | 1592. | 28. | 9.5 | 927. | 224.9 |
| 3C 6- 5 | 85 | 1593. | 1612. | 20. | 4.0 | 949. | 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. | 9.5 | 1130. | 134.0 |
| 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 | 774. | 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. | 310.0 |
| 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. | 348.0 |
| 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. | 254.8 |
| 4B10- 0 | 164 | 904. | 918. | 14. | 4.0 | 367. | 312.7 |
| 5D10- 0 | 167 | 760. | 785. | 24. | 11.0 | 420. | 117.4 |
| 2A11- 0 | 168 | 568. | 577. | 9. | 2.5 | 514. | 68.1 |
| 4C11- 0 | * * B A D T H E R M J C O U P L E D A T A * | | | | | | |
| 1D11- 6 | * * B A D T H E R M J C O U P L E D A T A * | | | | | | |

RUN 43717B HEATER RUN STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-----|------|
| | 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 | 1098.0 | 4.0 | 1.0 | 2.5 |
| 49 | 1334.1 | 1228.5 | 1265.4 | 1333.0 | 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 | 9.5 | 4.0 | 6.0 |
| 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 | 1518.7 | 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 | 889.9 | 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 | 536.6 | 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 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|-------|-------------------|-------|-------|
| | 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 | 12.7 | 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 | 950.0 | 677.1 | 804.2 | 93.5 | 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 | 195.9 | 188.9 | 194.5 |
| 70 | 29.7 | 21.6 | 26.5 | 926.1 | 873.5 | 895.6 | 237.9 | 206.9 | 219.0 |
| 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 | 140.3 | 232.9 |
| 77 | 33.5 | 19.6 | 25.3 | 990.1 | 722.4 | 829.4 | 256.8 | 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 | 354.9 | 263.8 | 334.4 |
| 102 | 16.2 | 7.8 | 10.5 | 678.9 | 403.7 | 576.9 | 379.6 | 293.4 | 354.0 |
| 111 | 113.4 | 11.9 | 23.8 | 645.4 | 449.2 | 572.0 | 433.0 | 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 |

43717B-3

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.

PLECHT SEASET 21 ROD BUNDLE TEST SERIES
 KUM NUMBER 43817C

| RJD/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 | 1062. | 1092. | 10. | 3.0 | 335. | 43.6 |
| 4C 3- 3 | 11 | 1214. | 1221. | 7. | 1.5 | 622. | 46.4 |
| 1C 4- 0 | 14 | 1346. | 1360. | 14. | 3.0 | 631. | 65.5 |
| 2A 5- 0 | 17 | 1344. | 1410. | 16. | 3.0 | 716. | 171.3 |
| 2A 5- 7 | 21 | 1509. | 1524. | 15. | 3.0 | 622. | 218.7 |
| 1D 5- 2 | 50 | 1460. | 1489. | 9. | 3.0 | 746. | 237.6 |
| 2D 6- 2 | 53 | 1500. | 1511. | 11. | 3.0 | 547. | 324.0 |
| 3D 6- 2 | 58 | 1556. | 1566. | 7. | 1.5 | 576. | 320.0 |
| 4B 5- 2 | 60 | 1567. | 1575. | 8. | 1.5 | 744. | 272.7 |
| 5C 6- 2 | 61 | 1472. | 1487. | 15. | 3.0 | 505. | 282.4 |
| 10 6- 3 | 63 | 1466. | 1476. | 10. | 3.0 | 605. | 247.7 |
| 5D 6- 3 | 64 | 1474. | 1496. | 16. | 3.0 | 861. | 214.6 |
| 2A 6- 4 | 7C | 1461. | 1476. | 15. | 4.5 | 966. | 132.5 |
| 3B 6- 4 | 75 | 1577. | 1590. | 13. | 3.0 | 605. | 230.7 |
| 2D 6- 5 | 84 | 1557. | 1570. | 13. | 3.0 | 654. | 330.0 |
| 3C 6- 5 | 85 | 1555. | 1611. | 17. | 3.0 | 1146. | 64.3 |
| 3E 6- 5 | 86 | 1527. | 1537. | 10. | 3.0 | 646. | 312.0 |
| 3C 6- 6 | 95 | 1576. | 1544. | 18. | 3.0 | 1115. | 100.5 |
| 3D 6- 6 | 96 | 1556. | 1570. | 14. | 3.0 | 653. | 324.0 |
| 4A 6- 6 | 97 | 1467. | 1484. | 17. | 3.0 | 777. | 274.5 |
| 4C 6- 6 | 98 | 1577. | 1593. | 15. | 3.0 | 626. | 266.0 |
| 5C 6- 6 | 101 | 1541. | 1553. | 12. | 3.0 | 734. | 296.0 |
| 1C 7- 0 | 110 | 1454. | 1466. | 12. | 3.0 | 736. | 275.6 |
| 2B 7- 0 | 111 | 1452. | 1463. | 12. | 1.5 | 705. | 255.7 |
| 3D 7- 0 | 115 | 1474. | 1486. | 12. | 1.5 | 626. | 350.0 |
| 3B 7- 0 | 117 | 1363. | 1374. | 11. | 1.5 | 641. | 297.6 |
| 2B 7- 6 | 120 | 1467. | 1461. | 14. | 3.0 | 746. | 243.4 |
| 2C 7- 6 | 121 | 1464. | 1494. | 15. | 3.0 | 756. | 327.5 |
| 2E 7- 6 | 122 | 1341. | 1358. | 18. | 3.0 | 705. | 300.7 |
| 3A 7- 6 | 123 | 1447. | 1463. | 16. | 3.0 | 656. | 340.5 |
| 3B 7- 6 | 124 | 1476. | 1492. | 15. | 3.0 | 767. | 306.0 |
| 4B 7- 6 | 127 | 1473. | 1488. | 15. | 3.0 | 674. | 355.9 |
| 5C 7- 6 | 128 | 1454. | 1468. | 14. | 3.0 | 662. | 344.0 |
| 1C 8- 0 | 131 | 1310. | 1335. | 18. | 3.0 | 744. | 351.4 |
| 2E 8- 0 | 133 | 1261. | 1278. | 16. | 3.0 | 772. | 334.5 |
| 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. | 1346. | 15. | 3.0 | 664. | 370.7 |
| 1C 8- 6 | 141 | 1147. | 1162. | 15. | 3.0 | 545. | 363.0 |
| 1D 8- 6 | 142 | 1646. | 1062. | 16. | 3.0 | 536. | 344.0 |
| 2C 8- 6 | 145 | 1166. | 1178. | 11. | 1.5 | 586. | 406.4 |
| 4B 8- 6 | 148 | 1120. | 1135. | 15. | 3.0 | 618. | 366.4 |
| 3D 8- 3 | 154 | 975. | 992. | 18. | 3.0 | 507. | 423.3 |
| 4C 8- 3 | 156 | 1041. | 1054. | 14. | 3.0 | 534. | 384.0 |
| 1010- 0 | 161 | 621. | 639. | 19. | 21.5 | 541. | 59.0 |
| 4310- 0 | 164 | 646. | 660. | 15. | 3.0 | 246. | 348.0 |
| 5010- 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 | 554. | 18.3 |
| 1011- 6 | 172 | 471. | 483. | 12. | 3.0 | 263. | 14.0 |

* * * B A L T H E R M O C O U P L E D A T A * *

KUN 43817C HEATER RJD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-----|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 589.6 | 517.1 | 542.7 | 590.8 | 519.4 | 544.2 | 1.0 | 0.0 | .6 |
| 24 | 590.6 | 504.4 | 552.9 | 895.4 | 816.8 | 857.8 | 3.0 | 2.5 | 2.6 |
| 39 | 1214.2 | 1081.6 | 1135.2 | 1221.2 | 1047.3 | 1145.8 | 3.0 | 1.5 | 2.6 |
| 48 | 1371.0 | 1300.4 | 1330.0 | 1384.4 | 1314.2 | 1349.8 | 3.0 | 3.0 | 3.0 |
| 60 | 1395.8 | 1344.0 | 1349.6 | 1414.1 | 1409.8 | 1411.2 | 3.0 | 3.0 | 3.0 |
| 67 | 1608.2 | 1483.4 | 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 | 1569.6 | 3.0 | 3.0 | 3.0 |
| 71 | 1549.7 | 1454.6 | 1510.1 | 1567.9 | 1468.7 | 1533.6 | 3.0 | 1.5 | 2.6 |
| 72 | 1503.9 | 1440.2 | 1500.1 | 1519.2 | 1508.4 | 1513.8 | 3.0 | 1.5 | 2.3 |
| 74 | 1578.9 | 1447.1 | 1510.0 | 1587.3 | 1459.1 | 1526.8 | 3.0 | 1.5 | 2.0 |
| 75 | 1598.4 | 1482.4 | 1538.0 | 1610.1 | 1476.2 | 1550.0 | 3.0 | 1.5 | 2.6 |
| 76 | 1601.0 | 1444.4 | 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 | 1487.3 | 1247.1 | 1410.4 | 1449.8 | 1257.8 | 1428.2 | 3.0 | 1.5 | 2.1 |
| 90 | 1483.4 | 1340.6 | 1443.5 | 1498.7 | 1358.2 | 1458.1 | 3.0 | 1.5 | 2.8 |
| 96 | 1383.0 | 1227.3 | 1320.9 | 1400.2 | 1249.4 | 1346.2 | 4.5 | 3.0 | 3.2 |
| 102 | 1183.0 | 1040.2 | 1136.7 | 1195.2 | 1062.4 | 1150.5 | 3.0 | 1.5 | 2.3 |
| 111 | 1040.4 | 914.0 | 1007.3 | 1063.5 | 931.5 | 1022.4 | 3.0 | 1.0 | 3.0 |
| 120 | 950.5 | 820.8 | 905.7 | 964.5 | 839.4 | 906.6 | 30.5 | 2.0 | 9.9 |
| 132 | 817.1 | 470.4 | 558.2 | 627.8 | 490.5 | 568.8 | 3.0 | 3.0 | 3.0 |
| 138 | 582.2 | 464.6 | 497.4 | 544.0 | 474.6 | 509.2 | 3.0 | 3.0 | 3.0 |

| ELEV | TEMP RATE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 2.3 | 0.0 | 1.4 | 588.7 | 512.9 | 539.0 | 2.9 | 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 | 363.4 | 334.6 | 624.0 | 46.5 | 34.0 | 43.9 |
| 48 | 19.1 | 13.4 | 15.0 | 831.5 | 738.4 | 774.0 | 90.4 | 81.9 | 86.0 |
| 60 | 10.3 | 10.7 | 10.6 | 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 | 10.0 | 10.6 | 902.0 | 808.6 | 855.1 | 239.6 | 227.0 | 233.4 |
| 71 | 18.2 | 12.7 | 15.5 | 849.6 | 594.2 | 752.7 | 249.9 | 232.4 | 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 | 8.6 | 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 | 54.2 | 237.7 |
| 76 | 14.5 | 0.8 | 13.4 | 1120.9 | 637.3 | 846.8 | 325.9 | 71.2 | 223.0 |
| 77 | 17.0 | 4.4 | 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 | 15.4 | 10.5 | 11.8 | 836.3 | 627.8 | 712.5 | 350.0 | 151.4 | 276.6 |
| 90 | 17.0 | 11.3 | 14.8 | 746.4 | 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 | 257.4 | 342.3 |
| 102 | 18.2 | 11.1 | 13.8 | 666.1 | 537.6 | 596.3 | 406.9 | 306.4 | 374.0 |
| 111 | 17.0 | 12.5 | 15.1 | 654.9 | 459.9 | 540.2 | 423.3 | 196.1 | 347.4 |
| 120 | 59.6 | 14.0 | 22.8 | 555.6 | 244.7 | 314.2 | 398.0 | 55.0 | 233.8 |
| 132 | 12.1 | 4.7 | 10.7 | 559.0 | 259.7 | 470.5 | 28.6 | 11.5 | 20.5 |
| 138 | 14.1 | 4.6 | 11.8 | 536.1 | 195.4 | 341.0 | 28.6 | 12.8 | 16.4 |

43817C-3

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 ^o C (1604 ^o 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 ^o C (90 ^o F) |
| Average and range of initial 1.83 m (72 in.) housing temperature | 506 ^o C (498 ^o C - 513 ^o C) [943 ^o F (928 ^o F - 956 ^o 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.

FLIGHT SEASET 21 ROD BUNDLE TEST SERIES
 RUN NUMBER 44317D

| ROD/ELEV | CHAN. | MU | INITIAL AT FLIGHT (DEG F) | MAXIMUM TEMPERATURE (DEG F) | TEMPERATURE RISE (DEG F) | TURNAROUND TIME (SECONDS) | QUENCH TEMPERATURE (DEG F) | QUENCH TIME (SECONDS) |
|----------|---|-----|---------------------------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------|
| 2A 3- 3 | | 7 | 1042. | 1053. | 11. | 2.5 | 241. | 61.5 |
| 4C 3- 3 | | 9 | 1100. | 1171. | 11. | 2.5 | 777. | 53.9 |
| 1C 4- 0 | | 10 | 1240. | 1311. | 21. | 6.0 | 700. | 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. | 70.4 |
| 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 | 1464. | 1504. | 21. | 4.5 | 1075. | 75.6 |
| 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 |
| 33 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 L T H E R M O C O U P L E D A T A * | | | | | | | |
| 2D 6- 5 | * * * B A L 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 | 870. | 176.9 |
| 3C 6- 6 | | 97 | 1543. | 1619. | 26. | 4.5 | 1090. | 77.9 |
| 3D 6- 6 | | 98 | 1575. | 1596. | 21. | 4.5 | 804. | 203.0 |
| 4A 6- 6 | | 100 | 1474. | 1503. | 24. | 6.0 | 824. | 243.7 |
| 4C 6- 6 | | 101 | 1500. | 1604. | 24. | 4.5 | 1150. | 85.1 |
| 5C 6- 6 | | 103 | 1538. | 1563. | 24. | 4.5 | 744. | 272.0 |
| 1C 7- 0 | * * * B A L 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. | 106.6 |
| 3D 7- 0 | | 115 | 1402. | 1497. | 14. | 2.5 | 619. | 297.5 |
| 53 7- 0 | | 117 | 1354. | 1369. | 15. | 4.5 | 691. | 203.9 |
| 23 7- 6 | | 121 | 1467. | 1484. | 22. | 4.5 | 844. | 216.0 |
| 2C 7- 6 | | 122 | 1401. | 1502. | 21. | 4.5 | 922. | 189.0 |
| 2E 7- 6 | | 123 | 1342. | 1365. | 22. | 4.5 | 927. | 164.7 |
| 3A 7- 6 | * * * B A L T H E R M O C O U P L E D A T A * | | | | | | | |
| 3B 7- 6 | | 125 | 1445. | 1513. | 19. | 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 | 840. | 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 | | 134 | 1312. | 1335. | 23. | 4.5 | 603. | 323.6 |
| 5C 8- 0 | | 140 | 1300. | 1410. | 22. | 4.5 | 662. | 335.0 |
| 1C 8- 6 | | 141 | 1187. | 1180. | 19. | 2.5 | 612. | 268.0 |
| 1D 8- 6 | | 142 | 1162. | 1180. | 18. | 4.5 | 633. | 240.6 |
| 2C 8- 6 | | 143 | 1211. | 1227. | 15. | 2.5 | 640. | 251.0 |
| 4B 8- 6 | | 145 | 1230. | 1246. | 16. | 2.5 | 697. | 277.5 |
| 5D 8- 6 | | 146 | 1167. | 1209. | 21. | 4.5 | 600. | 353.1 |
| 3D 9- 3 | | 155 | 1002. | 1102. | 19. | 4.5 | 525. | 305.0 |
| 4C 9- 3 | | 157 | 1002. | 1101. | 19. | 4.5 | 687. | 265.0 |
| 1010- 0 | | 160 | 637. | 693. | 56. | 37.0 | 440. | 134.9 |
| 4310- 0 | | 163 | 800. | 849. | 19. | 4.5 | 583. | 336.0 |
| 5010- 0 | | 166 | 800. | 828. | 22. | 6.0 | 620. | 244.8 |
| 2411- 0 | | 167 | 574. | 586. | 11. | 4.5 | 543. | 31.5 |
| 4011- 0 | | 169 | 640. | 662. | 13. | 6.0 | 501. | 32.0 |
| 1011- 6 | | 170 | 452. | 467. | 15. | 6.0 | 549. | 9.8 |

KUN 443170 HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-----|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 514.6 | 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 |
| 34 | 1160.4 | 1042.4 | 1085.5 | 1171.2 | 1053.2 | 1095.6 | 2.5 | 2.5 | 2.5 |
| 40 | 1269.7 | 1270.0 | 1284.3 | 1311.0 | 1299.5 | 1305.3 | 6.0 | 6.0 | 6.0 |
| 60 | 1474.6 | 1362.9 | 1402.6 | 1486.0 | 1379.2 | 1420.4 | 4.5 | 2.5 | 3.8 |
| 67 | 1600.2 | 1464.6 | 1515.0 | 1626.5 | 1505.2 | 1546.7 | 7.5 | 6.0 | 7.0 |
| 70 | 1545.0 | 1520.3 | 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 | 1580.6 | 1380.8 | 1520.0 | 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 | 1472.4 | 1512.4 | 1574.4 | 1497.6 | 1532.4 | 4.5 | 4.5 | 4.5 |
| 76 | 1588.6 | 1430.4 | 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 | 1545.0 | 1437.1 | 1535.1 | 1618.8 | 1465.5 | 1558.7 | 6.0 | 4.5 | 4.8 |
| 84 | 1482.1 | 1334.2 | 1422.7 | 1476.0 | 1356.1 | 1438.8 | 4.5 | 2.5 | 3.4 |
| 90 | 1494.6 | 1342.3 | 1424.5 | 1512.8 | 1364.5 | 1449.7 | 4.5 | 4.5 | 4.5 |
| 96 | 1424.2 | 1257.3 | 1344.2 | 1452.7 | 1289.1 | 1373.2 | 7.5 | 4.5 | 5.0 |
| 102 | 1230.4 | 1127.1 | 1174.9 | 1246.3 | 1141.1 | 1196.5 | 4.5 | 2.5 | 3.3 |
| 111 | 1093.0 | 950.1 | 1042.4 | 1112.0 | 973.8 | 1060.4 | 4.5 | 4.5 | 4.5 |
| 120 | 874.8 | 637.1 | 754.3 | 898.6 | 693.1 | 789.7 | 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 |

| ELEV | TEMP MISC (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|-------|-------------------|-------|-------|
| | 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 | 743.9 | 489.9 | 9.6 | 4.3 | 7.6 |
| 34 | 10.6 | 0.7 | 10.1 | 776.5 | 241.4 | 565.9 | 61.5 | 53.4 | 57.1 |
| 40 | 21.3 | 20.7 | 21.0 | 769.8 | 768.3 | 769.0 | 94.2 | 90.3 | 92.2 |
| 60 | 23.6 | 15.4 | 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 | 953.2 | 216.7 | 205.8 | 212.5 |
| 70 | 21.0 | 20.6 | 20.8 | 904.1 | 784.8 | 844.4 | 230.0 | 217.4 | 223.4 |
| 71 | 17.6 | 17.0 | 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 | 133.4 |
| 76 | 24.5 | 16.1 | 24.0 | 1131.2 | 680.4 | 945.3 | 277.0 | 51.4 | 139.8 |
| 77 | 24.0 | 21.1 | 24.2 | 1104.4 | 757.9 | 950.2 | 264.8 | 60.4 | 149.7 |
| 78 | 28.4 | 20.0 | 23.6 | 1149.5 | 683.7 | 936.7 | 283.0 | 65.6 | 144.3 |
| 84 | 18.8 | 13.5 | 16.1 | 887.2 | 618.9 | 749.2 | 297.5 | 112.8 | 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 | 942.7 | 624.7 | 720.4 | 335.0 | 216.5 | 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 | 18.0 | 686.9 | 480.2 | 574.3 | 379.0 | 265.0 | 315.3 |
| 120 | 55.4 | 12.4 | 24.4 | 784.9 | 246.8 | 471.4 | 342.7 | 2.0 | 230.7 |
| 132 | 13.1 | 11.1 | 12.4 | 581.3 | 543.7 | 554.1 | 40.6 | 31.5 | 34.7 |
| 138 | 16.1 | 14.5 | 15.6 | 555.6 | 288.8 | 451.4 | 411.0 | 4.0 | 121.5 |

44317D-3

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 NUMBER 43817E

| 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 | 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 | 625. | 214.5 |
| 2A 5- 7 | 15 | 1528. | 1577. | 39. | 11.0 | 641. | 262.7 |
| 5C 6- 0 | 36 | 1430. | 1483. | 53. | 13.5 | 266. | 447.0 |
| 2D 6- 2 | 39 | 1517. | 1528. | 11. | 2.5 | 656. | 133.9 |
| 1D 6- 4 | 47 | 1486. | 1506. | 20. | 4.5 | 746. | 175.4 |
| 3D 6- 4 | 50 | 1470. | 1515. | 45. | 8.5 | 1356. | 43.7 |
| 4B 6- 4 | 52 | 1534. | 1555. | 21. | 4.5 | 507. | 169.2 |
| 5C 6- 4 | 54 | 1471. | 1506. | 35. | 10.5 | 1163. | 113.6 |
| 5D 6- 4 | 55 | 1501. | 1513. | 11. | 2.5 | 756. | 271.6 |
| 1D 6- 5 | 58 | 1501. | 1517. | 16. | 4.5 | 437. | 163.4 |
| 2A 6- 5 | 59 | 1452. | 1516. | 24. | 4.5 | 250. | 251.0 |
| 2D 6- 5 | 61 | 1540. | 1556. | 16. | 4.5 | 474. | 150.9 |
| 3B 6- 5 | 63 | 1563. | 1578. | 14. | 2.5 | 693. | 163.6 |
| 3C 6- 6 | 72 | 1574. | 1610. | 32. | 6.0 | 644. | 100.9 |
| 4C 6- 6 | 75 | 1569. | 1612. | 23. | 4.5 | 444. | 105.9 |
| 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 | 63 | 1516. | 1533. | 17. | 4.0 | 669. | 160.7 |
| 3D 6- 8 | 66 | 1567. | 1592. | 25. | 4.5 | 477. | 123.7 |
| 4A 6- 8 | 67 | 1465. | 1489. | 25. | 6.0 | 727. | 323.4 |
| 1C 7- 0 | 93 | 1452. | 1504. | 12. | 2.5 | 736. | 235.9 |
| 2B 7- 0 | 94 | 1505. | 1516. | 11. | 2.5 | 776. | 177.7 |
| 3D 7- 0 | 98 | 1542. | 1560. | 18. | 4.5 | 406. | 167.6 |
| 5B 7- 0 | 103 | 1436. | 1452. | 16. | 4.0 | 743. | 245.9 |
| 2B 7- 6 | 110 | 1472. | 1491. | 19. | 4.5 | 676. | 223.9 |
| 2C 7- 6 | 111 | 1502. | 1518. | 16. | 4.0 | 416. | 161.7 |
| 2E 7- 6 | 113 | 1363. | 1403. | 21. | 4.5 | 665. | 265.6 |
| 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 | 1166. | 1200. | 14. | 2.5 | 680. | 308.9 |
| 4B 7- 6 | 120 | 1466. | 1507. | 20. | 4.5 | 662. | 257.9 |
| 5C 7- 6 | 122 | 1472. | 1490. | 18. | 4.5 | 610. | 270.7 |
| 1C 8- 0 | 124 | 1267. | 1312. | 25. | 6.0 | 762. | 302.7 |
| 2E 8- 0 | 126 | 1146. | 1228. | 32. | 11.0 | 626. | 306.4 |
| 3D 8- 0 | 129 | 1316. | 1344. | 28. | 6.5 | 605. | 239.4 |
| 5B 8- 0 | 133 | 1271. | 1295. | 25. | 9.5 | 701. | 314.0 |
| 5C 8- 0 | 134 | 1351. | 1373. | 22. | 4.5 | 766. | 300.6 |
| 1C 8- 6 | 135 | 1079. | 1092. | 13. | 2.5 | 644. | 334.7 |
| 1D 8- 6 | 136 | 1007. | 1025. | 18. | 4.5 | 636. | 367.6 |
| 2C 8- 6 | 138 | 1204. | 1242. | 38. | 11.0 | 794. | 264.6 |
| 4B 8- 6 | 143 | 1164. | 1178. | 13. | 2.5 | 710. | 315.3 |
| 5D 8- 6 | 145 | 1114. | 1133. | 19. | 4.5 | 604. | 377.4 |
| 3D 9- 3 | 150 | 933. | 957. | 25. | 9.5 | 701. | 244.9 |
| 4C 9- 3 | 152 | 1007. | 1026. | 20. | 4.5 | 674. | 317.6 |
| 1010- 0 | 157 | 666. | 729. | 63. | 57.3 | 244. | 375.0 |
| 4810- 0 | 164 | 622. | 843. | 21. | 9.5 | 451. | 360.0 |
| 5010- 0 | 166 | 677. | 716. | 39. | 27.5 | 247. | 126.0 |
| 2A11- 0 | 168 | 536. | 544. | 8. | 3.0 | 523. | 20.0 |
| 4C11- 0 | 169 | 631. | 639. | 9. | 2.5 | 576. | 34.5 |
| 1011- 6 | 171 | 353. | 363. | 11. | 2.5 | 254. | 24.5 |

RUN 43817E HEATER ROD STATISTICAL DATA

| ELEV | INITIAL TEMP (DEG F) | | | MAX TEMP (DEG F) | | | TURNAROUND TIME (SEC) | | |
|------|----------------------|--------|--------|------------------|--------|--------|-----------------------|-----|------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | MAX | MIN | MEAN |
| 12 | 621.9 | 586.3 | 604.4 | 623.6 | 590.8 | 611.3 | 2.0 | 1.0 | 1.3 |
| 24 | 950.3 | 807.3 | 878.8 | 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 | 1422.0 | 12.5 | 4.5 | 9.8 |
| 60 | 1529.9 | 1476.8 | 1502.7 | 1511.9 | 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 | 8.4 |
| 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 | 1430.0 | 1503.0 | 1560.3 | 1444.1 | 1516.1 | 4.5 | 2.5 | 2.6 |
| 90 | 1555.8 | 1186.0 | 1436.9 | 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 | 1159.9 | 1518.2 | 780.5 | 1126.4 | 20.0 | 2.5 | 6.6 |
| 111 | 1020.7 | 869.3 | 921.5 | 1039.8 | 842.7 | 944.7 | 11.0 | 4.5 | 7.6 |
| 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 | 461.8 | 2.5 | 2.5 | 2.5 |

| ELEV | TEMP RISE (DEG F) | | | QUENCH TEMP (DEG F) | | | QUENCH TIME (SEC) | | |
|------|-------------------|------|------|---------------------|-------|-------|-------------------|-------|-------|
| | MAX | MIN | MEAN | MAX | MIN | MEAN | 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 | 0.0 | 0.7 | 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 | 68.0 | 70.8 |
| 48 | 35.5 | 10.3 | 26.2 | 765.6 | 704.6 | 742.0 | 127.0 | 121.0 | 124.3 |
| 60 | 40.5 | 12.0 | 25.4 | 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 | 265.4 | 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 | 132.9 | 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 | 150.4 | 194.4 |
| 78 | 31.6 | 14.8 | 19.9 | 1017.2 | 648.5 | 825.7 | 309.8 | 100.4 | 195.4 |
| 79 | 22.2 | 14.6 | 18.9 | 974.9 | 872.7 | 924.9 | 179.0 | 160.7 | 167.6 |
| 80 | 27.3 | 20.7 | 24.5 | 949.6 | 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 |
| 90 | 18.5 | 10.3 | 13.1 | 923.0 | 650.2 | 790.5 | 346.8 | 126.7 | 215.1 |
| 96 | 22.0 | 14.4 | 19.3 | 948.7 | 651.1 | 795.3 | 371.0 | 161.7 | 261.0 |
| 102 | 31.8 | 21.5 | 24.8 | 885.4 | 627.6 | 771.9 | 314.0 | 226.9 | 285.7 |
| 111 | 38.1 | 12.4 | 20.5 | 798.6 | 365.0 | 658.4 | 377.9 | 84.3 | 297.1 |
| 120 | 33.4 | 14.1 | 23.2 | 700.8 | 529.2 | 610.8 | 362.0 | 245.2 | 314.0 |
| 132 | 15.8 | 11.3 | 17.5 | 583.3 | 243.6 | 460.5 | 375.0 | 95.5 | 296.2 |
| 138 | 19.0 | 8.1 | 11.2 | 576.1 | 254.4 | 458.2 | 34.5 | 12.0 | 20.4 |
| 138 | 10.6 | 8.8 | 9.7 | 254.4 | 254.4 | 254.4 | 28.5 | 24.5 | 26.5 |

43817E-3

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:

$$\sigma^2 = \sum_{i=1}^n \frac{E_i^2}{3} \quad (L-1)$$

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:

$$\sigma = \sqrt{E_d^2 + E_c^2} \quad (L-2)$$

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,

$$E_d = \left(\frac{\sum_{i=1}^n (Y_i - Y_f)^2}{n - 2} \right)^{1/2} \quad (L-3)$$

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

$$Y = x_1^{r_1} \cdot x_2^{r_2} \cdot x_3^{r_3} \quad (L-4)$$

then,

$$\frac{\sigma_y^2}{y} = \sum_{i=1}^n \left(r_i \cdot \frac{\sigma_{x_i}}{x_i} \right)^2 \quad (L-5)$$

and

$$E_c = \sqrt{\sigma_y^2} \quad (L-6)$$

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) |
| 239-324 ^(a) | Loop thermocouples | ±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) ±5.89°C (±10.61°F) | ±4.53°C (±8.16°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 | $9.4 \times 10^{-4} \text{ m}^3/\text{sec}$ (15 gal/min) flowmeter | $5.9 \times 10^{-7} \text{ m}^3/\text{sec}$ (0.0094 gal/min) | $2.37 \times 10^{-6} \text{ m}^3/\text{sec}$ (0.0375 gal/min) | $1.36 \times 10^{-6} \text{ m}^3/\text{sec}$ (0.0216 gal/min) | $1.62 \times 10^{-6} \text{ m}^3/\text{sec}$ (0.0256 gal/min) | $4.32 \times 10^{-6} \text{ m}^3/\text{sec}$ (0.0685 gal/min) |
| 333 | $3.8 \times 10^{-3} \text{ m}^3/\text{sec}$ (60 gal/min) flowmeter | $4.2 \times 10^{-6} \text{ m}^3/\text{sec}$ (0.067 gal/min) | $9.5 \times 10^{-6} \text{ m}^3/\text{sec}$ (0.15 gal/min) | $5.45 \times 10^{-6} \text{ m}^3/\text{sec}$ (0.0864 gal/min) | $6.76 \times 10^{-6} \text{ m}^3/\text{sec}$ (0.107 gal/min) | $1.91 \times 10^{-5} \text{ m}^3/\text{sec}$ (0.303 gal/min) |
| 334 | $9.4 \times 10^{-4} \text{ m}^3/\text{sec}$ (15 gal/min) flowmeter | $1.17 \times 10^{-5} \text{ m}^3/\text{sec}$ (0.186 gal/min) | $9.46 \times 10^{-6} \text{ m}^3/\text{sec}$ (0.150 gal/min) | $2.72 \times 10^{-6} \text{ m}^3/\text{sec}$ (0.0432 gal/min) | $8.85 \times 10^{-6} \text{ m}^3/\text{sec}$ (0.140 gal/min) | $2.39 \times 10^{-5} \text{ m}^3/\text{sec}$ (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)] | 0.050 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 | Equipment 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 $\pm 1.0^{\circ}\text{C}$ ($\pm 1.8^{\circ}\text{F}$).

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 (YEV. 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

$$M = 0.52502 \, kYd^2Fa\sqrt{\rho_1 (P_1 - P_2)} \quad (L-7)$$

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/ft³)

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 F_a 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 | | F _a | | P ₁ | | ΔP | | Overall Error |
|---|------------|--------------------------------|------------|--------------------------------|------------|---|----------------|---|----------------|--|---------------------|-----------------------------|
| $\frac{\sigma}{K}$ K (%) | γ_K | $\frac{\sigma}{y}$ y (%) | γ_y | $\frac{\sigma}{d}$ d (%) | γ_d | $\frac{\sigma}{F_a}$ F _a (%) | γ_{F_a} | $\frac{\sigma}{P_1}$ P ₁ (%) | γ_{P_1} | $\frac{\sigma}{\Delta P}$ ΔP (%) | $\gamma_{\Delta P}$ | $\frac{\sigma_m}{m}$ (%) |
| ±1.0 | 1 | ±0.38 | 1 | ±0.12 | 2 | ±0.006 | 1 | ±0.41 | 1/2 | ±0.17 ^(b) | 1/2 | ±1.12 |
| | | | | | | | | | | ±3.4 ^(c) | | ±2.03 |
| <p>Flow equation $M = 0.52502 KYd^2 F_a \sqrt{P_1 (P_1 - P_2)}$</p> <p>Most probable error $\left(\frac{\sigma_m}{m}\right)^2 = \sum_{i=1}^n \left[\gamma_i \left(\frac{\sigma_{x_i}}{x_i}\right) \right]^2$</p> | | | | | | | | | | | | |

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 Sturm-Liouville 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

$$\frac{\partial}{\partial r} \left(k \frac{\partial T}{\partial r} \right) + \frac{k}{r} \frac{\partial T}{\partial r} + q''' = \rho c \left(\frac{\partial T}{\partial t} \right) \quad (M-1)$$

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:

$$\frac{\partial T(0,t)}{\partial r} = 0 \quad (M-2)$$

$$T(a,t) = T_D(t) \quad 0 < a < b \quad (M-3)$$

$$\frac{\partial T(b,t)}{\partial r} = -\phi/k \quad (M-4)$$

$T(r,0)$, 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 consideration ($0 \leq r \leq b$) 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,

$$\lim_{r \rightarrow d} T(r,t) = \lim_{r \rightarrow d} T(r,t) \tag{M-5}$$

$$\begin{array}{ll} r \in R_{i-1} & r \in R_i \\ r \rightarrow d & r \rightarrow d \end{array}$$

$$\lim_{r \rightarrow d} \frac{\partial T(r,t)}{\partial r} k(T) = \lim_{r \rightarrow d} \frac{\partial T(r,t)}{\partial r} k(T) \tag{M-6}$$

$$\begin{array}{ll} r \in R_{i-1} & r \in R_i \\ r \rightarrow d & r \rightarrow d \end{array}$$

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):

$$\frac{\partial}{\partial r} k \frac{\partial T}{\partial r} \approx \frac{k}{(\Delta r)^2} [T(r + \Delta r, t) - 2T(r, t) + T(r - \Delta r, t)] \quad (M-7)$$

$$\frac{k}{r} \frac{\partial T}{\partial r} \approx \frac{k}{r} \left[\frac{T(r + \Delta r, t) - T(r - \Delta r, t)}{2\Delta r} \right] \quad (M-8)$$

$$\rho c \frac{\partial T}{\partial t} \approx \rho c \left[\frac{T(r, t) - T(r, t - \Delta t)}{\Delta t} \right] \quad (M-9)$$

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

$$\frac{r}{k} \frac{\partial k}{\partial T} \frac{\partial T}{\partial r}$$

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, \dots, 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:

$$B_i T_{i-1} + A_i T_i + C_i T_{i+1} = D_i \quad (M-10)$$

where the coefficients are given by

$$B_i = 1 - (\Delta r)_i / (2r_i) \quad (M-11)$$

$$A_i = -2 - (\rho_i c_i / k_i) (\Delta r_i)^2 / \Delta t \quad (M-12)$$

$$C_i = 1 + (\Delta r)_i / (2r_i) \quad (M-13)$$

$$D_i = -q_i''' \left[\frac{(\Delta r_i)^2}{k_i} \right] - (\rho_i c_i / k_i) (\Delta r_i)^2 T_i^{\text{old}} / \Delta t \quad (\text{M-14})$$

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

$$B_k T_{k-1} + A_k T_k + C_k T_{k+1} = D_k \quad (\text{M-15})$$

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

$$B_1' T_0 + A_1' T_1 + C_1' T_2 = D_1' \quad (\text{M-16})$$

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:

$$T_k = T_1' \quad (M-17)$$

$$k_i \left[\frac{T_{k+1} - T_{k-1}}{2(\Delta r)_i} \right] = k_{i+1} \left[\frac{T_2' - T_0'}{2(\Delta r)_{i+1}} \right] \quad (M-18)$$

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

$$B_k' T_{k-1} + A_k' T_k + C_k' T_{k+1} = D_k' \quad (M-19)$$

where the primed coefficients are given by

$$B_k' = B_1' (B_k + C_k) \quad (M-20)$$

$$A'_k = B'_1 A_k + \sigma A'_1 C_k \quad (M-21)$$

$$C'_k = \sigma C_k (B'_1 + C'_1) \quad (M-22)$$

$$D'_k = B'_1 D_k + \sigma D'_1 C_k \quad (M-23)$$

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_j , 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

$$B_N T_{N-1} + A_N T_N + C_N T_{N+1} = D_N \quad (M-24)$$

Further, equation (M-4) may be written in difference form as

$$\frac{T_{N+1} - T_{N-1}}{2\Delta r_{N-1}} = -\frac{\phi}{k_N} \quad (M-25)$$

Combining these two equations yields

$$(B_N + C_N) T_{N-1} + A_N T_N = D_N + \frac{2C_N \Delta r_{N-1}}{k_N} \phi \quad (M-26)$$

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

$$\frac{\partial k}{\partial r} \frac{\partial T}{\partial r} + k \frac{\partial^2 T}{\partial r^2} + \frac{k}{r} \frac{\partial T}{\partial r} = \rho c \frac{\partial T}{\partial t} - q'''' \quad (\text{M-27})$$

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

$$2 \frac{\partial^2 T}{\partial r^2} = \frac{\rho c}{k} \frac{\partial T}{\partial t} - \frac{q''''}{k} \quad (\text{M-28})$$

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

$$A_0 T_0 + C_0 T_1 = D_0 \quad (\text{M-29})$$

where the coefficients are given by

$$A_0 = -4 - \frac{\rho_0 c_0}{k_0} \frac{(\Delta r_0)^2}{\Delta t} \quad (\text{M-30})$$

$$C_0 = 4 \quad (\text{M-31})$$

$$D_0 = \frac{-\rho_0 c_0}{k_0} \frac{(\Delta r_0)^2}{(\Delta t)} T(0, t - \Delta t) - q_0'''' \frac{(\Delta r_0)^2}{k_0 (\Delta t)} \quad (\text{M-32})$$

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, \dots, 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 $N+1$

Finally, let $\underline{\delta}$ be a vector with $\delta_i = 0, i = 0, \dots, N-1$; 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

$$A\underline{T}^i = D\underline{T}^i + \underline{q} + \phi^i \underline{\delta} \quad (\text{M-33})$$

Again, ϕ 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:

$$A\underline{p}^k = D\underline{p}^{k-1} + \underline{q} \quad (\text{M-34})$$

with \underline{p}^{k-1} given. Similarly, let \underline{h}^k denote a homogeneous solution of the following:

$$A\underline{h}^k = D\underline{h}^{k-1} \quad (\text{M-35})$$

with \underline{h}^{k-1} given. Begin these sequences as follows:

$$\underline{p}^0 = \underline{T}^0 \quad (\text{M-36})$$

and

$$A\underline{h}^1 = \underline{\delta} \quad (\text{M-37})$$

Define \underline{I}^1 by $\underline{I}^1 = \underline{p}^1 + \phi^1 \underline{h}^1$; then \underline{I}^1 satisfies equation (M-33) in the form

$$A\underline{I}^1 = D\underline{I}^0 + \underline{q} + \phi^1 \underline{\delta}$$

This may be proved as follows. Multiplying the equation defining \underline{I}^1 by A yields

$$\begin{aligned}
A\underline{T}^1 &= A(\underline{P}^1 + \phi^1 \underline{H}^1) \\
&= A\underline{P}^1 + \phi^1 A\underline{H}^1 \\
&= \underline{D}^0 + \underline{q} + \phi^1 \delta
\end{aligned}$$

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

$$\underline{T}^k = \underline{P}^k + \phi^k \underline{H}^1 + \phi^{k-1} \underline{H}^2 + \dots + \phi^1 \underline{H}^k \quad (\text{M-38})$$

then \underline{T}^k satisfies equation (M-33) for all $\phi^1, \phi^2, \dots, \phi^k$. The proof of this result is easily given by induction.

Therefore, given \underline{T}^0 , future temperatures may be approximated by $\underline{T}^1, \underline{T}^2, \dots, \underline{T}^k$, 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, \dots, T^k have been computed, the values of ϕ^i are chosen so that T_m^i agrees with T_{data}^i . 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, $\phi^1 = \phi^2 = \dots = \phi^k$) 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:

$$q''''V - \phi A = \frac{\partial T}{\partial t} \times \text{constant} \quad (\text{M-39})$$

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

$$\left(\frac{\partial T}{\partial t}\right)^i \approx \frac{T_D^i - T_D^{i-1}}{\Delta t}$$

Here T_D^i is the measured temperature T_{data} . Therefore equation (M-39) may be approximated, yielding

$$q''''V - \phi^i A = \frac{T_D^i - T_D^{i-1}}{\Delta t^i} \times \text{constant} \quad (\text{M-40})$$

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

$$\phi^{i+1} = E^{i+1} \phi^i + F^{i+1} \quad (\text{M-41})$$

where E^{i+1} and F^{i+1} are given by

$$E^{i+1} = \frac{(T_D^{i+1} - T_D^i)/(\Delta t)^{i+1}}{(T_D^i - T_D^{i-1})/(\Delta t)^i}$$

$$F^{i+1} = \left[(q''''')^{i+1} \times V - E^{i+1} \times (q''''')^i \times V \right] / A$$

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 $\phi^{i+2}, \phi^{i+3}, \dots$ 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 $\underline{H}^1, \underline{H}^2, \dots, \underline{H}^k, \underline{P}^k$ 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, \dots, T_m^k best fits $T_{data}^1, \dots, T_{data}^k$. 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 represent 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

$$\frac{dk}{dT} = -8.8889 \times 10^{-4} \text{ Btu/hr-ft-}^{\circ}\text{F}^2$$

$$\frac{1}{k} \frac{dk}{dT} = \frac{-8.8889 \times 10^{-4}}{14.778 - 8.8889 \times 10^{-4} T} \text{ }^{\circ}\text{F}^{-1}$$

$$\frac{dc}{dT} = (0.333492) 1.3611 \times 10^{-3} e^{-(1.3611 \times 10^{-3} T)} \text{ Btu/lbm-}^{\circ}\text{F}^2$$

-- Kanthal

$$\frac{dk}{dT} = 4.3 \times 10^{-3} \text{ Btu/hr-ft-}^{\circ}\text{F}^2$$

$$\frac{1}{k} \frac{dk}{dT} = \frac{4.3 \times 10^{-3}}{9.7 + 4.3 \times 10^{-3} T} \text{ }^{\circ}\text{F}^{-1}$$

1. The results of these computations are given in English engineering units, the form in which the data are analyzed by the code.

$$\frac{dc}{dT} = 0.0003 \text{ Btu/lbm-}^{\circ}\text{F}^2$$

-- Magnesium oxide

$$\frac{dk}{dT} = (121.814) \left[0.010722 e^{-0.010722T} \right] - \frac{2 (7015.835)}{T^2} \text{ Btu/hr-ft-}^{\circ}\text{F}^2$$

$$\frac{1}{k} \frac{dk}{dT} = \frac{(121.814) \left[0.010722 e^{-0.010722T} \right] - \frac{2 (7015.835)}{T^2}}{0.2529 - 121.814 e^{-0.010722T} + \frac{7015.835}{T}} \text{ }^{\circ}\text{F}^{-1}$$

$$\frac{dc}{dT} = (0.111256) \left[1.33715 \times 10^{-3} e^{(-1.33715 \times 10^{-3} T)} \right] \text{ Btu/lbm-}^{\circ}\text{F}^2$$

-- Nichrome V

$$\frac{dk}{dT} = 5.75 \times 10^{-3} \text{ Btu/hr-ft-}^{\circ}\text{F}^2$$

$$\frac{1}{k} \frac{dk}{dT} = \frac{5.75 \times 10^{-3}}{5.2 + 5.75 \times 10^{-3} T} \text{ }^{\circ}\text{F}^{-1}$$

$$\frac{dc}{dT} = 0.0002 \text{ Btu/lbm-}^{\circ}\text{F}^2$$

-- Stainless steel 304

$$\frac{dk}{dT} = 4.2 \times 10^{-3} \text{ Btu/hr-ft-}^{\circ}\text{F}^2$$

$$\frac{1}{k} \frac{dk}{dT} = \frac{4.2 \times 10^{-3}}{8.4 + 4.2 \times 10^{-3} T} \text{ }^{\circ}\text{F}^{-1}$$

$$\frac{dc}{dT} = 0.001 \text{ Btu/lbm-}^{\circ}\text{F}^2$$

-- Stainless steel 316

$$\frac{dk}{dT} = 4.3 \times 10^{-3} \text{ Btu/hr-ft-}^{\circ}\text{F}^{-2}$$

$$\frac{1}{k} \frac{dk}{dT} = \frac{4.3 \times 10^{-3}}{7.5 + 4.3 \times 10^{-3} T} \text{ }^{\circ}\text{F}^{-1}$$

$$\frac{dc}{dT} = 0.001 \text{ Btu/lbm-}^{\circ}\text{F}^{-2}$$

-- Stainless steel 347

$$\frac{dk}{dT} = 4.2 \times 10^{-3} \text{ Btu/hr-ft-}^{\circ}\text{F}^{-2}$$

$$\frac{1}{k} \frac{dk}{dT} = \frac{4.2 \times 10^{-3}}{8.3 + 4.2 \times 10^{-3} T} \text{ }^{\circ}\text{F}^{-1}$$

$$\frac{dc}{dT} = 2.8 \times 10^{-5} \text{ Btu/lbm-}^{\circ}\text{F}^{-2}$$

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:

| $T(^{\circ}\text{F})$ | $k[(\text{Btu/hr-ft-}^{\circ}\text{F})]$ |
|-----------------------|--|
| 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 magnesium 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

$$k = 25.571 - 0.0276T \text{ w/m-}^{\circ}\text{C}$$
$$(14.778 - 8.8889 \times 10^{-4} T \text{ Btu/hr-ft-}^{\circ}\text{F})$$

$$C_p = 2017.74 - 1396.26e^{-0.00295T} \text{ J/kg-}^{\circ}\text{C}$$
$$(0.48193 - 0.333492e^{-1.3611 \times 10^{-3}T} \text{ Btu/lb-}^{\circ}\text{F})$$

$$\rho = \text{input quantity} \left[\text{kg/m}^3 (\text{lb/ft}^3) \right]$$

TABLE M-1
MATERIAL PROPERTY DATA SOURCES

| Material | Property | Source of Data |
|---------------------|----------------|--------------------------------|
| Boron nitride | K | (a) |
| | C _p | Touloukian ^(b) |
| | ρ | Supplied by user |
| Kanthal | K | (c) |
| | C _p | (c) |
| | ρ | Supplier ^(d) |
| Magnesium oxide | K | Kingery, et al. ^(e) |
| | C _p | Touloukian ^(b) |
| | ρ | Supplied by user |
| Nichrome V | K | Touloukian ^(b) |
| | C _p | Touloukian ^(b) |
| | ρ | Touloukian ^(b) |
| Stainless steel 304 | K | WCAP-2808 ^(f) |
| | C _p | Touloukian ^(b) |
| | ρ | Touloukian ^(b) |
| Stainless steel 316 | K | WCAP-2808 ^(f) |
| | C _p | Touloukian ^(b) |
| | ρ | Touloukian ^(b) |
| Stainless steel 347 | K | WCAP-2808 ^(f) |
| | C _p | Touloukian ^(b) |
| | ρ | Touloukian ^(b) |
| Air | K | Baumeister ^(g) |
| | C _p | 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

$$k = 16.789 + 0.0134 T \text{ w/m-}^\circ\text{C}$$
$$(9.7 + 4.3 \times 10^{-3} T \text{ Btu/hr-ft-}^\circ\text{F})$$

Cp = linear interpolation from the following:

| T [°C(°F)] | | Cp [J/kg-°C(Btu/lb-°F)] | |
|------------|--------|-------------------------|---------|
| -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) |

$$\rho = 7144.2 \text{ kg/m}^3 (446.0 \text{ lb/ft}^3)$$

-- Magnesium oxide

$$k = \rho_{\text{MgO}} (0.0273 - 13.15e^{-0.0192T} + 420.9/T)/223 \text{ w/m-}^\circ\text{C}$$
$$[\rho_{\text{MgO}} (0.2529 - 121.814e^{-0.010722T} + 7015.835/T)/223 \text{ Btu/hr-ft-}^\circ\text{F}]$$

$$C_p = 1377.353 - 465.805e^{-0.002406T} \text{ J/kg-}^\circ\text{C}$$
$$(0.328976 - 0.111256e^{-1.33715 \times 10^{-3}T} \text{ Btu/lb-}^\circ\text{F})$$

$$\rho = \text{input quantity} [\text{kg/m}^3 (\text{lb/ft}^3)]$$

-- Nichrome V

$$k = 8.997 + 0.0179T \text{ w/m-}^\circ\text{C} (5.2 + 5.75 \times 10^{-3}T \text{ Btu/hr-ft-}^\circ\text{F})$$

Cp = linear interpolation from the following:

| T [°C(°F)] | | C _p [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) |

$$\rho = 8361.63 \text{ kg/m}^3 (522.0 \text{ lb/ft}^3)$$

-- Stainless steel 304

$$k = 14.535 + 0.01308T \text{ w/m-}^\circ\text{C} (8.4 + 4.2 \times 10^{-3}T \text{ Btu/hr-ft-}^\circ\text{F})$$

C_p = linear interpolation from the following:

| T [°C(°F)] | | C _p [J/kg-°C(Btu/lb-°F)] | |
|------------|--------|-------------------------------------|----------|
| -32 | (0) | 372.6 | (0.089) |
| 149 | (300) | 372.6 | (0.089) |
| 260 | (500) | 375.9 | (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) |

$$\rho = 8025.2 \text{ kg/m}^3 (501.3 \text{ lb/ft}^3)$$

-- Stainless steel 316

$$k = 12.978 + 0.01339T \text{ w/m-}^{\circ}\text{C} \quad (7.5 + 4.3 \times 10^{-3}T \text{ Btu/hr-ft-}^{\circ}\text{F})$$

Cp = linear interpolation from the following:

| T [$^{\circ}\text{C}$ ($^{\circ}\text{F}$)] | | Cp [J/kg- $^{\circ}\text{C}$ (Btu/lb- $^{\circ}\text{F}$)] | |
|--|--------|---|----------|
| -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) |
| 1138 | (1900) | 659.4 | (0.1575) |
| 1204 | (2200) | 703.4 | (0.168) |

$$\rho = 7949.96 \text{ kg/m}^3 \quad (496.3 \text{ lb/ft}^3)$$

-- Stainless steel 347

$$k = 13.064 + 0.0143T \text{ w/m-}^{\circ}\text{C} \quad (7.55 + 4.58 \times 10^{-3}T \text{ Btu/hr-ft-}^{\circ}\text{F})$$

$$Cp = 447.99 + 0.211T \text{ J/kg-}^{\circ}\text{C} \quad (0.107 + 2.8 \times 10^{-5}T \text{ Btu/lb-}^{\circ}\text{F})$$

$$\rho = 7905.1 \text{ kg/m}^3 \quad (493.5 \text{ lb/ft}^3)$$

-- Air

$$k = 20.91 \times 10^{-5} (T + 273)^{0.846} \text{ w/m-}^{\circ}\text{C} \\ [7.35 \times 10^{-5} (T + 460)^{0.846} \text{ Btu/hr-ft-}^{\circ}\text{F}]$$

$$Cp = 1009.02 \text{ J/kg-}^{\circ}\text{C} \quad (0.241 \text{ Btu/lb-}^{\circ}\text{F})$$

$$\rho = 1.201 \text{ kg/m}^3 \quad (0.075 \text{ lb/ft}^3)$$

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 (0.735 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 an 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

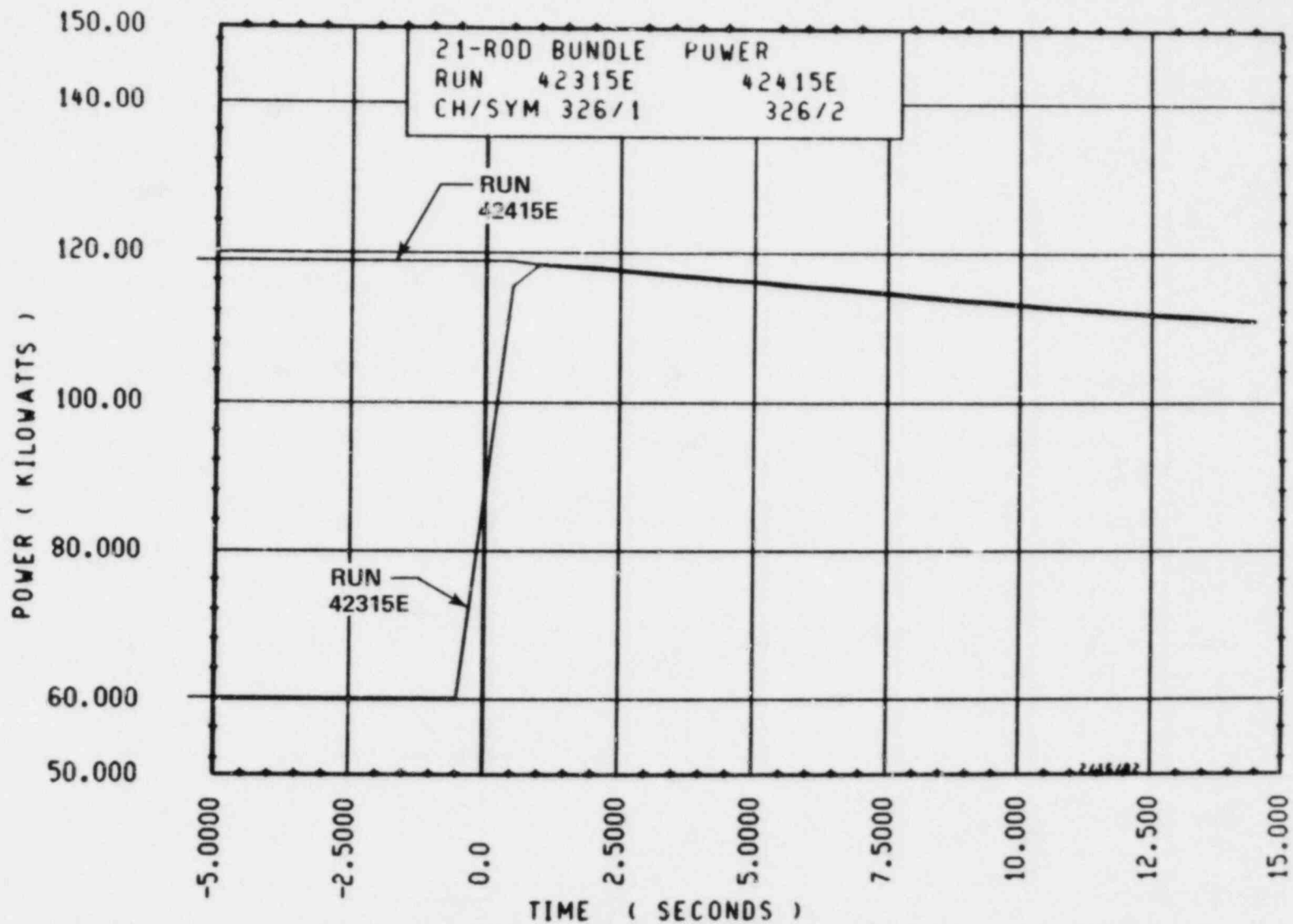


Figure M-1. Power Step at Flood Initiation

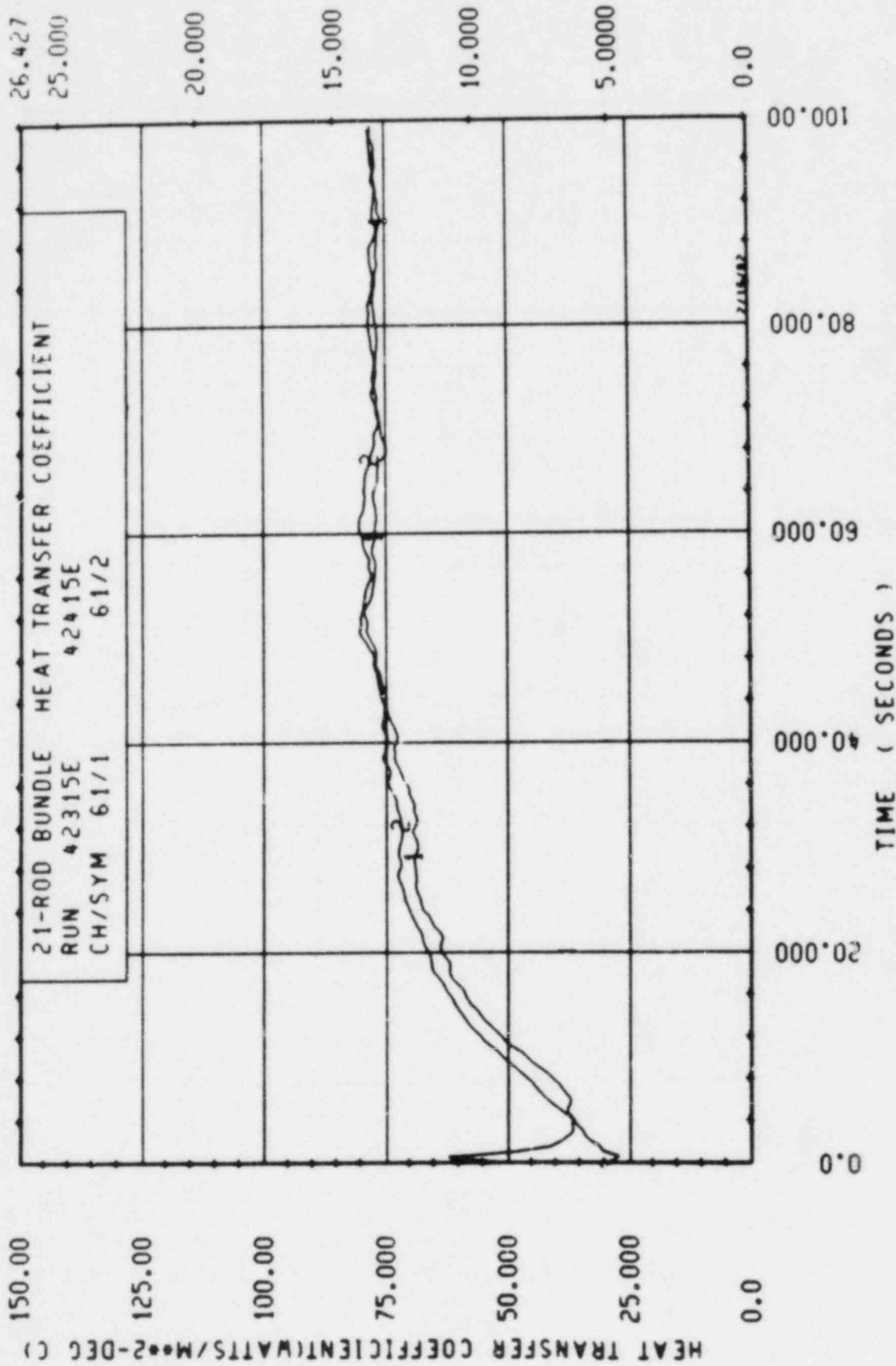


Figure M-2. Heat Transfer Coefficient Variation

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 (postflood). 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

$$\frac{T(1 + 3) - T(1 + 2)}{t(1 + 3) - t(1 + 2)} < (-50^{\circ}\text{F}/\text{sec})$$

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).

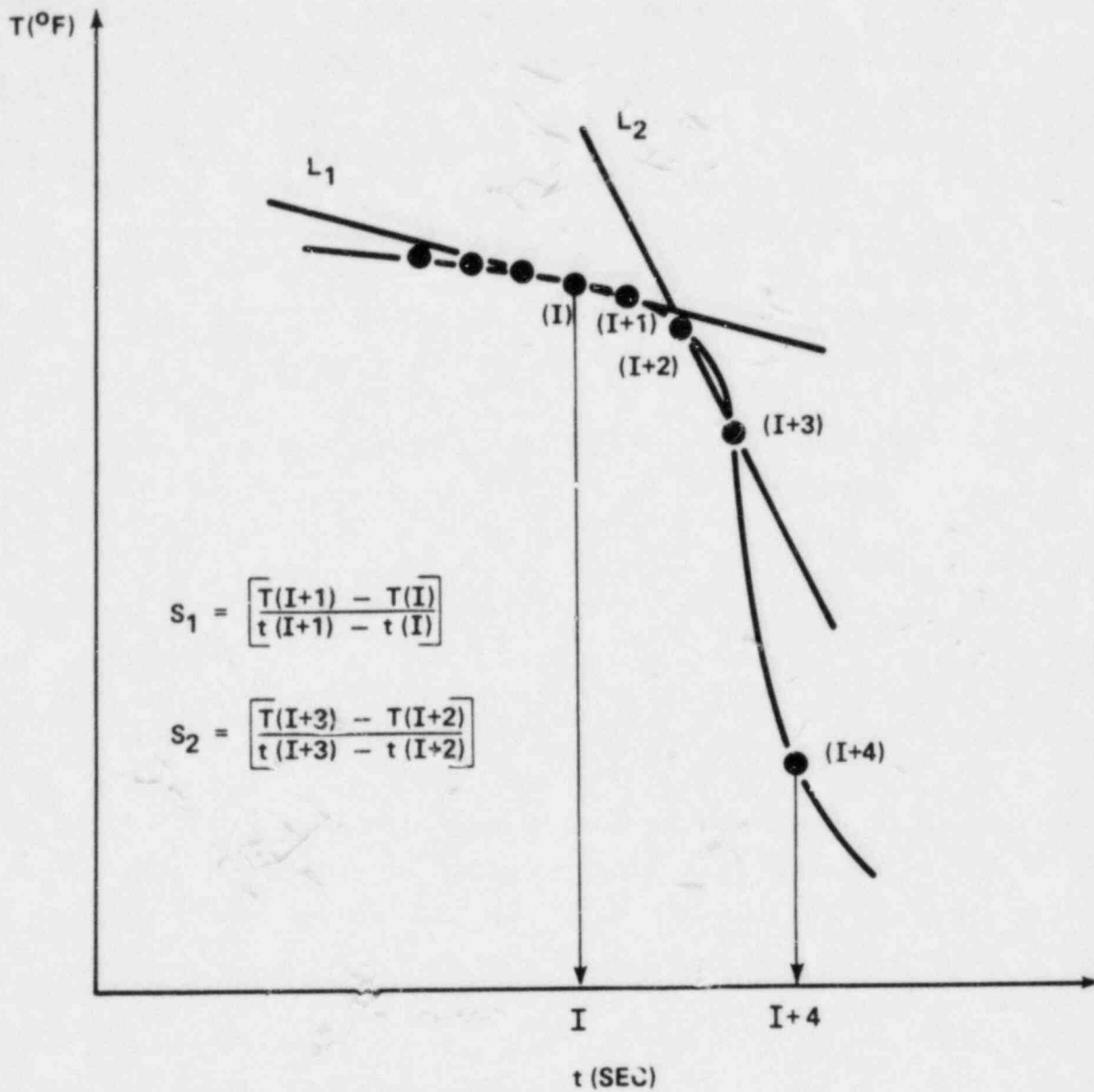


Figure M-3. Determination of Quench Time and Temperature (sheet 1 of 2)

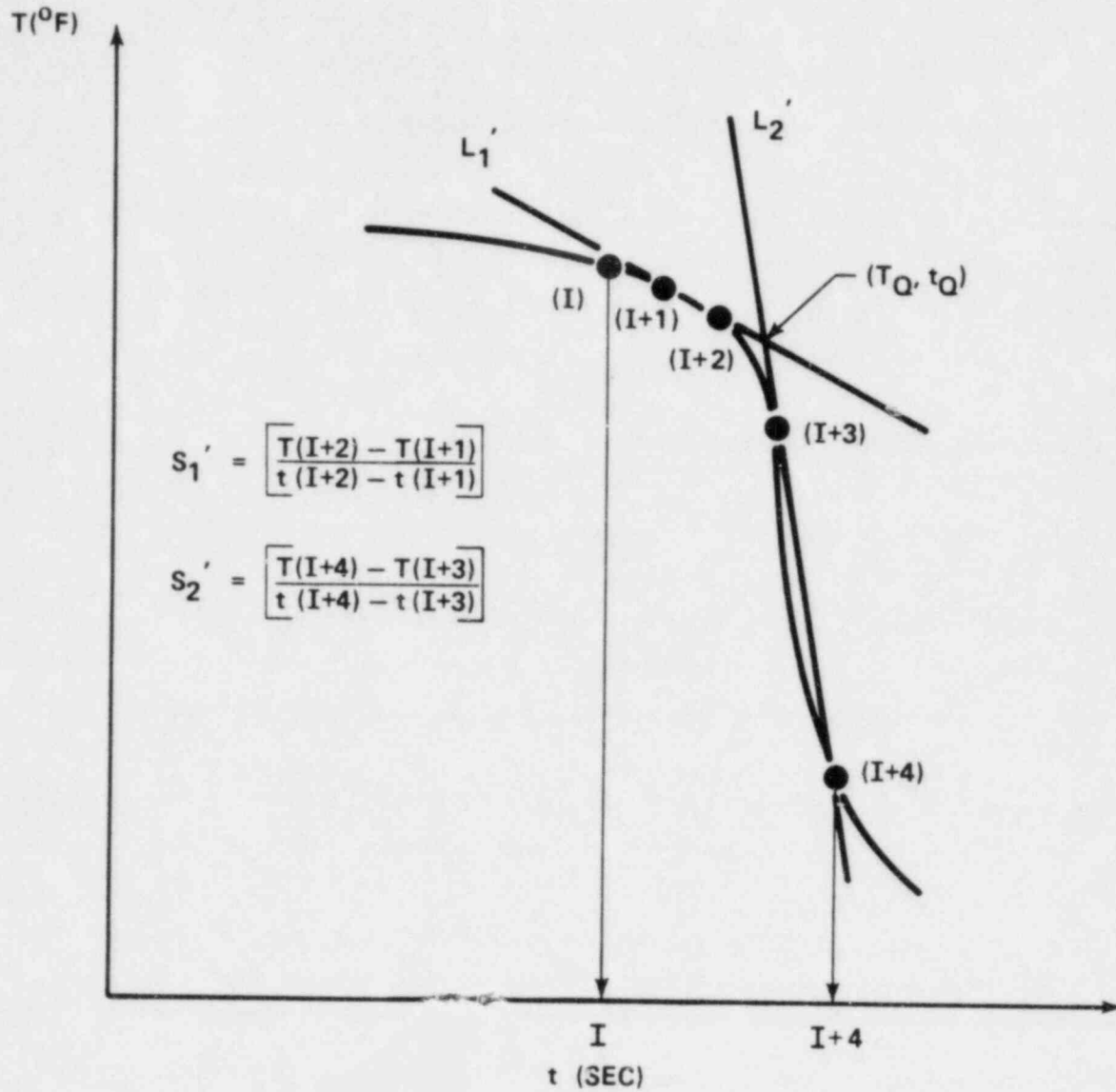


Figure M-3. Determination of Quench Time and Temperature (sheet 2 of 2)

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:

$$\Delta P_{\text{measured}} = \Delta P_{\text{elevation}} + \Delta P_{\text{acceleration}} + \Delta P_{\text{friction}}$$

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

$$\Delta P_{\text{friction}} = \left(\frac{f l}{D_e} + K_q \right) \left(\frac{\rho_b V_b^2}{2g_c} \right)$$

1. Blaisdel, J. A., et al., "PWR FLECHT SET Phase A Report," WCAP-8238, December 1973.

where

$$L = \text{length} = 0.30 \text{ m (12 in.)}$$

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 = $4 (\text{flow area}) / \text{wetted perimeter}$

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

$$K_g \text{ (or } f) = A_0 + A_1 \text{ Re} + A_2 \text{ Re}^2 + A_3 \text{ Re}^3 + A_4 \text{ Re}^4 \text{ for } \text{Re} < 30,000$$

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

$K = 0.696$ for 1.04 m (41 in.) grid

$K = 0.882$ for 1.57 m (62 in.) grid

$K = 0.949$ for 2.11 m (83 in.) grid

$K = 0.907$ for 2.62 m (103 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,

$$\alpha = 1 - \frac{\Delta P_{\text{measured}} - \Delta P_{\text{friction}}}{\rho_{\text{sat liquid}} g L}$$

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

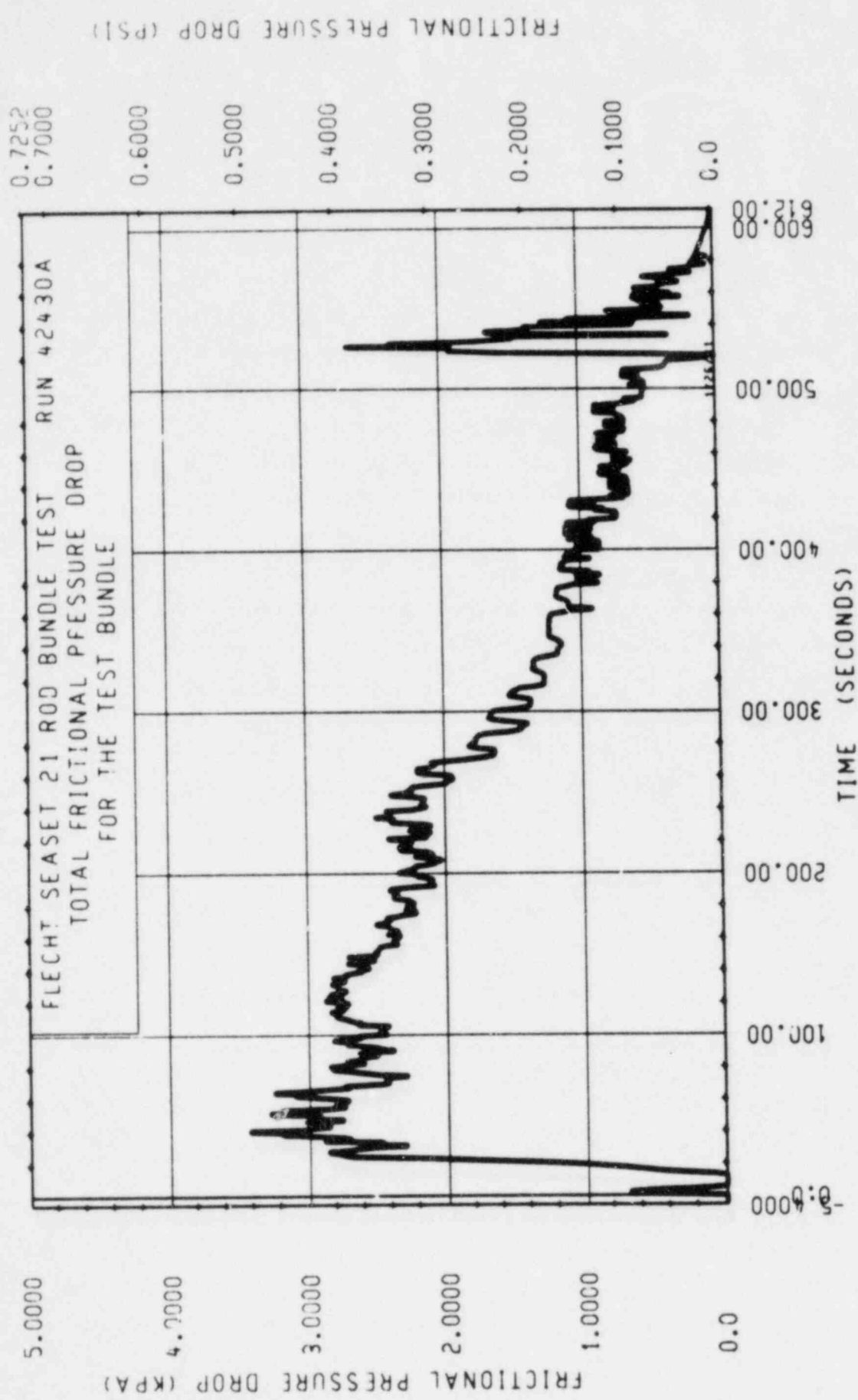


Figure M-5. Calculated Frictional Pressure Drop [Run 42430A, 28 mm/sec (1.1 in./sec) Flooding Rate, 0.28 MPa (40 psia) Pressure]

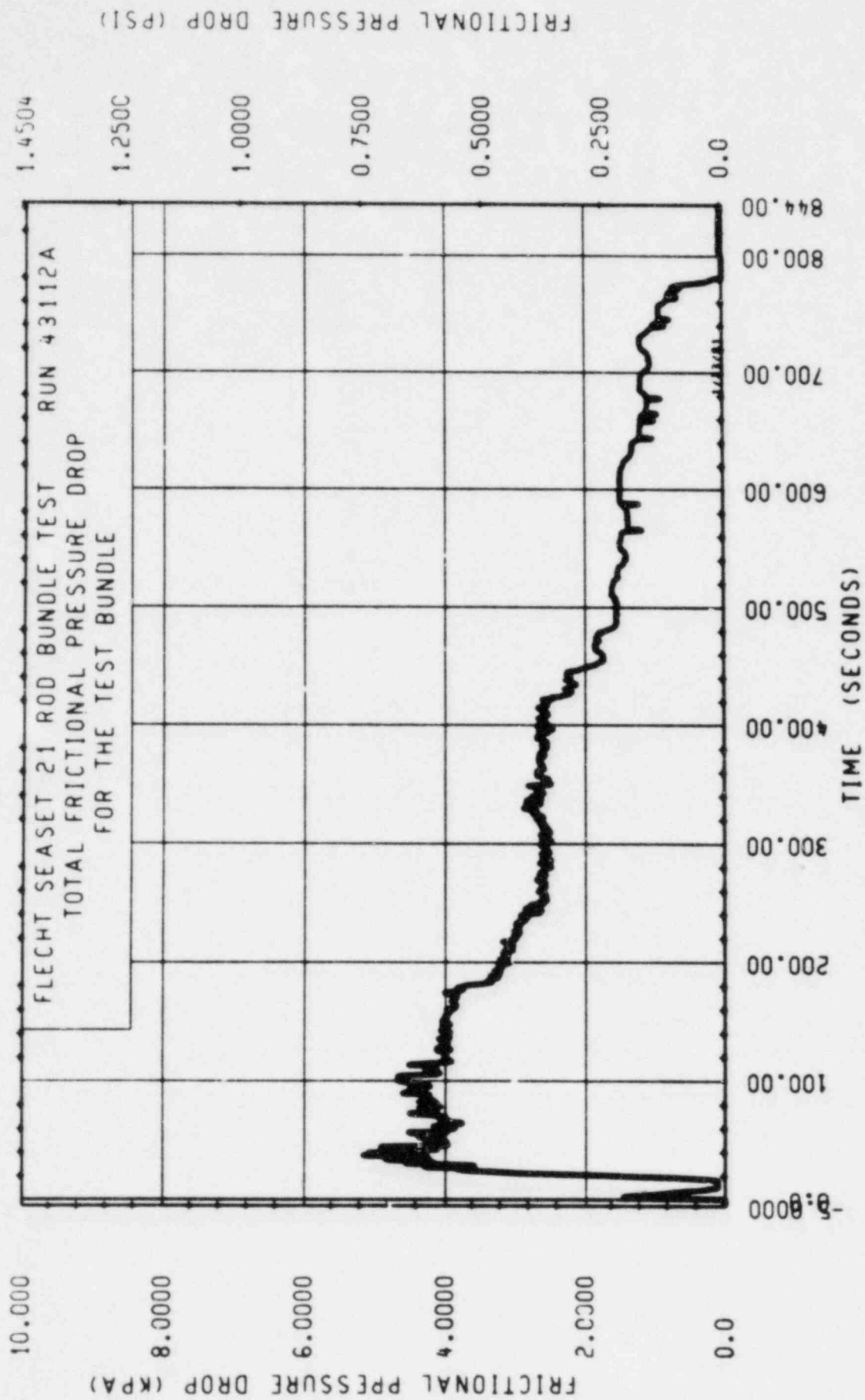


Figure M-6. Calculated Frictional Pressure Drop [Run 43112A, 28 mm/sec (1.1 in./sec) Flooding Rate, 0.14 MPa (20 psia) Pressure]

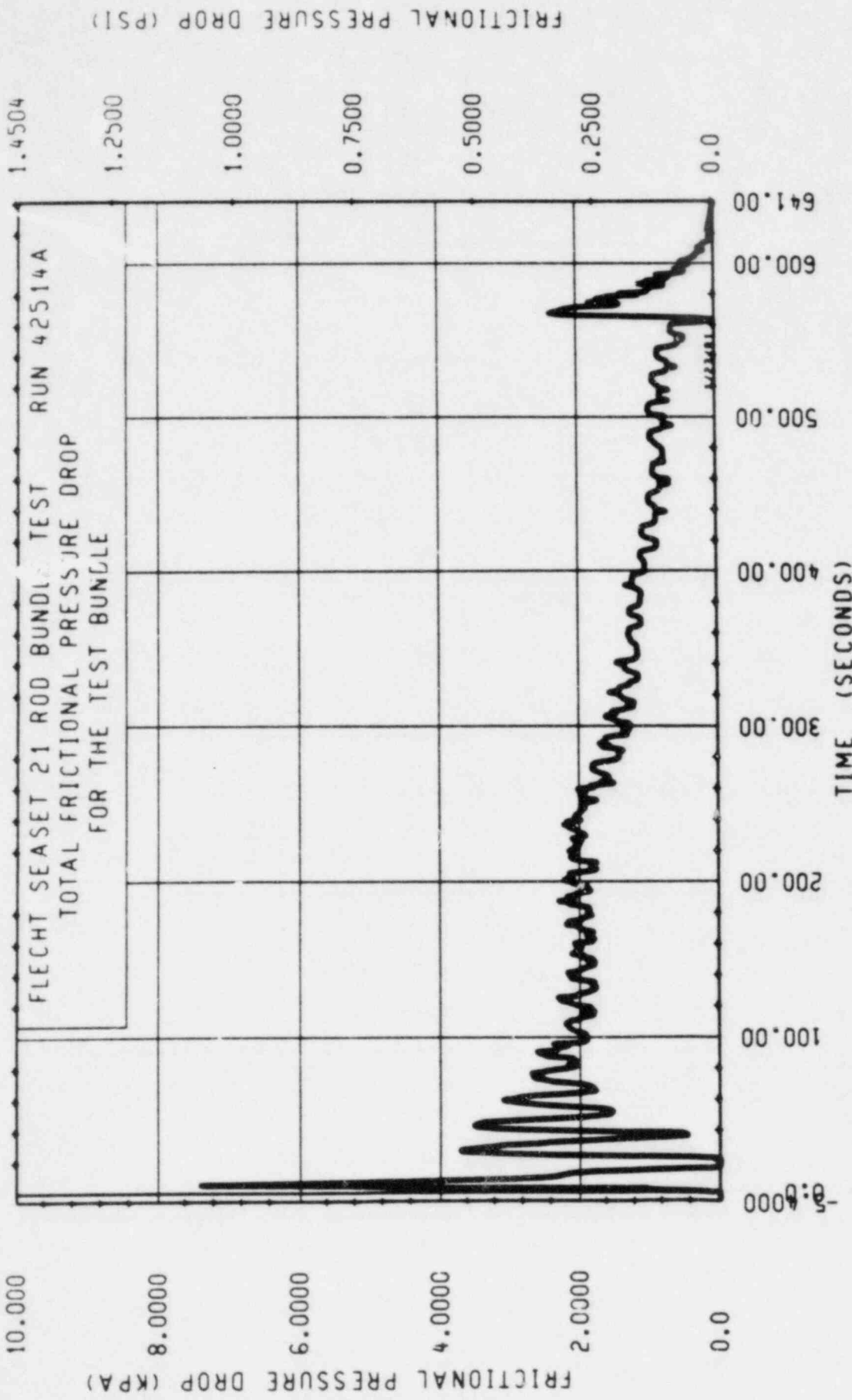


Figure M-7. Calculated Frictional Pressure Drop (Run 42514A, Variable Flooding Rate Test)

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:

$$M_{\text{input}} = \int_0^t \dot{m}_{\text{input}} dt = \int_0^t \dot{m}_{\text{inj}} dt - M_D(t)$$

5.5434

5.0000

TOTAL MASS STORAGE (KG)

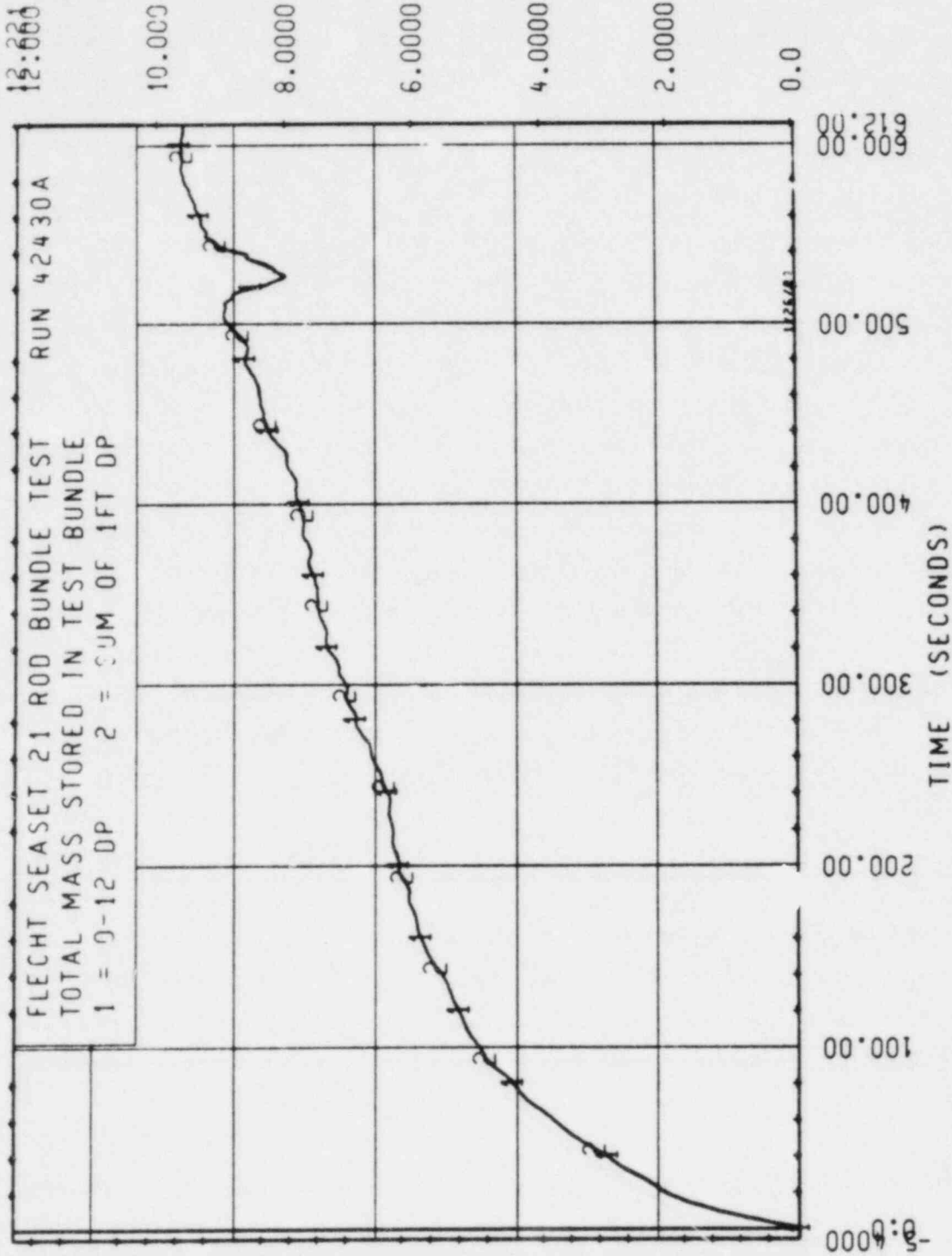
4.0000

3.0000

2.0000

1.0000

0.0



12:660

10.000

8.0000

6.0000

4.0000

2.0000

0.0

600.00

500.00

400.00

300.00

200.00

100.00

0.0

TIME (SECONDS)

TOTAL MASS STORAGE (LBM)

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, \dot{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:

$$x(i) = \frac{1}{t(i + \Delta - 1) - t(i - 1)} \sum_{n=i+\Delta}^{n=i+\Delta-1} \frac{x(n) + x(n+1)}{2}$$

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:

$$\Delta P_{\text{LOST}} = (P_a - P_b) + \frac{\rho}{2g_c} (V_a^2 - V_b^2) + \frac{\rho g}{g_c} (Z_a - Z_b)$$

where

P_a = measured static pressure at upstream point

P_b = measured static pressure at downstream point

$$\Delta P_{\text{LOST}} = \frac{K\rho V^2}{2g_c}$$

V = velocity in unblocked portion of bundle

Therefore, since the gravity head can be neglected because of the pressure of a reference leg,

$$K \frac{\rho V^2}{2g_c} = (P_a - P_b) + \frac{\rho}{2g_c} (V_a^2 - V_b^2)$$

$$K = \frac{(P_a - P_b) + \frac{\rho}{2g_c} (V_a^2 - V_b^2)}{\frac{\rho V^2}{2g_c}}$$

where

$$K = \begin{cases} \frac{fL}{D_h}, & \text{for frictional losses} \\ K_{\text{grid}}, & \text{for grid losses} \\ \frac{fL}{D_h} + K_{\text{blockage}}, & \text{for blockage sleeve losses} \end{cases}$$

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:

$$\frac{fL}{D_h} = \frac{\Delta P_{a-b}}{\frac{\rho V^2}{2g_c}}$$

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:

$$K_{\text{grid}} = \frac{\Delta P_{a-b}}{\frac{\rho V^2}{2g_c}} - \frac{fL}{D_h}$$

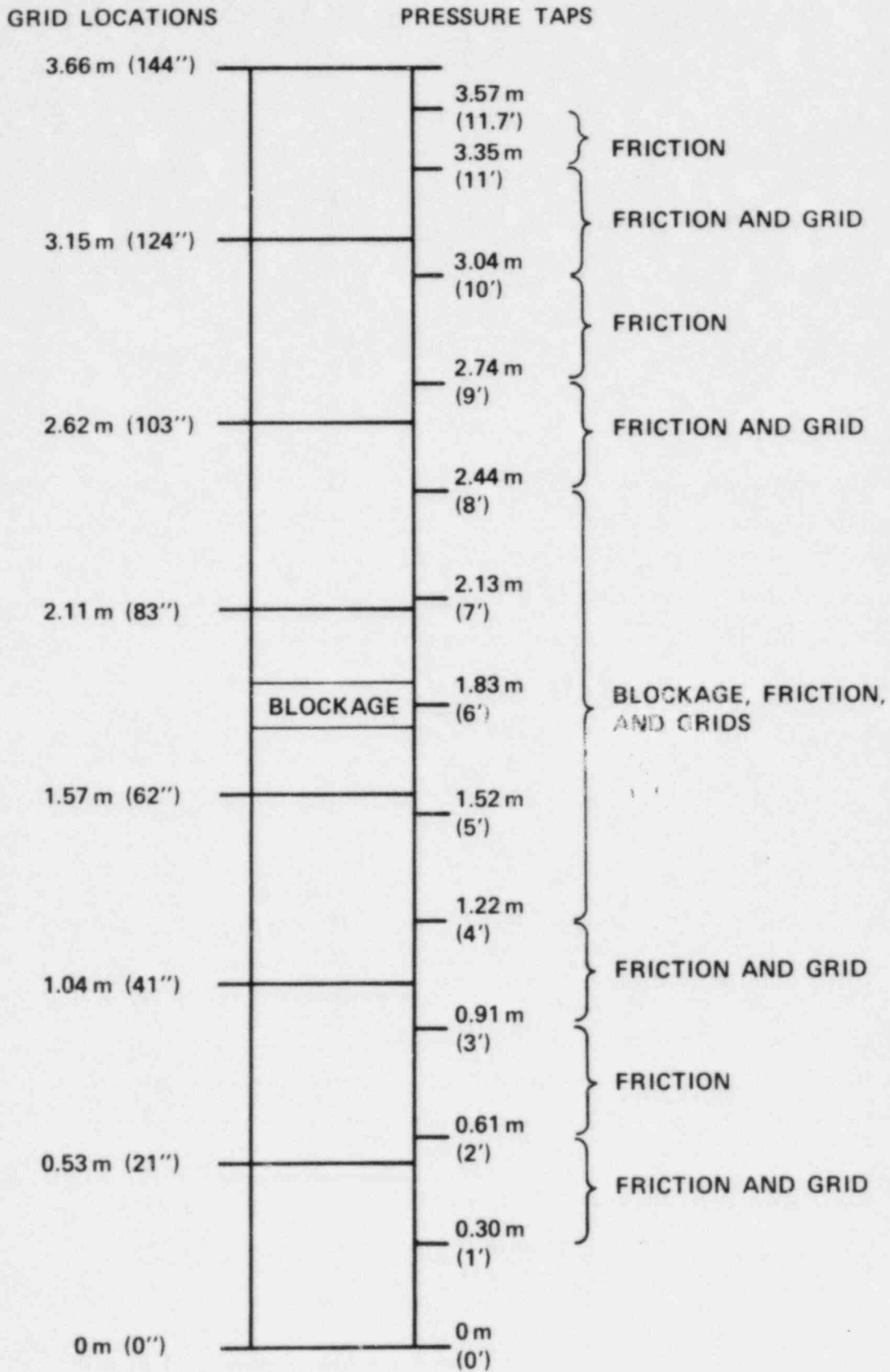


Figure M-9. Grid Location/Pressure Measurement Relationships

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:

$$K_{\text{blockage}} = \frac{\Delta p_{a-b}}{\frac{\rho V^2}{2g_c}} - \frac{fL}{D_h} - K_{\text{grid at 62 in.}} - K_{\text{grid at 83 in.}}$$

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 | 34 | 1.897 |
| 1B | 1.93 | | | | | | | | | | | | |
| 1B | 1.96 | | | | | | | 69 | 1.928 | 43 | 1.913 | 57 | 1.953 |
| 1B | 1.98 | | | | | | | | | | | | |
| 1B | 2.01 | | | | | | | 90 | 1.979 | 56 | 1.963 | 78 | 2.004 |
| 1B | 2.03 | | | | | | | | | | | 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 | | | | | 45 ^(b) | 1.923 |
| 1C | 1.93 | | | | | | | | | | | | |
| 1C | 1.96 | | | | | | | | | 57 | 1.958 | 65 | 1.974 |
| 1C | 1.98 | | | | | | | | | | | 79 | 2.002 |
| 1C | 2.01 | | | | | | | | | 67 | 1.991 | 90 | 1.778 |
| 1C | 2.03 | | | | | | | | | | | | |
| 1D | 1.80 | 31 | 1.847 | 31 | 1.831 | 31 | 1.844 | 25 ^(b) | 1.798 | 32 ^(b) | 1.793 | 27 ^(b) | 1.847 |
| 1D | 1.85 | | | | | | | | | | | | |
| 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 | | | 59 | 1.953 |
| 2A | 1.96 | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | |
| 2B | 1.83 | 40 | 1.819 | 40 ^(b) | 1.857 | 40 ^(b) | 1.839 | | | 20 | 1.694 | 15 | 1.697 |
| 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 | 60 | 1.961 |
| 2B | 1.96 | | | | | | | | | | | 67 | 1.981 |
| 2B | 1.98 | 90 | 1.974 | 90 | 2.012 | 90 | 2.017 | 92 | 1.984 | 68 | 1.976 | 91 | 2.035 |
| 2B | 2.03 | | | | | | | | | 85 | 2.024 | | |
| 2C | 1.70 | | | | | | | | | | | | |
| 2C | 1.80 | 32 | 1.829 | 32 ^(b) | 1.829 | 32 ^(b) | 1.831 | 26 | 1.867 | 21 | 1.676 | | |
| 2C | 1.85 | | | | | | | | | | | | |
| 2C | 1.88 | 52 | 1.908 | 52 | 1.905 | 52 | 1.910 | 49 | 1.946 | 27 | 1.788 | | |
| 2C | 1.90 | | | | | | | | | | | 38 ^(b) | 1.895 |
| 2C | 1.911 | 64 | 1.938 | 64 | 1.938 | 64 | 1.941 | 62 | 1.976 | | | 61 ^(b) | 1.946 |
| 2C | 1.96 | 83 | 1.986 | 83 | 1.981 | 83 | 1.943 | 83 | 2.019 | | | 80 | 1.996 |
| 2C | 1.98 | | | | | | | | | 60 ^(b) | 1.958 | | |
| 2C | 2.01 | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | |
| 2E | 1.83 | 42 | 1.788 | 42 | 1.859 | 42 ^(b) | 1.869 | | | 22 | 1.694 | | |
| 2E | 1.88 | 54 | 1.839 | 54 | 1.913 | 54 | 1.928 | 51 | 1.880 | 33 ^(b) | 1.821 | 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 | | | 50 ^(b) | 1.923 |
| 3D | 1.98 | 79 | 2.014 | 96 | 2.012 | 96 | 2.004 | 98 | 1.994 | | | 85 | 2.019 |
| 3D | 2.01 | | | | | | | | | 86 | 2.022 | 94 | 2.045 |
| 3D | 2.03 | | | | | | | | | 91 | 2.042 | | |
| 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 ^(h) | 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 | 24(b) | 1.803 | | | | | | | | |
| 4C | 1.80 | | | | | | | | | 41(b) | 1.892 | | | | | | | | | | |
| 4C | 1.88 | | | | | | | | | 96 | 1.948 | | | 79 | 1.938 | 79 | 1.943 | 79 | 1.953 | 52(b) | 1.930 |
| 4C | 1.93 | | | | | | | | | | | | | | | | | | | 75 | 1.991 |
| 4C | 1.98 | 136 | 2.002 | 98 | 1.989 | 98 | 1.996 | 101 | 2.004 | 75 | 1.991 | 73 | 1.906 | | | | | | | | |
| 4D | 1.78 | 29 | 1.781 | 29 | 1.791 | 29 | 1.798 | 22(b) | 1.775 | 31(b) | 1.781 | 25(b) | 1.816 | | | | | | | | |
| 4D | 1.80 | | | | | | | 31 | 1.803 | | | | | | | | | | | | |
| 4D | 1.83 | 47 | 1.842 | 47(b) | 1.842 | 47(b) | 1.852 | 42 | 1.829 | 42 | 1.877 | 32 | 1.870 | | | | | | | | |
| 4D | 1.88 | | | | | | | 58 | 1.880 | | | 43 | 1.890 | | | | | | | | |
| 4D | 1.90 | | | | | | | 67 | 1.908 | | | 53 | 1.930 | 1.918 | | | | | | | |
| 4D | 1.911 | | | | | | | 80 | 1.930 | | | 74 | 1.968 | | | | | | | | |
| 4D | 1.93 | 102 | 1.981 | 76 | 1.984 | 74 | 1.968 | | | | | | | | | | | | | | |
| 4D | 1.98 | | | | | | | | | | | | | | | | | | | | |
| 4E | 1.70 | 24 | 1.717 | 24 | 1.709 | 24 | 1.694 | 23 | 1.816 | 26 | 1.702 | 21 | 1.778 | | | | | | | | |
| 4E | 1.78 | | | | | | | | | | | | | 43(b) | 1.869 | | | | | | |
| 4E | 1.83 | 80 | 1.946 | 80 | 1.943 | 80 | 1.923 | 80 | 1.923 | 80 | 1.923 | 54(b) | 1.935 | | | | | | | | |
| 4E | 1.93 | | | | | | | | | | | 77 | 1.996 | 75 | 1.989 | | | | | | |
| 4E | 1.98 | | | | | | | | | | | 88 | 2.042 | 96 | 2.035 | | | | | | |
| 4E | 2.03 | | | | | | | | | | | 100 | 1.999 | 100 | 1.994 | 100 | 1.976 | | | | |
| 5B | 1.70 | 30 | 1.796 | 30 | 1.806 | 30 | 1.801 | 44(b) | 1.839 | 44(b) | 1.839 | 22(b) | 1.778 | | | | | | | | |
| 5B | 1.83 | | | | | | | | | | | 26(b) | 1.831 | | | | | | | | |
| 5B | 1.90 | 48 | 1.844 | 48 | 1.854 | 48(b) | 1.854 | 44(b) | 1.839 | 44(b) | 1.839 | 44(b) | 1.905 | | | | | | | | |
| 5B | 1.96 | | | | | | | | | | | 65 | 1.966 | 64 | 1.956 | | | | | | |
| 5B | 2.01 | | | | | | | | | | | 89 | 2.050 | 87 | 2.009 | | | | | | |
| 5B | 2.03 | | | | | | | | | | | | | | | | | | | | |
| 5C | 1.70 | 49 | 1.819 | 49 | 1.840 | 49 | 1.826 | 45(b) | 1.829 | 36(b) | 1.880 | 17 | 1.704 | | | | | | | | |
| 5C | 1.80 | | | | | | | | | | | | | 59 | 1.885 | | | | | | |
| 5C | 1.83 | 61 | 1.872 | 61 | 1.895 | 61 | 1.882 | 59 | 1.885 | 54 | 1.971 | 33(b) | 1.882 | | | | | | | | |
| 5C | 1.88 | | | | | | | | | | | 55 | 1.935 | | | | | | | | |
| 5C | 1.93 | | | | | | | | | | | 81 | 1.923 | 81 | 1.943 | 81 | 1.928 | 76 | 1.989 | | |
| 5C | 1.98 | | | | | | | | | | | 101 | 1.974 | 101 | 1.996 | 101 | 1.981 | 103 | 1.984 | 84 | 2.052 |
| 5C | 2.01 | | | | | | | | | 90 | 2.103 | 88 | 2.014 | | | | | | | | |
| 5C | 2.03 | | | | | | | | | | | | | | | | | | | | |

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 38 | 70.8 | 25 38 | 70.7 | 25 38 ^(b) | 71.0 | 33 46 | 71.87 | 37 | 73.0 | 34 | 74.7 |
| 1B | 72 | | 72.8 | | 72.7 | | 73.2 | | 74.11 | | | | |
| 1B | 74 | | | | | | | 69 | 75.9 | 43 | 75.3 | 57 | 76.9 |
| 1B | 75 | | | | | | | 90 | 77.9 | 56 | 77.3 | 78 | 78.9 |
| 1B | 76 | | | | | | | | | | | 89 | 80.0 |
| 1B | 77 | | | | | | | | | | | | |
| 1B | 78 | | | | | | | | | | | | |
| 1B | 79 | | | | | | | | | | | | |
| 1B | 80 | | | | | | | | | | | | |
| 1C | 70 | 26 39 | 71.3 | 26 39 | 70.6 | 26 39 ^(b) | 70.8 | 19 | 70.9 | 57 | 77.1 | 45 ^(b) | 75.7 |
| 1C | 72 | | 73.3 | | 72.7 | | 72.8 | | | | | | |
| 1C | 76 | | | | | | | | | | | | |
| 1C | 77 | | | | | | | | | 67 | 78.4 | 79 | 78.8 |
| 1C | 78 | | | | | | | | | | | 90 | 80.0 |
| 1C | 79 | | | | | | | | | | | | |
| 1C | 80 | | | | | | | | | | | | |
| 1D | 71 | 31 | 72.7 | 31 | 72.1 | 31 | 72.6 | 25 ^(b) | 70.8 | 32 ^(b) | 70.6 | 27 ^(b) | 72.7 |
| 1D | 73 | | 75.8 | | 75.2 | | 75.8 | | 74.5 | | | | |
| 1D | 74 | 50 | 75.8 | 50 | 75.2 | 50 | 75.8 | 47 | 74.5 | | | 35 | 74.5 |
| 1D | 75 | | | | | | | | | | | | |
| 1D | 75.25 | 63 | 77.0 | 63 | 76.4 | 63 | 76.9 | 61 | 75.4 | 44 | 74.7 | 46 | 75.8 |
| 1D | 76 | | | | | | | | | 47 | 75.6 | 58 | 76.8 |
| 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 38 ^(b) | 66.3 | 14 | 65.7 |
| 2A | 74 | | 76.8 | | 76.9 | | 76.7 | | 76.7 | | 73.3 | | |
| 2A | 75 | | | | | | | | | | | 36 ^(b) | 74.9 |
| 2A | 76 | 70 | 76.8 | 70 | 76.9 | 70 | 76.7 | 70 | 76.7 | | | 59 | 76.9 |
| 2A | 77 | | | | | | | | | | | 66 | 78.0 |
| 2A | 78 | 89 | 78.8 | 89 | 78.6 | 89 | 78.7 | 91 | 78.9 | 59 | 77.3 | | |

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 | | | | | | | | | | | | |
| 2B | 72 | 40 | 71.6 | 40 ^(b) | 73.1 | 40 ^(b) | 72.4 | | | 20 | 66.7 | 15 | 66.8 |
| 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 | 60 | 77.2 |
| 2B | 77 | | | | | | | | | | | 67 | 78.0 |
| 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 | | | | | | | | | | | | |
| 2C | 71 | 32 | 72.0 | 32 ^(b) | 72.0 | 32 ^(b) | 72.1 | 26 | 73.5 | 21 | 66.0 | | |
| 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 | 80 | 78.6 |
| 2C | 79 | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | |
| 2E | 72 | 42 | 70.4 | 42 | 73.2 | 42 ^(b) | 73.6 | | | 22 | 66.7 | | |
| 2E | 74 | 54 | 72.4 | 54 | 75.3 | 54 | 75.9 | 51 | 74.0 | 33 ^(b) | 71.7 | 29 ^(b) | 74.4 |

b. Underneath blockage sleeve

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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 2E 2E | 76 78 79 | 73 92 | 74.4 76.4 | 73 92 | 77.2 79.2 | 73 92 | 77.2 79.8 | | | 45 69 | 75.6 77.7 | 47 82 | 76.4 78.5 |
| 3A 3A 3A 3A 3A 3A 3A 3A | 72 74 75 76 77 78 79 80 | 43 74 93 | 72.6 76.8 78.8 | 43 55 74 93 | 73.2 75.4 77.2 79.3 | 43 55 74 93 | 71.9 74.1 75.9 78.0 | 38 ^(b) 52 74 95 | 72.8 75.0 76.9 78.9 | 49 ^(b) 62 70 81 | 75.6 77.0 78.1 79.2 | 40 ^(b) 48 ^(b) 68 83 | 74.9 75.5 78.0 78.9 |
| 3B 3B 3B 3B 3B 3B | 72 74 75 76 77 78 79 | 44 56 75 94 | 73.3 75.4 77.2 79.3 | 44 ^(b) 56 75 94 | 73.1 75.2 77.0 79.3 | 44 ^(b) 56 75 94 | 72.7 74.6 76.4 78.5 | 39 ^(b) 53 75 96 | 72.4 74.6 76.3 78.5 | 63 71 | 77.1 78.1 | 41 ^(b) 63 84 | 74.7 76.7 78.9 |
| 3C 3C 3C 3C 3C 3C 3C 3C 3C 3C | 70 71 72 74 75.25 76 77 78 79 80 | 28 34 45 57 66 76 85 95 | 70.9 71.9 72.9 74.9 76.1 77.0 77.9 78.9 | 28 34 45 ^(b) 57 66 76 85 95 | 70.2 71.1 72.1 74.2 75.4 76.2 77.3 78.5 | 28 34 45 ^(b) 57 66 76 85 95 | 71.0 71.9 72.9 75.0 76.1 77.0 77.9 78.9 | 21 28 40 54 ^(b) 64 ^(b) 76 85 97 | 70.6 71.6 72.6 74.6 75.8 76.8 77.7 78.8 | 29 40 ^(b) 72 82 | 69.2 74.4 78.2 79.4 | 19 30 ^(b) 49 ^(b) 69 ^(b) 93 | 69.5 74.3 76.3 78.4 79.6 |
| 3D 3D 3D 3D | 70 71 72 74 | 46 58 | 73.2 75.4 | 46 ^(b) 58 | 73.1 75.2 | 46 ^(b) 58 | 72.6 74.9 | 41 55 ^(b) | 72.4 74.6 | 30 | 70.1 | 23 | 70.7 |

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 | 76 | 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 | 55 | 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 ^(h) | 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 | 67.3 | 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 | 44 ^(b) | 72.4 | | | 22 ^(b) | 70.0 |
| 5B | 72 | 48 | 72.6 | 48 | 73.0 | 48 ^(b) | 73.0 | | | | | 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 | | | | | | | | | 36 ^(b) | 74.0 | 17 | 67.1 |
| 5C | 71 | | | | | | | | | | | | |
| 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 | 56 | 75.9 |
| 5D | 76 | | | | | | | | | 55 | 75.8 | | |
| 5D | 77 | 88 | 77.7 | 88 | 78.1 | 88 | 77.7 | 89 | 77.0 | 66 | 76.5 | 77 | 78.2 |
| 5D | 79 | | | | | | | | | 78 | 78.3 | | |
| 5D | 78 | | | | | | | | | | | | |

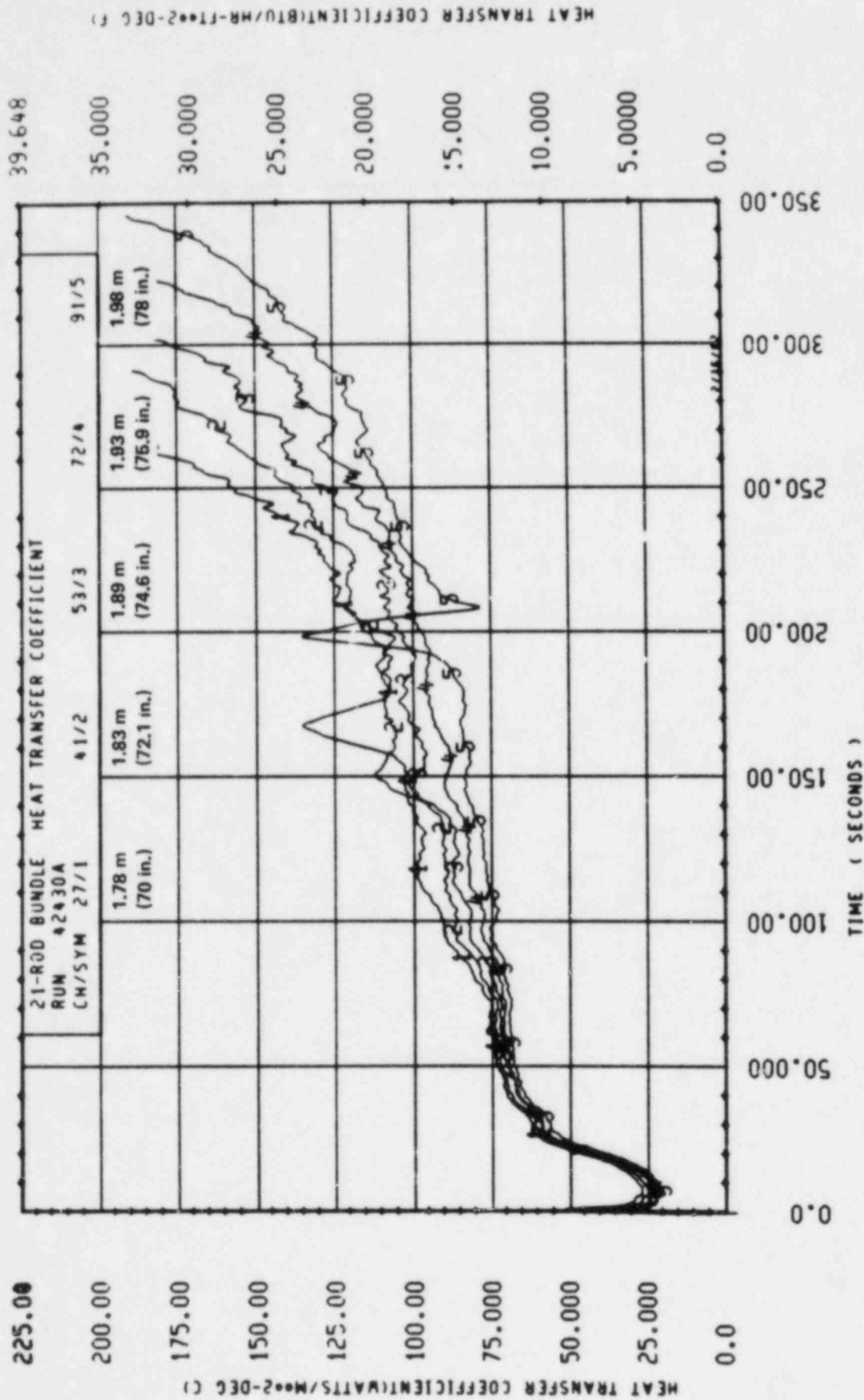


Figure N-1. Heat Transfer Coefficient Versus Time, Run 42430A, Rod 2D

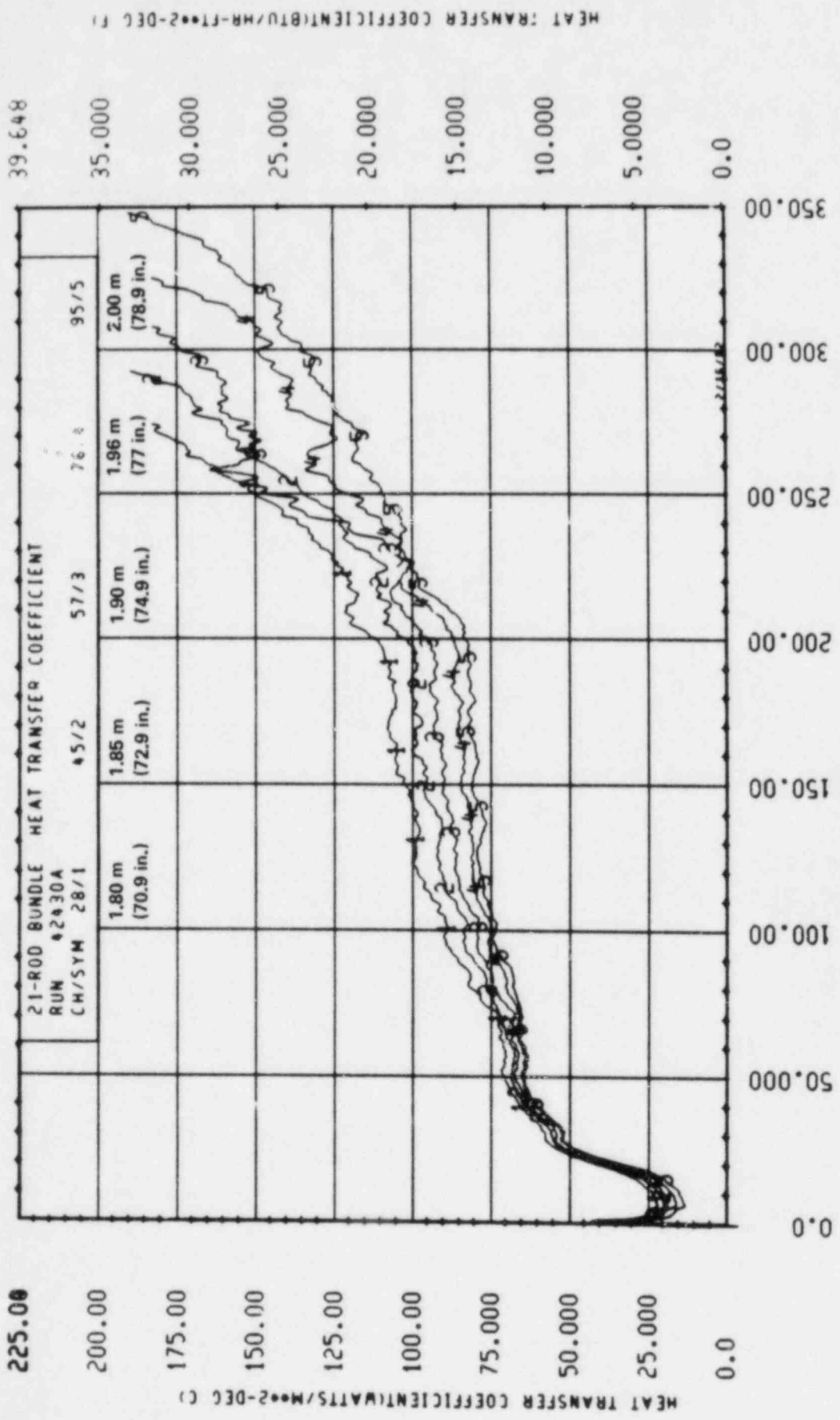


Figure N-2. Heat Transfer Coefficient Versus Time, Run 42430A, Rod 3C

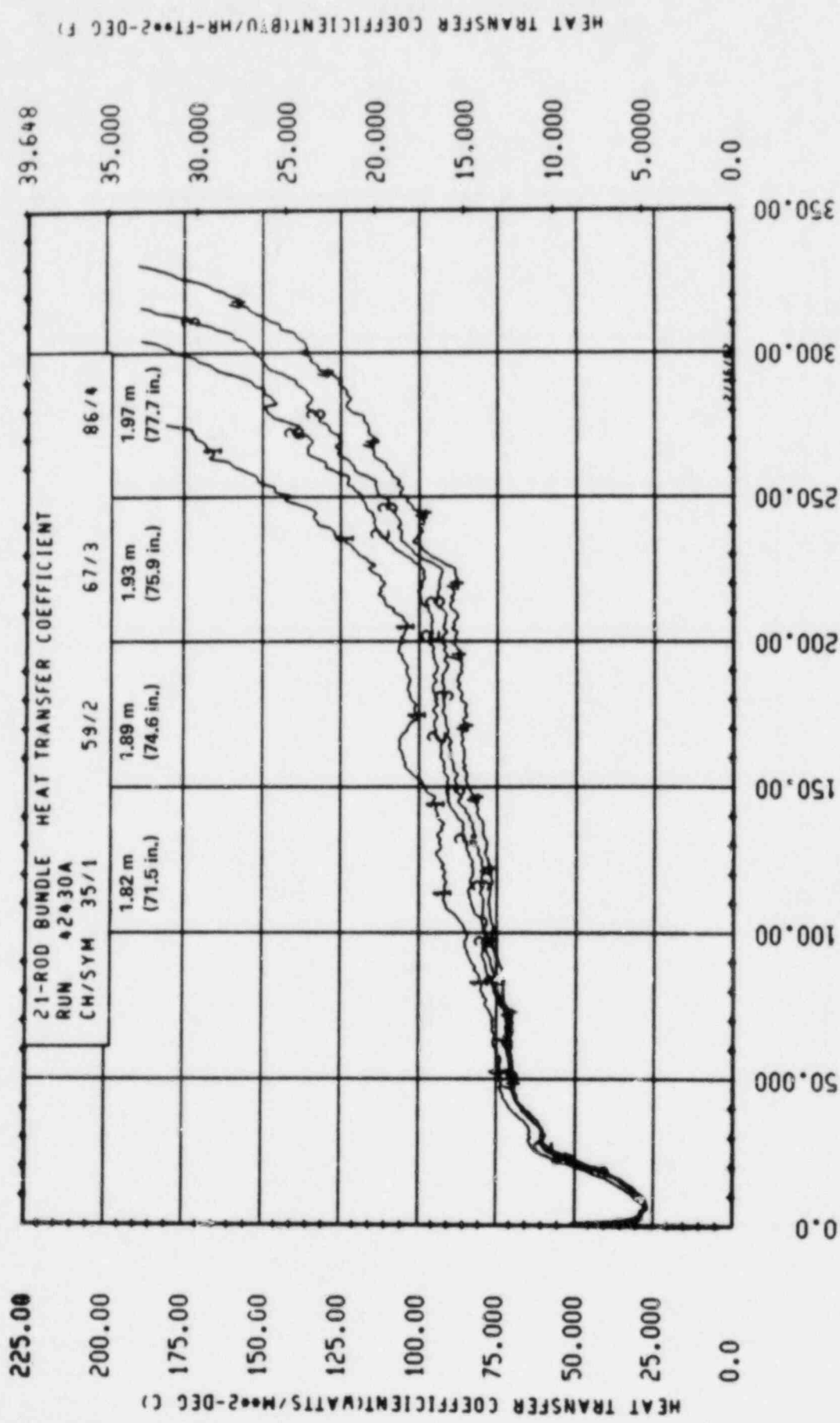


Figure N-3. Heat Transfer Coefficient Versus Time, Run 42430A, Rod 3E

HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)

39.648
35.000
30.000
25.000
20.000
15.000
10.000
5.000
0.0

225.00
200.00
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0

HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)

0.0 50.000 100.00 150.00 200.00 250.00 300.00 350.00

TIME (SECONDS)

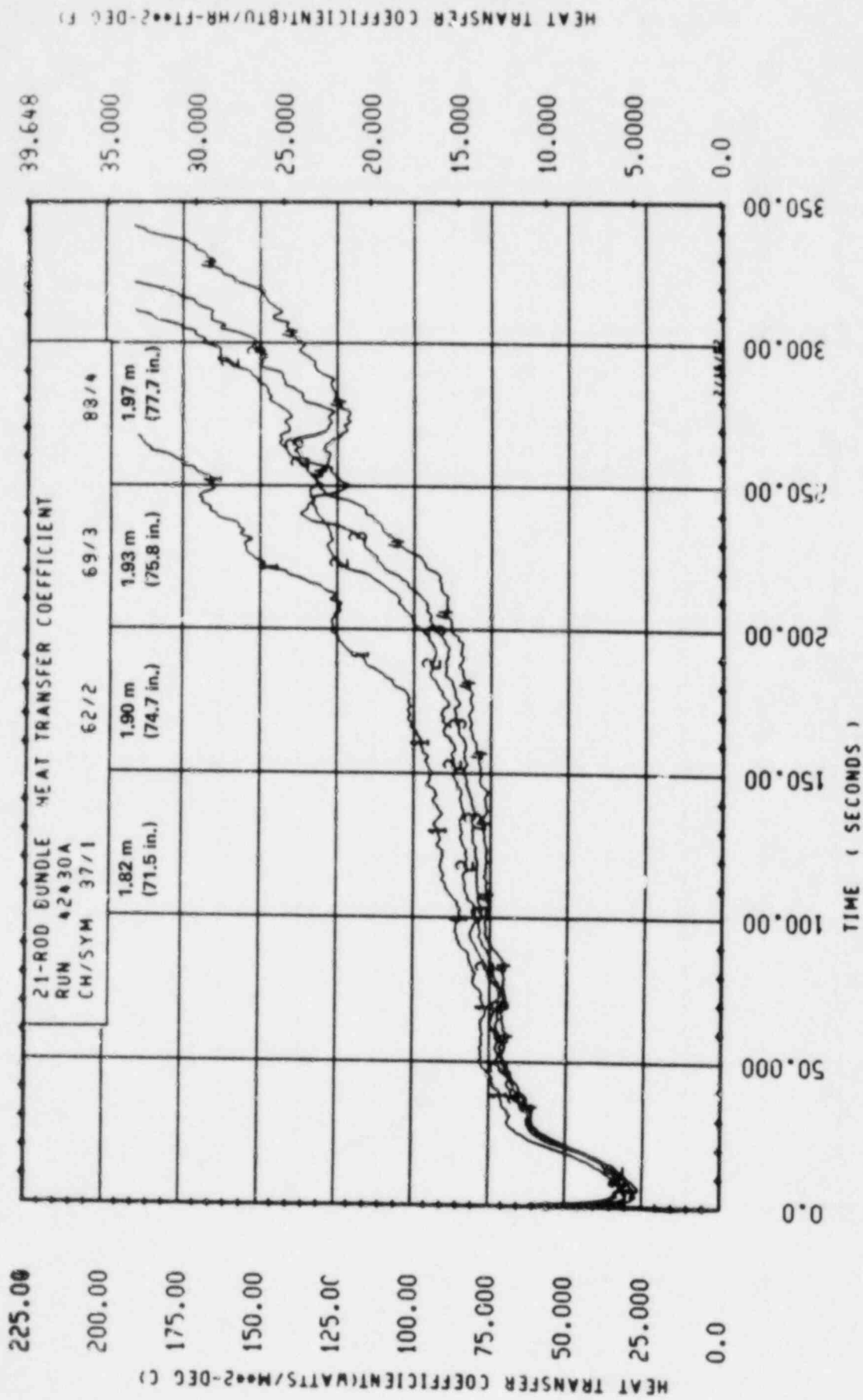


Figure N-4. Heat Transfer Coefficient Versus Time, Run 42430A, Rod 5D

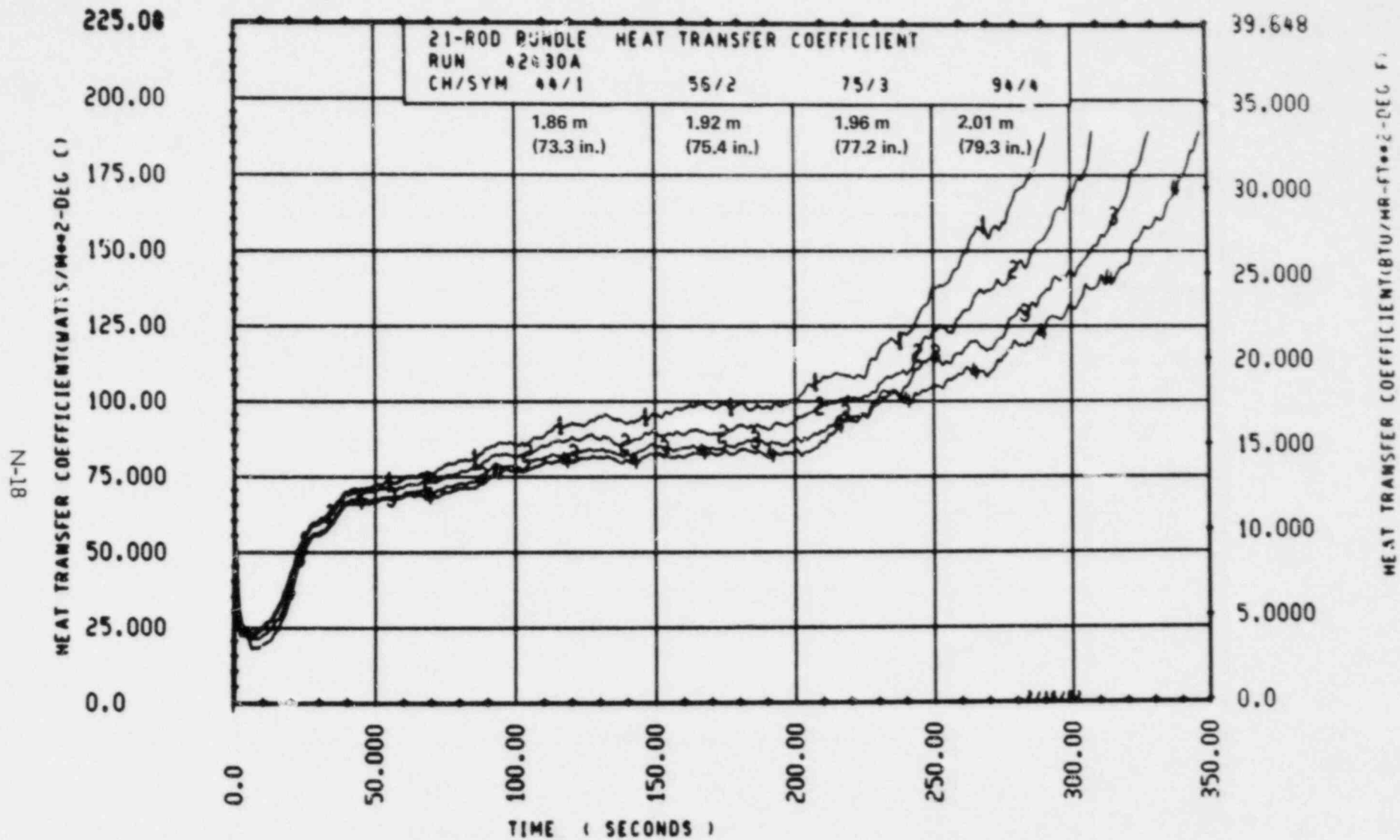


Figure N-5. Heat Transfer Coefficient Versus Time, Run 42430A, Rod 3B

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.

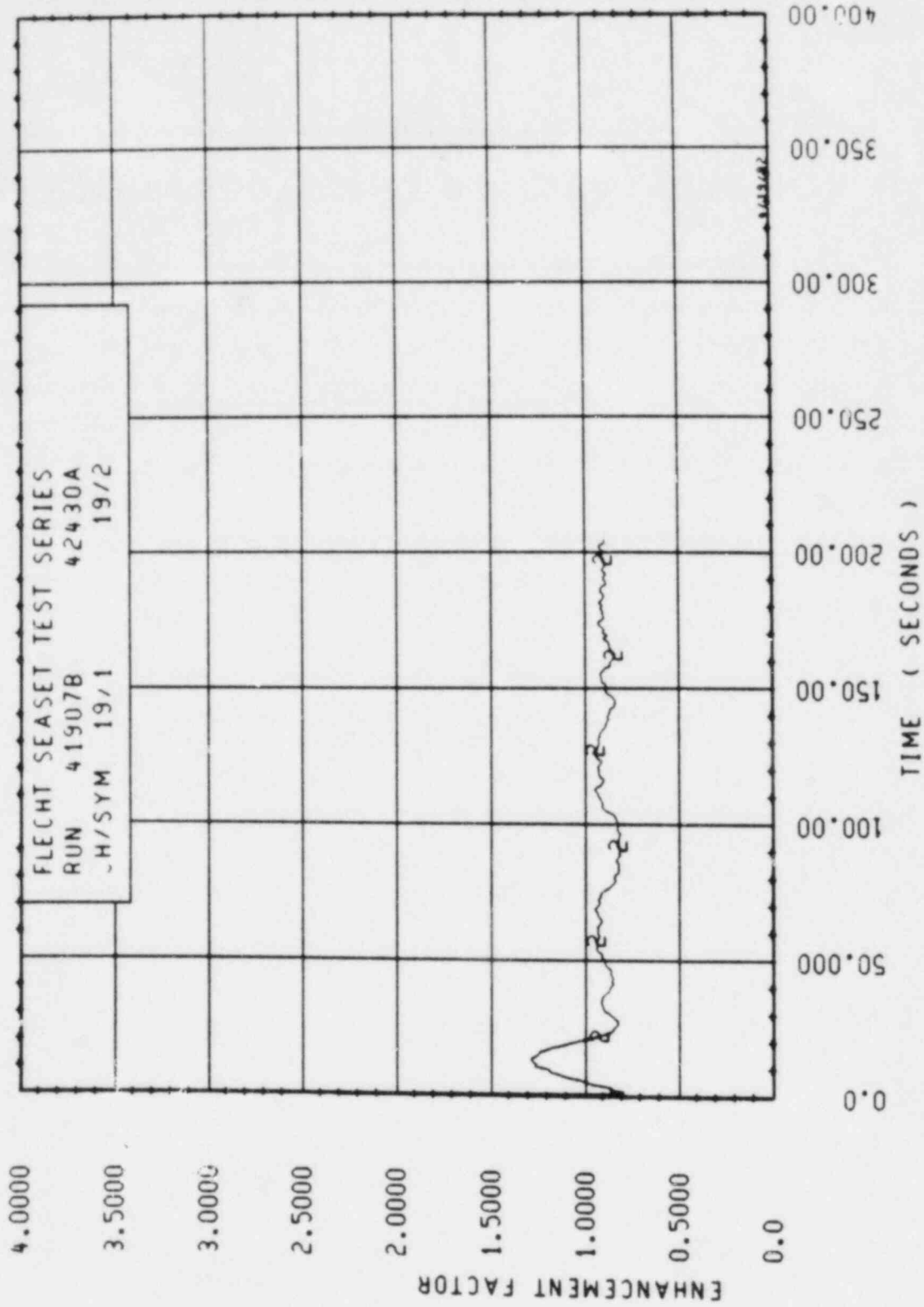


Figure O-1. Enhancement Factor for Run 41907B, Rod 4C, 1.52 m (60 in.) Elevation

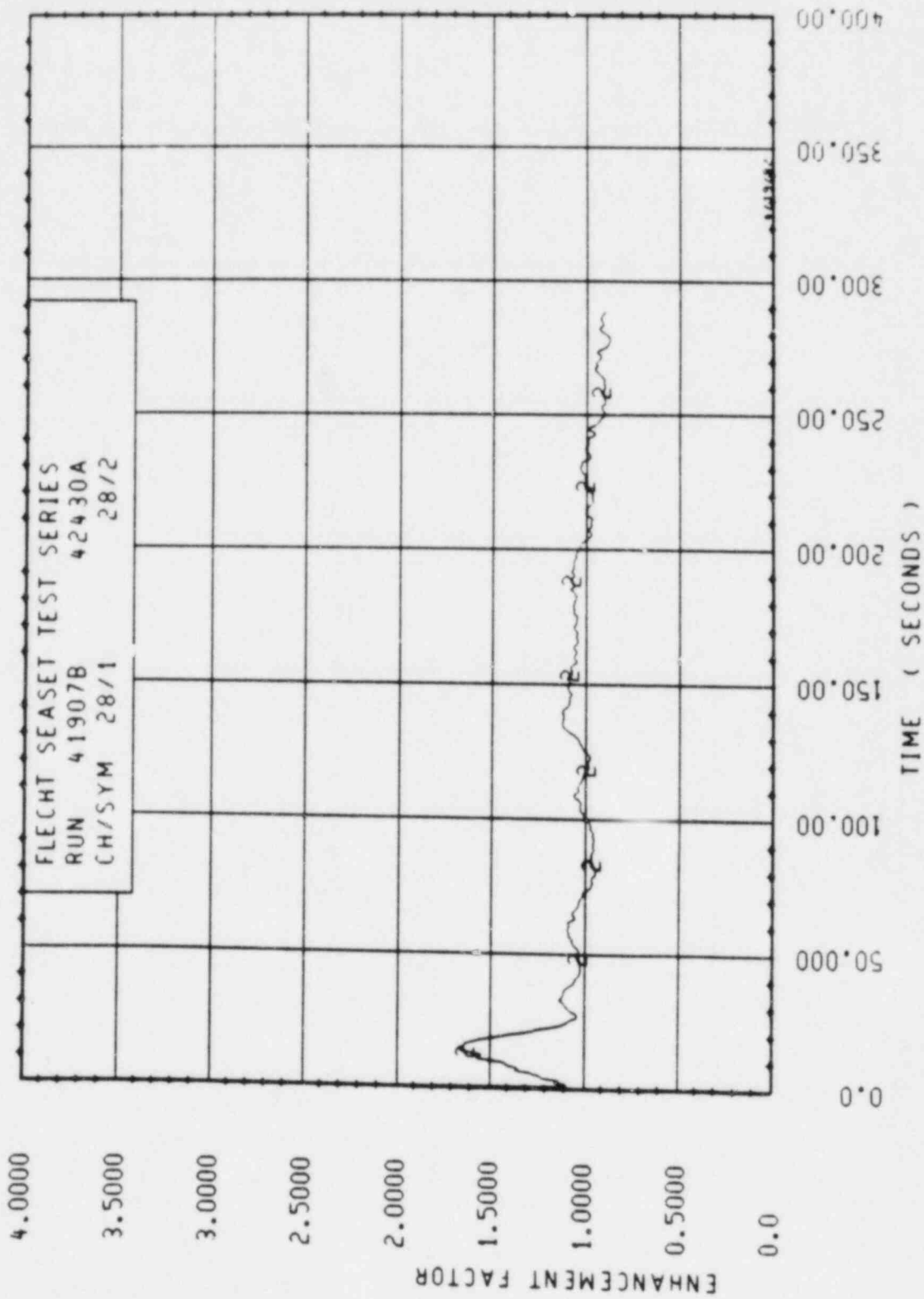


Figure O-2. Enhancement Factor for Run 41907B, Rod 3C, 1.73 m (70.2 in.) Elevation

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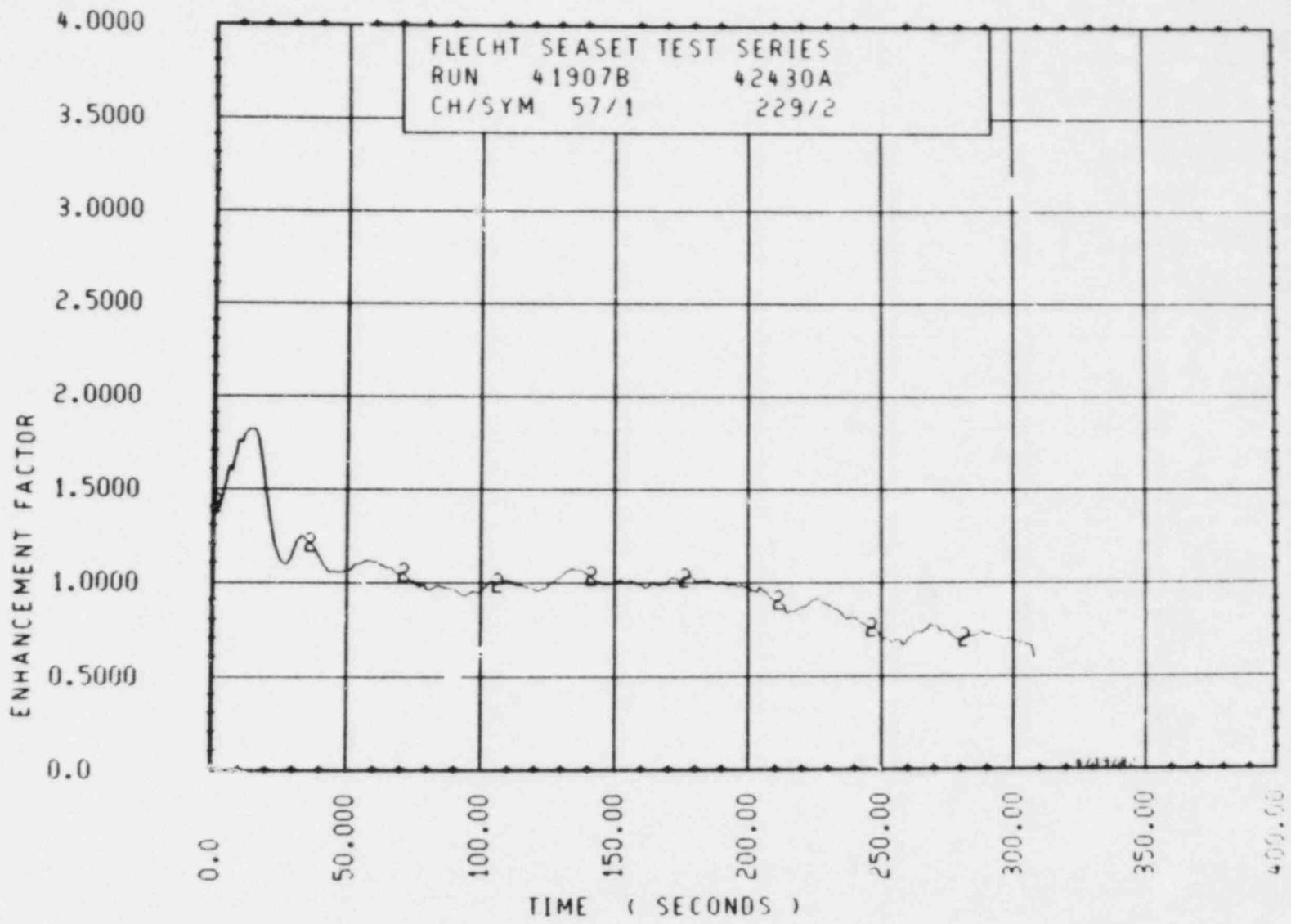


Figure O-3. Enhancement Factor for Run 41907B, Rod 3C, 1.88 m (74.2 in.) Elevation

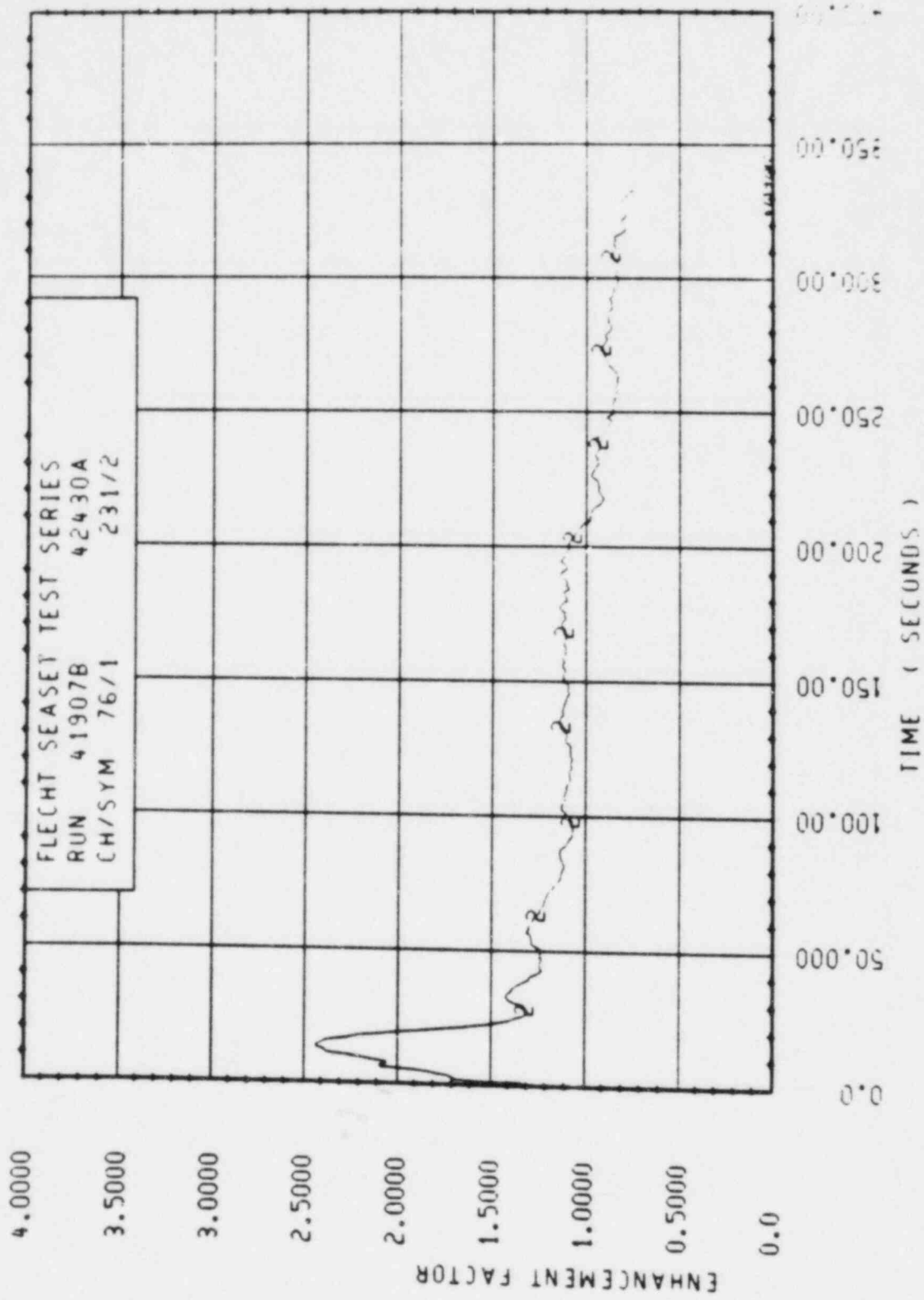


Figure O-4. Enhancement Factor for Run 41907B, Rod 3C, 1.94 m (76.2 in.) Elevation

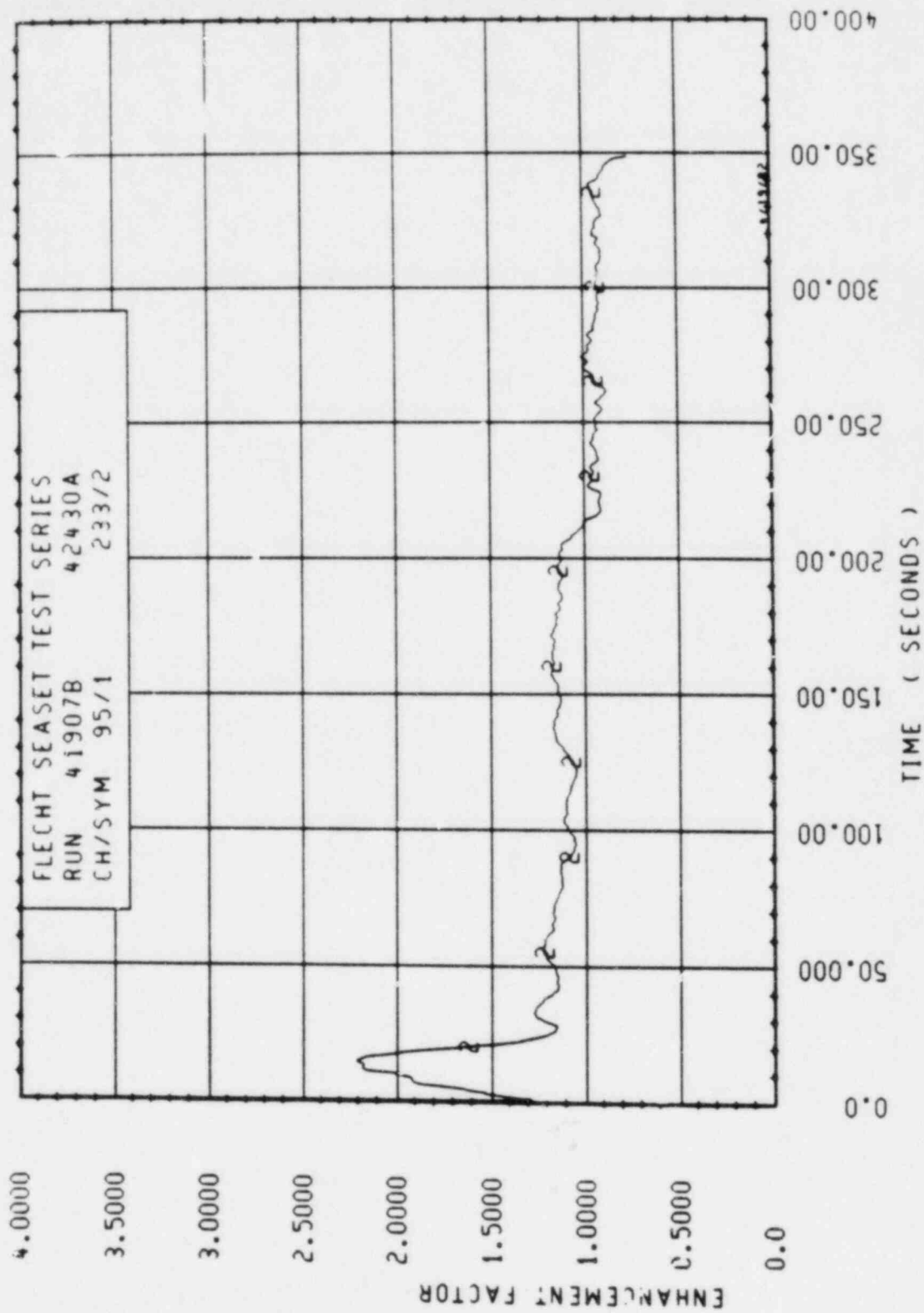


Figure O-5. Enhancement Factor for Run 41907B, Rod 3C, 1.99 m (78.5 in.) Elevation

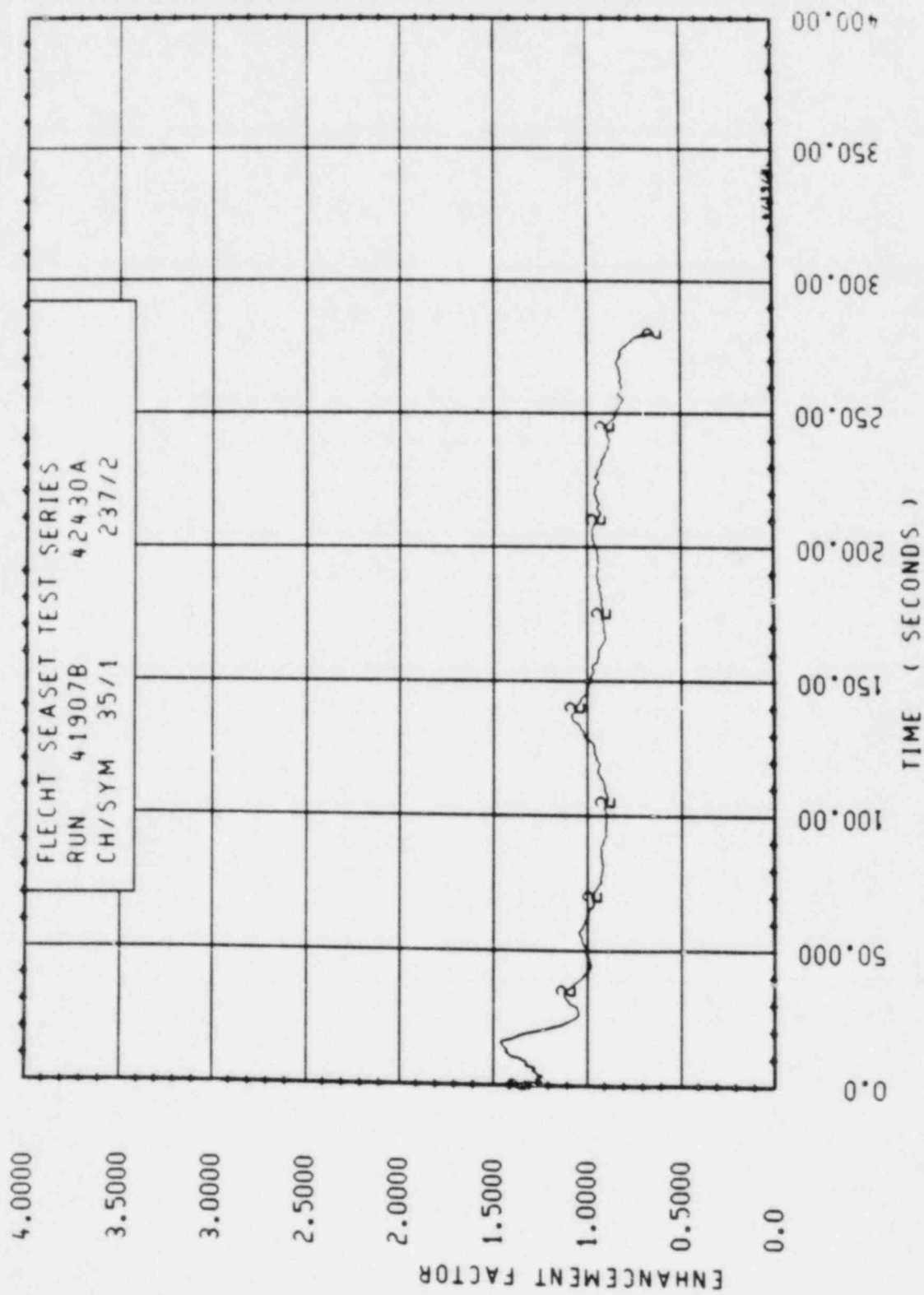


Figure O-6. Enhancement Factor for Run 41907B, Rod 3E, 1.83 m (72.1 in.) Elevation

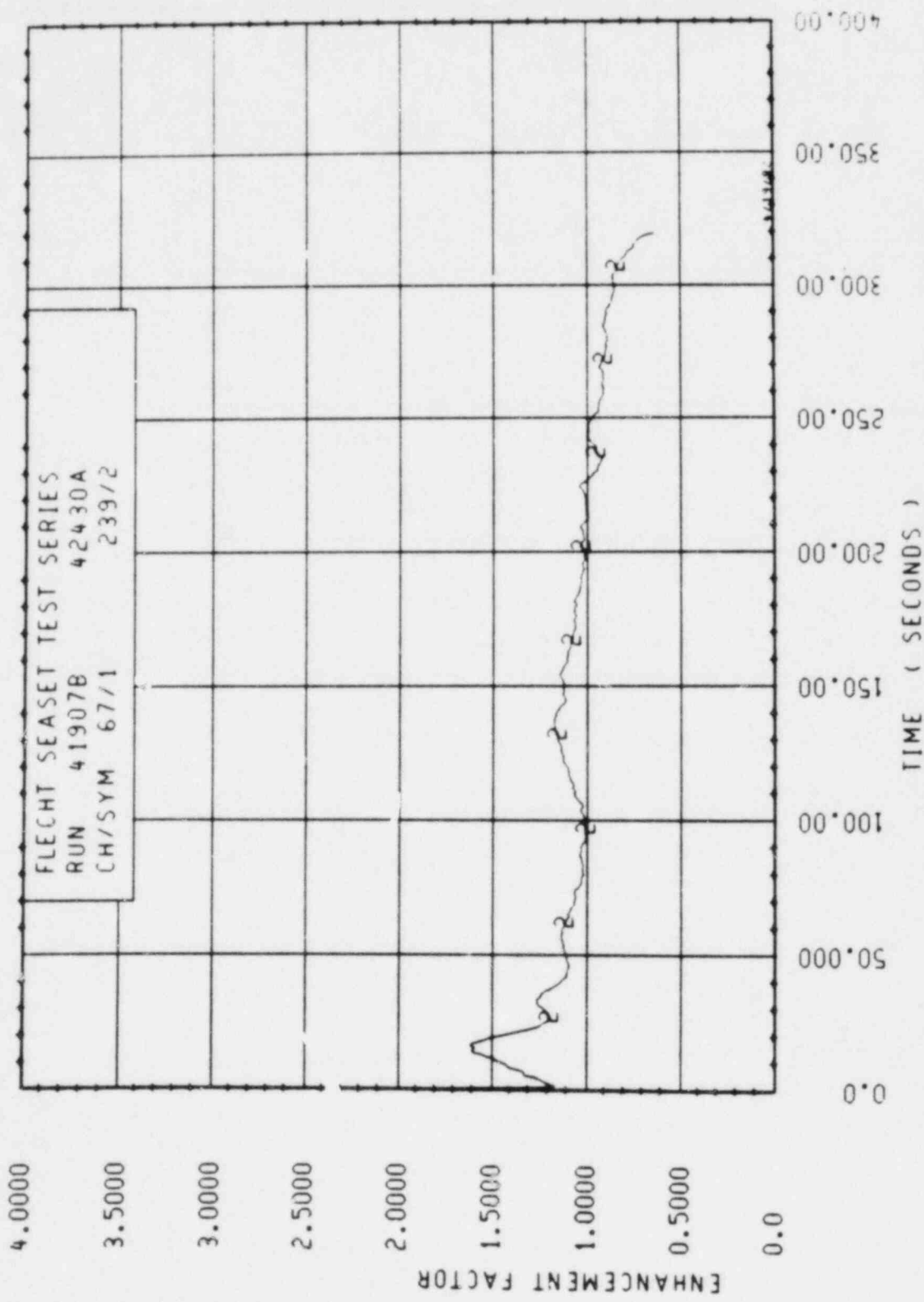


Figure O-7. Enhancement Factor for Run 41907B, Rod 3E, 1.94 m (76.3 in.) Elevation

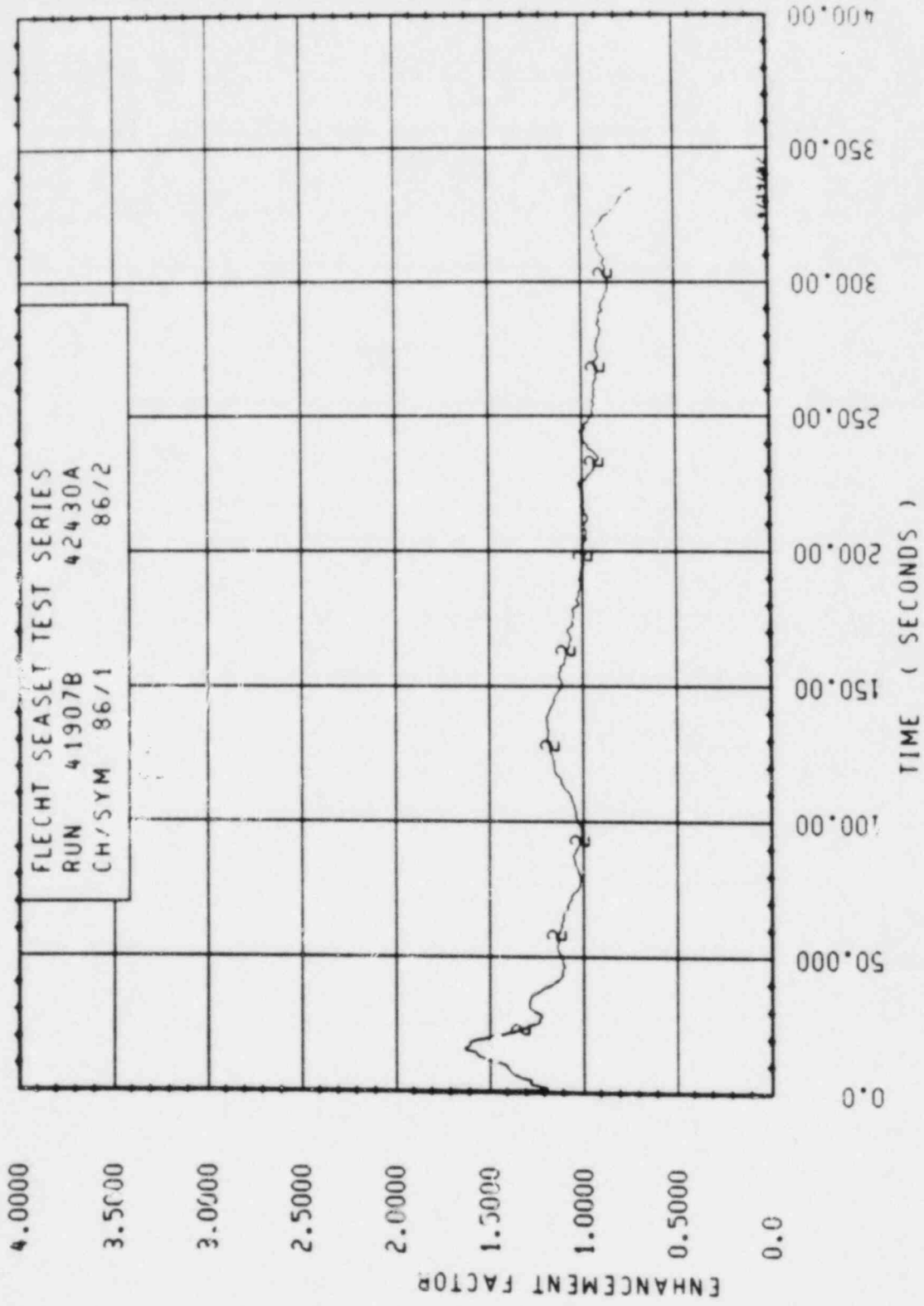


Figure O-8. Enhancement Factor for Run 41907B, Rod 3E, 1.99 m (78.2 in.) Elevation

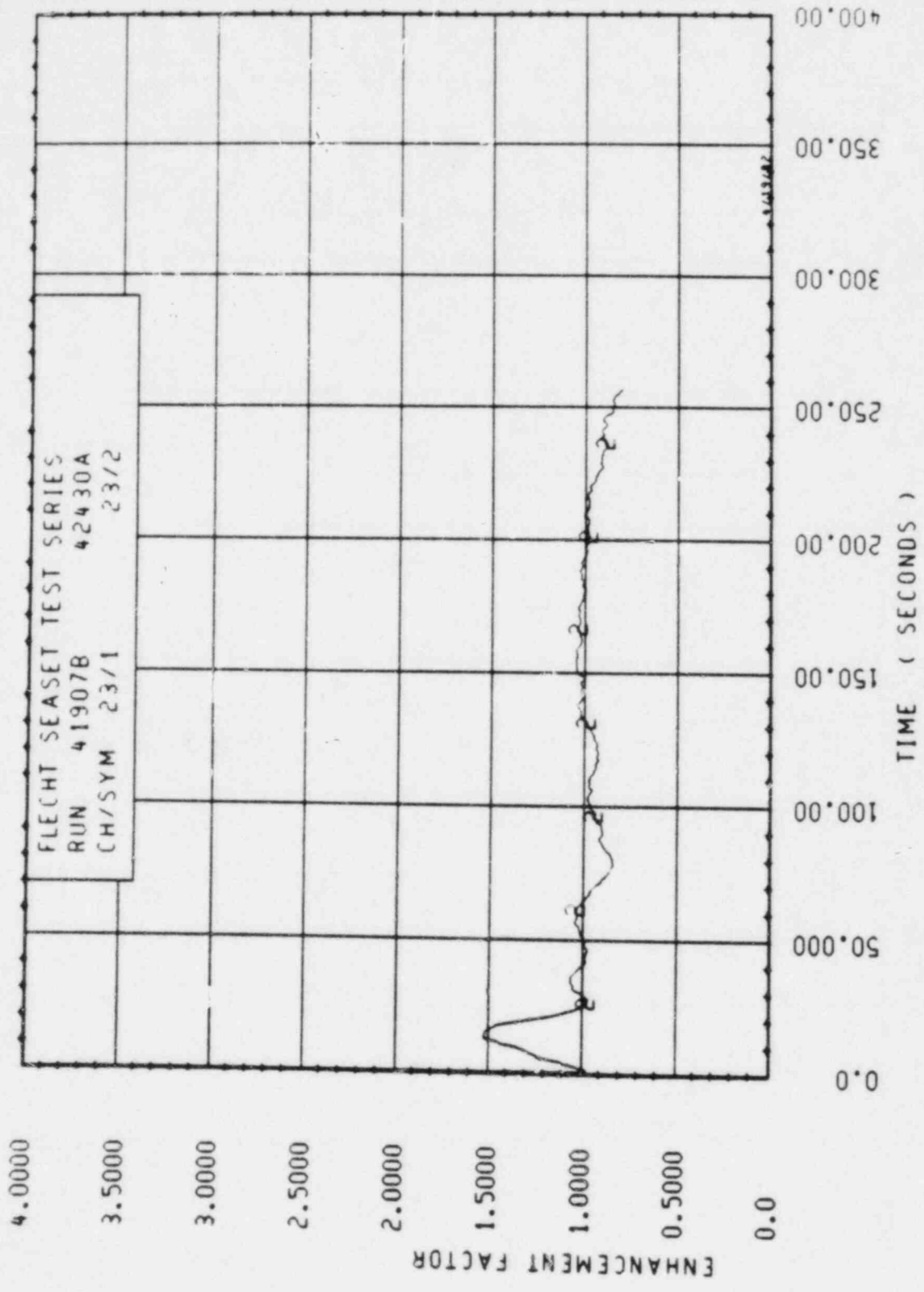


Figure O-9. Enhancement Factor for Run 41907B, Rod 4C, 1.70 m (67.1 in.) Elevation

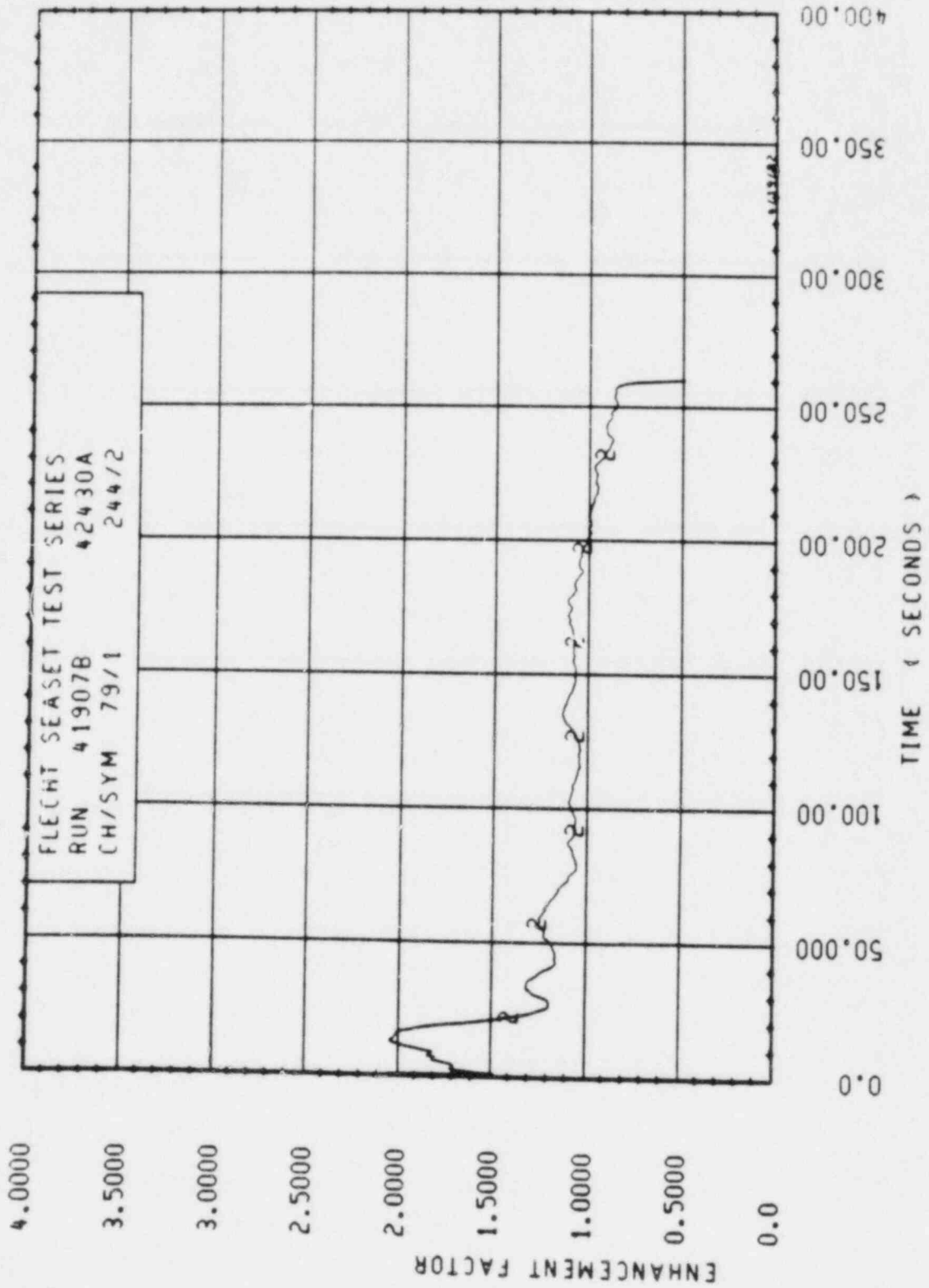


Figure O-10. Enhancement Factor for Run 41907B, Rod 4C, 1.94 m (76.3 in.) Elevation

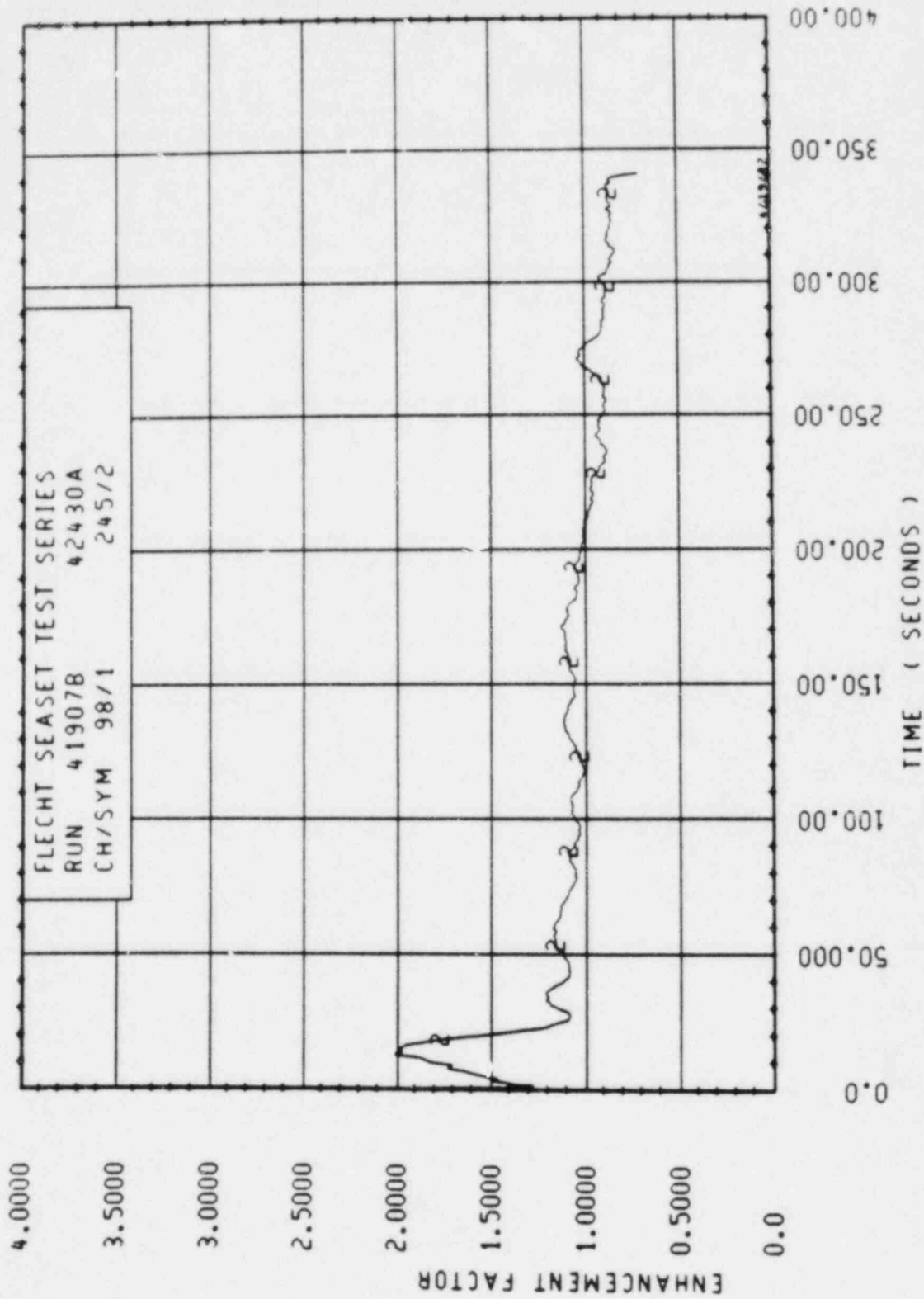


Figure O-11. Enhancement Factor for Run 41907B, Rod 4C, 1.99 m (78.3 in.) Elevation

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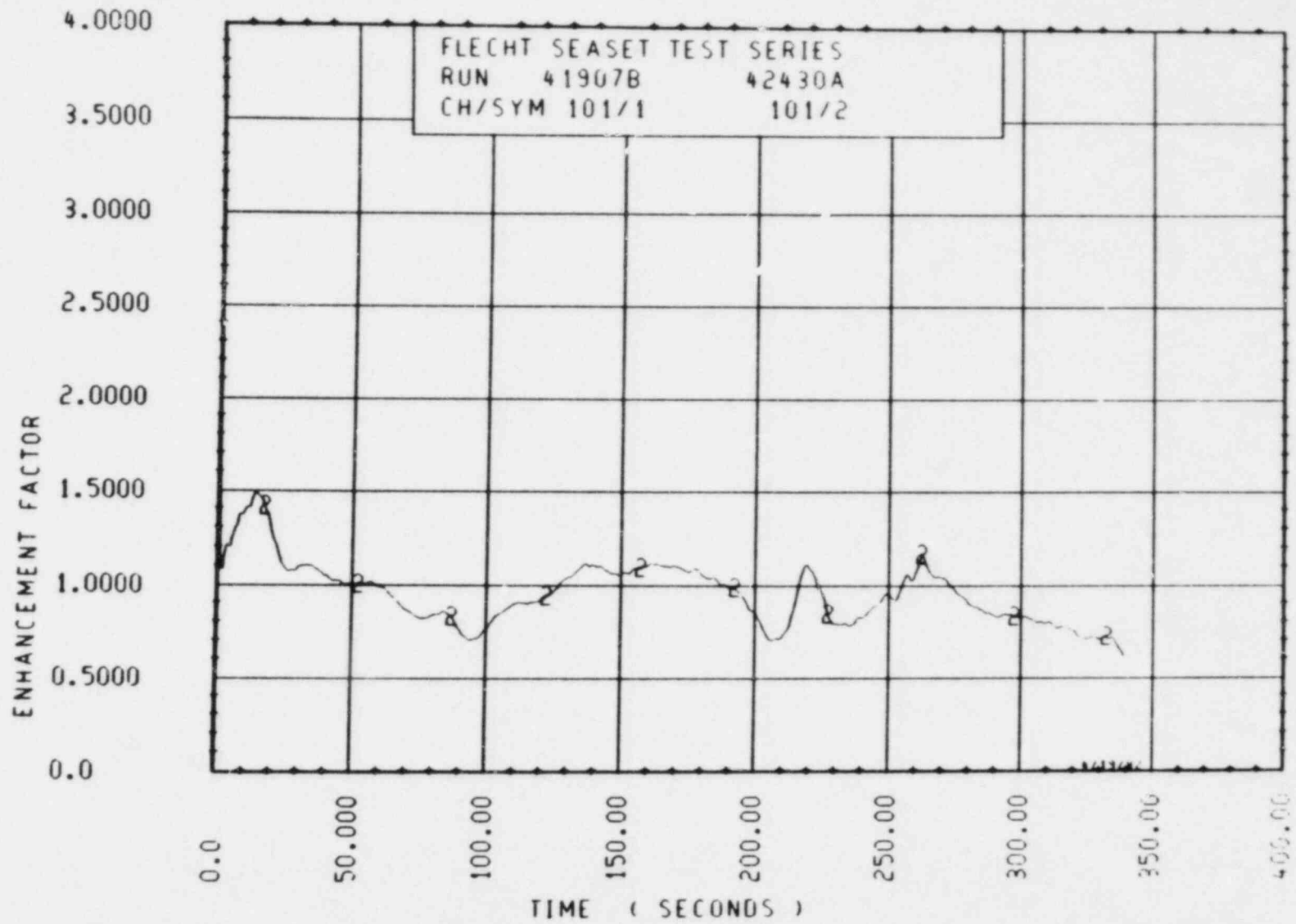


Figure O-12. Enhancement Factor for Run 41907B, Rod 5C, 2.00 m (78.6 in.) Elevation

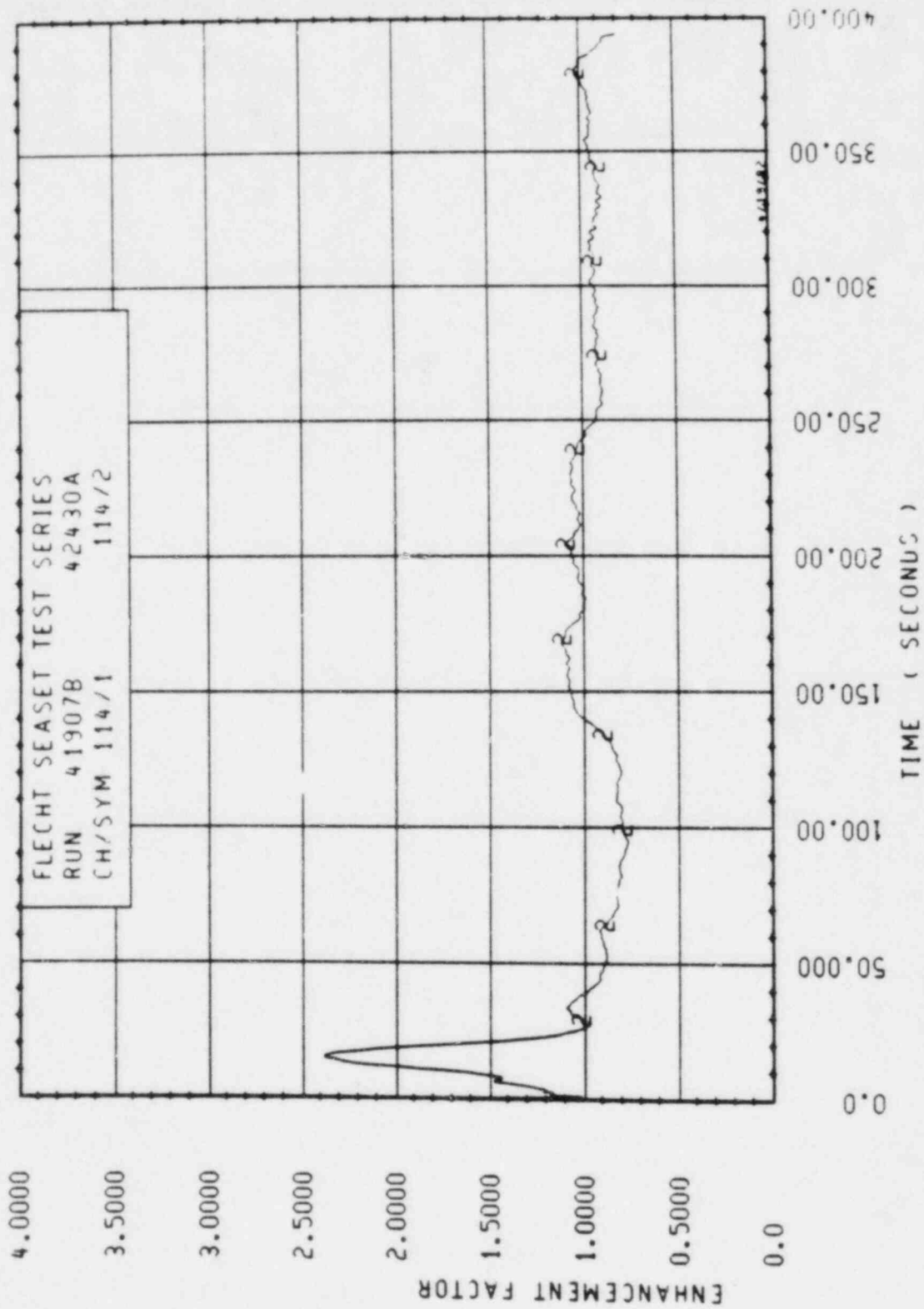


Figure O-13. Enhancement Factor for Run 41907B, Rod 3B, 2.13 m (84 in.) Elevation

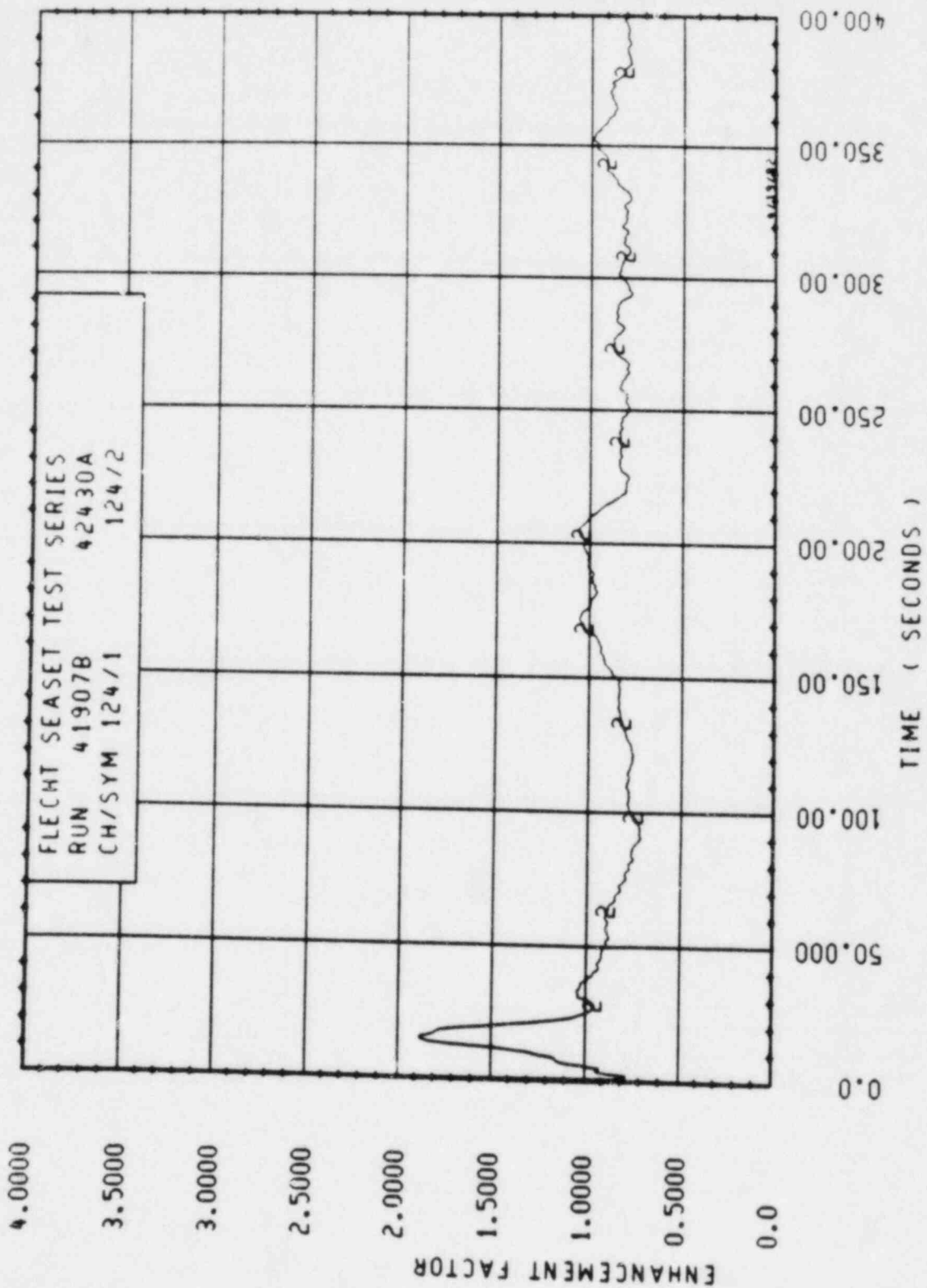


Figure O-14. Enhancement Factor for Run 41907B, Rod 3B, 2.29 m (90 in.) Elevation

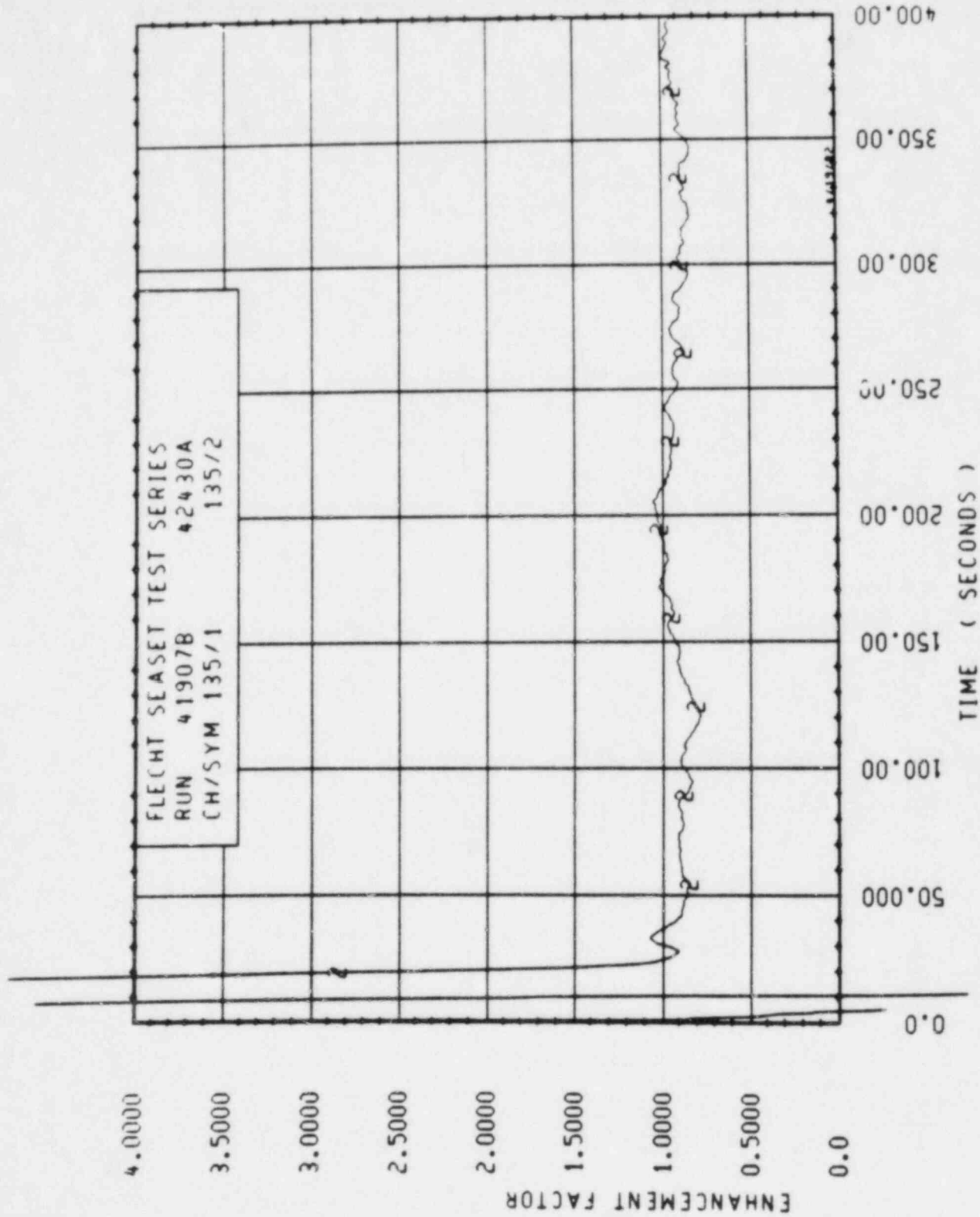


Figure O-15. Enhancement Factor for Run 41907B, Rod 3B, 2.44 m (96 in.) Elevation

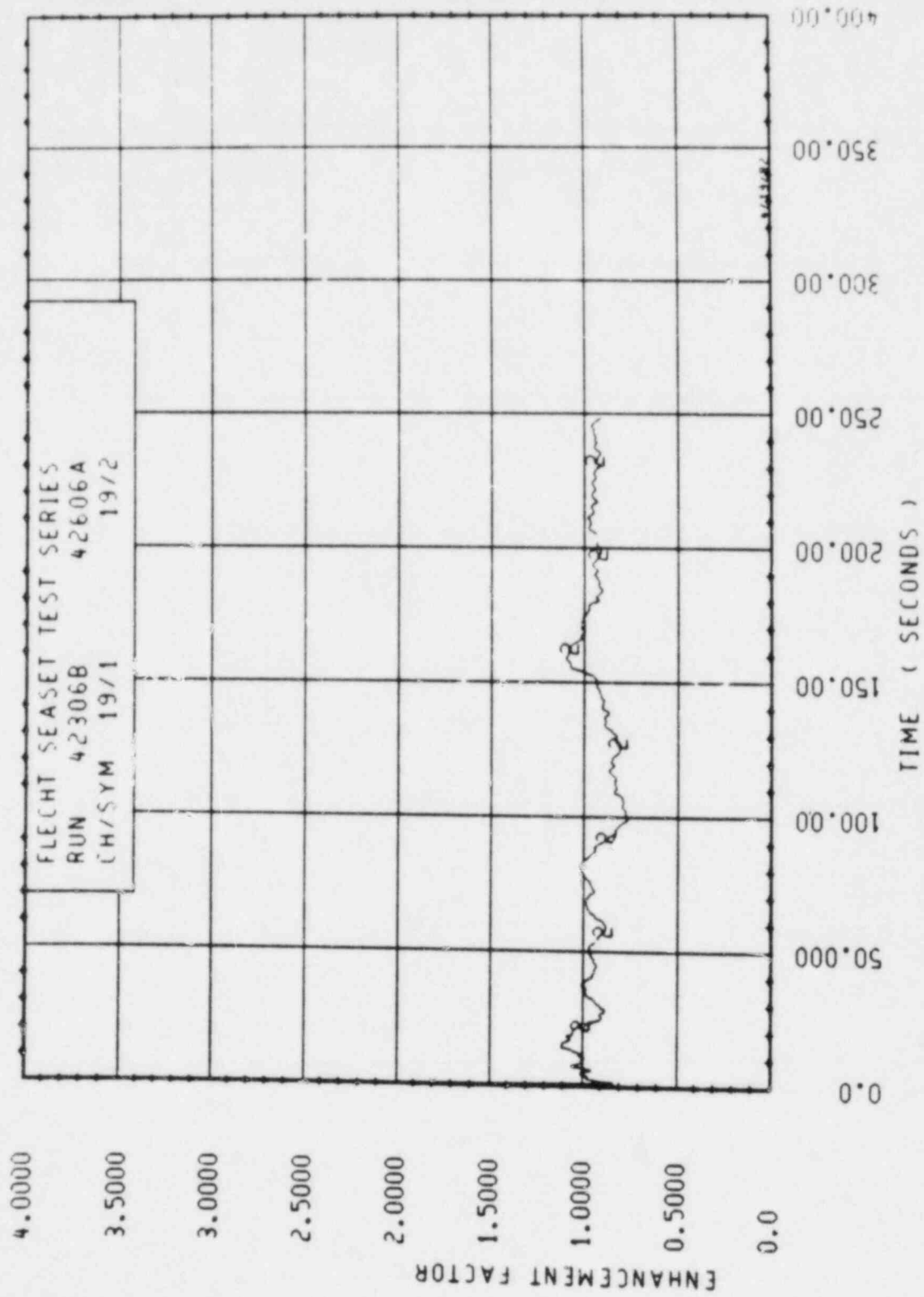


Figure O-16. Enhancement Factor for Run 42306B, Rod 4C, 1.52 m (60 in.) Elevation

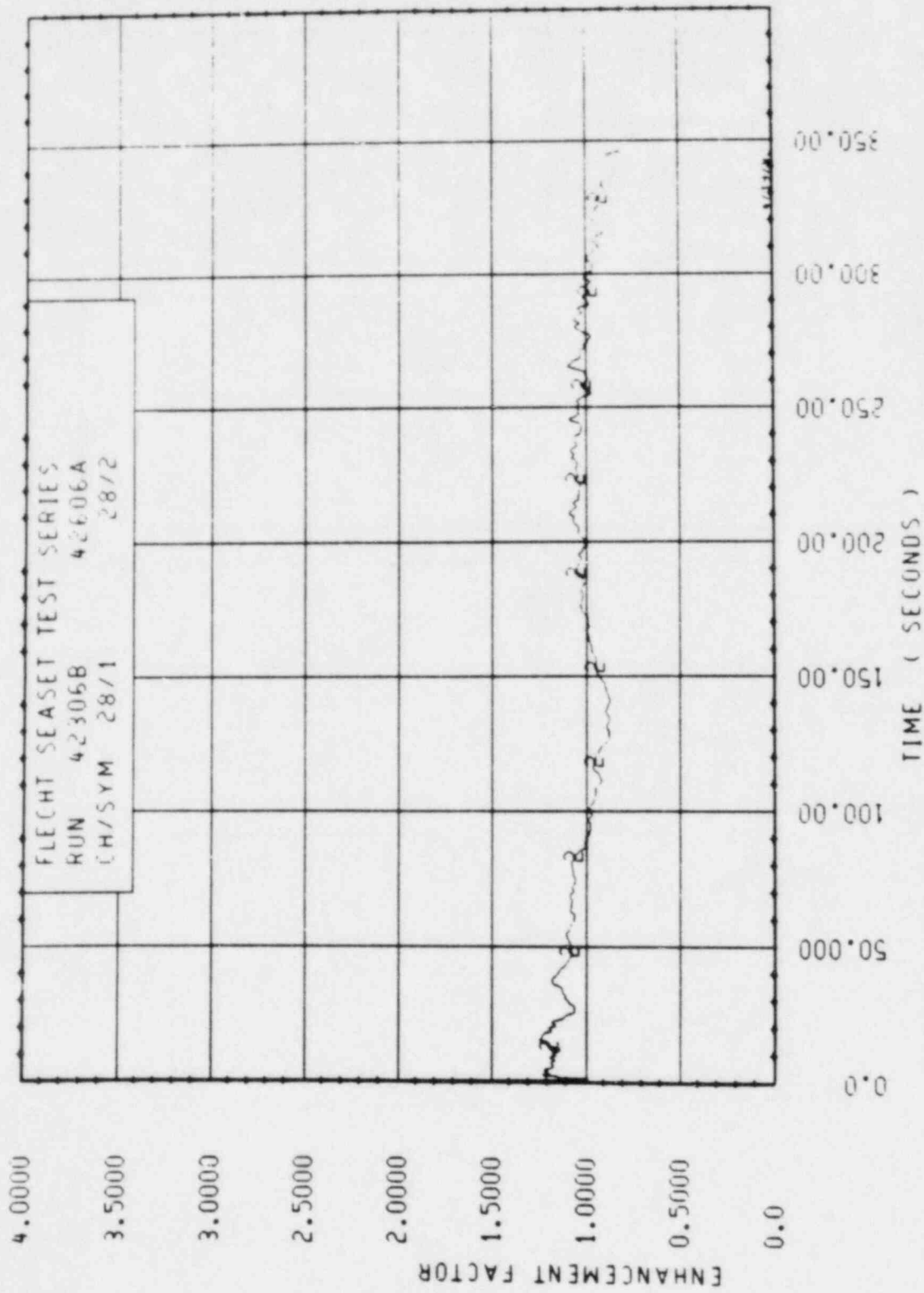


Figure O-17. Enhancement Factor for Run 42306B, Rod 3C, 1.78 m (70.2 in.) Elevation

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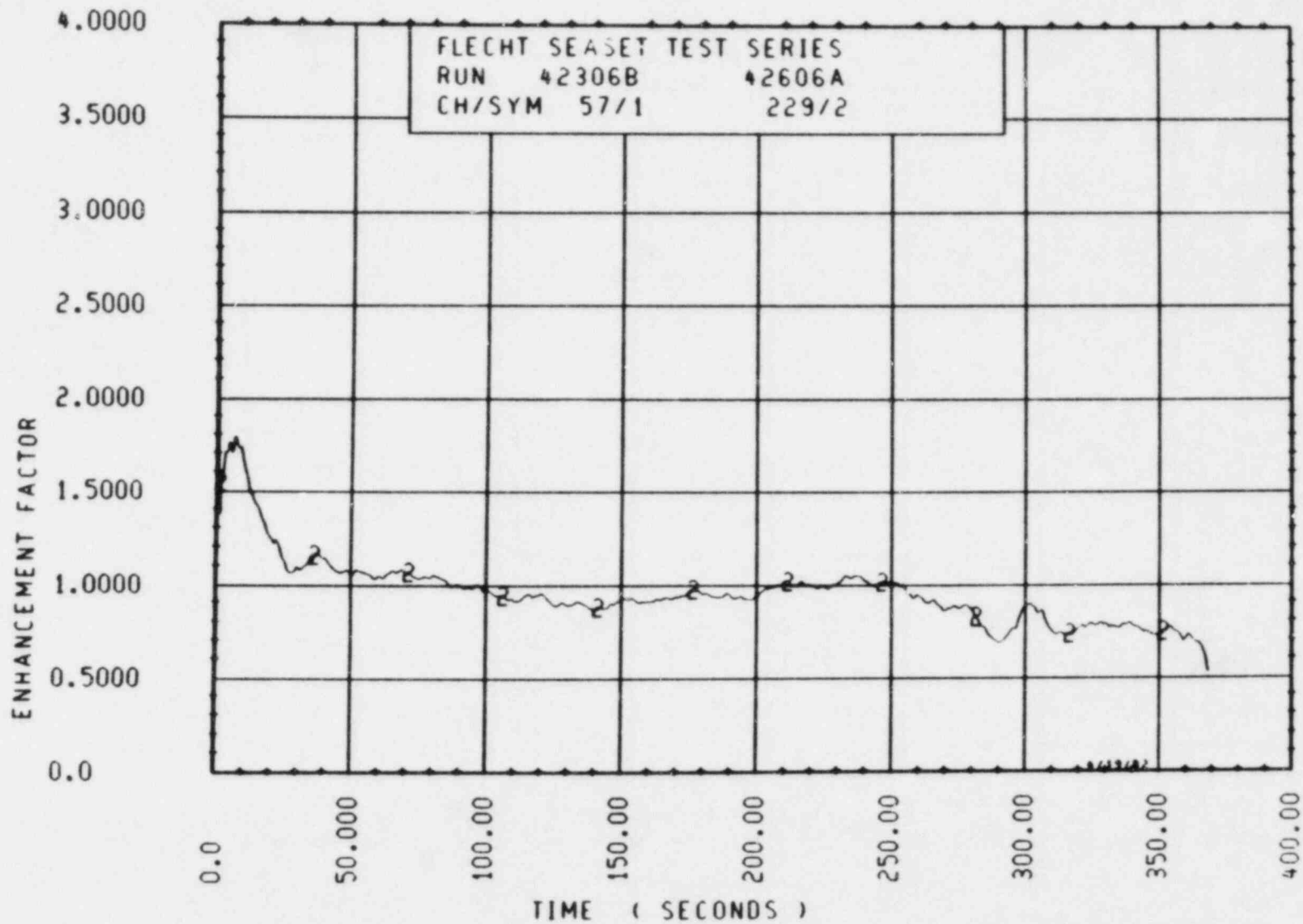


Figure O-18. Enhancement Factor for Run 42306B, Rod 3C, 1.88 m (74.2 in.) Elevation

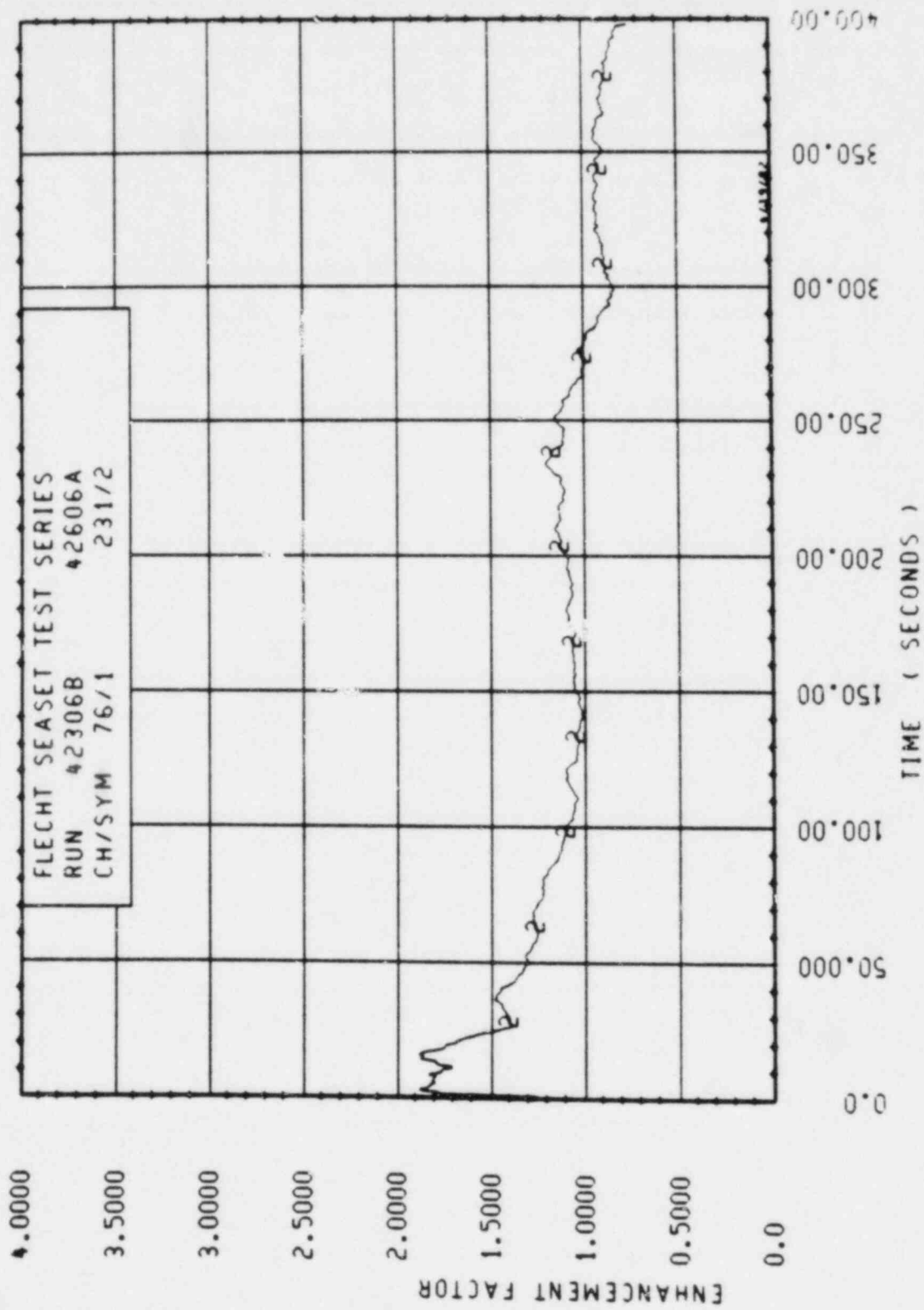


Figure O-19. Enhancement Factor for Run 42306B, Rod 3C, 1.94 m (76.2 in.) Elevation

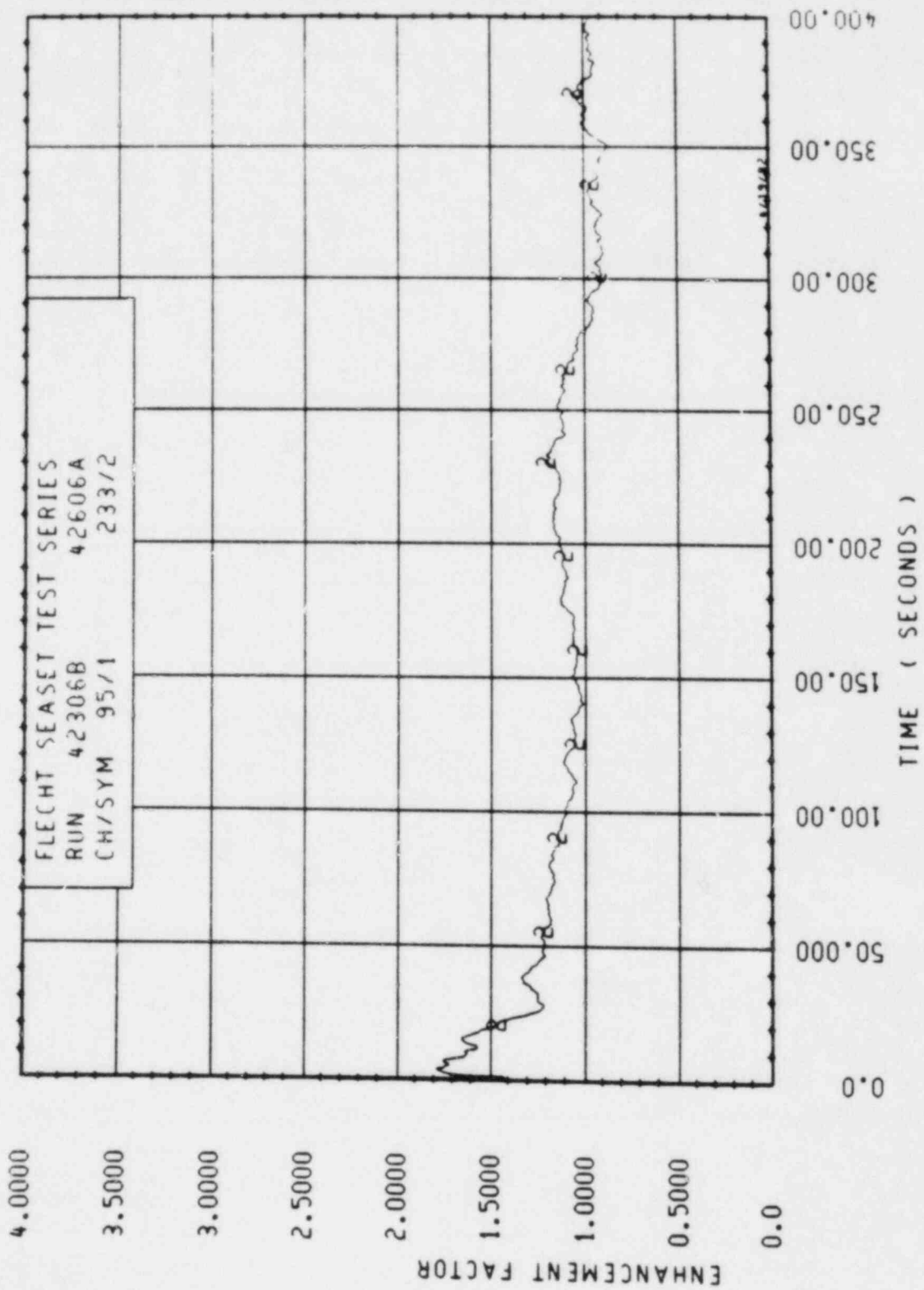


Figure O-20. Enhancement Factor for Run 42306B, Rod 3C, 1.99 m (78.5 in.) Elevation

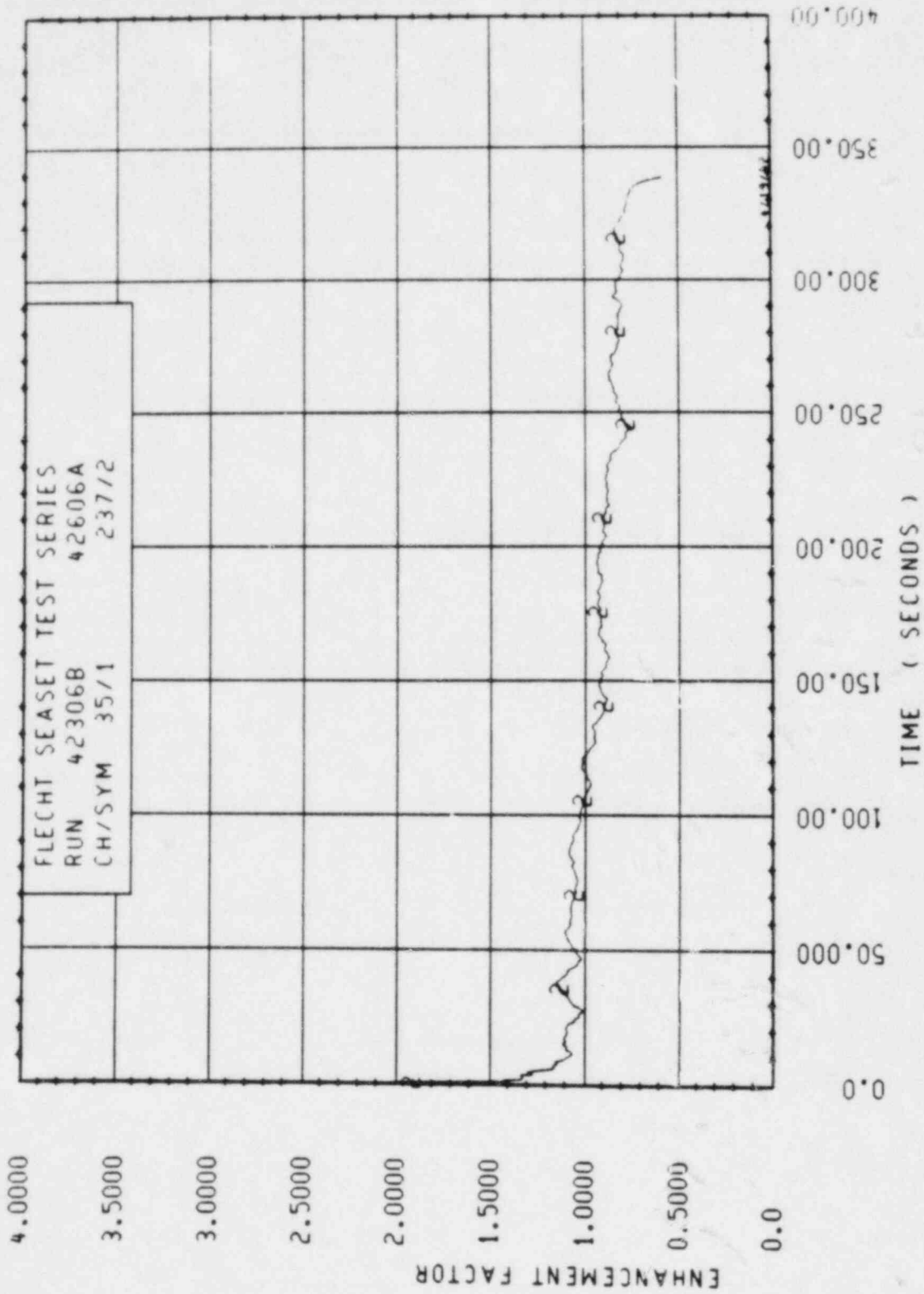


Figure O-21. Enhancement Factor for Run 42306B, Rod 3E, 1.83 m (72.1 in.) Elevation

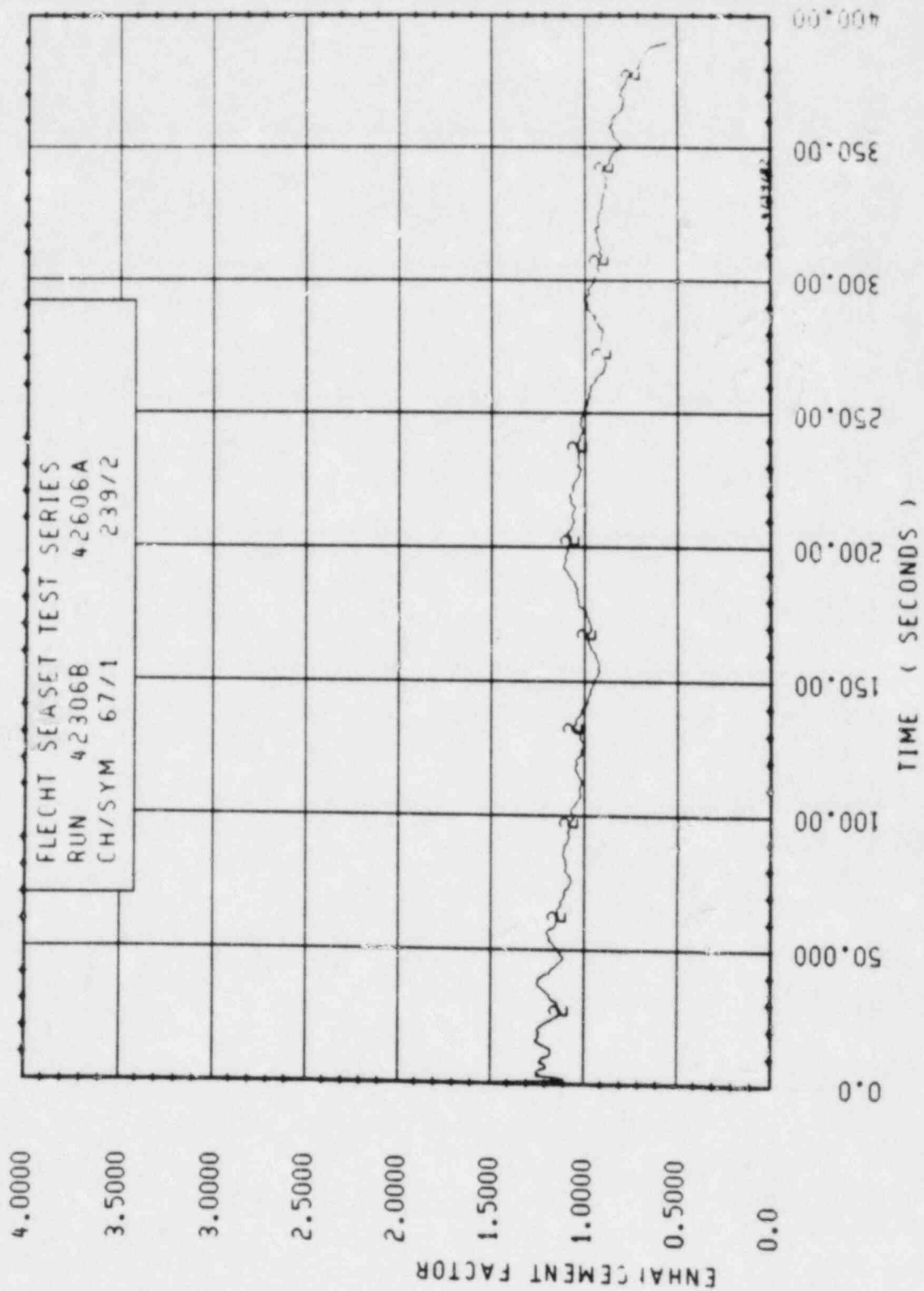


Figure O-22. Enhancement Factor for Run 42306B, Rod 3E, 1.94 m (76.3 in.) Elevation

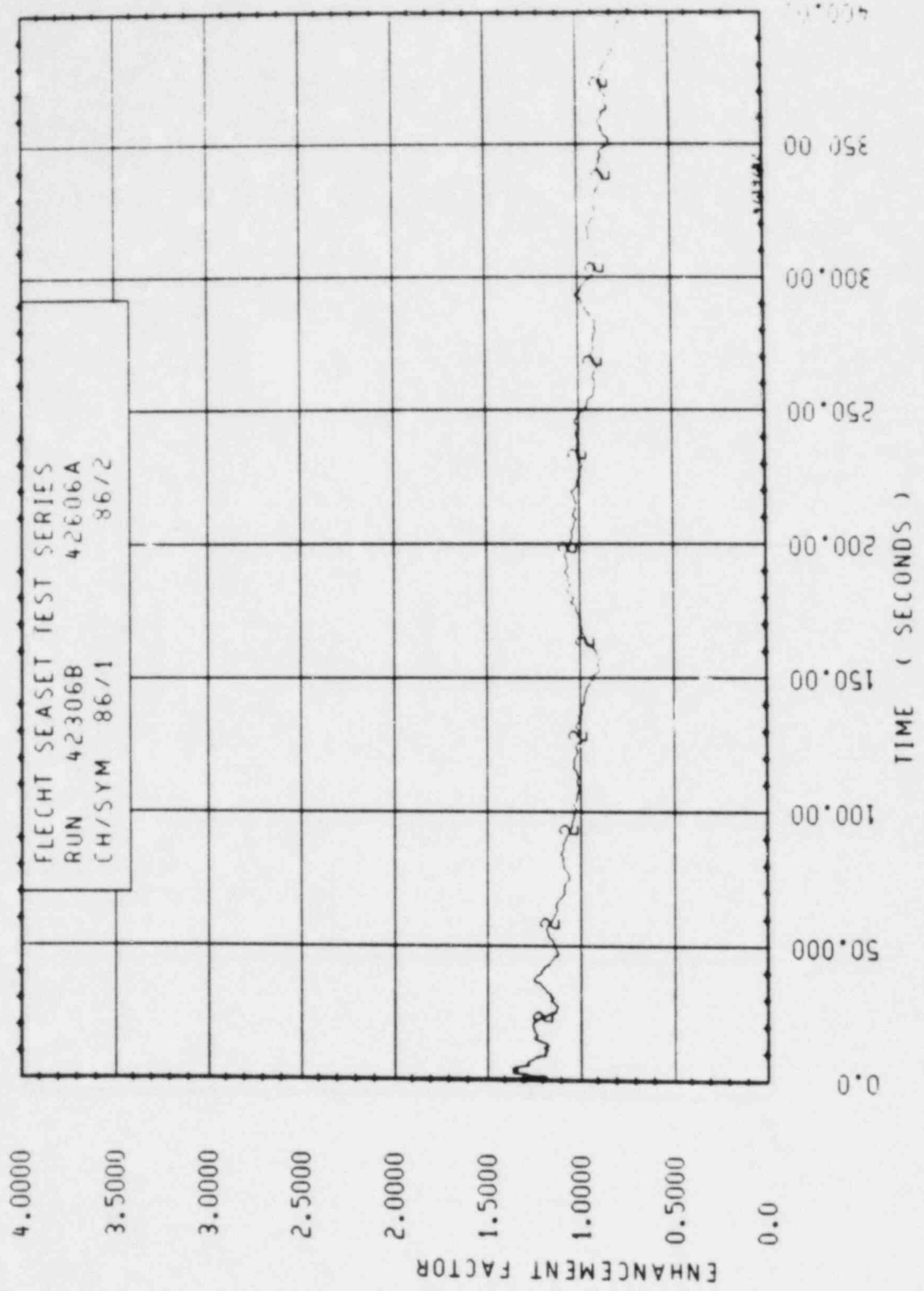


Figure O-23. Enhancement Factor for Run 42306B, Rod 3E, 1.99 m (78.2 in.) Elevation

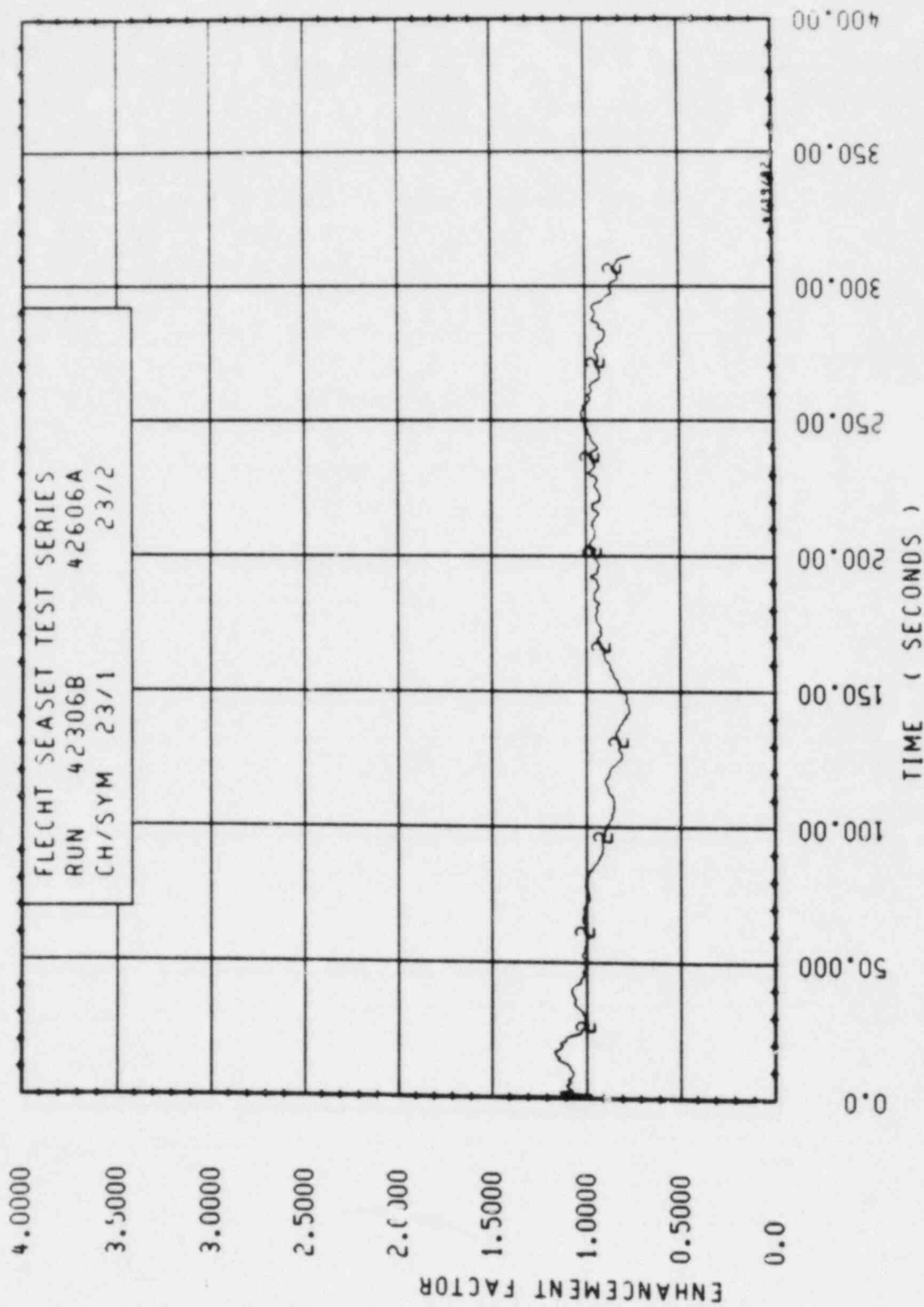


Figure O-24. Enhancement Factor for Run 42306B, Rod 4C, 1.70 m (67.1 in.) Elevation

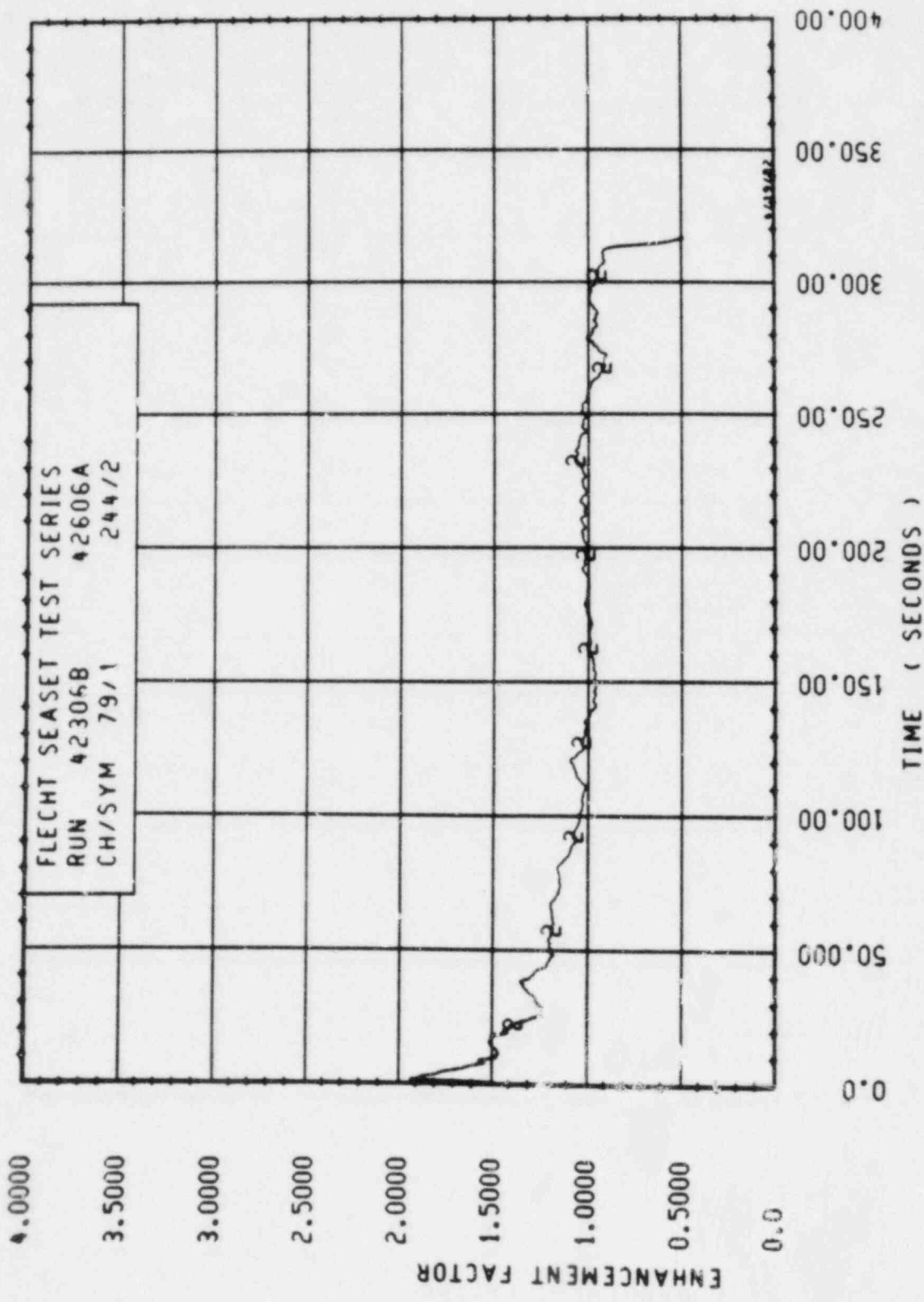


Figure O-25. Enhancement Factor for Run 42306B, Rod 4C, 1.94 m (76.3 in.) Elevation

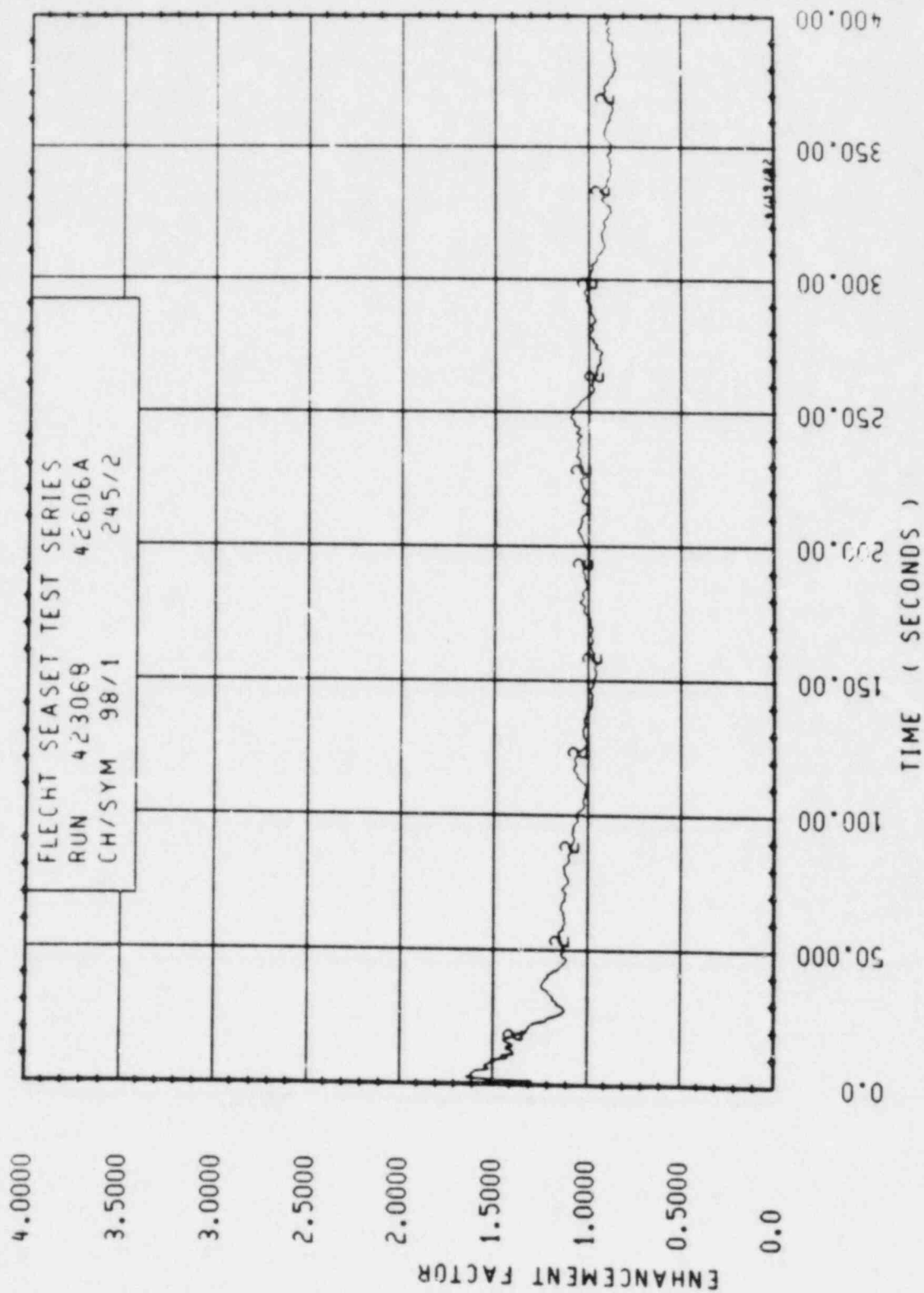


Figure O-26. Enhancement Factor for Run 42306B, Rod 4C, 1.99 m (78.3 in.) Elevation

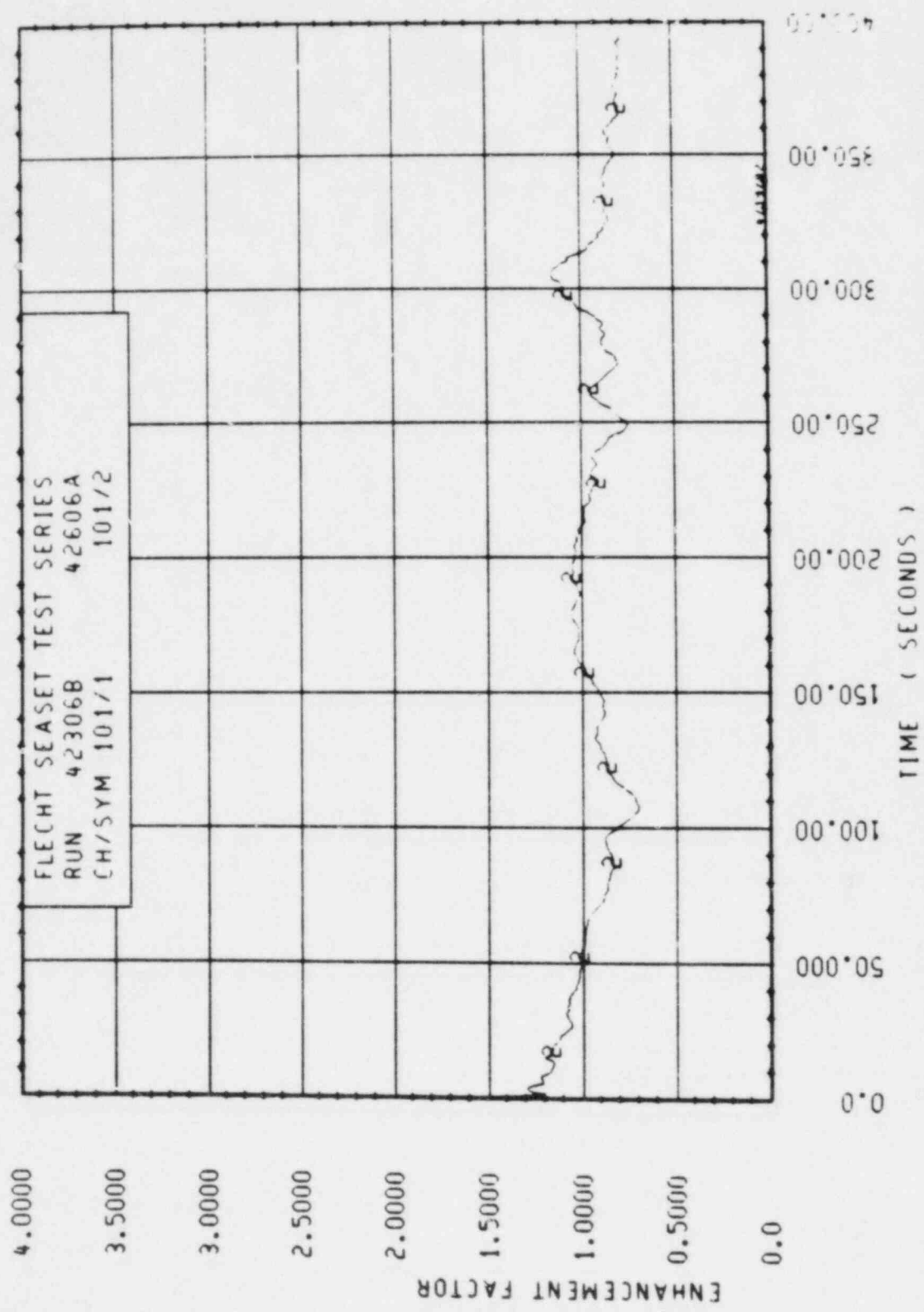


Figure O-27. Enhancement Factor for Run 42306B, Rod 5C, 2.00 m (78.6 in.) Elevation

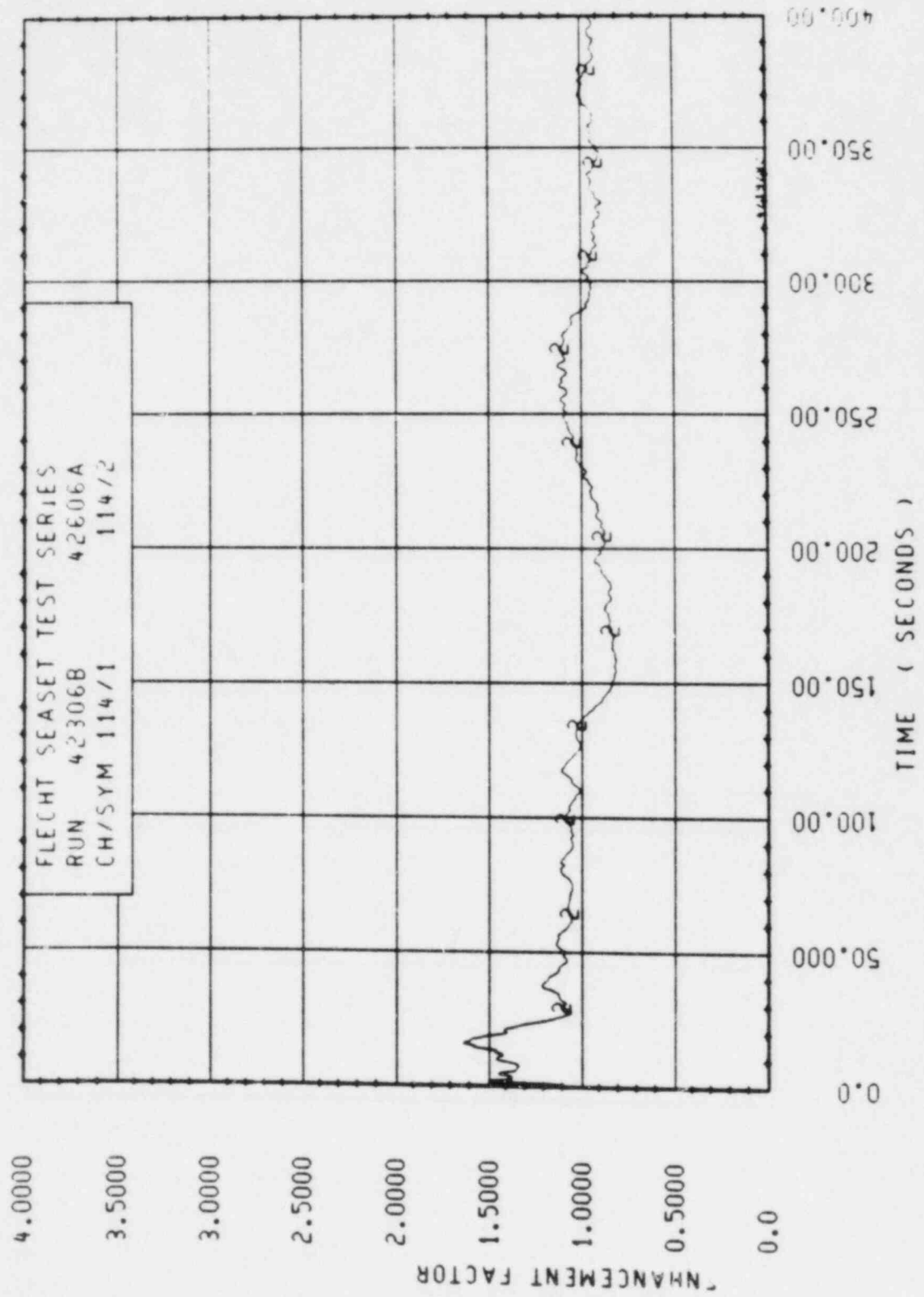


Figure O-28. Enhancement Factor for Run 42306B, Rod 3B, 2.13 m (84 in.) Elevation

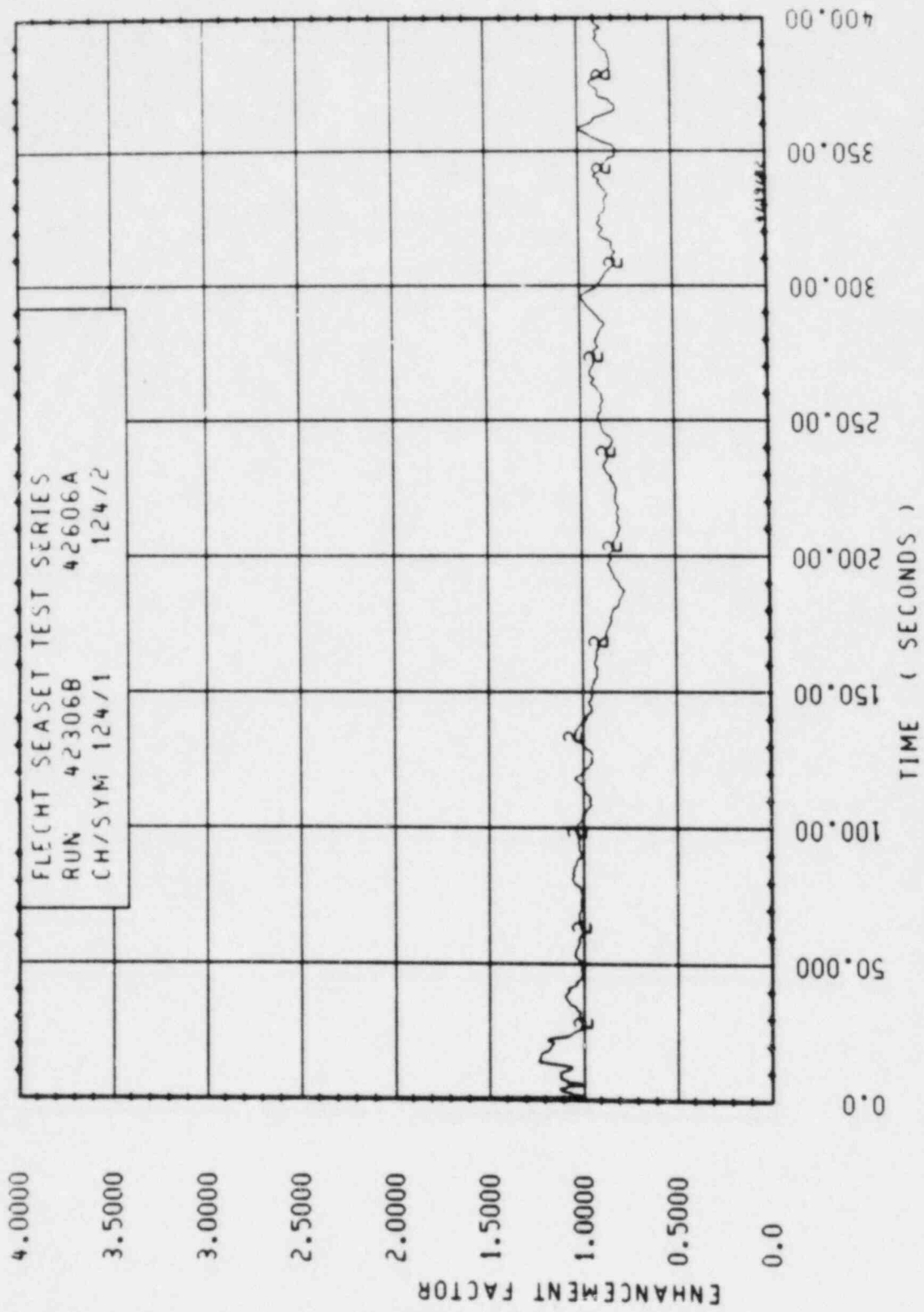


Figure O-29. Enhancement Factor for Run 42306B, Rod 3B, 2.29 m (90 in.) Elevation

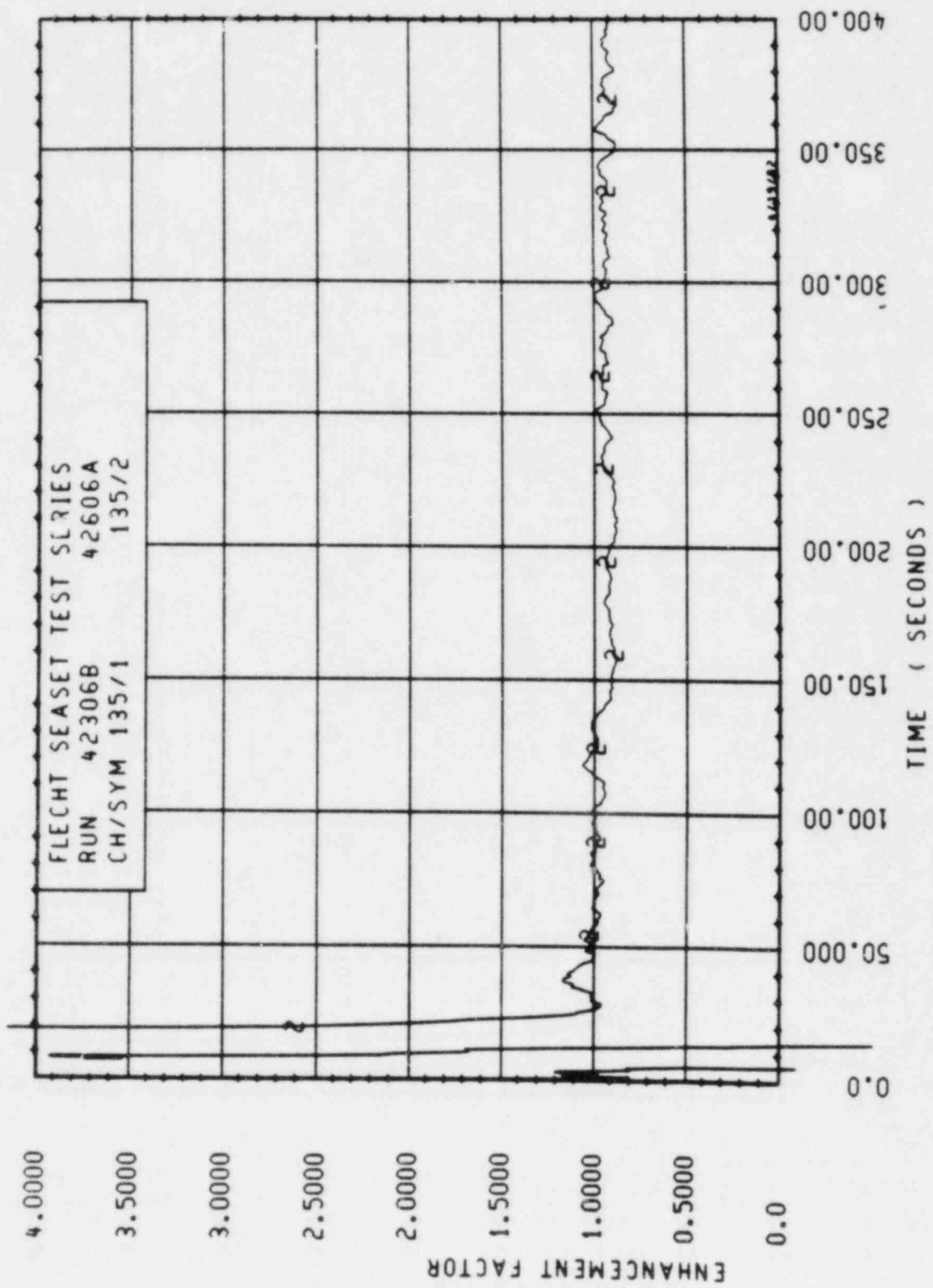


Figure O-30. Enhancement Factor for Run 42306B, Rod 3B, 2.44 m (96 in.) Elevation

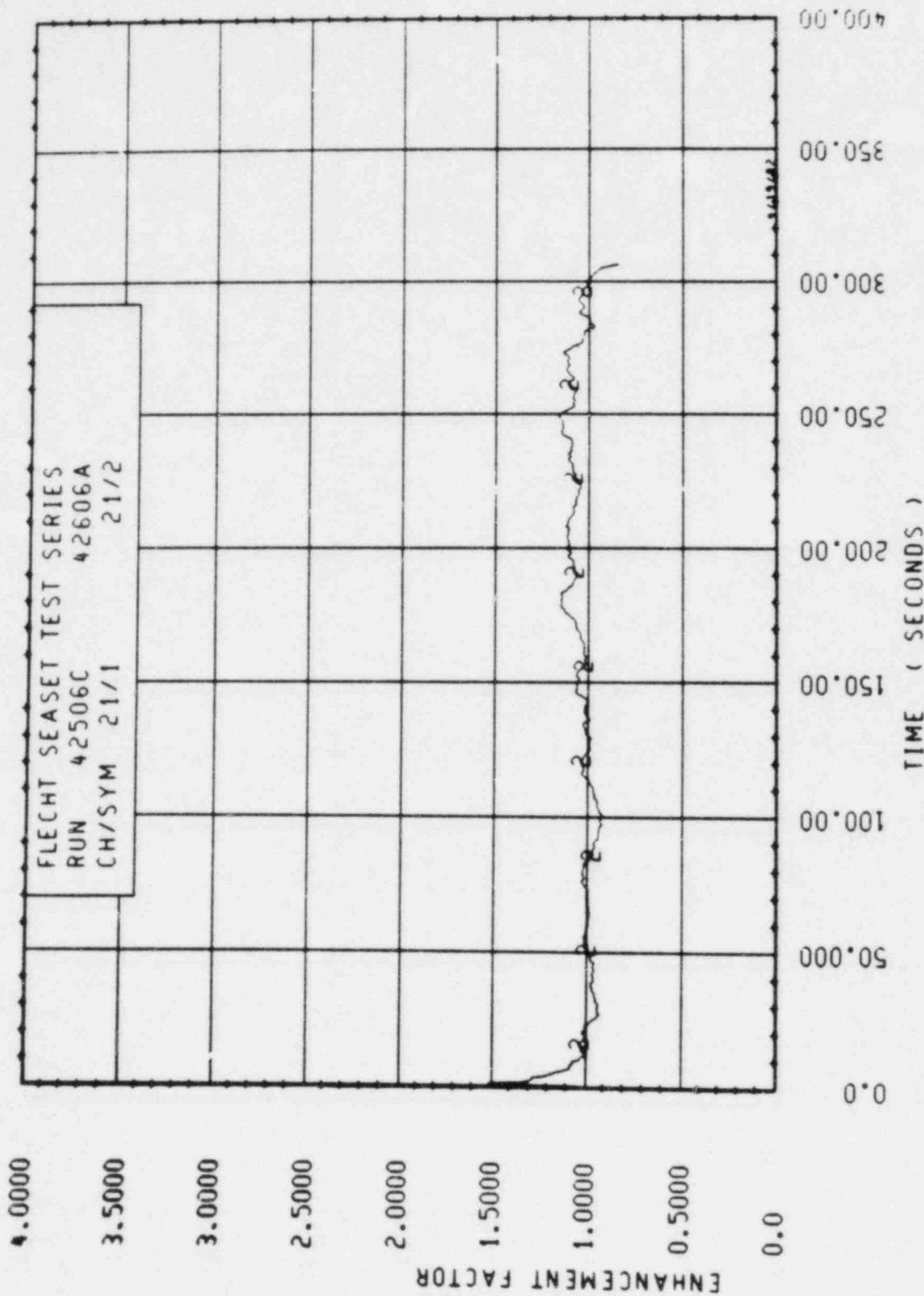


Figure O-31. Enhancement Factor for Run 42506C, Rod 2A, 1.71 m (67.5 in.) Elevation

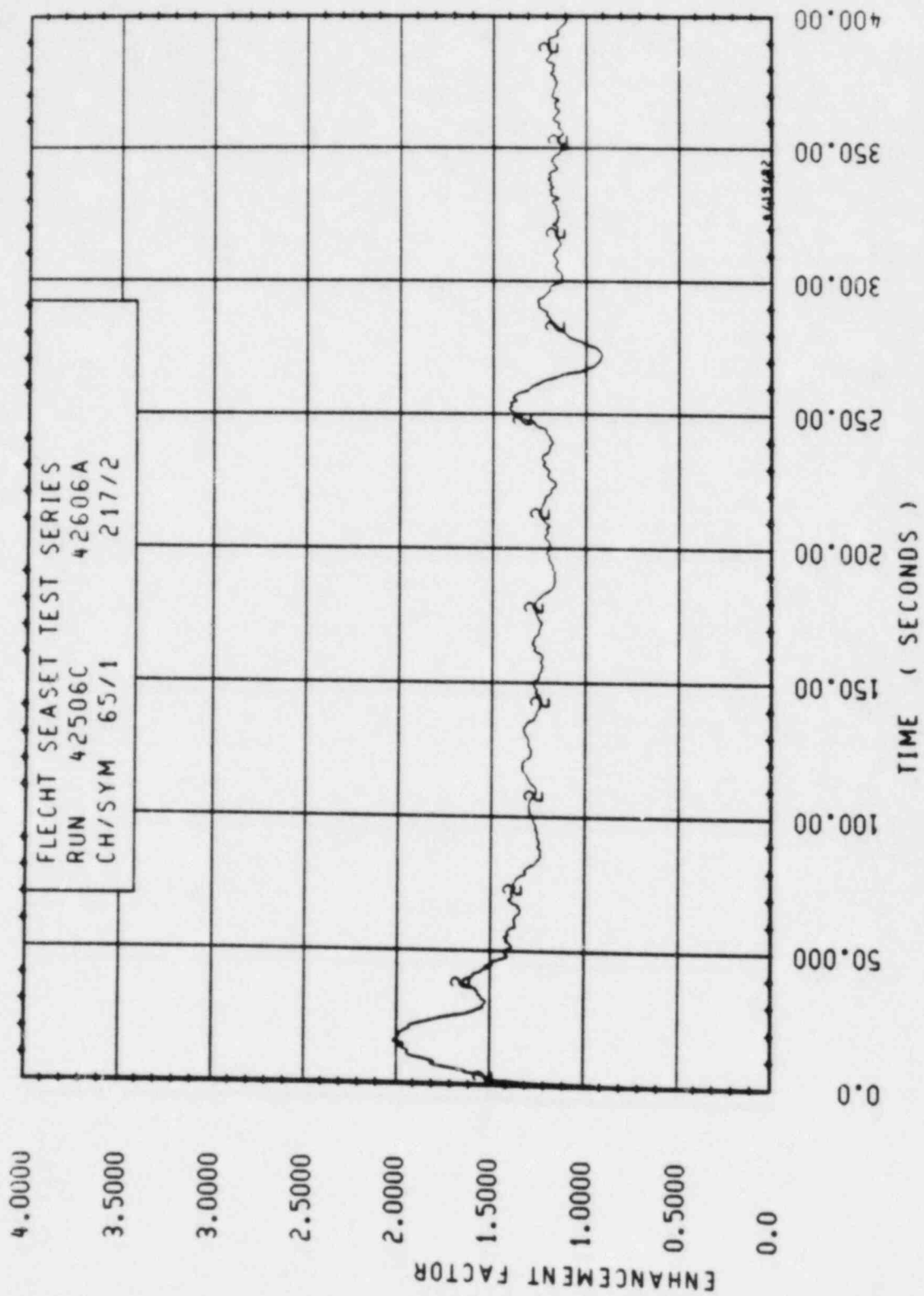


Figure O-32. Enhancement Factor for Run 42506C, Rod 2D, 1.91 m (75.3 in.) Elevation

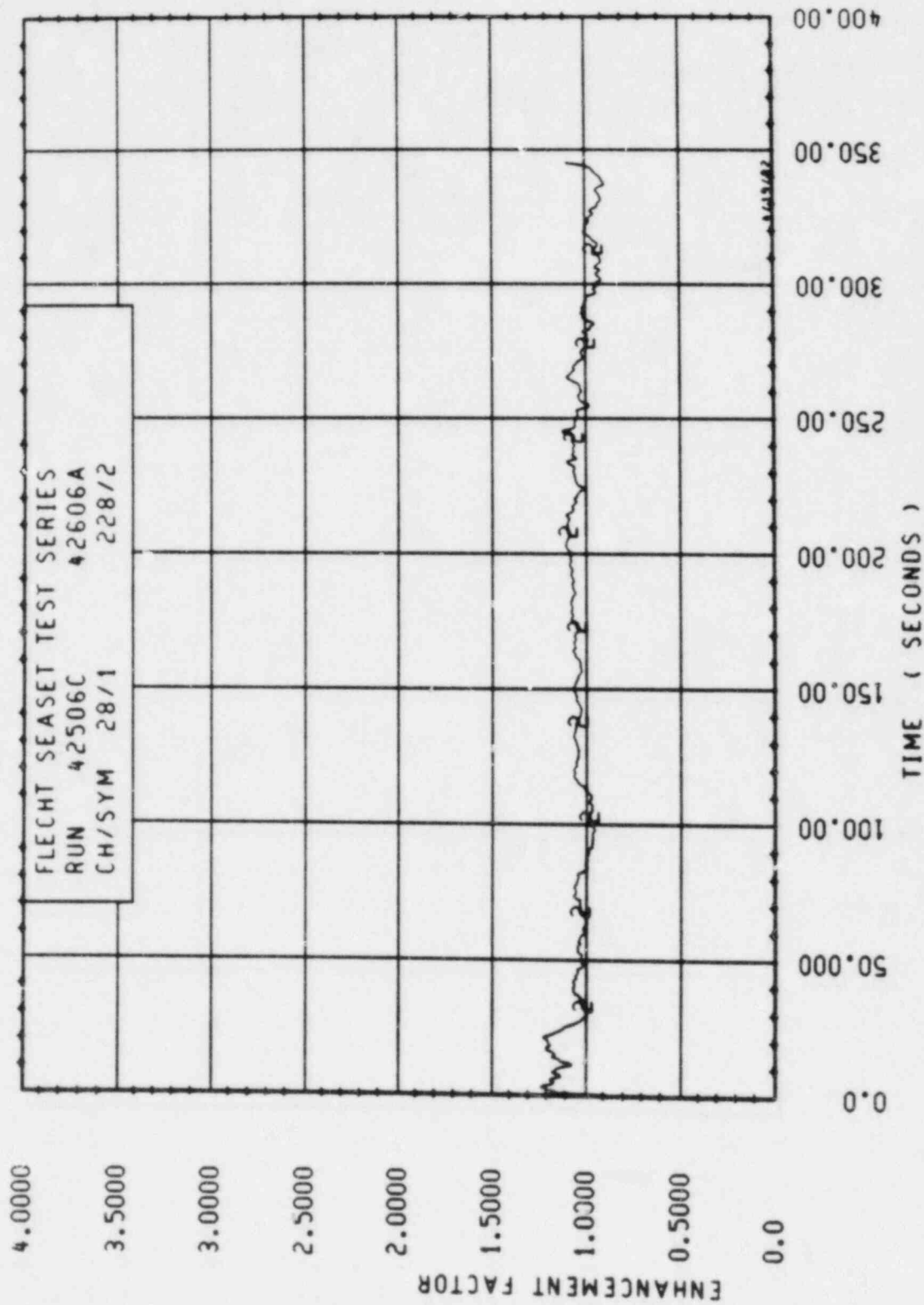


Figure O-33. Enhancement Factor for Run 42506C, Rod 3C, 1.80 m (71 in.) Elevation

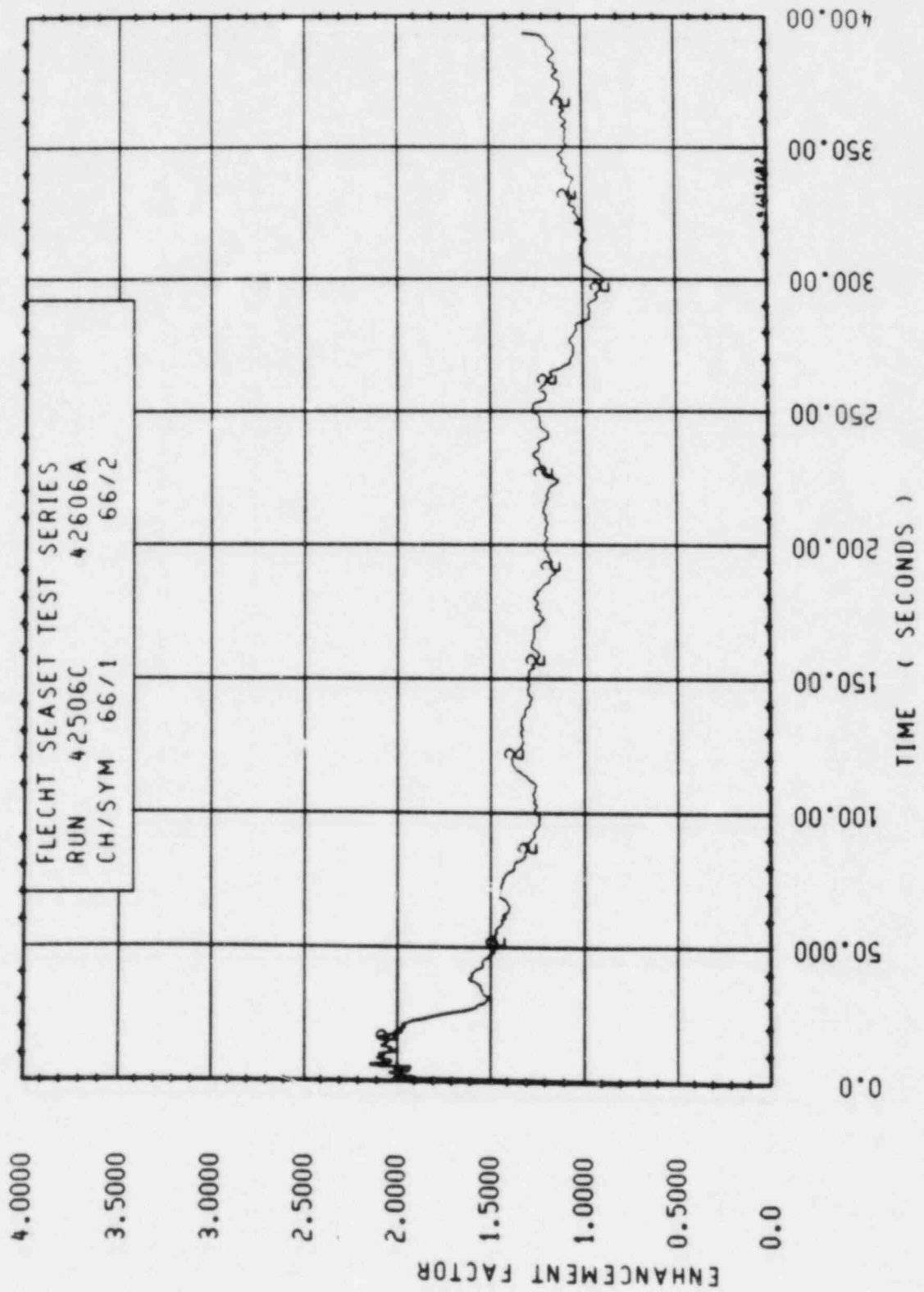


Figure O-34. Enhancement Factor for Run 42506C, Rod 3C, 1.93 m (76.1 in.) Elevation

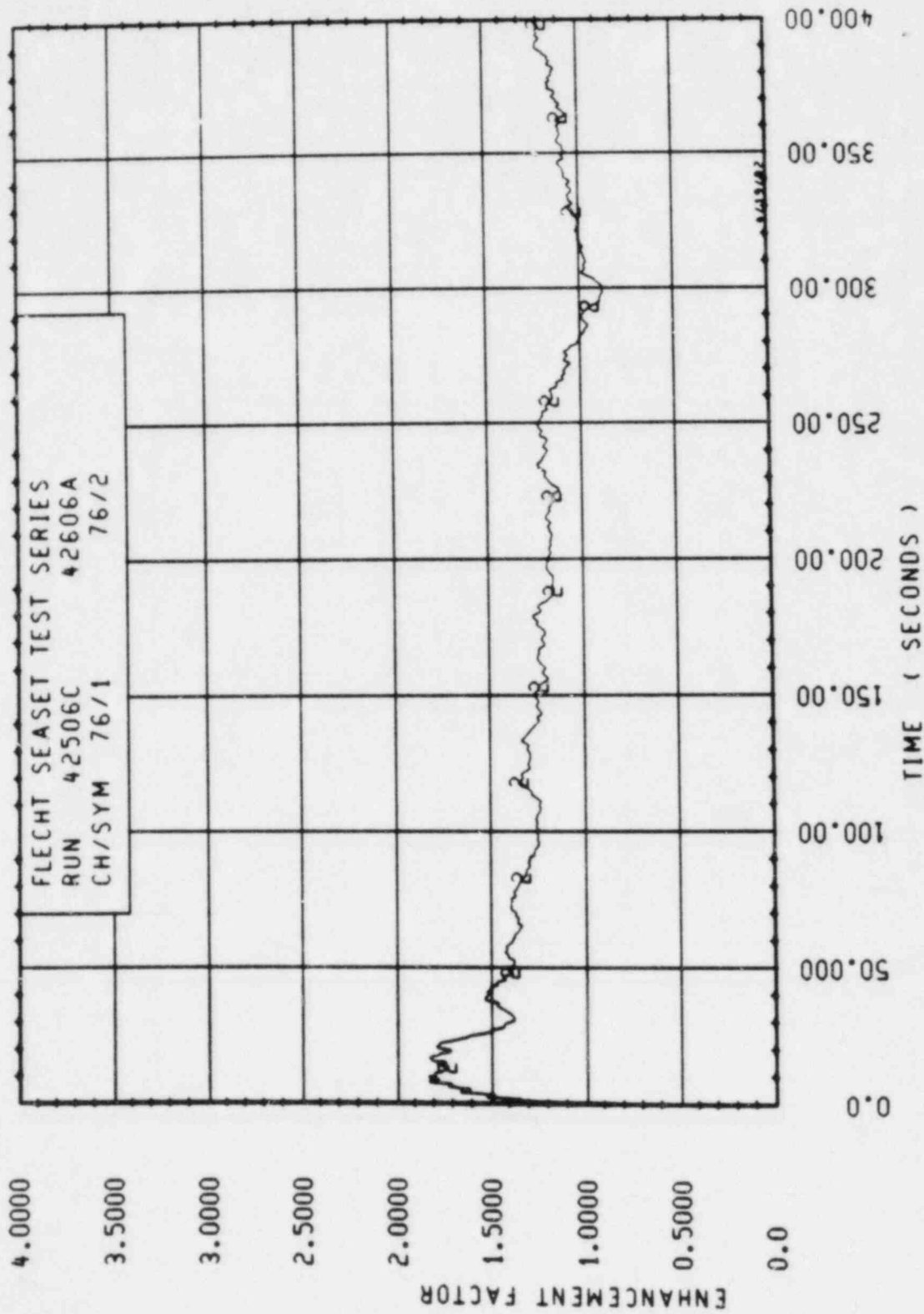


Figure O-35. Enhancement Factor for Run 42506C, Rod 3C, 1.96 m (77 in.) Elevation

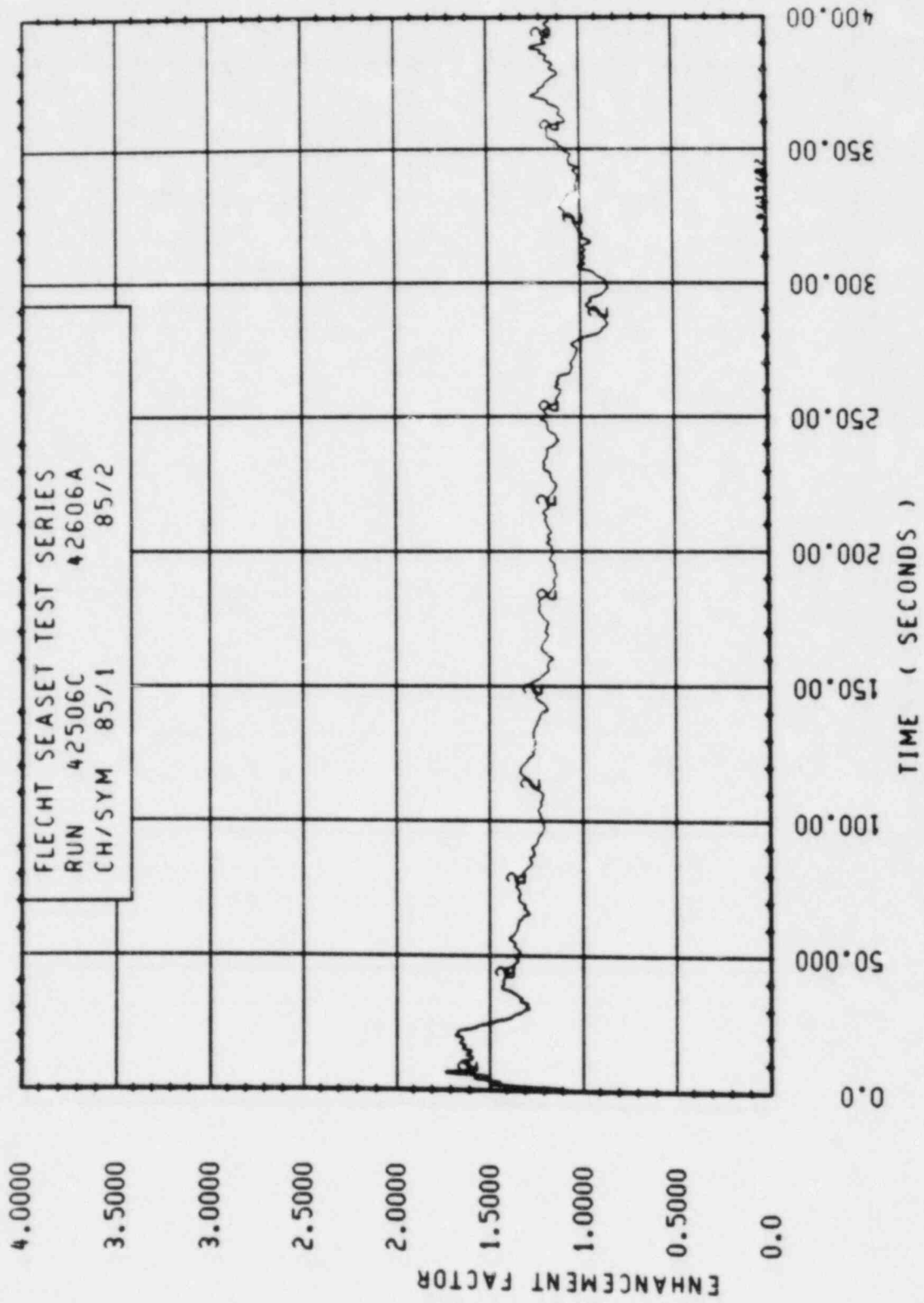


Figure O-36. Enhancement Factor for Run 42506C, Rod 3C, 1.98 m (77.9 in.) Elevation

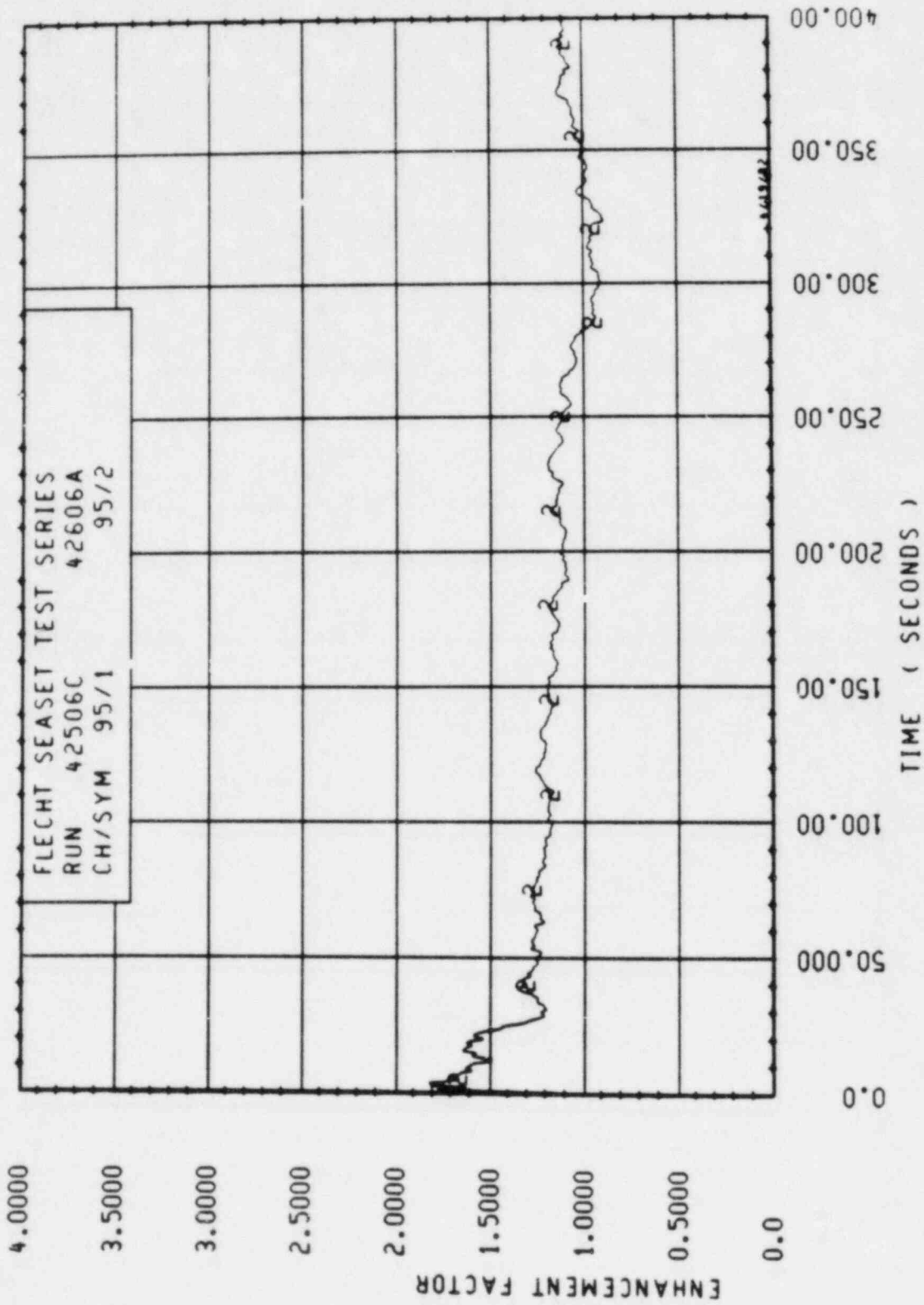


Figure O-37. Enhancement Factor for Run 42506C, Rod 3C, 2.00 m (78.9 in.) Elevation

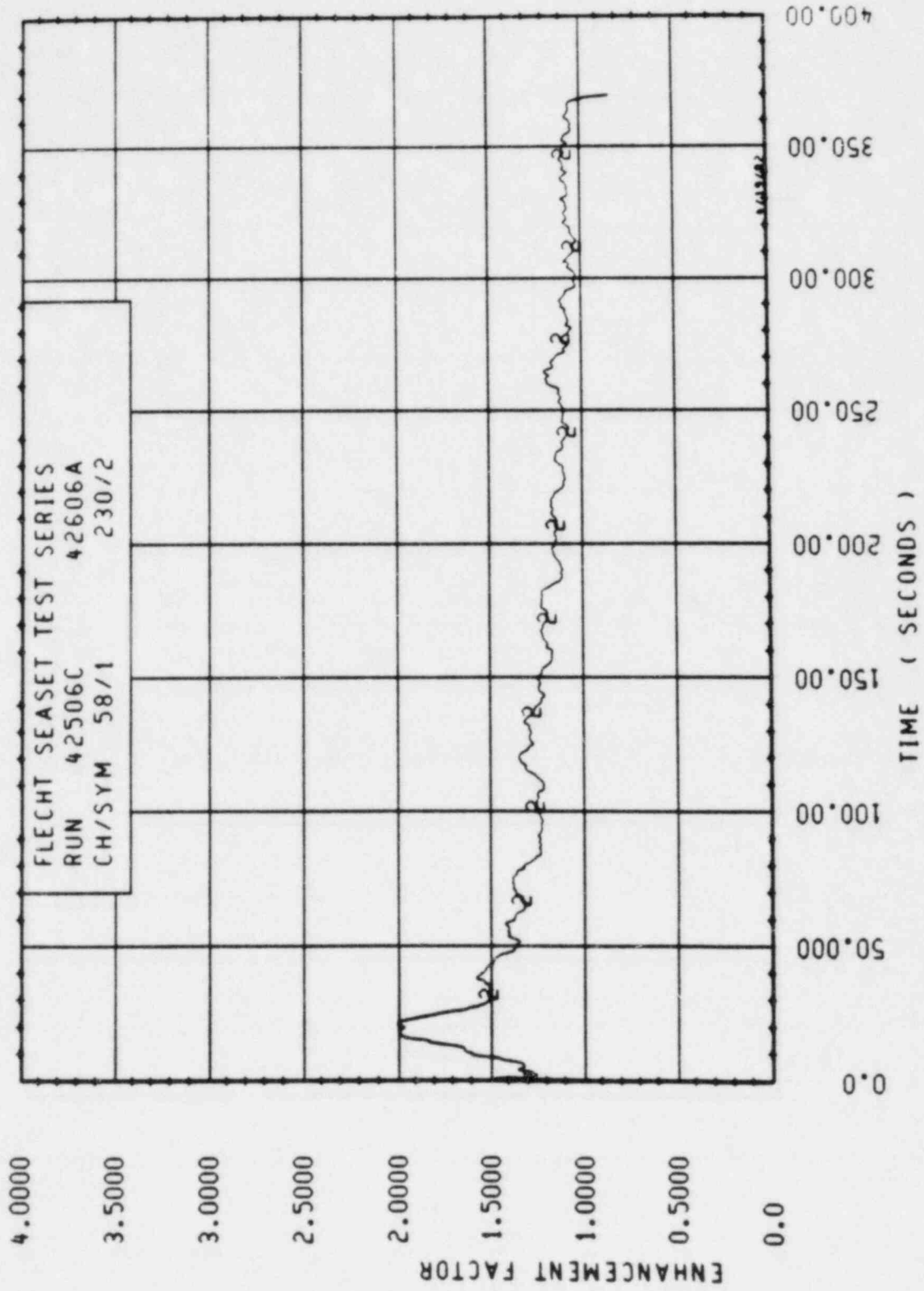


Figure O-38. Enhancement Factor for Run 42506C, Rod 3D, 1.90 m (74.9 in.) Elevation

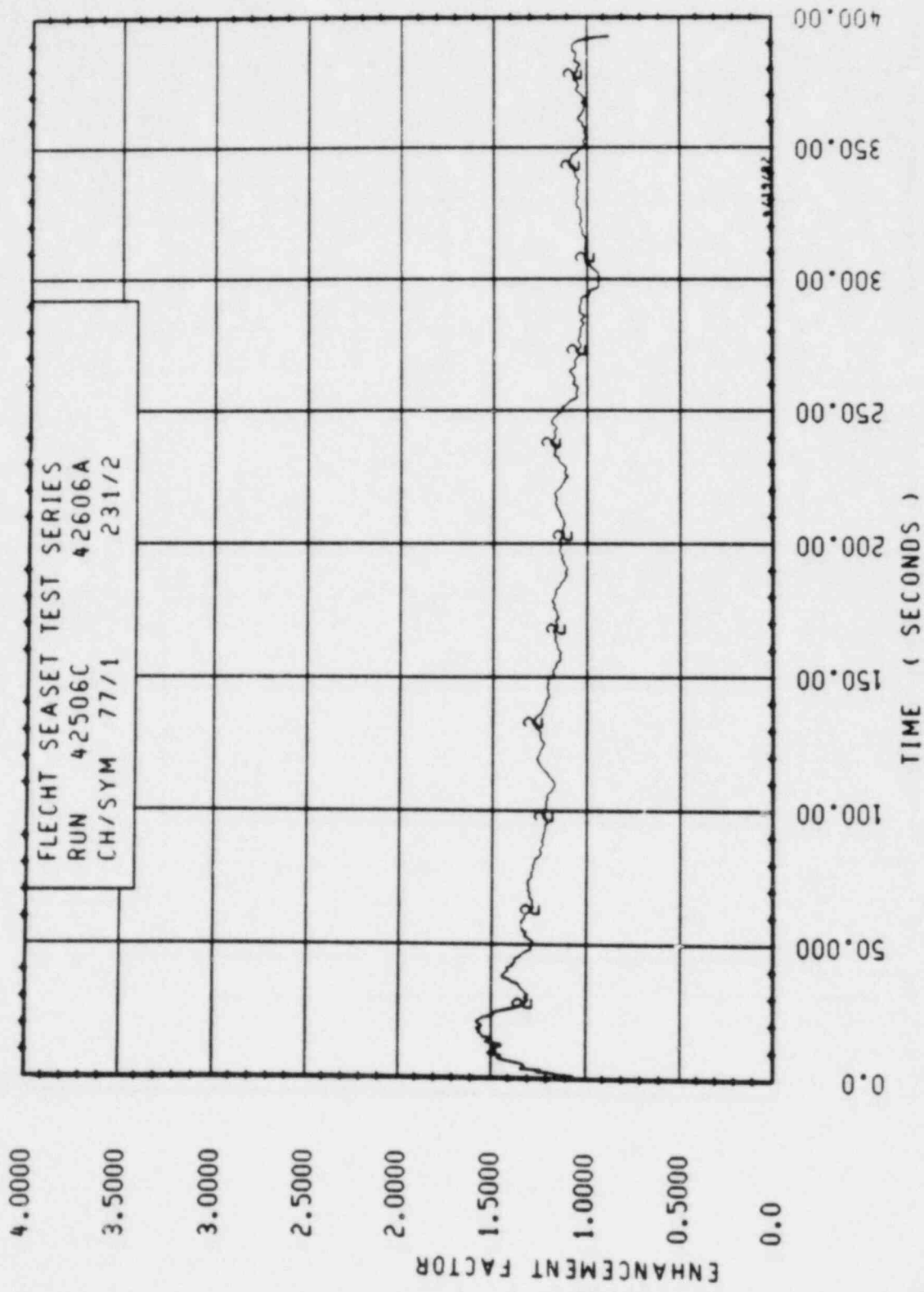


Figure O-39. Enhancement Factor for Run 42506C, Rod 3D, 1.95 m (76.7 in.) Elevation

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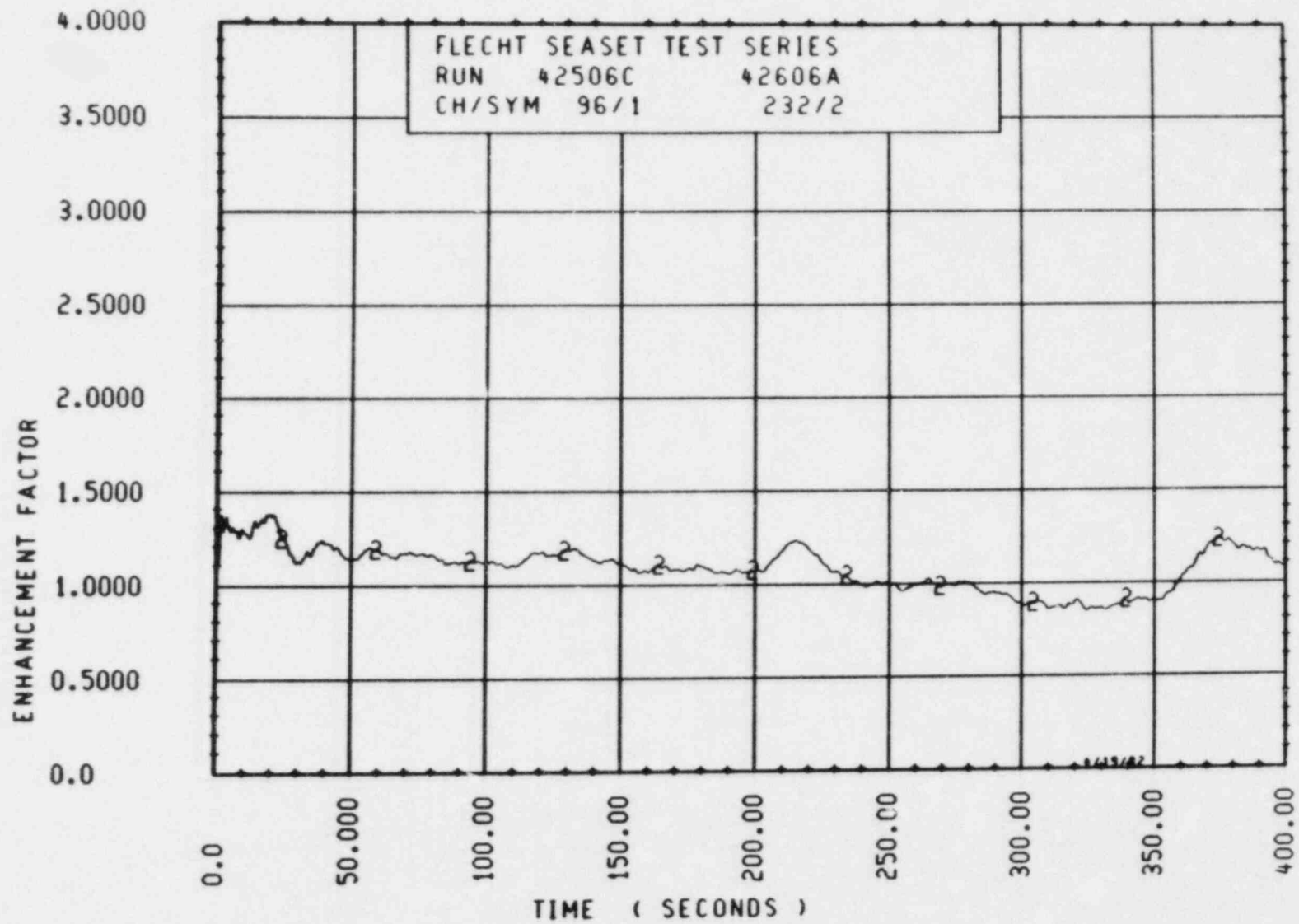


Figure O-40. Enhancement Factor for Run 42506C, Rod 3D, 2.00 m (78.9 in.) Elevation

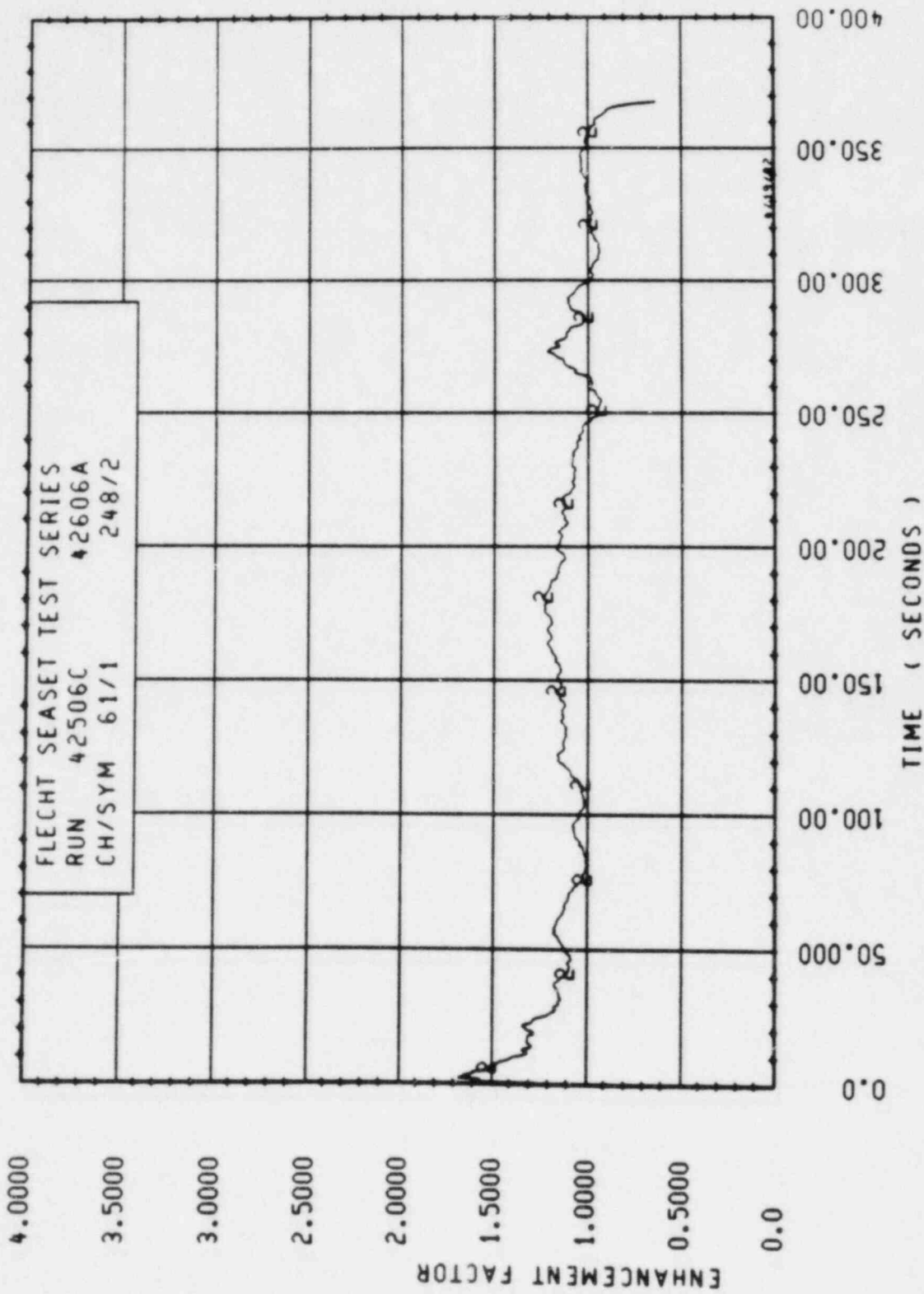


Figure O-41. Enhancement Factor for Run 42506C, Rod 5C, 1.98 m (74.1 in.) Elevation

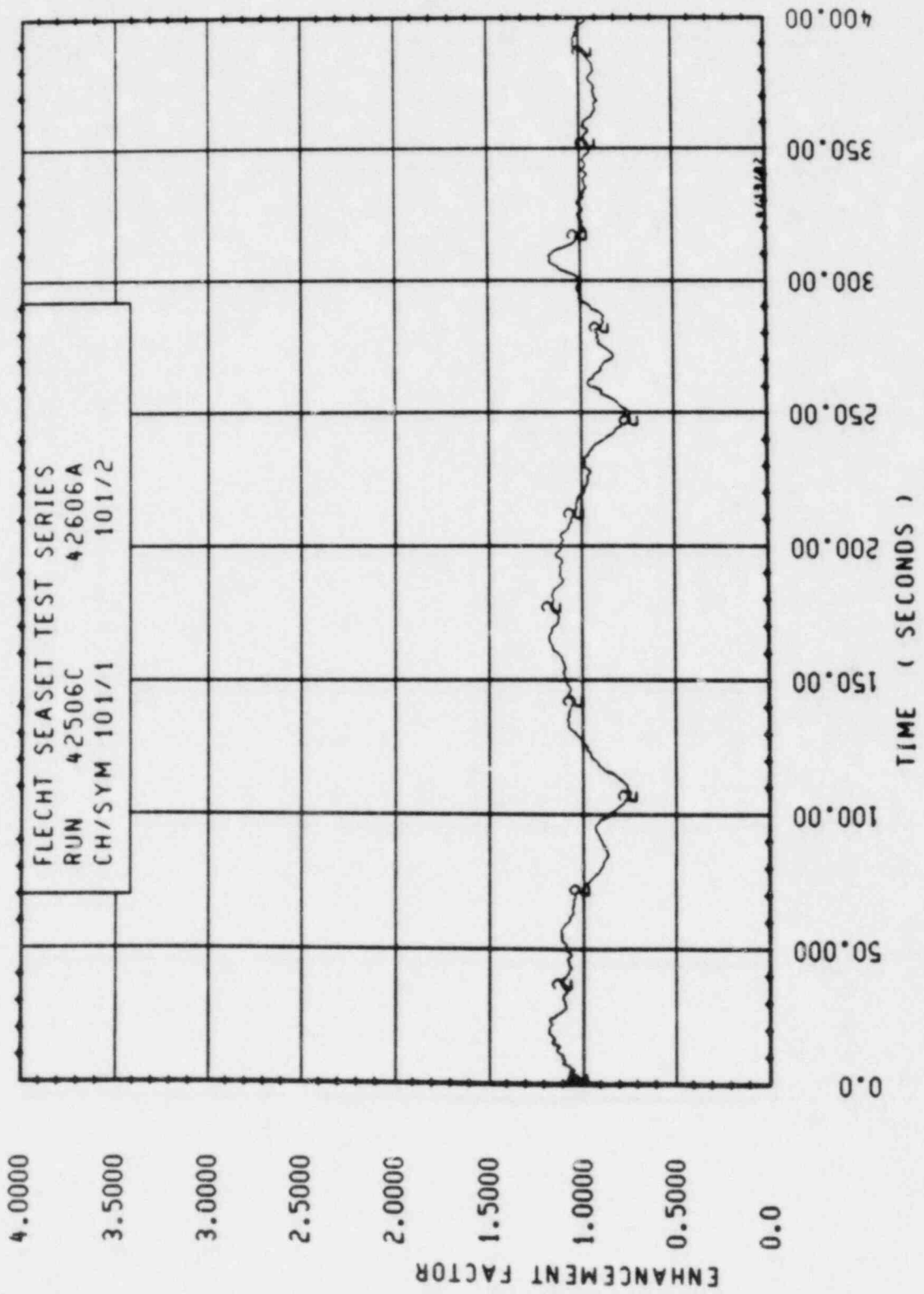


Figure O-42. Enhancement Factor for P.un 42506C, Rod 5C, 1.98 m (78 in.) Elevation

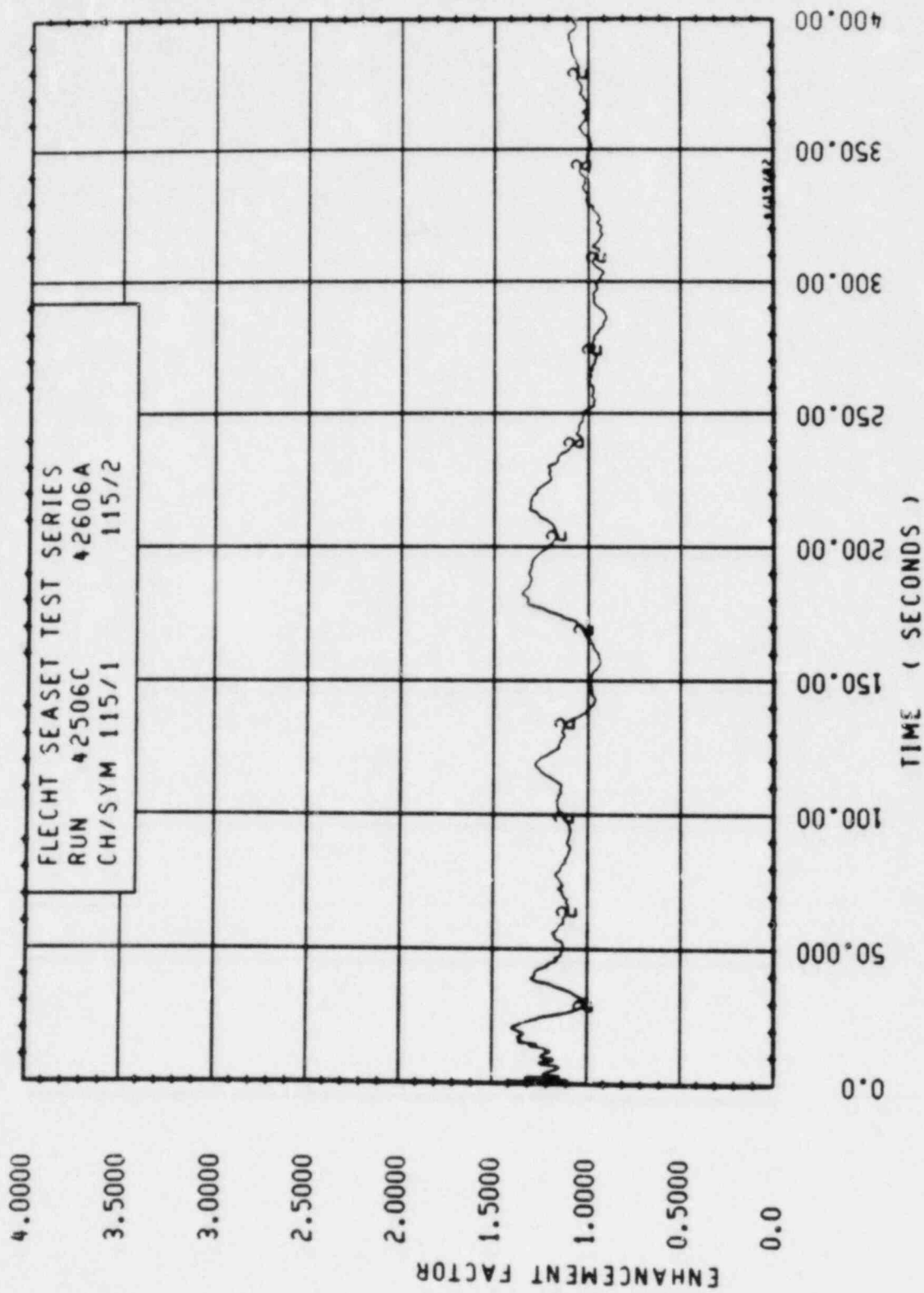


Figure O-43. Enhancement Factor for Run 42506C, Rod 3D, 2.13 m (84 in.) Elevation

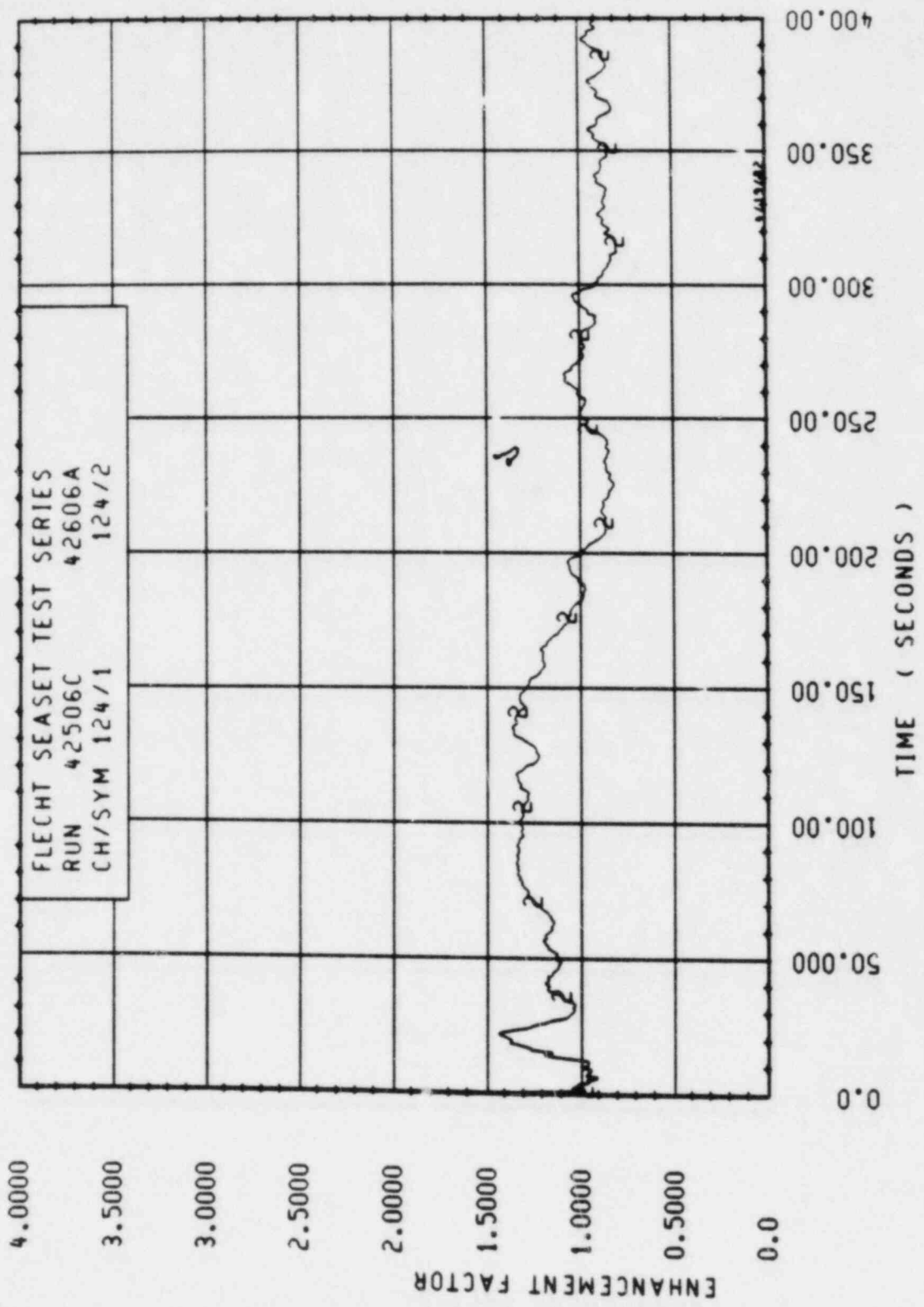


Figure O-44. Enhancement Factor for Run 42506C, Rod 3B, 2.29 m (90 in.) Elevation

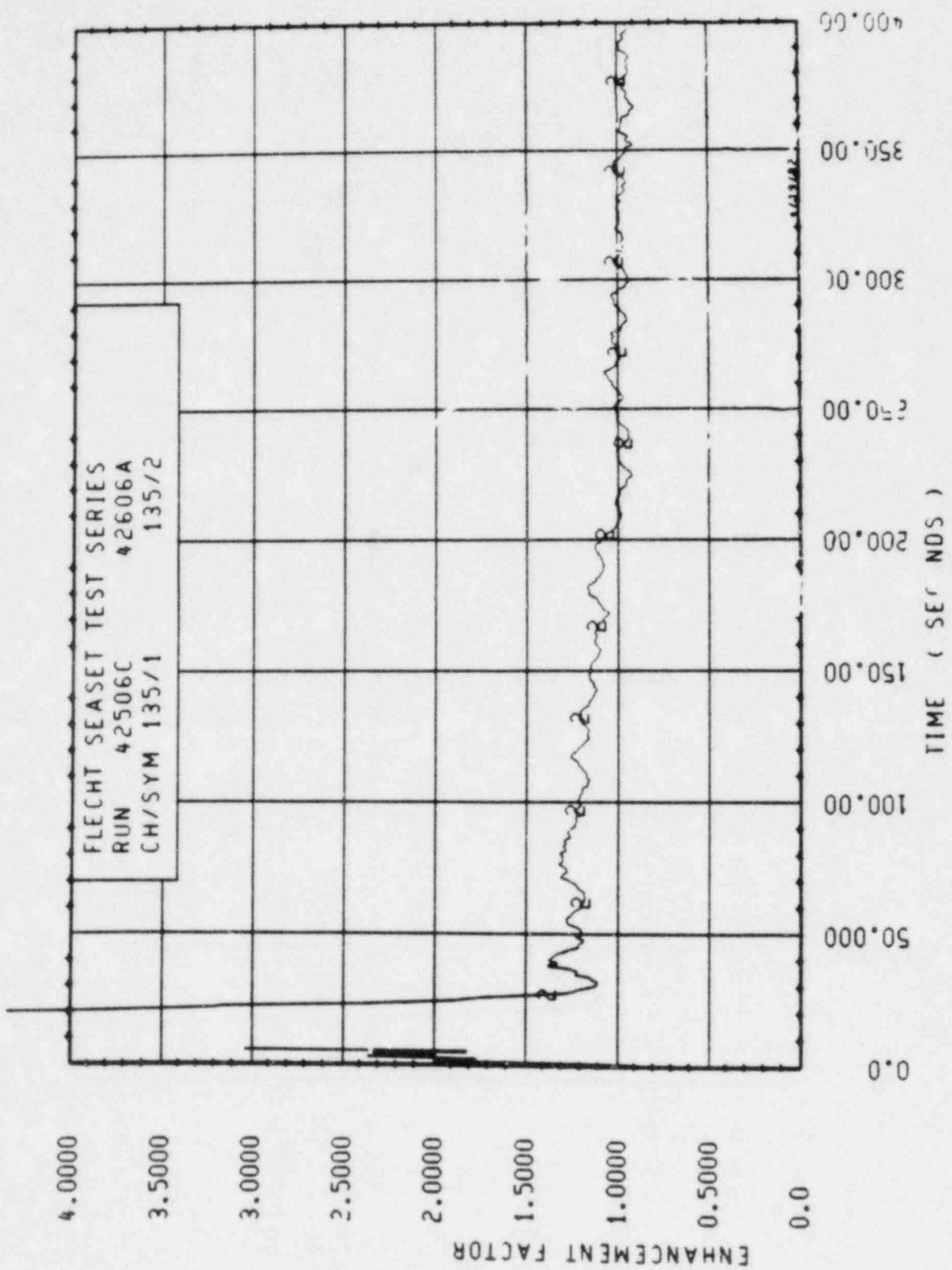


Figure O-45. Enhancement Factor for Run 42506C, Rod 3B, 2.44 m (96 in.) Elevation

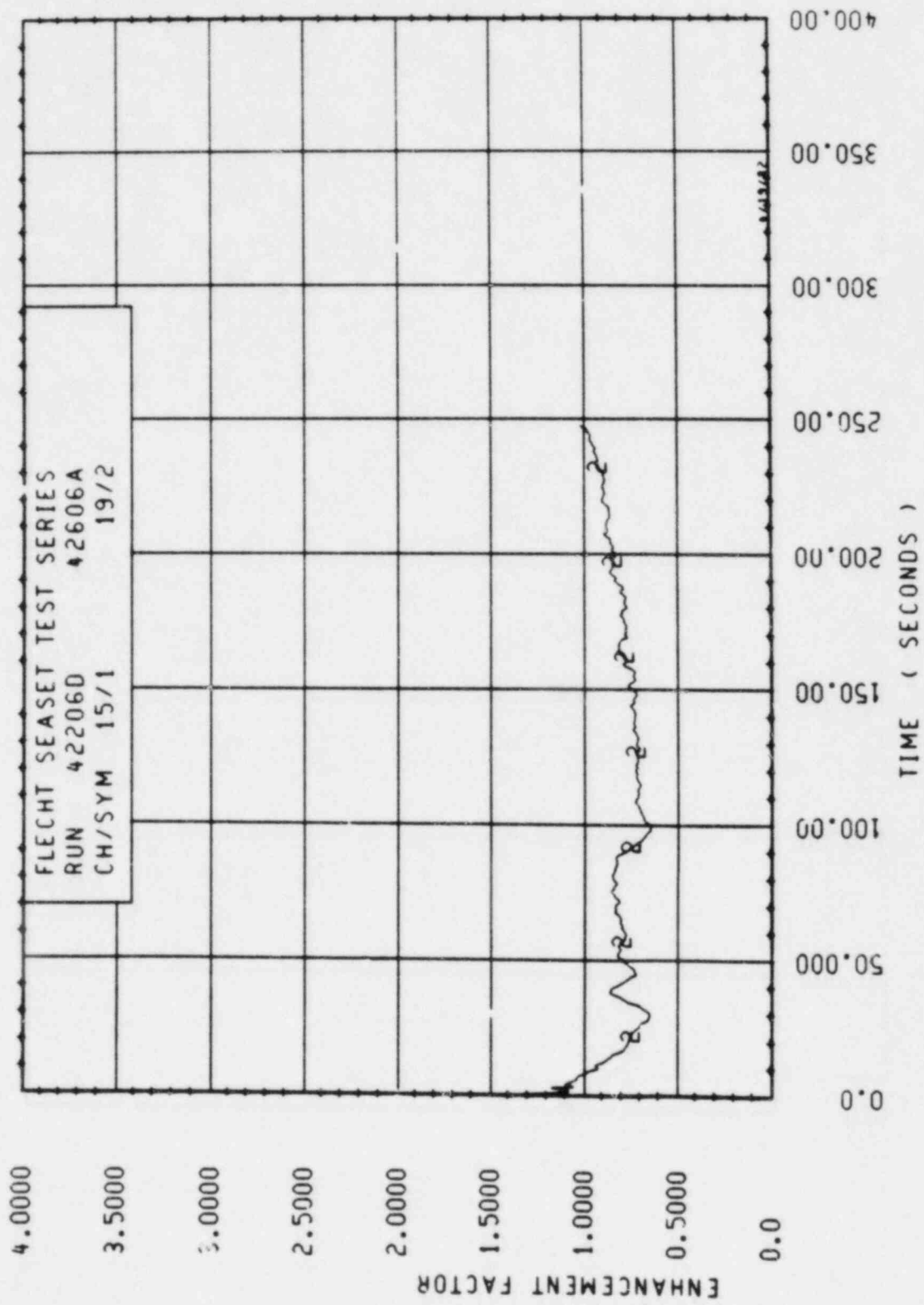


Figure O-46. Enhancement Factor for Run 42206D, Rod 4C, 1.52 m (60 in.) Elevation

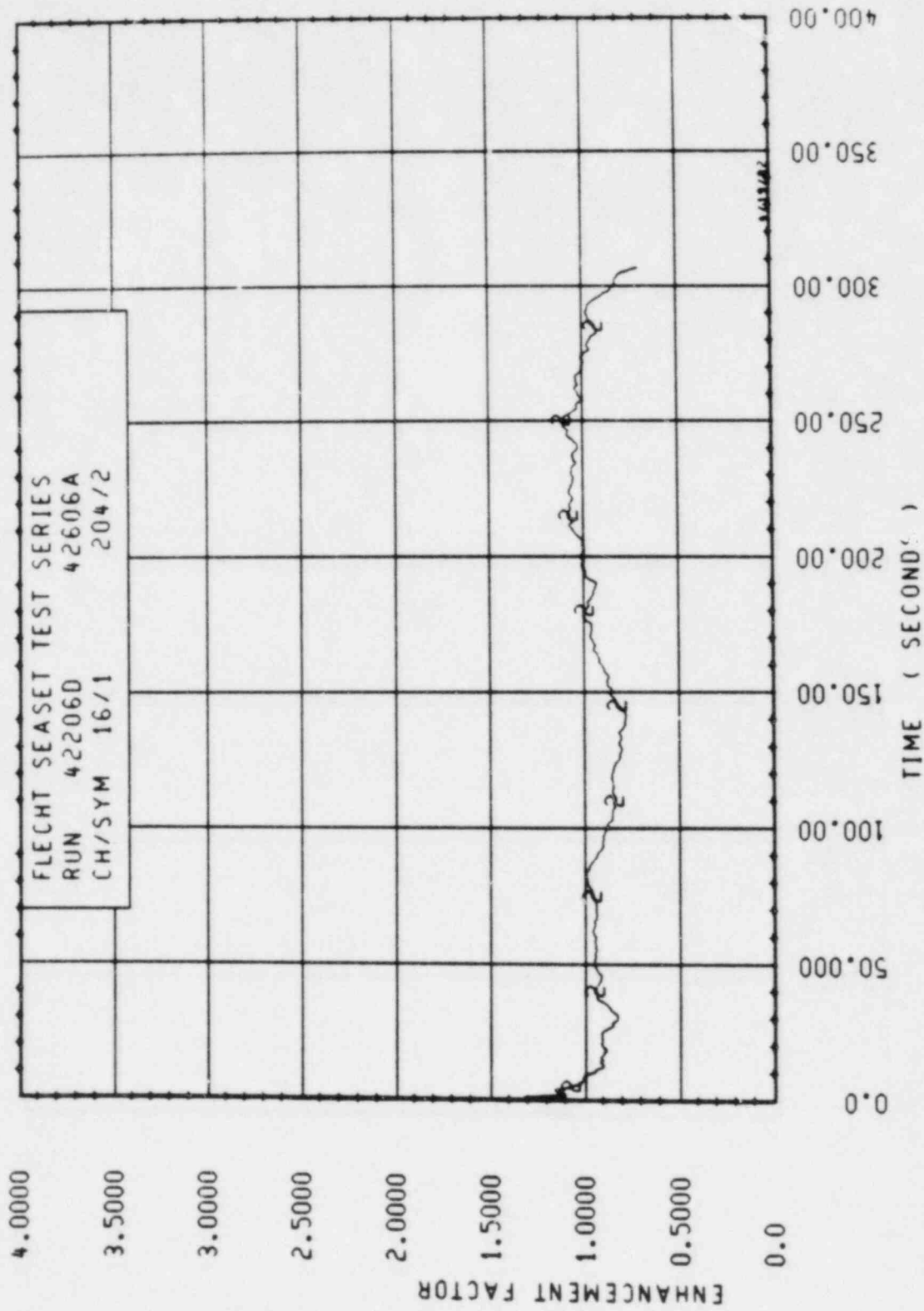


Figure O-47. Enhancement Factor for Run 42206D, Rod 2A, 1.72 m (67.8 in.) Elevation

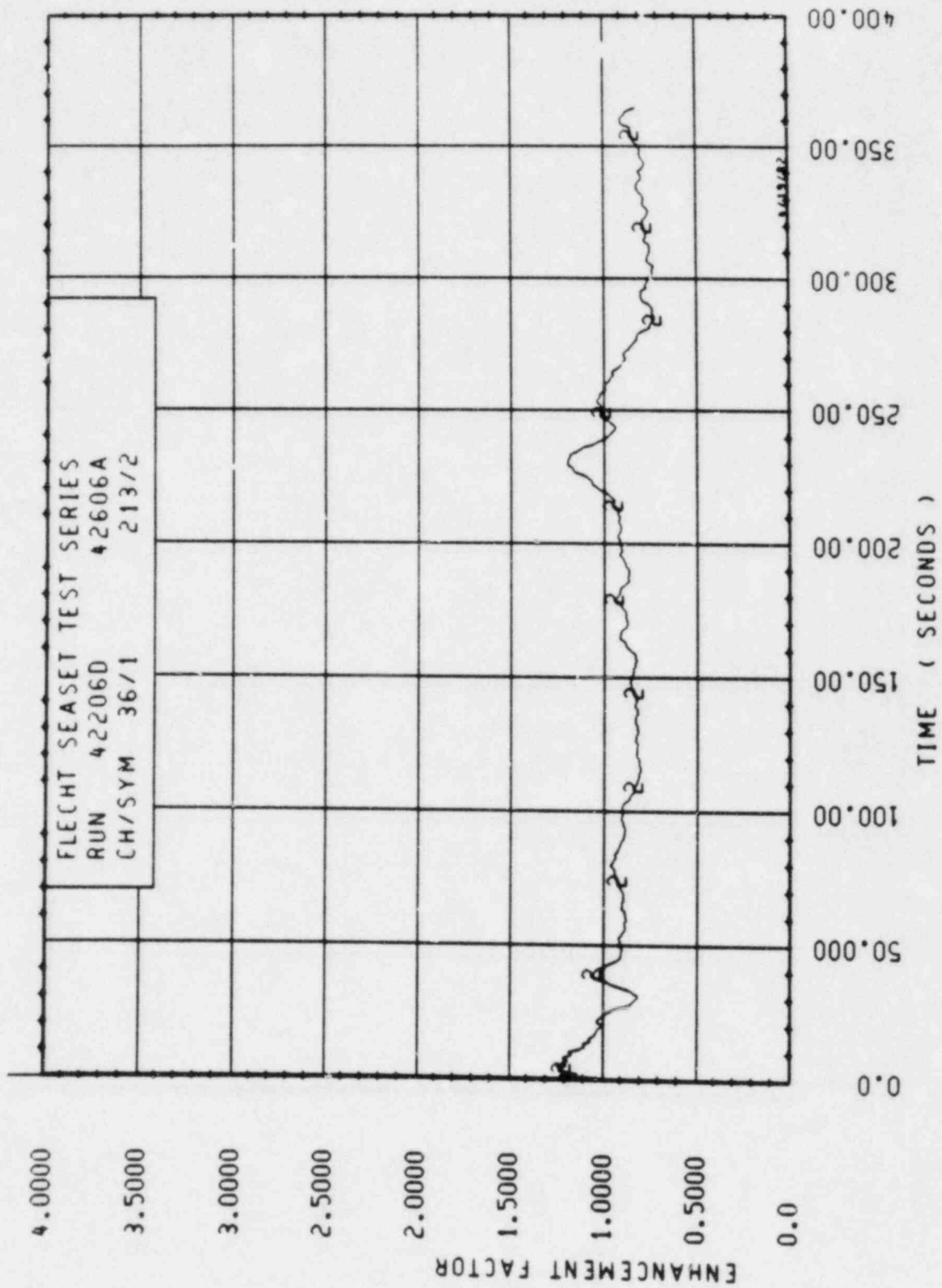


Figure O-48. Enhancement Factor for Run 42206D, Rod 2D, 1.84 m (72.4 in.) Elevation

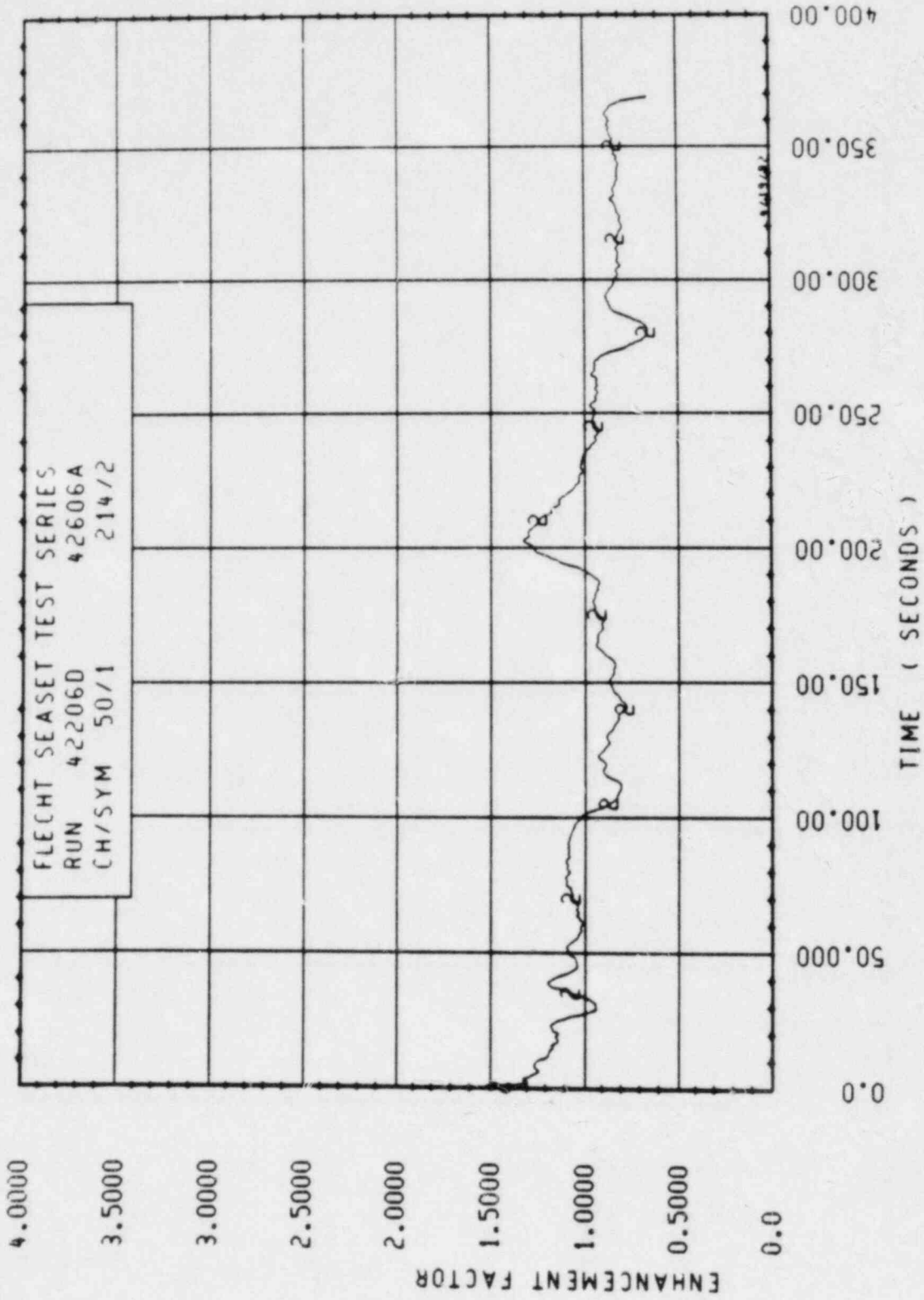


Figure O-49. Enhancement Factor for Run 42206D, Rod 2D, 1.89 m (74.4 in.) Elevation

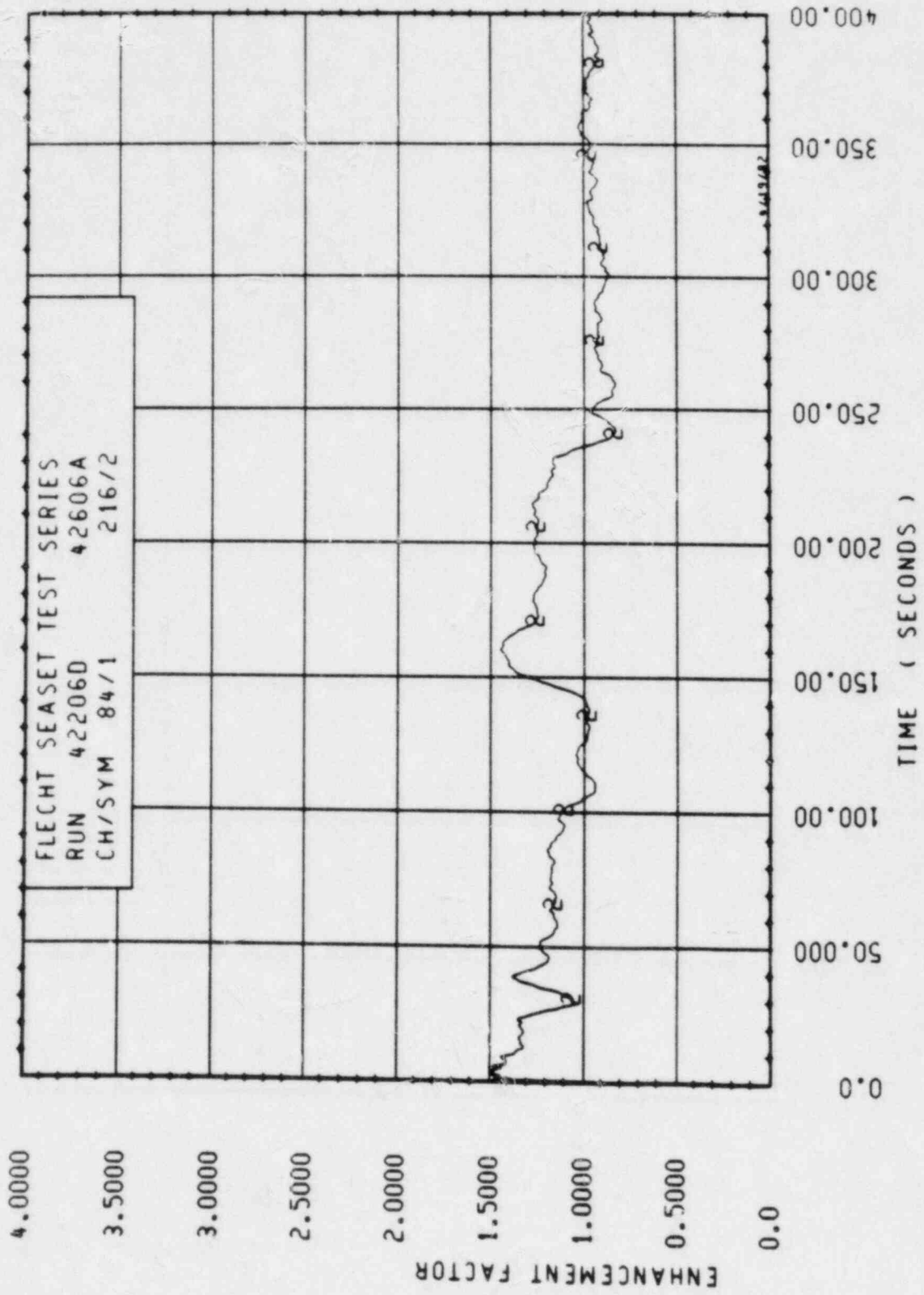


Figure O-50. Enhancement Factor for Run 42206D, Rod 2D, 1.97 m (77.4 in.) Elevation

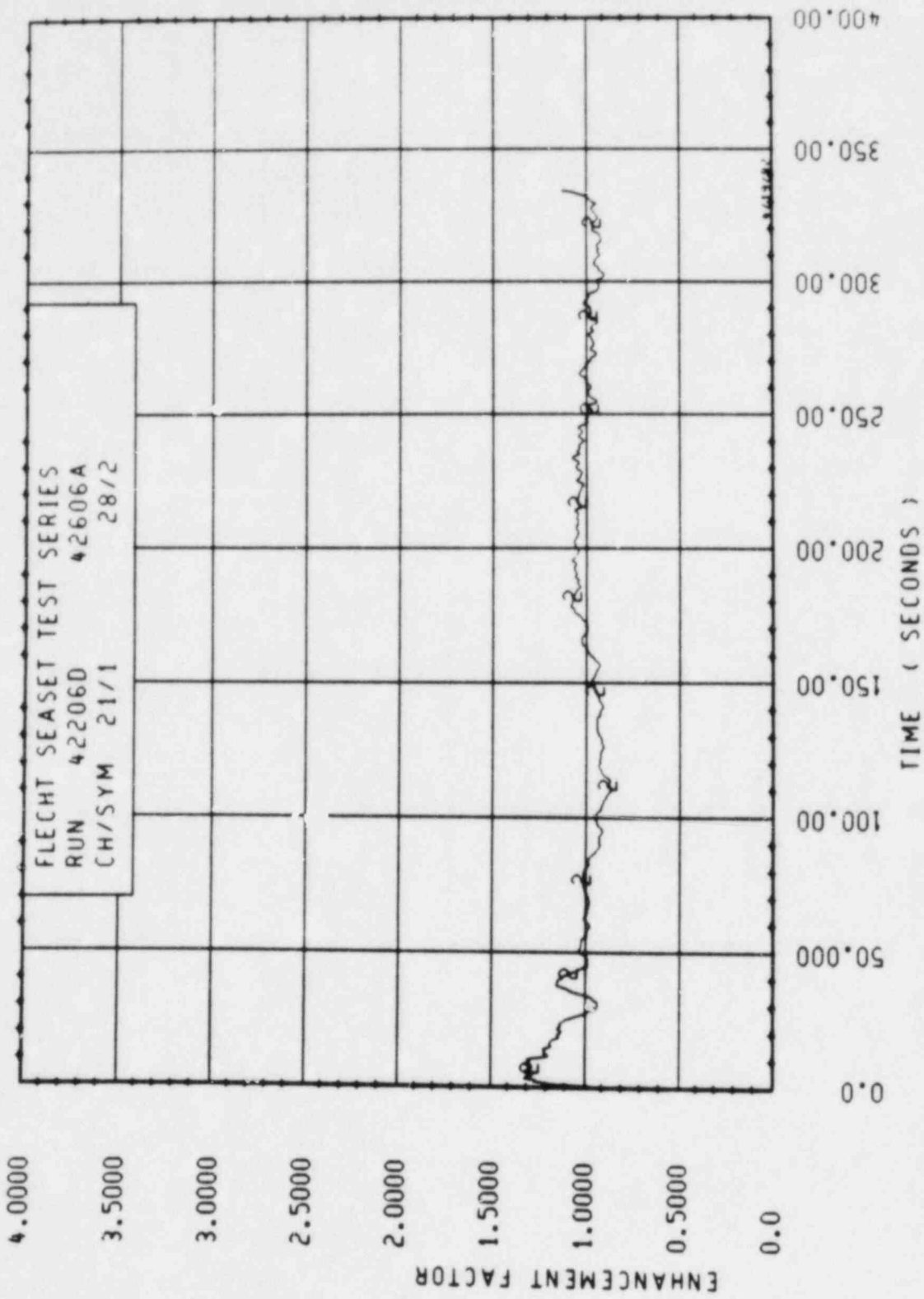


Figure O-51. Enhancement Factor for Run 42206D, Rod 3C, 1.79 m (70.6 in.) Elevation

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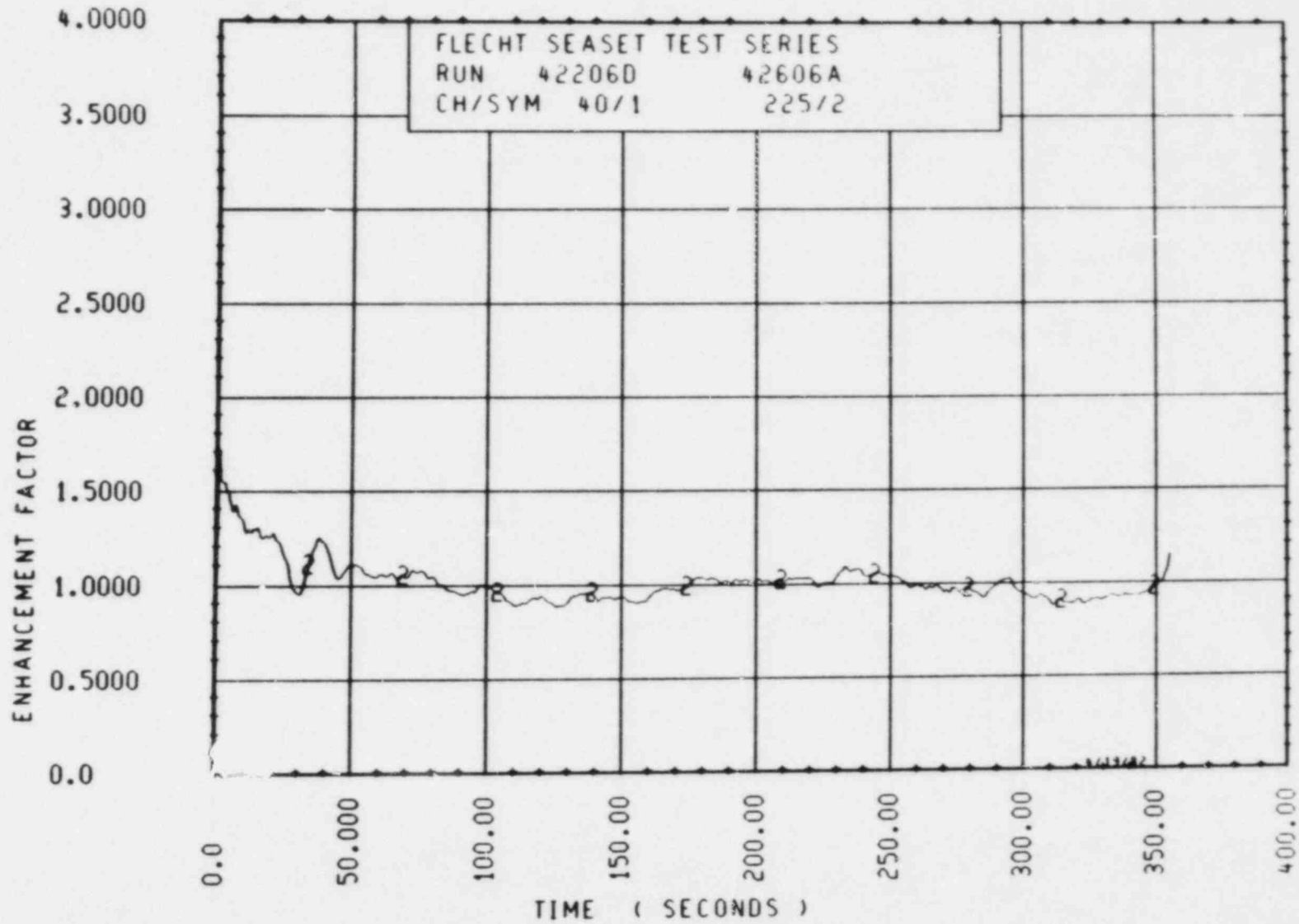


Figure O-52. Enhancement Factor for Run 42206D, Rod 3C, 1.84 m (72.6 in.) Elevation

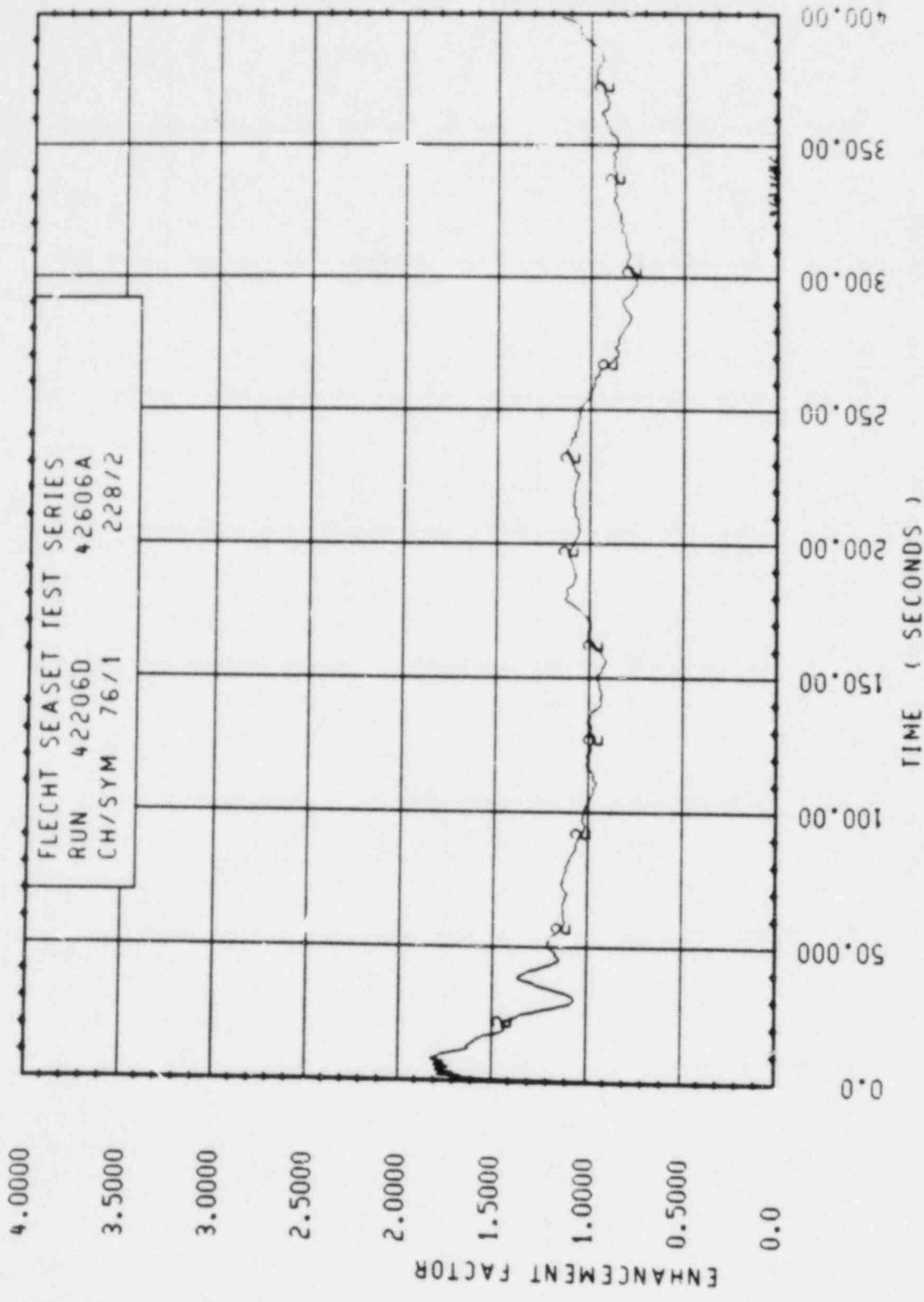


Figure O-53. Enhancement Factor for Run 42206D, Rod 3C, 1.95 m (76.8 in.) Elevation

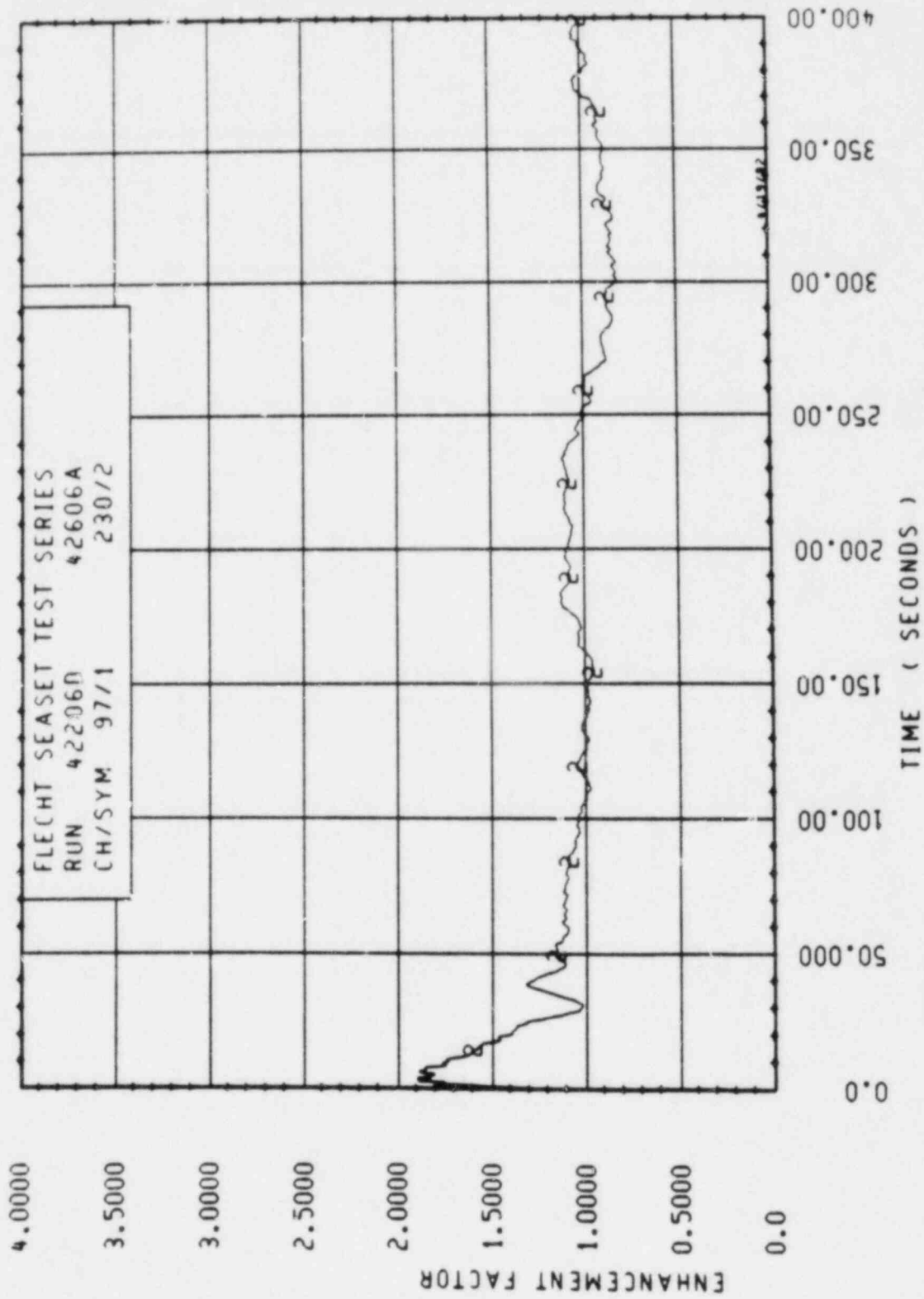


Figure O-54. Enhancement Factor for Run 42206D, Rod 3C, 2.00 m (78.8 in.) Elevation

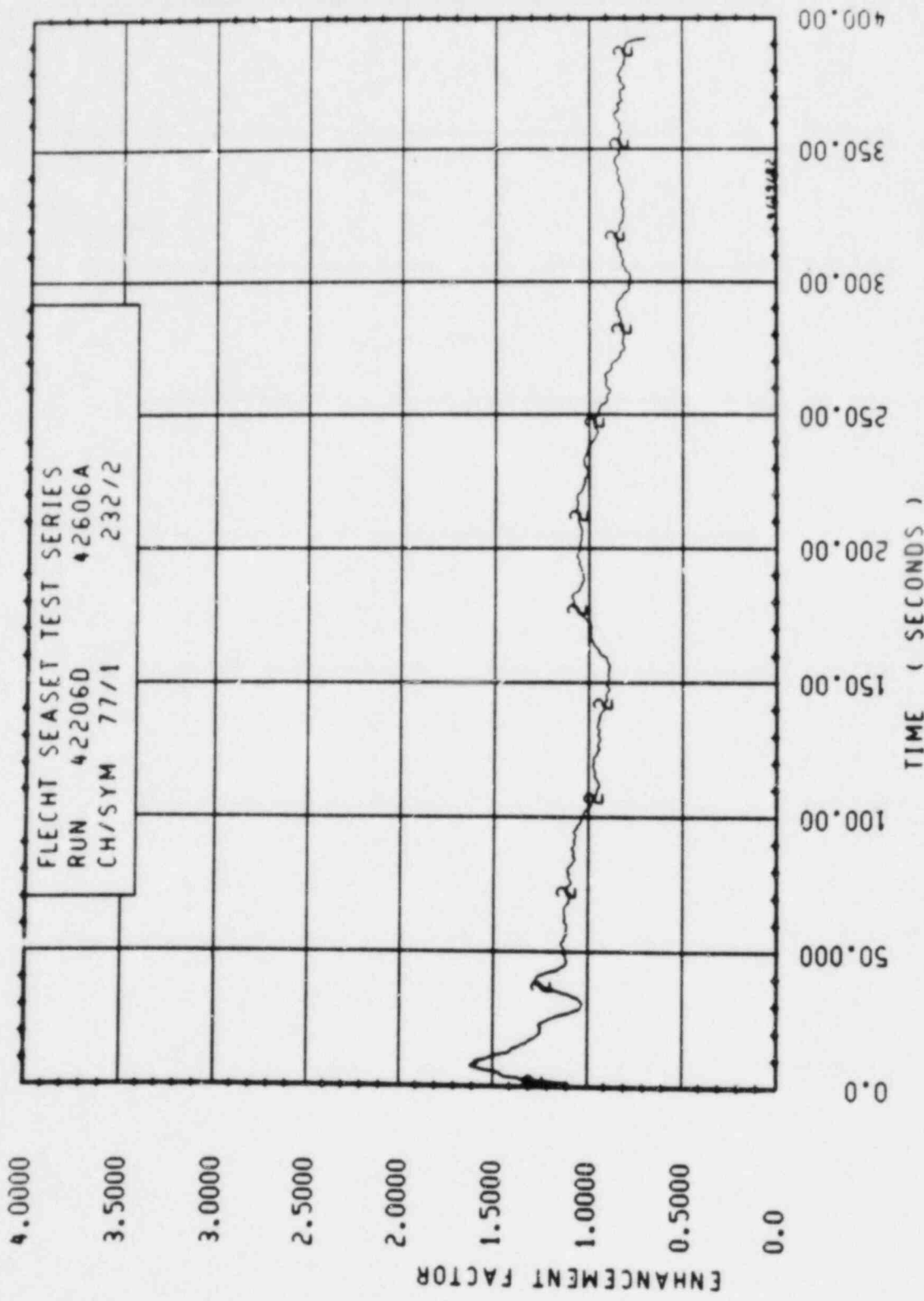


Figure O-55. Enhancement Factor for Run 42206D, Rod 3D, 1.94 m (76.4 in.) Elevation

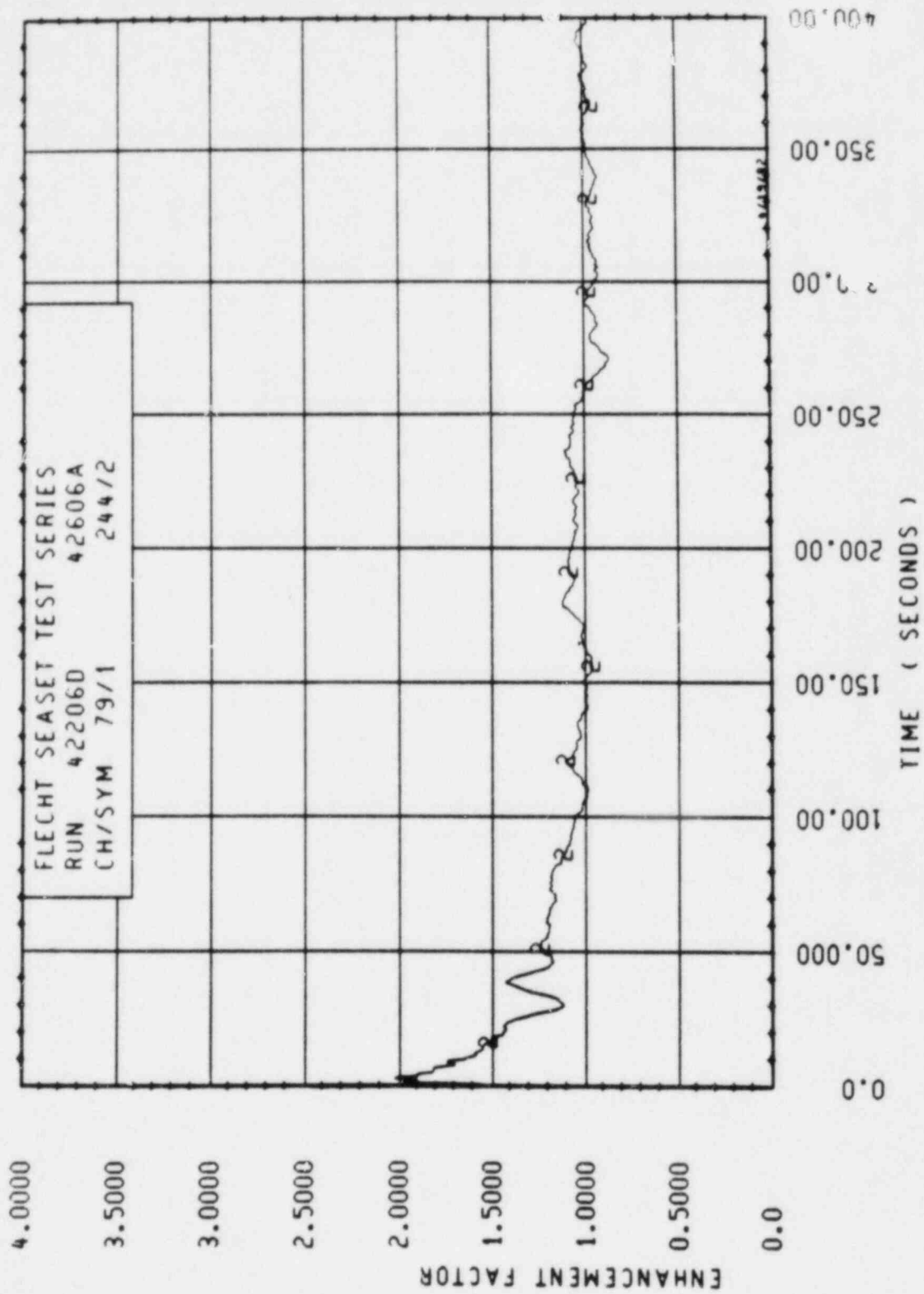


Figure O-56. Enhancement Factor for Run 42206D, Rod 4C, 1.95 m (76.9 in.) Elevation

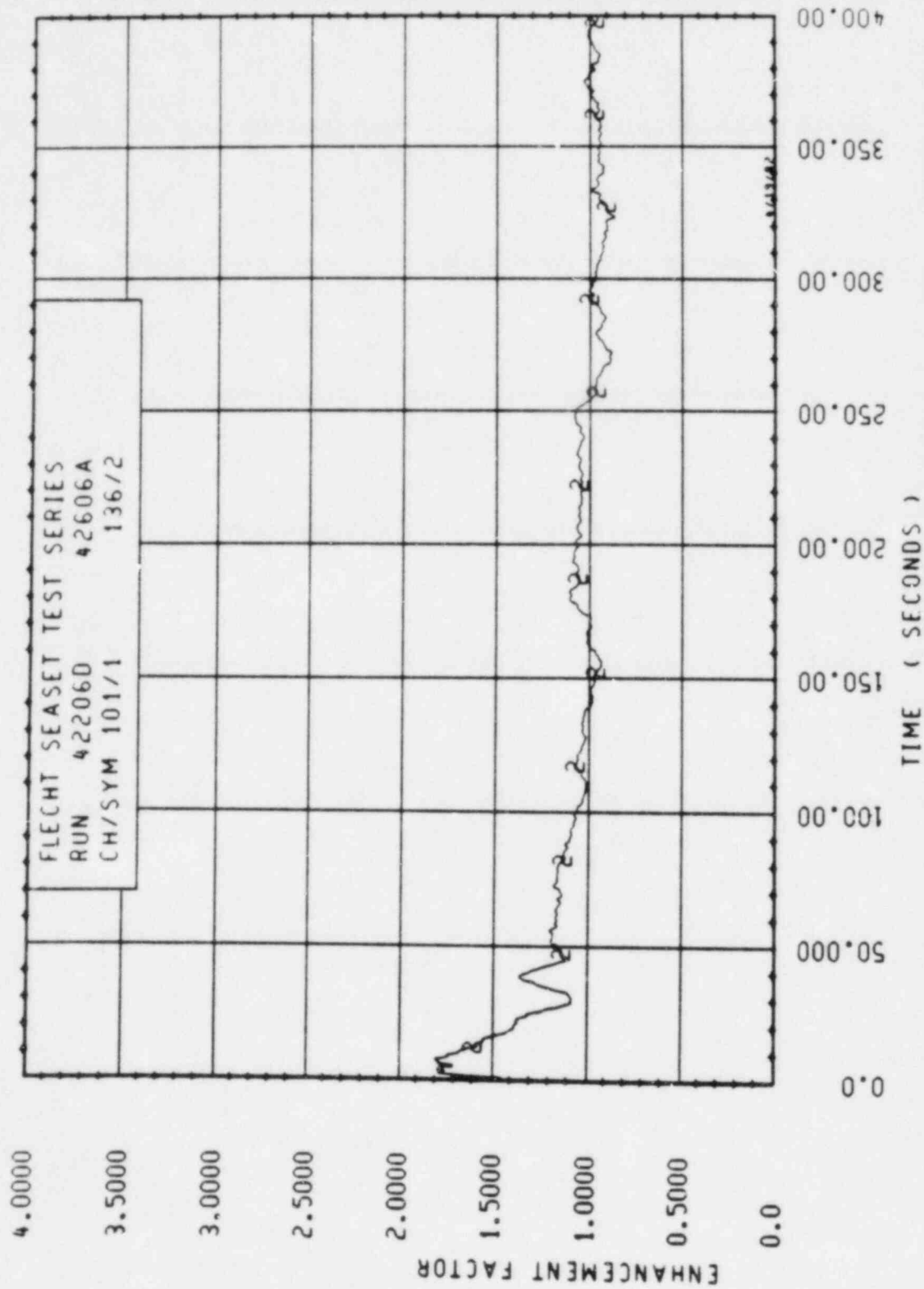


Figure O-57. Enhancement Factor for Run 42206D, Rod 4C, 2.00 m (78.9 in.) Elevation

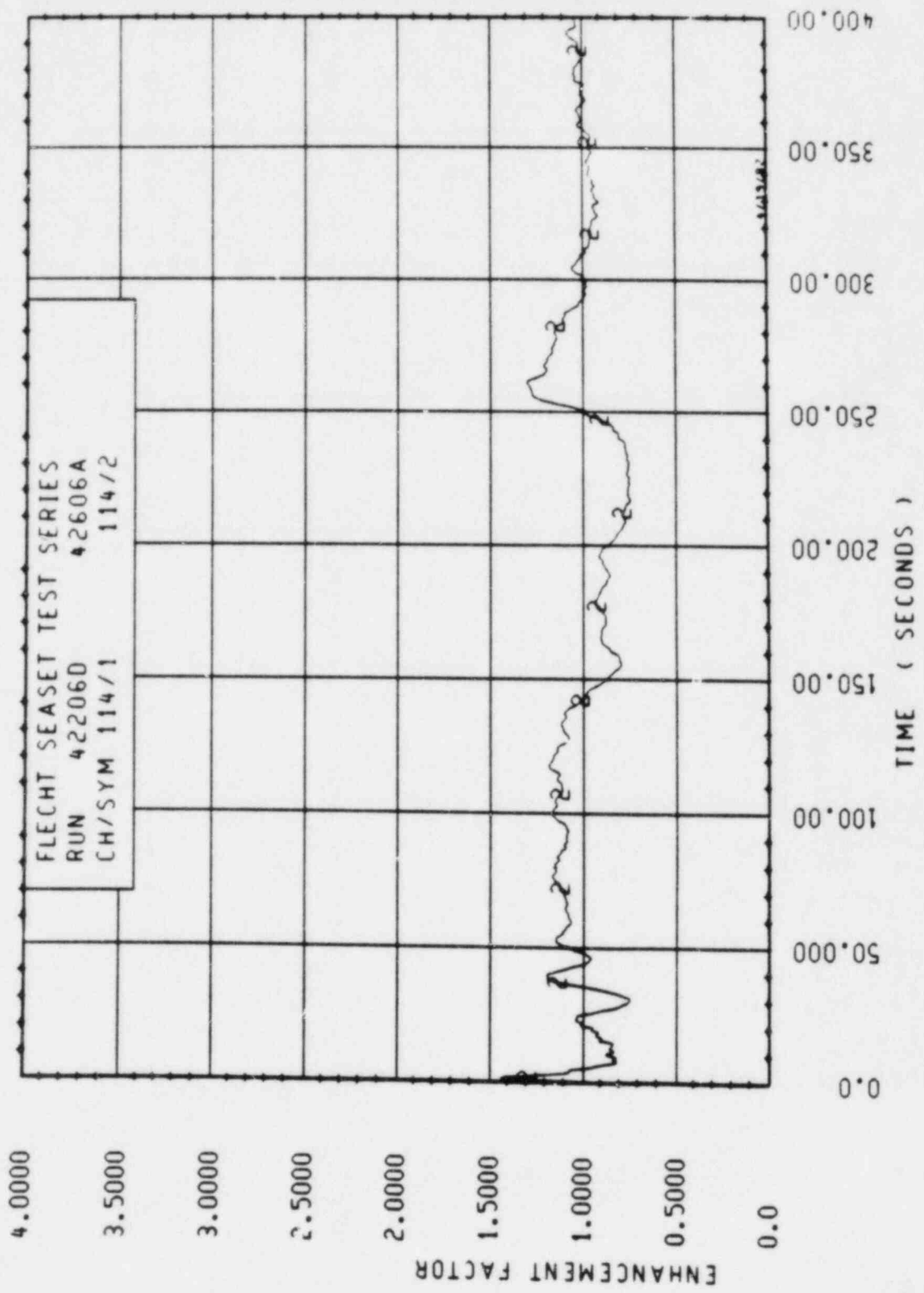


Figure O-58. Enhancement Factor for Run 42206D, Rod 3B, 2.13 m (84 in.) Elevation

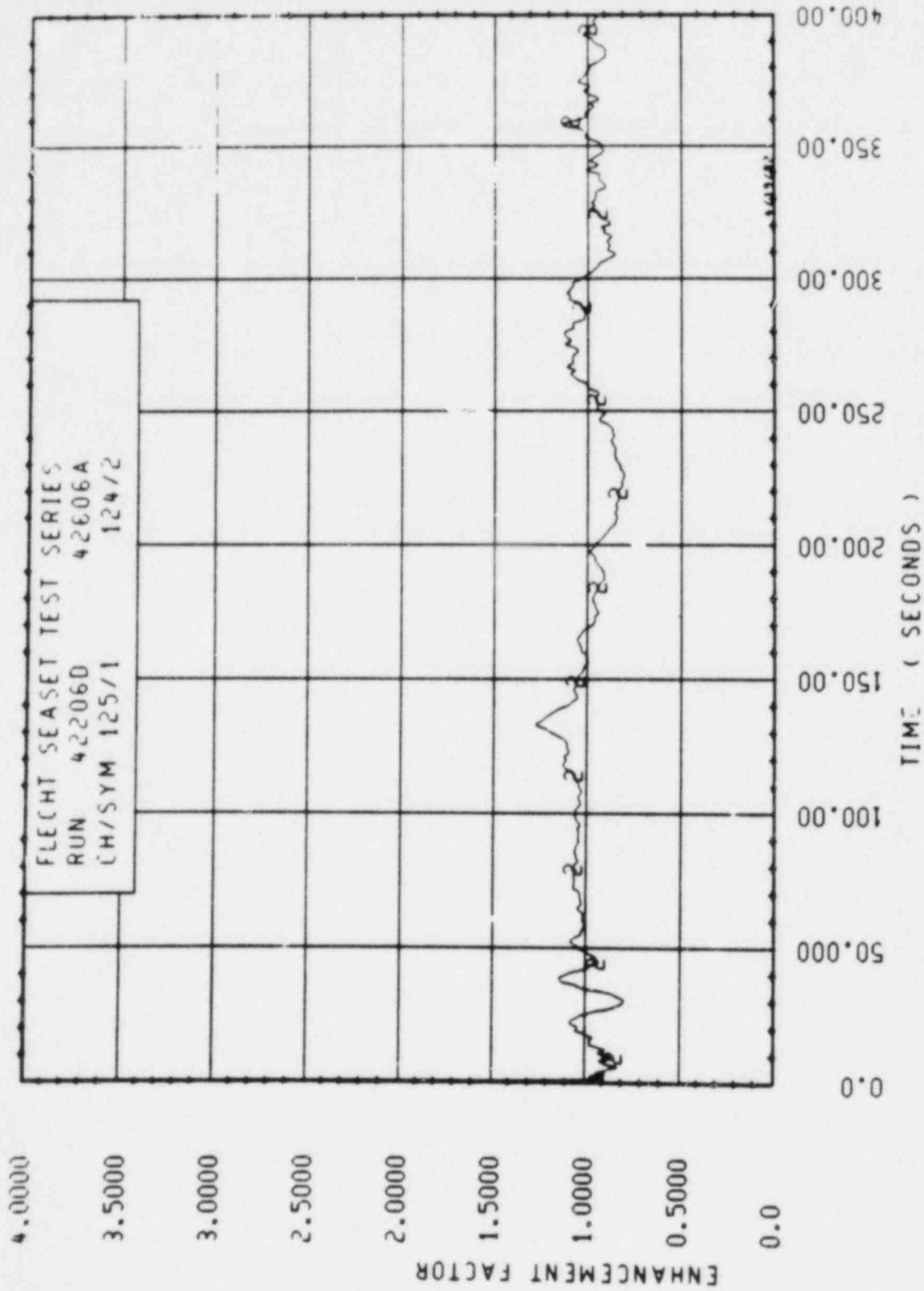


Figure O-59. Enhancement Factor for Run 42206D, Rod 3B, 2.29 m (90 in.) Elevation

I9-O

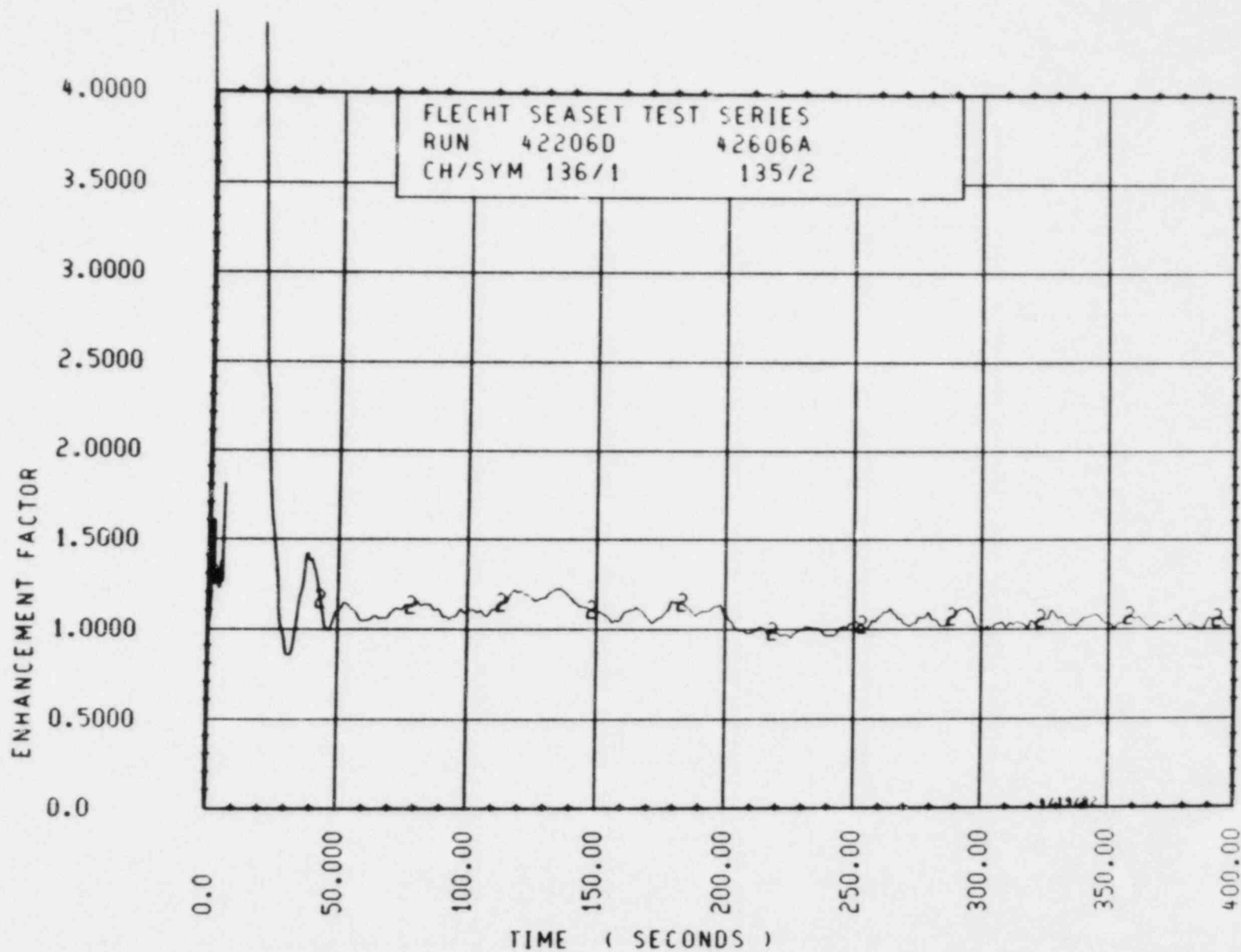


Figure O-60. Enhancement Factor for Run 42206D, Rod 3B, 2.44 m (96 in.) Elevation

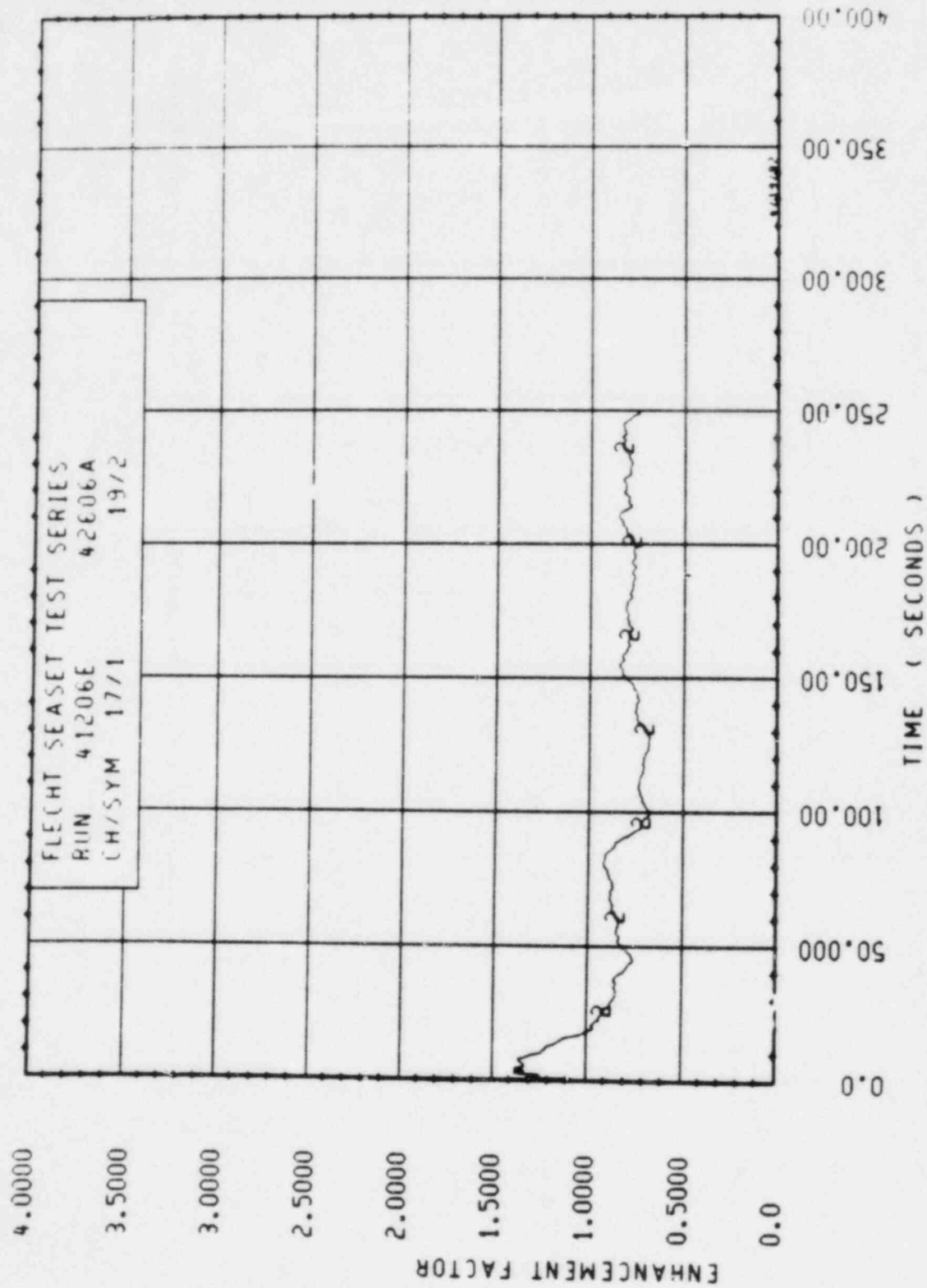


Figure O-61. Enhancement Factor for Run 41206E, Rod 4C, 1.52 m (60 in.) Elevation

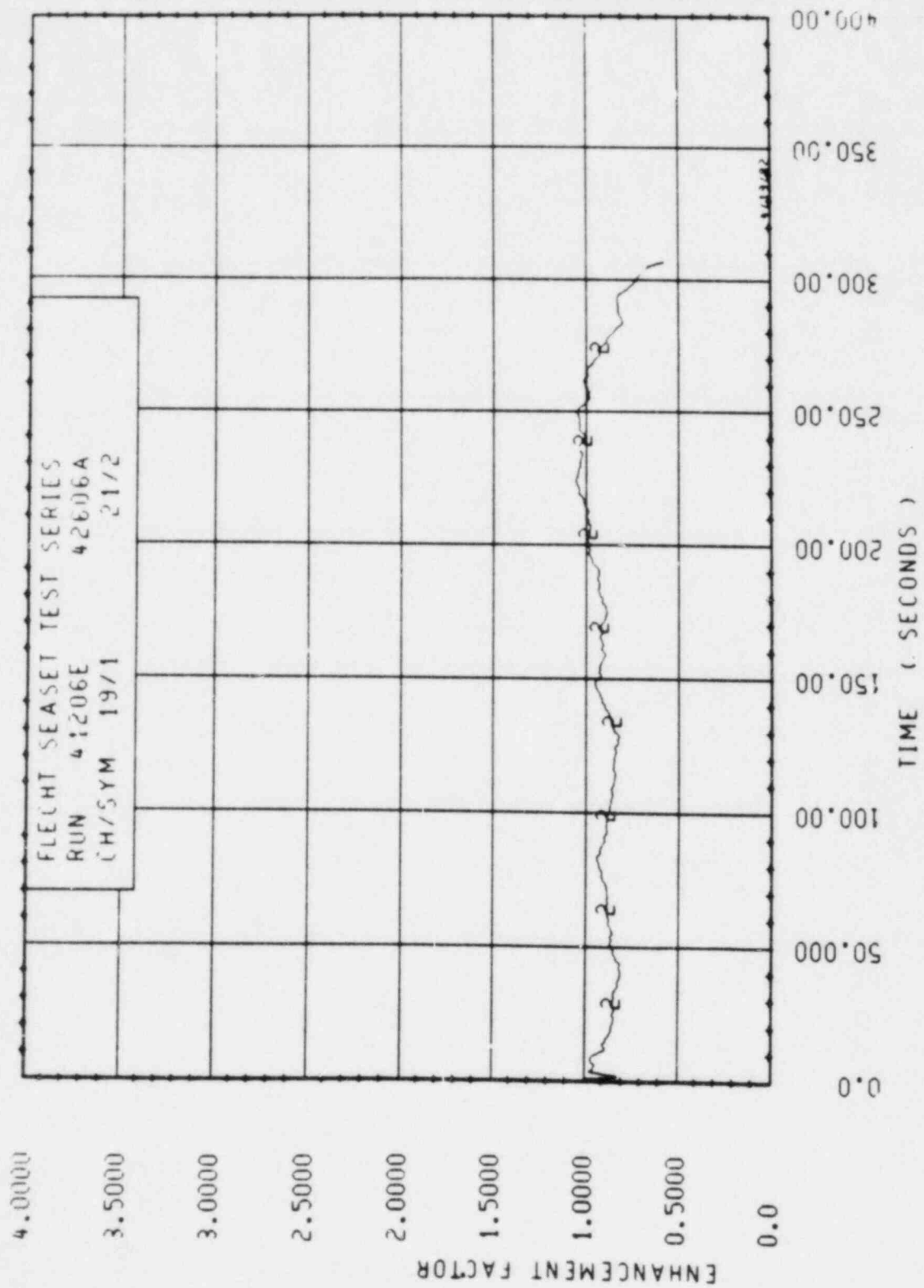


Figure O-62. Enhancement Factor for Run 41206E, Rod 2A, 1.68 m (66.3 in.) Elevation

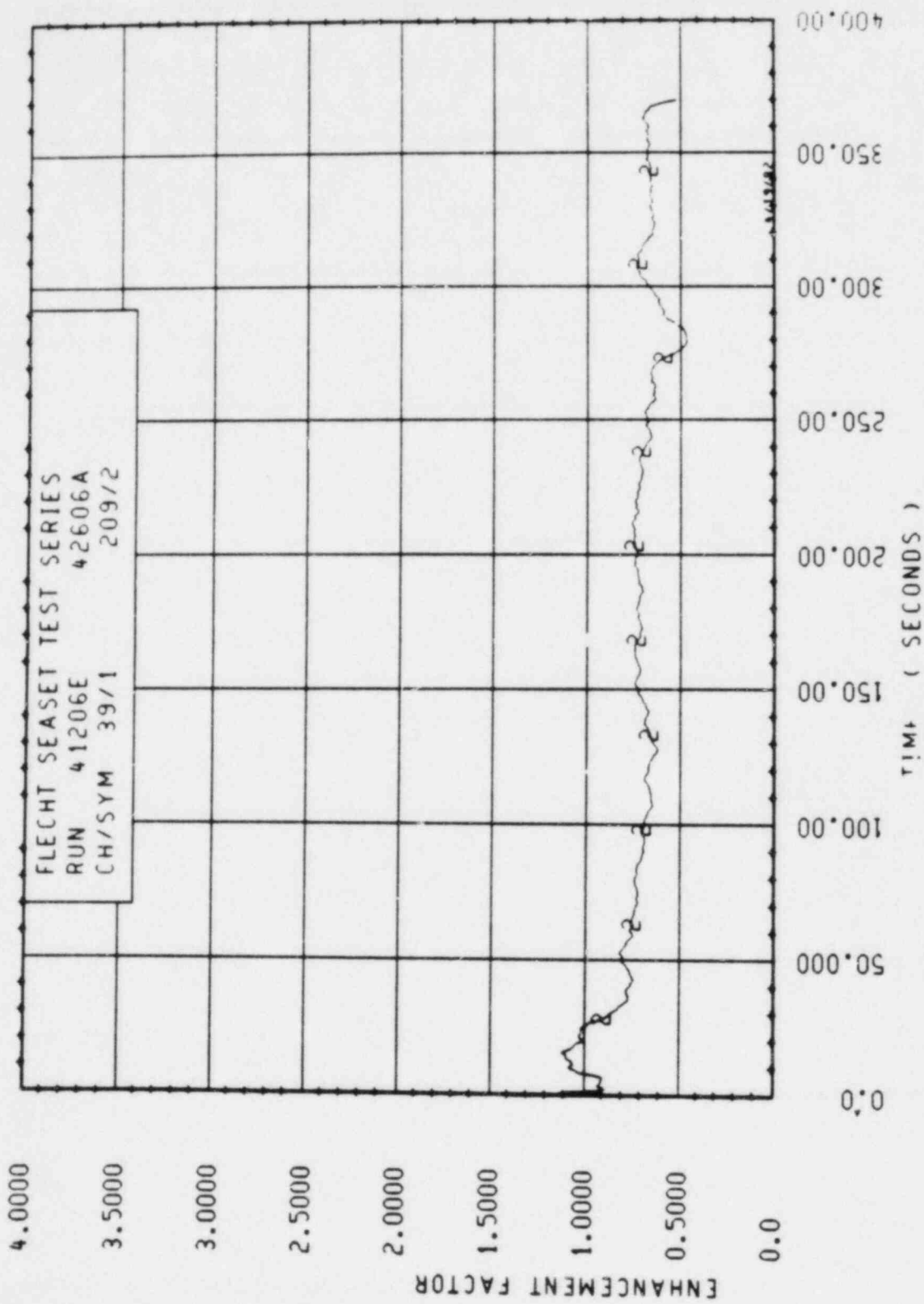


Figure O-63. Enhancement Factor for Run 41206E, Rod 2D, 1.89 m (74.5 in.) Elevation

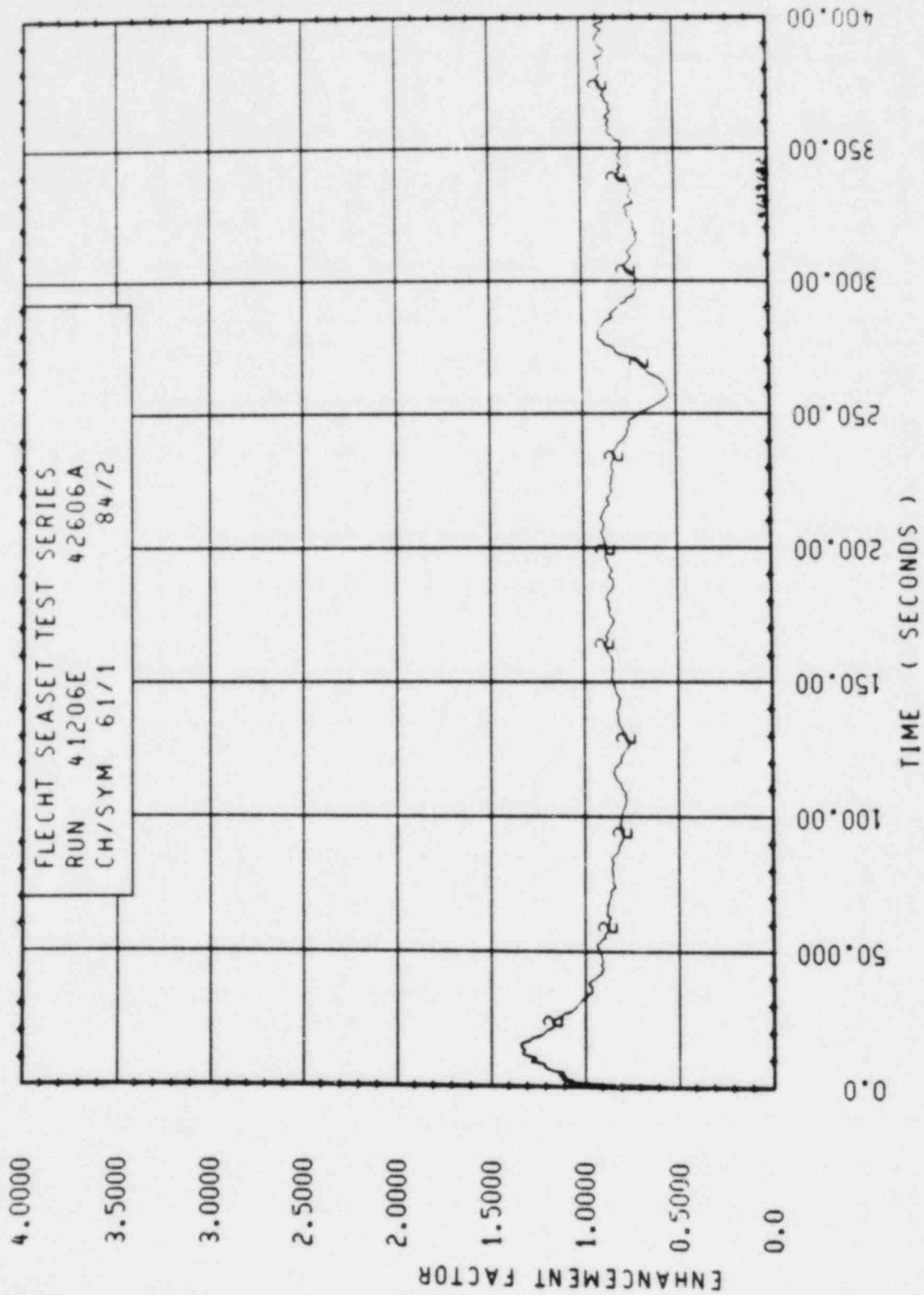


Figure O-64. Enhancement Factor for Run 41206E, Rod 2D, 1.95 m (76.8 in.) Elevation

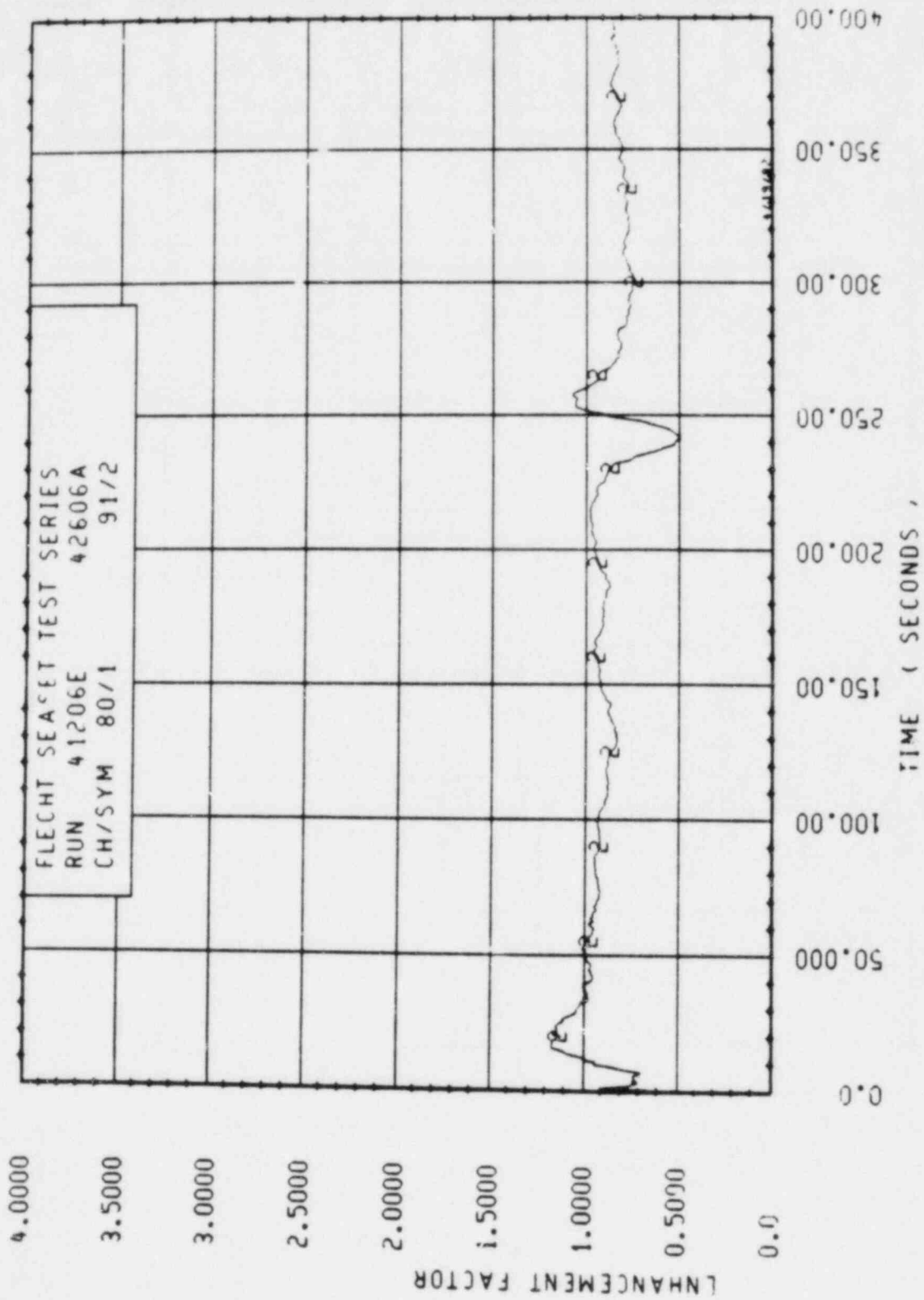


Figure O-65. Enhancement Factor for Run 41206E, Rod 2D, 2.00 m (78.7 in.) Elevation

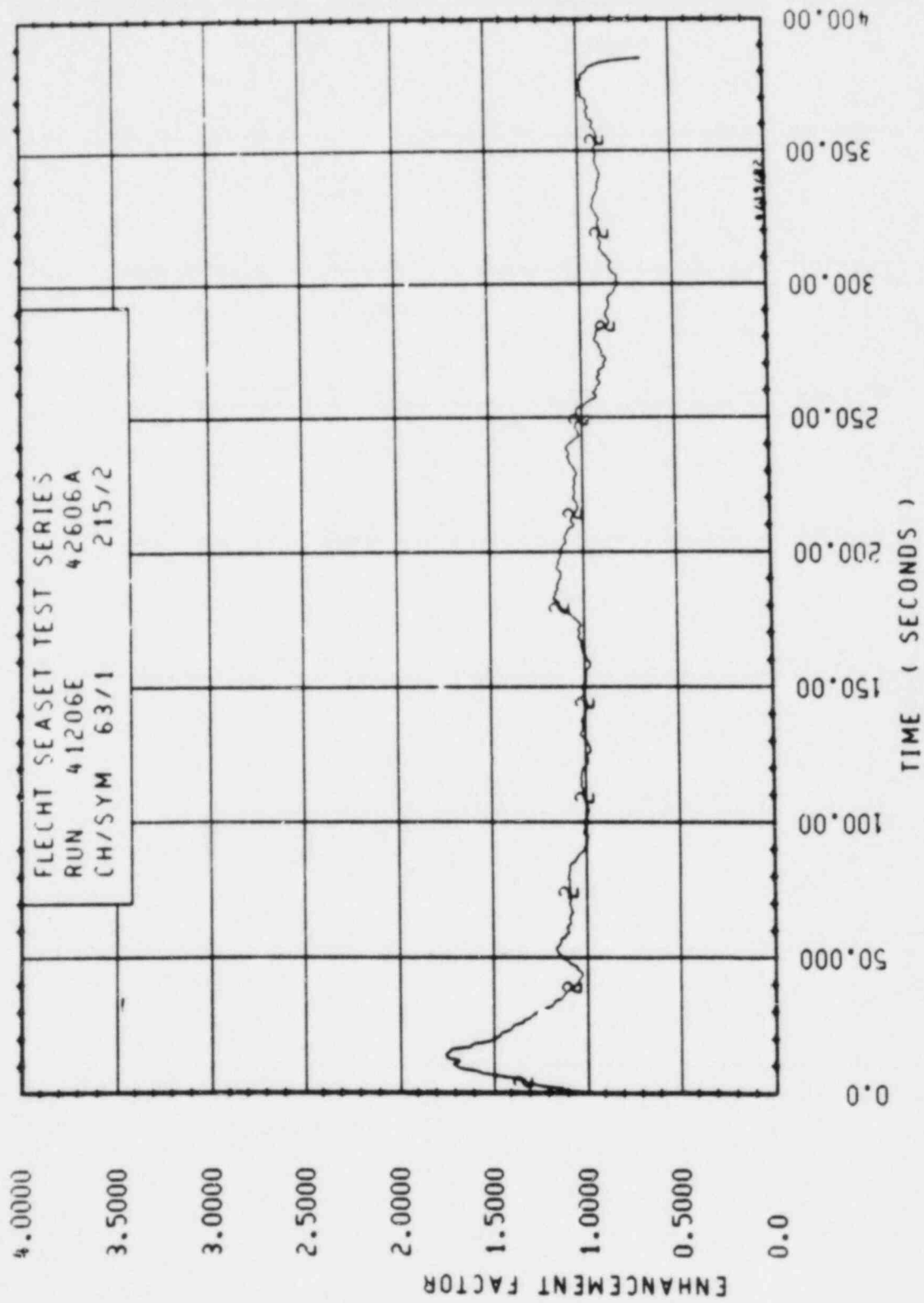


Figure O-66. Enhancement Factor for Run 41206E, Rod 3B, 1.96 m (77.1 in.) Elevation

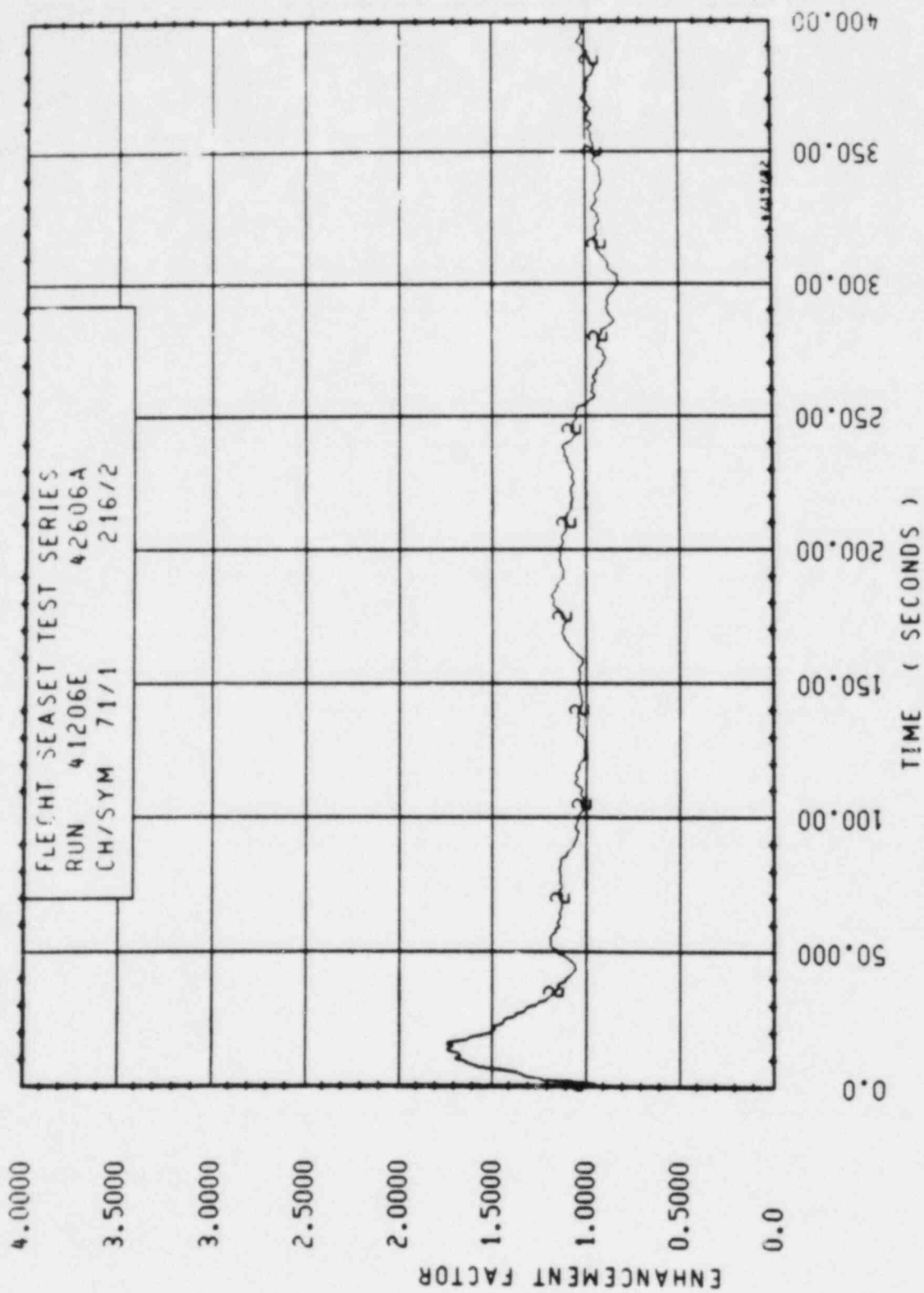


Figure O-67. Enhancement Factor for Run 41206E, Rod 3B, 1.98 m (78.1 in.) Elevation

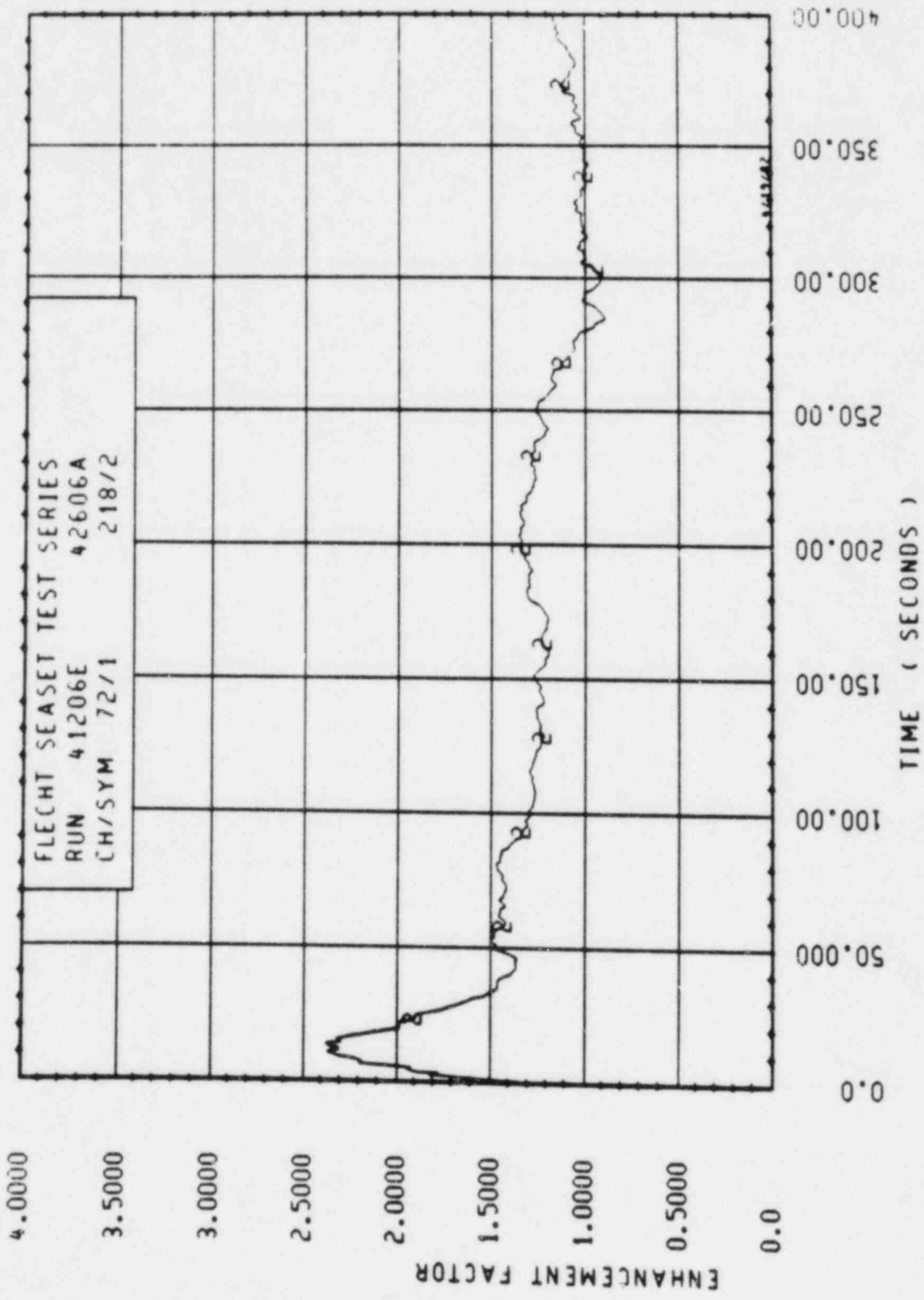


Figure O-68. Enhancement Factor for Run 41206E, Rod 3C, 1.99 m (78.2 in.) Elevation

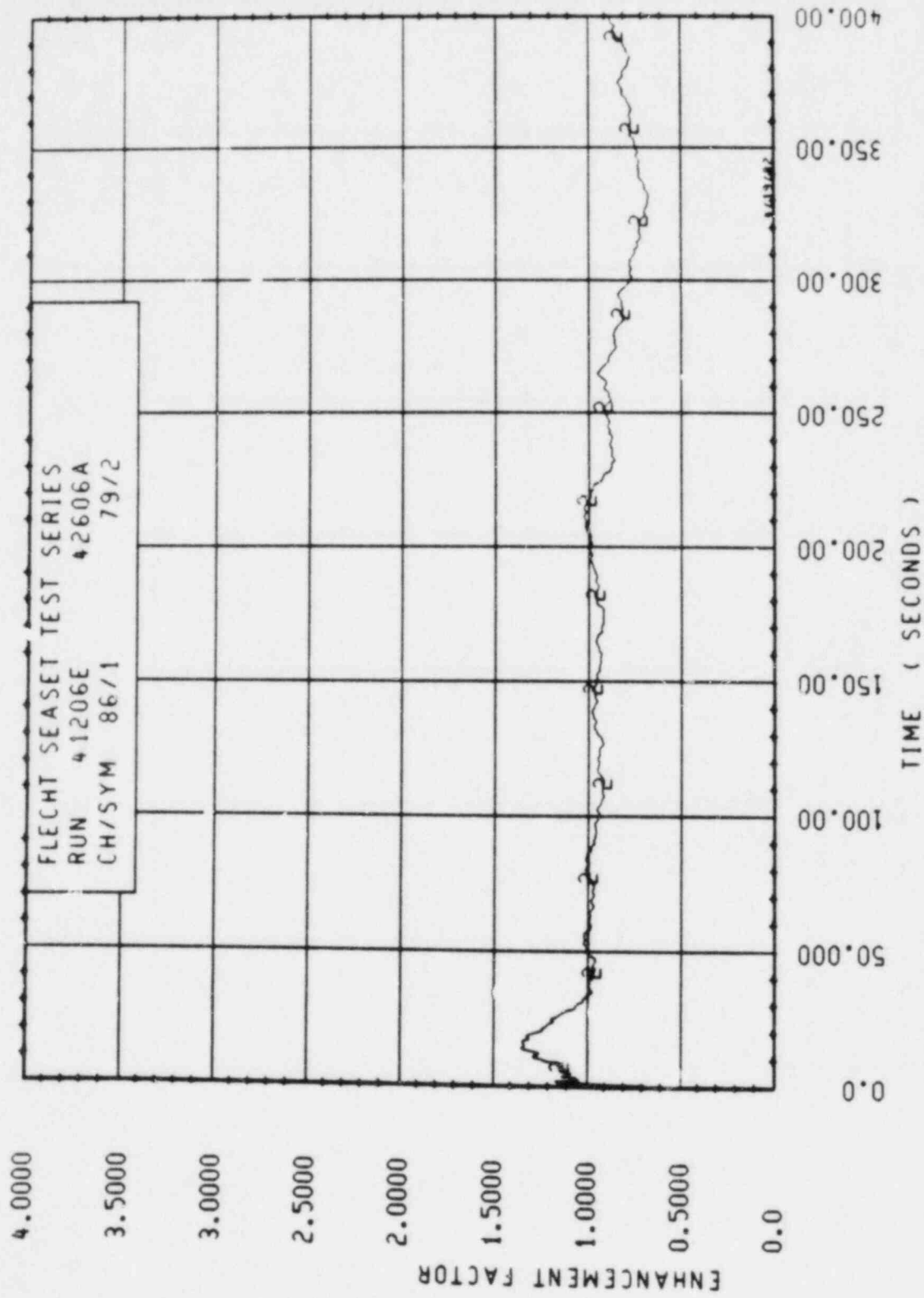


Figure O-69. Enhancement Factor for Run 41206E, Rod 3D, 2.02 m (79.6 in.) Elevation

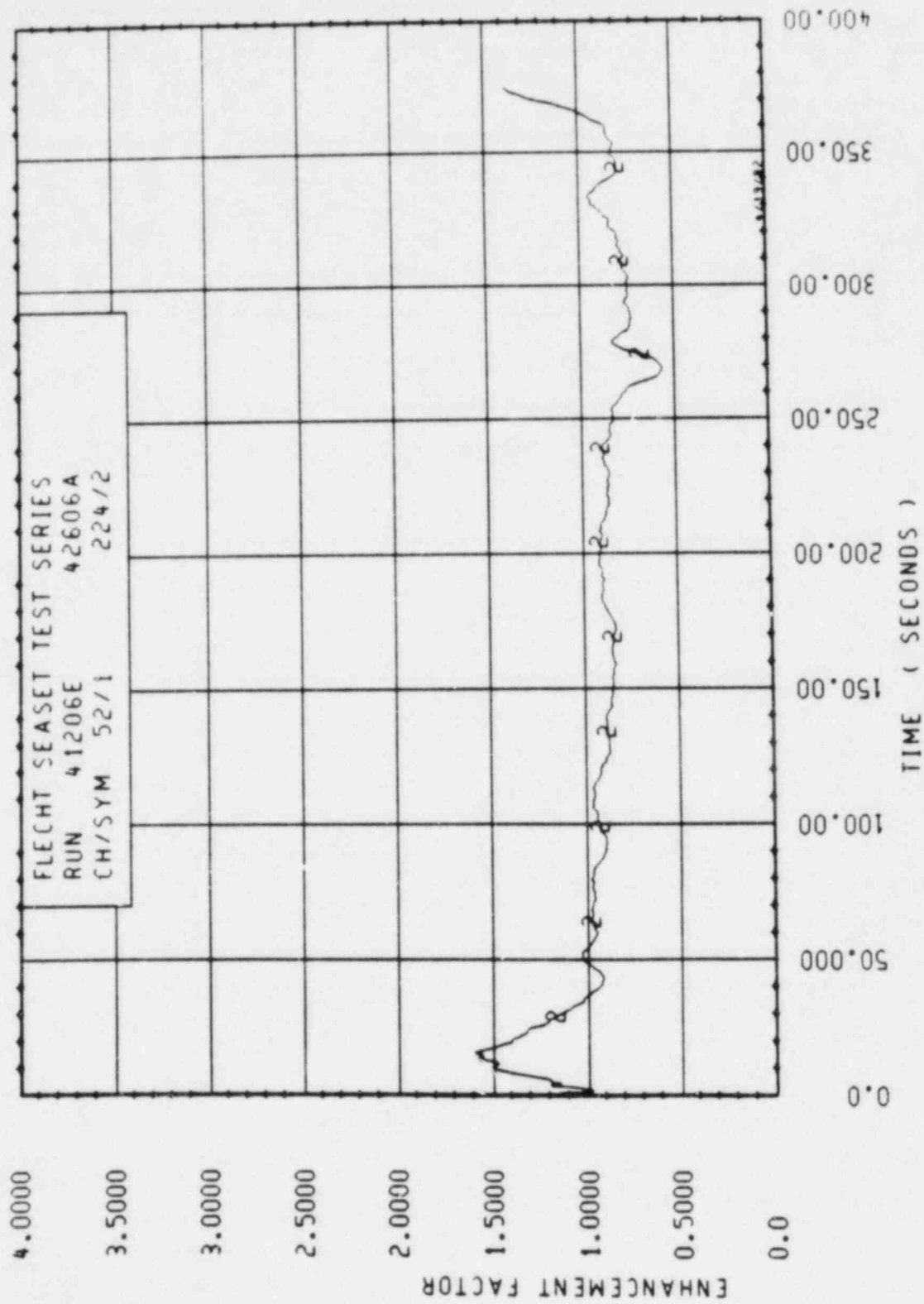


Figure O-70. Enhancement Factor for Run 41206E, Rod 4B, 1.93 m (75.9 in.) Elevation

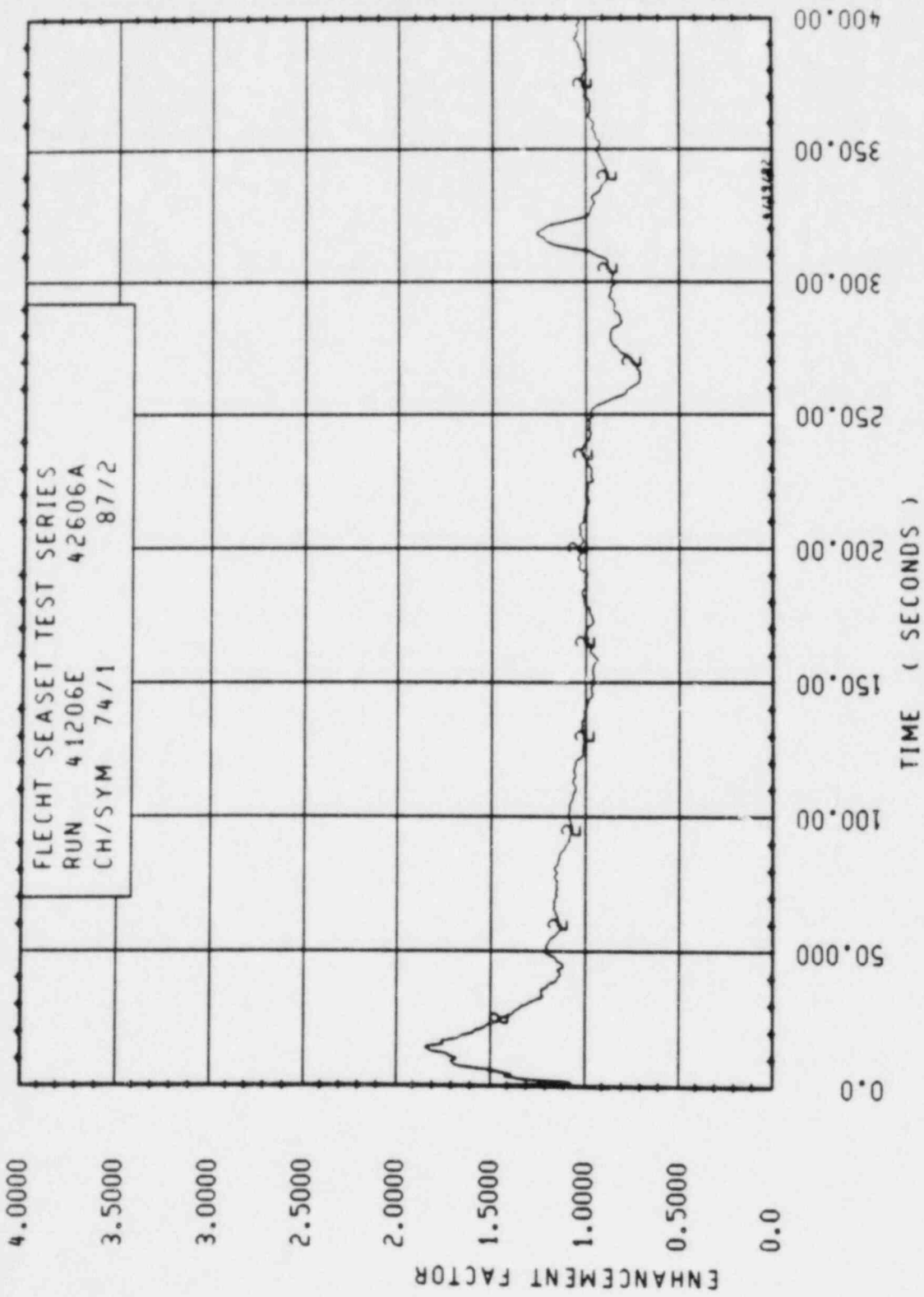


Figure O-71. Enhancement Factor for Run 41206E, Rod 4B, 1.98 m (78.1 in.) Elevation

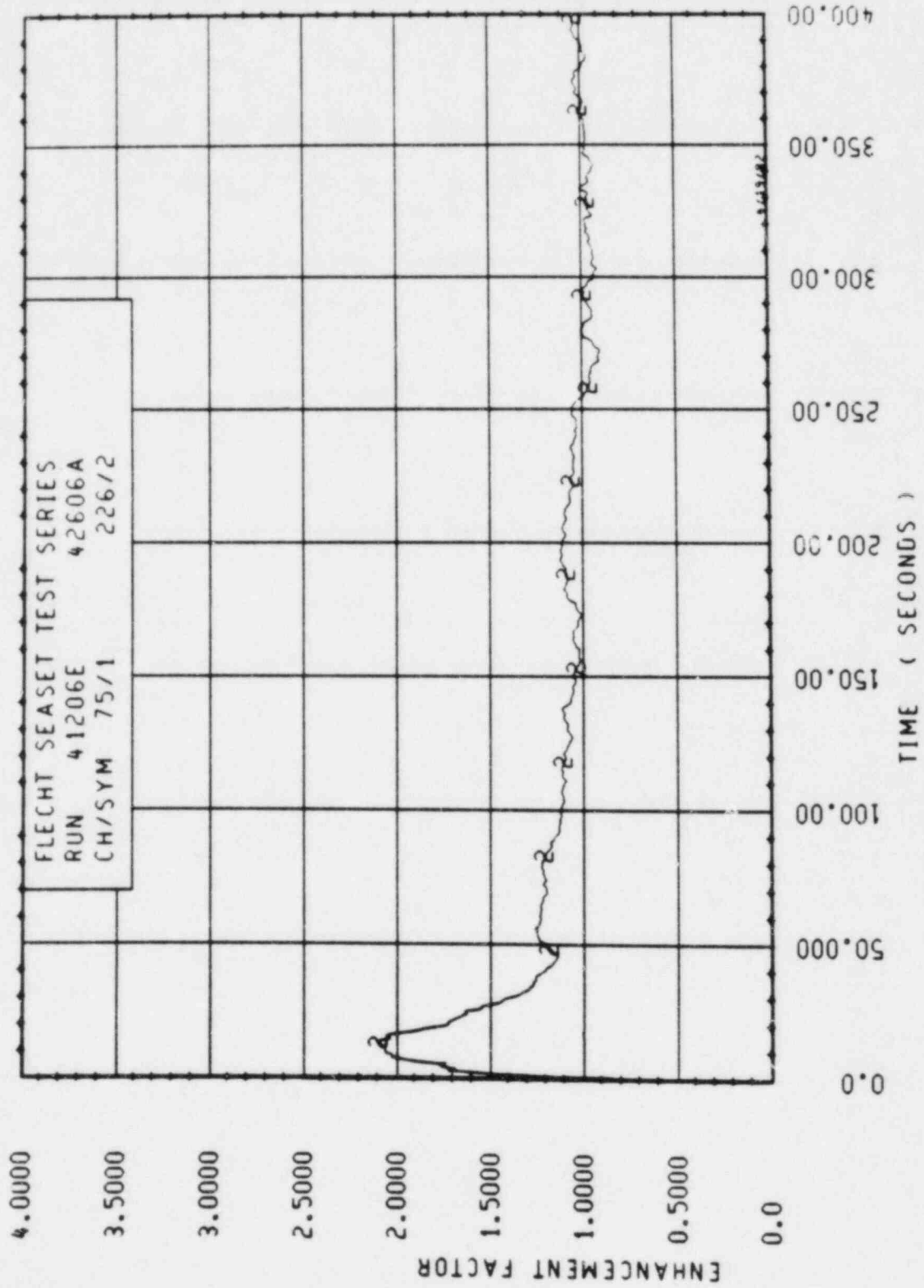


Figure O-72. Enhancement Factor for Run 41206E, Rod 4C, 1.99 m (78.4 in.) Elevation

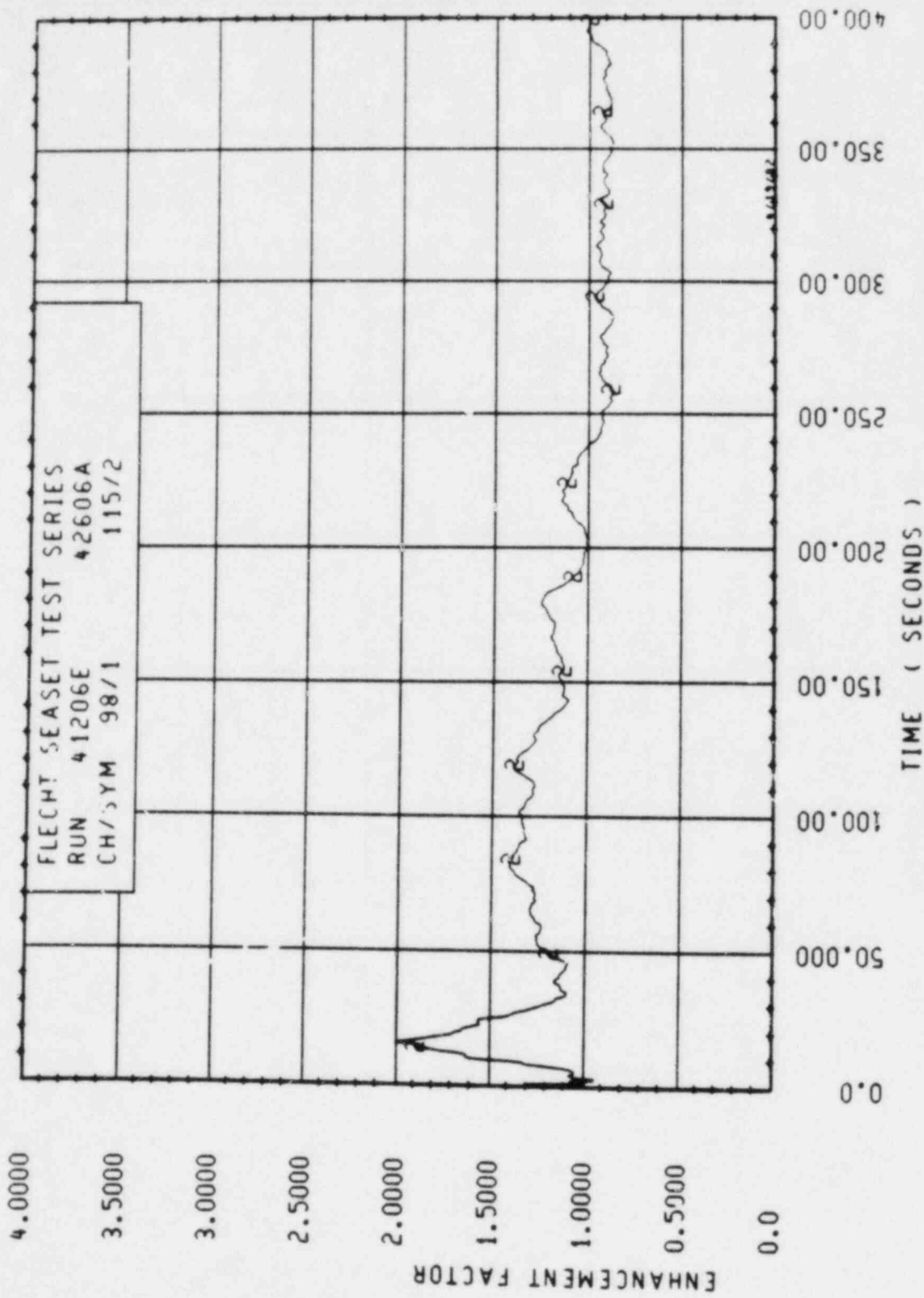


Figure O-73. Enhancement Factor for Run 41206E, Rod 3D, 2.13 m (84 in.) Elevation

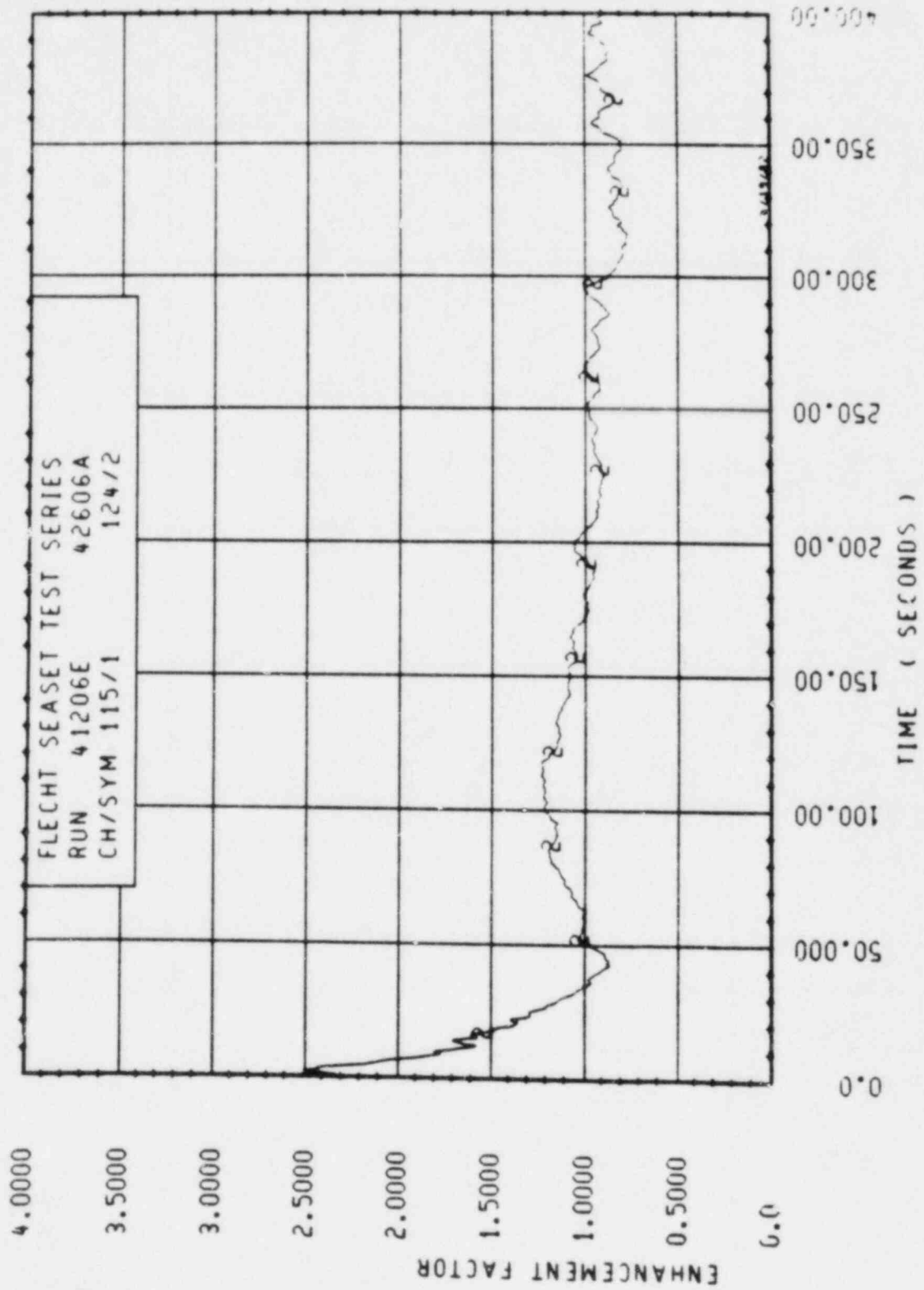


Figure O-74. Enhancement Factor for Run 41206E, Rod 3B, 2.29 m (90 in.) Elevation

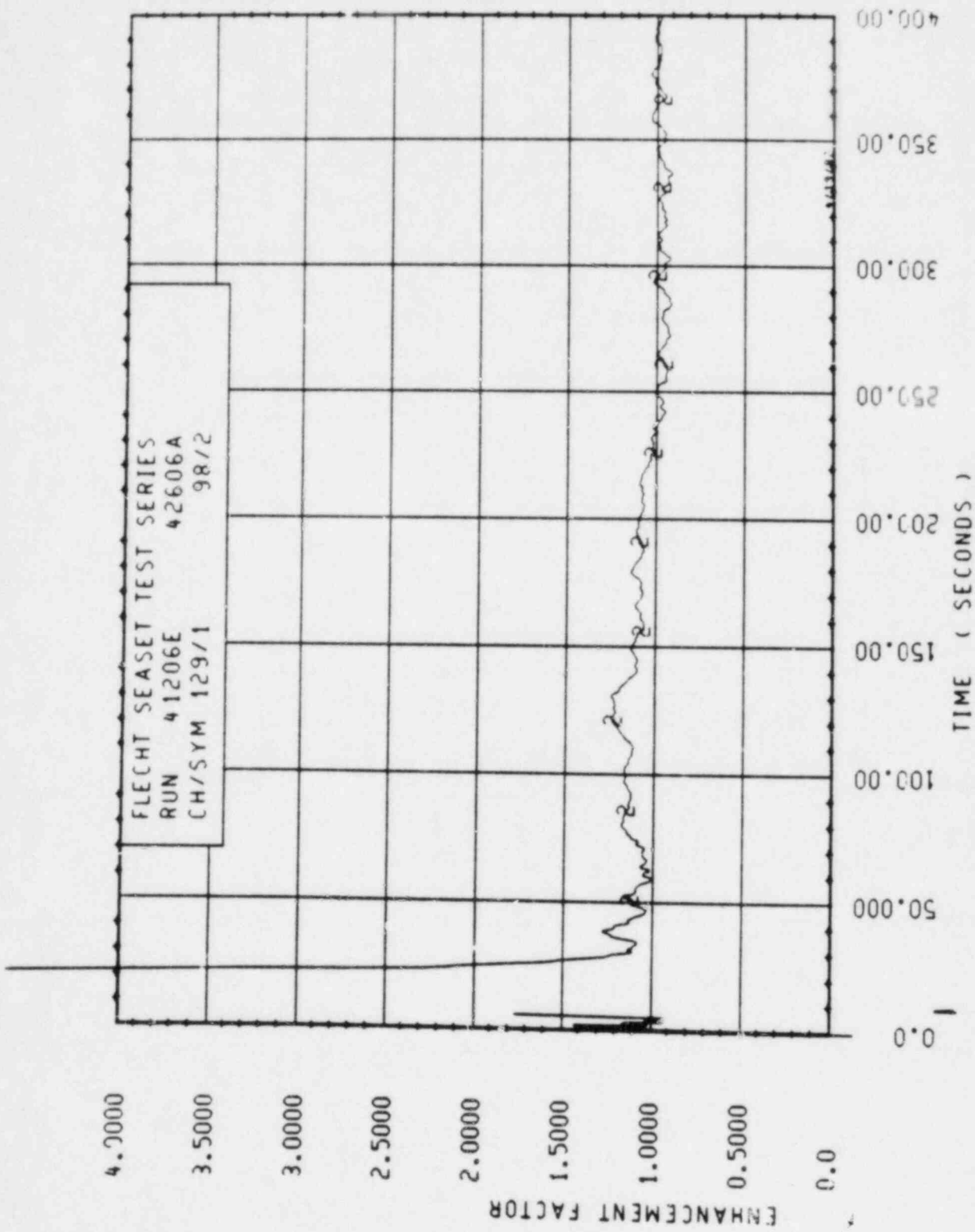


Figure O-75. Enhancement Factor for Run 41206E, Rod 3D, 2.44 m (96 in.) Elevation

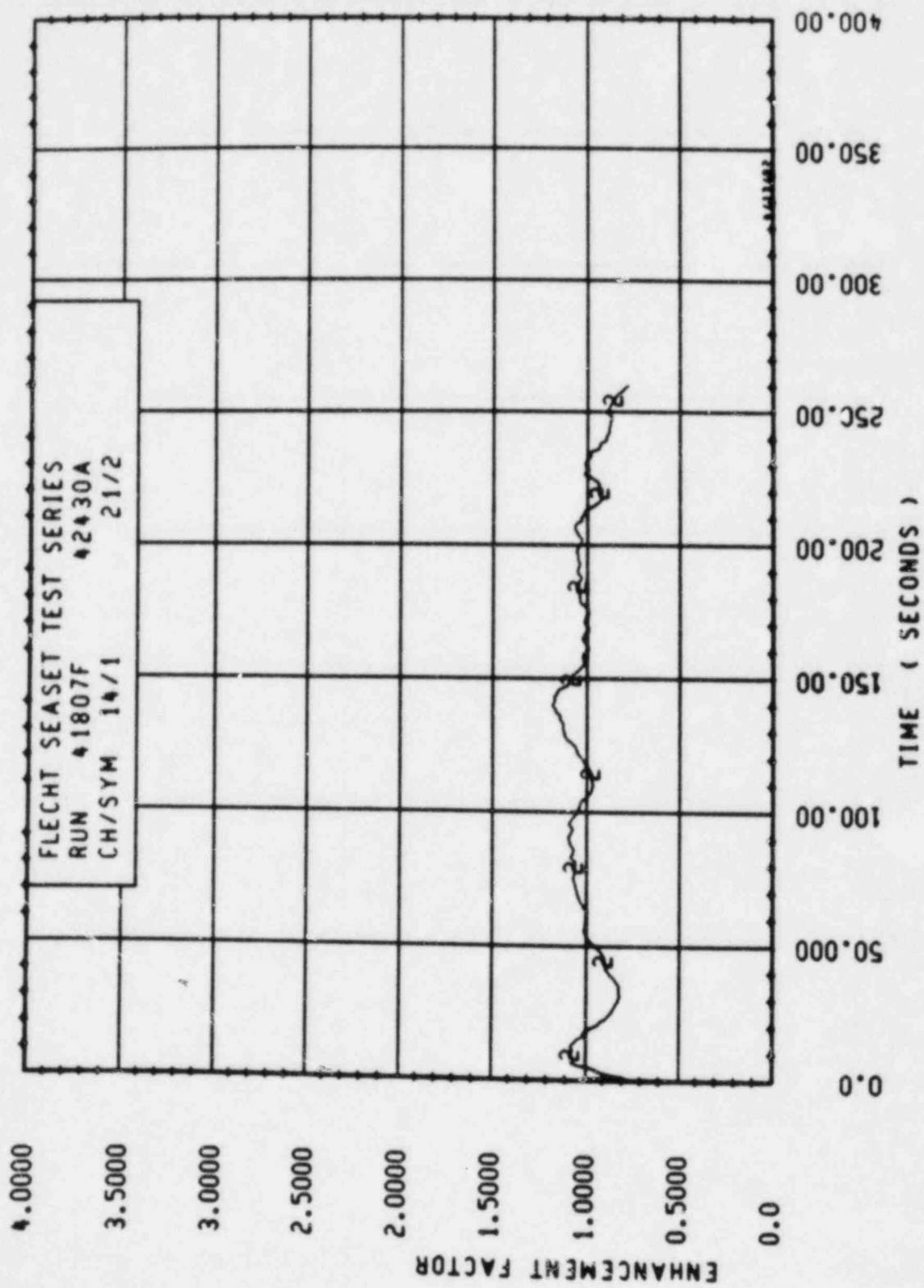


Figure O-76. Enhancement Factor for Run 41807F, Rod 2A, 1.67 m (65.7 in.) Elevation

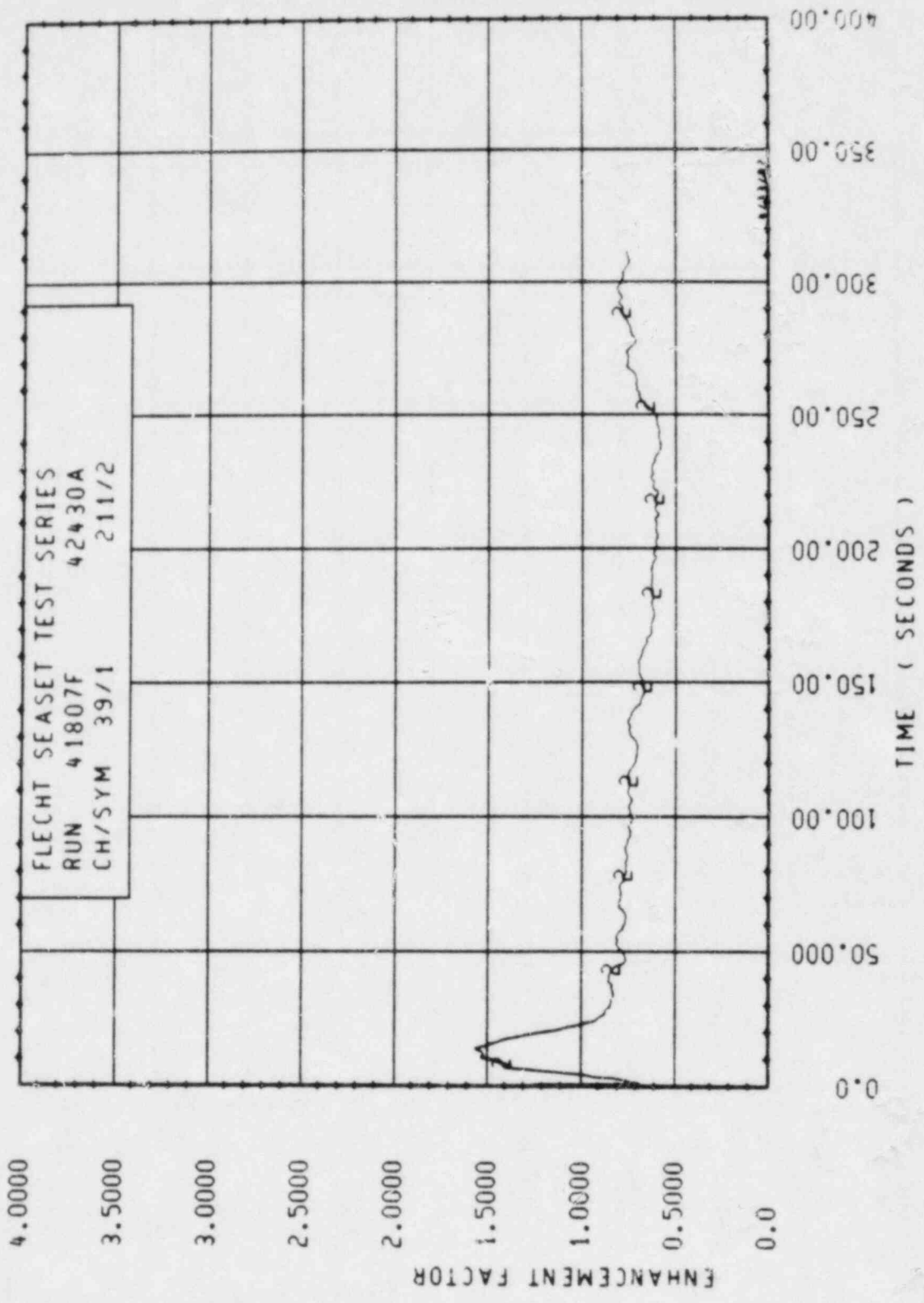


Figure O-77. Enhancement Factor for Run 41807F, Rod 2D, 1.90 m (74.7 in.) Elevation

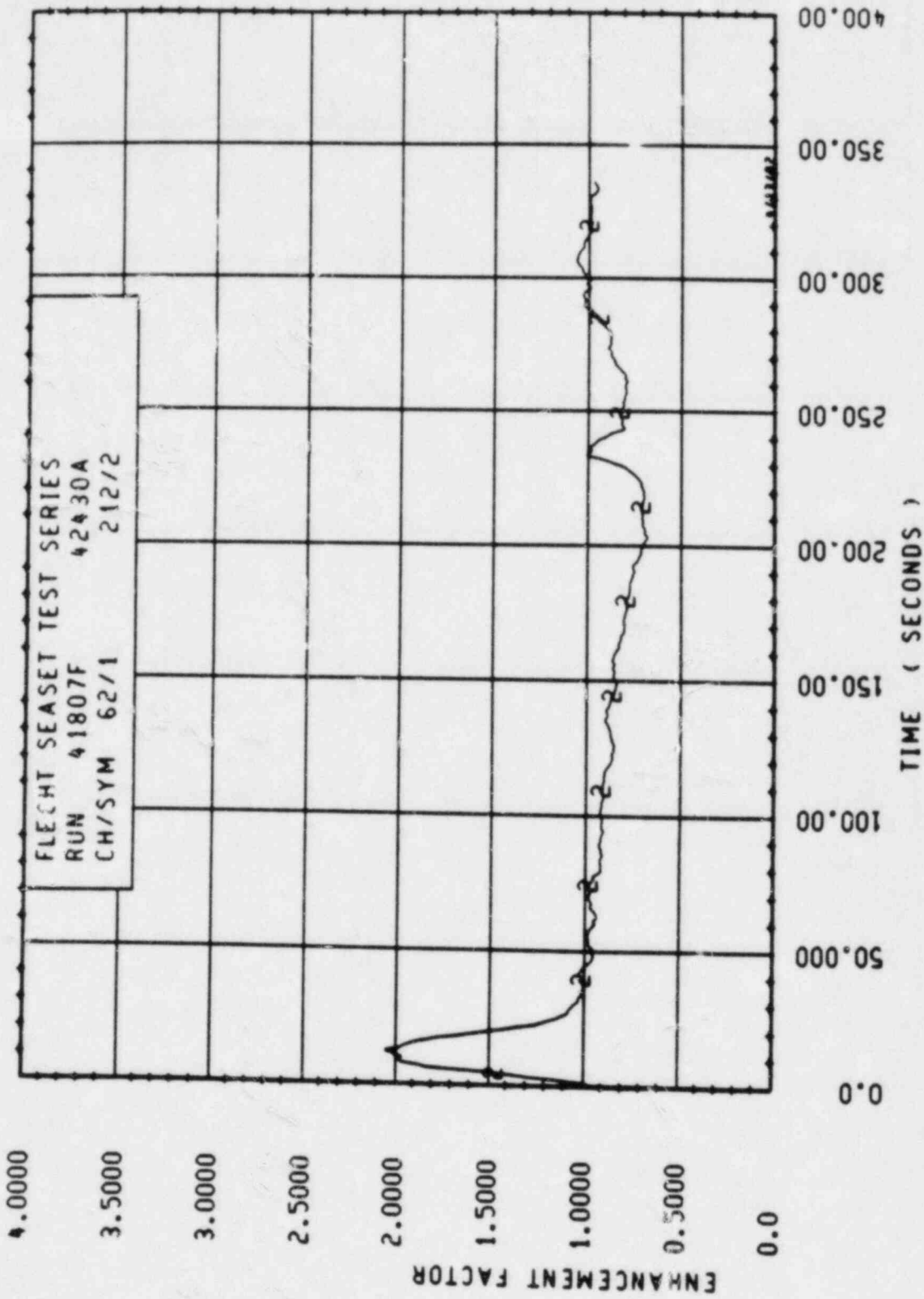


Figure O-78. Enhancement Factor for Run 41807F, Rod 2D, 1.95 m (76.9 in.) Elevation

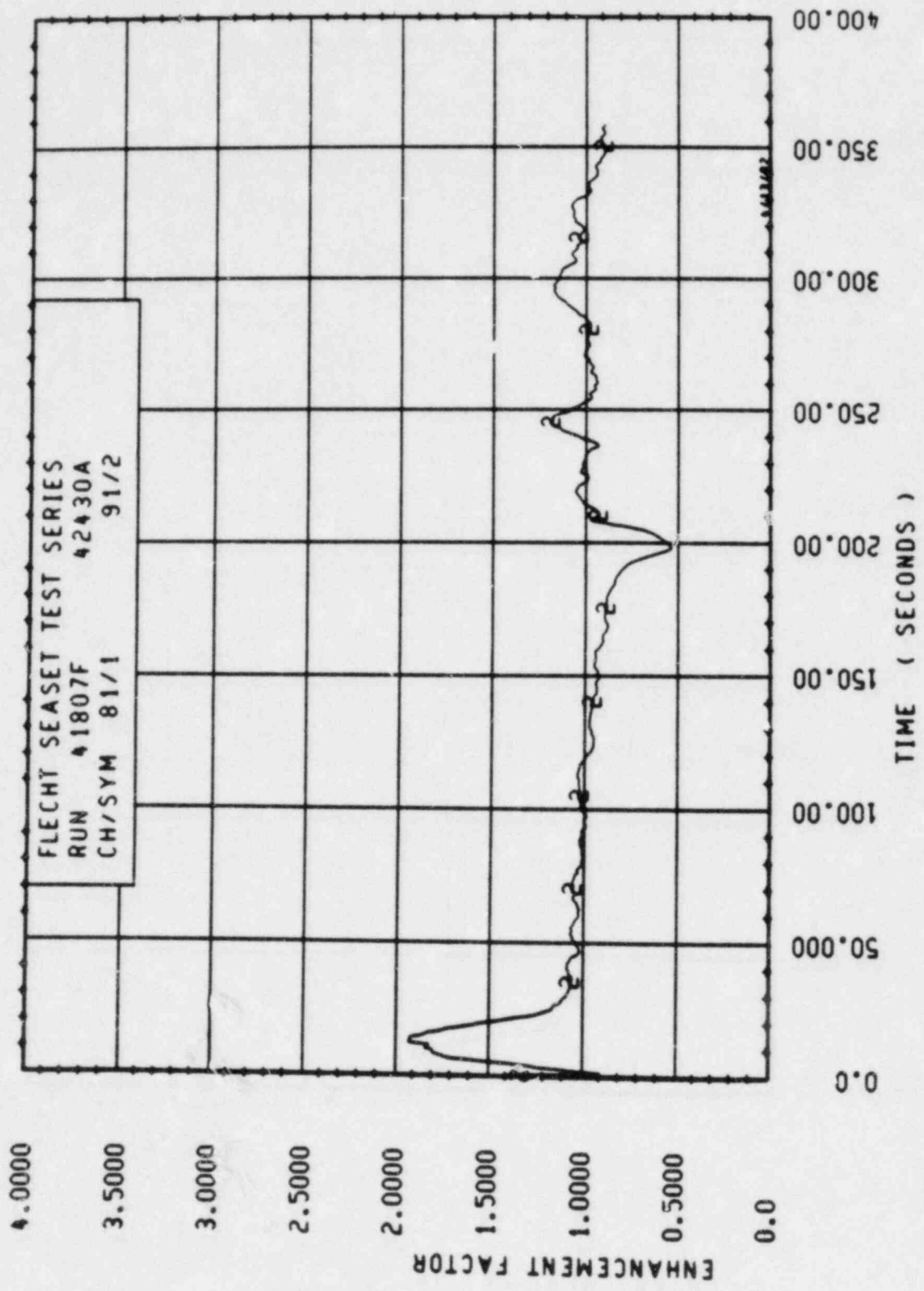


Figure O-79. Enhancement Factor for Run 41807F, Rod 2D, 2.00 m (78.9 in.) Elevation

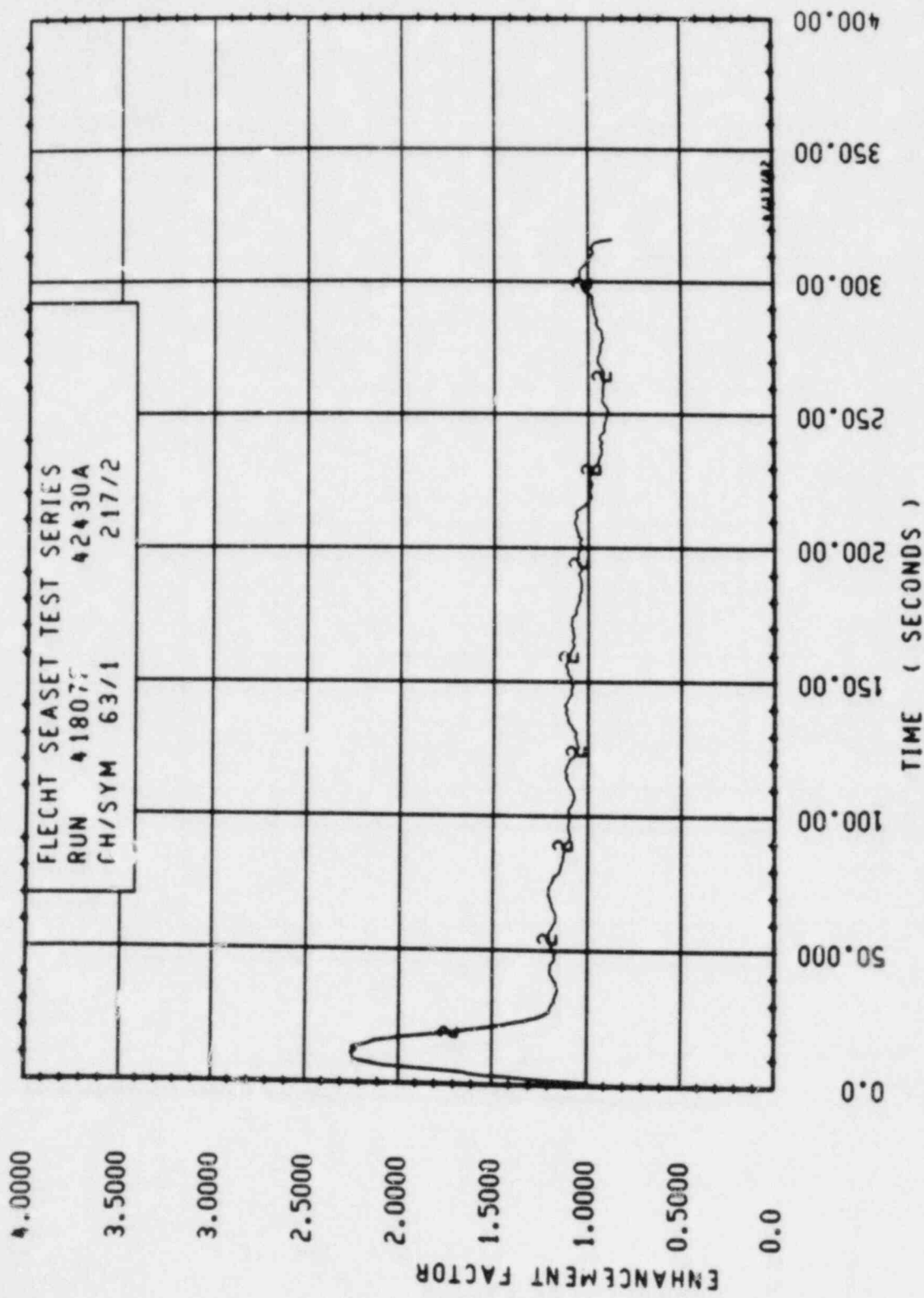


Figure O-80. Enhancement Factor for Run 41807F, Rod 3B, 1.95 m (76.7 in.) Elevation

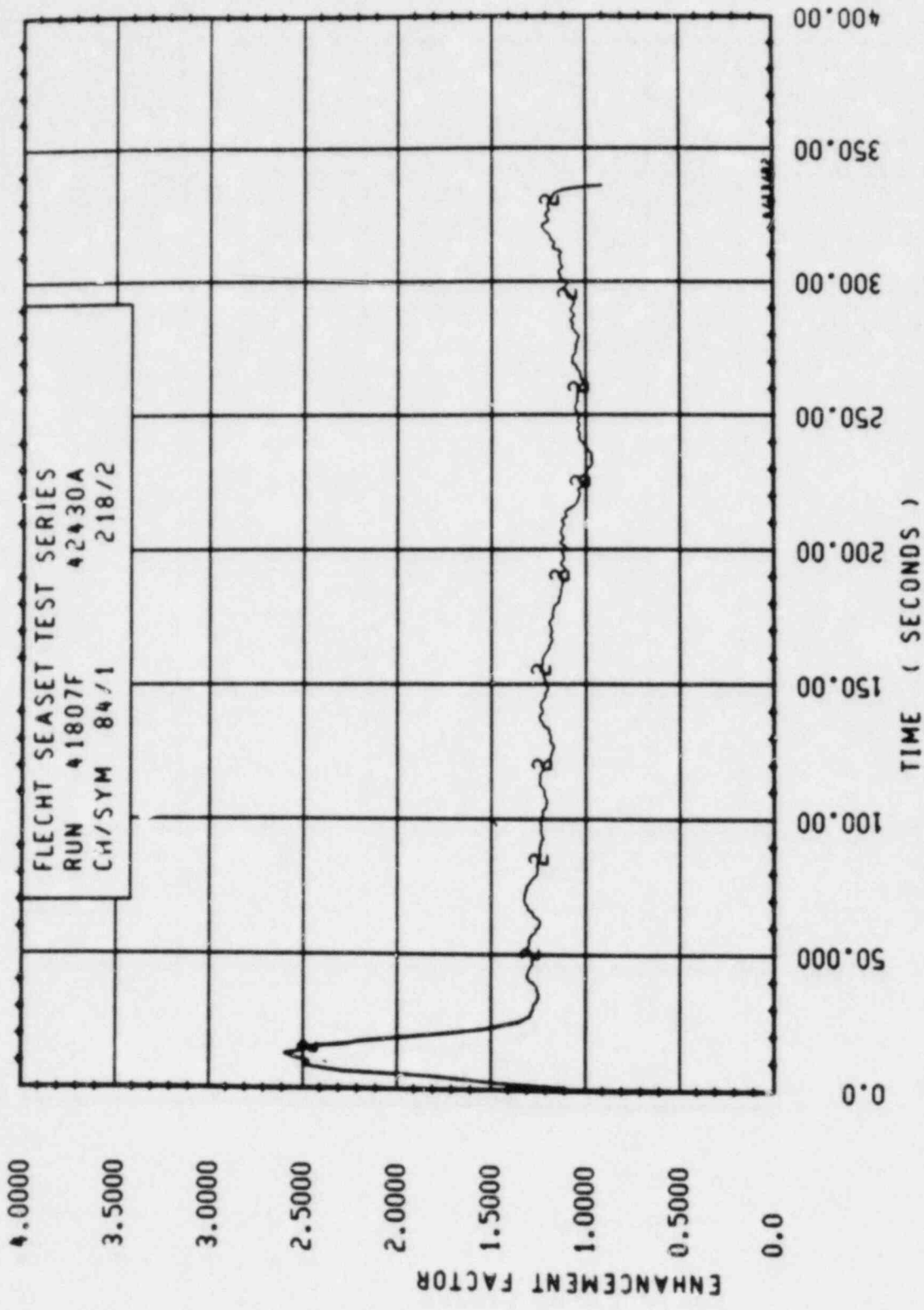


Figure O-81. Enhancement Factor for Run 41807F, Rod 3B, 2.00 m (78.9 in.) Elevation

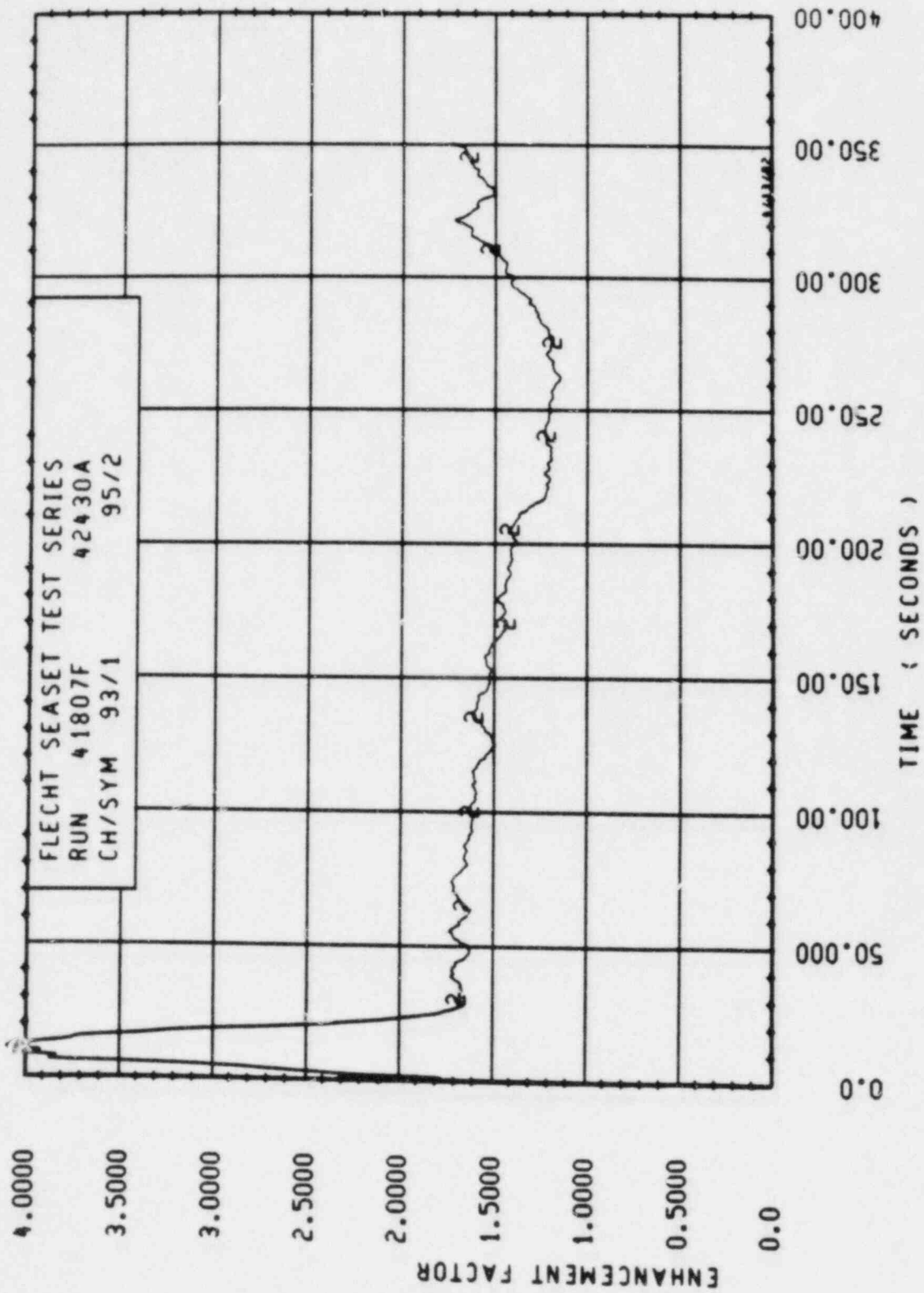


Figure O-82. Enhancement Factor for Run 41807F, Rod 3C, 2.02 m (79.6 in.) Elevation

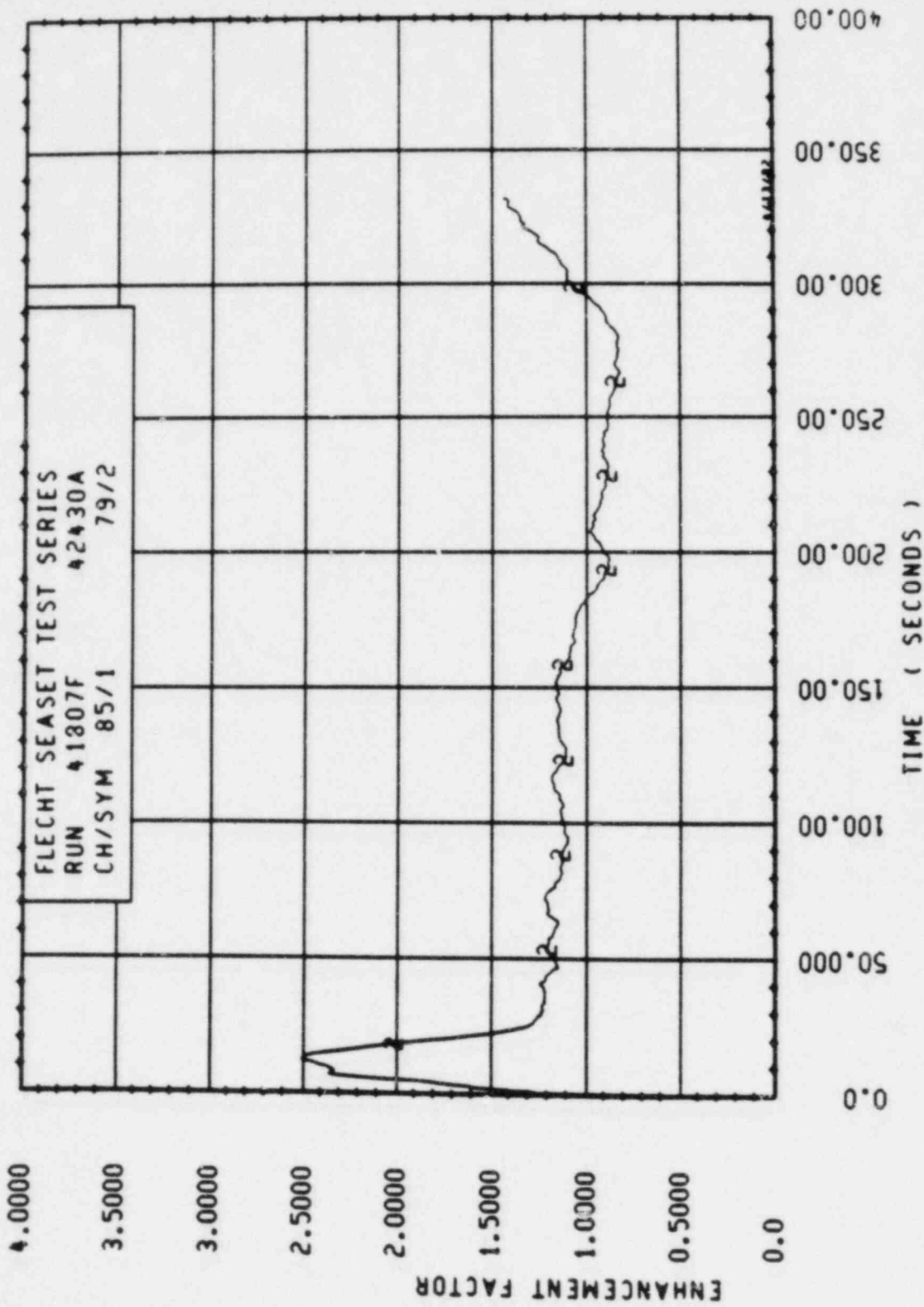


Figure O-83. Enhancement Factor for Run 41807F, Rod 3D, 2.02 m (79.5 in.) Elevation

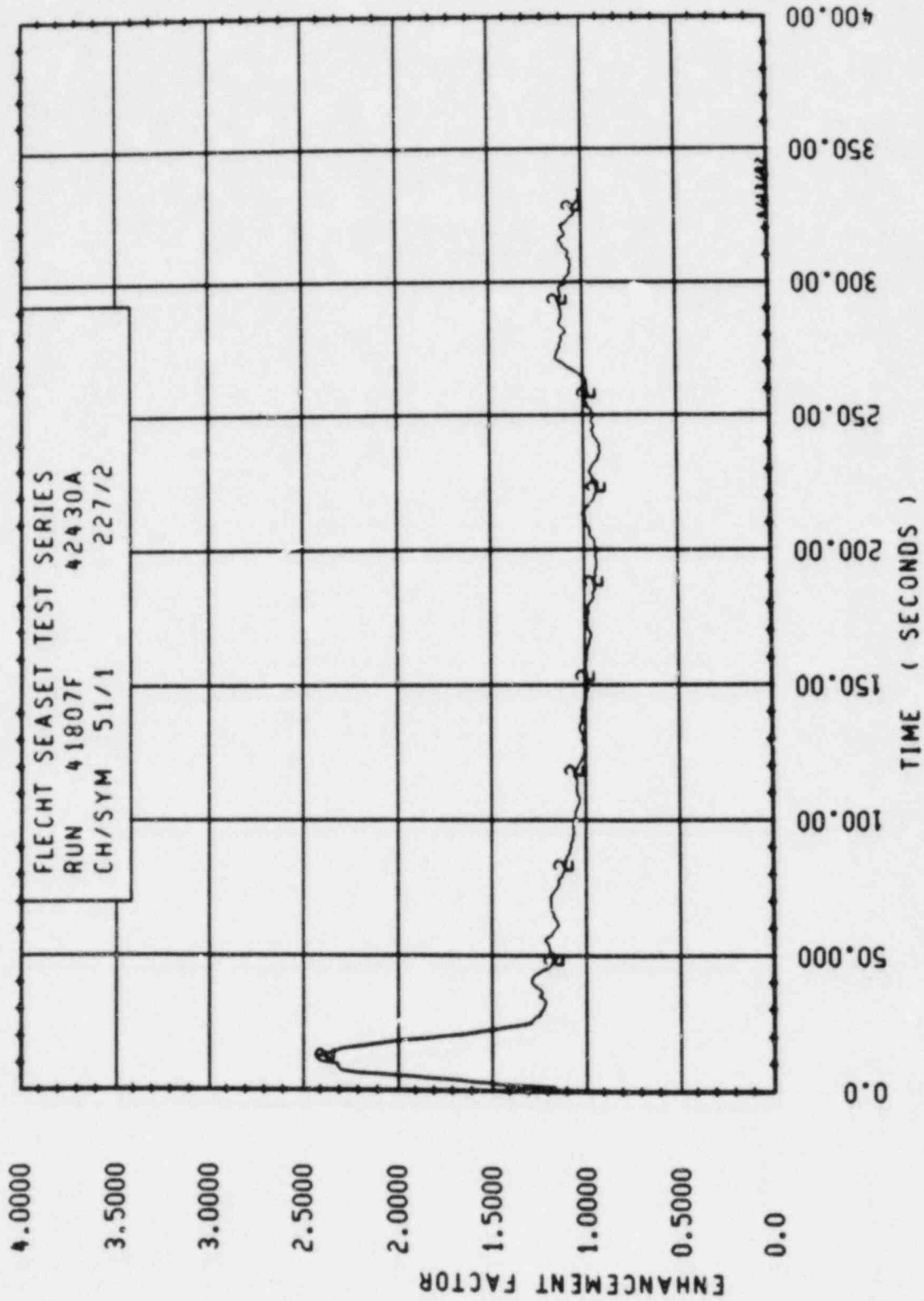


Figure O-84. Enhancement Factor for Run 41807F, Rod 4B, 1.94 m (76.2 in.) Elevation

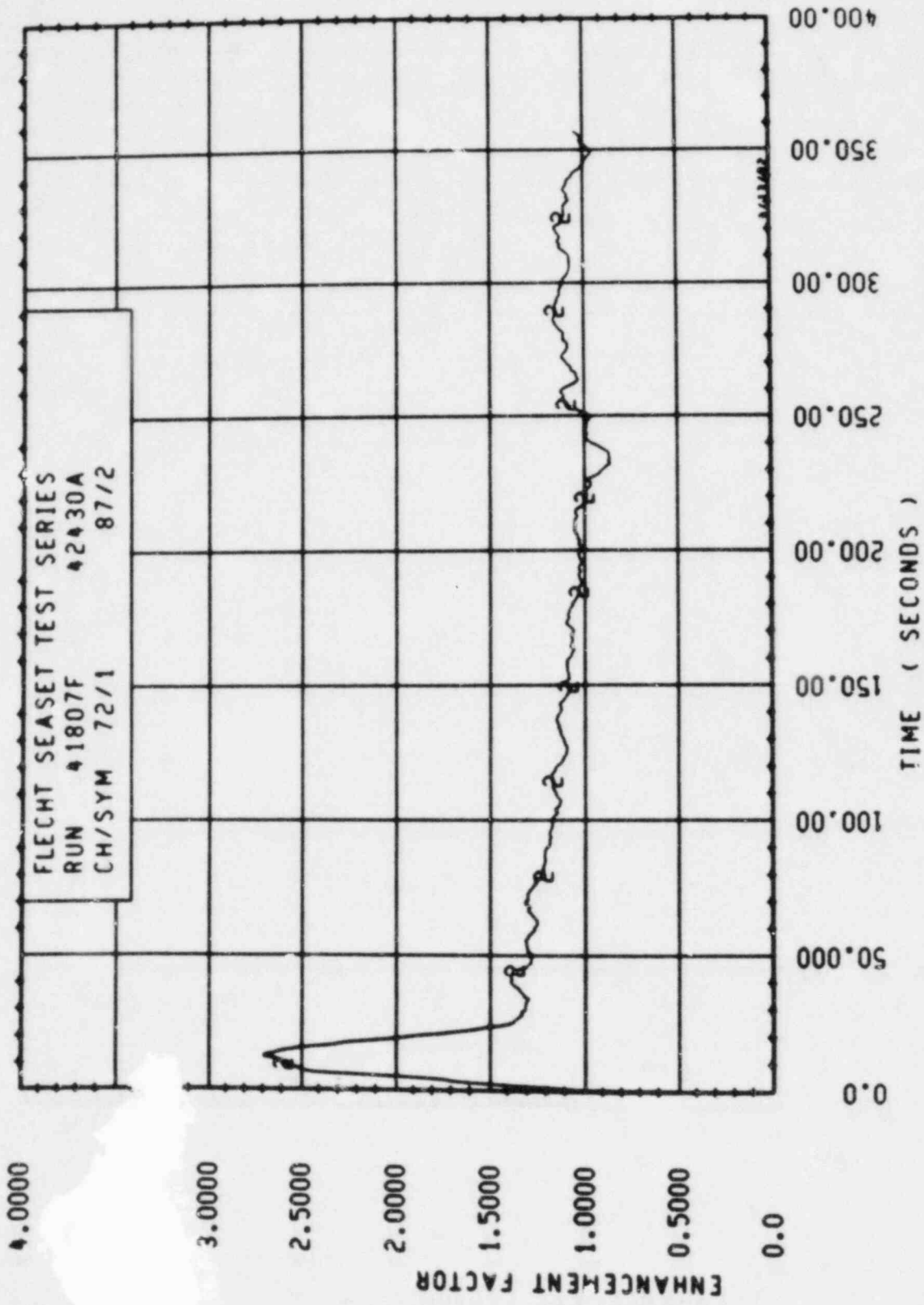


Figure O-85. Enhancement Factor for Run 41807F, Rod 4B, 1.99 m (78.4 in.) Elevation

0-87

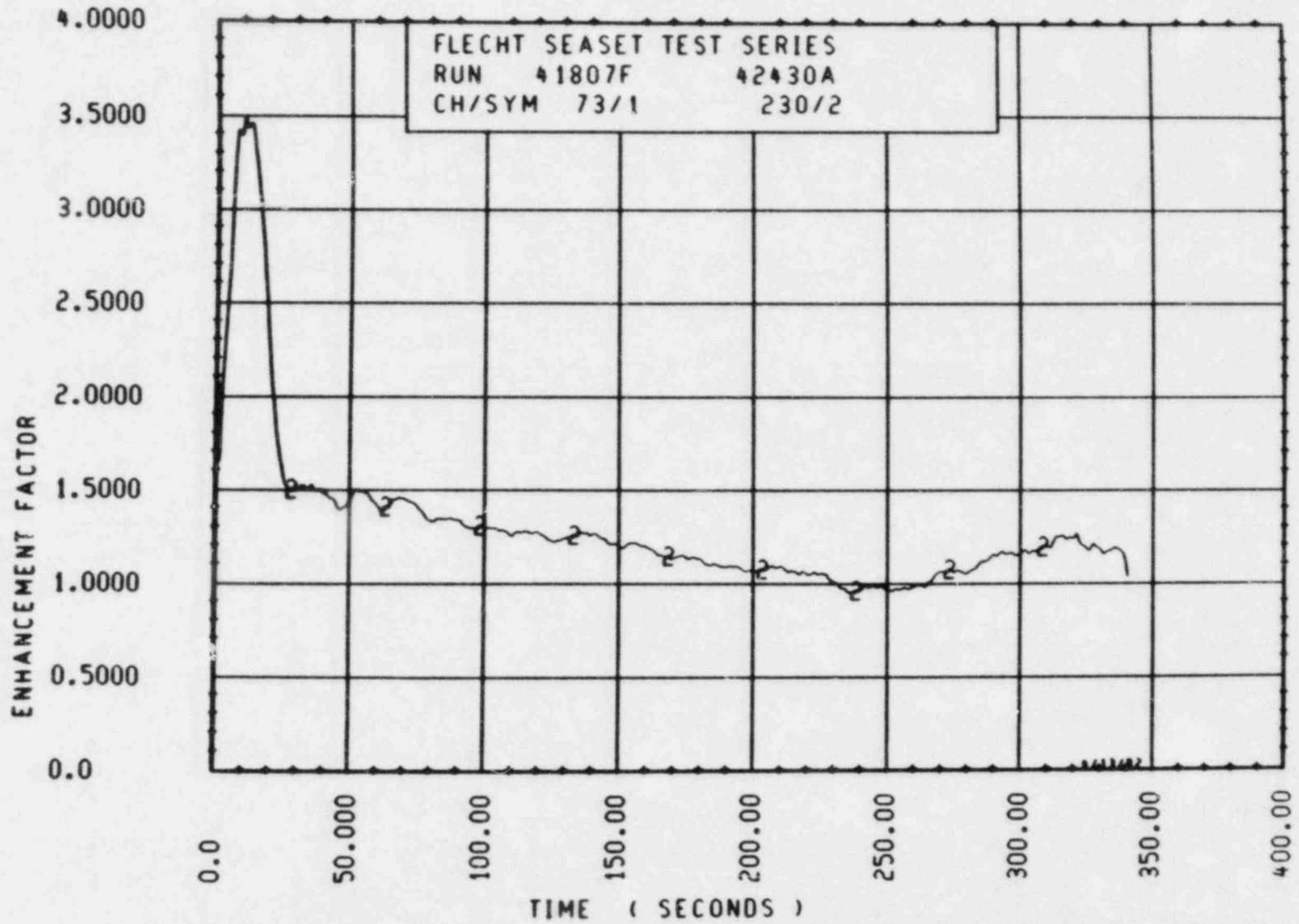


Figure O-86. Enhancement Factor for Run 41807F, Rod 4C, 1.99 m (78.2 in.) Elevation

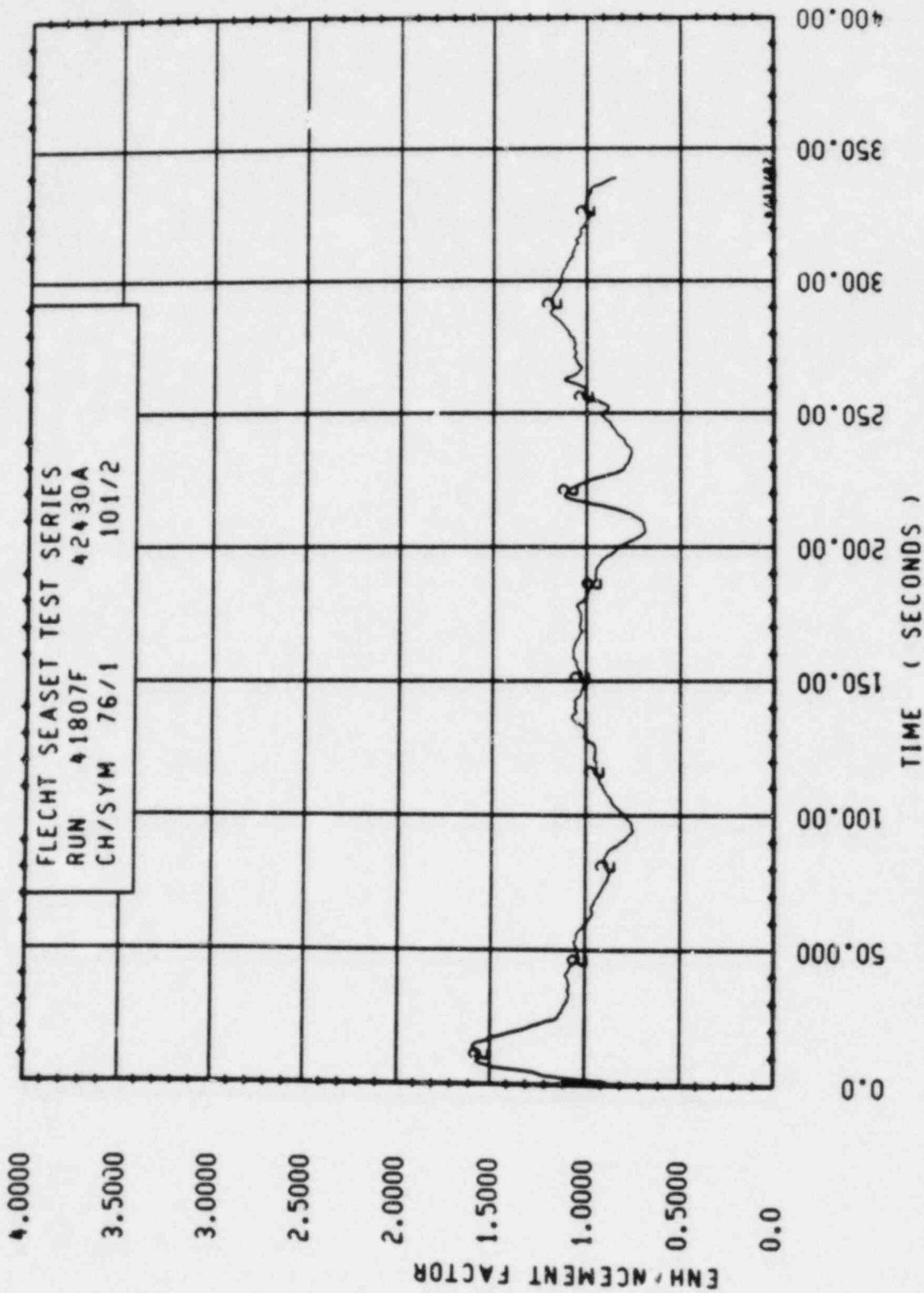


Figure O-87. Enhancement Factor for Run 41807F, Rod 5C, 1.99 m (78.3 in.) Elevation

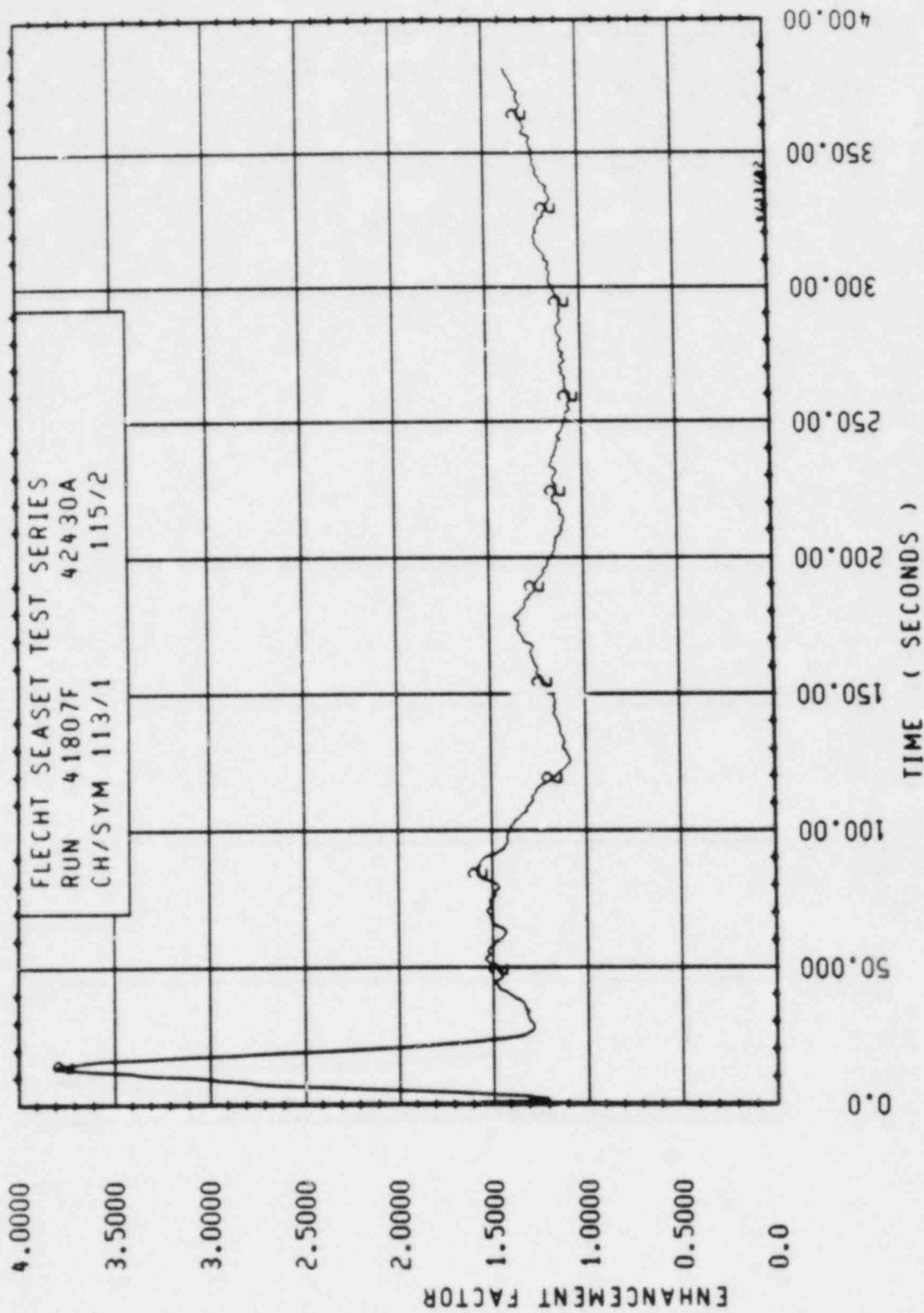


Figure O-88. Enhancement Factor for Run 41807F, Rod 3D, 2.13 m (84 in.) Elevation

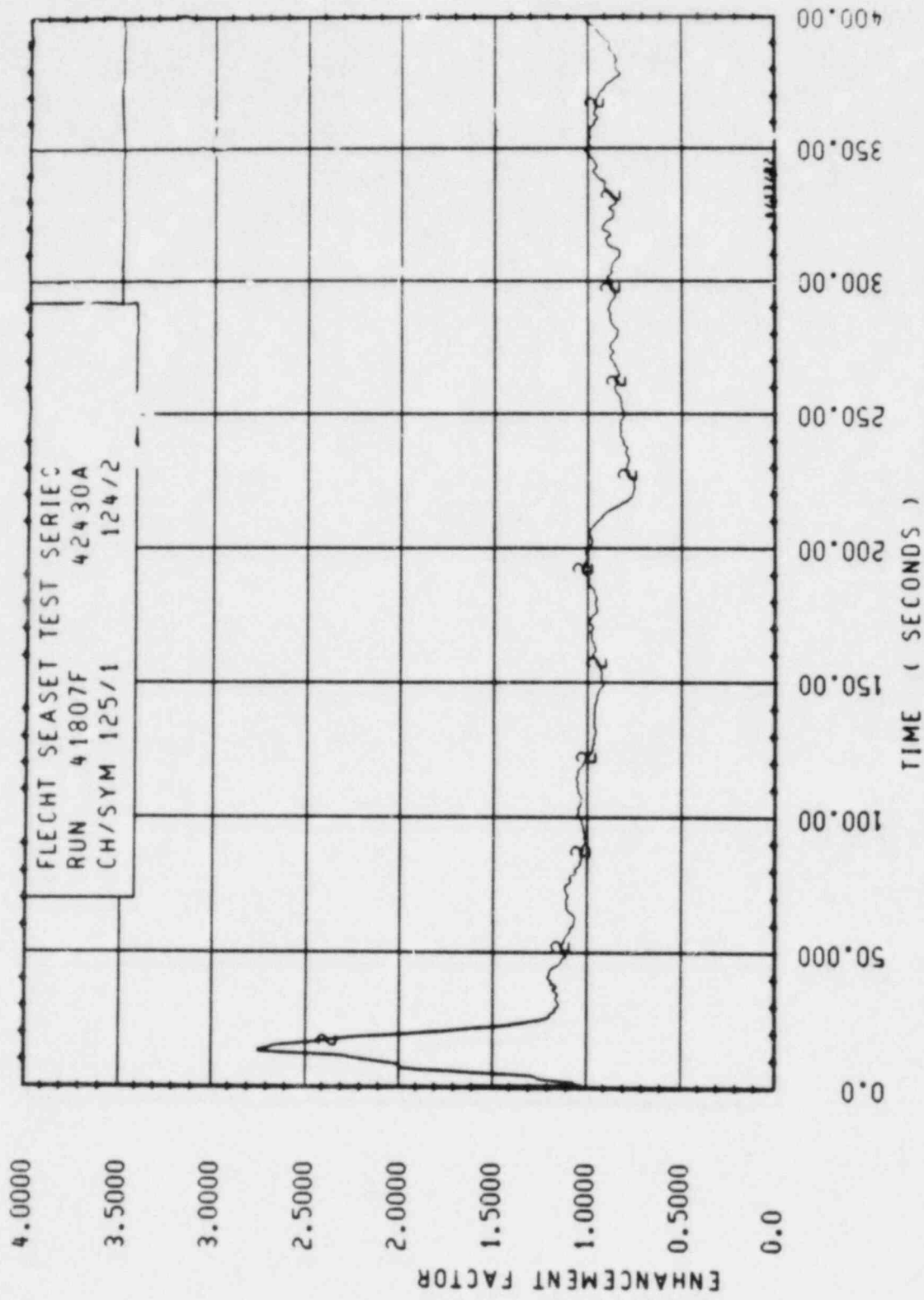


Figure O-89. Enhancement Factor for Run 41807F, Rod 3B, 2.29 m (90 in.) Elevation

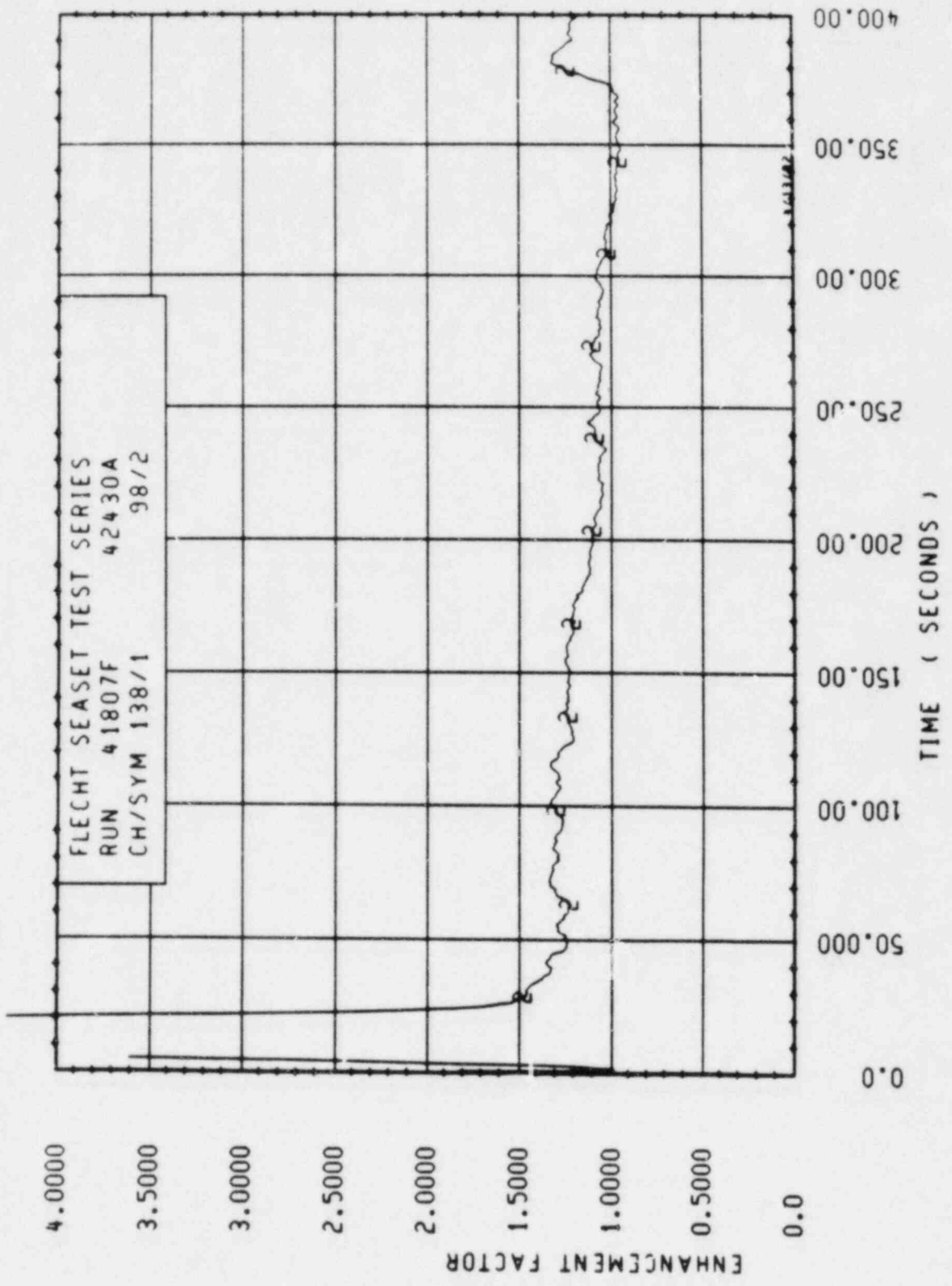


Figure O-90. Enhancement Factor for Run 41807F, Rod 3D, 2.44 m (96 in.) Elevation

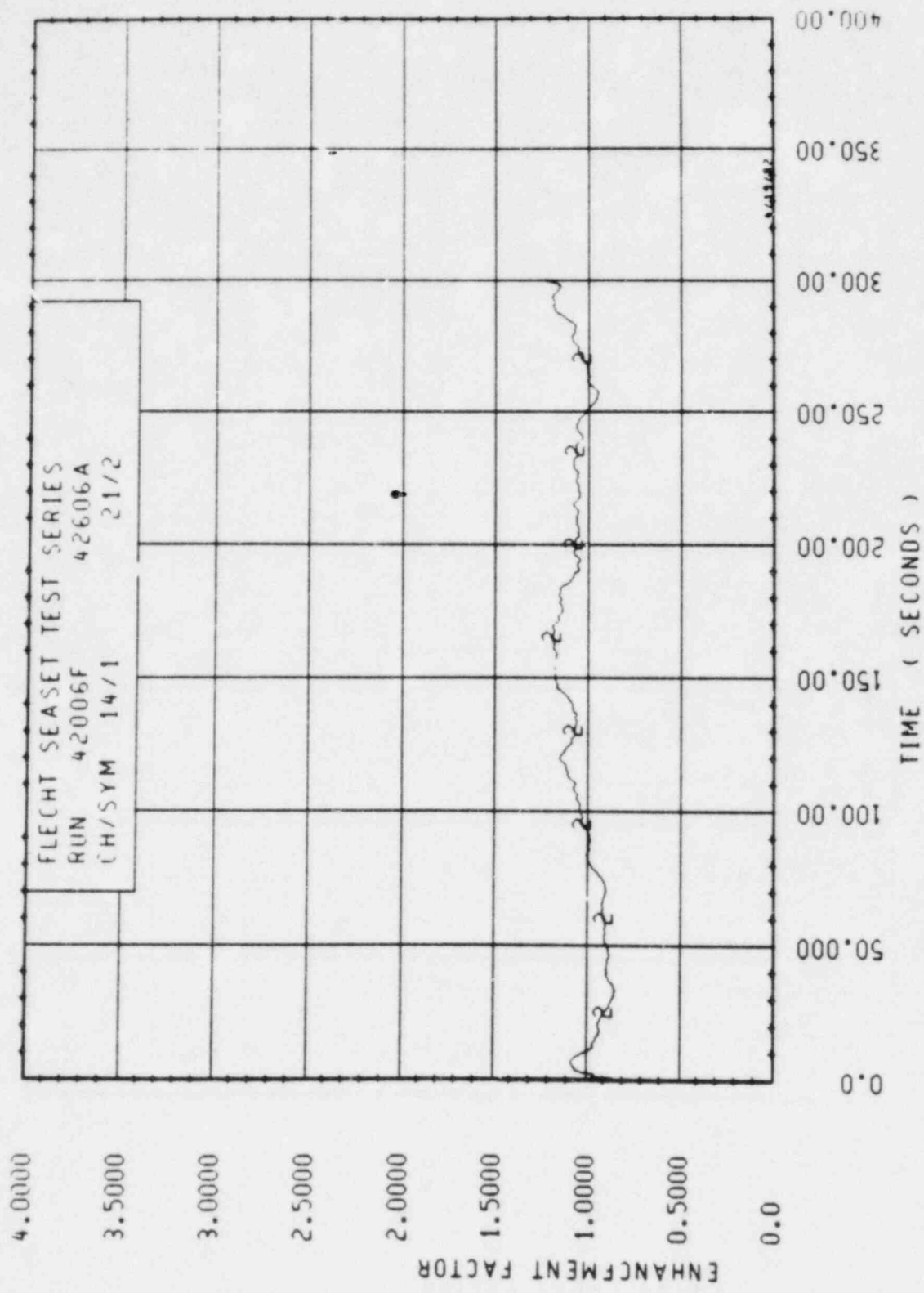


Figure O-91. Enhancement Factor for Run 42006F, Rod 2A, 1.67 m (65.7 in.) Elevation

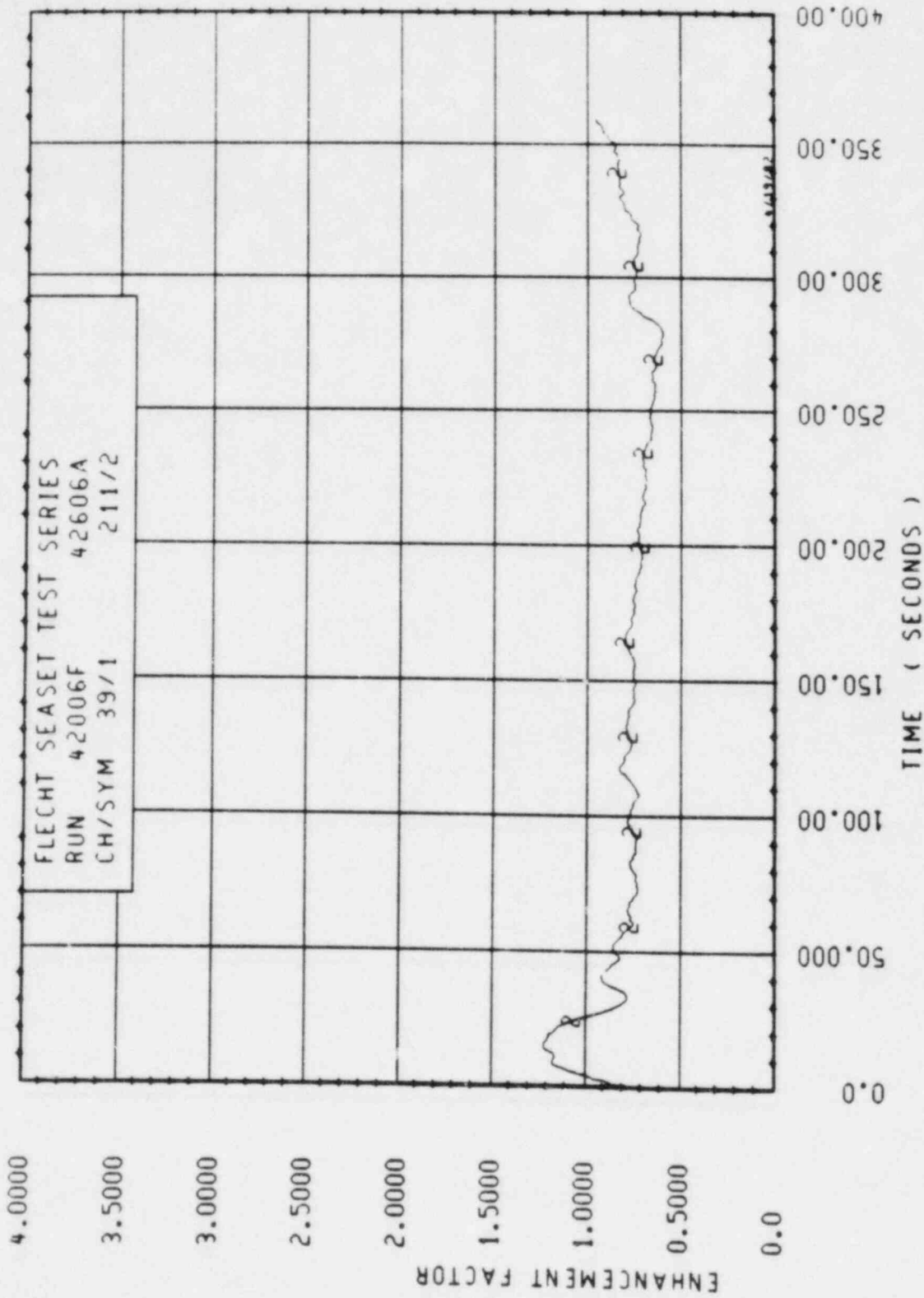


Figure O-92. Enhancement Factor for Run 42006F, Rod 2D, 1.90 m (74.7 in.) Elevation

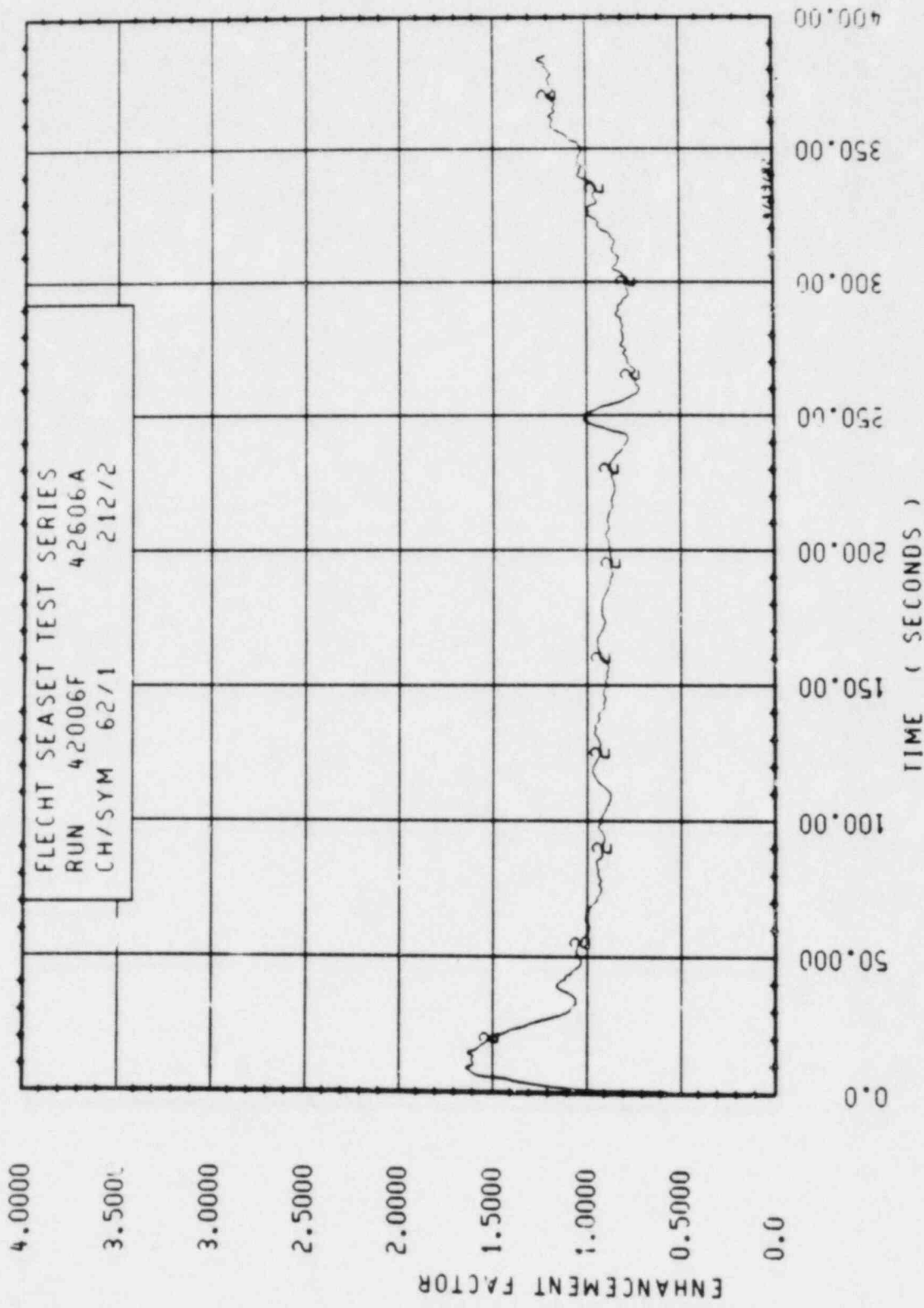


Figure O-93. Enhancement Factor for Run 42006F, Rod 2D, 1.95 m (76.9 in.) Elevation

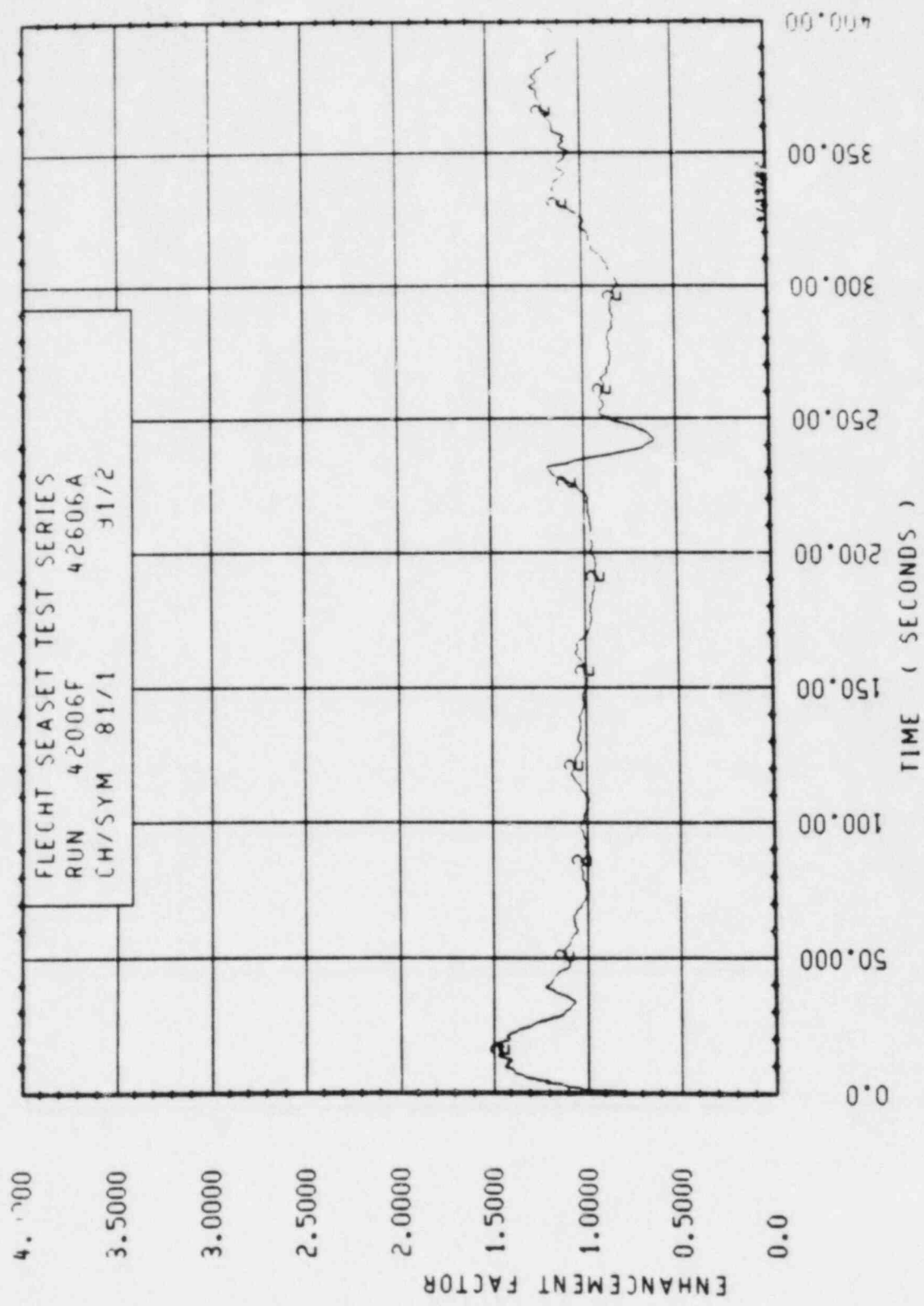


Figure O-94. Enhancement Factor for Run 42006F, Rod 2D, 2.00 m (78.9 in.) Elevation

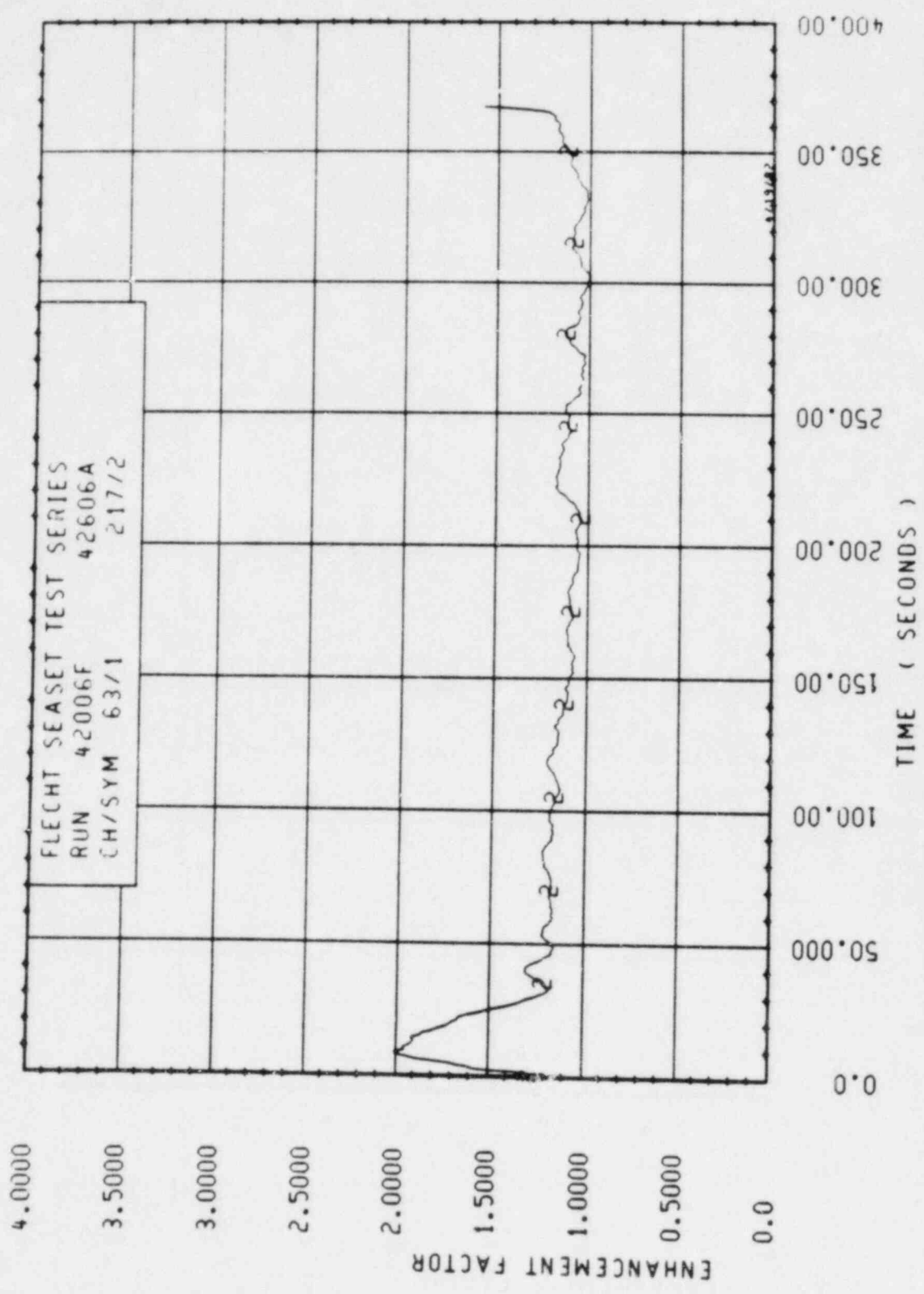


Figure O-95. Enhancement Factor for Run 42006F, Rod 3B, 1.95 m (76.7 in.) Elevation

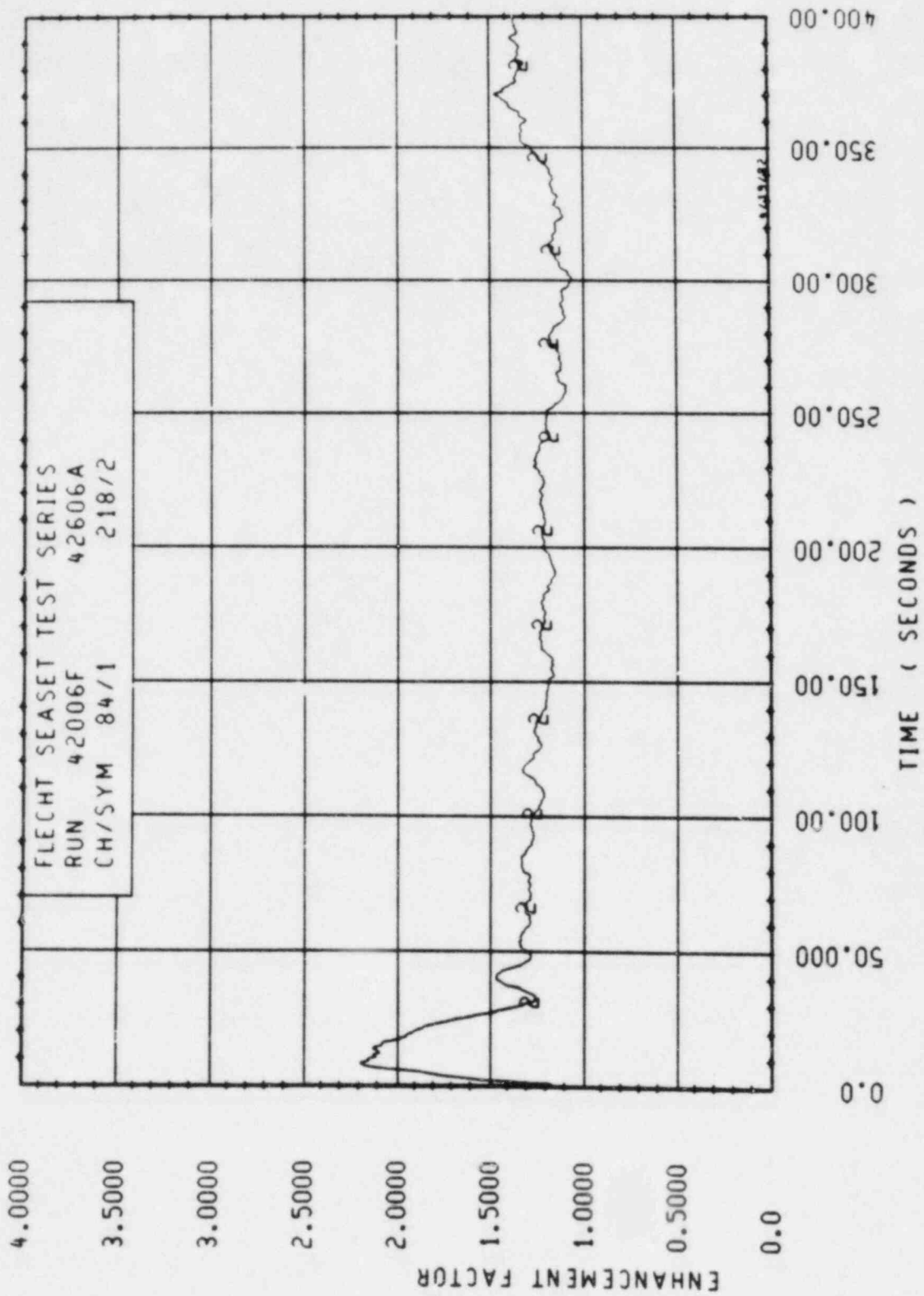


Figure O-96. Enhancement Factor for Run 42006F, Rod 3B, 2.00 m (78.9 in.) Elevation

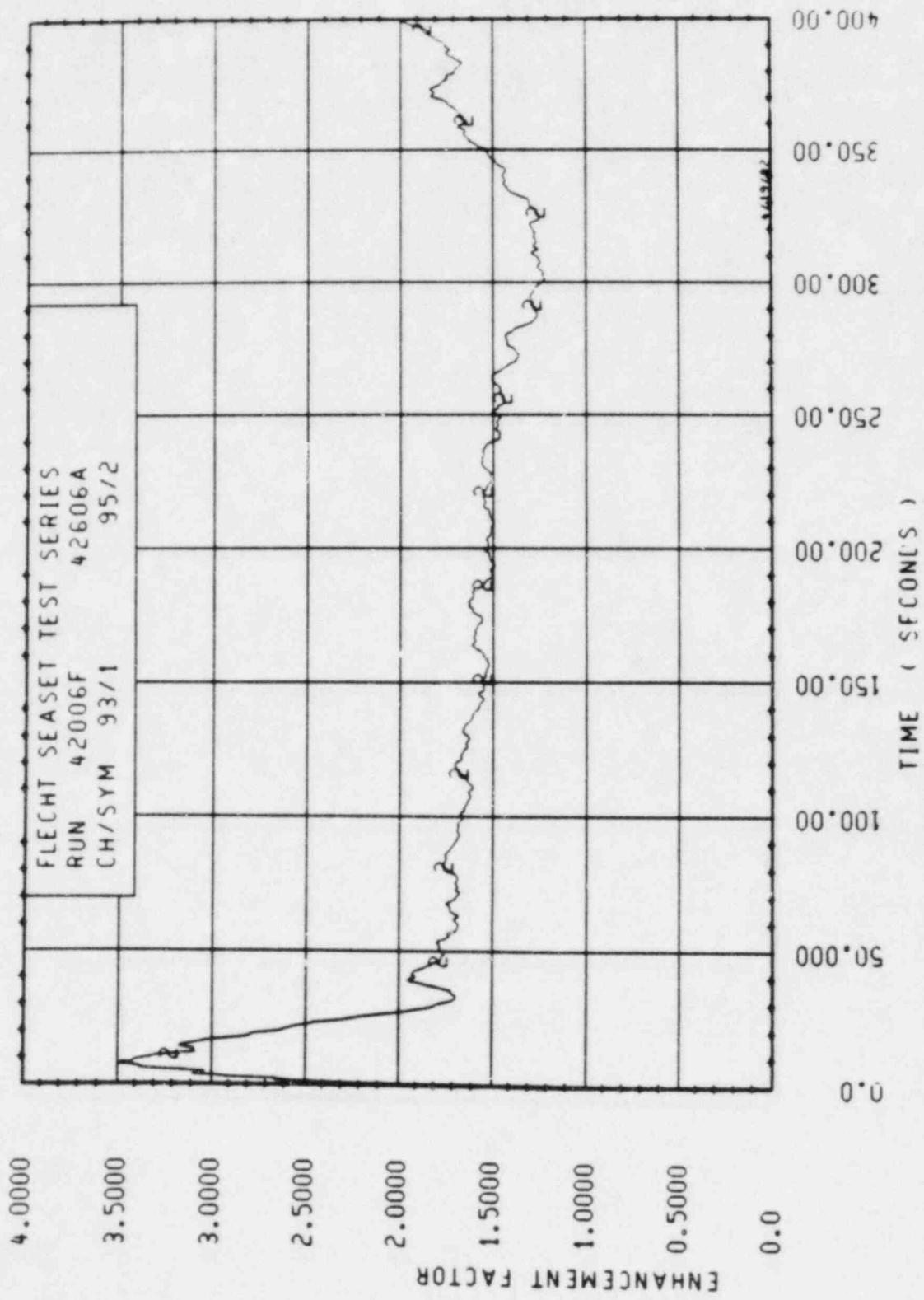


Figure O-97. Enhancement Factor for Run 42006F, Rod 3C, 2.02 m (79.6 in.) Elevation

66-0

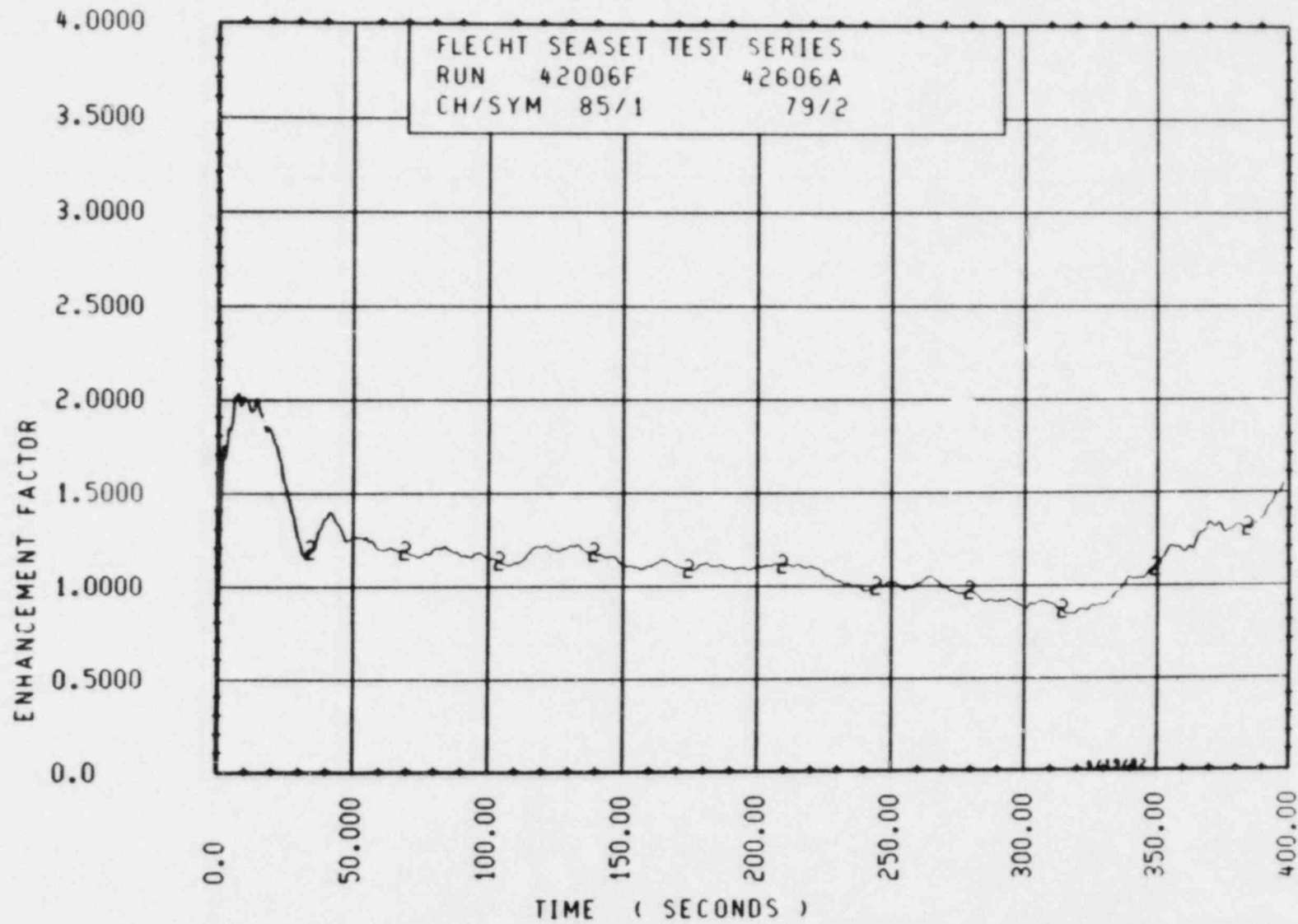


Figure O-98. Enhancement Factor for Run 42006F, Rod 3D, 2.02 m (79.5 in.) Elevation

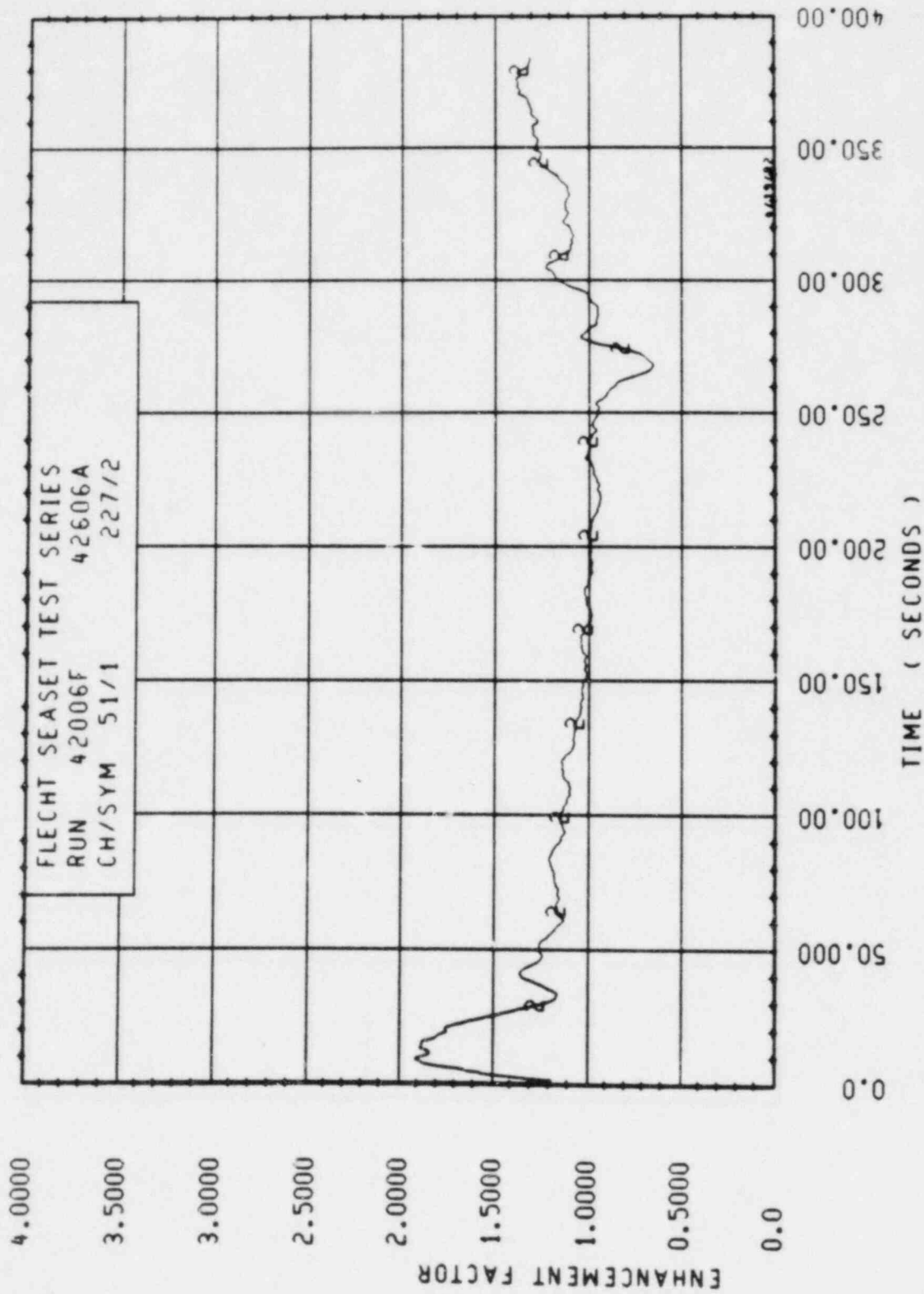


Figure O-99. Enhancement Factor for Run 42006F, Rod 4B, 1.94 m (76.2 in.) Elevation

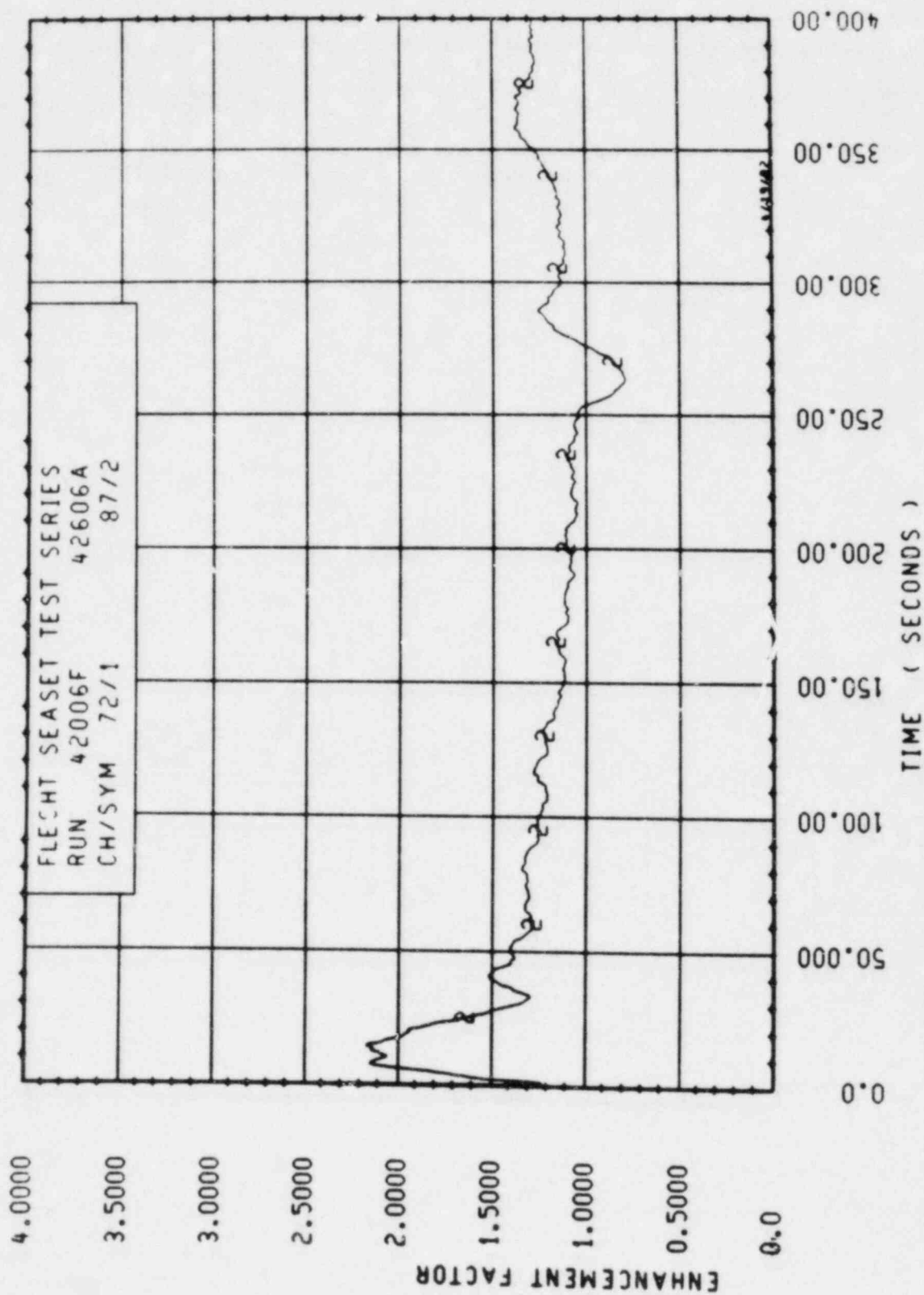


Figure O-100. Enhancement Factor for Run 42006F, Rod 4B, 1.99 m (78.4 in.) Elevation

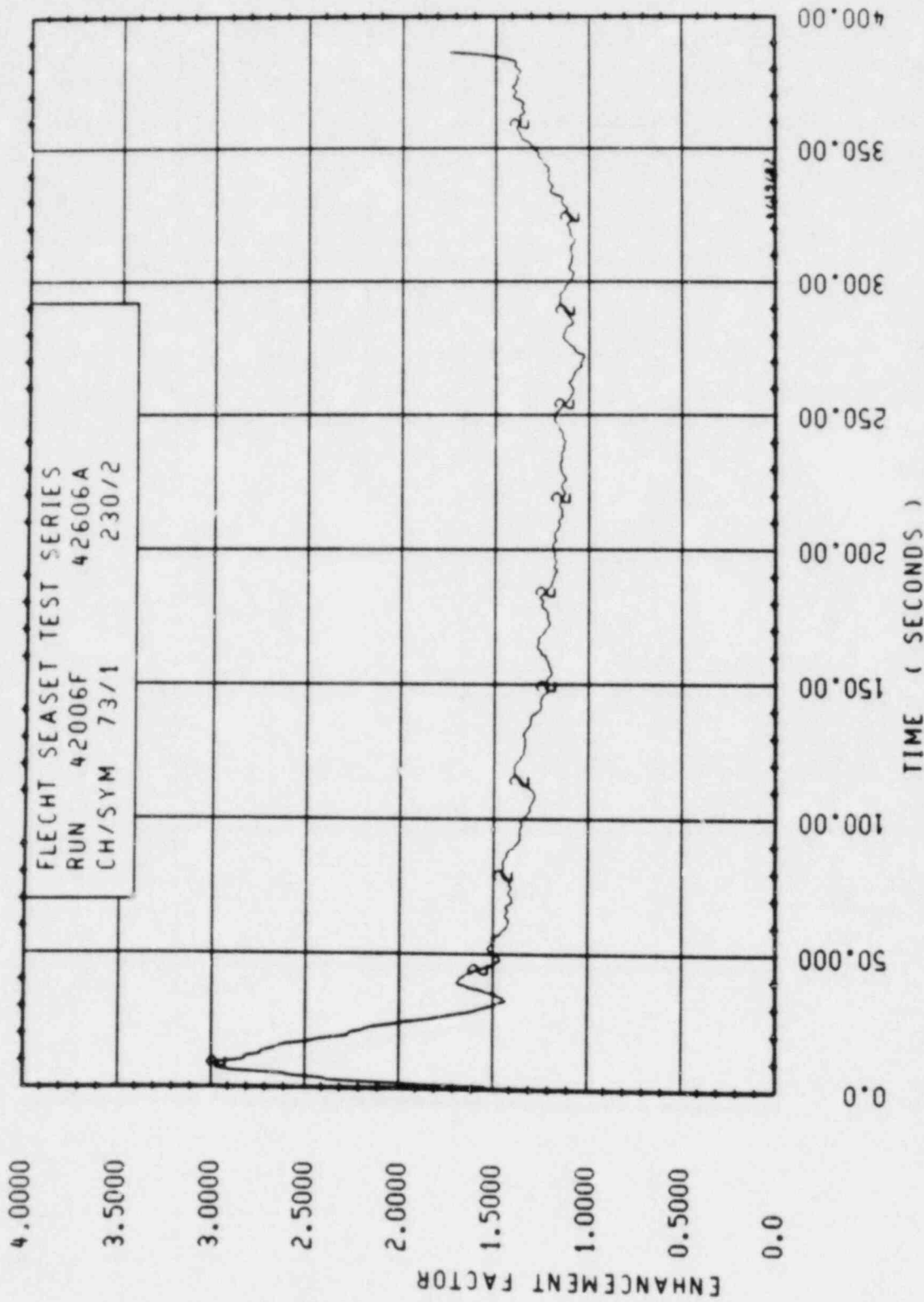


Figure O-101. Enhancement Factor for Run 42006F, Rod 4C, 1.99 m (78.2 in.) Elevation

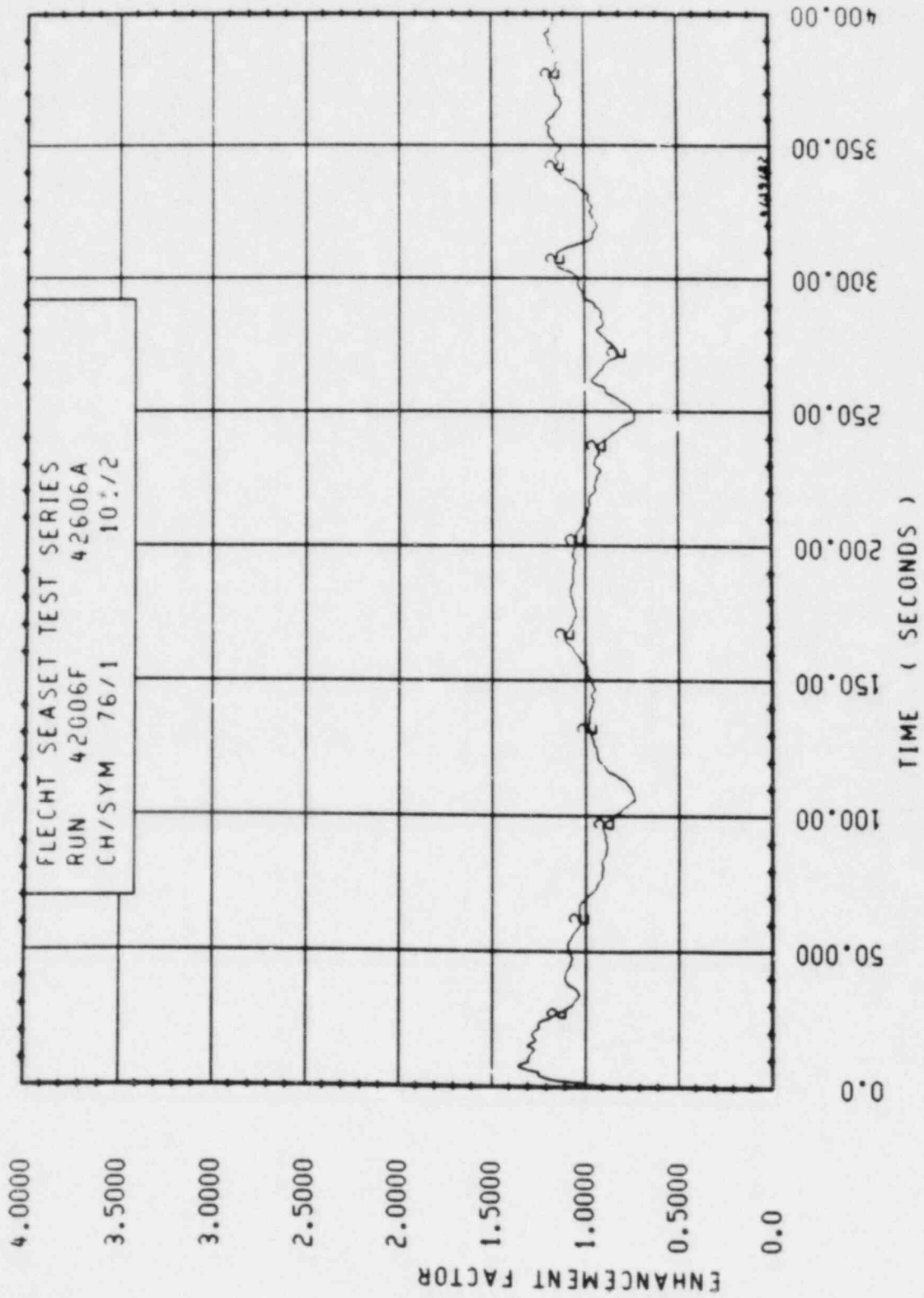


Figure O-102. Enhancement Factor for Run 42006F, Rod 5C, 1.99 m (78.3 in.) Elevation

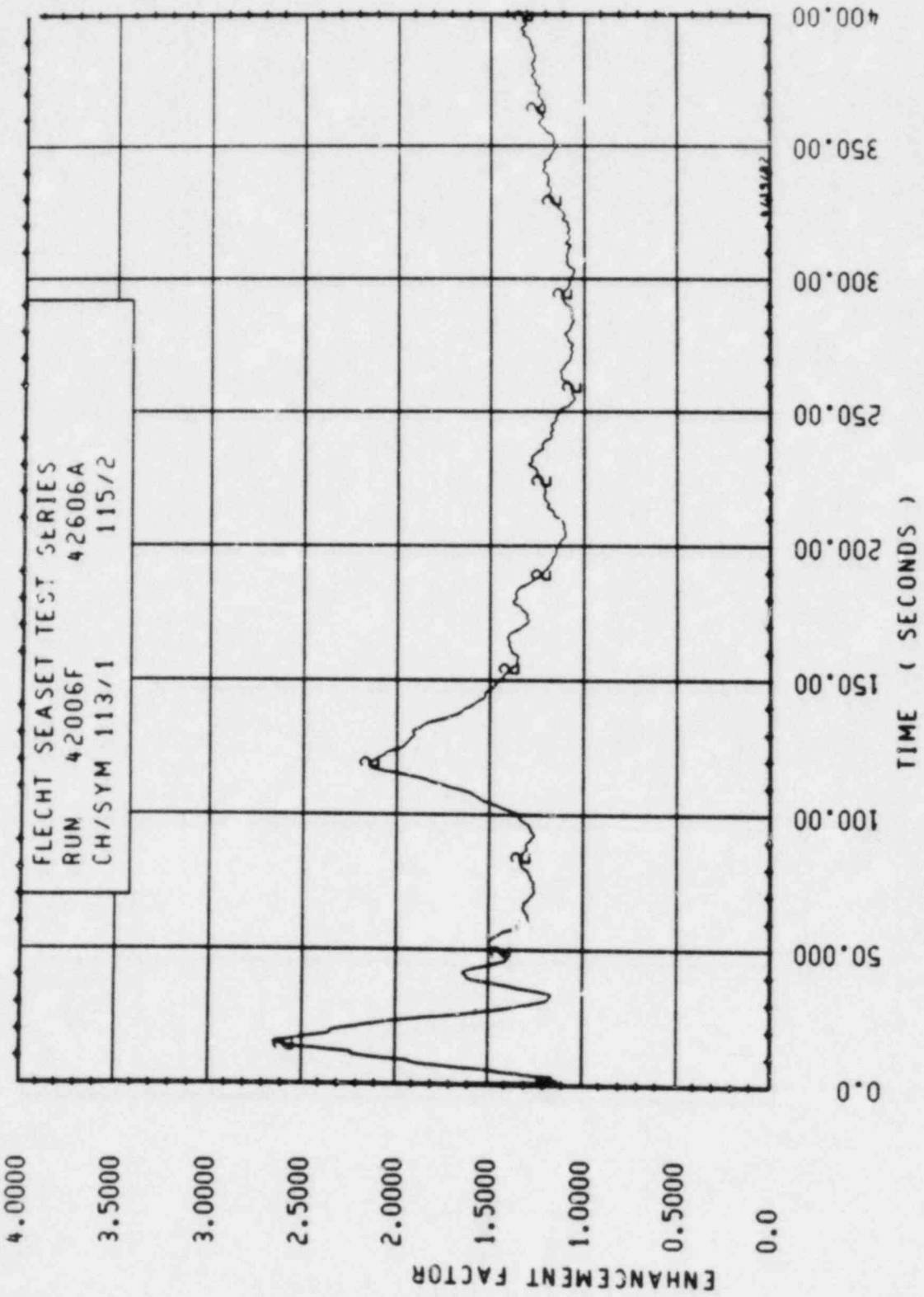


Figure O-103. Enhancement Factor for Run 42006F, Rod 3D, 2.13 m (84 in.) Elevation

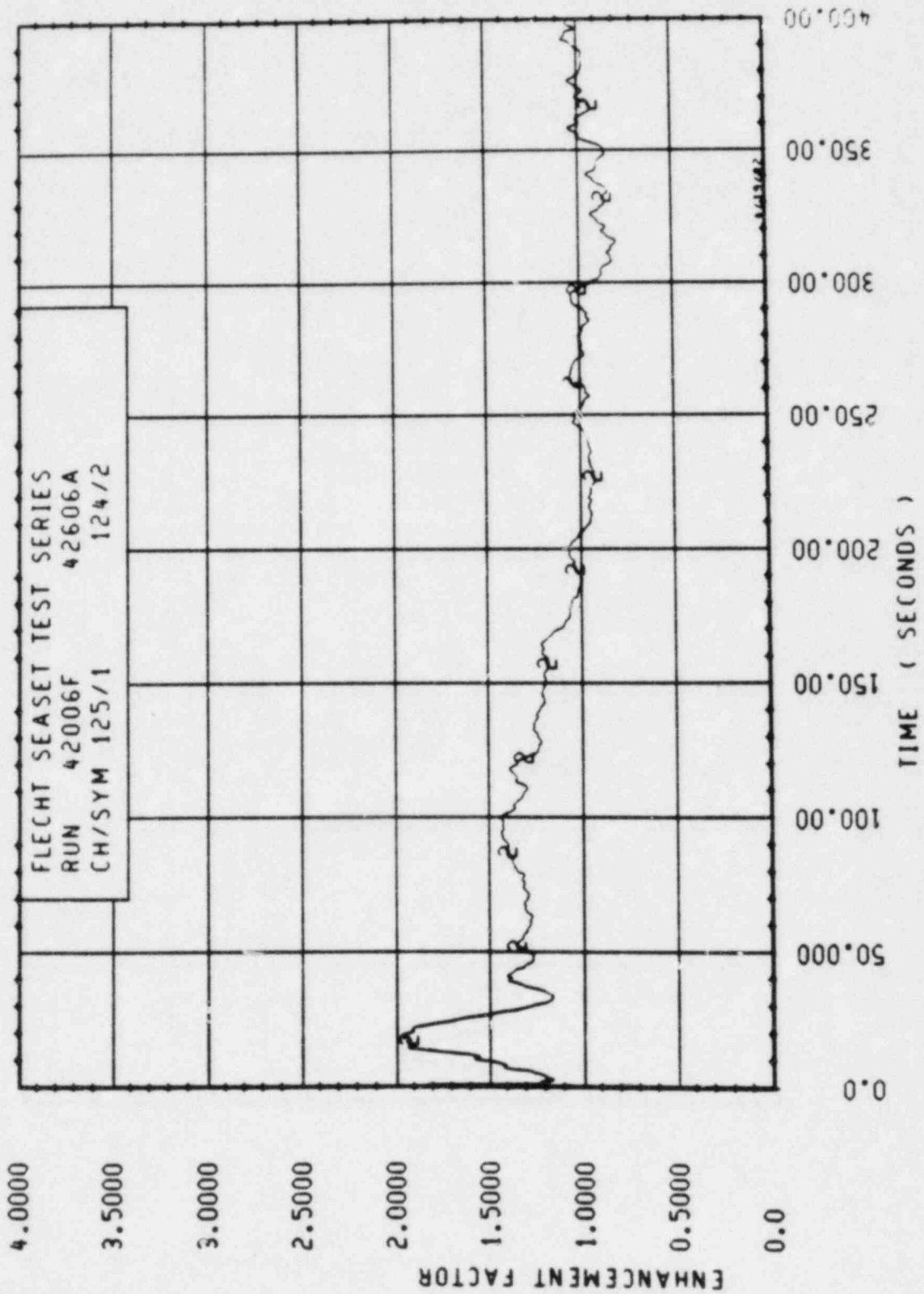


Figure O-104. Enhancement Factor for Run 42006F, Rod 3B, 2.29 m (90 in.) Elevation

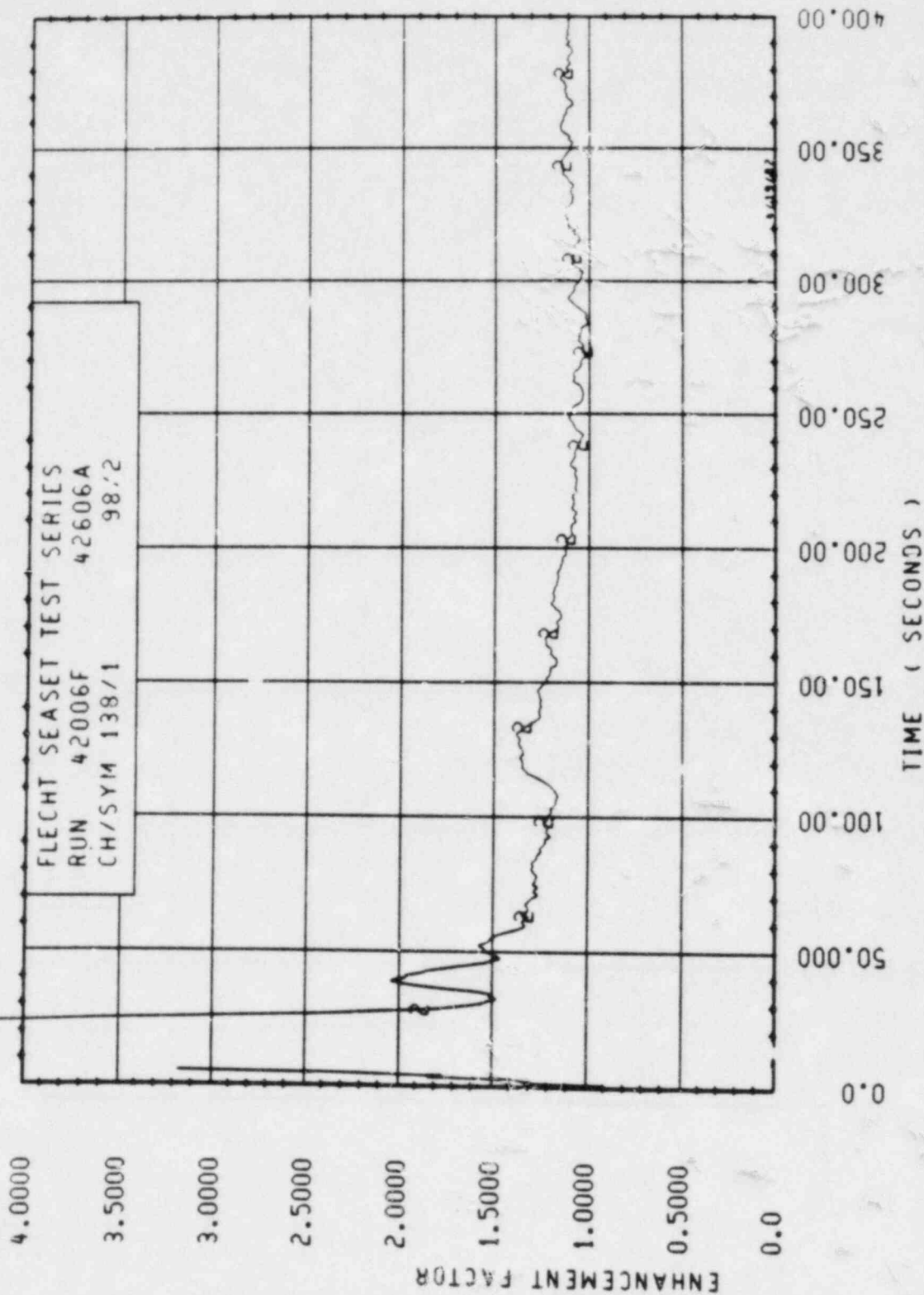


Figure O-105. Enhancement Factor for Run 42006F, Rod 3D, 2.44 m (96 in.) Elevation

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:

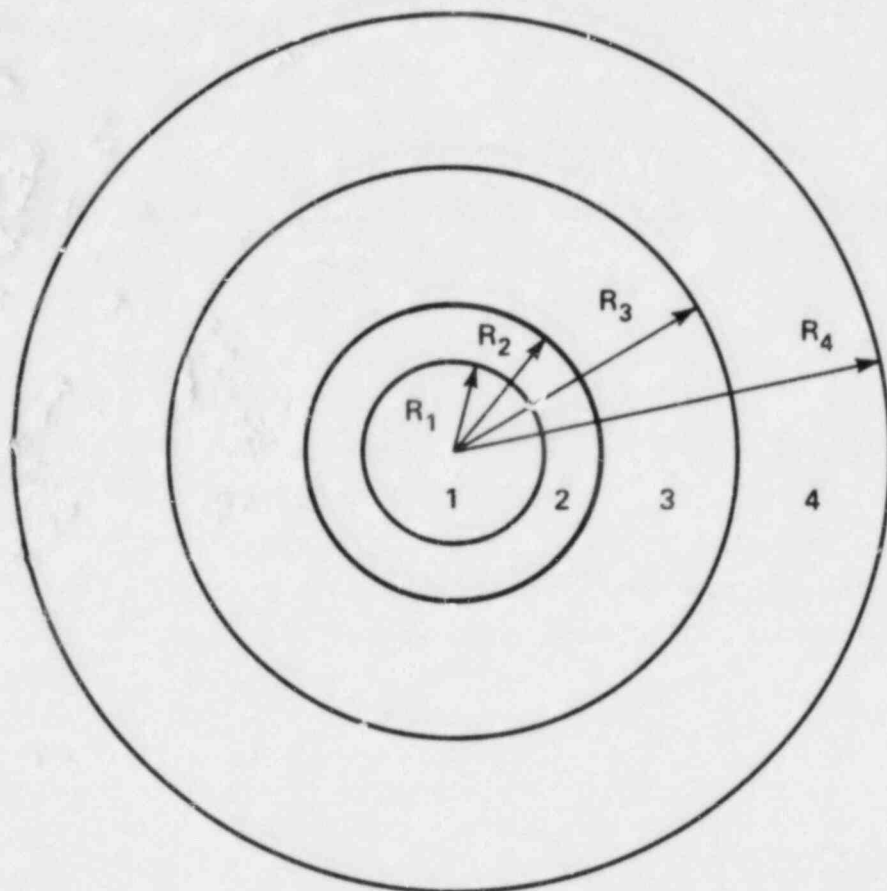
$$(A\rho C_p)_{\text{rod}} = (A\rho C_p)_{\text{BN}} + (A\rho C_p)_{\text{KN}} + (A\rho C_p)_{\text{SS}} \quad (\text{P-1})$$

The first and second terms on the right-hand side of equation (P-1) were calculated according to the following:

$$(A\rho C_p)_{\text{BN}} = (\rho C_p)_{\text{BN}} (A)_{\text{zone 1}} + (A)_{\text{zone 3}} + (A)_{\text{zone 2}} (1-f) \quad (\text{P-2})$$

$$(A\rho C_p)_{\text{KN}} = (\rho C_p)_{\text{KN}} (A)_{\text{zone 2}} f \quad (\text{P-3})$$

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 [$\text{J/kg-}^\circ\text{C}$ ($\text{Btu/lb-}^\circ\text{F}$)] |
|-----------------------------|--|--|
| Boron nitride (BN) | 1995 (124.8) | 2017.7-1396.3 e (-0.00245 T) [0.48193-0.33349 e (-0.0013611 T)] |
| Kanthai (KN) | 7145 (446) | 456 + 0.46 T for $T \leq 649^\circ\text{C}$ [0.109 + (5.9E-5)T for $T \leq 1200^\circ\text{F}$] -1758 + 0.39 T for $649^\circ\text{C} < T \leq 760^\circ\text{C}$ [-0.42 + (5.0E-4)T for $1200^\circ\text{F} < T \leq 1400^\circ\text{F}$] 4162 - 3.8 T for $760^\circ\text{C} < T \leq 871^\circ\text{C}$ [0.994-(5.1E-4)T for $1400^\circ\text{F} < T \leq 1600^\circ\text{F}$] 664.9 + 0.090 T for $T > 871^\circ\text{C}$ [0.1588 + (1.2E-5)T for $T > 1600^\circ\text{F}$] |
| Stainless steel 304 (SS) | 8026 (501) | 444 + 0.2888 T for $T \leq 315.11^\circ\text{C}$ [0.106 + (3.833E-5)T for $T \leq 599.25^\circ\text{F}$] 484.4 + 0.1668 T for $T > 315.11^\circ\text{C}$ [0.1157 + (2.2143E-5)T for $T > 599.25^\circ\text{F}$] |

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 (136) | 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.

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|--|--|---|--|--|--|
| NRC FORM 335 (7-77) | | U.S. NUCLEAR REGULATORY COMMISSION BIBLIOGRAPHIC DATA SHEET | | 1. REPORT NUMBER (Assigned by DDC) NUREG/CR-2444, Vol. 2 EPRI NP-2014 WCAP-9992 | |
| 4. TITLE AND SUBTITLE (Add Volume No., if appropriate) PWR FLECHT SEASET 21-Rod Bundle Flow Blockage Task Data and Analysis Report, NRC/EPRI/Westinghouse Report No. 11. Appendices K-P. | | | | 2. (Leave blank) | |
| 7. AUTHOR(S) M. J. Loftus, L. E. Hochreiter, N. Lee, M.F. McGuire, A. H. Wenzel, M. M. Valkovic | | | | 3. RECIPIENT'S ACCESSION NO. | |
| 9. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code) Westinghouse Electric Corporation Nuclear Energy Systems Post Office Box 355 Pittsburgh, Pennsylvania 15230 | | | | 5. DATE REPORT COMPLETED MONTH: June YEAR: 1982 | |
| 12. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code) U.S. Nuclear Regulatory Commission Electric Power Office of Nuclear Regulatory Research Institute Research 3412 Hillview Ave. Division of Accident Evaluation Palo Alto, CA 94303 Washington, D. C. 20555 | | | | 6. (Leave blank) | |
| 13. TYPE OF REPORT Technical | | | | 10. PROJECT/TASK/WORK UNIT NO. | |
| 15. SUPPLEMENTARY NOTES | | | | 11. CONTRACT NO. B6204 | |
| 16. ABSTRACT (200 words or less) <p>This report presents data and limited analysis from the 21-Rod Bundle Flow Blockage Task of the Full-Length Emergency Cooling Heat Transfer Sep rate 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 on predicting reflooding behavior of flow blockage configurations, and to screen flow blockage configurations for future 163-rod flow blockage bundle tests.</p> | | | | 14. (Leave blank) | |
| 17. KEY WORDS AND DOCUMENT ANALYSIS | | | | 17a. DESCRIPTORS | |
| 17b. IDENTIFIERS/OPEN-ENDED TERMS | | | | | |
| 18. AVAILABILITY STATEMENT Unlimited | | | | 19. SECURITY CLASS (This report) Unclassified | |
| | | | | 21. NO. OF PAGES | |
| | | | | 20. SECURITY CLASS (This page) Unclassified | |
| | | | | 22. PRICE \$ | |

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NUCLEAR REGULATORY COMMISSION
WASHINGTON, D C. 20555

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