PWR FLECHT SEASET Unblocked Bundle, Forced and Gravity Reflood Task Data Report

Volume 2: Appendix C

EPRI

EPRI NP-1459
Volume 2
Project 959-1
Interim Report
September 1981
FLECHT SEASET Program
Report No. 7
NUREG/CR-1532
WCAP-9699

Keywords:
Reflooding
Gravity Reflooding
Steam-Cooling Test
Heater Rod Bundle
Boiloff Test
Heat Transfer Coefficient

Prepared by
Westinghouse Electric Corporation
Pittsburgh, Pennsylvania

ELECTRIC POWER RESEARCH INSTITUTE

PWR FLECHT SEASET Unblocked Bundle, Forced and Gravity Reflood Task Data Report
Volume 2: Appendix C

NP-1459, Volume 2
Research Project 959-1
FLECHT SEASET Program Report No. 7
NUREG/CR-1532
WCAP-9699

Interim Report, September 1981

Prepared by

WESTINGHOUSE ELECTRIC CORPORATION
Nuclear Energy Systems
P.O. Box 355
Pittsburgh, Pennsylvania 15230

Principal Investigators
M. J. Loftus
L. E. Hochreiter
C. E. Conway
C. E. Dodge
A. Tong
E. R. Rosal
M. M. Valkovic
S. Wong

Prepared for

United States Nuclear Regulatory Commission
Washington, D.C. 20555

Program Management Representative
L. H. Sullivan

Westinghouse Electric Corporation

Program Management Representative
L. Chajson

Electric Power Research Institute
3412 Hillview Avenue
Palo Alto, California 94304

EPRI Project Manager
Bill K. H. Sun

Analysis and Testing Program
Nuclear Power Division

ORDERING INFORMATION

Requests for copies of this report should be directed to Research Reports Center (RRC), Box 50490, Palo Alto, CA 94303, (415) 965-4081. There is no charge for reports requested by EPRI member utilities and affiliates, contributing nonmembers, U.S. utility associations, U.S. government agencies (federal, state, and local), media, and foreign organizations with which EPRI has an information exchange agreement. On request, RRC will send a catalog of EPRI reports.

Copyright © 1981 Electric Power Research Institute, Inc.

EPRI authorizes the reproduction and distribution of all or any portion of this report and the preparation of any derivative work based on this report, in each case on the condition that any such reproduction, distribution, and preparation shall acknowledge this report and EPRI as the source.

NOTICE

This report was prepared by the organization(s) named below as an account of work sponsored by the Electric Power Research Institute, Inc. (EPRI). Neither EPRI, members of EPRI, the organization(s) named below, nor any person acting on behalf of any of them: (a) makes any warranty, express or implied, with respect to the use of any information, apparatus, method, or process disclosed in this report or that such use may not infringe privately owned rights; or (b) assumes any liabilities with respect to the use of, or for damages resulting from the use of, any information, apparatus, method, or process disclosed in this report.

Prepared by
Westinghouse Electric Corporation
Pittsburgh, Pennsylvania

EPRI PERSPECTIVE

PROJECT DESCRIPTION

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

PROJECT OBJECTIVE

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

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

PROJECT RESULTS

Accomplishments to date are documented in the following FLECHT SEASET Program NRC/EPRI/W Reports: No. 1 (Program Plan, December 1977), No. 2 (Steam Generator

Separate-Effects Task Plan, March 1978), No. 3 (Unblocked Bundle Reflood Task Plan, March 1978), No. 4 (Steam Generator Separate-Effects Task Data Report, January 1980), No. 5 (21-Rod Bundle Flow Blockage Task Plan Report, EPRI Interim Report NP-1382, October 1980), and No. 6 (161-Rod Bundle Flow Blockage Task Plan Report, EPRI Interim Report NP-1458, January 1981).

This report, presented in two volumes, systematically compiles the experimental data obtained from the unblocked 161-rod bundle forced and gravity reflooding tests. It also describes in detail the experimental system, the instrumentation, the test procedures, and the data reduction methods. Since this is the only reflooding data available to the public from a simulated PWR 17 x 17 rod geometry fuel bundle, the data can be used to generate reflooding correlations for the current licensing evaluation models or to assess the best-estimate LOCA system codes.

Bill K. H. Sun, Program Manager
Nuclear Safety and Analysis Department
FLECHT SEASET Program, EPRI Management Representative

ABSTRACT

This report presents data from the Unblocked Bundle, Forced and Gravity Reflood Task of the Full-Length Emergency Core Heat Transfer Separate Effects and Systems Effects Tests (FLECHT SEASET) program. The tests consisted of forced and gravity reflood experiments and steam cooling tests, using electrical heater rods to simulate current nuclear fuel arrays (similar to Westinghouse 17 x 17 assemblies) of PWR and PWR fuel vendors. Data obtained include rod clad temperatures, turnaround and quench times, heat transfer coefficients, inlet flooding rates, overall mass balance, differential pressures and calculated void fractions in the test section, thimble wall and steam temperatures, and exhaust steam and liquid carryover rates.

ACKNOWLEDGMENTS

The work of the following Westinghouse Nuclear Energy Systems contributors is hereby acknowledged:

NTD STRATEGIC PROJECTS
L. Chajson
H. W. Massie, Jr.

SAFEGUARDS DEVELOPMENT
R. P. Vijuk
N. Lee
K. Beatty
D. H. Dixon
M. A. Emery
D. P. Kitzmiller
K. F. McNamee
D. P. Remlinger
D. W. Sklarsky

MATHEMATICS AND PROGRAMMING
R. W. Steer

FACILITIES ENGINEERING
L. R. Katz
B. R. Sinwell
P. M. Brumbaugh

TEST OPERATIONS
C. E. Fuchs
P. F. Orangio
F. L. Lilly
J. T. Martin
N. Washington
J. Kalo
M. Mulligan
J. Tomasic
J. Latta

NFD METALLOGRAPHY
P. Heasley

PUBLICATION PROGRAMS
J. G. Nagle

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

EPRI - K. H. Sun, R. B. Duffey
NRC-RSR - L. B. Thompson
NRC-NRR - W. Hodges
EG&G - G. Wilson
NUS Corporation - D. A. Prelewicz

TABLE OF CONTENTS

Section	Title	Page
1	SUMMARY	1-1
2	INTRODUCTION	2-1
	2-1. General	2-1
	2-2. Task Objectives	2-4
	2-3. Test Facility	2-4
	2-4. Reference Conditions and Test Parameters	2-5
	2-5. Test Matrix	2-7
3	SYSTEM DESCRIPTION	3-1
	3-1. As-Built Facility Description	3-1
	3-2. Gravity Reflood Tests	3-2
	3-3. Steam Cooling Tests	3-6
	3-4. Heater Rod Bundle	3-6
	3-5. System Design Features	3-6
	3-6. Low Mass Housing	3-19
	3-7. Bundle Differential Pressure Cells	3-19
	3-8. Heater Rod Seals	3-21
	3-9. Steam Probes	3-21
	3-10. Pressure Control	3-22
	3-11. Facility and Bundle Operation	3-22
	3-12. Power Measurement	3-22
	3-13. Coolant Injection System	3-23
	3-14. Data Acquisition Systems	3-23
	3-15. Computer Data Acquisition System (CDAS)	3-23
	3-16. Fluke Data Logger	3-24

TABLE OF CONTENTS (cont)

Section	Title	Page
	3-17. Multiple-Pen Strip Chart Recorders	3-25
3-18.	Instrumentation	3-25
	3-19. Heater Rod Bundle Instrumentation	3-26
	3-20. Test Section Instrumentation	3-26
	3-21. Carryover Tank Instrumentation	3-26
	3-22. Steam Separator Instrumentation	3-29
	3-23. Exhaust Pipe Instrumentation	3-29
	3-24. Accumulator Tank Instrumentation	3-29
	3-25. Injection Line Instrumentation	3-29
	3-26. Gravity Reflood Test Instrumentation	3-29
3-27.	Test Procedure	3-30
	3-28. Gravity Reflood Test Procedure	3-31
	3-29. Steam Cooling Test Procedure	3-32
	3-30. Boiloff Test Procedure	3-32
3-31.	Heater Rod Replacement	3-32
3-32.	Photographic Studies	3-35
TEST RESULTS		4-1
4-1.	Summary of Run Conditions and Test Results	4-1
4-2.	Data Reduction Methods	4-2
	4-3. Mass Balance Data	4-2
	4-4. Quench Criteria	4-2
	4-5. Heat Transfer Coefficients	4-20
4-6.	Failed Rods	4-22
4-7.	Steam Cooling Tests	4-24
4-8.	Rod Bundle Distortion	4-25
4-9.	Summary and Conclusions	4-26

TABLE OF CONTENTS (cont)

Section	Title	Page
APPENDIX A	DETAILED FACILITY DESCRIPTION	A-1
APPENDIX B	PHOTOGRAPHIC STUDIES	B-1
APPENDIX C	DATA TABLES AND PLOTS	VOLUME 2
APPENDIX D	ERROR ANALYSIS	D-1
APPENDIX E	CALCULATION TECHNIQUES	E-1
APPENDIX F	FAILED ROD ANAYSIS	F-1
APPENDIX G	ROD BUNDLE DISTORTION	G-1
APPENDIX H	EXTERNAL DISTRIBUTION	H-1

LIST OF ILLUSTRATIONS

Figure	Title	Page
2-1	Decay Power Curve (ANS + 20%) 30 Seconds After Initiation of a Loss-of-Coolant Accident	2-6
2-2	Cosine Axial Power Profile	2-8
3-1	FLECHT SEASET Unblocked Bundle Flow Diagram, Forced Reflood Configuration	3-3
3-2	FLECHT SEASET Upper Plenum Baffle	3-5
3-3	Bundle Cross Section	3-7
3-4	FLECHT SEASET Unblocked Bundle Test Section Housing Differential Pressure Cell Hookup	3-20
3-5	FLECHT SEASET Computer Hardware Interface (Unblocked Bundle Task)	3-27
3-6	Upper and Lower Plenum Thermocouple Location	3-28
4-1	FLECHT SEASET Data Reduction Flow Chart	4-17
4-2	Mass Balance Versus Time (Reference Run)	4-18
4-3	FLECHT SEASET Unblocked Bundle Mass Balance Results	4-19
4-4	Temperature History of Hottest Rod Thermocouple (Reference Run)	4-21
4-5	Smoothed Versus Average Heat Transfer Data	4-23

LIST OF TABLES

Table	Title	Page
2-1	Comparison of PWR Vendors' Fuel Rod Geometries (Old and New)	2-2
2-2	Reference Test Conditions for Unblocked Bundle Task	2-9
2-3	Range of Initial Test Conditions for Unblocked Bundle Task	2-11
2-4	Original Forced Reflood, Gravity Reflood, and Steam Cooling Test Matrix	2-13
3-1	Initial Data Acquisition System Channel Assignments	3-8
4-1	FLECHT SEASET Unblocked Bundle Reflood Test Data Summary	4-3
4-2	FLECHT SEASET Unblocked Bundle Steam Cooling Test Data Summary	4-15

GLOSSARY

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

Analysis -- the examination of data to determine, if possible, the basic physical processes that occur and the interrelation of the processes. Where possible, physical processes will be identified from the data and will be related to first principles.

Average fluid conditions -- average thermodynamic properties (for example, enthalpy, quality, temperature, pressure) and average thermal-hydraulic parameters (for example, void fraction, mass flow rate) which are derived from appropriately reduced data for a specified volume or a specified cross-sectional area

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

Bundle -- a number of heater rods, including spares, which are assembled into a matrix with CRG-type rods, using necessary support hardware to meet the Task Plan design requirements

Carryout -- same as carryover

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

Computational methods -- the procedure of reducing, analyzing, and evaluating data or mathematical expressions, either by hand calculations or by digital computer codes

Computer code -- a set of specific instructions in computer language to perform the desired mathematical operations utilizing appropriate models and correlations

Computer data acquisition system (CDAS) -- the system which controls the test and records data for later reduction and analysis

Computer tape -- magnetic tapes that store FLECHT SEASET data

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)

Correlation -- a set of mathematical expressions, based on physical principles and experimental data but resting primarily on experimental data, which describes the thermal-hydraulic behavior of a system

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.

Data -- recorded information, regardless of form or characteristic, of a scientific or technical nature. It may, for example, document research, experimental, developmental, or engineering work, or be usable or used to define a design or process or to procure, produce, support, maintain, or operate material. The data may be graphic or pictorial delineations in media such as drawings or photographs, text in specifications or related performance or design type documents, or computer printouts. Examples of data include research and engineering data, engineering drawings and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identifications and related information, computer programs, computer codes,

computer data bases, and computer software documentation. The term data does not include financial, administrative, cost and pricing, and management information or other information incidental to contract administration.

Data validation -- a procedure used to ensure that the data generated from a test meet the specified test conditions, and that the instrumentation was functioning properly during the test

Design and procurement -- the design of the system, including the specification (consistent with the appropriate Task Plan) of the material, component, and/or system of interest; and the necessary purchasing function to receive the material, component, and/or system on the test site. This does not preclude Contractor from constructing components and systems on the test site to meet requirements of the Task Plan.

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

Evaluation -- the process of comparing the data with similar data, other data sets, existing models and correlations, or computer codes to arrive at general trends, consistency, and other qualitative descriptions of the results

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

FLECHT SET -- Full-Length Emergency Core Heat Transfer - Systems Effects Tests

Heat transfer mechanisms -- the process of conduction, convection, radiation, or phase changes (for example, vaporization, condensation, boiling) in a control volume or a system

Hypothetical -- conjectured or supposed. It is understood that this program is concerned with study of physical phenomena associated with reactor accidents that have an extremely low probability and are therefore termed hypothetical.

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

Model -- a set of mathematical expressions generated from physical laws to represent the thermal-hydraulic behavior of a system. A model rests mainly on physical principles.

PMG -- Program Management Group

Pressurized water reactor (PWR) -- a nuclear reactor type in which the system pressure exceeds saturation pressure, thus preventing gross vapor formation under normal operating conditions

Reduce data -- convert data from the measured signals to engineering units. In some cases the data are manipulated in a simple fashion to calculate quantities such as flows.

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

Test section -- lower plenum, bundle, and upper plenum

Test site -- the location of the test facilities where tests will be conducted

Transducer -- the devices used in experimental systems that sense the physical quantities, such as temperature, pressure, pressure difference, or power, and transform them into electrical outputs, such as volts

Unblocked -- the situation in which the flow area in the rod bundle or a single tube is not purposely obstructed

APPENDIX C
DATA TABLES AND PLOTS

This appendix contains the data acquired in 63 valid tests performed with the 17 x 17 rod bundle having a cosine axial power profile. Seven of the 70 tests conducted were considered invalid for the reasons specified in table C-1. The data reported herein represent sample tables and plots for each run. The data have not been analyzed or evaluated in detail. Caution should be observed that erroneous data may exist despite efforts which were made to ensure correct and valid data. A data evaluation report, to be published subsequently, will present the results of the data analysis in greater detail.

For each test run, the following tables and plots are included:

-- Summary and comment sheet - lists the run conditions, rods disconnected and/or failed, housing temperatures, and comments concerning the data

-- Heater rod thermocouple data summary sheet - lists the following information for heater rod thermocouples connected for the entire test program:

(1) Thermocouple designation - rod identification and nominal elevation

For example, 7J 1.83 (72) refers to rod 7J at the 1.83 m (72 in.) elevation.

(2) Initial temperature at flood - rod clad temperature measured at the beginning of power decay and initiation of coolant injection

(3) Maximum temperature - hottest rod clad temperature measured during the run

(4) Temperature rise - difference between the maximum temperature and the initial temperature

(5) Turnaround time - defined in paragraph 4-1

TABLE C-1

INVALID TESTS

Test No.	Run No.	Run Conditions	Comments
4	31404	25 mm/sec (1 in./sec) flooding rate 871°C (1600°F) T_{init} (Reference)	Failed thermocouple scrammed test at initiation of flood.
17	30717	38 mm/sec (1.5 in./sec) flooding rate 538°C (1000°F) T_{init}	Upper heater rod seals on outer rows were observed to leak and test was scrammed.
18	30418	38 mm/sec (1.5 in./sec) flooding rate 260°C (500°F) T_{init}	Rod 4G shorted to ground during test.
23	30123	38 mm/sec (1.5 in./sec) flooding rate 1.3 kw/m (0.4 kw/ft) peak initial power 260°C (500°F) T_{init}	Zone C power was not recorded.
38	33238	Gravity reflood Hot/cold channels 871°C/260°C (1600°F/500°F) T_{init}	Bottom heater rod seals were observed to leak during test; test was terminated.
52	32552	Steam cooling test	SCR power supply failed.
68	36968	Steam cooling test	Boiler steam flow oscillations (∿ ± 40%)

(6) Quench temperature - defined in paragraph 4-1

(7) Quench time - defined in paragraph 4-1

-- Rod clad temperatures and heat transfer coefficients calculated by DATAR for each run at the following rod thermocouples and corresponding elevations:

Rod T/C	Elevation [m (in.)]	Computer Channel
9G	0.305 (12)	2
8N	0.610 (24)	5
9G	0.991 (39)	8
8H	1.22 (48)	13
7J	1.83 (72)	59
8K	1.98 (78)	99
11E	2.29 (90)	124
8K	2.44 (96)	140
11E	2.82 (111)	155
8H	3.05 (120)	163
9G	3.35 (132)	171
8H	3.51 (138)	177

These thermocouples were connected for the entire test series. Table C-2 lists the thermocouple channels and locations connected for each of the valid tests.

It should be noted that the high initial heat transfer coefficient shown for runs with low initial rod clad temperatures of 260°C (500°F) are not correct for approximately the first 10 seconds of the test; these values are not considered realistic. This problem arises because in these tests the specified initial rod temperature was so low that the test began simultaneously with the application of power to the rods. Normally, a heatup period of about 50 seconds is needed to reach the desired initial rod temperature. During this heatup period (indicated by negative values of time in the data), the DATAR calculation was performed. The initialization of the code usually requires a few seconds to reach the correct solution. Thus, in most tests, these erroneous values of heat transfer coefficient occur well before the beginning

TABLE C-2

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

RUN NUMBER	1-FOOT ELEVATION					2-FOOT ELEVATION					3-3 FOOT ELEVATION					
	6J	7E	9G	11E	11I	5H	8E	8K	8N	12F	5E	6J	7E	9G	11G	11I
30223		1	2		3	4			5	6			7	8		9
30323		1	2		3	4			5	6			7	8		9
30518		1	2		3	4			5	6			7	8		9
30619		1	2		3	4			5	6			7	8		9
30817		1	2		3	4			5	6			7	8		9
30921		1	2		3	4			5	6			7	8		9
31021		1	2		3	4			5	6			7	8		9
31108		1	2		3	4			5	6			7	8		9
31203		1	2		3	4			5	6			7	8		9
31302		1	2		3	4			5	6			7	8		9
31504	1		2		3	4			5	6	9	7		8		
31615	1		2		3	4			5	6	9	7		8		
31701	1		2		3	4			5	6	9	7		8		
31805	1		2		3	4			5	6	9	7		8		
31922	1		2		3	4			5	6	9	7		8		
32013	1		2		3	4			5	6	9	7		8		
32114	1		2		3	4			5	6	9	7		8		
32235	1		2		3	4			5	6	9	7		8		
32333	1		2		3	4			5	6	9	7		8		
32452	1		2		3	4			5	6	9	7		8		
32652	1		2		3	4			5	6	9			8		
32753	1		2		3	4			5	6	9	7		8		
32854	1		2		3	4			5	6	9	7		8		
32955	1		2		3	4			5	6	9	7		8		
33056	1		2		3	4			5	6	9	7		8		
33338	1		2		3	4		6	5			7		8	9	
33436	1		2		3	4		6	5			7		8	9	
33544	1		2		3	4		6	5			7		8	9	
33644	1		2		3	4		6	5			7		8	9	
33749	1		2		3	4		6	5			7		8	9	
33849	1		2		3	4		6	5			7		8	9	
33903	1		2	3		4		6	5			7		8	9	
34006	1		2	3		4		6	5			7		8	9	
34103	1		2	3		4		6	5			7		8	9	
34209	1		2	3		4		6	5			7		8	9	
34316	1		2	3		4		6	5			7		8	9	
34420	1		2	3		4		6	5			7		8	9	
34524	1		2	3		4		6	5			7		8	9	
34610	1		2	3		4			5			7		8	9	
34711	1		2	3		4		6	5			7		8	9	
34815	1		2	3		4		6	5			7		8	9	
34907	1		2	3		4		6	5			7		8	9	
35050	1		2	3		4		6	5			7		8	9	
35114	1		2	3		4		6	5			7		8	9	
35212	1		2	3		4		6	5			7		8	9	

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

35304	1		2	3			4		6	5				7		8	9					
35426	1		2	3			4		6	5				7		8	9					
35557	1		2	3			4		6	5				7		8	9					
35658	1		2	3			4		6	5				7		8	9					
35759	1		2	3			4		6	5				7		8	9					
35807	1		2	3			4		6	5				7		8	9					
35912	1		2	3			4		6	5				7		8	9					
36026	1		2	3			4		6	5				7		8	9					
36160	1		2	3			4		6	5				7		8	9					
36261	1		2	3			4		6	5				7		8	9					
36362	1		2	3			4		6	5				7		8	9					
36463	1		2	3			4	88	6	5				7		8	9					
36564	1		2	3			4	88	6	5				7		8	9					
36665	1		2	3			4	88	6	5				7		8	9					
36766	1		2	3			4	88	6	5				7		8	9					
36867	1		2	3			4	88	6	5				7		8	9					
37069	1		2	3			4	88	6	5				7		8	9					
37170			2	3			4	88	6	5				7		8	9					

RUN NUMBER	4 FOOT ELEVATION									5 FOOT ELEVATION												
	2H	5H	5J	8E	8H	8K	8N	12D		3C	3M	4J	5E	6C	6G	6J	6L	7E	7G	7J	8F	9G
30223	10	11	12		13	14	15	16		17	18	19	20				21	22	23			
30323	10	11	12		13	14	15	16		17	18	19	20				21	22	23			
30518	10	11	12		13	14	15	16		17	18	19	20				21	22	23			
30619	10	11	12		13	14	15	16		17	18	19	20				21	22	23			
30817	10	11	12		13	14	15	16		17	18	19	20				21	22	23			
30921	10	11	12		13	14	15	16		17	18	19	20				21	22	23			
31021	10	11	12		13	14	15	16		17	18	19	20				21	22	23			
31108	10	11	12		13	14	15	16		17	18	19	20				21	22	23			
31203	10	11	12		13	14	15	16		17	18	19	20				21	22	23			
31302	10	11	12		13	14	15	16		17	18	19	20				21	22	23			
31504	10	11	12		13	14	15	16		17	18	19	20			21			23		22	
31615	10	11	12		13	14	15	16		17	18	19	20			21			23			
31701	10	11	12		13	14	15	16		17	18	19	20			21			23			
31805	10	11	12		13	14	15	16		17	18	19				21			23			
31922	10	11	12		13	14	15	16		17	18	19				21			23			
32013	10	11	12		13	14	15	16		17	18	19		38		21			23	37		
32114	10	11	12		13	14	15	16		17	18	19				21			23	37		32
32235	10	11	12		13	14	15	16		17	18	19				21			23	37		32
32333	10	11	12		13	14	15	16		17	18	19				21			23	37		32
32452	10	11	12		13	14	15	16		17	18	19				21			23	37		
32652	10	11	12		13	14	15	16		17	18	19				21			23	37		
32753	10	11	12		13	14	15	16		17	18	19				21			23	37		
32854	10	11	12		13	14	15	16		17	18	19				21			23	37		
32955	10	11	12		13	14	15	16		17	18	19				21			23	37		
33056	10	11	12		13	14	15	16		17	18	19				21			23	37		
33338	10	11	12		13	14	15	16		17		19				21			23			
33436	10	11	12		13	14	15	16		17		19				21			23			

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

33544	10	11	12		13	14	15	16		17		19				21			23			
33644	10	11	12		13	14	15	16		17		19				21			23			
33749	10	11	12		13	14	15	16		17		19				21			23			
33849	10	11	12		13	14	15	16		17		19				21			23			
33903	10	11	12		13	14	15	16		17		19				21			23	42		
34006	10	11	12		13	14	15	16		17		19				21			23	42		
34103	10	11	12		13	14	15	16		17		19				21			23	42		
34209	10	11	12		13	14	15	6		17		19			25	21			23	42		
34316	10	11	12		13	14	15	6		17		19			25	21			23	42		
34420	10	11	12		13	14	15	16		17	19				25	21			23	42		
34524	10	11	12		13	14	15	16		17	19				25	21			23	42		
34610	10	11	12		13	14	15	16		17	19				25	21			23	42		
34711	10	11	12		13	14	15	16		17	19				25	21			23	42		
34815	10	11	12		13	14	15	16		17	19				25	21			23	42		
34907	10	11	12		13	14	15	16		17	19				25	21			23	42		
35050	10	11	12		13	14	15	16		17	19				25	21			23	42		
35114	10	11	12		13	14	15	16		17	19				25	21			23	42		
35212	10	11	12		13	14	15	16		17	19				25	21			23	42		
35304	10	11	12		13	14	15	16		17	19				25	21			23	42		
35426	10	11	12		13	14	15	16		17	19				25	21			23	42		
35557	10	11	12		13	14	15	16		17	19				25	21			23	42		
35658	10	11	12		13	14	15	16		17	19				25	21			23	42		
35759	10	11	12		13	14	15	16		17	19				25	21			23	42		
35807	10	11	12	42	13	14	15	16		17	19				25	21			23			
35912	10	11	12	42	13	14	15	16		17	19				25	21			23			
36026	10	11	12	42	13	14	15	16		17	19				25	21			23			
36160	10	11	12	42	13	14	15	16		17	19				25	21			23			
36261	10	11	12	42	13	14	15	16		17	19				25	21			23			
36362	10	11	12	42	13	14	15	16		17	19				25	21			23			
36463	10	11	12	42	13	14	15	16		17	19				25	21			23			
36564	10	11	12	42	13	14	15	16		17	19				25	21			23			
36665	10	11	12	42	13	14	15	16		17	19				25	21			23			
36766	10	11	12	42	13	14	15	16		17	19				25	21			23			
36867	10	11	12	42	13	14	15	16		17	19				25	21			23			
37069	10	11	12	42	13	14	15	16		17	19				25	21			23			
37170	10	11	12	42	13	14	15	16		17	19				25	21			23			

RUN NUMBER	5 FOOT ELEVATION												5-7 FOOT ELEVATION								
	9F	9J	10G	10H	10M	11E	11G	11H	11I	11K	13J	13M	3C	3F	3M	4J	4M	6C	6J	6L	7C
30223	24								25	26		27	28		29	30			31	32	34
30323	24								25	26		27	28		29	30			31	32	34
30518	24								25	26		27	28		29	30			31	32	34
30619	24								25	26		27	28		29	30			31	32	34
30817	24								25	26		27	28		29	30			31	32	34
30921	24								25	26		27	28		29	30			31	32	34
31021	24								25	26		27	28		29	30			31	32	34
31108	24								25	26		27	28		29	30			31	32	34

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

31203	24					26			25			27		28		29	30				31	32	34
31302	24					26			25			27		28		29	30				31	32	34
31504	24					26			25			27		28	32	29	30				31		34
31415	24			22		26			25			27		28	32	29					31		34
31701	24			22		26			25			27		28	32				29		31		34
31805	24			22		26	20		25			27		28	32				29		31		
31922	24			22		26	20		25			27		28	32				29	36	31		
32013	24			22		26	20		25		42	27		28	32				29	36	31		
32114	24			22		26	20		25		42	27		28					29		31		
32235	24			22		26	20		25		42	27		28					29		31		
32333	24			22		26	20		25		42	27		28					29		31		
32452	24		32	22		26	20		25		42	27		28					29		31		
32652	24		32	22		26	20		25		42	27		28					29		31		
32753	24		32	22		26	20		25		42	27		28					29		31		
32854	24		32	22		26	20		25		42	27		28					29		31		
32955	24		32	22		26	20		25		42	27		28					29		31		
33056	24		32	22		26	20		25		42	27		28					29		31		
33338	24	18		22		26	20		25		42	27		28					29		31		
33436	24			22		26	20	18	25		42	27		28					29		31		
33544	24			22		26	20	18	25		42	27		28					29		31		
33644	24			22		26	20	18	25		42	27		28					29		31		
33749	24			22		26	20	18	25		42	27		28					29		31		
33849	24			22		26	20	18	25		42	27		28							31		
33903	24		18	22		26	20		25			27		28							31		
34006	24			22	18	26	20		25			27		28							31		
34103	24			22	18	26	20		25			27		28							31		
34209	24			22	18	26	20					27		28							31		
34316	24			22	18	26	20					27		28							31		
34420	24			22	18	26	20					27		28							31		
34524	24			22	18		20					27		28							31		
34610	24			22	18		20					27		28							31		
34711	24			22	18		20					27		28							31		
34815	24			22	18		20					27		28							31		
34907	24			22	18		20					27		28							31		
35050	24			22	18		20					27		28							31		
35114	24			22	18		20					27		28							31		
35212	24			22	18		20					27		28							31		
35304	24			22	18		20					27		28							31		
35426	24			22	18		20					27		28							31		
35557	24			22	18		20					27		28							31		
35658	24			22	18		20					27		28							31		
35759	24			22	18		20					27		28							31		
35807	24			22	18		20					27		28							31		
35912	24			22	18		20					27		28							31		
36026	24			22	18		20					27		28							31		
36160	24			22	18		20					27		28							31		
36261	24			22	18		20					27		28							31		
36362	24			22	18		20					27		28							31		
36463	24			22	18		20					27		28							31		
36564	24			22	18		20					27		28							31		

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

36665	24			22	18		20					27		28					31		
36766	24			22	18		20					27		28					31		
36867	24			22	18		20					27		28					31		
37069	24			22	18		20					27		28					31		
37170	24			22	18		20					27		28					31		

RUN NUMBER	5-7 FOOT ELEVATION																5-10 FOOT ELEVATION				
	7J	8E	8F	9G	9I	9J	9K	10G	10H	10M	11G	11H	11I	11K	13J	13M	3F	4J	4M	5I	6C
30223		33			35								36	37		38	39	40	41		42
30323		33			35								36	37		38	39	40	41		42
30518		33			35								36	37		38	39	40	41		42
30619		33			35								36	37		38	39	40	41		42
30817		33			35								36	37		38	39	40	41		42
30921		33			35								36	37		38	39	40	41		42
31021		33			35								36	37		38	39	40	41		42
31108		33			35								36	37		38	39	40	41		42
31203		33							35				36	37		38	39	40	41		42
31302		33					45		35				36	37		38	39	40	41		42
31504			33				45		35				36	37		38	39	40	41		42
31615						30	45		35			33	36	37		38	39		41		42
31701	37					30		91	35		39	33	36			38			41		42
31805	37			34		30		91	35		39	33	36			38			41		42
31922				34		30		91	35	38	39	33			37				41		42
32013				34		30		91	35		39	33							41		
32114				34		30		91	35		39	33							41		
32235				34		30		91	35		39	33							41		
32333				34		30		91	35		39	33							41		
32452				34		30		91	35		39	33							41		
32652				34		30		91	35		39	33							41		
32753				34		30		91	35		39	33							41		
32854				34		30		91	35		39	33							41		
32955				34		30		91	35		39	33							41		
33056				34		30		91	35		39	33							41		
33338				34		30		91	35		39	33							41	32	
33436				34		30		91	35		39	33							41	32	
33544				34		30		91	35		39	33							41	32	
33644				34		30		91	35		39	33							41	32	
33749				34		30		91	35		39	33							41	32	
33849				34		30		91	35		39	33							41	32	
33903				34		30		91			39								41	32	
34006				34		30		91			39								41	32	
34103				34		30		91			39								41	32	
34209				34		30		91			39								41	32	
34316				34		30		91			39								41	32	
34420				34		30		91			39								41	32	
34524				34		30		91			39								41	32	

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

34610				34		30		91			39									41		32	
34711				34		30		91			39									41		32	
34815				34		30		91			39									41		32	
34907				34		30		91			39									41		32	
35050				34		30		91			39									41		32	
35114				34		30		91			39									41		32	
35212				34		30		91			39									41		32	
35304				34		30		91			39									41		32	
35426				34		30		91			39									41		32	
35557				34		30		91			39									41		32	
35658				34		30		91			39									41		32	
35759				34		30		91			39									41		32	
35807				34		30		91			39									41		32	
35912				34		30		91			39									41		32	
36026				34		30		91			39									41		32	
36160				34		30		91			39									41		32	
36261				34		30		91			39									41		32	
36367				34		30		91			39									41		32	
36463				34		30		91			39									41		32	
36564				34		30		91			39									41		32	
36665				34		30		91			39									41		32	
36766				34		30		91			39									41		32	
36867				34		30		91			39											32	
37069				34		30		91			39											32	
37170				34		30		91			39											32	

RUN NUMBER	5-10 FOOT ELEVATION														6 FOOT ELEVATION						
	6L	7E	7G	7J	7K	8E	8F	9E	9I	9K	10G	10H	10M	13J	2H	3F	3I	4D	4G	4J	4L
30223	43		44	45					46		47		48	49	50	51		52	53		54
30323	43		44	45					46		47		48	49	50	51	79	52	53		54
30518	43		44	45					46		47		48	49	50	51	79	52	53		54
30619	43		44	45					46		47		48	49	50	51	79	52	53		54
30817	43		44	45					46		47		48	49	50	51	79	52	53		54
30921	43		44	45					46		47		48	49	50	51		52	53		54
31021	43		44	45					46		47		48	49	50	51	79	52	53		54
31108	43		44	45					46		47		48	49	50	51	79	52	53		54
31203				45			44		46		47	43	48	49	50		79	52	53		54
31302							44		46		47	43	48	49	50		79	52	53		54
31504							44		46		47	43	48	49	50		79	52	53		54
31615						44			46	40	47	43	48	49	50			52	53		54
31701		45				44			46	40	47	43	48	49	50		79	52	53	82	54
31805		45				44			46	40	47	43	48	49	50		79	52	53		54
31922		45				44			46	40	47	43	48	49	50		79	52	53		54
32013		45				44			46	40	47	43	48	49	50		79	52	53		54
32114		45				44			46	40	47	43	48	49	50			52	53		54
32235		45				44			46	40	47	43	48	49	50			52	53		54
32333		45				44			46	40	47	43	48	49	50			52	53		54

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

32452	45		44		46	40	47	43	48	49		50		52	53	54
32652	45		44		46	40	47	43	48	49		50		52	53	54
3275[illegible]	45		44		46	40	47	43	48	49		50		52	53	54
328[illegible]	45		44		[illegible]	40	47	43	48	[illegible]		50		52	[illegible]	54
32955	45		44		[illegible]	40	47	43	48	49		50		52	53	54
33056	45		44		46	40	47	43	48	49		50		52	53	54
33338		36	44	45		40	47	43	48	49		50				54
33436		36	44	45		40		43	48	49		50				54
33544		36	44	45		40		43	48	49		50				54
33644		36	44	45		40		43	48	49		50				54
33749		36	44	45		40		43	48	49		50				54
33849		36	44	45		40		43	48	49		50				54
33903		36	44	45		40		43	48	49		50				54
34006		36	44	45		40		43	48	49		50				54
34103		36	44	45		40		43	48			50				54
34209		36	44	45		40		43	48			50				54
34316		36	44	45		40		43	48			50				54
34420		36	44	45		40		43	48			50				54
34524		36	44	45		40		43	48			50				54
34610		36	44	45				43	48			50				54
34711		36	44	45				43	48			50				54
34815		36	44	45				43	48			50				54
34907		36	44	45				43	48			50				54
35050		36	44	45				43	48			50				54
35114		36	44	45				43	48			50				54
35212		36	44	45				43	48			50				54
35304		36	44	45				43	48			50				54
35426		36	44	45				43	48			50				54
35557		36	44	45				43	48			50				54
35658		36	44	45				43	48			50				54
35759		36	44	45				43	48			50				54
35807		36	44	45				43	48			50				54
35912		36	44	45				43	48			50				54
36026		36	44	45				43	48			50				54
36160		36	44	45				43	48			50				54
36261		36	44	45				43	48			[illegible]				54
36362		36	44	45				43	48			50				54
36463		36	44	45				43	48			50				54
36564		36	44	45				43	48			50				54
36665		36	44	45				43	48			50				54
36766		36	44	45				43	48			50				54
36867		36	44	45				43	48			50				
37069		36	44	45				43	48			50				
37170		36	44	45				43	48			50				

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

RUN NUMBER	6 FOOT ELEVATION																					
	4M	5F	5H	5I	6C	6E	6F	6I	6K	6L	7B	7E	7G	7H	7J	7K	7M	8C	8E	8F	8G	8H
30223							55	56			57		58		59							60
30323							55	56			57				59							60
30518							55	56			57		58		59							60
30619							55	56			57		58		59							60
30817							55	56			57		58		59							60
30921							55	56			57		58		59							60
31021							55	56			57		58		59							60
31108							55	56			57		58		59							60
31203		51					55	56			57		58		59							60
31302		51					55	56			57		58		59							60
31504		51					55	56			57		58		59							60
31615		51					55	56			57		58		59				71			
31701		51								60	57		58		59				71			
31805		51							55	60	57		58		59				71			
31922	85	51			69				55	60	57	81	58		59				71			
32013	85	51			69				55	60	57	81	58		59				71			
32114	85	51			69				55	60	57	81	58		59				71			
32235	85	51			69				55	60	57	81	58		59		63		71			
32333	85	51	63		69				55	60	57	81	58		59				71			
32452	85	51	63		69				55	60	57	81	58		59				71			
32652	85	51	63		69				55	60	57	81	58		59				71			
32753	85	51	63		69				55	60	57	81	58		59				71			
32854	85	51	63		69				55	60	57	81	58		59				71			
32955	85	51	63		69				55	60	57	81	58		59				71			
33056	85	51	63		69				55	60	57	81	58		59				71			
33338		51								60	57				59				71			
33436		51								60	57				59				71			
33544		51								60	57				59				71			
33644		51								60	57				59				71			
33749		51								60	57				59				71			
33849		51								60	57			29	59				71			
33903		51		33						60	57			29	59	35		58	71			
34006		51		33						60	57			29	59	35		58	71			
34103		51		33						60	57			29	59	35		58	71			
34209		51		33						60	57		88	29	59	35		58	71			
34316		51		33						60	57		88	29	59	35		58	71		68	
34420		51		33						60	57		88	29	59	35		58	71		68	
34524		51		33						60	57		88	29	59	35		58	71		68	
34610		51		33						60	57		88	29	59	35		58	71		68	
34711		51		33						60	57		88	29	59	35		58	71		68	
34815		51		33						60	57		88	29	59	35		58	71		68	
34907		51		33		72				60	57		88	29	59	35		58	71		68	
35050		51		33		72				60	57		88	29	59	35		58	71		68	
35114		51		33		72				60	57		88	29	59	35			71		68	
35212		51		33		72				60	57		88	29	59	35			71		68	
35304		51		33		72				60	57		88	29	59	35			71		68	
35426		51		33		72				60	57		88	29	59	35			71		68	

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

35557		51		33	56					60	57		88	29	59	35			71	72	68	
35658		51		33	56					60	57		88	29	59	35			71	72	68	
35759		51		33	56					60	57		88	29	59	35			71	72	68	
35807		51		33	56					60	57		88	29	59	35			71	72	68	
35912		51		33	56					60	57		88	29	59	35			71	72	68	
36026		51		33	56					60	57		88	29	59	35			71	72	68	
36160		51		33	56					60	57		88	29	59	35			71	72	68	
36261		51		33	56					60	57		88	29	59	35			71	72	68	
36362		51		33	56					60	57		88	29	59	35			71	72	68	
36463		51		33	56					60	57			29	59	35			71	72	68	
36564		51		33	56					60	57			29	59	35			71	72	68	
36665		51		33	56					60	57			29	59	35			71	72	68	
36766		51		33	56					60	57			29	59	35			71	72	68	
36867		51		33	56					60	57			29	59	35			71	72	68	
37069		51		33	56					60	57			29	59	35			71	72	68	
37170		51		33	56					60	57			29	59	35			71	72	68	

RUN NUMBER	6 FOOT ELEVATION																					
	8I	8K	8N	9C	9D	9E	9F	9H	9I	9K	9L	10D	10H	10J	10K	10M	11D	11F	11K	12D	12F	12I
30223			61						62		63			64		65				66		
30323			61						62		63			64		65				66		
30518			61	91					62		63			64		65				66		
30619			61	91					62		63			64		65				66		
30817			61	91					62		63			64		65				66		
30921			61	91					62		63			64		65				66		
31021			61	91					62		63			64		65				66		
31108			61	91					62		63			64		65				66		
31203			61	91							63		62	64		65				66		
31302			61	91						65	63		62	64						66		
31504			61	91						65	63		62	64						66		
31615			61	91						65	63	60	62							66	64	
31701	55	76	61							65	63		62						56	66	64	
31805		76	61							65	63		62						56	66	64	
31922		76	61					89		65	63		62						56	66	64	
32013		76	61					89		65	63		62						56	66	64	
32114		76	61		36			89		65	63		62				79		56	66	64	
32235		76	61		36			89		65			62				79		56	66	64	
32333		76	61		36			89		65			62				79		56	66	64	
32452		76	61		36			89		65			62				79		56	66	64	
32652		76	61		36			89		65			62				79		56	66	64	
32753		76	61		36			89		65			62				79		56	66	64	
32854		76	61		36			89		65			62				79		56	66	64	
32955		76	61		36			89		65			62				79		56	66	64	
33056		76	61		36			89		65			62				79		56	66	64	
33338		76	61			81	52			65			62	53				55	56	66		58
33436		76	61			81	52			65			62	53				55	56	66		58

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

33544	76	61		81	52	65	62	53		55	56	66	58
33644	76	61		81	52	65	62	53		55	56	66	58
33749	76	61		81	52	65	62	53		55	56	66	58
33849	76	61		81	52	65	62	53		55	56	66	58
33903	76	61		81	52	65		53	62	55	56	66	
34006	76	61		81	52	65		53	62	55	56	66	
34103	76	61		81	52	65	49	53	56 62	55		66	
34209	76	61		81	52	65	49	53	56 62	55		66	
34316	76	61		81	52	65	49	53	56 62	55		66	
34420	76	61		81	52	65	49	53	56 62	55		66	
34524	76	61		81	52	65	49	53	56 62	55		66	
34610	76	61		81	52	65	49	53	56 62	55		66	
34711	76	61		81	52	65	49	53	56 62	55		66	
34815	76	61		81	52	65	49	53	56 62	55		66	
34907	76	61		81	52	65	49	53	56 62	55		66	
35050	76	61	74	81	52	65	49	53	56 62	55		66	
35114	76	61	74	81	52	65	49	53	56 62	55		66	
35212	76	61	74	81	52	65	49	53	56 62	55		66	
35304	76	61	74	81	52	65	49	53	56 62	55		66	
35426	76	61	74	81	52	65	49	53	56 62	55		66	
35557	76	61	74	81	52	65	49	53	62			66	55
35658	76	61	74	81	52	65	49	53	62			66	55
35759	76	61	74	81	52	65	49	53	62			66	55
35807	76	61	74	81	52	65	49	53	62			66	55
35912	76	61	74	81	52	65	49	53	62			66	55
36026	76	61	74	81	52	65	49	53	62			66	55
36160	76	61	74	81	52	65	49	53	62			66	55
36261	76	61	74	81	52	65	49	53	62			66	55
36362	76	61	74	81	52	65	49	53	62			66	55
36463	76	61	74	81	52	65	49	53	62			66	55
36564	76	61	74	81	52	65	49	53	62			66	55
36665	76	61	74	81	52	65	49	53	62			66	55
36766	76	61	74	81	52	65	49	53	62			66	55
36867	76	61	74	81	52	65	49	53	62			66	55
37069	76	61	74	81	52	65	49	53	62			66	55
37170	76	61	74	81	52	65	49	53	62			66	55

RUN NUMBER	6 FOOT ELEVATION									6-2 FOOT ELEVATION											
	12L	13G	13J	14I	3I	3L	4G	5I	6D	6F	6I	6L	7D	7K	7M	8C	8D	8J	9C	9E	9F
30223	67			63	69	70	71			72	73		74		75						
30323	67			68	69	70	71			72	73		74		75						
30518	67			68	69	70				72	73		74		75						
30619	67			68	69	70				72	73		74		75						
30817	67			68	69	70				72	73		74		75						
30921	67			68	69	70				72	73		74		75						
31021	67			68	69	70				72	73		74		75						

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

31108	67			68		69	70				72	73		74		75					
31203	67			68		69	70				72	73		74		75					
31302	67			68		69	70				72	73		74		75					
31504	67			68		69	70				72	73				75			74		
31615	67			68		69	70				72	73				75			74		
31701	67			68		69	70				72		73			75			74		
31805	67			68		69	70				72		73			75			74		
31922	67		75	68			70				72		73						74		
32013	67		75	68			70				72		73						74		
32114	67		75	68			70				72		73						74		
32235	67		75	68			70				72		73						74		
32333	67		75	68			70				72		73						74		
32452	67		75	68			70				72		73						74		
32652	67		75	68			70				72		73						74		
32753	67		75	68			70				72		73						74		
32854	67		75	68			70				72		73						74		
32955	67		75	68			70				72		73						74		
33056	67		75	68			70				72		73						74		
33338				68					63	72		73					64	74	46	67	
33436				68					63	72		73					64	74	46	67	
33544				68					63	72		73					64	74	46	67	
33644				68					63	72		73					64	74	46	67	
33749				68					63	72		73					64	74	46	67	
33849				68					63	72		73					64	74	46	67	
33903				68					63	72		73		70		77	78	64	74	46	67
34006				68				77	63	72		73		70			78	64	74	46	67
34103		88		68				77	63	72		73		70			78	64	74	46	67
34209				68				77	63	72		73		70			78	64	74	46	67
34316								77	63	72		73		70			78	64	74	46	67
34420								77	63	72		73		70			78	64	74	46	67
34524								77	63	72		73		70			78	64	74	46	67
34610								77	63	72		73		70			78	64	74	46	67
34711								77	63	72		73		70			78	64	74	46	67
34815								77	63	72		73		70			78	64	74	46	67
34907								77	63			73		70			78	64	74	46	67
35050								77	63			73		70			78	64		46	67
35114								77	63			73		70			78	64		46	67
35212								77	63			73		70			78	64		46	67
35304								77	63			73		70			78	64		46	67
35426								77	63			73		70			78	64		46	67
35557								77	63			73		70			78	64		46	67
35658								77	63			73		70			78	64		46	67
35759								77	63			73		70			78	64		46	67
35807								77	63			73		70			78	64		46	67
35912								77	63			73		70			78	64		46	67
36026								77	63			73		70				64		46	
36160								77	63			73		70				64		46	
36261								77	63			73		70				64		46	
36362								77	63			73		70				64		46	
36463								77	63			73		70				64		46	

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

36564								77	63			73		70				64		46	
36665								77	63			73		70				64		46	
36766								77	63			73		70				64		46	
36867								77	63			73		70				64		46	
37069								77	63			73		70				64		46	
37170								77	63			73		70				64		46	

RUN NUMBER	6-2 FOOT ELEVATION											6-4 FOOT ELEVATION									
	9L	10J	11F	11K	12H	12I	13G	3I	3L	4G	5I	6F	6I	6L	7D	7M	8C	9C	9E	9F	9L
30223	76	77				78		79	80	81		82	83		84	85					86
30323	76	77				78			80	81		82	83		84	85					86
30516	76	77				78	71		30			82	83		84	85					86
30619	76	77				78	71		80			82	83		84	85					86
30817	76	77				78	71		80			82	83		84	85					86
30921	76	77				78	71	79	80			82	83		84	85					86
31021	76	77				78	71		80			82	83		84	85					86
31108	76	77				78	71		80			82	83		84	85					86
31203	76	77				78	71		80			82	83		84	85					86
31302	76	77				78	71		80			82	83		84	85					86
31504	76	77				78	71		80			82	83		84	85					86
31615		77				78		79	80				83	87	84	85		76			86
31701				77		78							83	87	84	85					
31805				77		78		82					83	87	84	85					
31922				77		78		82					83	87	84						
32013				77		78							83	87	84						
32114				77		78							83	87	84						
32235				77		78							83	87	84						
32333				77		78							83	37	84						
32452				77		78							83	87	84						
32652				77		78							83	87	84						
32753				77		78							33	87	84						
32854				77		78							83	87	84						
32955				77		78							83	87	84						
33056				77		78							83	87	84						
33338	69	70	75	77		78					79			87	84					82	
33436	69	70	75	77		78					79			87	84				47	82	
33544	69	70	75	77		78					79			87	84				47	82	
33644	69	70	75	77		78					79			87	84				47	82	
33749	69	70	75	77		78					79			87	84				47	82	
33849	69	70	75	77		78					79			87	84				47	82	
33903	69		75								79			87	84		86		47	82	
34006	69		75								79			87	84		86		47	82	
34103	69		75								79			87	84		86		47	82	
34209	69		75								79			87	84		86		47	82	
34316	69		75								79			87	84		86		47	82	

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

34420	69		75									79			87	84		86		47	82
34524	69		75									79			87	84		86		47	82
34610	69		75									79			87	84				47	82
34711	69		75									79			87	84				47	82
34815	69		75									79			87	84				47	82
34907	69		75									79			87	84				47	82
35050	69		75									79			87	84				47	82
35114	69		75									79			87	84				47	82
35212	69		75									79			87	84				47	82
35304	69		75									79			87	84				47	82
35426	69		75									79			87	84				47	82
35557	69		75									79			87	84				47	82
35658	69		75									79			87	84				47	82
35759	69		75									79			87	84				47	82
35807	69		75									79			87	84				47	82
35912	69		75									79			87	84					82
36026	69		75									79			87	84					82
36160	69		75									79		86	87	84					82
36261	69		75									79		86	87	84					82
36362	69		75									79		86	87	84					82
36463	69		75									79		86	87	84					82
36564	69		75									79		86	87	84					82
36665	69		75									79		86	87	84					82
36766	69		75									79		86	87	84					82
36867	69	41	75		54							79		86	87	84					82
37069	69	41	75		54							79		86	87	84					82
37170	69	41	75		54							79		86	87	84					82

RUN NUMBER	6-4 FOOT ELEVATION													6-6ELEVATION							
	10J	11D	11F	11G	11K	12I	13G	13H	2H	3L	4G	4L	5H	5I	5J	6F	6J	6K	6L	7B	7D
30223	87					88			89		91		98			92				90	94
30323	87					88			89		91		98			92				90	94
30518	87					88	81		89				98			92				90	94
30619	87					88	81		89				98			92				90	94
30817	87					88	81		89				98			92				90	94
30921	87					88	81		89				98			92				90	94
31021	87					88	81		89				98			92				90	94
31108	87					88	81		89				98			92				90	94
31203	87					88	81			89			98			92				90	94
31302	87					88	81			89			98			92				90	94
31504	87					88	81			89			98			92	101			90	94
31615		82				88	81			89			98			92	101				
31701				80	86	88	81			89					96	92	101		98		
31805				80	86	88	81			89						92	101	96	98		
31922				80	86	88						97				92	101	96	98		
32013				80	86	88						97				92	101	96	98		
32114				80	86	88						97				92	101	96	98		

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

32235			80	86	88				97			92	101	96	98
32333			80	86	88				97			92	101	96	98
32452			80	86	88				97			92	101	96	98
32652			80	86	88				97			92	101	96	98
32753			80	86	88				97			92	101	96	98
32854			80	86	88				97			92	101	96	98
32955			80	86	88				97			92	101	96	98
33056			80	86	88				97			92	101	96	98
33338	83	85	80	86	88	89			97			92	101		98
33436	83	85	80	86	88	89						92	101		98
33534	83	85	80	86	88	89						92	101		98
33644	83	85	80	86	88	89						92	101		98
33749	83	85	80	86	88	89						92	101		98
33849	83	85	80	86	88	89						92	101		98
33903	83	85	80		88							92	101		98
34006	83	85	80		88							92	101		98
34103	83	85	80									92	101		98
34209	83	85	80									92	101		98
34316	83	85	80									92	101		98
34420	83	85	80									92	101		98
34524	83	85	80									92	101		98
34610	83	85	80									92	101		98
34711	83	85	80									92	101		98
34815	83	85	80									92	101		98
34907	83	85	80							92			101		98
35050	83	85	80							92			101		98
35114	83	85	80							92			101		98
35212	83	85	80							92			101		98
35304	83	85	80							92			101		98
35426	83	85	80							92			101		98
35557	83	85	80							92					98
35658	83	85	80							92					98
35759	83	85	80							92					98
35807	83	85	80							92					98
35912	83	85	80							92					98
36026	83	85	80							92					98
36160	83	85	80							92					98
36261	83	85	80							92					98
36362	83	85	80							92					98
36463	83	85	80							92					98
36564	83	85	80							92					98
36665	83	85	80							92					98
36766	83	85	80							92					98
36867	83	85	80							92					98
37069	83	85	80							92					98
37170	83	85	80							92					98

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

RUN NUMBER	6-6FOOT ELEVATION																		
	7H	7K	8C	8H	8K	8N	9E	9F	10D	10J	11D	11F	11G	11K	12D	12F	12I	13G	14I
30223				96	99	97			93	100						102	101		95
30323				96	99	97			93	100							101	102	95
30518				96	99	97			93	100							101	102	95
30619				96	99	97			93	100							101	102	95
30817				96	99	97			93	100							101	102	95
30921				96	99	97			93	100						102	101		95
31021				96	99	97			93	100							101	102	95
31108				96	99	97			93	100							101	102	95
31203				96	99	97			93	100							101	102	95
31302				96	99	97			93	100							101	102	95
31504				96	99	97			93						100			102	95
31615				96	99	97			93		90		94		100	102			95
31701					99	97			93				94	90	100			102	95
31805					99	97			93				94	90	100			102	95
31922					99				93				94	90	100			102	95
32013					99				93				94	90	100			102	95
32114					99				93				94	90	100			102	95
32235					99				93				94	90	100			102	95
32333					99				93				94	90	100			102	95
32452					99				93				94	90	100			102	95
32652					99				93				94	90	100			102	95
32753					99				93				94	90	100			102	95
32854					99				93				94	90	100			102	95
32955					99				93				94	90	100			102	95
33056					99				93				94	90	100			102	95
33338	96				99			37	93			38	94	90	100	102			95
33436	96				99		97	37	93			38	94	90	100	102			95
33544	96				99		97	37	93			38	94	90	100	102			95
33644	96				99		97	37	93			38	94	90	100	102			95
33749	96				99		97	37	93			38	94	90	100	102			95
33849	96				99		97	37	93			38	94	90	100	102			95
33903	96	89	90		99		97	37	93			38	94		100	102			95
34006	96	89	90		99		97	37	93			38	94		100	102			95
34103	96	89	90		99		97	37	93			38	94		100	102			95
34209	96	89	90		99		97	37	93			38	94		100	102			95
34316	96	89	90		99		97	37	93			38	94		100	102			95
34420	96	89	90		99		97	37	93			38	94		100	102			95
34524	96	89	90		99		97	37	93			38	94		100	102			95
34610	96	89	90		99		97	37	93			38	94		100	102			95
34711	96	89	90		99		97	37	93			38	94		100	102			95
34815	96	89	90		99		97	37	93			38	94		100	102			95
34907	96	89	90		99		97	37	93			38	94		100	102			95
35050	96	89	90		99		97	37	93			38	94		100	102			95
35114	96	89	90		99		97	37	93			38	94		100	102			95
35212	96	89	90		99		97	37	93			38	94		100	102			95

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

35426	96	89	90		99		97	37	93			38	94		100	102			95		
35557	96	89	90		99		97	37	93			38			100	102			95		
35658	96	89	90		99		97	37	93			38			100	102			95		
35759	96	89	90		99		97	37	93			38			100	102			95		
35807	96	89	90		99		97	37	93			38			100	102			95		
35912	96	89	90		99		97	37	93			38			100	102			95		
36026	96	89	90		99		97	37	93			38			100	102			95		
36160	96	89	90		99		97	37	93			38			100	102			95		
36261	96	89	90		99		97	37	93			38			100	102			95		
36362	96	89	90		99		97	37	93			38			100	102			95		
36463	96	89	90		99		97	37	93			38			100	102			95		
36564	96	89	90		99		97	37	93			38			100	102			95		
36665	96	89	90		99		97	37	93			38			100	102			95		
36766	96	89	90		99		97	37	93			38			100	102			95		
36867	96	89	90		99		97	37	93			38			100	102			95		
37069	96	89	90		99		97	37	93			38			100	102			95		
37170	96	89	90		99		97	37	93			38			100	102			95		

RUN NUMBER	7 FOOT ELEVATION																				
	3J	3L	4G	5E	6F	6G	6I	7D	7E	7H	7M	8E	8I	9C	9D	9F	9G	9J	9L	10J	11E	11F
30223	103		104		105		106	107			108			109					110	111	112	
30323	103		104		105		106	107			108			109					110	111	112	
30518	103		104		105		106	107			108			109					110	111	112	
30619	103		104		105		106	107			108			109					110	111	112	
30217	103		104		105		106	107			108			109					110	111	112	
30921	103		104		105		106	107			108			109					110	111	112	
31021	103		104		105		106	107			108			109					110	111	112	
31108	103		104		105		106	107			108			109					110	111	112	
31203	103		104		105		106	107			108			109					110	111	112	
31302	103		104		105		106	107			108			109					110	111	112	
31304	103		104		105		106	107	126		108			109					110	111	112	
31615	103			104	105			107	126		108	110		109				106		111	112	
31701				104	105			107	126		108	110		109				106		111	112	
31922				104	105	112		107	126		108	110		109			111	106				
32013		108		104	105	112		107	126			110	82	109			111	106				
32114				104	105	112		107	126			110	82	109	38		111	106				
32235				104	105	112		107	126			110	82	109	38		111	106				
32333				104	105	112		107	126			110	82	109	38		111	106				
32452				104	105	112		107	126			110	82	109	38		111	106				
32652				104	105	112		107	126			110	82	109	38		111	106				
32753				104	105	112		107	126			110	82	109	38		111	106				
32854				104	105	112		107	126			110	82	109	38		111	106				
32955				104	105	112		107	126			110	82	109	38		111	106				
33056				104	105	112		107	126			110	82	109	38		111	106				
33338					105			107	126			110		109		112	111			104		106
33436					105			107	126			110		109		112	111			104		106

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

33544				105		107	126		110		109		112	111			104		106
33644				105		107	126		110		109		112	111			104		106
33749				105		107	126		110		109		112	111			104		106
33849				105		107	126		110		109		112	111			104		106
33903				105		107	126		110		109		112	111	113		104		106
34006				105		107	126		110		109		112	111	113		104		106
34103				105		107	126	103	110		109		112	111	113		104		106
34209				105		107	126	103	110		109		112	111	113		104		106
34316				105		107	126	103	110		109		112	111	113		104		106
34420				105		107	126	103	110		109		112	111	113		104		106
34524				105		107	126	103	110		109		112	111	113		104		106
34610				105		107	126	103	110		109		112	111	113		104		106
34711				105		107	126	103	110		109		112	111	113		104		106
34815				105		107	126	103	110		109		112	111	113		104		106
34907				105		107	126	103	110		109		112	111	113		104		106
35050				105		107	126	103	110		109		112	111	113		104		106
35114				105		107	126	103	110		109		112	111	113		104		106
35212				105		107	126	103	110		109		112	111	113		104		106
35304				105		107	126	103	110		109		112	111	113		104		106
35426				105		107	126	103	110		109		112	111	113		104		106
35557							126	103	110		109		112	111	113		104		106
35658							126	103	110		109		112	111	113		104		106
35759							126	103	110		109		112	111	113		104		106
35807							126	103	110		109		112	111	113		104		106
35912							126	103	110		109		112	111	113		104		106
36026							126	103	110		109		112	111	113		104		106
36160							126	103	110		109		112	111	113		104		106
36261							126	103	110		109		112	111	113		104		106
36362							126	103	110		109		112	111	113		104		106
36463							126	103	110		109		112	111	113		104		106
36564							126	103	110		109		112	111	113		104		106
36665							126	103	110		109		112	111	113		104		106
36766							126	103	110		109		112	111	113		104		106
36867							126	103	110		109		112	111	113		104		106
37069							126	103	110		109		112	111	113		104		106
37170							126	103	110		109		112	111	113		104		106

RUN NUMBER	7 FOOT ELEVATION										7-6 FOOT ELEVATION										
	11K	12I	13G	13H	3I	4G	5E	6D	6F	6I	6J	7D	7H	7M	8C	8D	8J	9C	9F	9G	9J
30223		113	114		115	116			117	118	126	119		120				121			
30323		113	114		115	116			117	118	126	119		120				121			
30518		113	114		115				117	118	126	119		120				121			
30619		113	114		115				117	118	126	119		120				121			
30817		113	114		115				117	118	126	119		120				121			
30921		113	114		115				117	118	126	119		120				121			
31021		113	114		115				117	118	126	119		120				121			

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

31108		113	114			115					117	118	126	119		120					121						
31203		113	114			115					117	118	126	119		120					121						
31302		113	114			115					117	118	126	119		120					121						
31504		113	114			115					117	118		119		120					121						
31615		113												119		120					121			117	115		
31701	103	113	114											119		120					121			117	115		
31805	103	113	114											119		120					121			117	115		
31922	103	113	114					125						119		120					121			117	115		
32013	103	113	114					125						119		120					121			117	115		
32114	103	113	114					125						119		120					121			117	115		
32235	103	113	114					125						119		120					121			117	115		
32333	103	113	114					125						119		120					121			117	115		
32452	103	113	114					125						119		120					121			117	115		
32652	103	113	114					125						119		120					121			117	115		
32753	103	113	114					125						119		120					121			117	115		
32854	103	113	114					125						119		120					121			117	115		
32955	103	113	114					125						119		120					121			117	115		
33056	103	113	114					125						119		120					121			117	115		
33338	103	113	114						125					119		120			115		121			117			
33435	103	113	114						125					119		120			115		121			117			
33544	103	113	114						125					119		120			115		121			117			
33644	103	113	114						125					119		120			115		121			117			
33749	103	113	114						125					119		120			115		121			117			
33849	103		114	113					125					119		120			115		121			117			
33903	103		114						125					119		120	122		115		121	116		117			
34006	103		114						125					119		120	122		115		121	116		117			
34103			114						125					119		120	122		115		121	116		117			
34209			114						125					119		120	122		115		121	116		117			
34316			114						125					119		120	122		115		121	116		117			
34420			114						125					119		120	122		115		121	116		117			
34524			114						125					119		120	122		115		121	116		117			
34610			114						125					119		120	122		115		121	116		117			
34711			114						125					119		120	122		115		121	116		117			
34815			114						125					119		120	122		115		121	116		117			
34907			114						125					119		120	122		115		121	116		117			
35050			114						125					119		120	122		115		121	116		117			
35114			114						125					119		120	122		115		121	116		117			
35212			114						125					119	127	120	122		115		121	116		117			
35304			114						125					119	127	120	122	121	115			116		117			
35426			114						125					119	127	120	122	121	115			116		117			
35557			114						125					119	127	120	122	121	115			116		117	107		
35658			114						125					119	127	120	122	121	115			116		117	107		
35759			114						125					119	127	120	122	121	115			116		117	107		
35807			114						125					119	127	120	122	121	115			116		117	107		
35912			114						125					119	127	120	122	121	115			116		117	107		
36026			114						125					119	127	120	122	121	115			116		117	107		
36160			114						125					119	127	120	122	121	115			116		117	107		
36261			114						125					119	127	120	122	121	115			116		117	107		
36362			114						125					119	127	120	122	121	115			116		117	107		
36463			114						125					119	127	120	122		115			116		117	107		

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

36564			114						125			119	127	120	122		115		116	117	107
36665			114						125			119	127	120	122		115		116	117	107
36766			114						125			119	127	120	122		115		116	117	107
36867			114						125			119	127	120	122		115		116	117	107
37069			114						125			119	127	120	122		115		116	117	107
37170			114						125			119	127	120	122		115		116	117	107

RUN NUMBER	7-6 FOOT ELEVATION										8 FOOT ELEVATION										
	9L	10J	11E	11F	11H	11I	11K	12H	12I	12J	2H	3I	4D	4G	4L	5F	5H	5J	6E	6F	6I
30223	122	123	124						125		127			128	129	138	139			130	
30323	122	123	124						125		127			128	129	138	139			130	
30518	122	123	124						125		127			128	129	138	139			130	
30619	122	123	124						125		127			128	129	138	139			130	
30817	122	123	124						125		127			128	129	138	139			130	
30921	122	123	124						125		127			128	129	138	139			130	
31021	122	123	124						125		127			128	129	138	139			130	
31108	122	123	124						125		127			128	129	138	139			130	
31203	122		124			123			125		127			128	129	138	139			130	
31302	122		124			123			125		127			128	129	138	139			130	
31504	122		124			123			125		127			128	129	138	139			130	
31615	122		124		118	123			125					128	129	138	139		127	130	
31701			124		118	123	122		125					128	129	138	139		127		
31805			124		118	123	122		125					128	129	138	139		127		
31922			124		118	123	122					135		128	129		139	138	127		
32013			124		118	123	122							128	129		139		127		135
32114			124		118	123	122								129				127		
32235			124		118	123	122								129				127		
32333			124		118	123	122								129				127		
32452			124		118	123	122								129						
32652			124		118	123	122								129						
32753			124		118	123	122								129						
32854			124		118	123	122								129						
32955			124		118	123	122								129						
33056			124		118	123	122								129						
33338		116	124	127	118		122			123					129						
33436		116	124	127	118		122			123					129						
33544		116	124	127	118		122			123					129						
33644		116	124	127	118		122			123					129						
33749		116	124	127	118		122			123					129						
33849		116	124	127	118		122			123					129						
33903			124	127	118					123					129						
34006			124	127	118					123					129						
34103			124	127	118					123			130		129						
34209			124	127	118			123					130		129						
34316			124	127	118			123					130		129						
34420			124	127	118			123							129						
34524			124	127	118			123							129						

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

34610			124	127	118			123								129						
34711			124	127	118			123								129						
34815	127		124		118			123								129						
34907	127		124		118			123								129						
35050	127		124		118			123								129						
35114	127		124		118			123								129						
35212			124		118			123								129						
35304			124		118			123								129						
35426			124		118			123								129						
35557			124		118			123								129						
35658			124		118			123								129						
35759			124		118			123								129						
35807			124		118			123								129						
35912			124		118			123								129						
36026			124		118			123								129						
36160			124		118			123								129						
36261			124		118			123								129						
36362			124		118			123								129						
36463			124		118			123								129						
36564			124		118			123								129						
36665			124		118			123								129						
36766			124		118			123								129						
36867			124		118			123								129						
37069			124		118			123								129						
37170			124		118			123								129						

RUN NUMBER	6K	7B	7D	7E	7H	7M	8C	8E	8H	8I	8K	9C	9D	9F	9H	9L	10D	10J	10K	11D	11F	11J
									6 FOOT ELEVATION													
30223			131			132			133		140					134		135	141			
30323			131			132			133		140					134		135	141			
30518			131			132			133		140					134		135	141			
30619			131			132			133		140					134		135	141			
30817			131			132			133		140					134		135	141			
30921			131			132			133		140					134		135	141			
31021			131			132					140				133			135	141			
31108			131			132					140				133			135	141			
31203			131			132					140				133			135	141			
31302			131			132					140				133			135	141			
31504			131	144		132					140				133			135	141			
31615			131	144		132					140				133				141			135
31701			131	144		132					140				133				141			135
31805			131	144		132					140				133				141			135
31922	141			144		132		131			140				133							
32010	141			144		132		131			140				133					138		
32114	141			144		132		131			140	108	135		133					138		
32235	141			144		132		131			140	108			133					138		

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

32333	141		144		132		131		140	108		133				138		
32452	141		144		132		131		140	108		133				138		
32652	141		144		132		131		140	108		133				138		
32753	141		144		132		131		140	108		133				138		
32854	141		144		132		131		140	108		133				138		
32955	141		144		132		131		140	108		133				138		
33056	141		144		132		131		140	108		133				138		
33338			144	136	132		131		140	108				133				
33436			144	136	132		131		140	108				133				
33544			144	136	132		131		140	108				133				
33644			144	136	132		131		140	108				133				
33749			144	136	132		131		14	108				133				
33849			144	136	132		131		140	108				133				
33903			144	136	132		131		140					133				108
34006			144	136	132		131		140					133				108
34103			144	136	132		131		140				137	133				108
34209			144	136	132		131		140					133			137	108
34316			144	136	132		131	108	140					133			137	
34420			144	136	132		131	108	140			130		133			137	
34524			144	136	132		131	108	140			130		133			137	
34610			144	136	132		131	108	140			130		133			137	
34711			144	136	132		131	108	140			130		133			137	
34815			144	136	132		131	108	140			130		133			137	
34907		139	144	136	132		131	108	140			130		133			137	
35050		139	144	136	132		131	108	140			130		133			137	
35114		139	144	136	132		131	108	140			130		133			137	
35212		139	144	136	132		131	108	140			130		133			137	
35304		139	144	136	132		131	108	140			130		133			137	
35426		139	144	136	132		131	108	140			130		133			137	
35557		139	144	136	132		131	108	140			130		133			137	
35658		139	144	136	132		131	108	140			130		133			137	
35759		139	144	136	132		131	108	140			130		133			137	
35807		139	144	136	132		131	108	140			130		133			137	
35912		139	144	136	132		131	108	140			130		133			137	
36026		139	144	136	132	145	131	108	140			130		133			137	
36160		139	144	136	132	145	131	108	140			130		133			137	
36261		139	144	136	132	145	131	108	140			130		133			137	
36362		139	144	136	132	145	131	108	140			130		133			137	
36463		139	144	136	132	145	131	108	140			130		133			137	
36564		139	144	136	132	145	131	108	140			130		133			137	
36665		139	144	136	132	145	131	108	140			130		133			137	
36766		139	144	136	132	145	131	108	140			130		133			137	
36867		139	144	136	132	145	131	108	140			130		133			137	
37069		139	144	136	132	145	131	108	140			130		133			137	
37170		139	144	136	132	145	131	108	140			130		133			137	

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

RUN NUMBER	8 FOOT ELEVATION							8-6 FOOT ELEVATION													
	11K	12D	12F	12I	12L	13G	14I	2H	4L	5J	6D	7B	7E	8D	8E	8H	8J	8K	9L	12H	12J
30223		136		137				145	147	146		142				143		144			
30323		136		137				145	147	146		142				143		144			
30518		136		137		116		145	147	146		142				143		144			
30619		136		137		116		145	147	146		142				143		144			
30817		136		137		116		145	147	146		142				143		144			
30921		136		137		116		145	147	146		142				143		144			
31021		136		137	134	116		145	147	146		142				143		144			
31108		136		137	134	116		145	147	146		142				143		144			
31203		136		137	134	116		145	147	146		142				143		144			
31302		136		137	134	116		145	147	146		142				143		144			
31504		136		137	134	116		145	147	146		142				143					
31615		136		137	134	116		145	147	146		142	143								
31701	130	136		137	134	116		145	147	146		142	143								
31805	130	136		137	134	116		145	147	146		142	143								
31922	130	136		137	134	116		145	147	146		142	143								
32013	130	136		137	134	116		145	147	146		142	143								
32114	130	136		137	134	116	139	145	147	146		142	143								
32235	130	136	135	137	134	116	139	145	147	146		142	143								
32333	130	136	135	137	134	116	139	145	147	146		142	143								
32452	130	136	135	137	134	116	139	145	147	146		142	143								
32652	130	136	135	137	134	116	139	145	147	146		142	143								
32753	130	136	135	137	134	116	139	145	147	146		142	143								
32854	130	136	135	137	134	116	139	145	147	146		142	143								
32955	130	136	135	137	134	116	139	145	147	146		142	143								
33056	130	136	135	137	134	116	139	145	147	146		142	143								
33375	130			137			139	145	147	146	141	142	143				134		135	138	148
33436	130			137			139	145	147	146	141	142	143				134		135	138	148
33544	130			137			139	145	147	146	141	142	143				134		135	138	148
33644	130			137			139	145	147	146	141	142	143				134		135	138	148
33749	130			137			139	145	147	146	141	142	143				134		135	138	148
33849	130			137			139	145	147	146	141	142	143				134		135	138	148
33903	130			137			139	145	147	146	141	142	143	138	148		134		135		
34006	130			137			139	145	147	146	141	142	143	138	148		134		135		
34103							139	145	147	146	141	142	143	138	148		134		135		
34209							139	145	147	146	141	142	143	138	148		134		135		
34316							139	145	147	146	141	142	143	138	148		134		135		
34420							139	145	147	146	141	142	143	138	148		134		135		
34524							139	145	147	146	141	142	143	138	148		134		135		
34610							139	145	147	146	141	142	143	138	148		134		135		
34711							139	145	147	146	141	142	143	138	148		134		135		
34815							139	145	147	146	141	142	143	138	148		134		135		
34907								145	147	146	141	142	143	138	148		134		135		
35050								145	147	146	141	142	143	138	148		134		135		
35114								145	147	146	141	142	143	138	148		134		135		
35212								145	147	146	141	142	143	138	148		134		135		

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

35304									145	147	146	141	142	143	138	148		134		135
35426									145	147	146	141	142	143	138	148		134		135
35557									145	147	146	141	142	143	138	148		134		135
35658									145	147	146	141	142	143	138	148		134		135
35759									145	147	146	141	142	143	138	148		134		135
35807									145	147	146	141	142	143	138	148		134		135
35912									145	147	146	141	142	143	138	148		134		135
36026										147	146	141	142	143	138	148		134		135
36160										147	146	141	142	143	138	148		134		135
36261										147	146	141	142	143	138	148		134		135
36362										147	146	141	142	143	138	148		134		135
36463										147	146	141	142	143	138	148		134		135
36564										147	146	141	142	143	138	148		134		135
36665										147	146	141	142	143	138	148		134		135
36766										147	146	141	142	143	138	148		134		135
36867										147	146	141	142	143	138	148		134		135
37069										147	146	141	142	143	138	148		134		135
37170										147	146	141	142	143	138	148		134		135

RUN NUMBER	9-3 FOOT ELEVATION																			
	3I	6F	6I	6J	7D	7H	7M	8C	8G	9C	9D	9F	9G	9H	10J	11D	11E	11G	12I	13G
30223	148	149	150		151		152			153					154		155		156	157
30323	148	149	150		151		152			153					154		155		156	157
30518	148	149	150		151		152			153					154		155		156	157
30619	148	149	150		151		152			153					154		155		156	157
30617	148	149	150		151		152			153					154		155		156	157
30921	148	149	150		151		152			153					154		155		156	157
31021	148	149	150		151		152			153					154		155		156	157
31108	148	149	150		151		152			153					154		155		156	157
31203	148	149	150		151		152			153					154		155		156	157
31302	148	149	150		151		152			153					154		155		156	157
31504	148	149	150		151		152			153					154		155		156	157
31615	148	149	150		151		152			153					154		155		156	157
31701	148	149	150		151		152			153					154		155		156	157
31805	148	149	150		151		152			153					154		155		156	157
31922	148	149	150		151		152			153					154		155		156	157
32013	148	149	150		151		152			153					154		155		156	157
32114	148	149	150		151		152			153					154	128	155		156	157
32235	148	149	150		151		152			153					154	128	155		156	157
32333	148	149	150		151		152			153					154	128	155		156	157
32452	148	149	150		151		152			153				127	154	128	155		156	157
32652	148	149	150		151		152			153				127	154	128	155		156	157

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

32753	148	149	150		151		152			153				127	154	128	155		156	157
32854	148	149	150		151		152			153				127	154	128	155		156	157
32955	148	149	150		151		152			153				127	154	128	155		156	157
33056	148	149	150		151		152			153				127	154	128	155		156	157
33338		149		150	151		152			153			158		154	128	155		156	157
33436		149		150	151		152			153			158		154	128	155		156	157
33544		149		150	151		152			153			158		154	128	155		156	157
33644		149		150	151		152			153			158		154	128	155		156	157
33749		149		150	151		152			153			158		154	128	155		156	157
33849		149		150	151		152			153			158			128	155	154	156	157
33903		149		150	151		152			153			158			128	155	154	156	157
34006		149		150	151		152			153			158			128	155	154	156	157
34103		149		150	151		152	157		153			158			128	155	154		
34209		149		150	151		152	157		153			158			128	155	154		
34316		149		150	151		152	157		153			158			128	155	154		
34420		149		150	151		152	157		153			158			128	155	154		
34524		149		150	151		152	157		153			158			128	155	154		
34610		149		150	151		152	157		153			158			128	155	154		
34711		149		150	151		152	157		153			158			128	155	154		
34815		149		150	151		152	157		153			158			128	155	154		
34907		149		150	151		152	157		153			158			128	155	154		
35050		149		150	151		152	157		153			158			128	155	154		
35114		149		150	151		152	157		153			158			128	155	154		
35212		149		150	151		152	157		153			158			128	155	154		
35304		149		150	151		152	157		153			158			128	155	154		
35426		149		150	151		152	157		153			158			128	155	154		
35557				150	151		152	157	105	153		149	158			128	155	154		
35656				150	151		152	157	105	153		149	158			128	155	154		
35759				150	151		152	157	105	153		149	158			128	155	154		
35807				150	151	105	152	[illegible]		153		149	158			128	155	154		
35912				150	151	105	152			153		149	158			128	155	154		
36026				150	151	105	152	157		153		149	158			128	155	154		
36160				150	151	105	152	157		153	128	149	158				155	154		
36261				150	151	105	152	157		153	128	149	158				155	154		
36362				150	151	105	152	157		153	[illegible]	149	158				155	154		
36463				150	151	105	152	157		153	128	149	158				155	154		
36564				150	151	105	152	157		153	128	149	158				155	154		
36665				150	151	105	152	157		153	128	149	158				155	154		
36766				150	151	105	152	157		153	128	149	158				155	154		
36867				150	151	105	152	157		153	128	149	158				155	154		
37069				150	151	105	152	157		153	128	149	158				155	154		
37170				150	151	105	152	157		153	128	149	158				155	154		

RUN NUMBER	10 FOOT ELEVATION																					
	2H	4D	4L	5H	5J	6D	6E	6K	7B	7E	8D	8E	8H	8J	8K	8N	9L	10D	12J	12L	14I
30223	158	159		160	161				162				163		164	165				166	167
30323	158	159		160	161				162				163		164	165				166	167

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

30518	158	159		160	161					162				163		164	165					166	167
30619	158	159		160	161					162				163		164	165					166	167
30817	158	159		160	161					162				163		164	165					166	167
30921	158	159		160	161					162				163		164	165					166	167
31021	158	159		160	161					162				163		164	165					166	167
31108	158	159		160	161					162				163		164	165					166	167
31203	158	159		160	161					162				163		164	165					166	167
31302	158	159		160	161					162				163		164	165					166	167
31504	158	159		160	161					162				163		164	165					166	167
31615	158	159		160	161					162	166			163		164	165						167
31701	158	159		160	161					162	166			163		164	165						167
31805	158	159		160	161					162	166			163		164	165						167
31922	158	159		160	161					162	166			163		164	165						167
32013	158	159		160	161					162	166			163		164	165						167
32114	158	159		160	161					162	166			163		164	165						167
32235	158	159		160	161					162	166			163		164	165						167
32333	158	159		160	161					162	166			163		164	165						167
32452	158	159		160	161					162	166			163		164	165						167
32652	158	159		160	161					162	166			163		164	165						167
32753	158	159		160	161					162	166			163		164	165						167
32854	158	159		160	161					162	166			163		164	165						167
32955	158	159		160	161					162	166			163		164	165						167
33056	158	159		160	161					162	166			163		164	165						167
33338	160					174				162	166			163	161	164	165			159			167
33436	160					174				162		166		163	161	164	165			159			167
33544	160					174				162		166		163	161	164	165			159			167
33644	160					174				162		166		163	161	164	165			159			167
33749	160									162		166	174	163	161	164	165			159			167
33849	160									162		166	174	163	161	164	165			159			167
33903	160		159						173	162		166	174	163	161	164	165						167
34006	160		159							162		166		163	161	164	165	174	173				167
34103	160		159				156			162		166		163	161	164	165	174	173				167
34209	160		159				156			162		166		163	161	164	165	174	173				167
34316	160		159				156			162		166		163	161	164	165	174	173				167
34420	160		159				156			162		166		163	161	164	165	174	173				167
34524	160		159				156			162		166		163	161	164	165	174	173				167
34610	160		159				156			162		166		163	161	164	165	174	173				167
34711	160		159				156			162		166		163	161	164	165	174	173				167
34815	160		159				156			162		166		163	161	164	165	174	173				167
34907	160		159				156			162		166		163	161	164	165	174	173				167
35050	160		159				156			162		166		163	161	164	165	174	173				167
35114	160		159				156			162		166		163	161	164	165	174	173				167
35212	160		159				156			162		166		163	161	164	165	174	173				167
35304	160		159				156			162		166		163	161	164	165	174	173				167
35426	160		159				156			162		166		163	161	164	165	174	173				167
35557	160		159				156			162		166		163	161	164	165	174	173				167
35658	160		159				156			162		166		163	161	164	165	174	173				167
35759	160		159				156			162		166		163	161	164	165	174	173				167
35807	160		159				156			162		166		163	161	164	165	174	173				167
35912	160		159				156			162		166		163	161	164	165	174	173				167

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

36026	160		159				156		162	166		163	161	164	165	174	173		167
36160	160		159				156		162	166		163	161	164	165	174	173		167
36261	160		159				156		162	166		163	161	164	165	174	173		167
36362	160		159				156		162	166		163	161	164	165	174	173		167
36463	160		159				156		162	166		163	161	164	165	174	173		167
36564	160		159				156		162	166		163	161	164	165	174	173		167
36665	160		159				156		162	166		163	161	164	165	174	173		167
36766	160		159				156		162	166		163	161	164	165	174	173		167
36867	160		159				156		162	166		163	161	164	165	174	173		167
37069	160		159				156		162	166		163	161	164	165	174	173		167
37170	160		159				156		162	166		163	161	164	165	174	173		167

RUN NUMBER	11 FOOT ELEVATION									11-6 FOOT ELEVATION				
	5E	4J	7E	9G	11E	11G	11H	11I	11K	5J	7B	8D	8H	8K
30223	168	169	170	171	172			173	174	175	176		177	178
30323	168	169	170	171	172			173	174	175	176		177	
305[illegible]	168	169	170	171	172			173	174	175	176		177	
30619	168	169	170	171	172			173	174	175	176		177	
30817	168	169	170	171	172			173	174	175	176		177	
30921	168	169	170	171	172			173	174	175	176		177	
31021	168	169	170	171	172			173	174	175	176		177	
31108	168	169	170	171	172			173	174	175	176		177	
31203	168	169	170	171	172			173	174	175	176		177	
31302	168	169	170	171	172			173	174	175	176		177	
31504	168	169		171	172	170		173	174	175	176		177	
31615	168	169		171	172	170		173	174	175	176		177	
31701	168	169		171	172	170	174	173		175	176		177	
31805	168	169		171	172	170	174	173		175	176		177	
31922	168	169		171	172	170	174	173		175	176		177	
32013	168	169		171	172	170	174	173		175	176		177	
32114	168	169		171	172	170	174	173		175	176		177	
32235	168	169		171	172	170	174	173		175	176		177	
32333	168	169		171	172	170	174	173		175	176		177	
32452	168	169		171	172	170	174	173		175	176		177	
32652	168	169		171	172	170	174	173		175	176		177	
32753	168	169		171	172	170	174	173		175	176		177	
32854	168	169		171	172	170	174	173		175	176		177	
32955	168	169		171	172	170	174	173		175	176		177	
33056	168	169		171	172	170	174	173		175	176		177	
33338	168	169		171	172	170		173		175	176		177	
33436	168	169		171	172	170		173		175	176		177	
33544	168	169		171	172	170		173		175	176		177	
33644	168	169		171	172	170		173		175	176		177	
33749	168	169		171	172	170		173		175	176		177	
33849	168	169		171	172	170	173			175	176		177	
33903	168	169		171	172	170				175	176		177	

TABLE C-2 (cont)

CONNECTED THERMOCOUPLES FOR ALL VALID TESTS

34006	168	169	171	172	170	175	176	177
34103	168	169	171	172	170	175	176	177
34209	168	169	171	172	170	175	176	177
34316	168	169	171	172	170	175	176	177
34420	168	169	171	172	170	175	176	177
34524	168	169	171	172	170	175	176	177
34610	168	169	171	172	170	175	176	177
34711	168	169	171	172	170	175	176	177
34815	168	169	171	172	170	175	176	177

of coolant injection and are normally ignored. However, in these very low temperature tests, there was little or no heatup time. Consequently, the initialization period of the DATAR calculations occurred during the time period of interest in the test. This problem is clearly shown in the reported heat transfer coefficients as a very large and rapidly decreasing value at the beginning of the test. These very large values are not realistic and should be ignored. Also, since the heat transfer coefficients plotted in this report have been smoothed (as explained in appendix E), the erroneous values are extended further in time than in the original calculations. This problem is evident in runs 30323, 30518, and 30619.

-- Steam probe temperatures in the bundle at the following locations:

Steam Probe Location	Elevation [m(in.)]	Computer Channel
7I	1.83 (72)	185
10L	2.44 (96)	194
10C	2.82 (111)	195
7C	3.05 (120)	197
10F	3.35 (132)	199
5K	3.51 (138)	200

plus fluid temperature in the upper plenum (CH 210) and steam probe temperature in the exhaust line (CH 201) from the upper plenum

-- Upper plenum (CH 209), lower plenum (CH 211), injection line (CH 221), and exhaust orifice (CH 215) fluid temperature

-- Thimble wall temperatures

-- Housing temperature for runs 31203, 31504, 31805, 31922, 32013, 32333, and 34006

-- Power decay curves for the three power zones, measured by the redundant power transducers

-- Housing upper plenum pressure

-- Overall bundle level (CH 245), measured by the housing 0-3.66 m (0-144 in.) overall differential pressure cell, and carryover tank level (CH 247)

-- Steam separator (CH 248) and drain tank (CH 249) levels, measured by differential pressures

-- Flooding rate, measured by the turbine meter and/or the rotameter (for the gravity refill tests, runs 33338, 33436, 33544, and 33644, the mass injection into the bottom of the downcomer)

-- Rate of mass into carryover tank

-- Effluence rate from exhaust orifice

-- Overall mass balance plot, showing the following:

(1) Total mass injected as measured by the turbine meter

(2) Total mass of steam exhausted as measured by the exhaust orifice flowmeter

(3) Total liquid collected in the carryover tank, steam separator liquid collection tank, and upper plenum

(4) Total mass stored in the bundle, calculated using the 0 to 3.66 m (0 to 144 in.) differential pressure measurements corrected for frictional pressure drop, as described in appendix E

(5) Total mass inventory, which is the sum of the steam mass out, liquid collected, and mass stored in the bundle. The mass in the steam probe collection tanks is added to the total mass inventory at the end of the test.

-- All heater rod thermocouple quench times as a function of elevation

-- Rod bundle axial differential pressures and bundle average void fractions at 0-0.30, 0.30-0.61, 0.61-0.91, and 0.91-1.22 m (0-12, 12-24, 24-36, and 36-48 in.) elevations. The void fractions were calculated from corrected axial differential pressures, as described in appendix E.

-- Rod bundle axial differential pressures and bundle average void fractions at 1.22-1.52, 1.52-1.83, 1.83-2.13, and 2.13-2.44 m (48-60, 60-72, 72-84, and 84-96 in.) elevations. The void fractions were calculated from corrected axial differential pressures, as described in appendix E.

-- Rod bundle axial differential pressures and bundle average void fractions at 2.44-2.74, 2.74-3.05, 3.05-3.35, and 3.35-3.66 m (96-108, 108-120, 120-132, and 132-144 in.) elevations. The void fractions were calculated from corrected axial differential pressures, as described in appendix E.

The differential pressures and void fractions above are denoted by the following channels:

Elevation [m (in.)]	Differential Pressure Channel	Void Fraction Channel
0-0.30 (0-12)	101	102
0.30-0.61 (12-24)	105	106
0.61-0.91 (24-36)	109	110
0.91-1.22 (36-48)	113	114
1.22-1.52 (48-60)	117	118
1.52-1.83 (60-72)	121	122
1.83-2.13 (72-84)	125	126
2.13-2.44 (84-96)	129	130
2.44-2.74 (96-108)	133	134
2.74-3.05 (108-120)	137	138
3.05-3.35 (120-132)	141	142
3.35-3.66 (132-144)	145	146

For the gravity refill tests, runs 33436, 33338, 33544, and 33644, plots of flooding rates measured by the bidirectional turbo-probe and the downcomer level for each run are also included.

For the steam cooling tests, plots of rod clad temperatures and surface heat fluxes as calculated by DATAR for each run for those 12 thermocouples tabulated on page C-3 are included. The steam probe temperatures, injection line temperature, upper plenum temperature, and power are shown for each run. The housing temperature, housing insulation temperature, steam flow, and upper plenum pressure as a function of time are shown for runs 36261 and 36766, to illustrate the steady-state behavior of the boundary conditions.

For the boiloff tests, plots of rod clad temperatures and heat transfer coefficients as calculated by DATAR for each run for those 12 thermocouples tabulated on page C-3 are included. The steam probe temperatures, upper plenum temperature, thimble wall temperatures, power, and upper plenum pressure are shown for each run. The bundle overall differential pressure, the carryover tank pressure differential, and the steam separator pressure differential as a function of time are also shown for each run. The 12 bundle axial differential pressures and bundle average void fractions calculated from corrected axial differential pressures are shown for each run.

All the data reported in this section have been smoothed over $\Delta T = 10$ sec, as described in appendix E.

Each data package is paginated by test number.

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 30223

Date: 2/5/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	258°C (497°F)
Rod peak power	1.3 kw/m (0.40 kw/ft)
Flow rate	37.8 mm/sec (1.49 in./sec)
Coolant temperature	54°C (129°F)
Bundle radial power profile	Uniform
Disconnected rods	None

B. Housing Temperatures

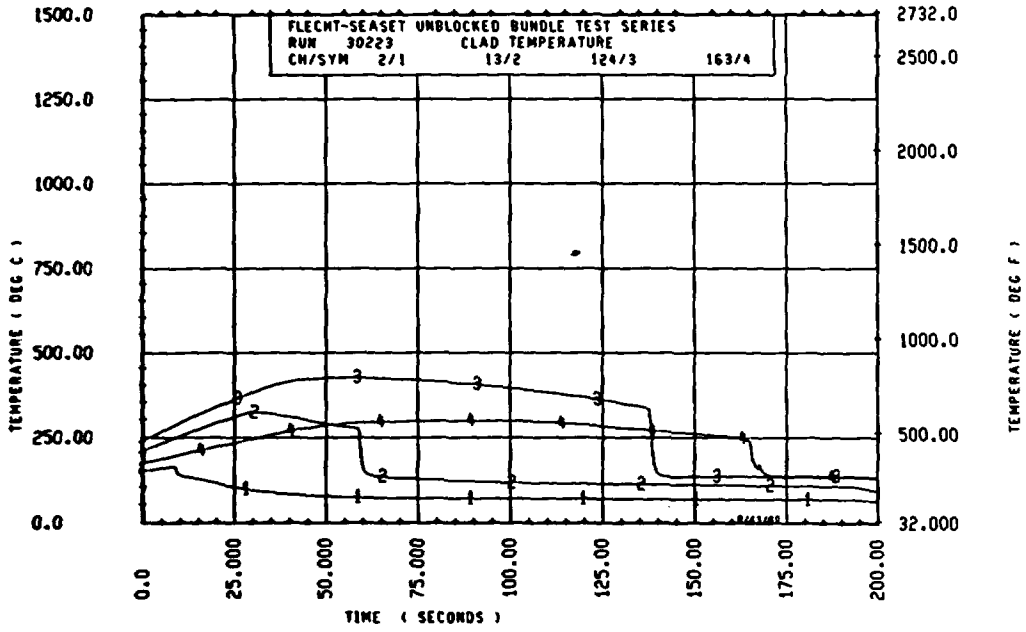
Elevation	Initial Temperature	Maximum Temperature
0.61 m (24 in.)		
1.22 m (48 in.)		
1.83 m (72 in.)		
2.44 m (96 in.)	(No housing temperatures available)	
2.74 m (108 in.)		
3.05 m (120 in.)		
3.35 m (132 in.)		

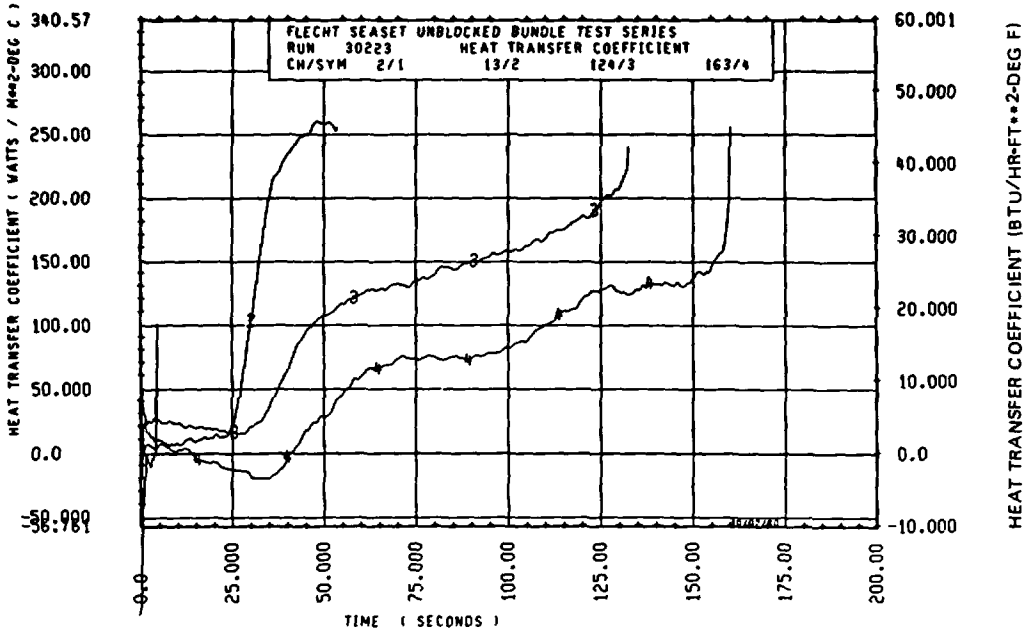
C. Comments

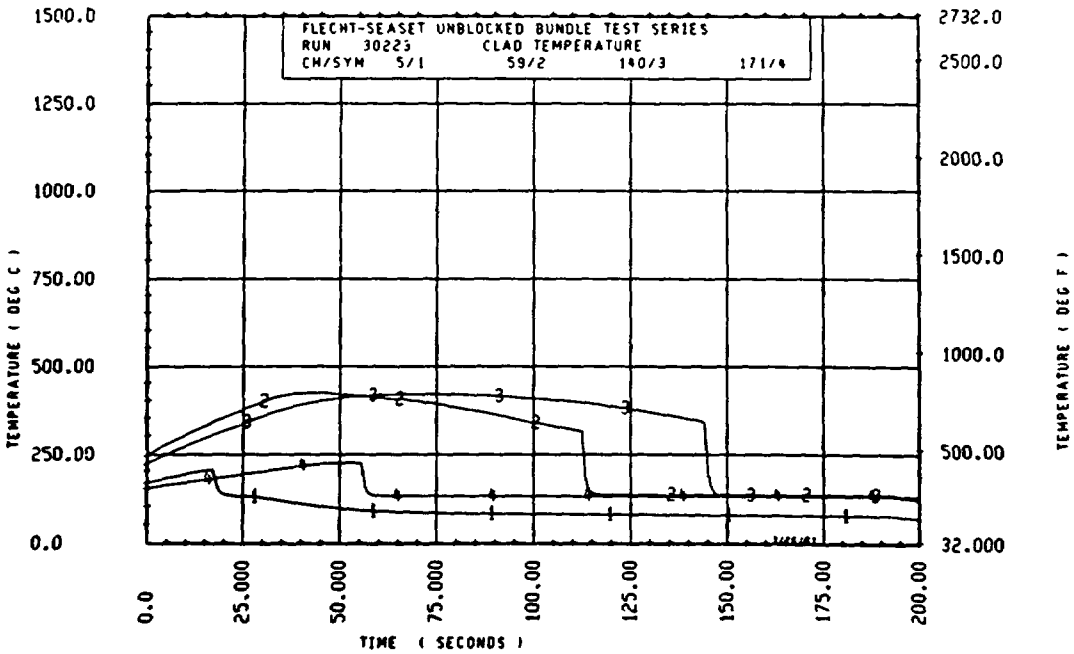
The steam probe solenoids were not functional; therefore there are no accurate steam temperature measurements.

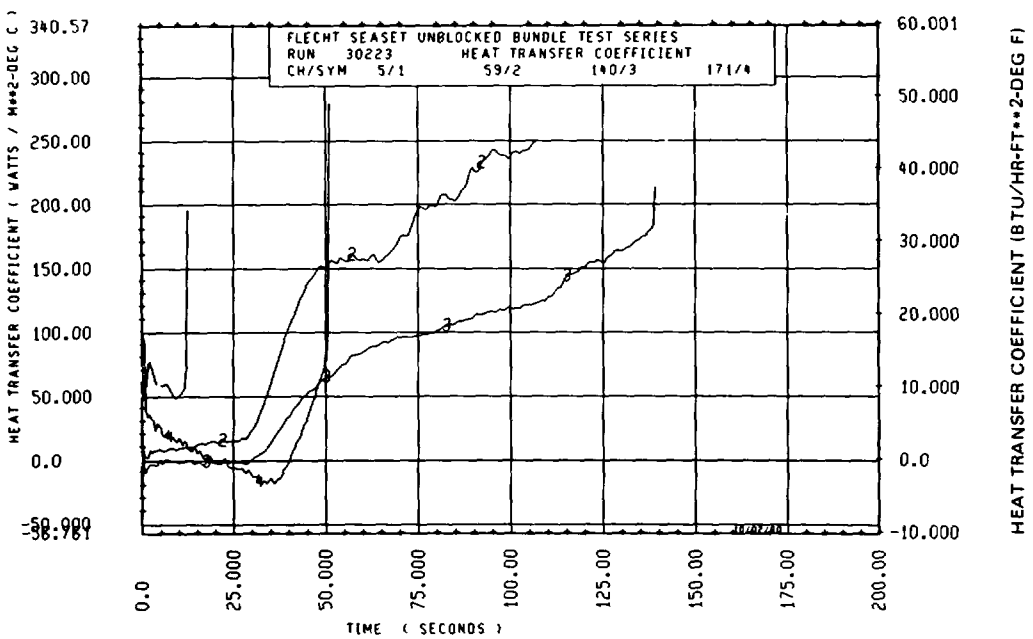
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 30223

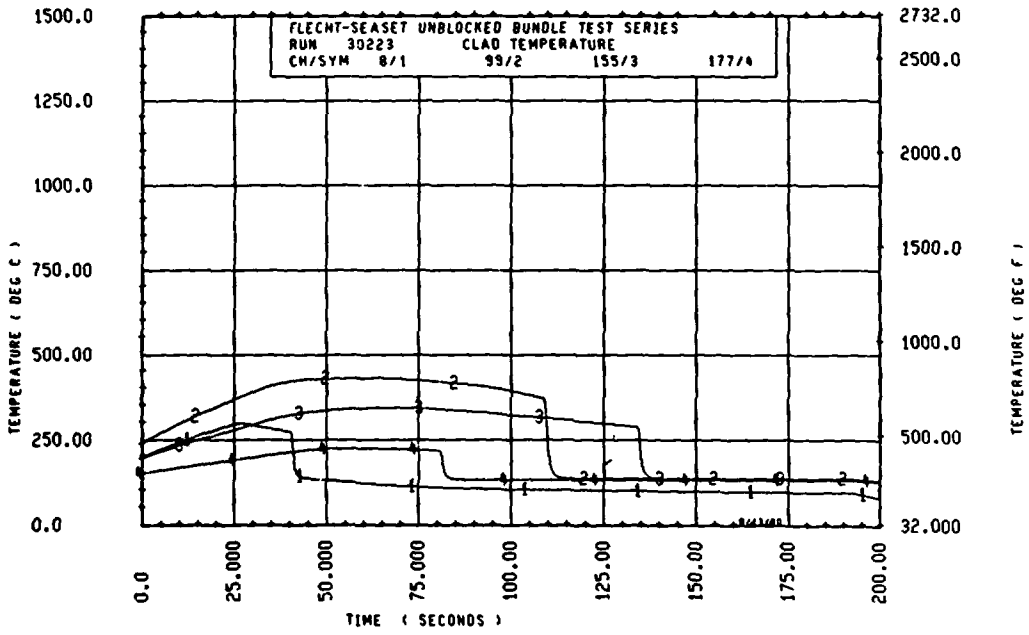
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	407.	599.	192.	29.5	477.	63.9
2H 6- 0	50	488.	797.	309.	45.0	641.	107.5
3C 5- 0	17	431.	679.	249.	40.0	597.	79.0
3C 5- 7	28	460.	725.	266.	37.5	625.	85.5
4L 8- 0	129	426.	756.	330.	71.0	573.	151.0
4L 8- 6	147	429.	758.	329.	68.0	576.	151.0
5E11- 0	168	319.	454.	134.	54.0	437.	79.5
5J 4- 0	12	408.	603.	194.	29.5	512.	62.0
5J 8- 6	146	398.	675.	277.	56.0	550.	170.4
5J11- 6	175	314.	436.	123.	54.5	351.	84.4
7B 6- 0	57	462.	743.	281.	38.5	612.	91.2
7B 8- 6	142	396.	720.	324.	82.0	605.	160.8
7B 9- 0	162	346.	579.	233.	85.5	453.	180.0
7B11- 6	176	314.	438.	123.	51.0	435.	54.5
7D 6- 4	84	495.	819.	324.	38.5	656.	99.5
7D 7- 6	119	468.	796.	328.	48.5	633.	132.0
7D 9- 3	151	374.	617.	242.	65.0	470.	167.5
7G 5- 0	23	476.	752.	276.	35.0	636.	90.5
7J 6- 0	59	481.	798.	317.	42.5	597.	112.5
7M 7- 6	120	464.	787.	323.	53.5	630.	133.1
7M 8- 0	132	433.	756.	322.	65.0	618.	143.4
7M 9- 3	152	379.	623.	244.	72.0	530.	134.9
8H 4- 0	13	412.	616.	205.	31.0	531.	58.9
8H10- 0	163	347.	571.	224.	94.0	459.	165.0
8H11- 6	177	306.	435.	129.	57.5	422.	80.9
8K 4- 0	14	407.	603.	196.	30.0	555.	47.5
8K 6- 6	99	469.	809.	339.	64.5	697.	109.3
8K 8- 0	140	439.	790.	351.	65.5	645.	144.1
8K10- 0	164	340.	571.	231.	77.5	457.	168.5
8N 2- 0	5	340.	406.	66.	17.0	286.	19.5
8N 4- 0	15	420.	612.	192.	29.0	529.	56.5
8N 6- 0	61	473.	783.	309.	45.0	651.	104.0
8N10- 0	165	343.	584.	242.	85.0	348.	168.2
9C 7- 0	109	470.	772.	302.	39.0	631.	119.5
9C 9- 3	153	379.	607.	227.	67.0	607.	73.4
9G 1- 0	2	303.	328.	25.	8.5	283.	10.0
9G 3- 3	8	392.	567.	175.	26.5	518.	40.5
9G11- 0	171	313.	440.	127.	50.5	438.	55.8
9I 5- 0	24	471.	752.	281.	33.0	614.	91.0
9I 5-10	46	492.	812.	319.	38.5	589.	109.7
10D 6- 6	93	458.	791.	333.	55.0	648.	115.0
11E 7- 6	124	465.	800.	335.	55.0	630.	137.8
11E 9- 3	155	391.	650.	259.	65.5	548.	134.4
11E11- 0	172	319.	445.	126.	48.5	439.	54.0
12D 4- 0	16	412.	605.	193.	29.5	540.	57.9
12D 6- 0	66	472.	783.	310.	44.0	650.	104.2
12F 6- 6	102	474.	775.	302.	39.5	650.	92.5

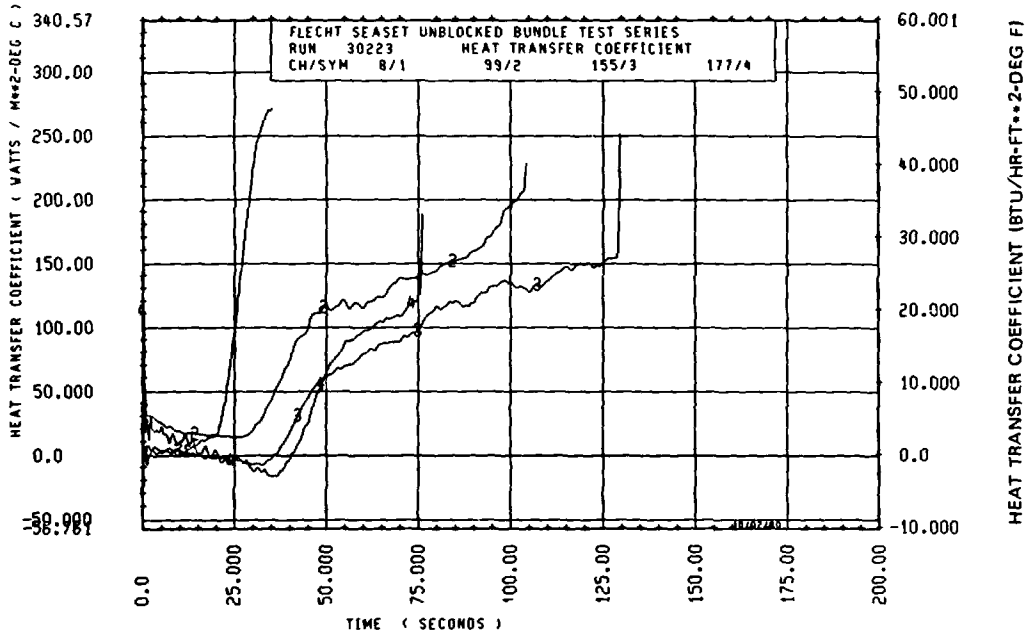

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

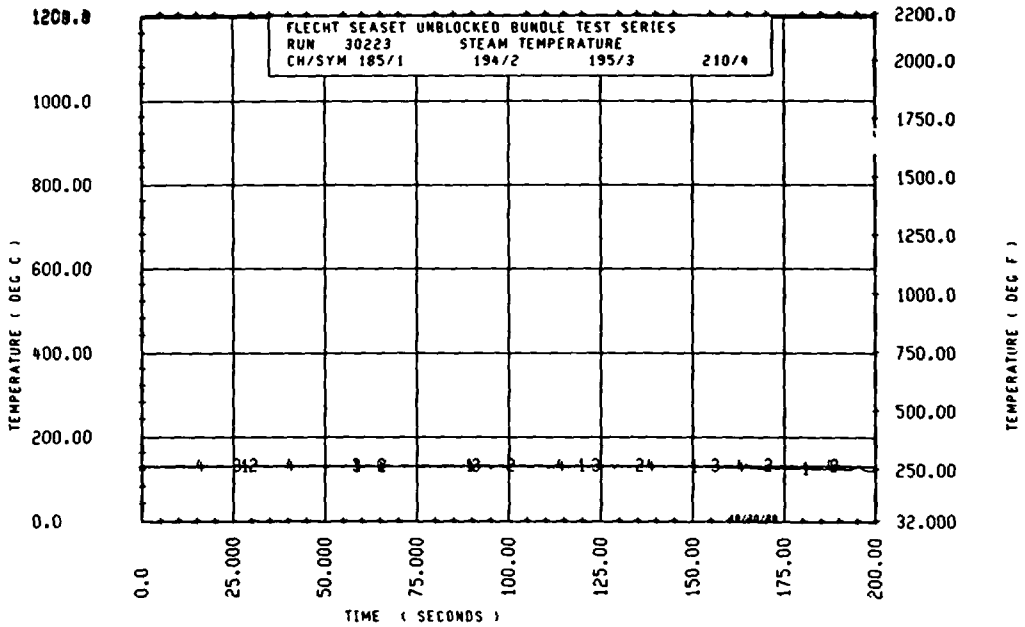

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

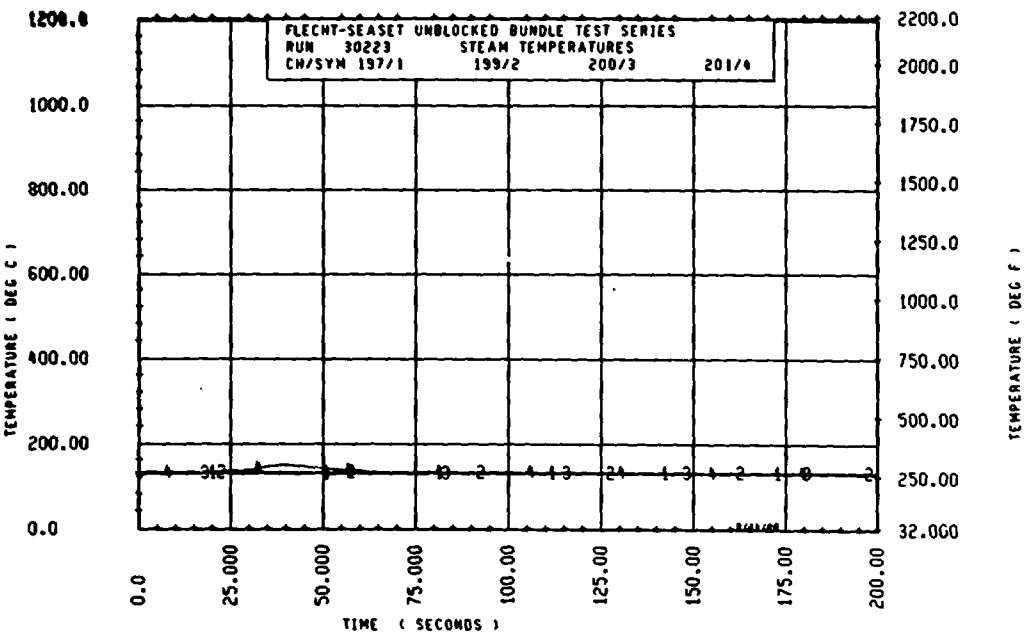

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

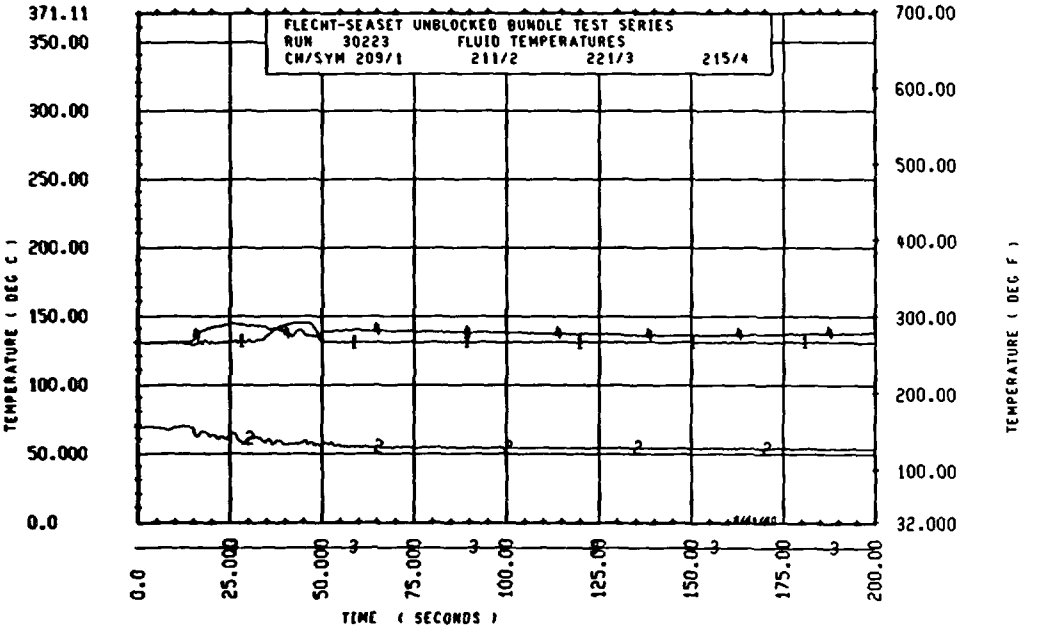

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

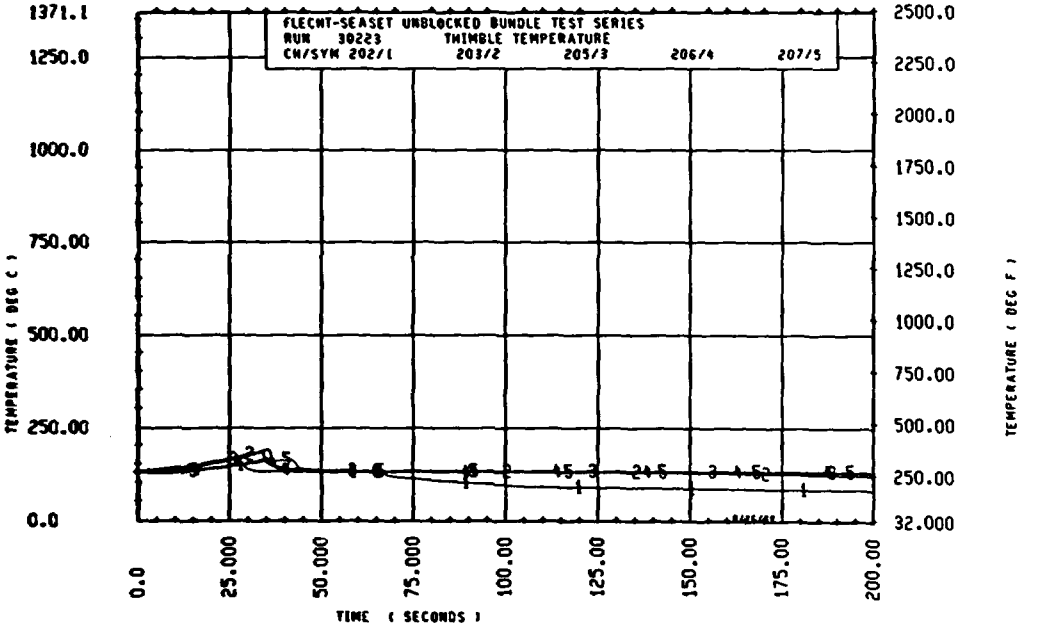

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

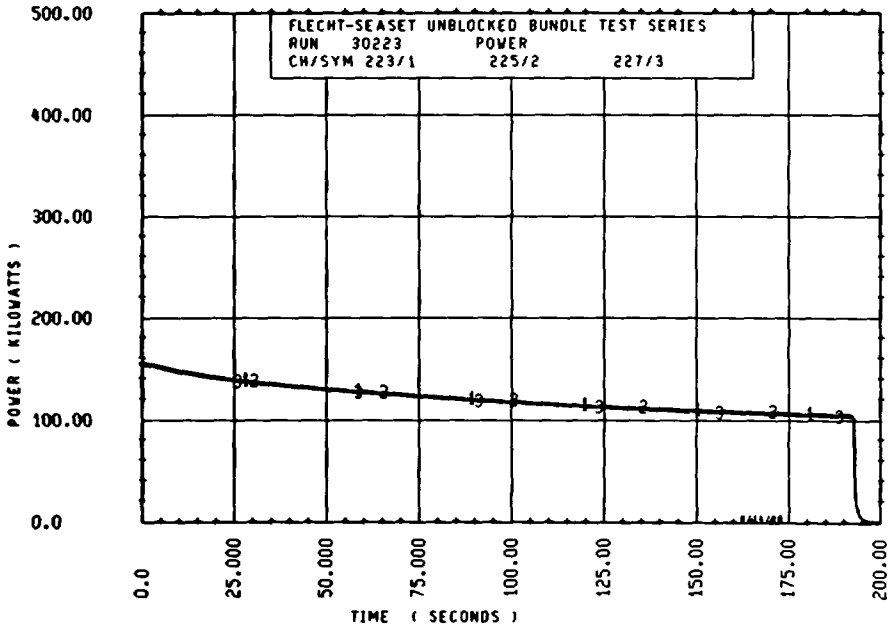

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

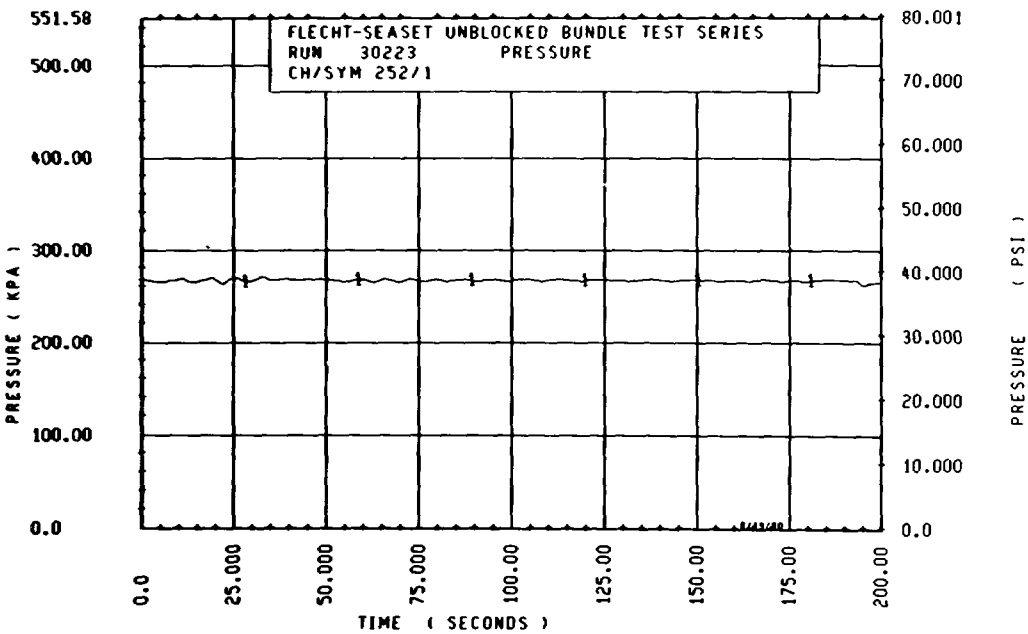

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

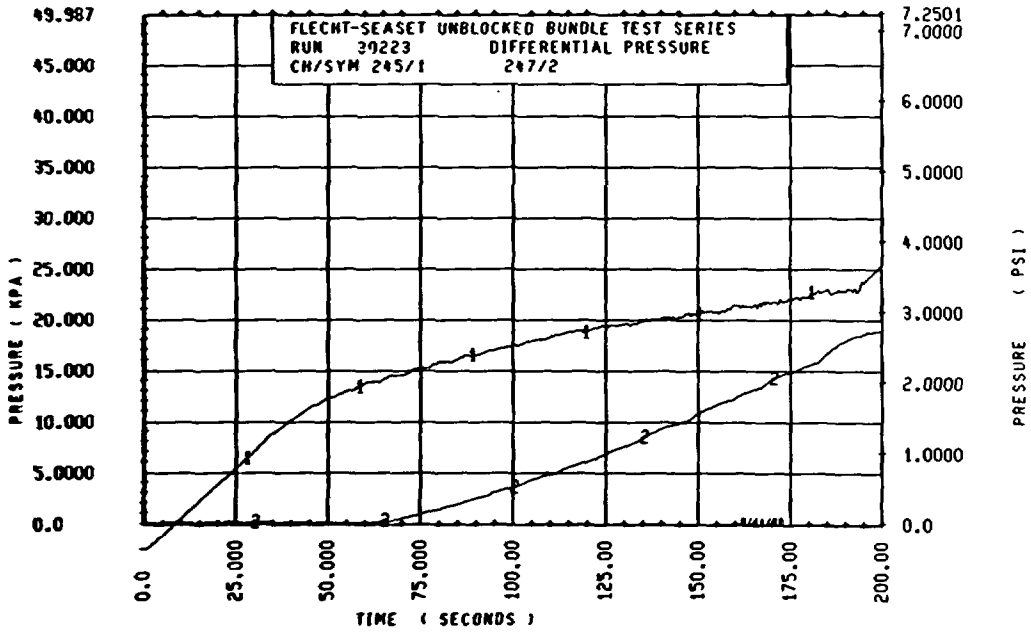


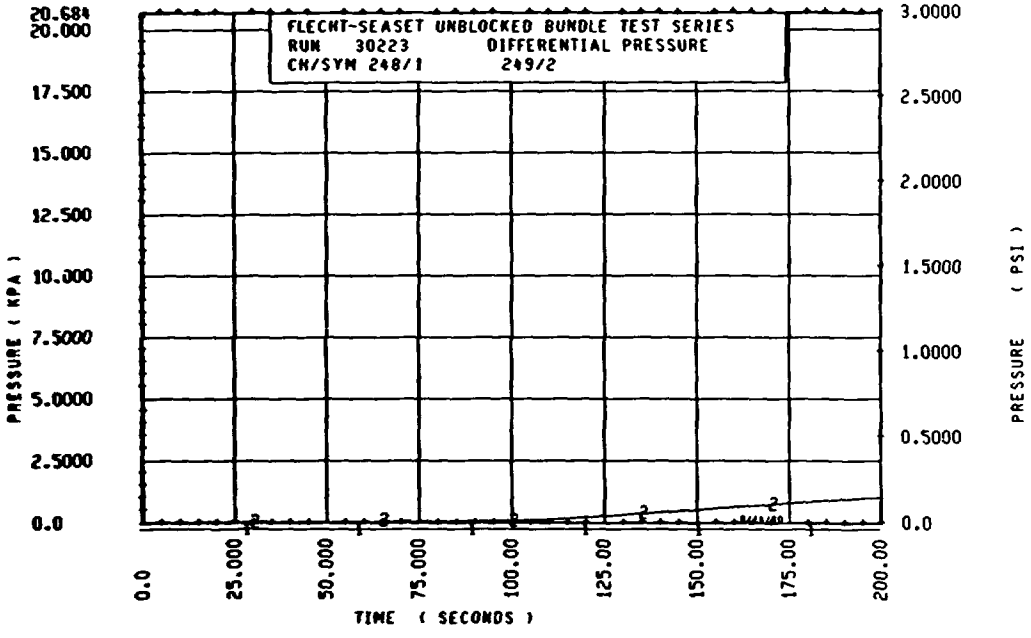


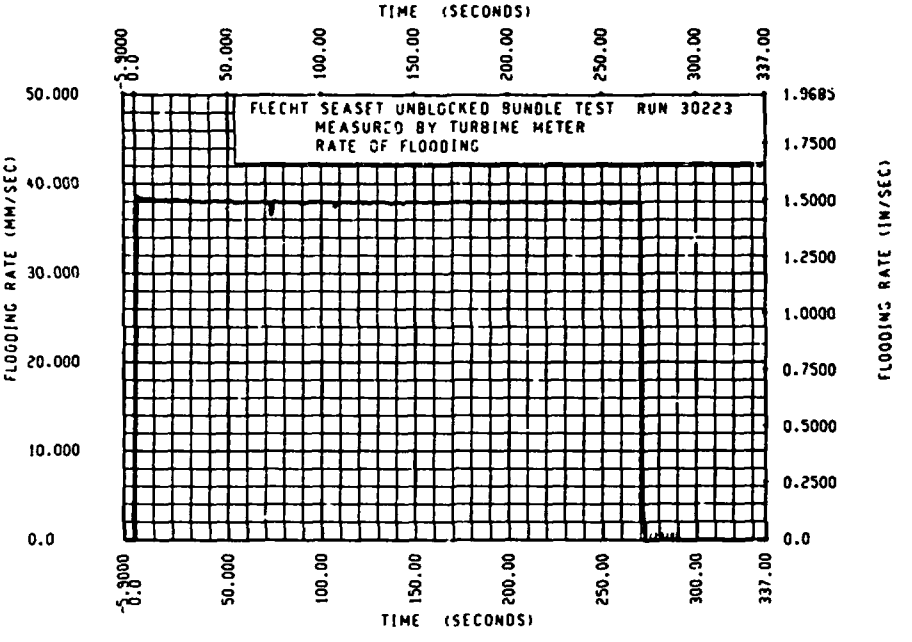
CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.); CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

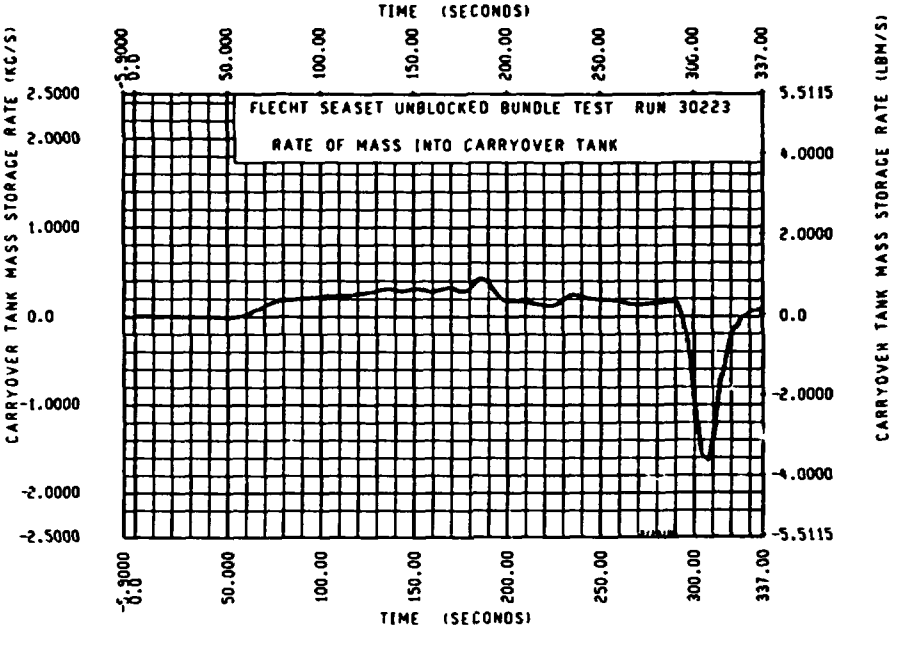

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

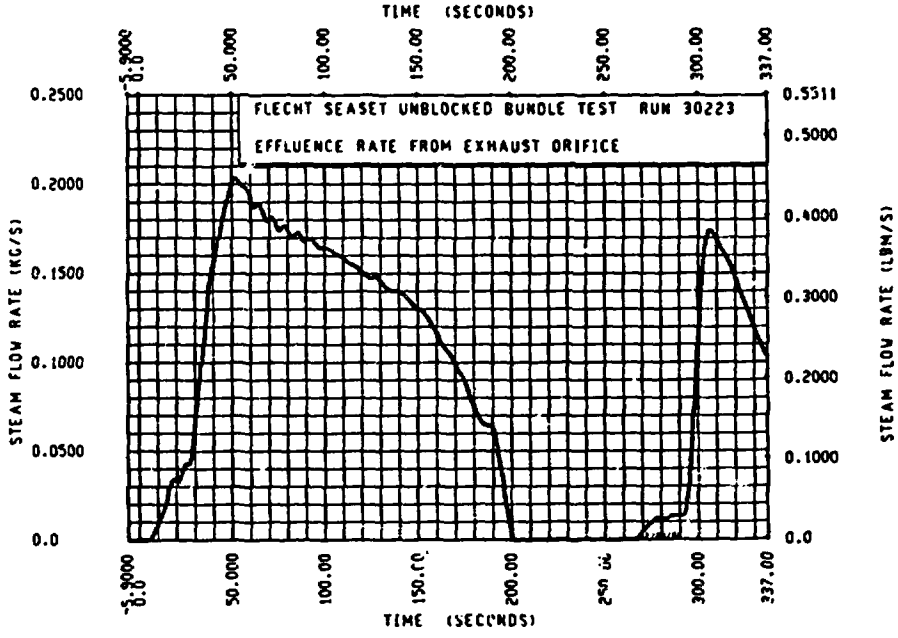

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

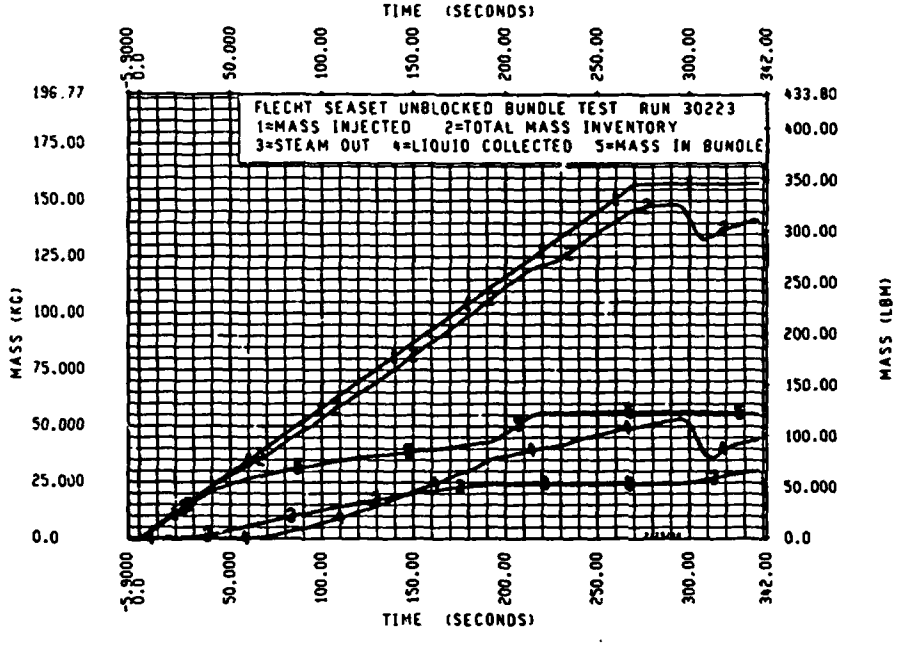

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

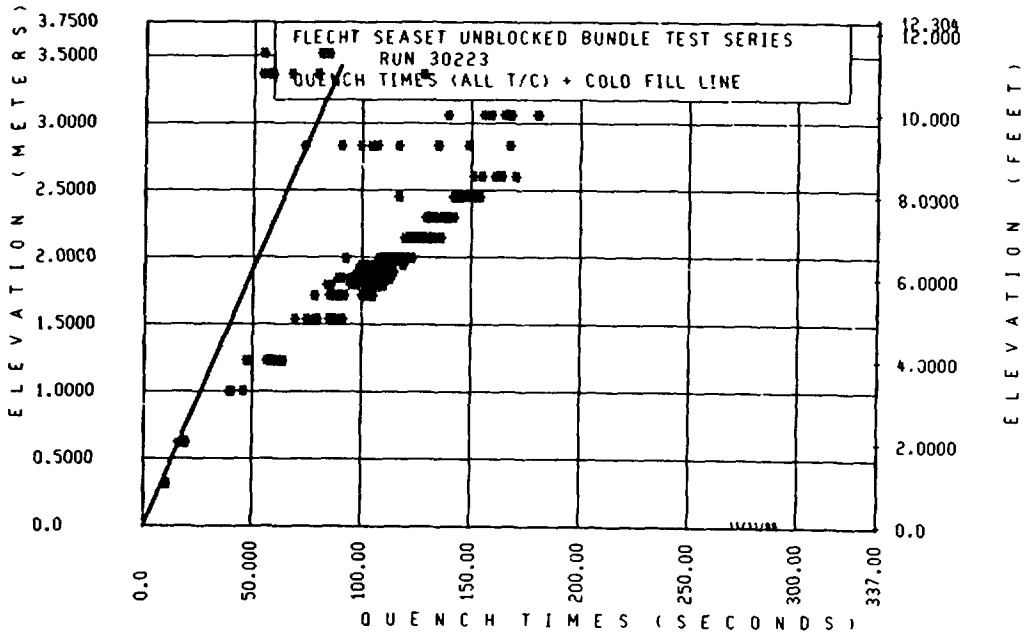

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

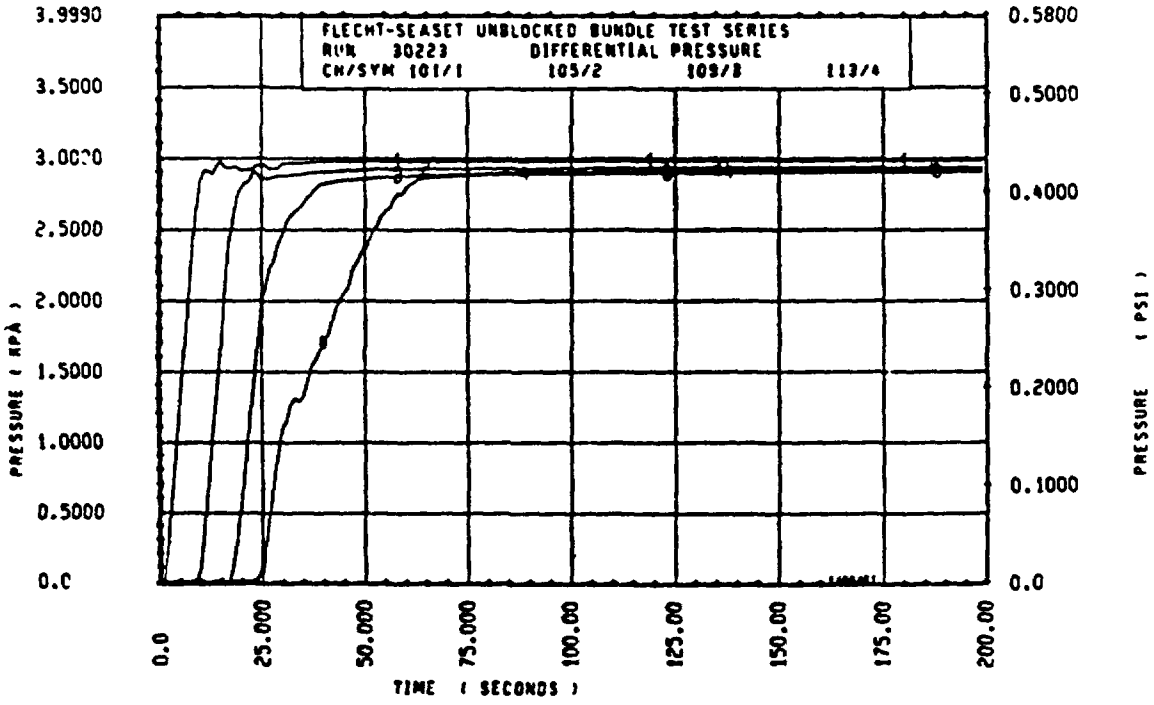

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30223
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
-5.9000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
337.00
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0

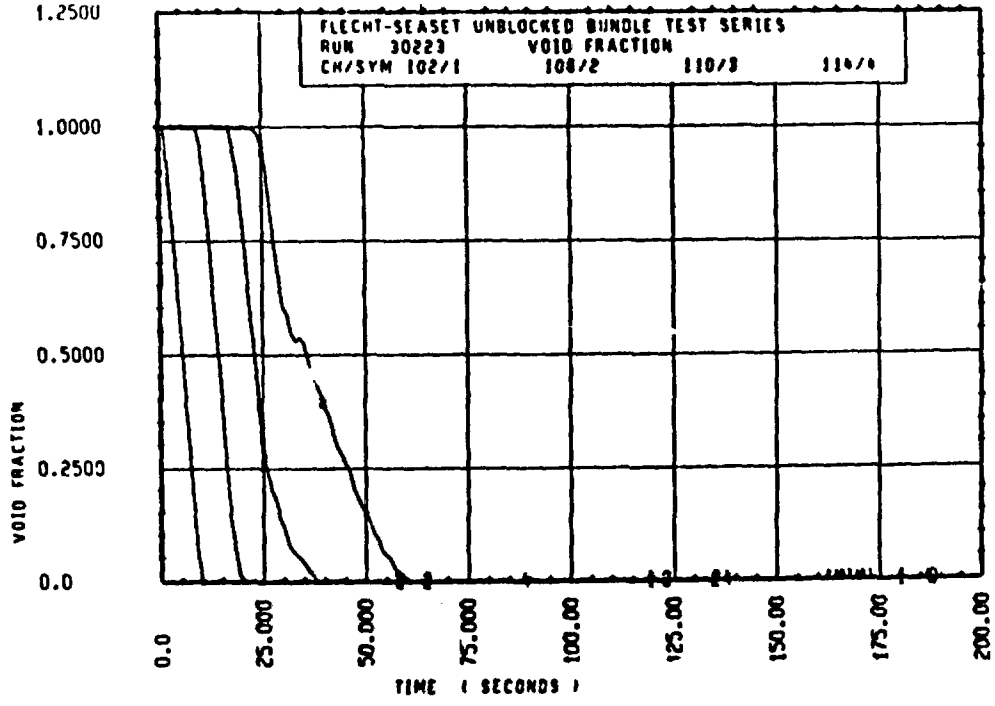

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30223
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
-5.9000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
337.00
2.5000
2.0000
1.0000
0.0
-1.0000
-2.0000
-2.5000
5.5115
4.0000
2.0000
0.0
-2.0000
-4.0000
-5.5115

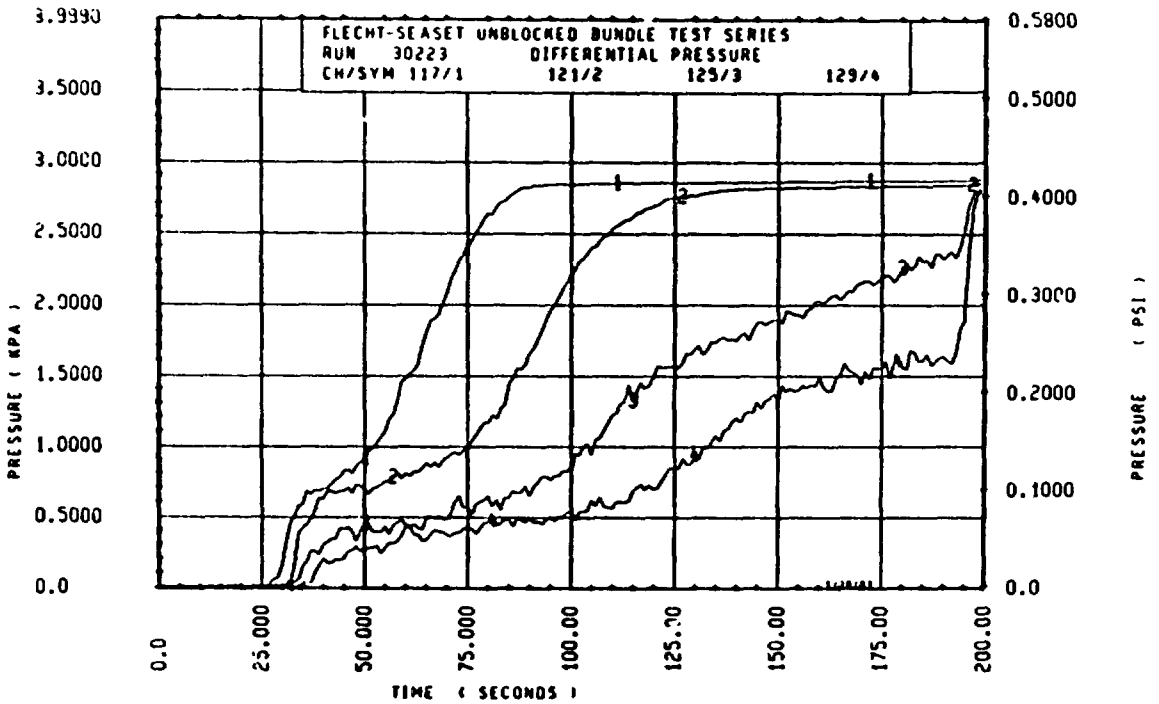

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30223
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.2500
0.2000
0.1500
0.1000
0.0500
0.0
0.5511
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
337.00

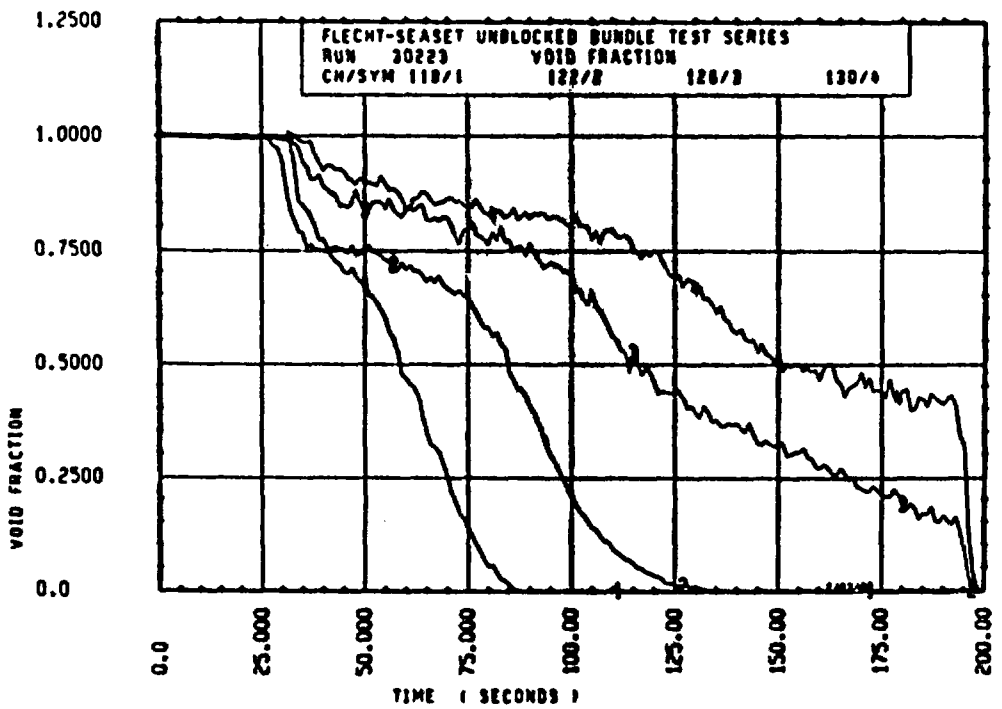

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30223
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
196.77
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
433.80
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
342.00

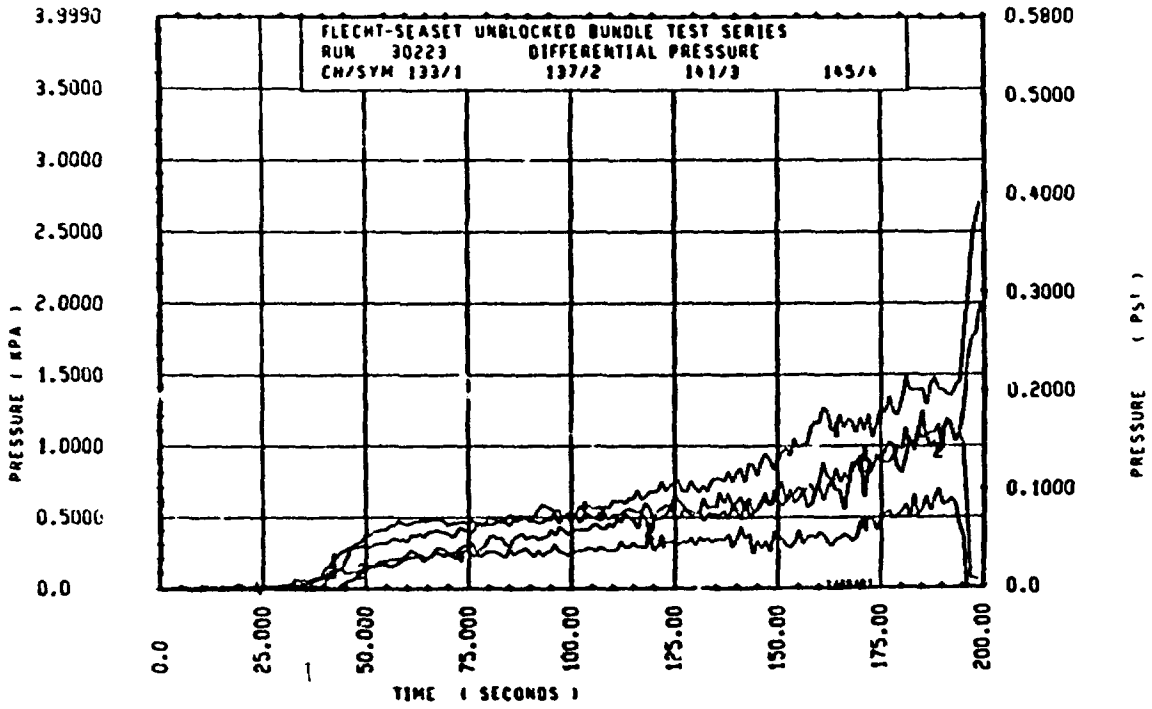

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
337.00
QUENCH TIMES (SECONDS)

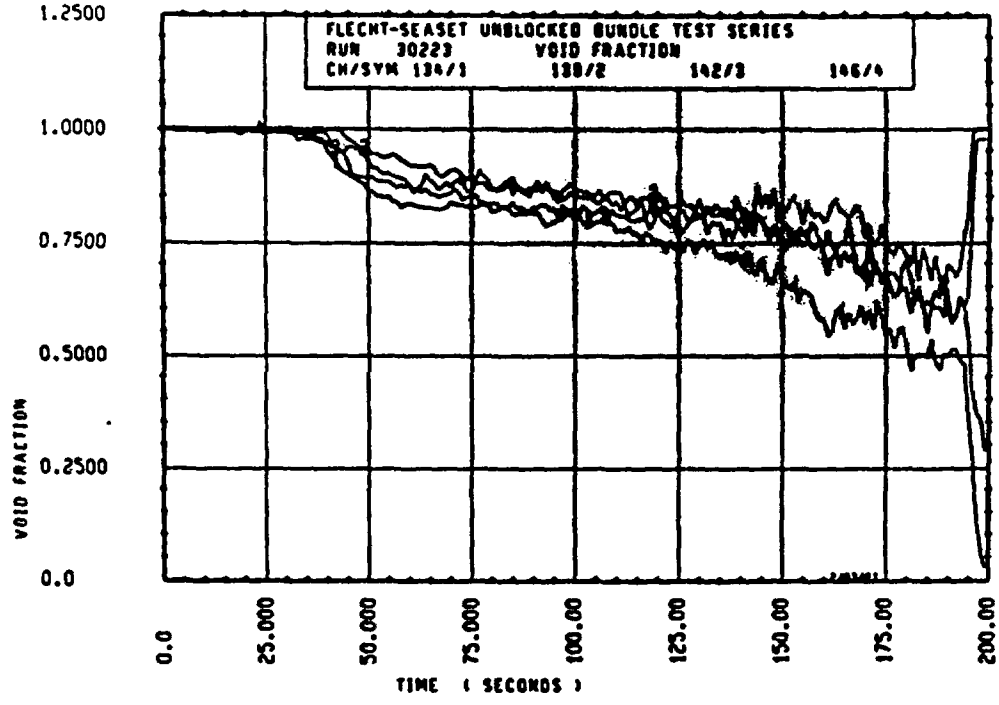

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (MPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30223 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 30323

Date: 2/7/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	259°C (499°F)
Rod peak power	1.3 kw/m (0.40 kw/ft)
Flow rate	38.6 mm/sec (1.52 in./sec)
Coolant temperature	52°C (126°F)
Bundle radial power profile	Uniform
Disconnected rods	None

B. Housing Temperatures

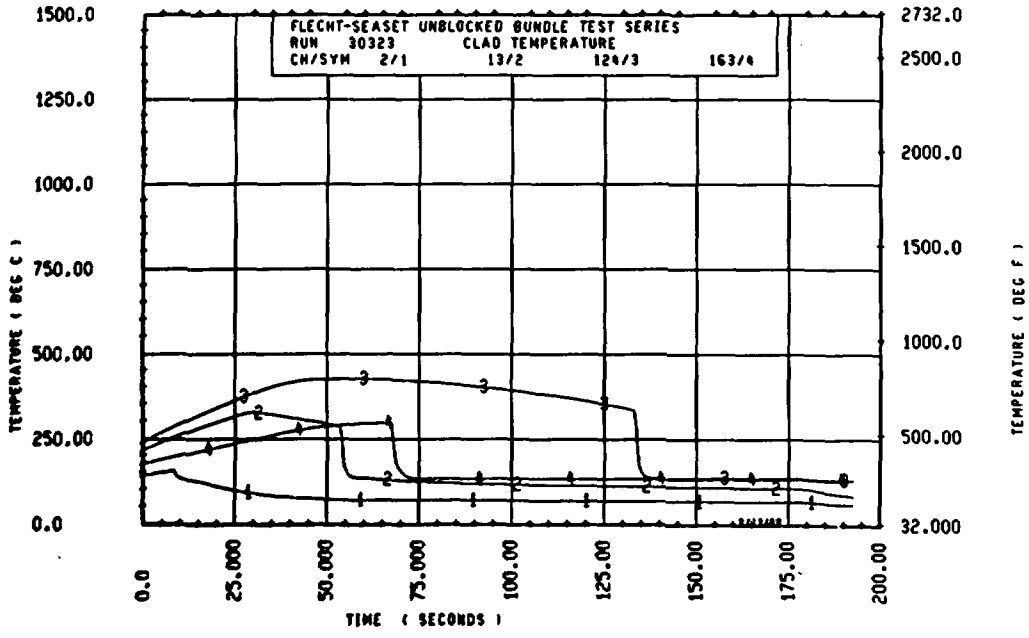
Elevation	Initial Temperature	Maximum Temperature
0.61 m (24 in.)		
1.22 m (48 in.)		
1.83 m (72 in.)		
2.44 m (96 in.)	(No housing temperatures available)	
2.74 m (108 in.)		
3.05 m (120 in.)		
3.35 m (132 in.)		

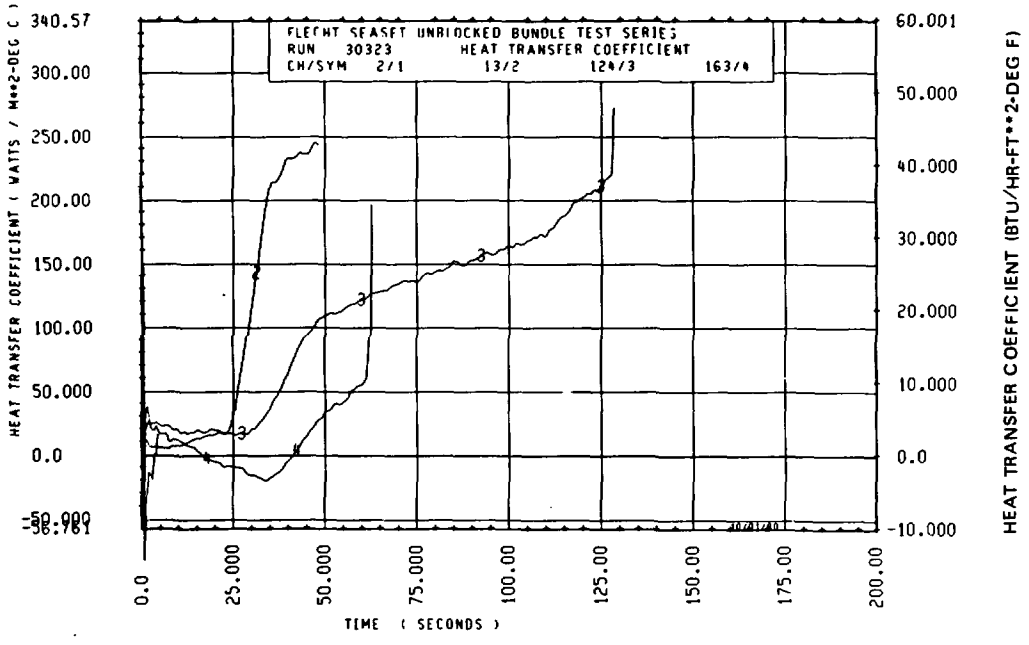
C. Comments

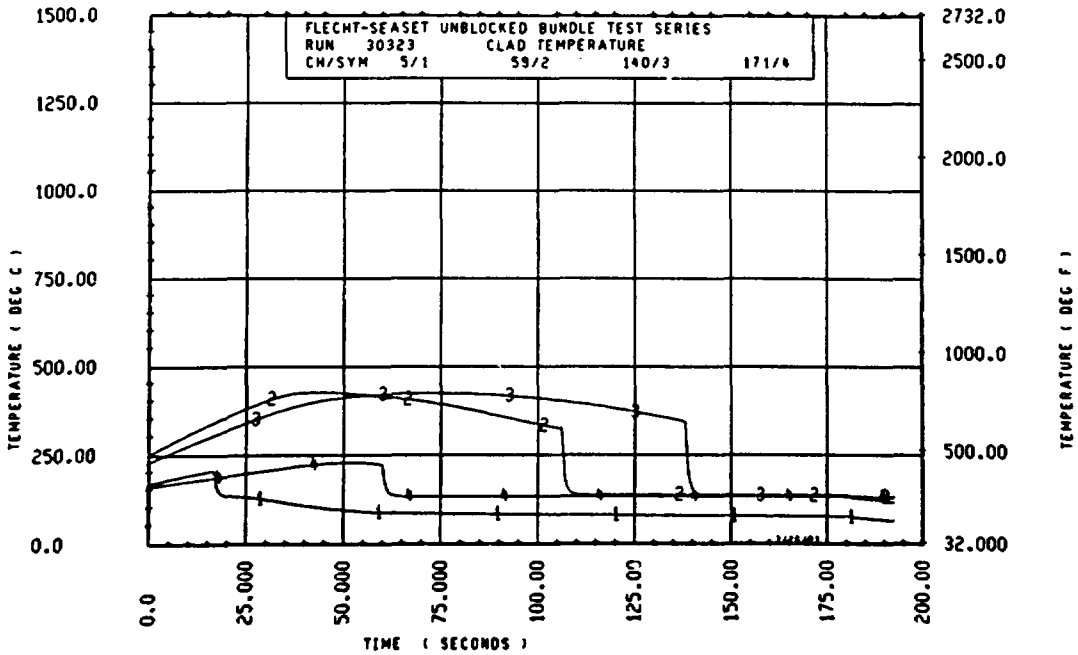
None

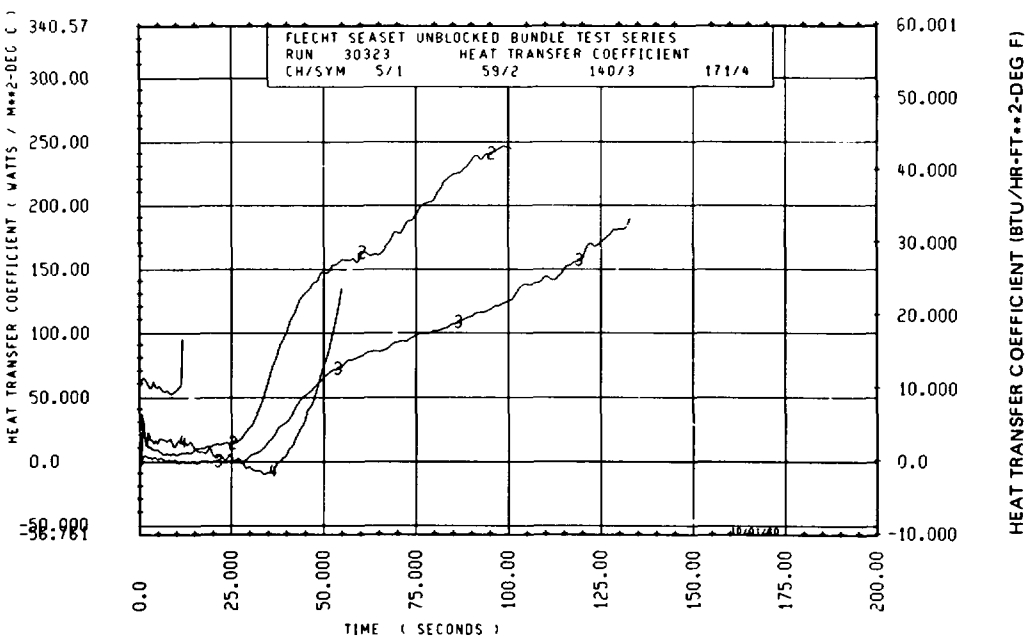
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 30323

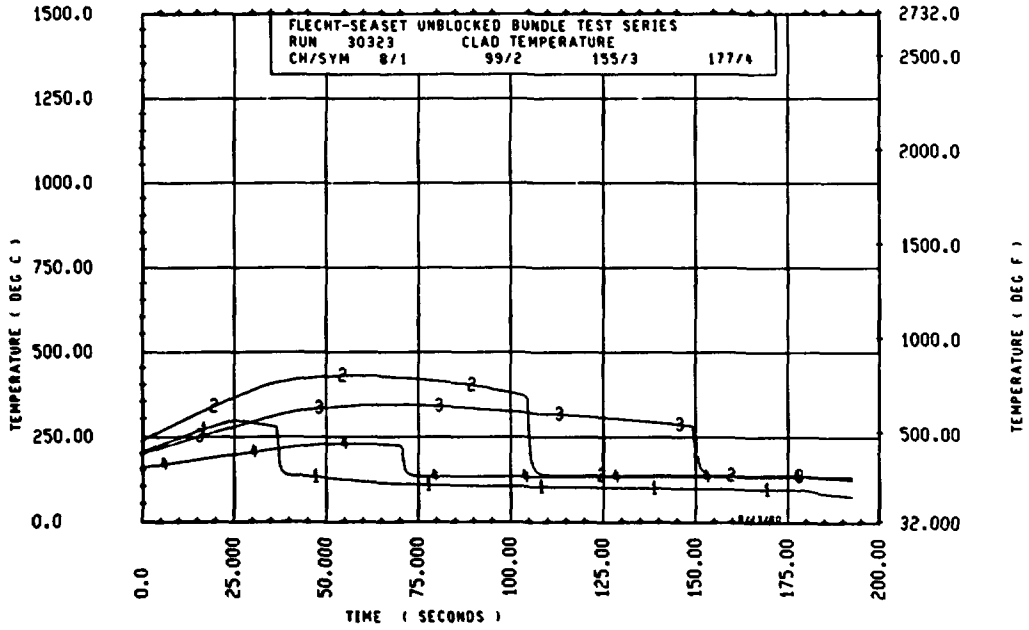
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	420.	607.	187.	29.0	509.	57.5
2H 6- 0	50	479.	792.	313.	48.5	653.	100.0
3C 5- 0	17	437.	683.	245.	40.0	601.	75.5
3C 5- 7	28	467.	731.	263.	39.0	630.	82.2
4L 8- 0	129	432.	764.	332.	69.5	575.	146.0
4L 8- 6	147	435.	766.	331.	68.5	580.	146.0
5E11- 0	168	323.	455.	132.	49.5	435.	74.5
5J 4- 0	12	420.	608.	187.	29.0	533.	56.9
5J 8- 6	146	403.	676.	274.	60.5	549.	163.9
5J11- 6	175	321.	443.	122.	53.5	391.	71.0
7B 6- 0	57	465.	743.	278.	38.0	624.	85.1
7B 8- 6	142	399.	718.	319.	86.0	608.	154.1
7B10- 0	162	351.	579.	228.	77.0	462.	171.4
7B11- 6	176	320.	442.	122.	54.0	436.	57.6
7D 6- 4	84	494.	821.	327.	43.0	663.	96.0
7D 7- 6	119	470.	800.	330.	45.0	627.	128.9
7D 9- 3	151	379.	622.	242.	67.0	471.	163.5
7G 5- 0	23	473.	742.	269.	38.0	645.	84.5
7J 6- 0	59	485.	802.	317.	44.0	616.	106.1
7M 7- 6	120	465.	791.	326.	53.0	629.	129.5
7M 8- 0	132	436.	759.	322.	65.5	620.	139.4
7M 9- 3	152	384.	624.	239.	65.5	607.	85.4
8H 4- 0	13	424.	620.	196.	29.5	548.	53.8
8H10- 0	163	353.	566.	213.	64.5	566.	67.5
8H11- 6	177	319.	445.	126.	53.0	431.	70.4
8K 4- 0	14	420.	609.	188.	29.0	564.	45.0
8K 6- 6	99	464.	808.	343.	58.0	695.	104.5
8K 8- 0	140	446.	797.	351.	69.5	650.	138.0
8K10- 0	164	356.	579.	224.	73.5	453.	159.5
8N 2- 0	5	338.	403.	65.	16.5	283.	19.0
8N 4- 0	15	423.	610.	187.	29.0	541.	53.5
8N 6- 0	61	473.	787.	314.	46.0	658.	98.5
8N10- 0	165	350.	584.	234.	90.0	331.	161.5
9C 7- 0	109	471.	768.	297.	43.0	629.	116.1
9C 9- 3	153	384.	619.	236.	70.5	611.	77.7
9G 1- 0	2	290.	314.	24.	8.0	281.	9.5
9G 3- 3	8	403.	568.	166.	25.3	533.	36.5
9G11- 0	171	322.	445.	123.	50.5	430.	60.0
9I 5- 0	24	466.	744.	279.	35.0	621.	85.0
9I 5-10	46	493.	815.	321.	41.5	605.	103.0
10D 6- 6	93	465.	798.	333.	55.5	658.	109.5
11E 7- 6	124	466.	800.	334.	57.0	630.	133.3
11E 9- 3	155	394.	652.	258.	64.5	538.	149.0
11E11- 0	172	323.	446.	123.	48.0	446.	51.0
12D 4- 0	16	424.	613.	189.	28.5	555.	52.4
12D 6- 0	66	476.	789.	313.	46.0	656.	99.9
13G 6- 6	102	476.	781.	304.	42.0	661.	88.5

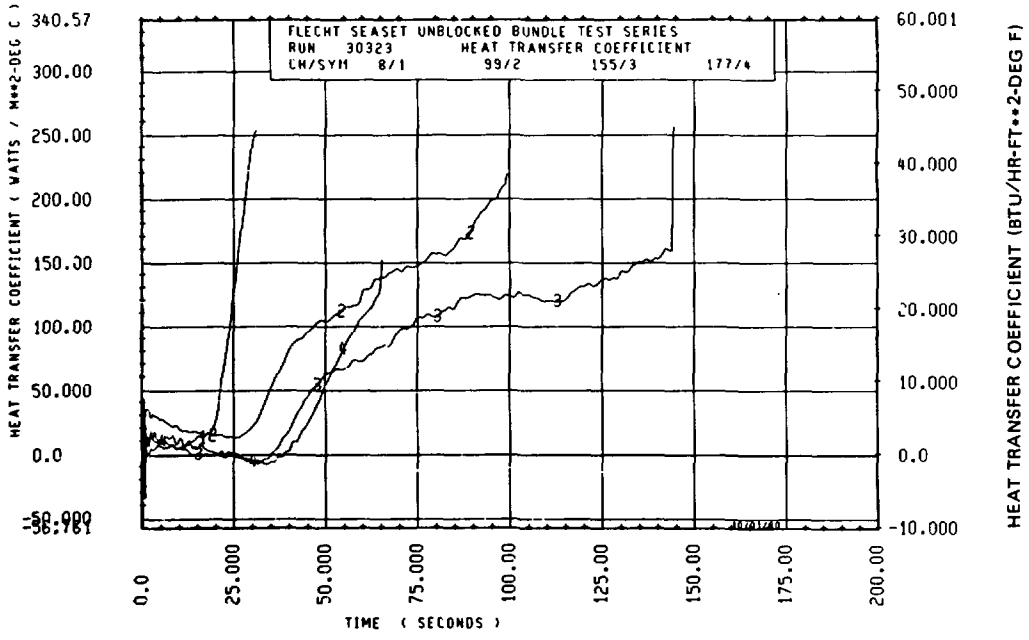

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

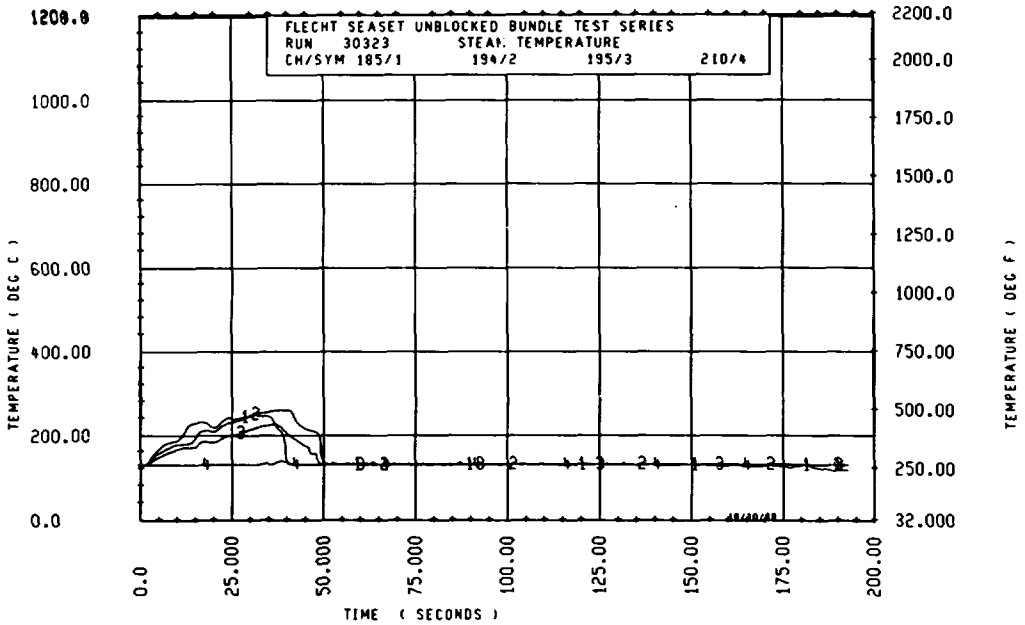

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

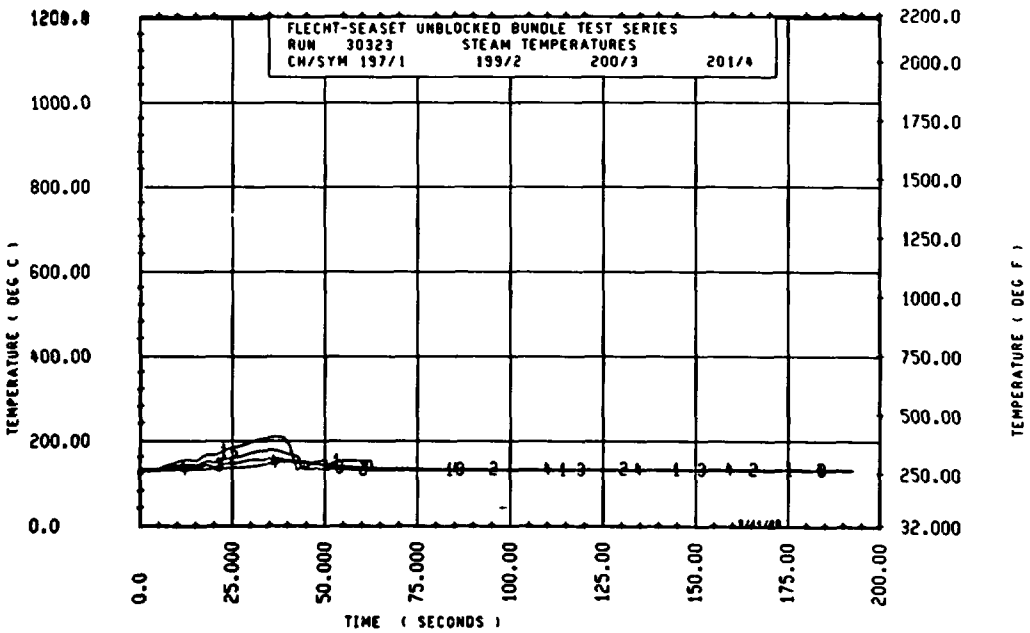

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

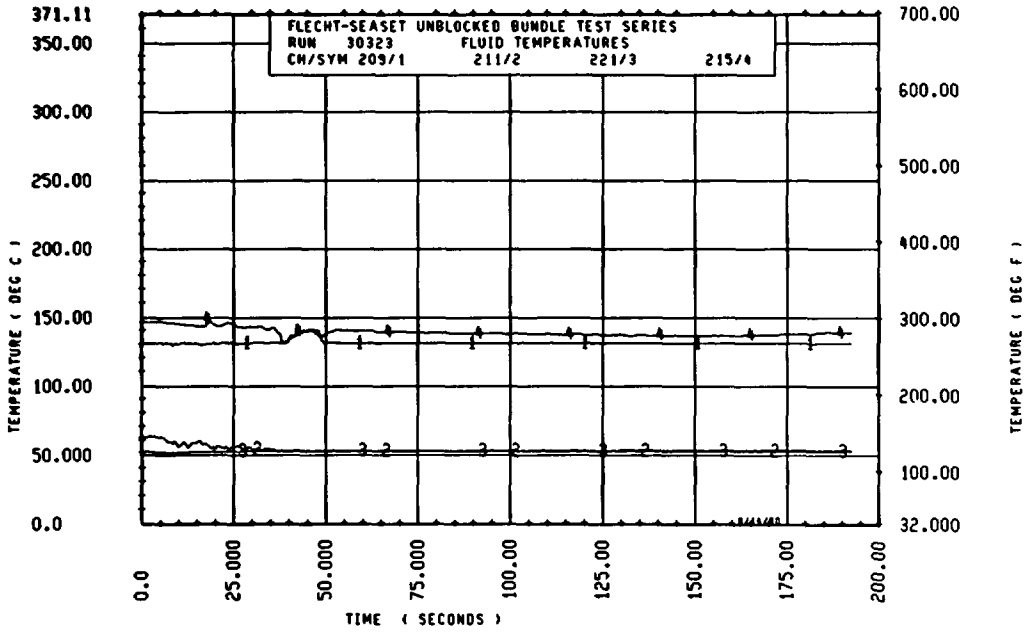

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-36.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

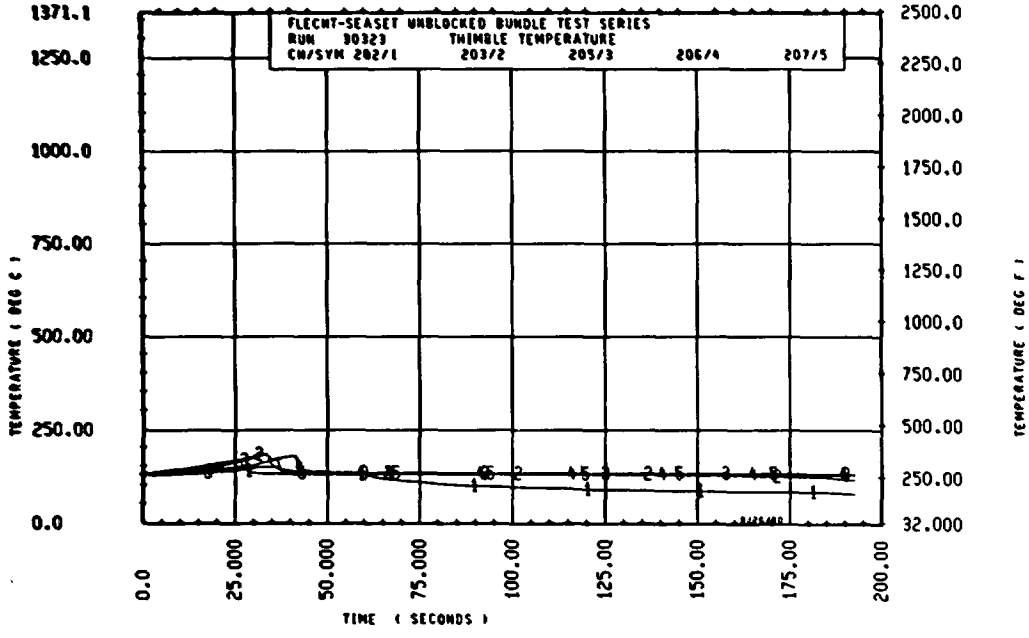

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

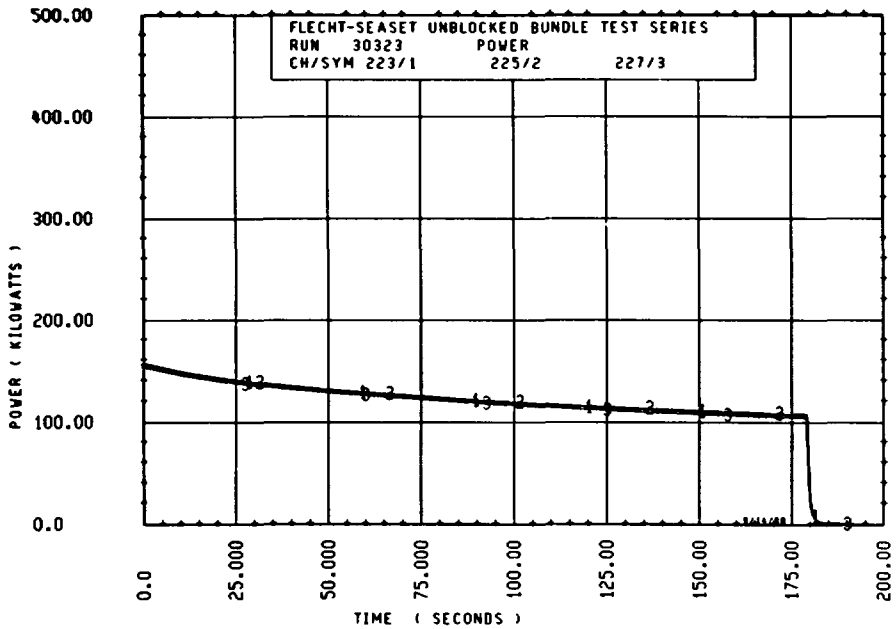

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

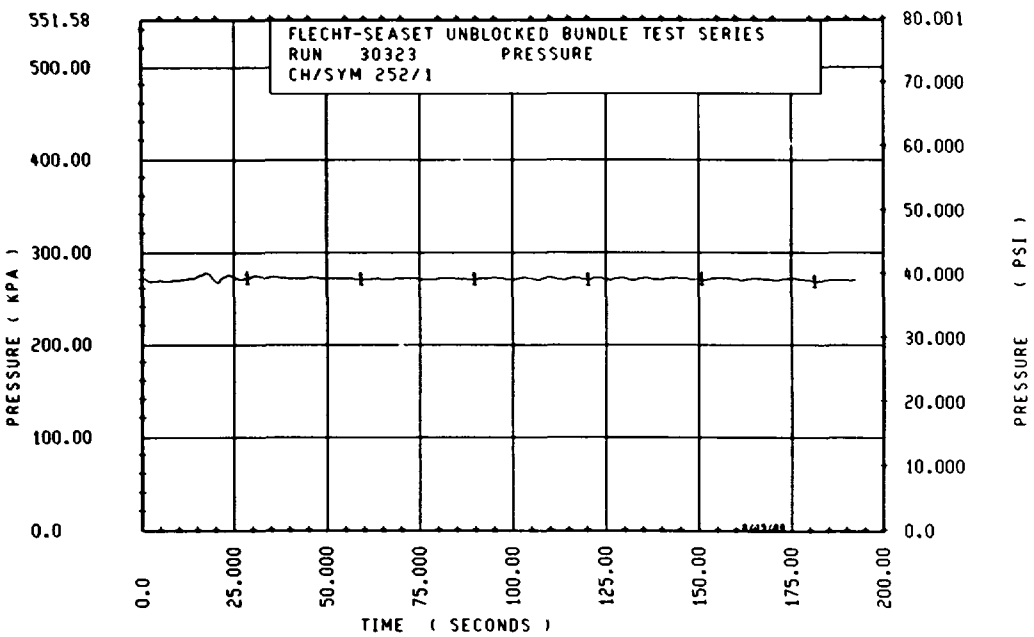

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

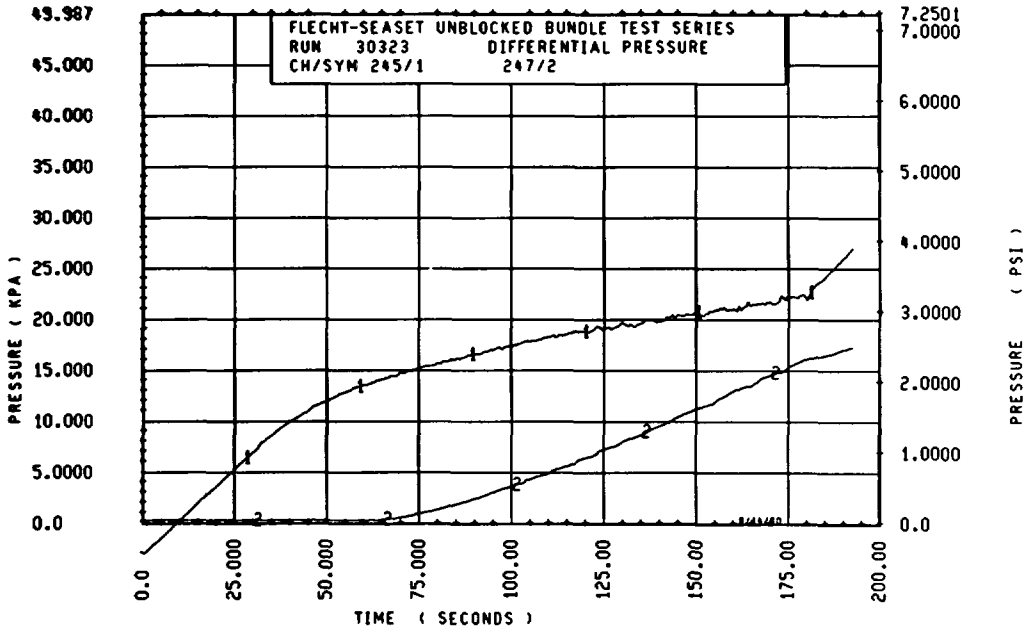


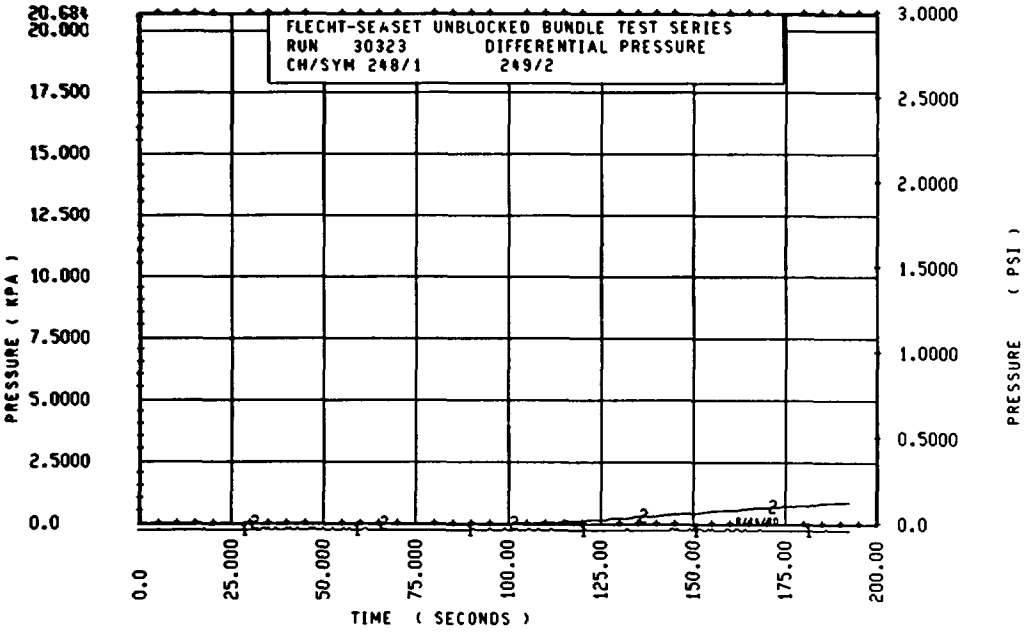


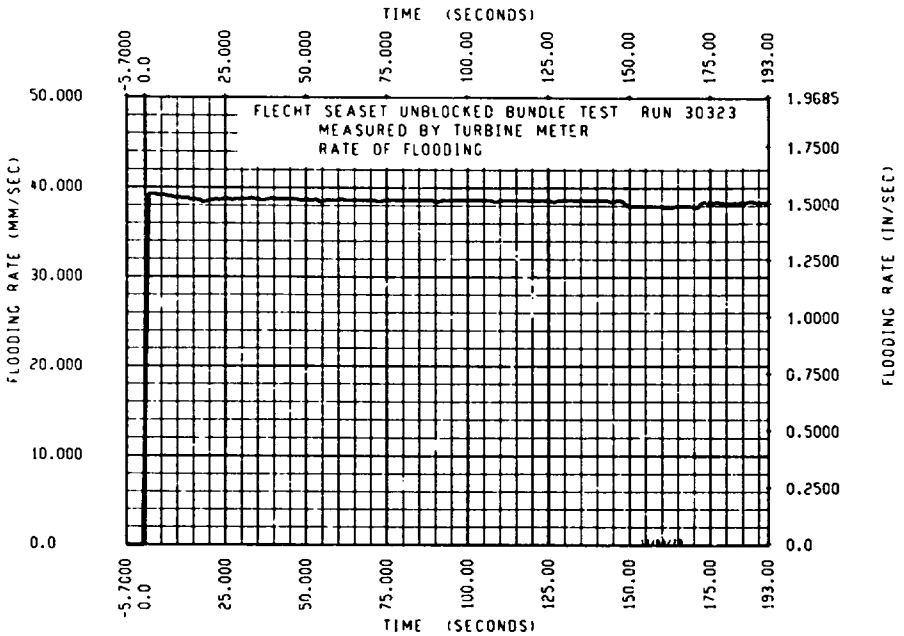
CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.); CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

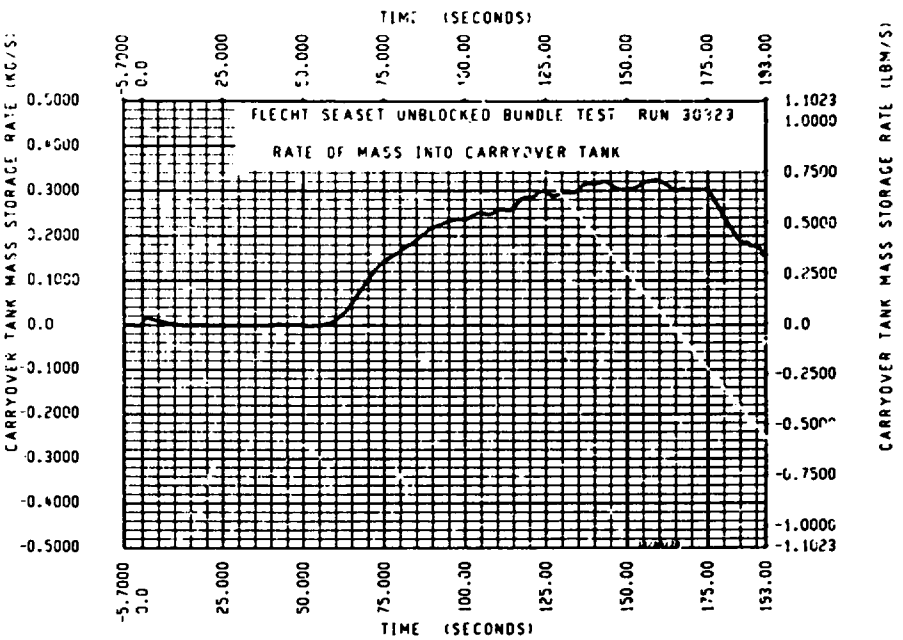

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

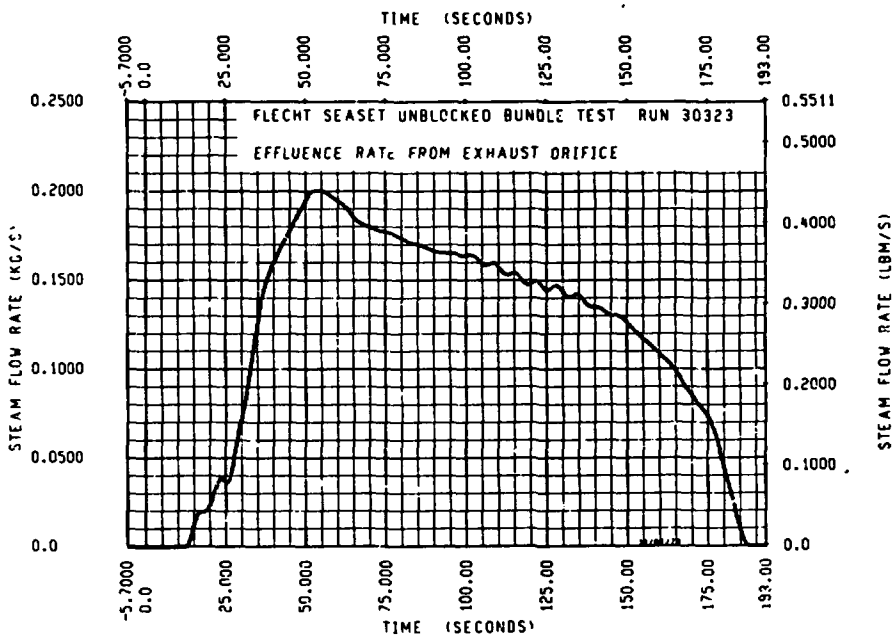

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

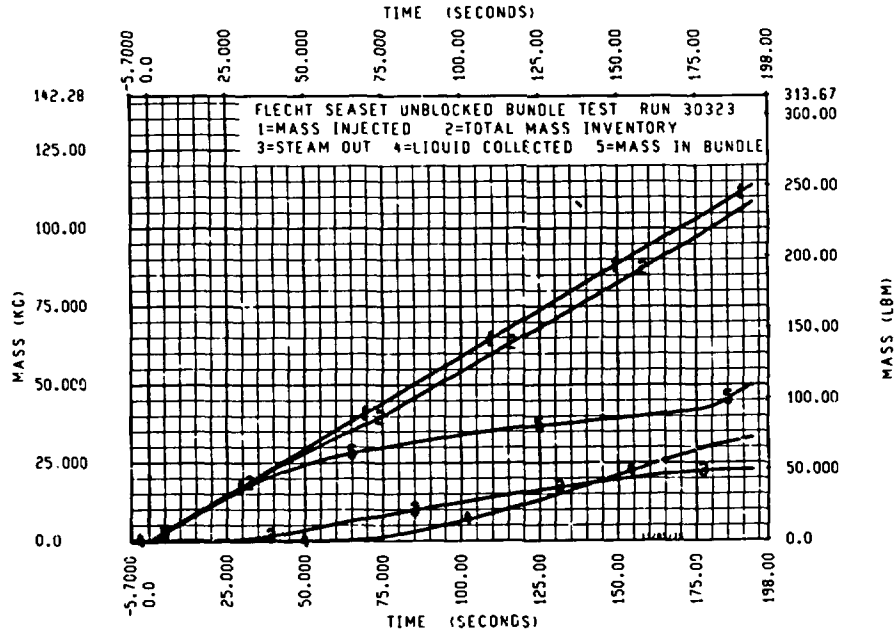

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

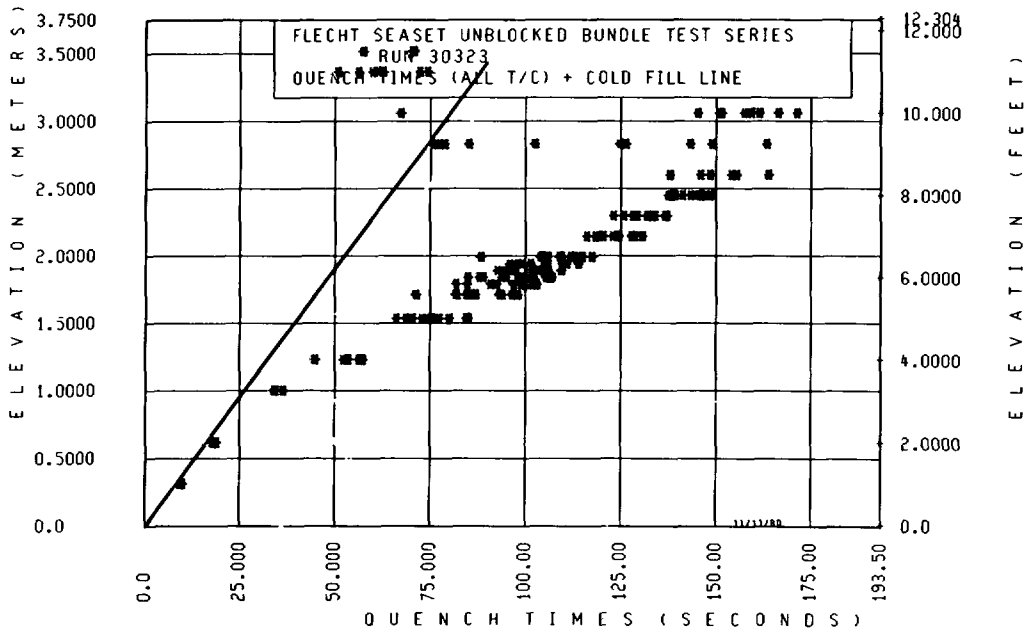

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

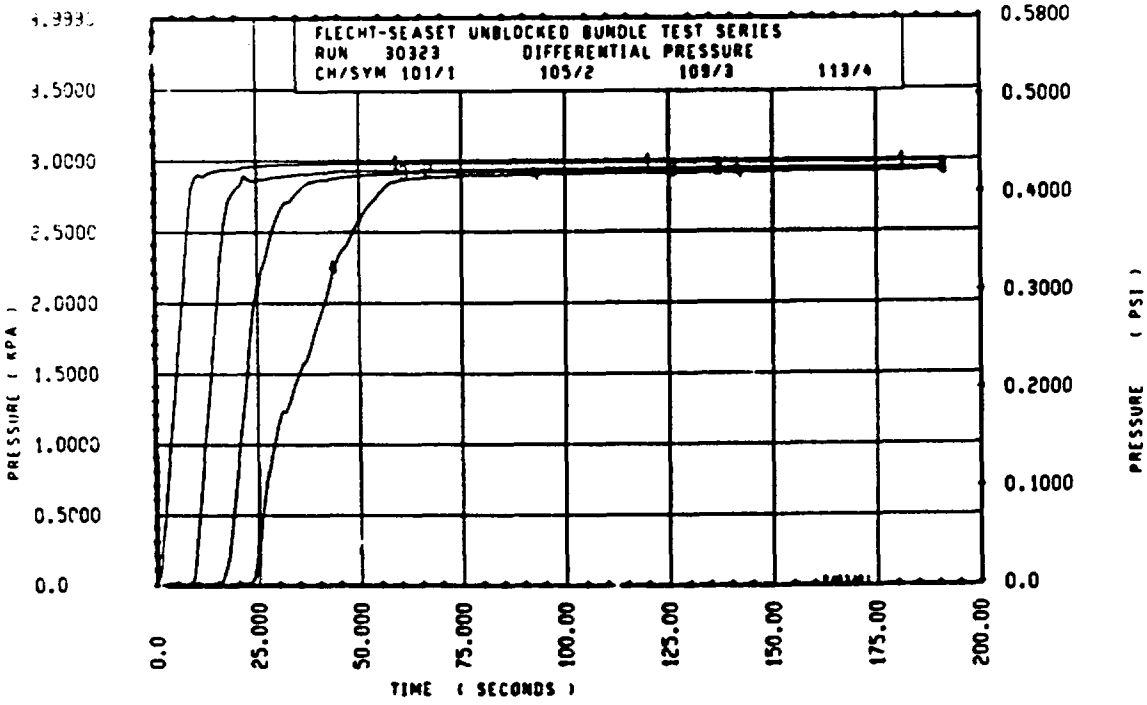

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30323
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
-5.7000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
193.00
FLOODING RATE (MM/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
FLOODING RATE (IN/SEC)
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0

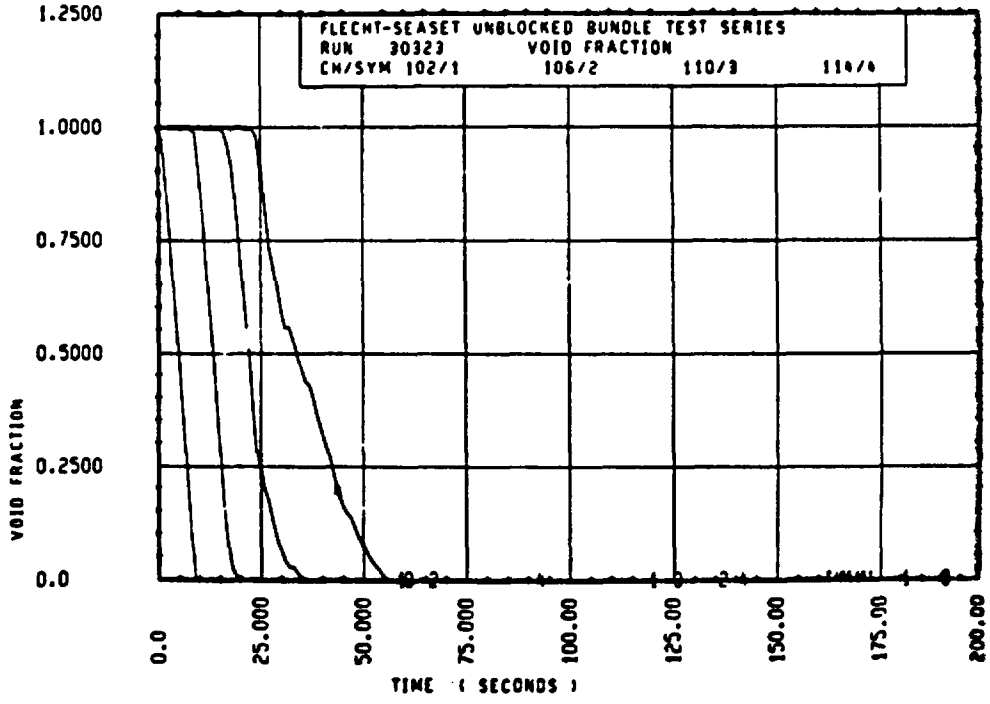

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30323
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
-5.7000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
193.00
CARRYOVER TANK MASS STORAGE RATE (KG/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
-0.1000
-0.2000
-0.3000
-0.4000
-0.5000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
1.1023
1.0000
0.7500
0.5000
0.2500
0.0
-0.2500
-0.7500
-1.0000
-1.1023

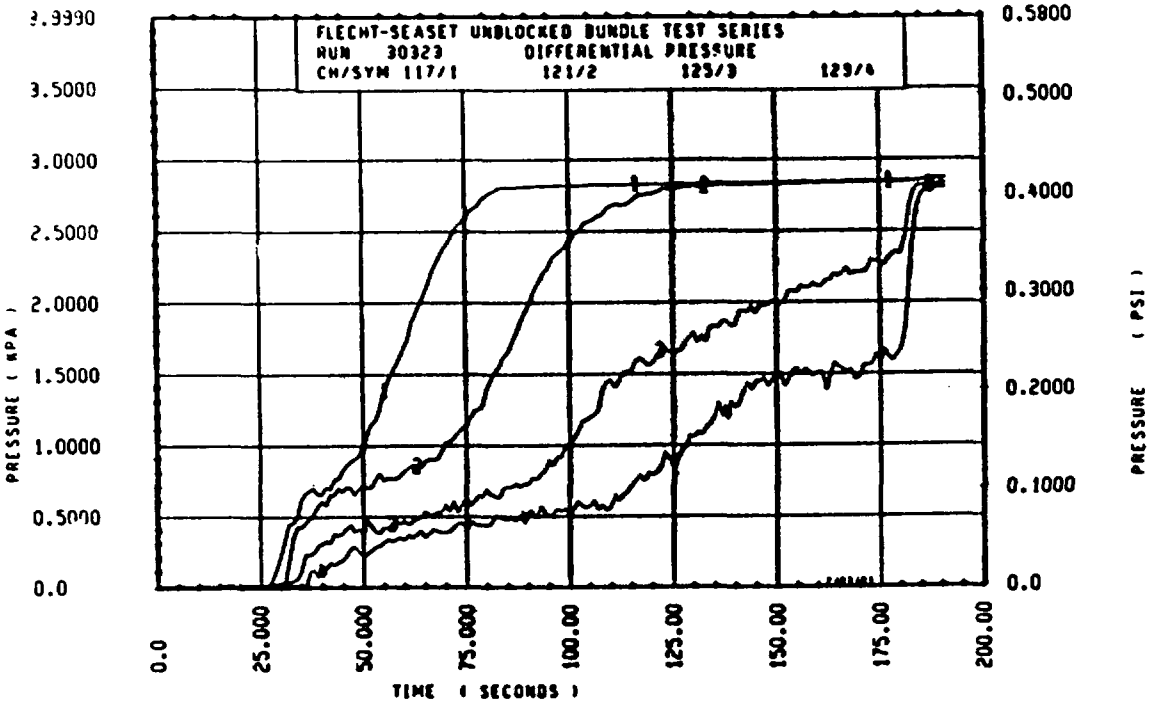

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30323
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.2500
0.2000
0.1500
0.1000
0.0500
0.0
0.5511
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
-5.7000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
193.00

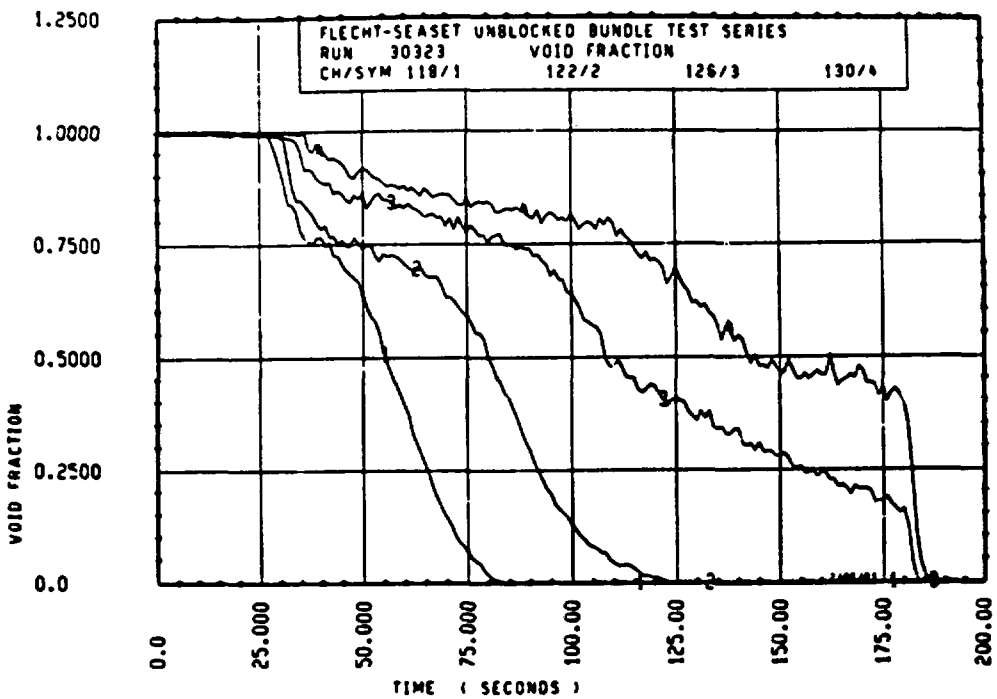

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30323
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
142.28
125.00
100.00
75.000
50.000
25.000
0.0
313.67
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-5.7000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
198.00

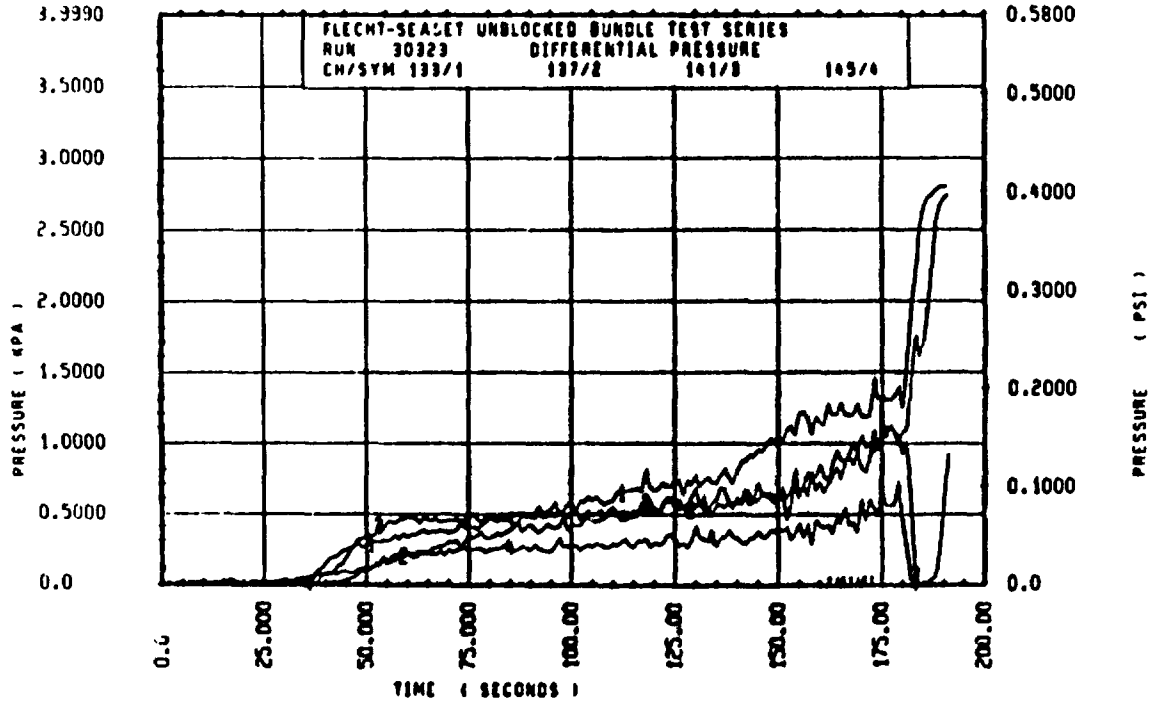

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
193.50
QUENCH TIMES (SECONDS)

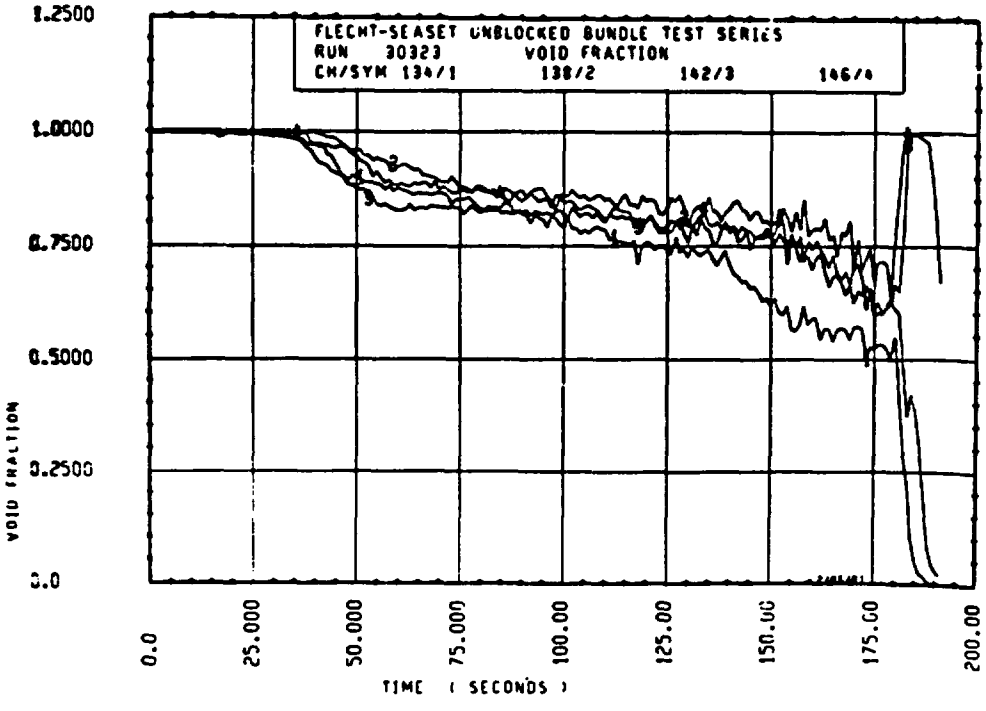

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
0.5000
1.0000
1.5000
2.0000
2.5000
3.0000
3.5000
0.1000
0.2000
0.3000
0.4000
0.5000
0.5800
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
0.0
0.2500
0.5000
0.7500
1.0000
1.2500
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30323 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 30518

Date: 2/21/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	256°C (494°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	38.9 mm/sec (1.53 in./sec)
Coolant temperature	52°C (126°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Hot Rod Quench Time Temperature*
0.61 m (24 in.)	134°C (273°F)	70°C (158°F)
1.22 m (48 in.)	134°C (273°F)	107°C (224°F)
1.83 m (72 in.)	131°C-175°C (268°F-347°F)	135°C (275°F)
2.44 m (96 in.)	131°C (268°F)	132°C (269°F)
2.74 m (108 in.)	132°C (269°F)	132°C (269°F)
3.05 m (120 in.)	131°C (268°F)	132°C (269°F)
3.35 m (132 in.)	131°C (268°F)	132°C (269°F)

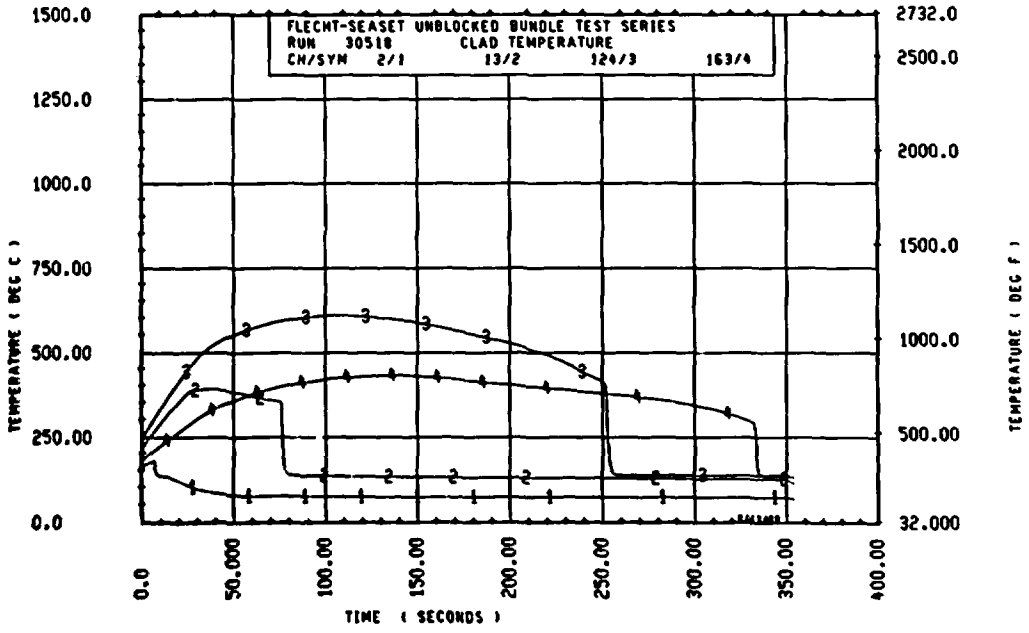
*At 187 seconds after flood

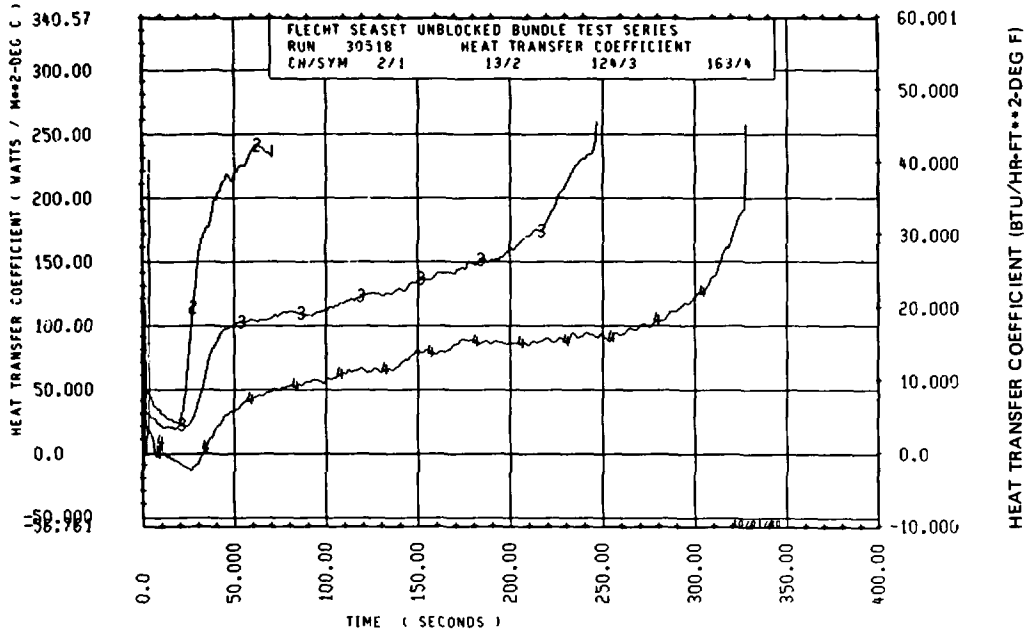
C. Comments

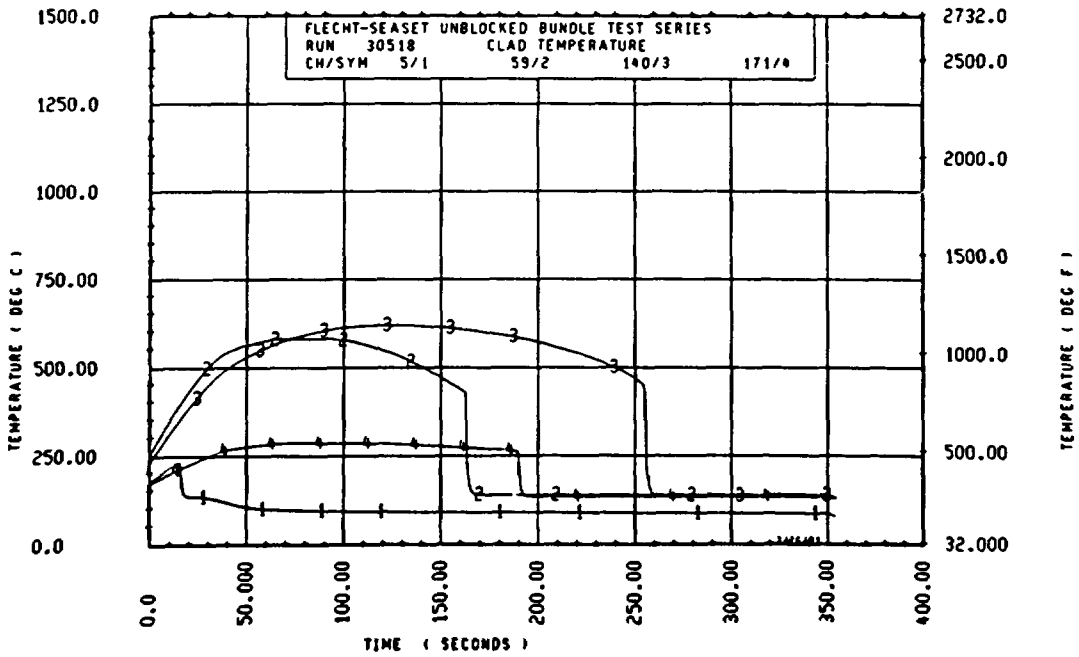
None

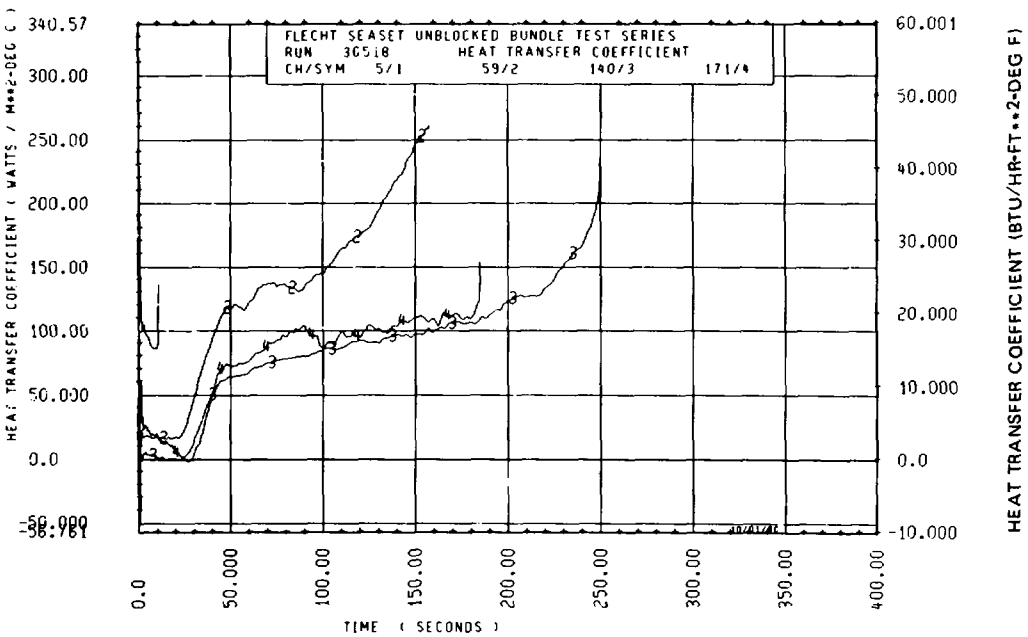
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 30518

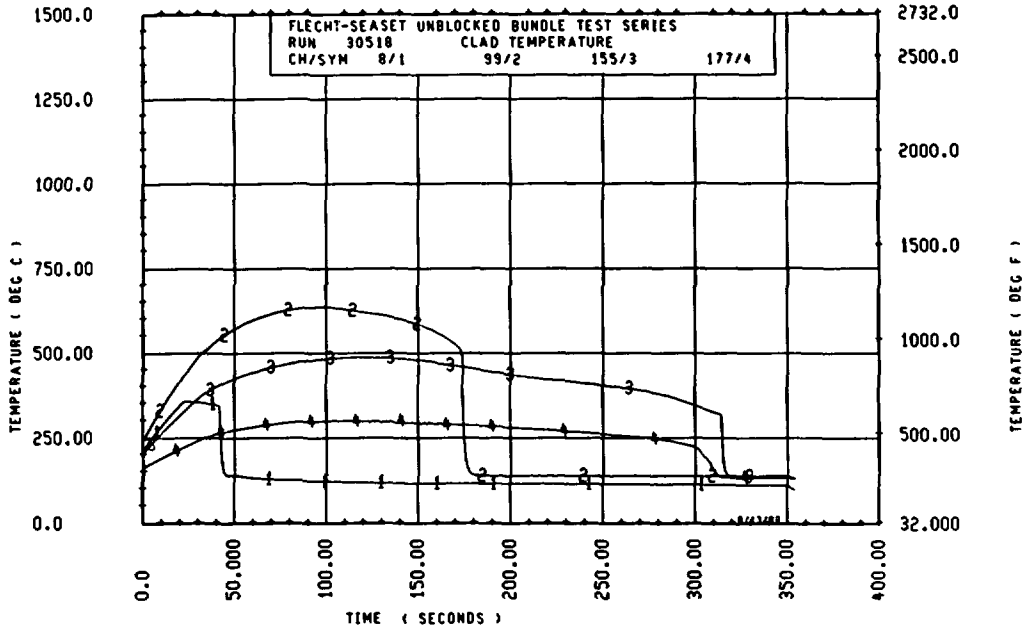
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2M 4- 0	10	420.	723.	303.	75.0	616.	77.2
2M 6- 0	50	480.	1095.	616.	78.0	871.	152.9
3C 5- 0	17	442.	894.	452.	71.5	785.	109.3
3C 5- 7	28	470.	933.	462.	60.5	777.	133.4
4L 8- 0	129	430.	1107.	677.	123.0	793.	256.0
4L 8- 6	147	434.	1112.	678.	128.5	800.	256.0
5E11- 0	168	339.	606.	267.	105.5	441.	321.8
5J 4- 0	12	423.	722.	299.	37.0	652.	77.5
5J 8- 6	146	403.	999.	595.	134.0	684.	293.6
5J11- 6	175	326.	563.	237.	111.0	378.	218.1
7B 6- 0	57	464.	947.	483.	59.0	792.	129.3
7B 8- 6	142	402.	1022.	620.	134.0	731.	285.8
7B10- 0	162	362.	821.	459.	147.0	597.	322.9
7B11- 6	176	328.	591.	263.	152.0	441.	343.5
7D 6- 4	84	493.	1104.	610.	64.5	835.	158.2
7D 7- 6	119	471.	1088.	617.	95.5	805.	232.0
7D 9- 3	151	382.	875.	493.	134.0	598.	298.0
7G 5- 0	23	475.	970.	494.	60.5	819.	118.5
7J 6- 0	59	484.	1081.	597.	91.5	801.	162.7
7M 7- 6	120	464.	1082.	618.	96.5	839.	227.9
7M 8- 0	132	438.	1086.	648.	136.0	816.	252.0
7M 9- 3	152	385.	863.	478.	112.5	653.	290.0
8N 4- 0	13	424.	739.	315.	37.5	668.	76.0
8N10- 0	163	361.	812.	450.	140.5	555.	332.8
8N11- 6	177	327.	573.	246.	103.0	283.	312.0
8K 4- 0	14	420.	718.	298.	36.5	689.	57.2
8K 6- 6	99	468.	1176.	709.	97.5	918.	173.9
8K 8- 0	140	445.	1146.	701.	116.0	837.	254.9
8K10- 0	164	359.	818.	458.	134.0	621.	313.0
8N 2- 0	5	350.	449.	99.	15.5	283.	18.5
8N 4- 0	15	423.	734.	311.	40.0	667.	71.0
8N 6- 0	61	470.	1081.	611.	89.0	864.	151.4
8N10- 0	165	352.	859.	507.	164.0	649.	313.0
9C 7- 0	109	473.	1047.	574.	104.0	780.	212.0
9C 9- 3	153	389.	890.	502.	140.5	666.	292.8
9G 1- 0	2	325.	358.	33.	6.5	282.	9.0
9G 3- 3	8	415.	675.	260.	25.0	646.	42.2
9G11- 0	171	344.	550.	206.	80.5	500.	189.9
9I 5- 0	24	466.	965.	498.	57.5	796.	120.4
9I 5-10	46	493.	1058.	565.	56.0	780.	155.8
10D 6- 6	93	466.	1145.	680.	94.0	829.	185.3
11E 7- 6	124	469.	1131.	662.	105.0	762.	251.9
11E 9- 3	155	400.	910.	510.	114.5	603.	314.0
11E11- 0	172	354.	587.	233.	101.5	452.	281.0
12D 4- 0	16	423.	742.	319.	43.0	687.	69.0
12D 6- 0	66	477.	1094.	617.	86.0	847.	156.3
13G 6- 6	102	477.	1048.	571.	73.5	797.	154.1

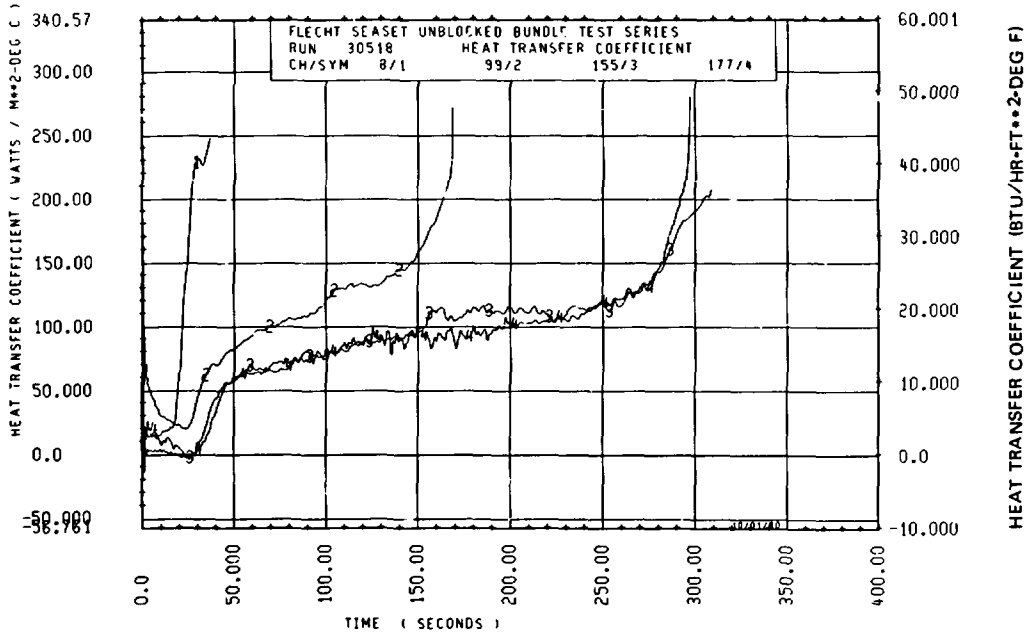

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

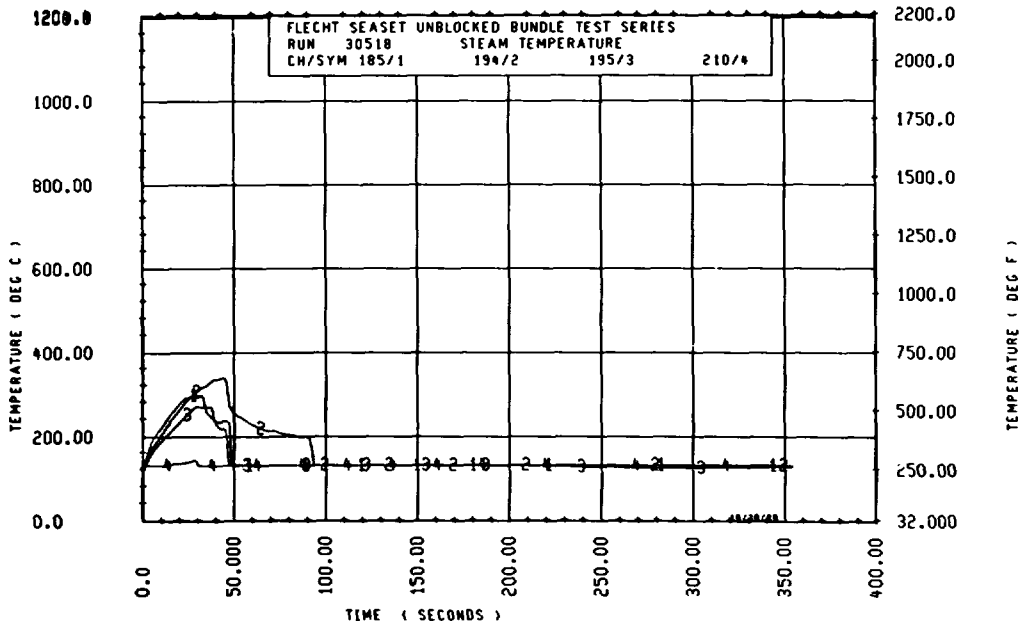

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

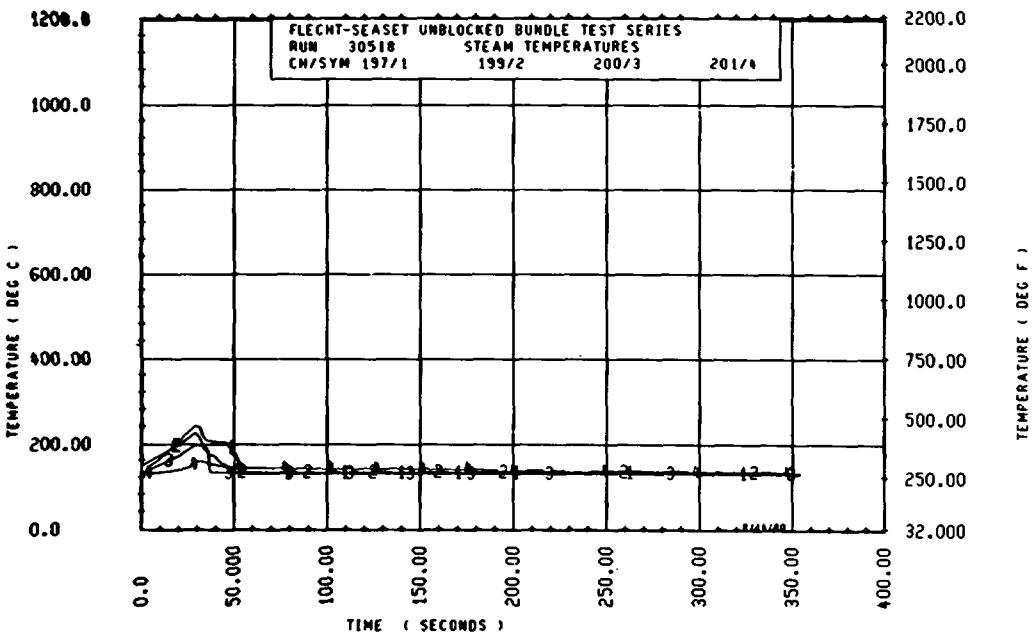

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

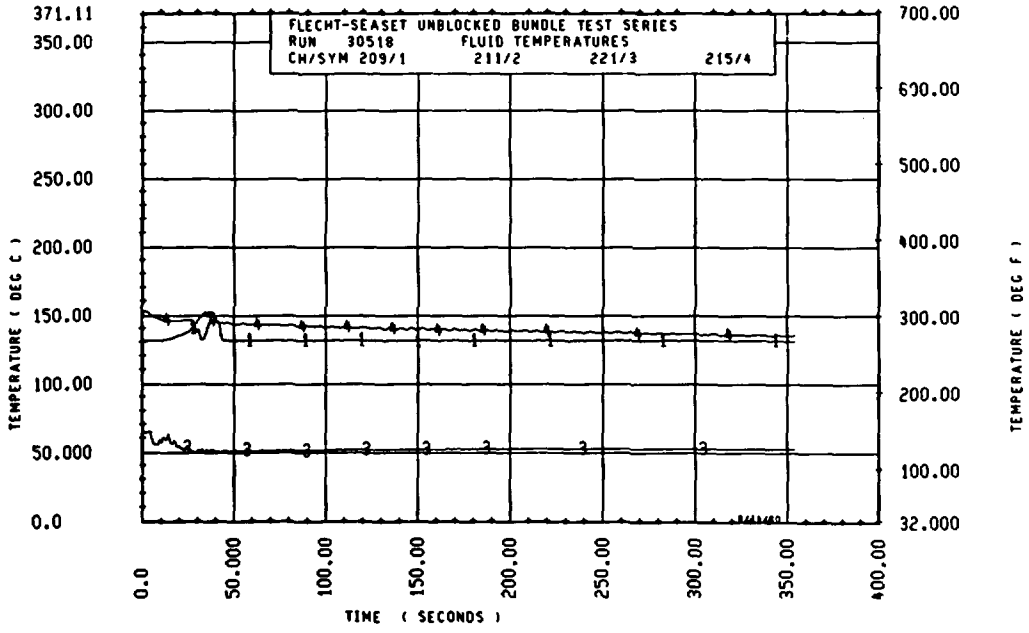

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

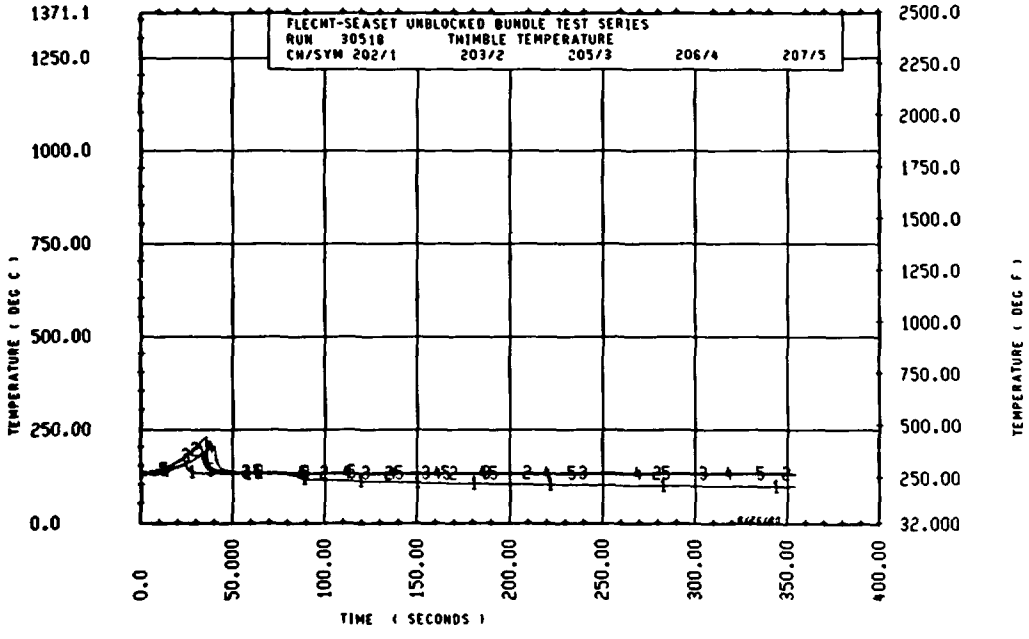

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

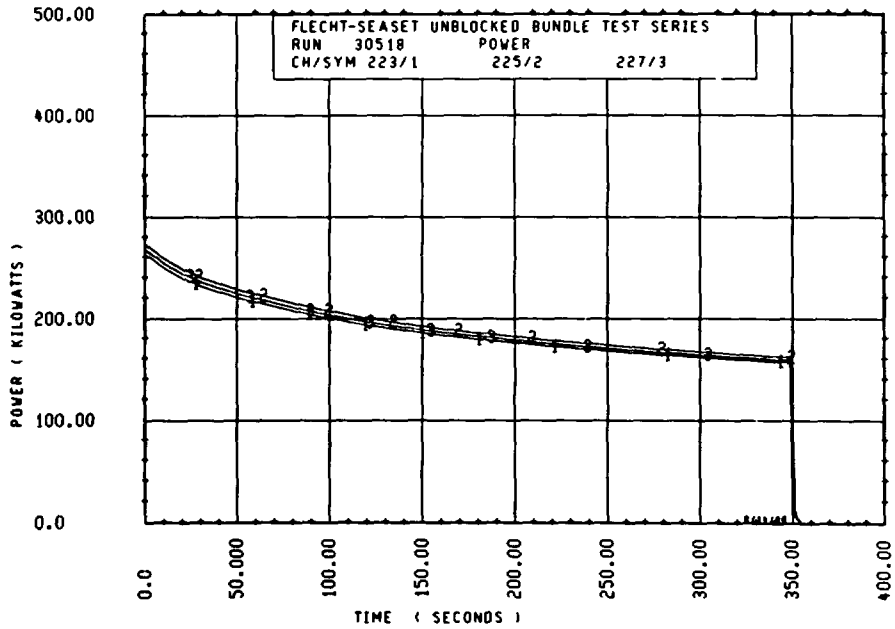

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

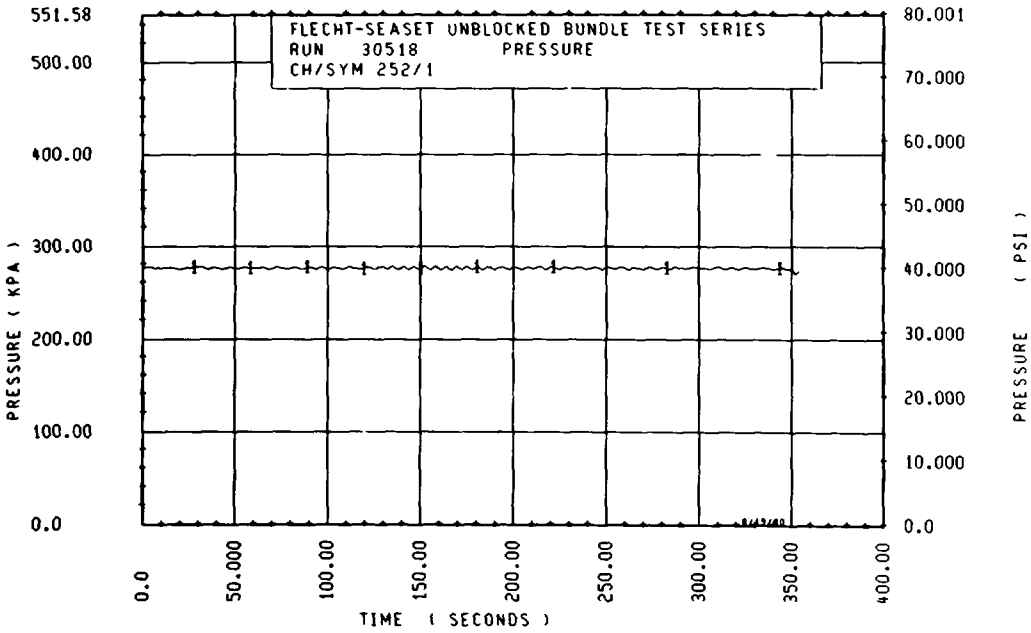

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

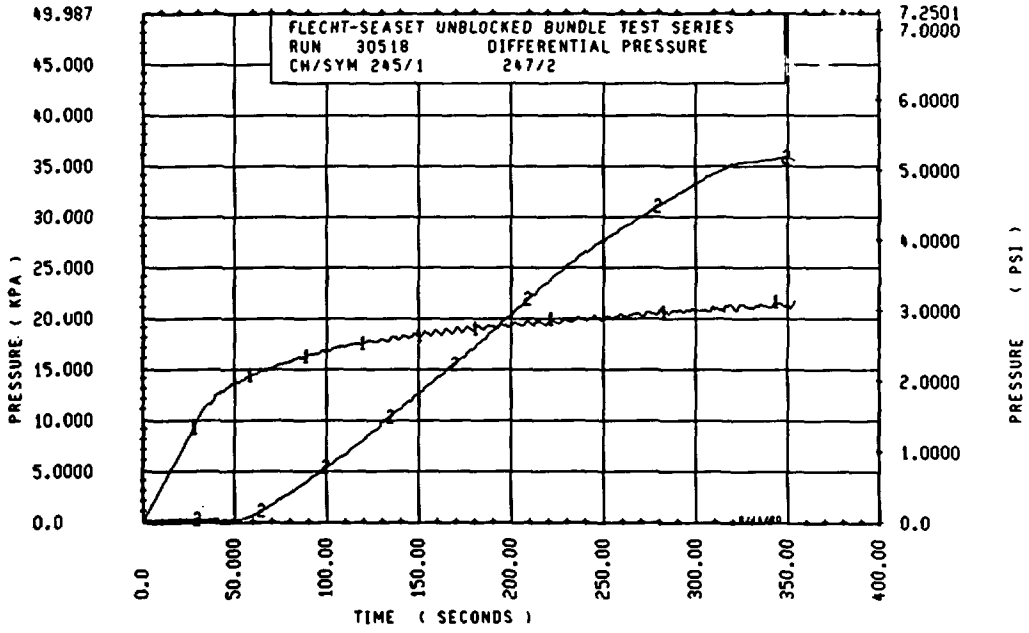


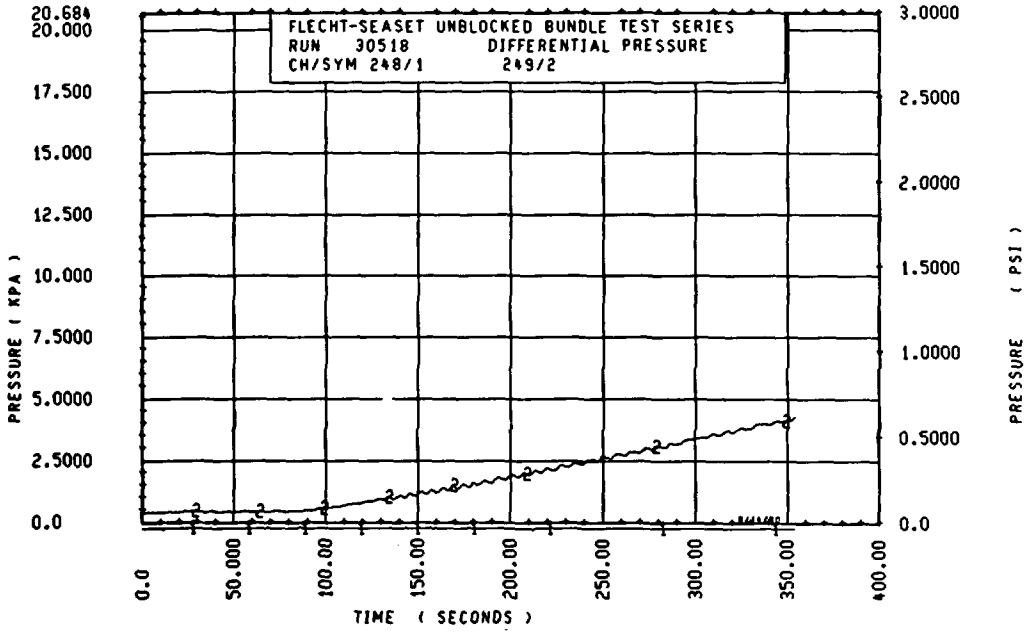


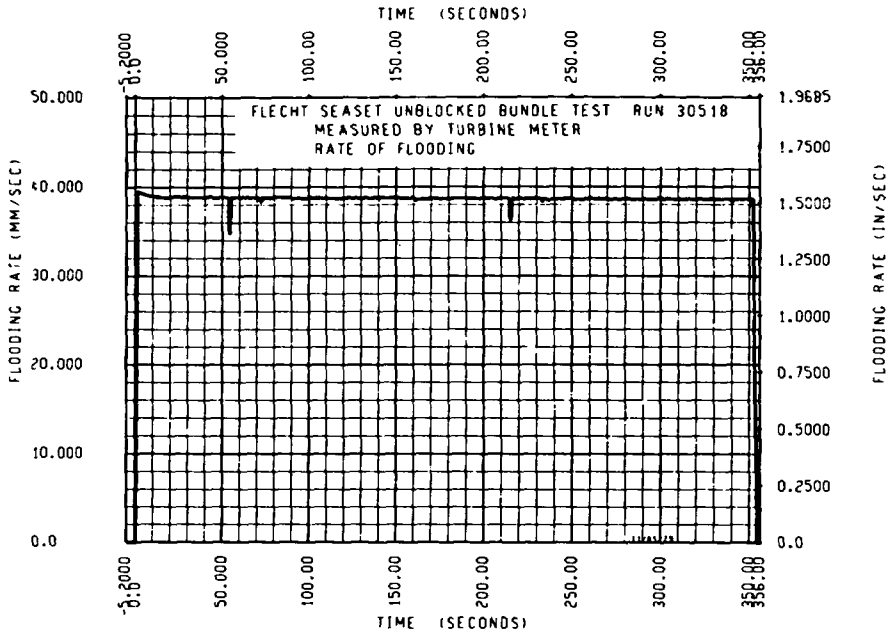
CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.);
CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.);
CH 207-4I, 3.05 m (120 in.)

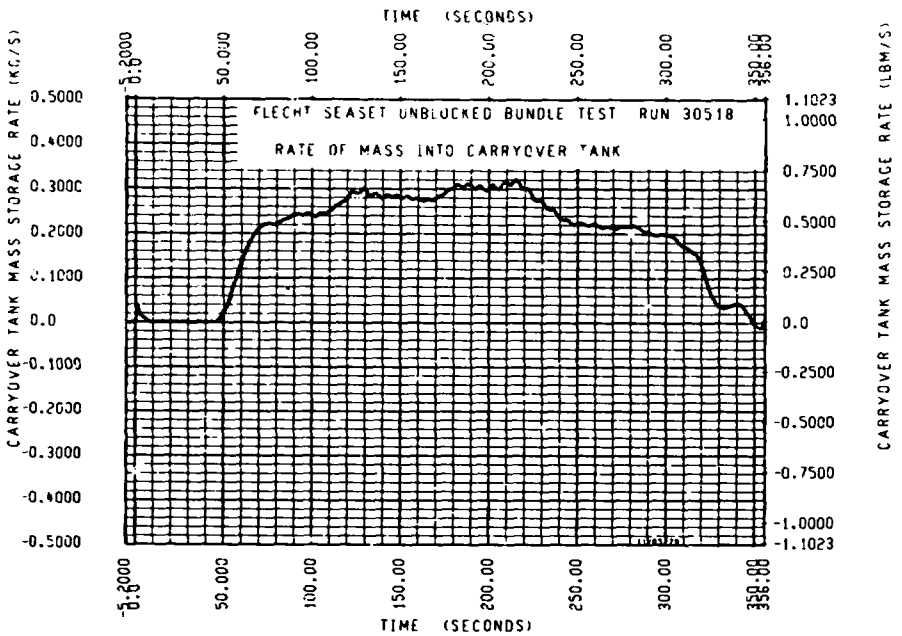

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

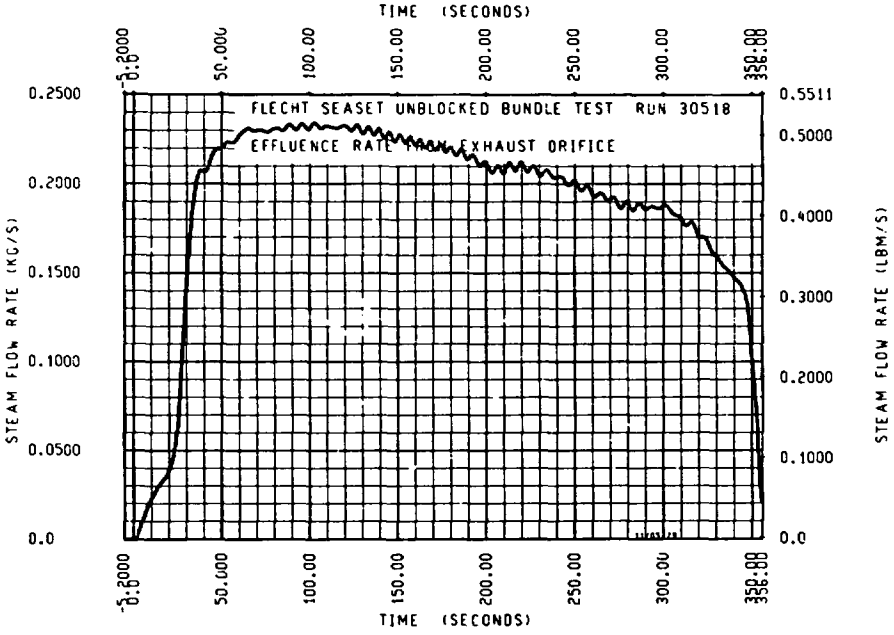

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

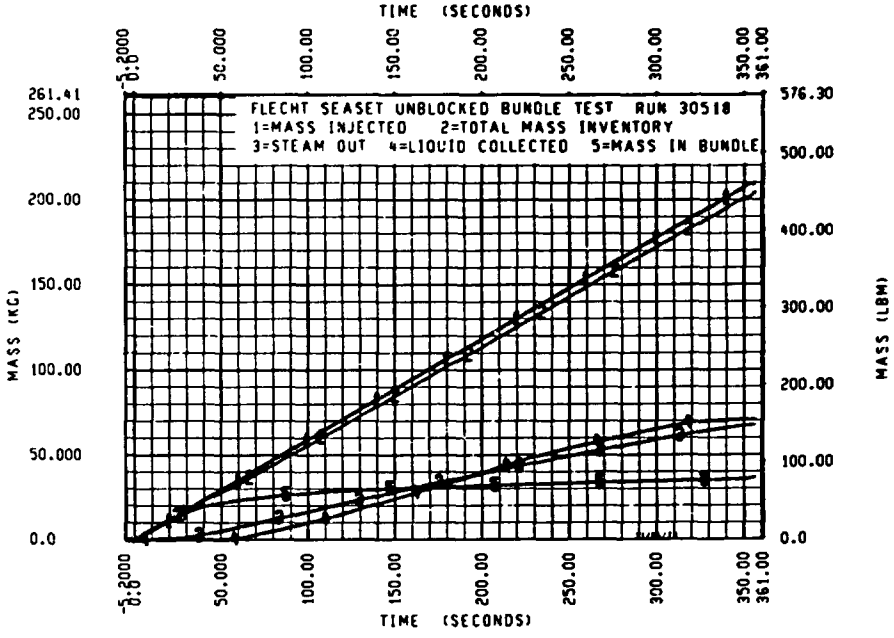

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

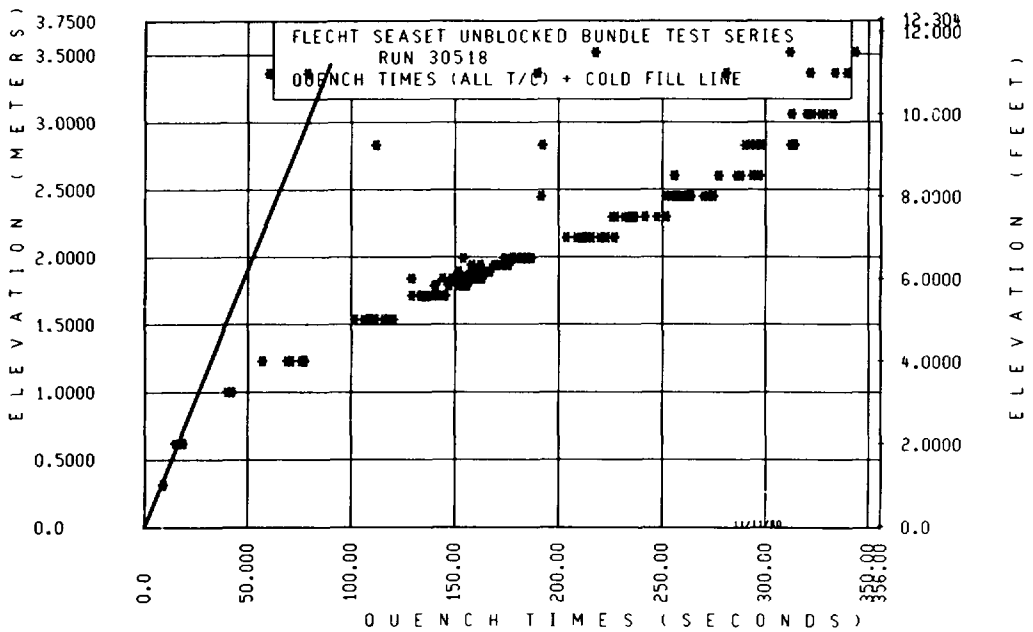

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

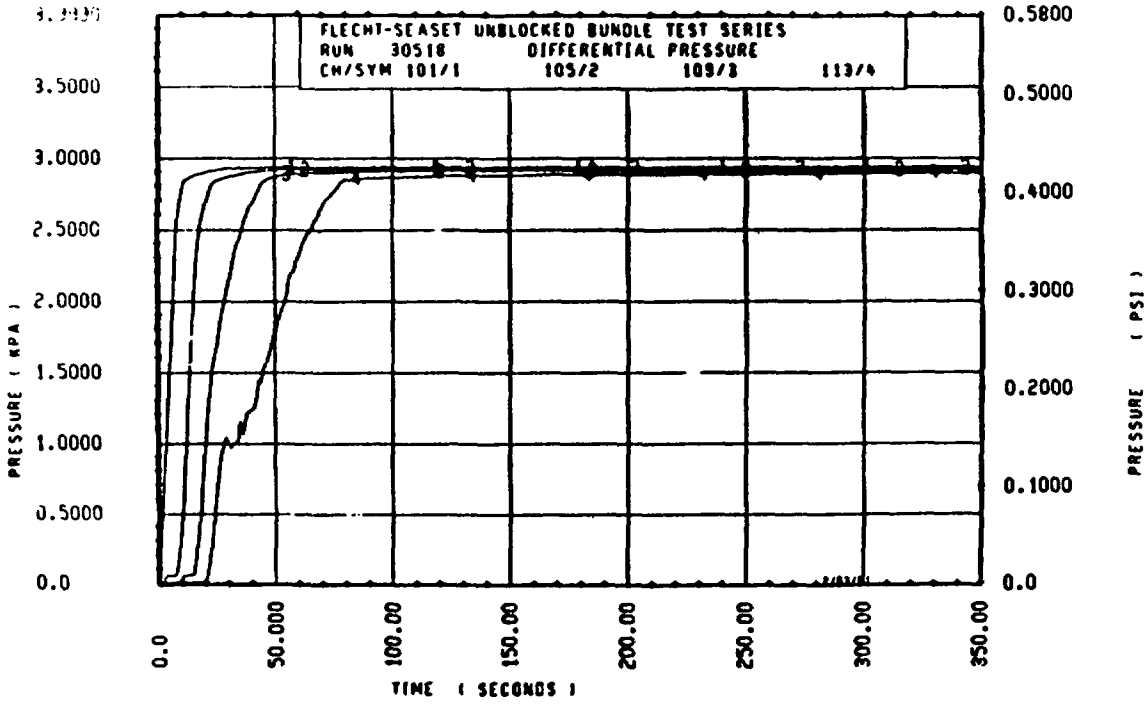

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30518
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
50.000
100.00
150.00
200.00
250.00
300.00

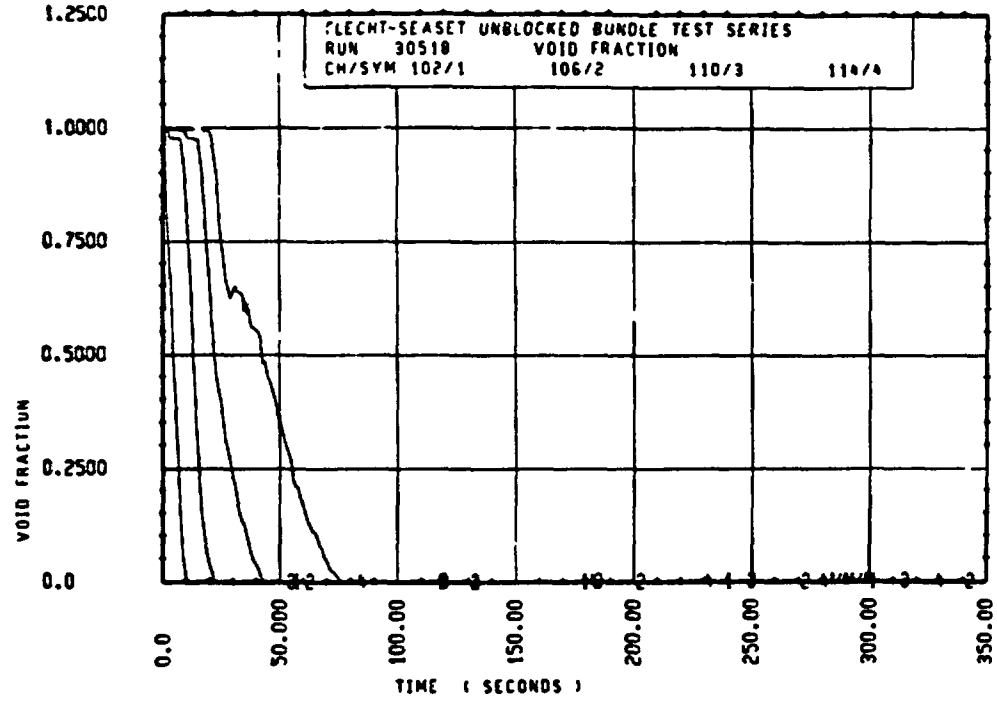

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30518
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
-0.1000
-0.2000
-0.3000
-0.4000
-0.5000
1.1023
1.0000
0.7500
0.5000
0.2500
0.0
-0.2500
-0.5000
-0.7500
-1.0000
-1.1023
50.000
100.00
150.00
200.00
250.00
300.00

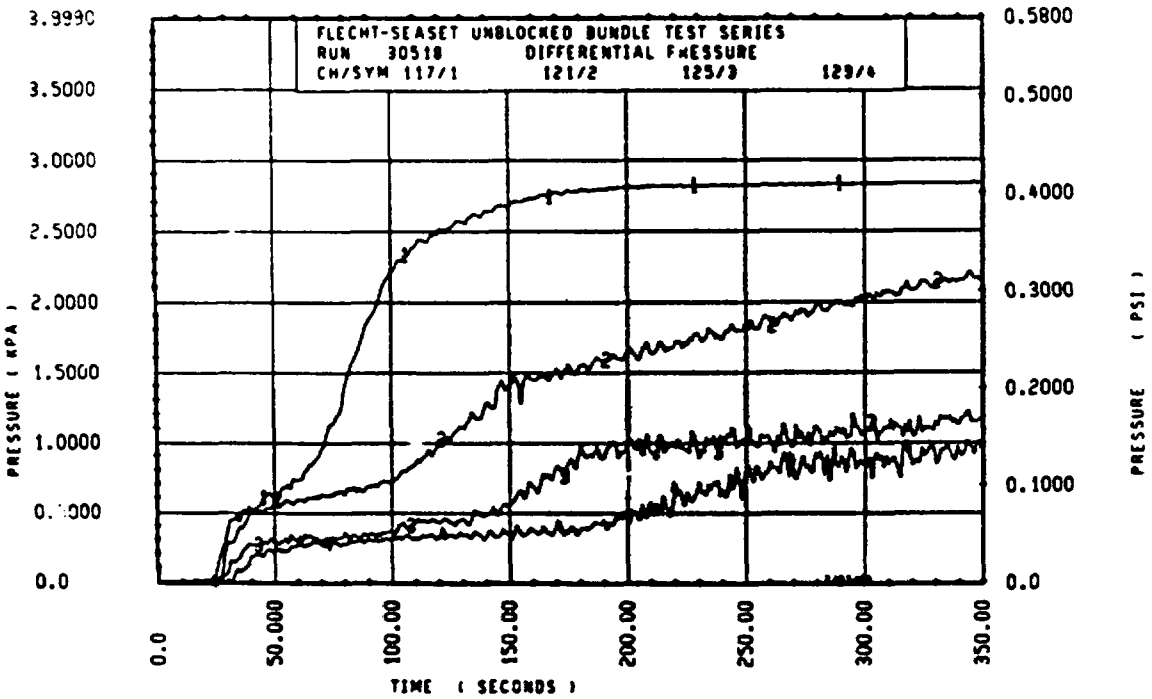

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30518
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.2500
0.2000
0.1500
0.1000
0.0500
0.0
0.5511
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
-5.2000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
358.00

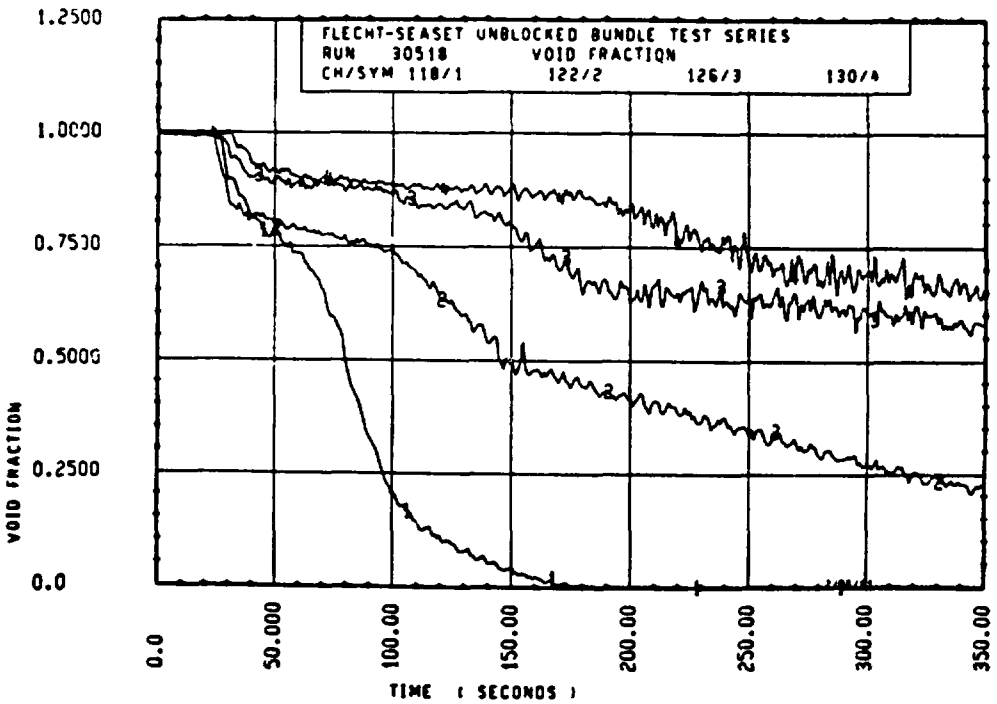

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30518
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
261.41
250.00
200.00
150.00
100.00
50.000
0.0
576.30
500.00
400.00
300.00
200.00
100.00
0.0
-5.2000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
361.00

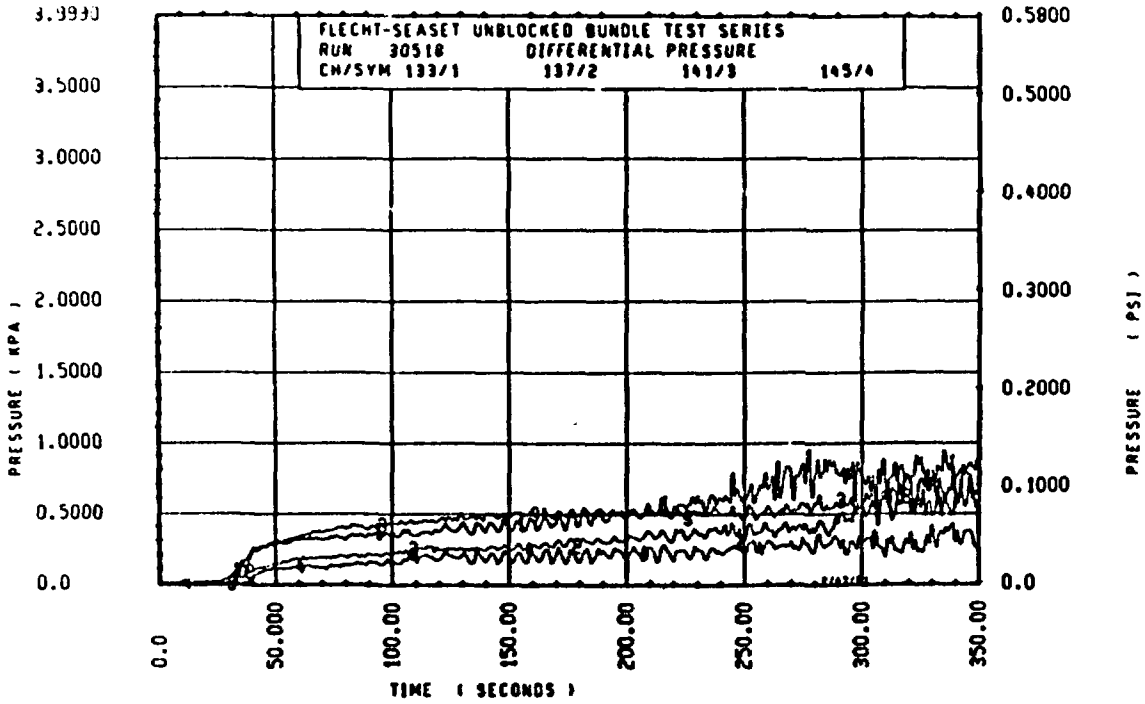

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
356.00
QUENCH TIMES (SECONDS)

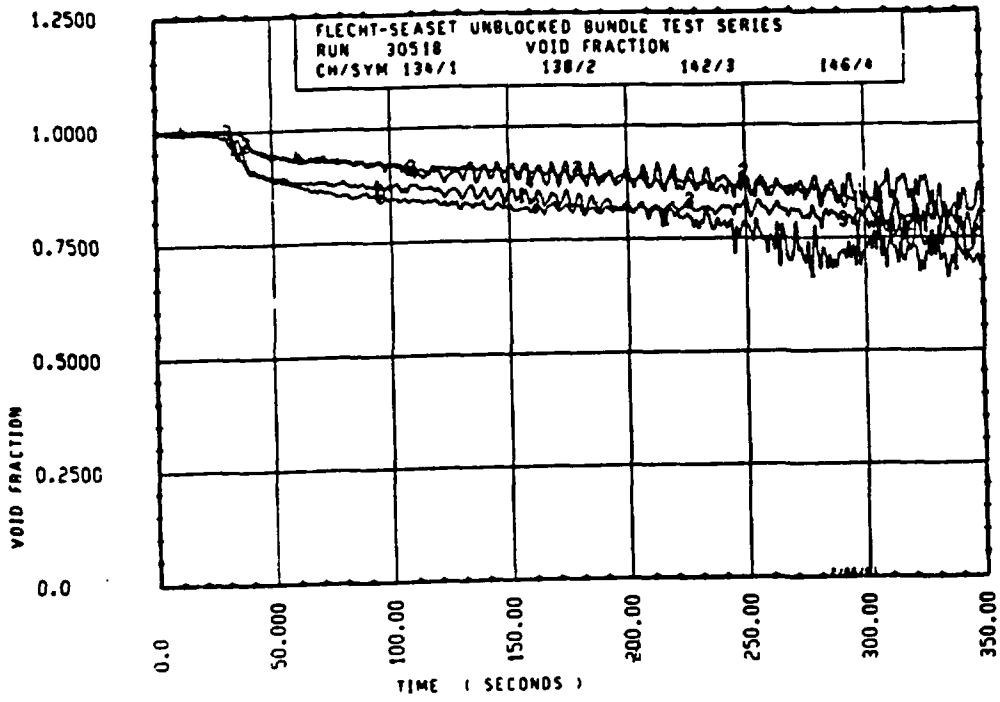

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
0.5000
1.0000
1.5000
2.0000
2.5000
3.0000
3.5000
0.1000
0.2000
0.3000
0.4000
0.5000
0.5800
50.000
100.00
150.00
200.00
250.00
300.00
350.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30518 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
0.0
0.2500
0.5000
0.7500
1.0000
1.2500
50.000
100.00
150.00
200.00
250.00
300.00
350.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 30619

Date: 2/22/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.134 MPa (19.5 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	256°C (494°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	38.9 mm/sec (1.53 in./sec)
Coolant temperature	36°C (96°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Hot Rod Quench Time Temperature*
0.61 m (24 in.)	111°C (232°F)	52°C (126°F)
1.22 m (48 in.)	111°C (232°F)	88°C (190°F)
1.83 m (72 in.)	109°C-111°C (228°F-232°F)	113°C (235°F)
2.44 m (96 in.)	109°C (228°F)	110°C (230°F)
2.74 m (108 in.)	109°C (228°F)	110°C (230°F)
3.05 m (120 in.)	109°C-111°C (228°F-232°F)	109°C (229°F)
3.35 m (132 in.)	109°C-112°C (228°F-234°F)	109°C (229°F)

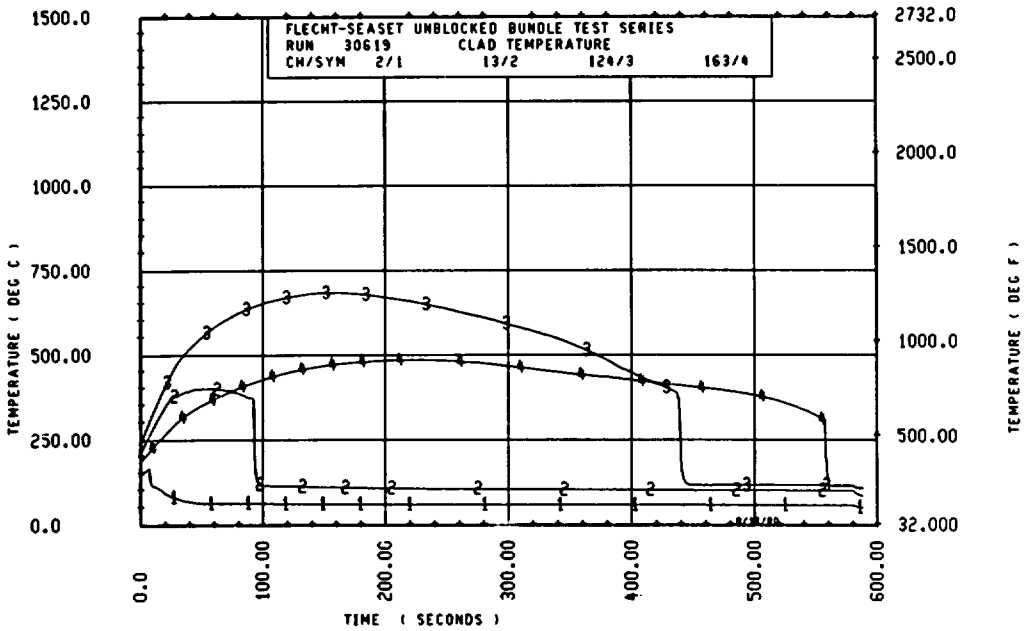
*At 292 seconds after flood

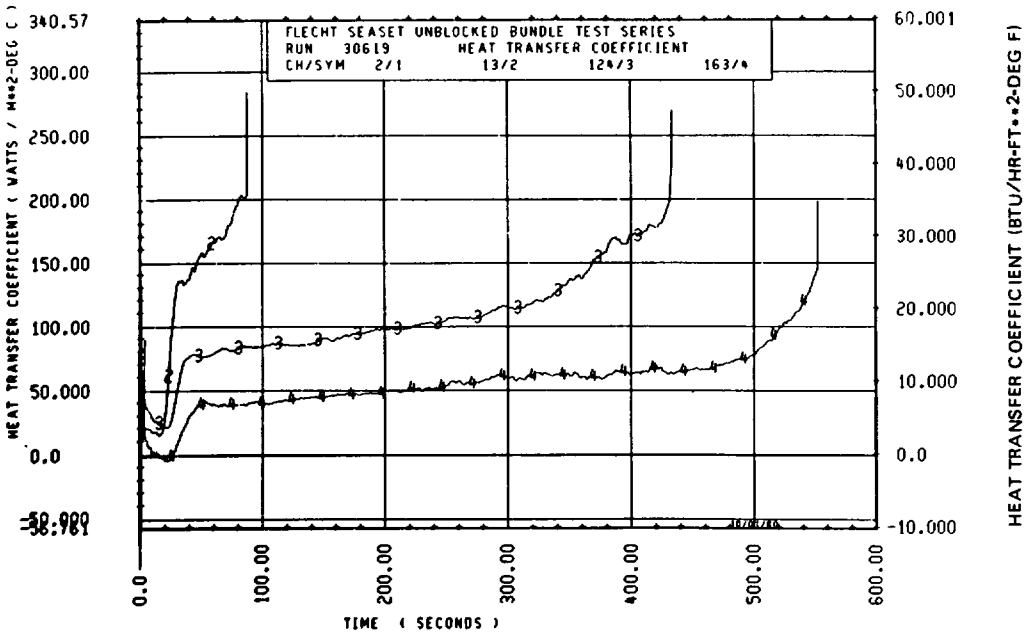
C. Comments

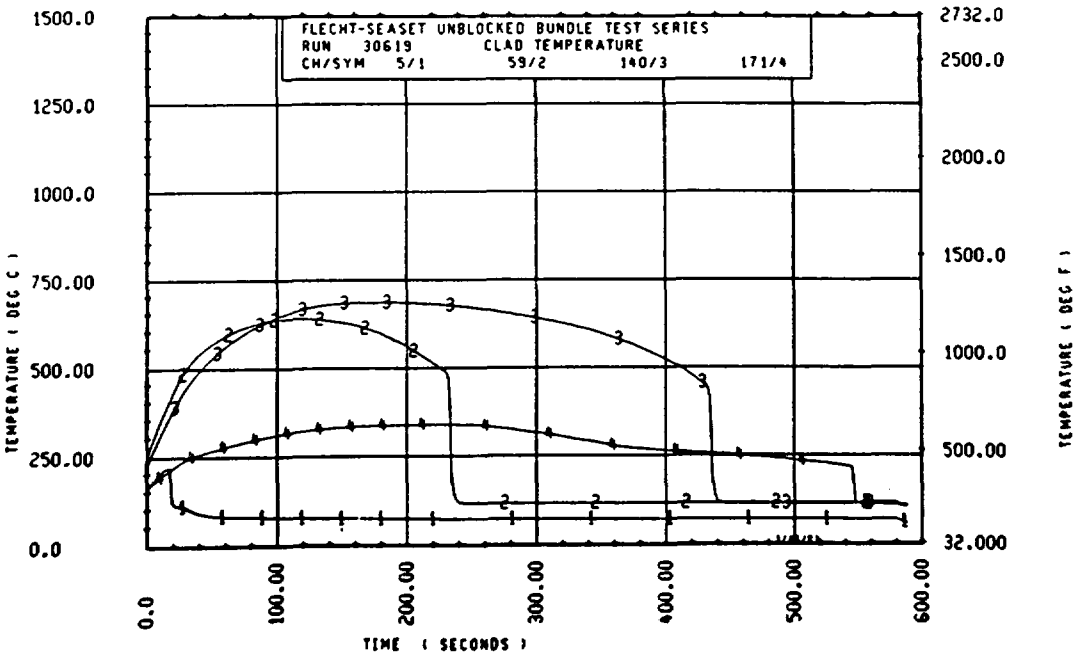
None

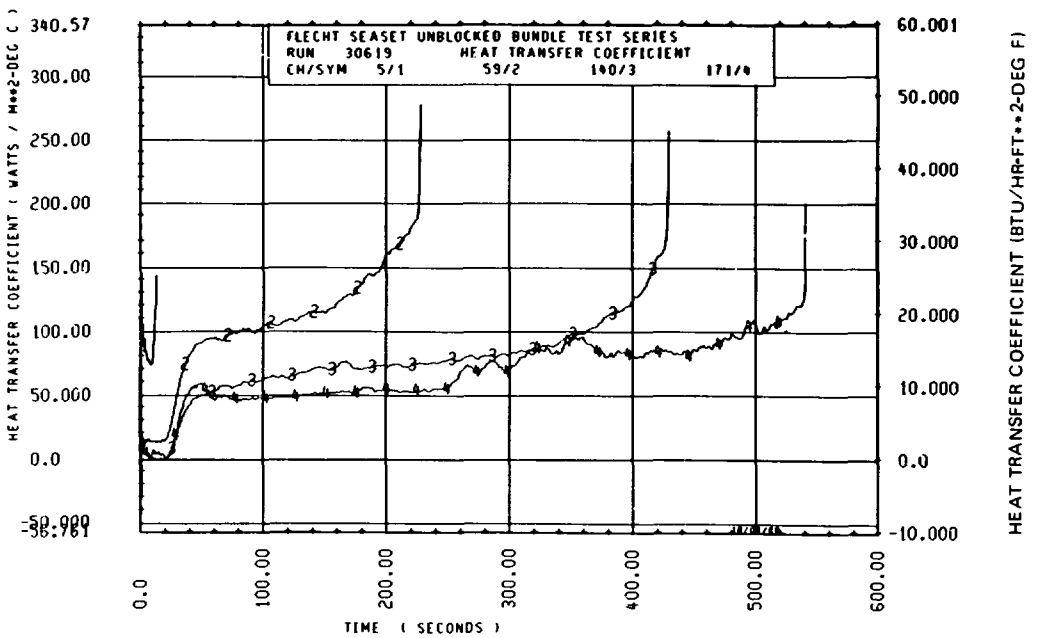
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 30619

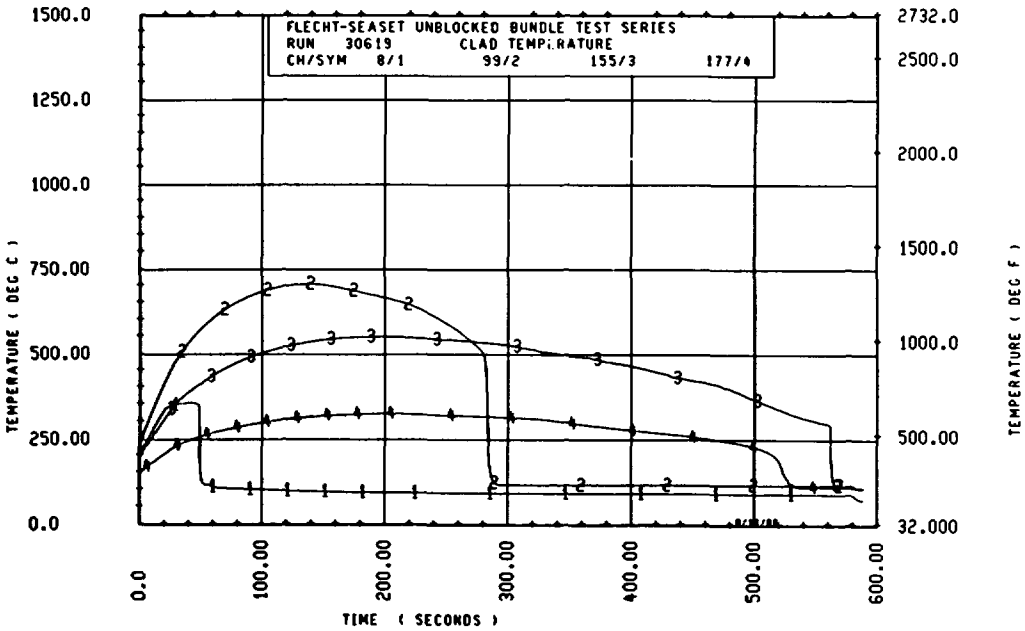
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	411.	743.	333.	53.5	667.	91.5
2H 6- 0	50	474.	1210.	735.	118.0	873.	234.8
3C 5- 0	17	431.	959.	528.	80.0	755.	157.9
3C 5- 7	28	461.	987.	526.	97.0	751.	201.5
4L 8- 0	129	422.	1216.	794.	178.0	811.	408.8
4L 8- 6	147	427.	1221.	794.	191.5	832.	408.9
5E11- 0	168	336.	643.	306.	209.0	353.	519.6
5J 4- 0	12	411.	733.	321.	47.0	670.	90.7
5J 8- 6	146	388.	1051.	663.	190.0	670.	488.5
5J11- 6	175	301.	606.	305.	191.5	456.	386.3
7E 6- 0	57	459.	1025.	566.	96.5	797.	196.3
7E 8- 6	142	383.	1085.	703.	231.0	694.	494.8
7E10- 0	162	361.	856.	495.	268.0	581.	561.2
7E11- 6	176	338.	626.	288.	259.0	431.	532.3
7D 6- 4	84	495.	1197.	702.	116.5	834.	243.7
7D 7- 6	119	468.	1200.	733.	135.0	738.	385.4
7D 9- 3	151	367.	952.	585.	202.0	607.	510.1
7G 5- 0	23	471.	1060.	590.	91.5	880.	152.9
7J 6- 0	59	482.	1187.	704.	115.0	854.	232.8
7M 7- 6	120	462.	1196.	734.	143.5	818.	382.7
7M 8- 0	132	432.	1196.	764.	186.5	754.	429.5
7M 9- 3	152	377.	931.	554.	189.0	650.	498.0
8H 4- 0	13	413.	755.	341.	57.0	698.	92.5
8H10- 0	163	368.	906.	538.	217.0	582.	557.0
8H11- 6	177	306.	618.	312.	207.0	239.	532.0
8K 4- 0	14	410.	740.	330.	52.0	714.	74.0
8K 6- 6	99	462.	1304.	842.	136.0	835.	282.6
8K 8- 0	140	438.	1267.	829.	161.5	750.	434.5
8K10- 0	164	365.	908.	543.	226.0	619.	535.0
8N 2- 0	5	329.	428.	99.	16.5	426.	17.9
8N 4- 0	15	411.	765.	354.	54.0	695.	89.3
8N 6- 0	61	468.	1199.	731.	127.5	871.	226.7
8N10- 0	165	349.	936.	586.	250.0	643.	526.0
9C 7- 0	109	470.	1152.	682.	131.0	755.	356.8
9C 9- 3	153	374.	941.	566.	207.0	610.	518.9
9G 1- 0	2	296.	331.	35.	7.0	244.	9.0
9G 3- 3	8	397.	674.	278.	39.0	651.	48.7
9G11- 0	171	332.	643.	311.	225.0	420.	545.7
9I 5- 0	24	470.	1053.	583.	78.5	883.	151.9
9I 5-10	46	493.	1155.	661.	96.0	850.	218.7
10D 6- 6	93	461.	1273.	812.	134.0	793.	293.3
11E 7- 6	124	464.	1261.	797.	158.5	675.	438.6
11E 9- 3	155	389.	1025.	637.	197.0	562.	561.0
11E11- 0	172	352.	665.	313.	222.0	440.	459.9
12D 4- 0	16	414.	770.	356.	51.5	697.	90.6
12D 6- 0	66	471.	1217.	747.	112.5	847.	238.8
13G 6- 6	102	473.	1155.	681.	110.5	707.	267.6

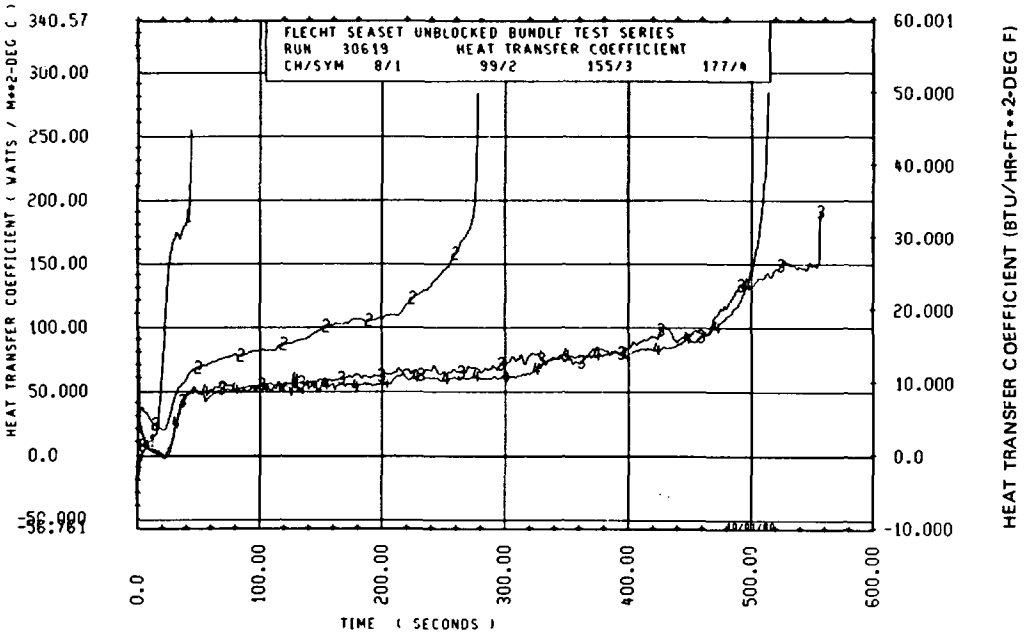

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

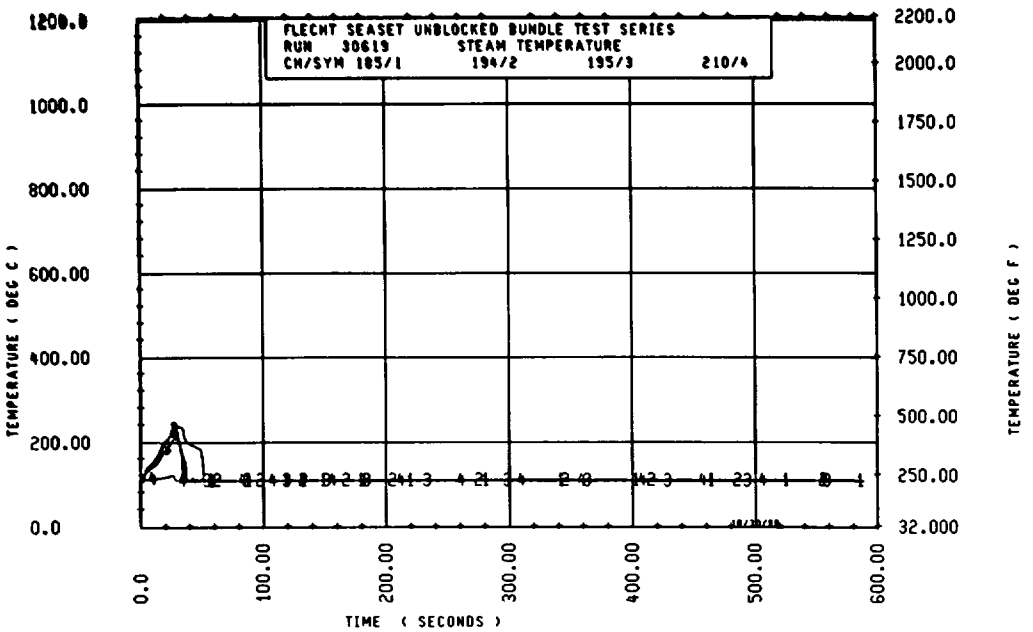

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

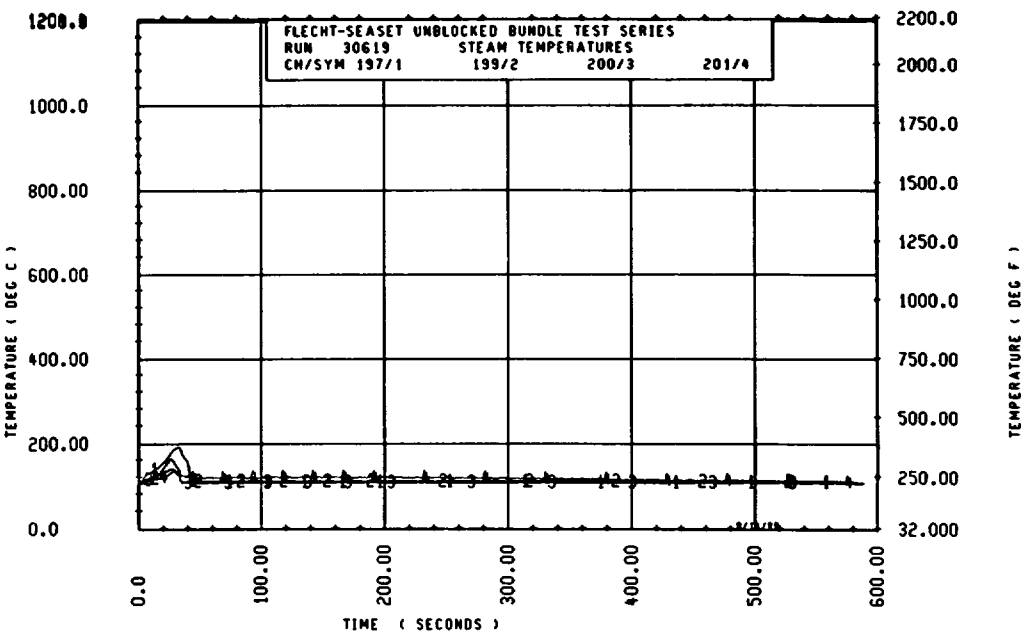

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

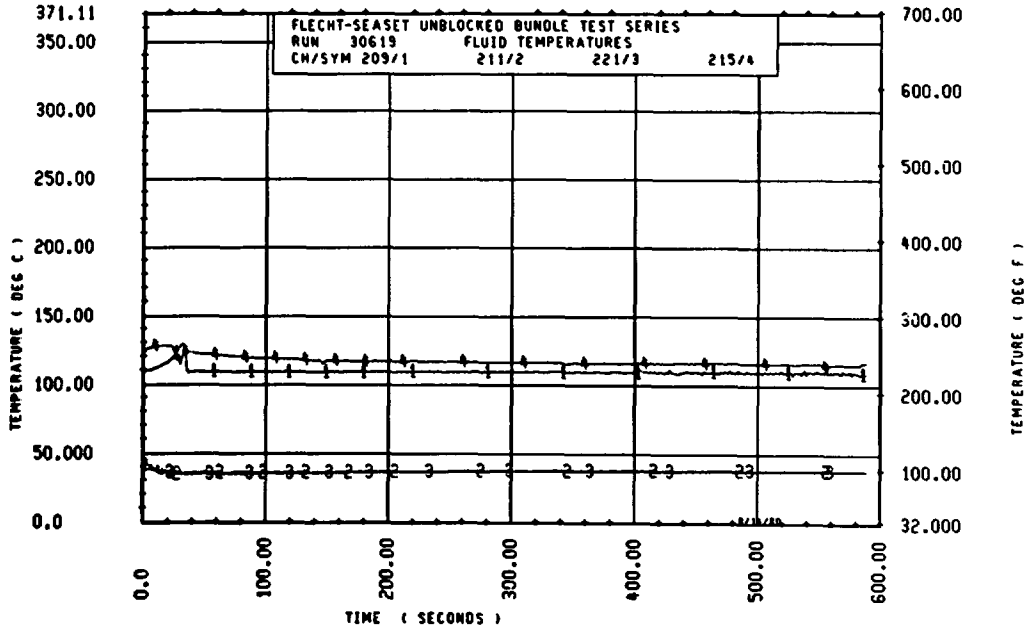

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-36.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

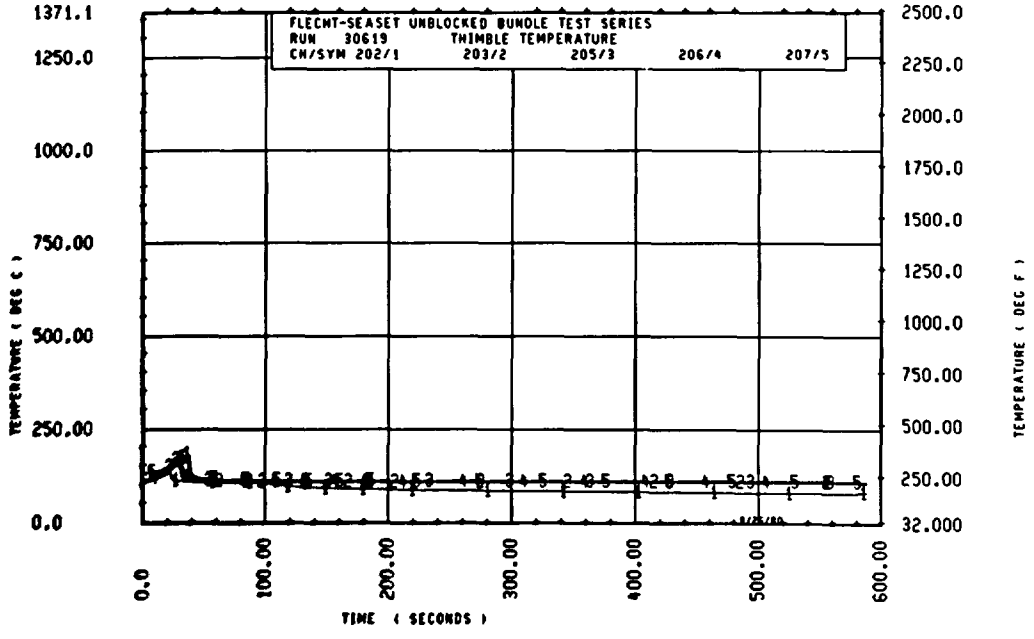

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-36.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

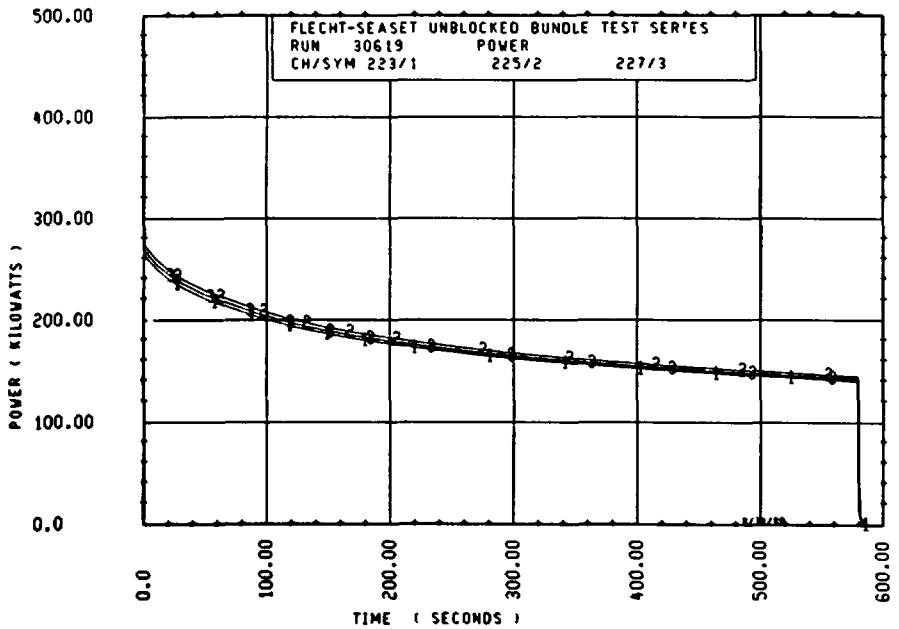

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

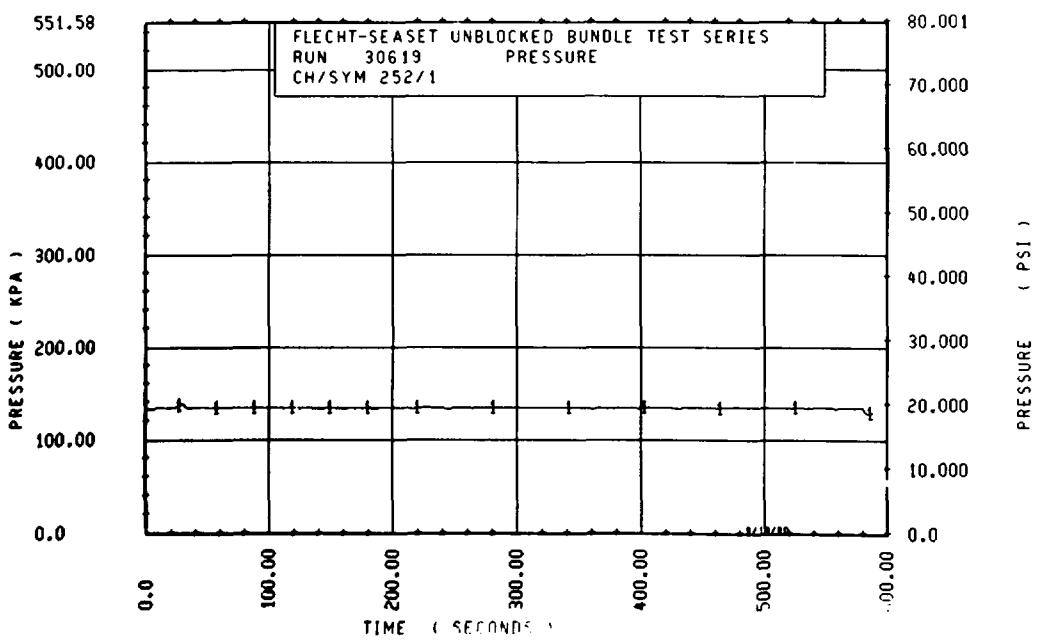

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

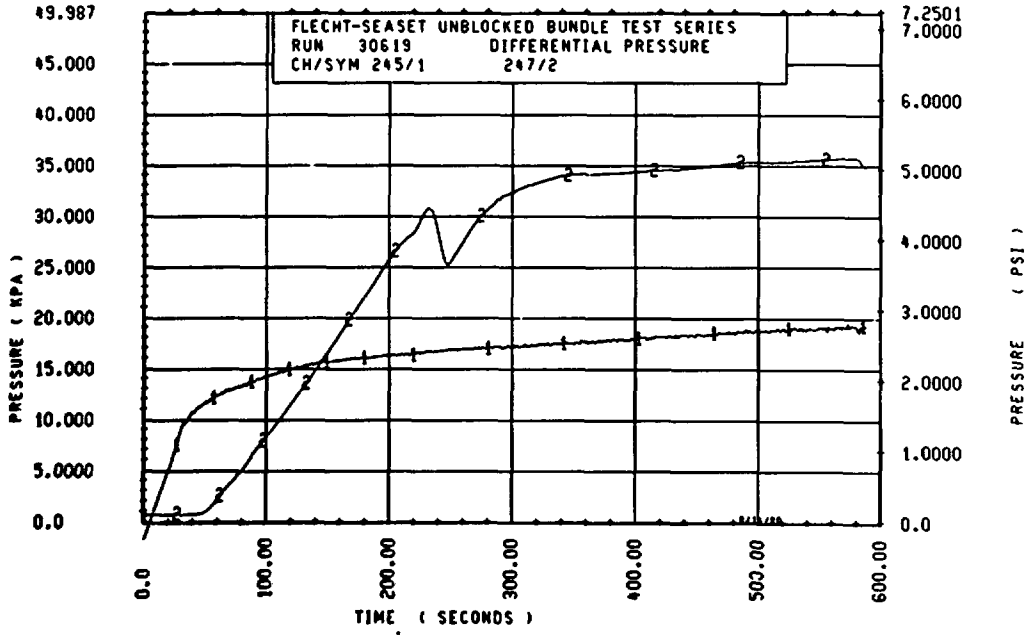


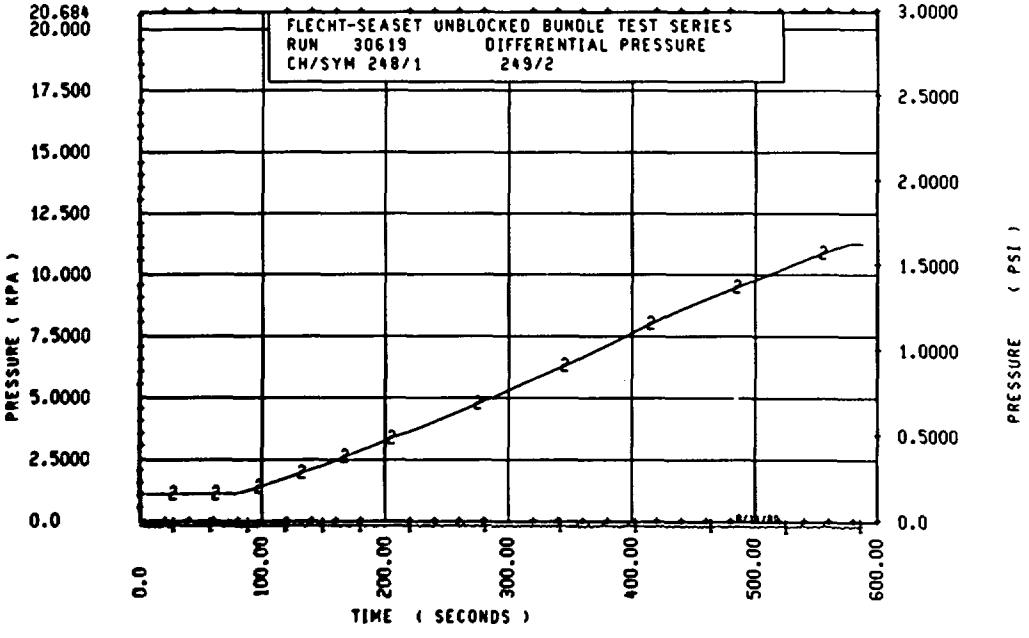


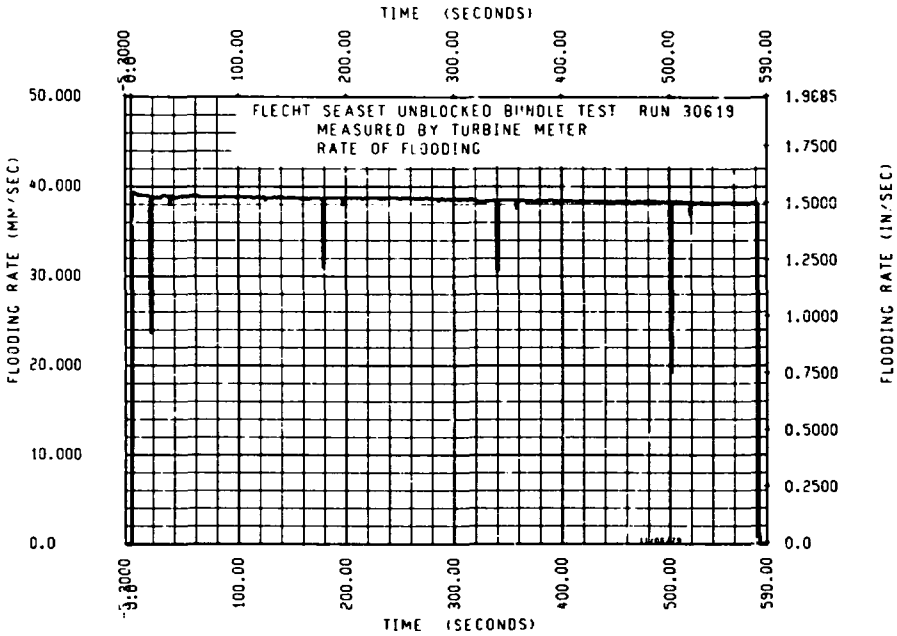
CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.);
CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.);
CH 207-4I, 3.05 m (120 in.)

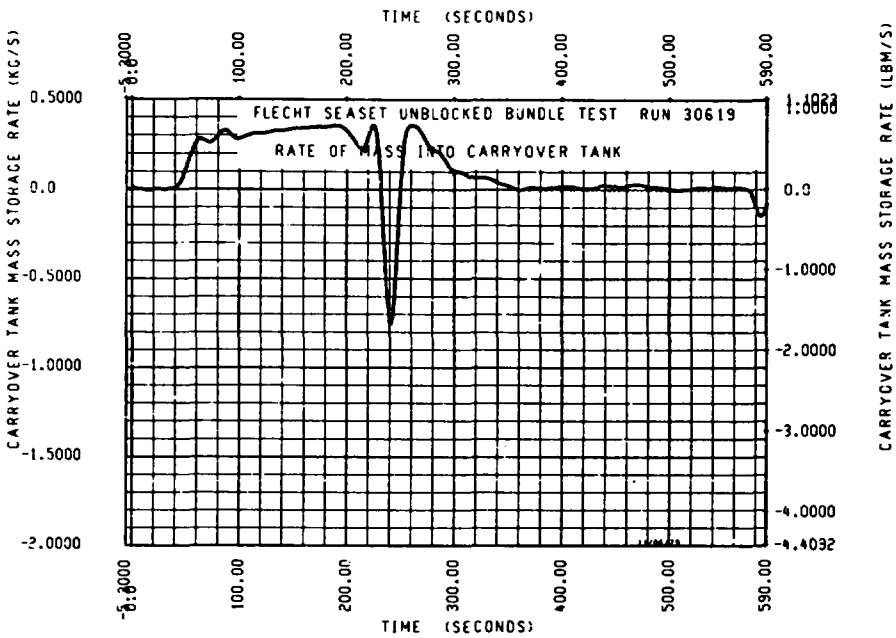

FLECHT-SEASET UNBLOCKED BUNDLE TEST SER'ES
RUN 30619 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

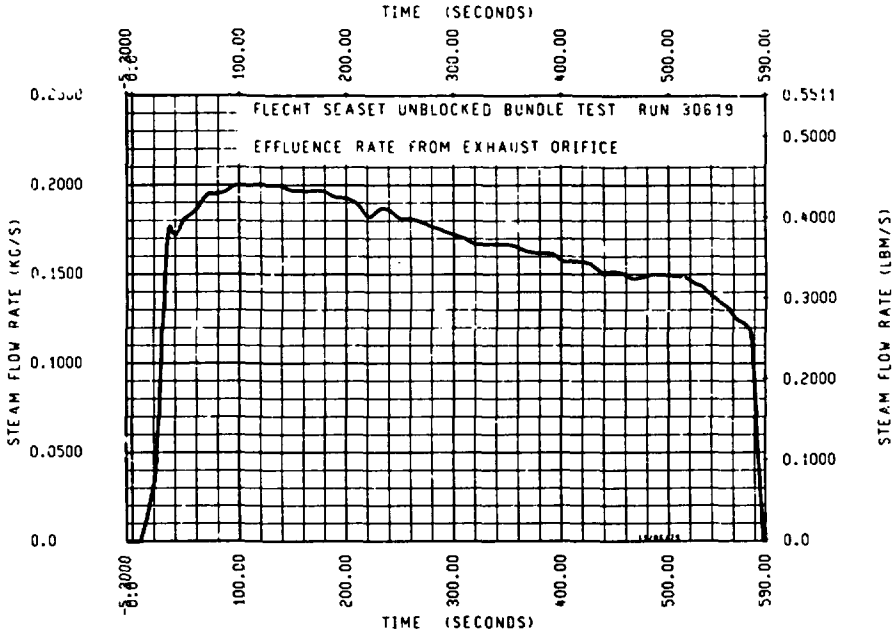

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
TIME (SECONDS)

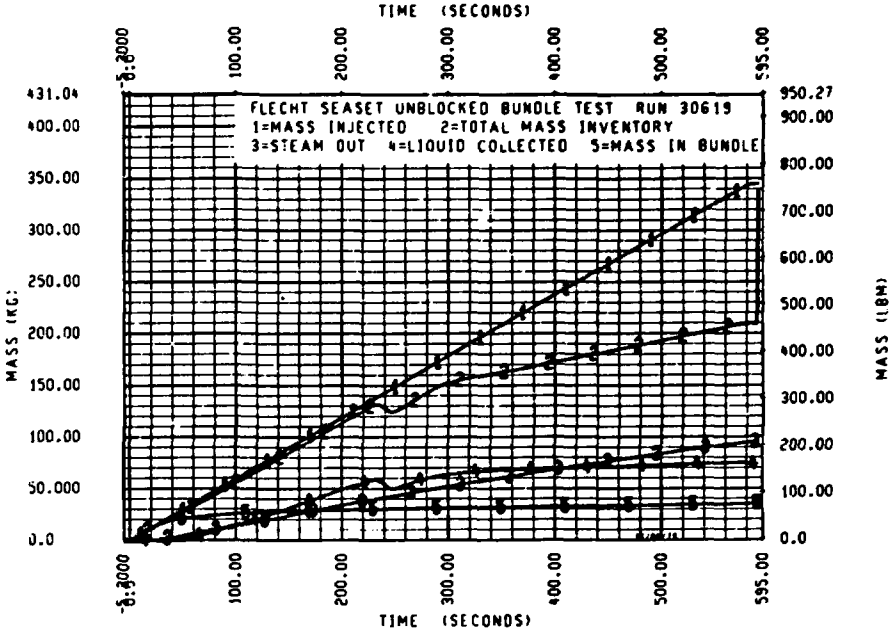

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

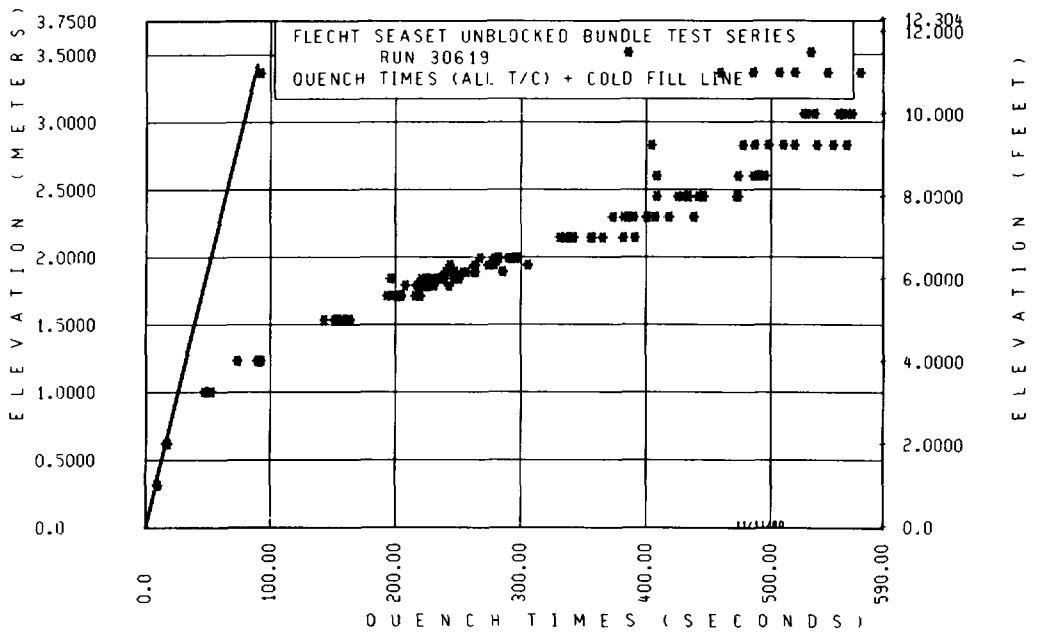

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

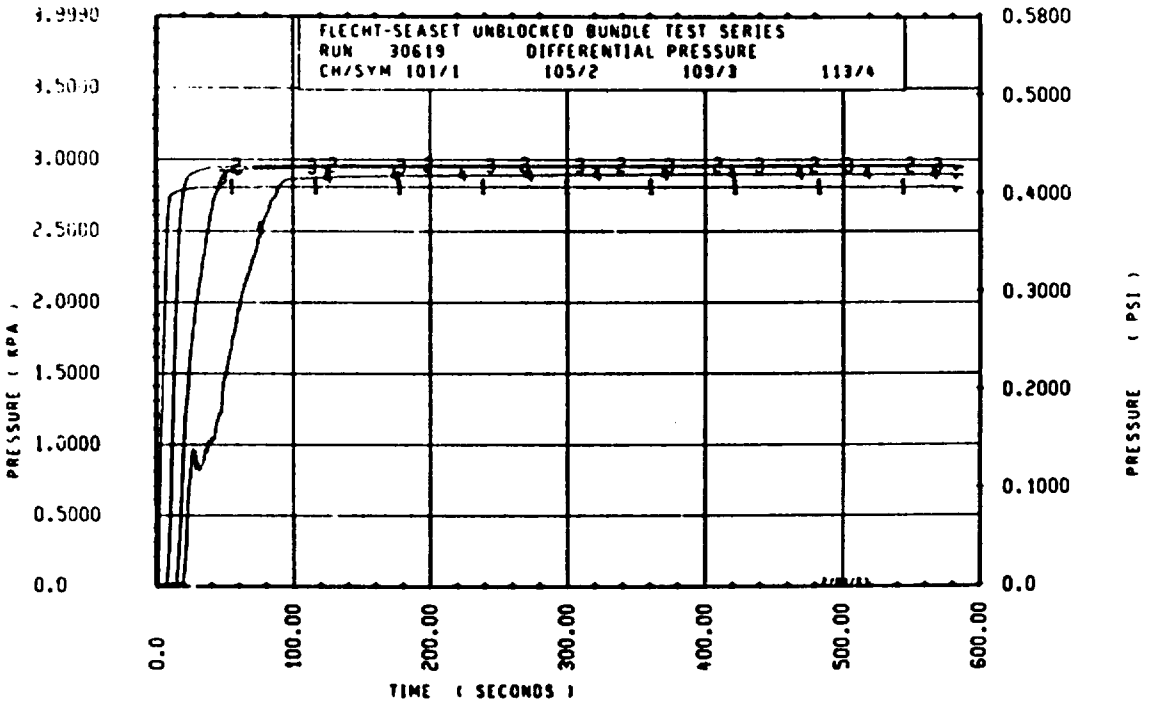

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30619
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.0000
0.0
100.00
200.00
300.00
400.00
500.00
590.00

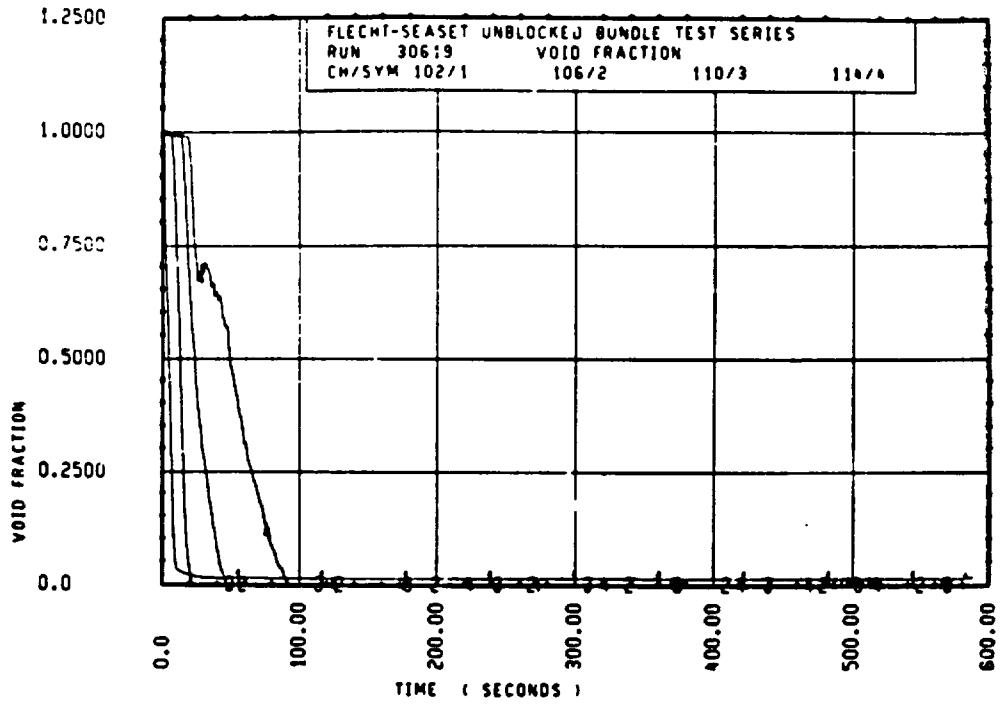

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30619
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
1.1023
1.0000
0.0
-1.0000
-2.0000
-3.0000
-4.0000
-4.4092
-5.0000
0.0
100.00
200.00
300.00
400.00
500.00
590.00

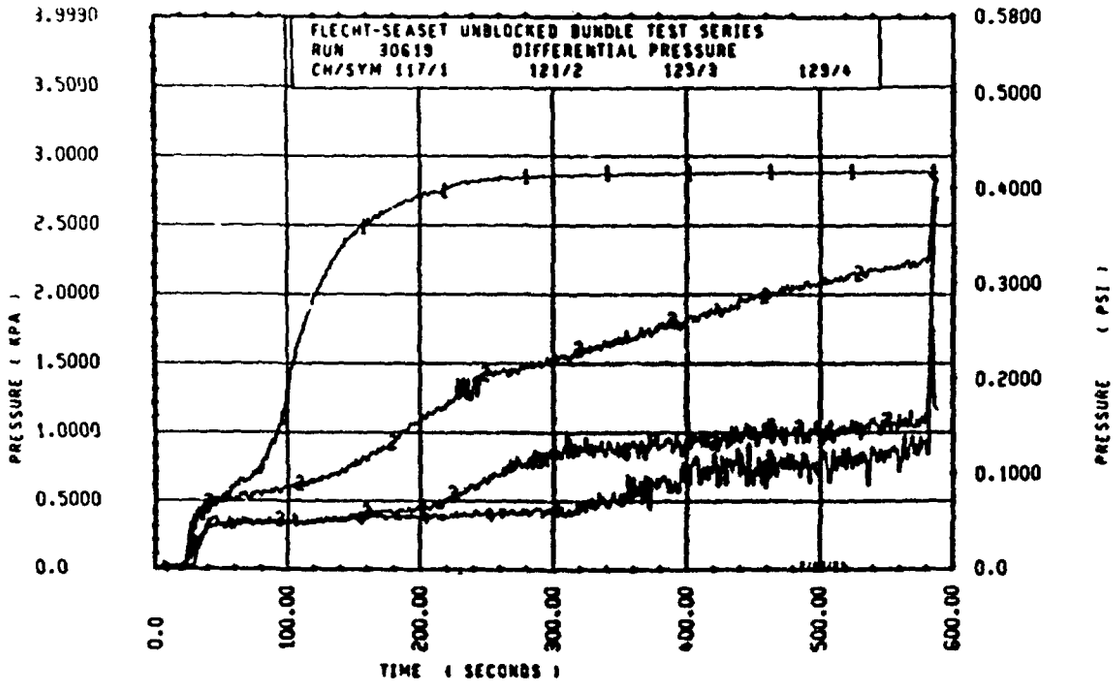

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30619
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.2000
0.1500
0.1000
0.0500
0.0
0.5511
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
590.00

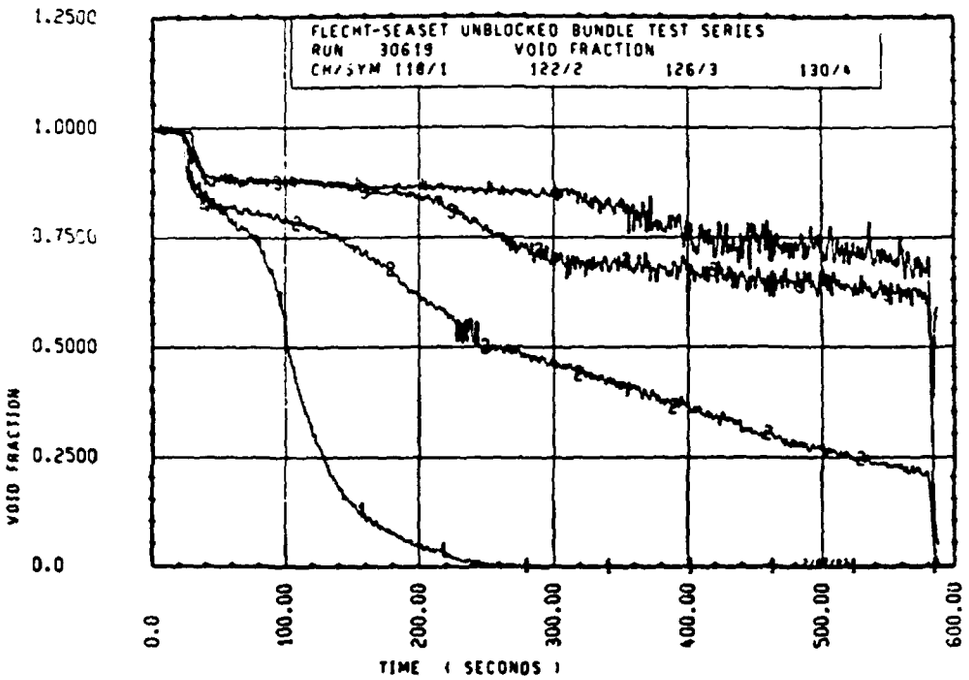

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30619
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
431.04
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
950.27
900.00
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
595.00

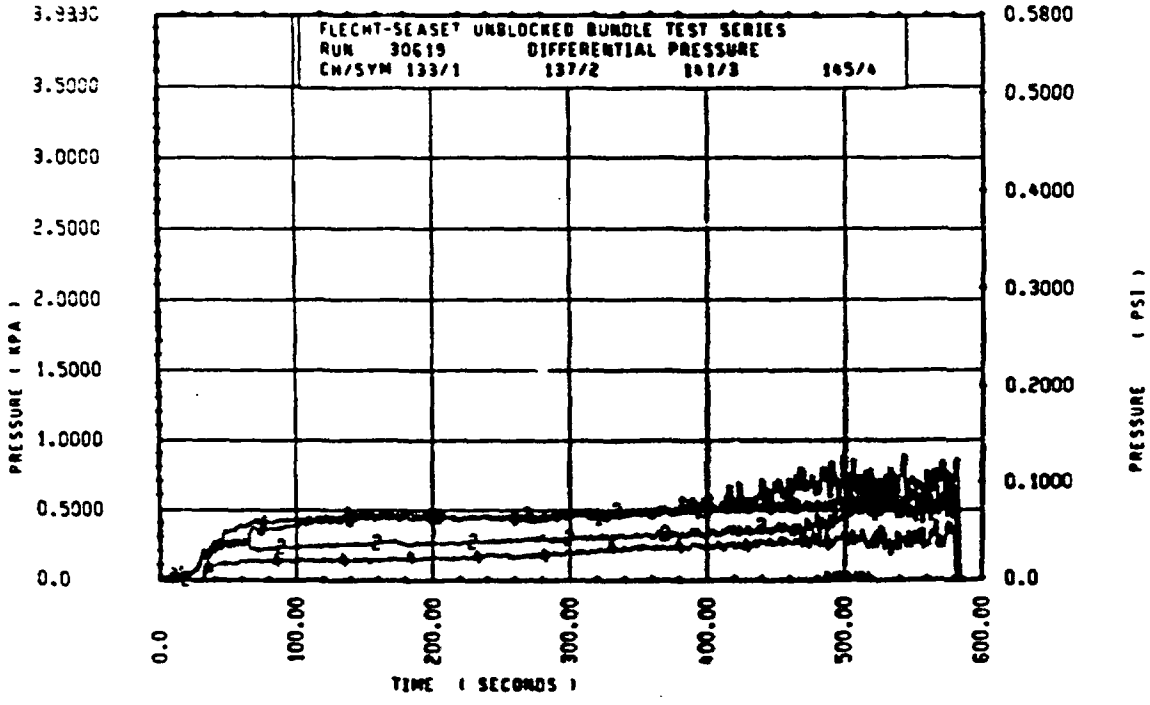

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
590.00
QUENCH TIMES (SECONDS)

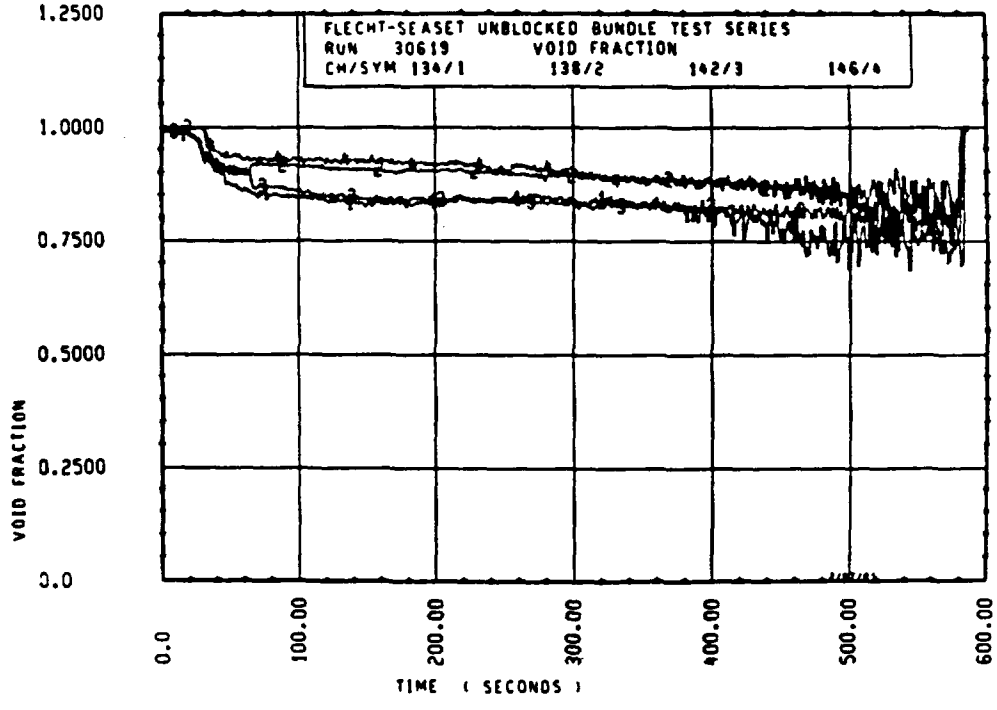

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
0.5000
1.0000
1.5000
2.0000
2.5000
3.0000
3.5000
3.9990
0.1000
0.2000
0.3000
0.4000
0.5000
0.5800
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
0.0
0.2500
0.5000
0.7500
1.0000
1.2500
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30619 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 30817

Date: 3/12/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	531°C (987°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	38.9 mm/sec (1.53 in./sec)
Coolant temperature	53°C (128°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	134°C (273°F)	76°C (159°F)
1.22 m (48 in.)	136°C (277°F)	106°C (223°F)
1.83 m (72 in.)	139°C-145°C (283°F-293°F)	134°C (273°F)
2.44 m (96 in.)	139°C-142°C (283°F-289°F)	131°C (268°F)
2.74 m (108 in.)	135°C (275°F)	131°C (268°F)
3.05 m (120 in.)	134°C (272°F)	131°C (268°F)
3.35 m (132 in.)	131°C (268°F)	131°C (268°F)

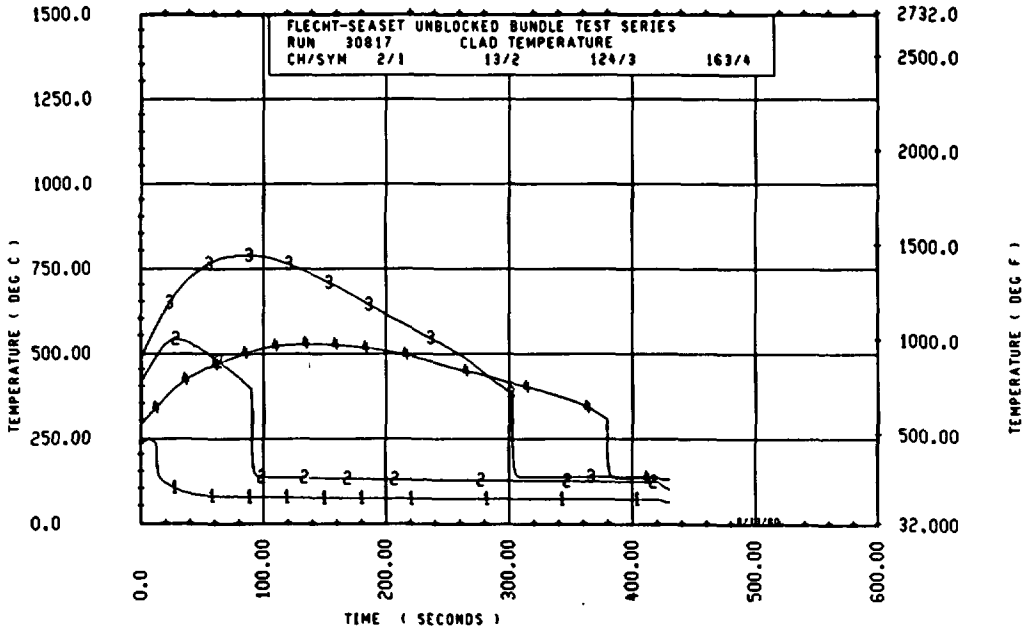
*At 219 seconds after flood

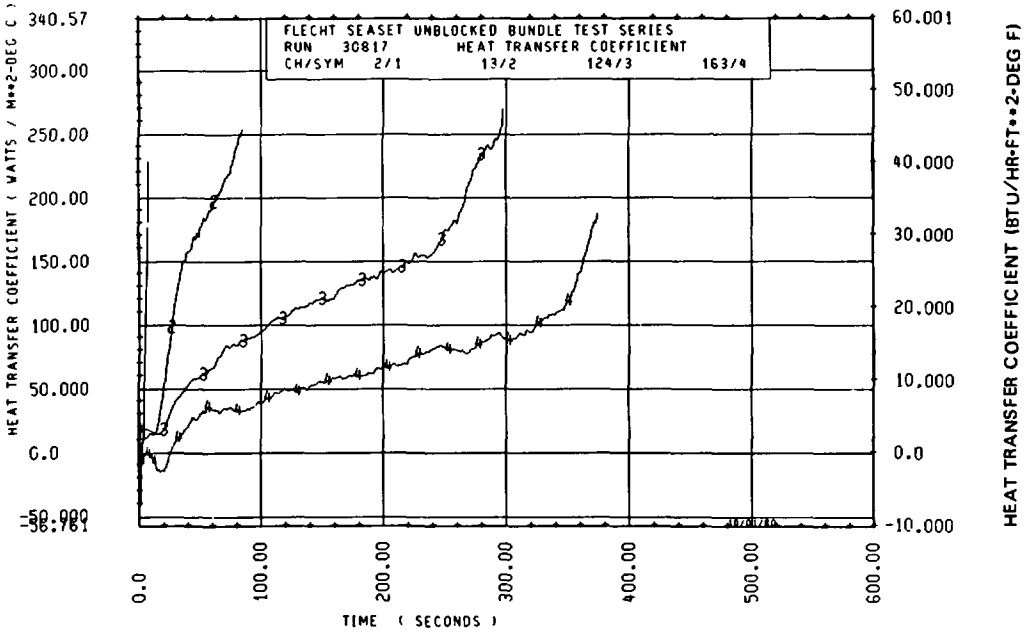
C. Comments

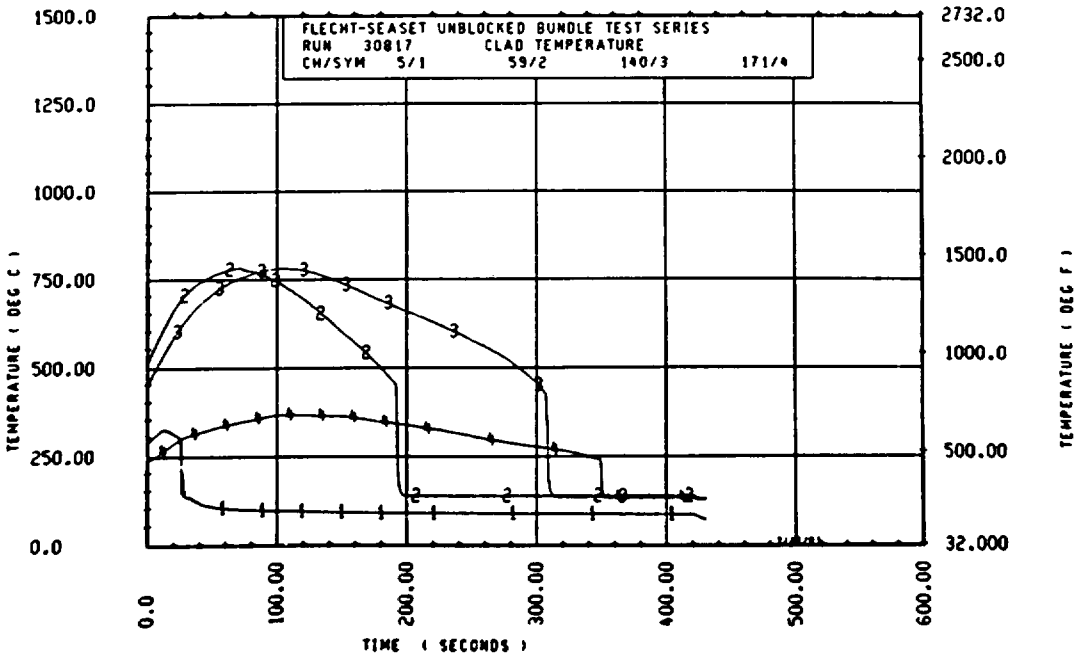
None

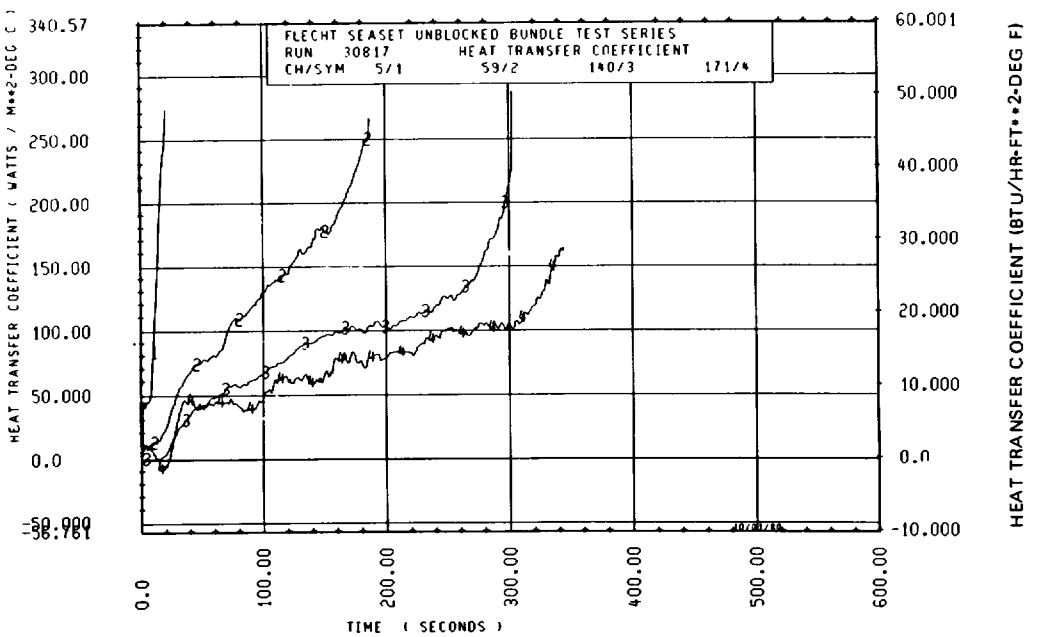
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 30817

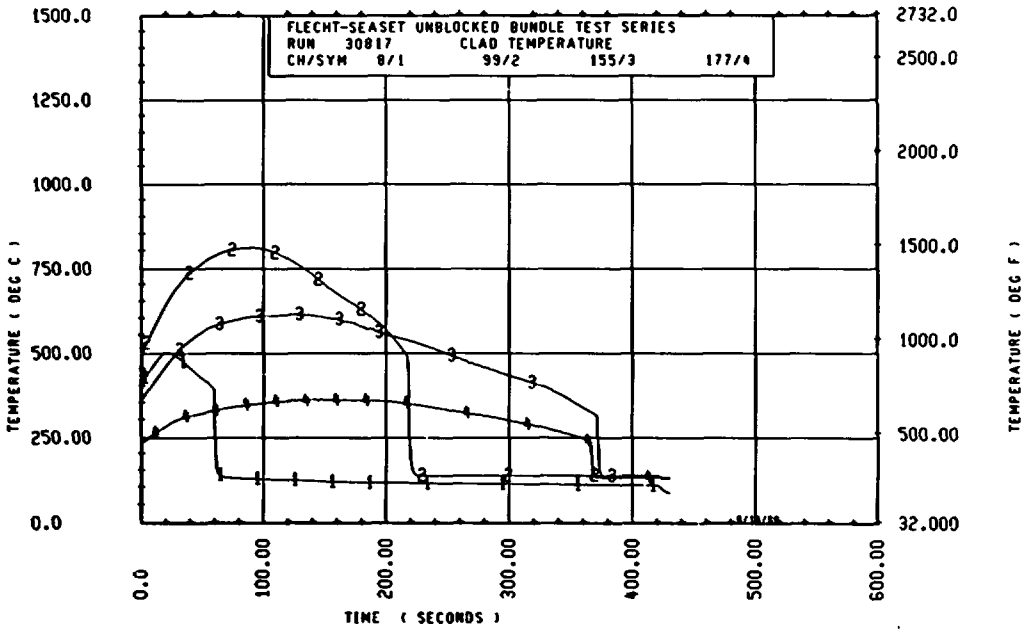
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	769.	987.	218.	32.0	750.	87.0
2H 6- 0	50	933.	1361.	428.	65.0	862.	186.3
3C 5- 0	17	839.	1151.	312.	58.0	809.	137.4
3C 5- 7	28	898.	1175.	278.	37.0	789.	163.4
4L 8- 0	129	810.	1365.	555.	98.5	798.	296.0
4L 8- 6	147	813.	1368.	555.	98.5	805.	296.0
5E11- 0	168	466.	746.	280.	128.0	489.	340.7
5J 4- 0	12	773.	985.	212.	30.5	729.	89.3
5J 8- 6	146	708.	1186.	478.	100.0	715.	335.0
5J11- 6	175	452.	687.	235.	121.5	486.	350.0
7B 6- 0	57	904.	1255.	351.	45.0	805.	163.9
7B 8- 6	142	712.	1170.	459.	108.0	703.	339.2
7B10- 0	162	562.	934.	372.	137.0	593.	378.8
7E11- 6	176	458.	689.	231.	139.0	452.	395.0
7C 6- 4	84	989.	1459.	470.	66.5	847.	190.2
7C 7- 6	119	919.	1430.	511.	78.5	810.	269.9
7D 9- 3	151	644.	1028.	384.	128.0	612.	342.9
7G 5- 0	23	922.	1265.	344.	45.5	866.	137.4
7J 6- 0	59	958.	1439.	481.	69.5	823.	192.1
7M 7- 6	120	908.	1392.	484.	71.0	805.	275.3
7M 8- 0	132	820.	1377.	557.	105.0	798.	301.0
7M 9- 3	152	656.	1095.	439.	101.0	642.	341.0
8H 4- 0	13	782.	1010.	228.	29.0	742.	90.3
8H10- 0	163	562.	983.	421.	141.5	581.	379.0
8H11- 6	177	454.	688.	234.	141.5	438.	366.0
8K 4- 0	14	770.	985.	215.	25.5	762.	83.0
8K 6- 6	99	920.	1492.	573.	89.5	899.	217.8
8K 8- 0	140	846.	1438.	592.	106.0	789.	307.4
8K10- 0	164	560.	1013.	453.	140.5	589.	373.0
8N 2- 0	5	552.	623.	70.	12.5	573.	25.9
8N 4- 0	15	780.	993.	214.	23.5	760.	86.9
8N 6- 0	61	937.	1369.	431.	64.5	865.	184.4
8N10- 0	165	555.	1018.	463.	117.5	656.	363.0
9C 7- 0	109	923.	1411.	488.	70.0	751.	259.8
9C 9- 3	153	655.	1106.	451.	122.0	614.	350.0
9G 1- 0	2	452.	482.	30.	6.5	455.	12.9
9G 3- 3	8	768.	937.	168.	20.0	736.	60.0
9G11- 0	171	458.	696.	238.	111.0	463.	349.0
9I 5- 0	24	934.	1276.	342.	44.5	869.	136.9
9I 5-10	46	991.	1424.	433.	56.5	821.	179.3
10D 6- 6	93	907.	1487.	580.	89.0	850.	223.7
11E 7- 6	124	909.	1452.	542.	83.5	715.	302.0
11E 9- 3	155	683.	1136.	452.	122.0	599.	371.0
11E11- 0	172	462.	730.	268.	145.0	459.	347.8
12D 4- 0	16	785.	1003.	218.	27.0	750.	89.5
12D 6- 0	66	942.	1407.	465.	71.5	872.	190.4
13G 6- 6	102	937.	1388.	450.	65.5	770.	195.3

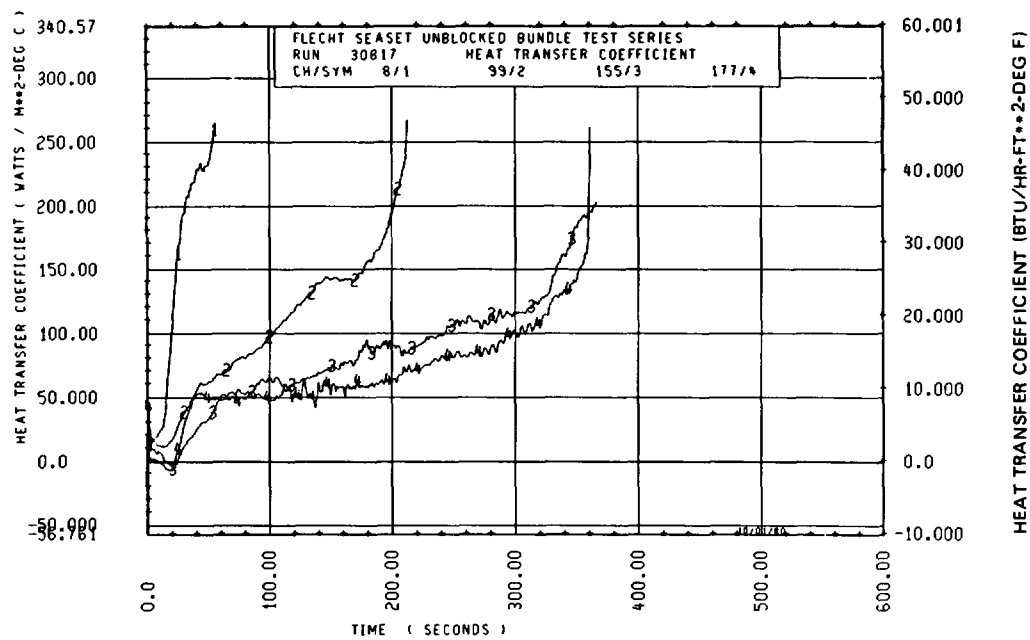

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

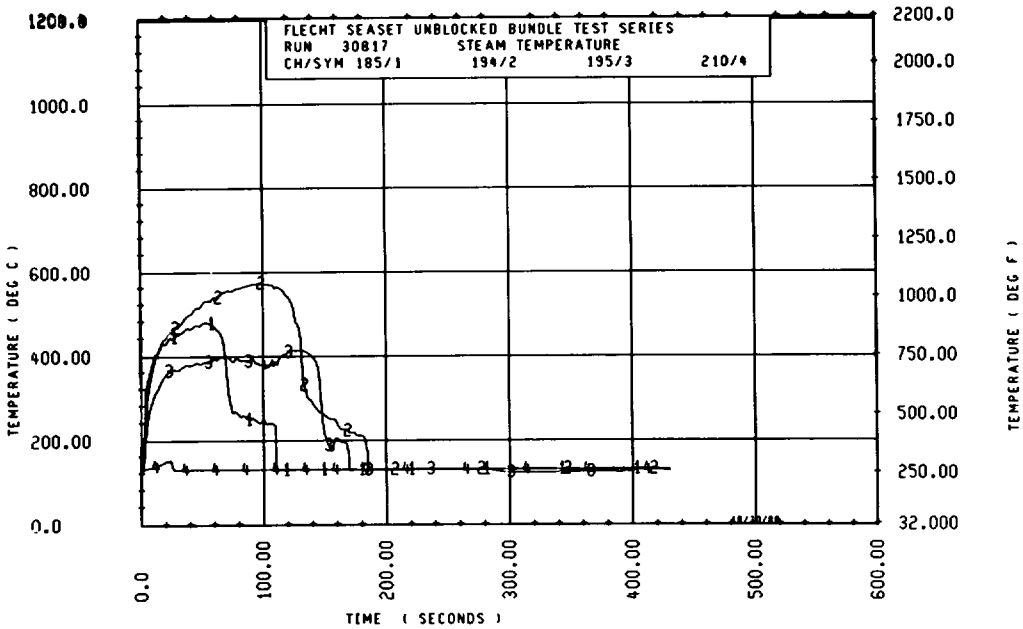

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

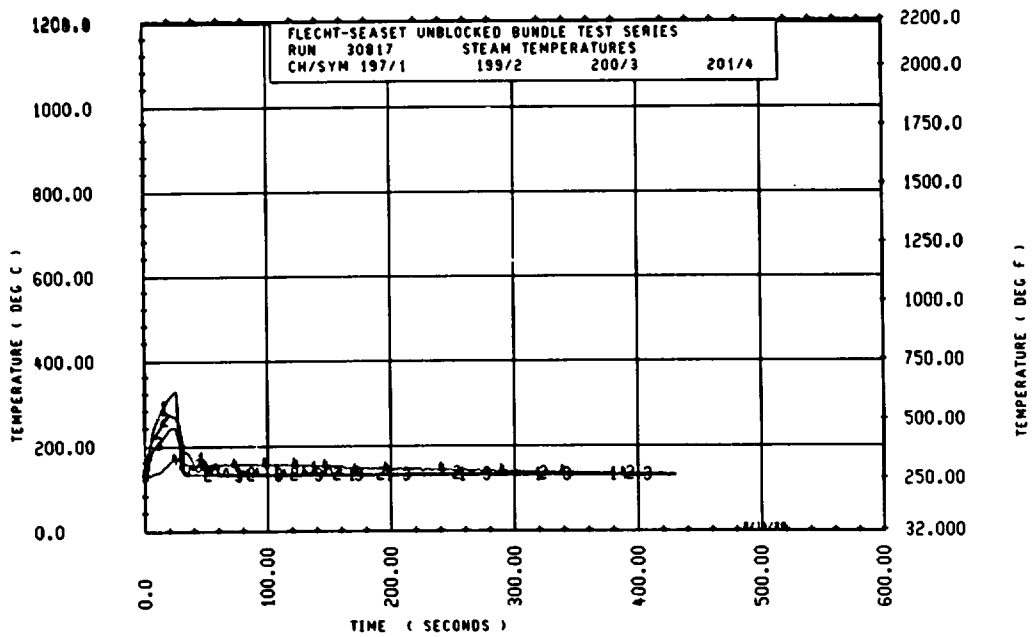

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

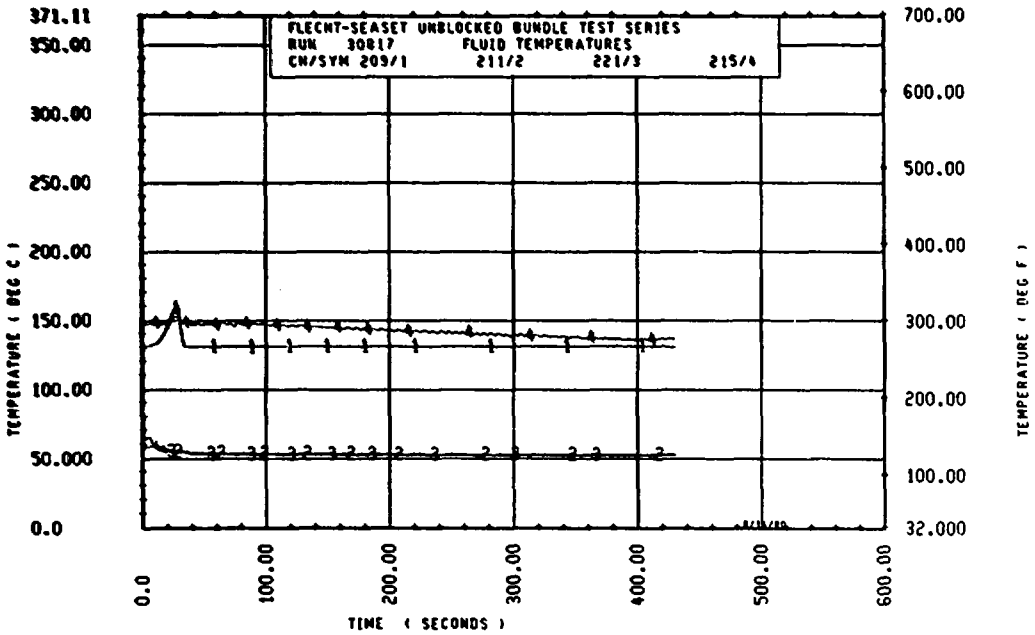

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

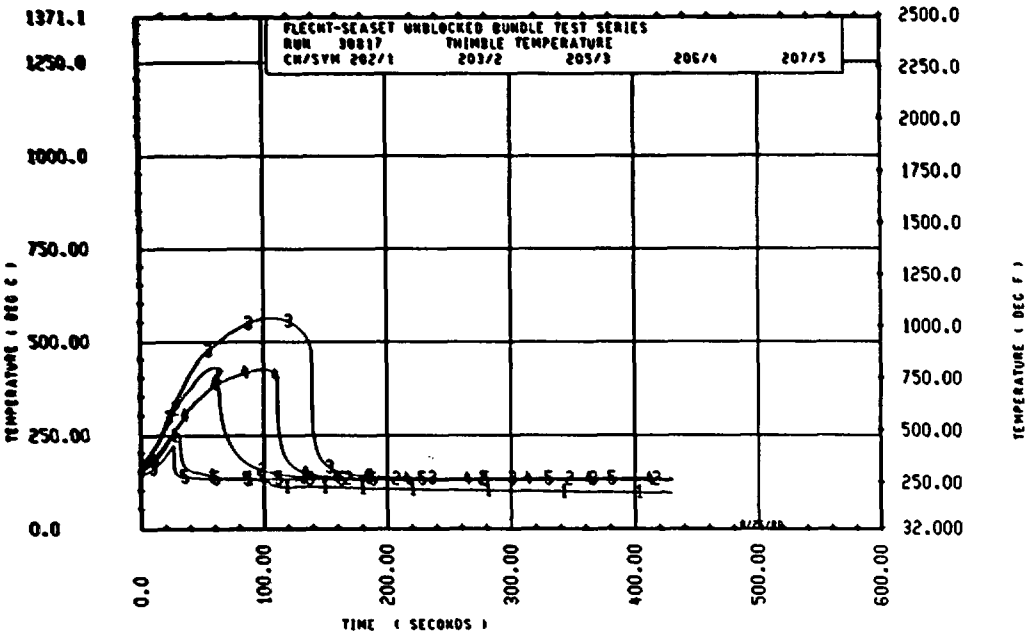

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

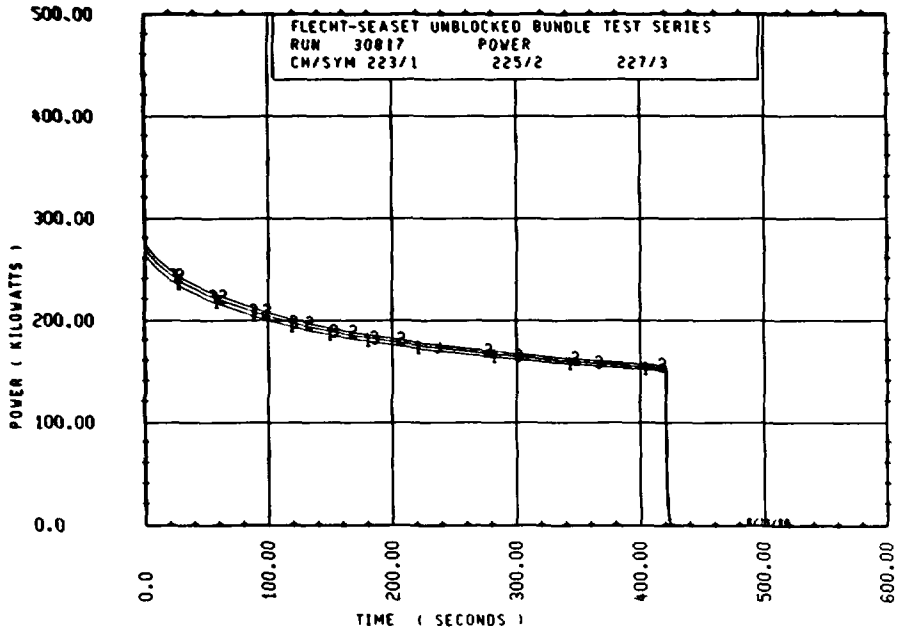

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

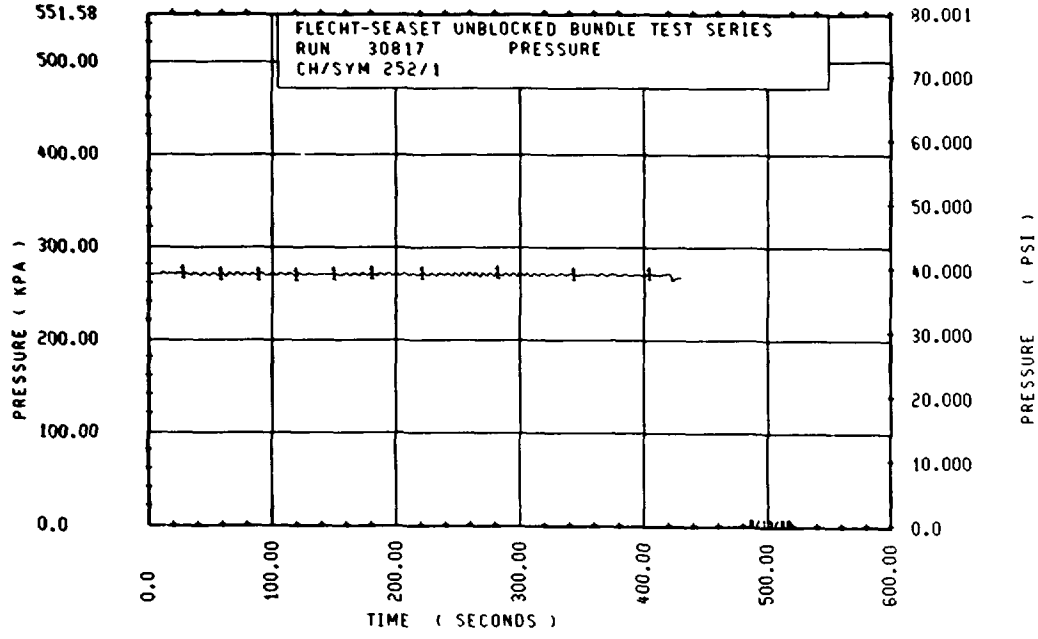

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

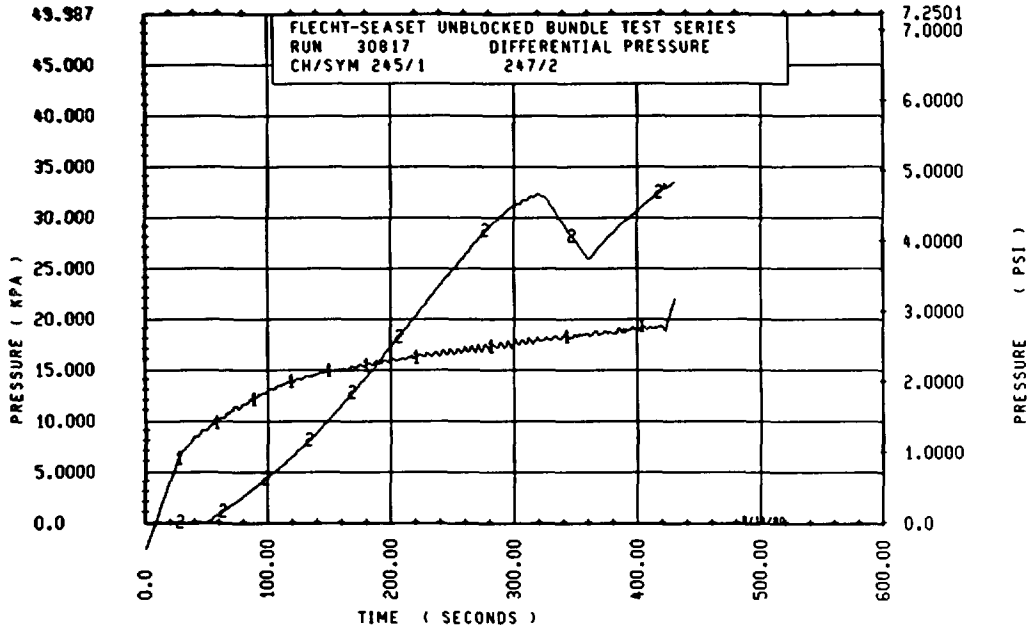


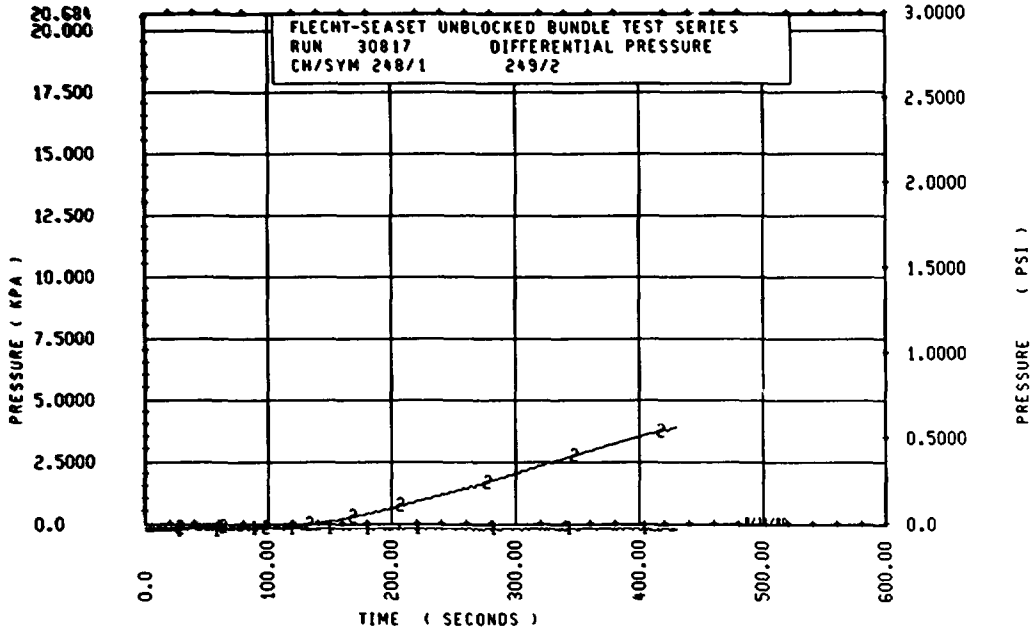


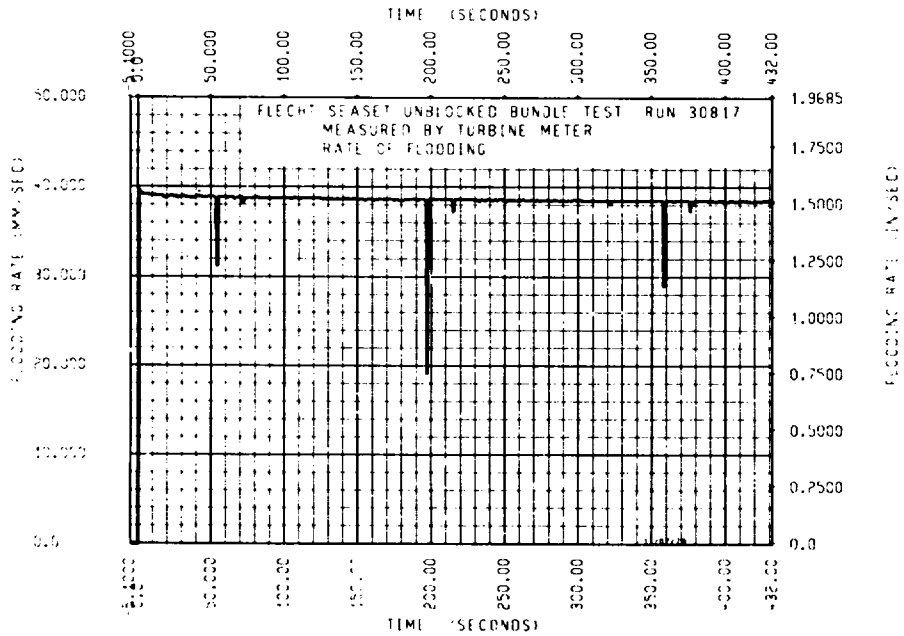
CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.);
CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.);
CH 207-4I, 3.05 m (120 in.)

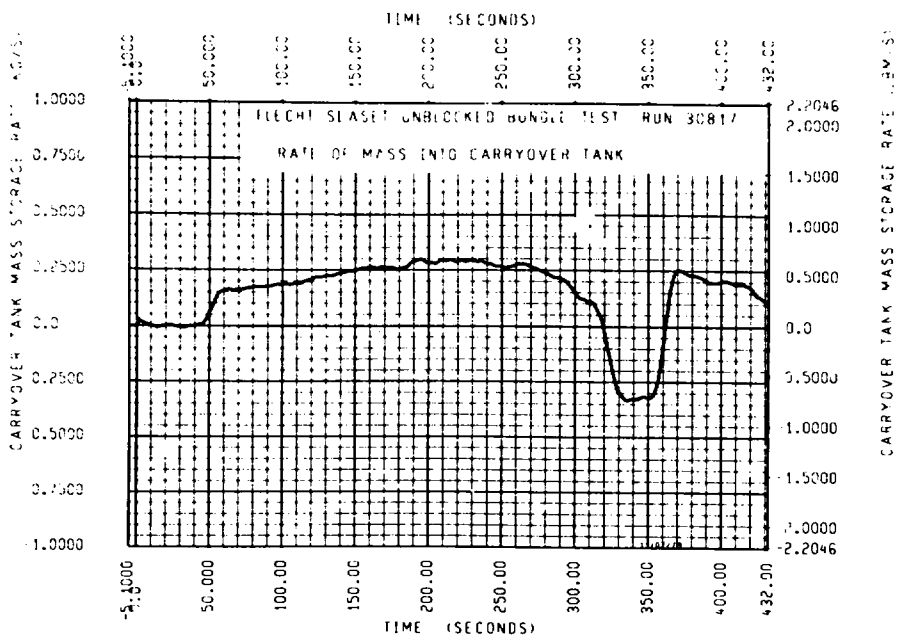

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

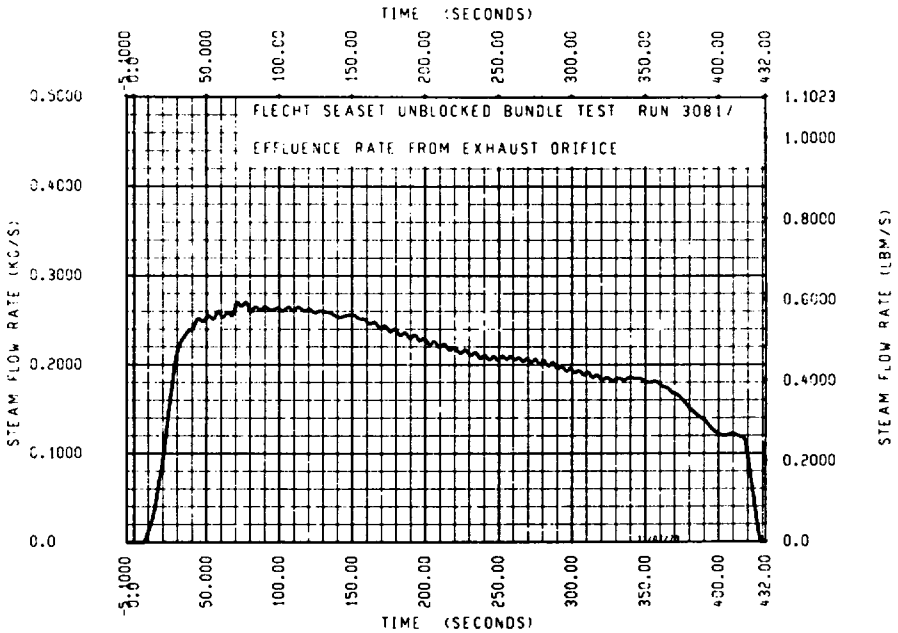

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

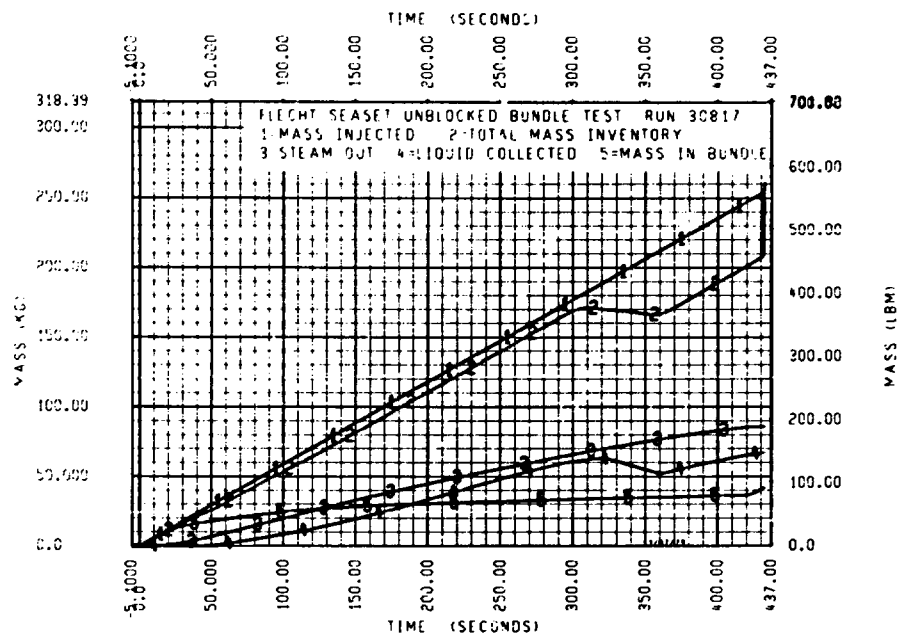

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

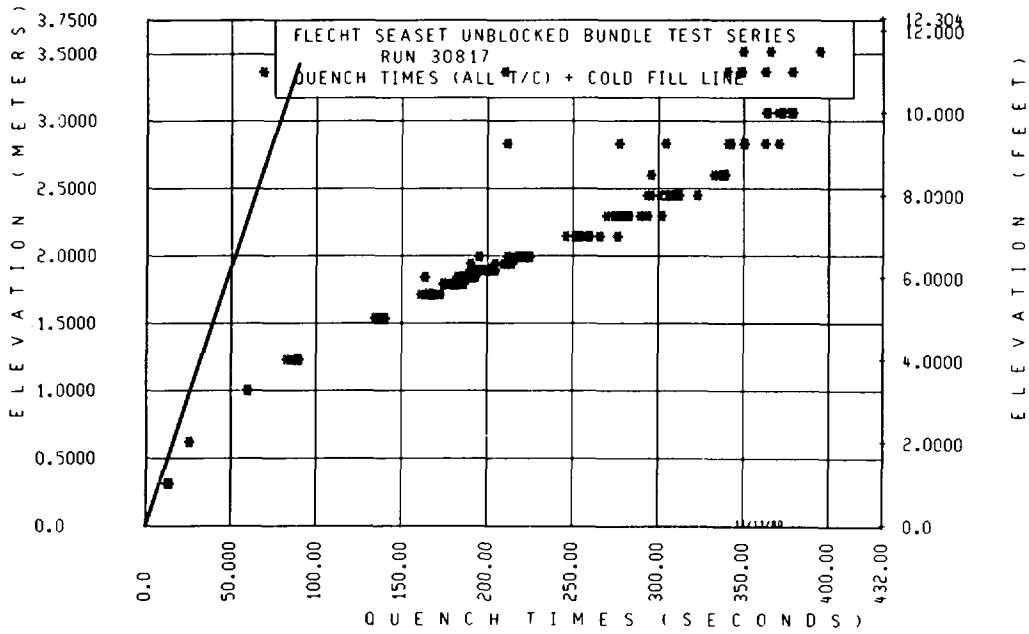

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

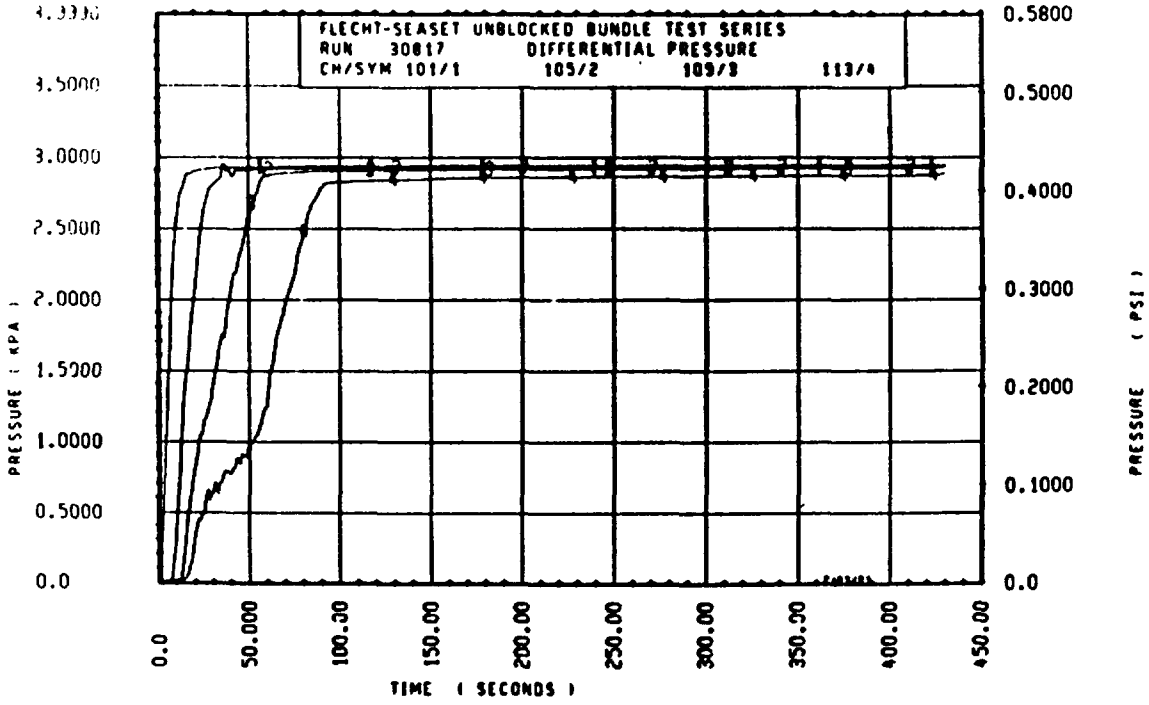

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30817
MEASURED BY TURBINE METER
RATE OF FLOODING
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
432.00

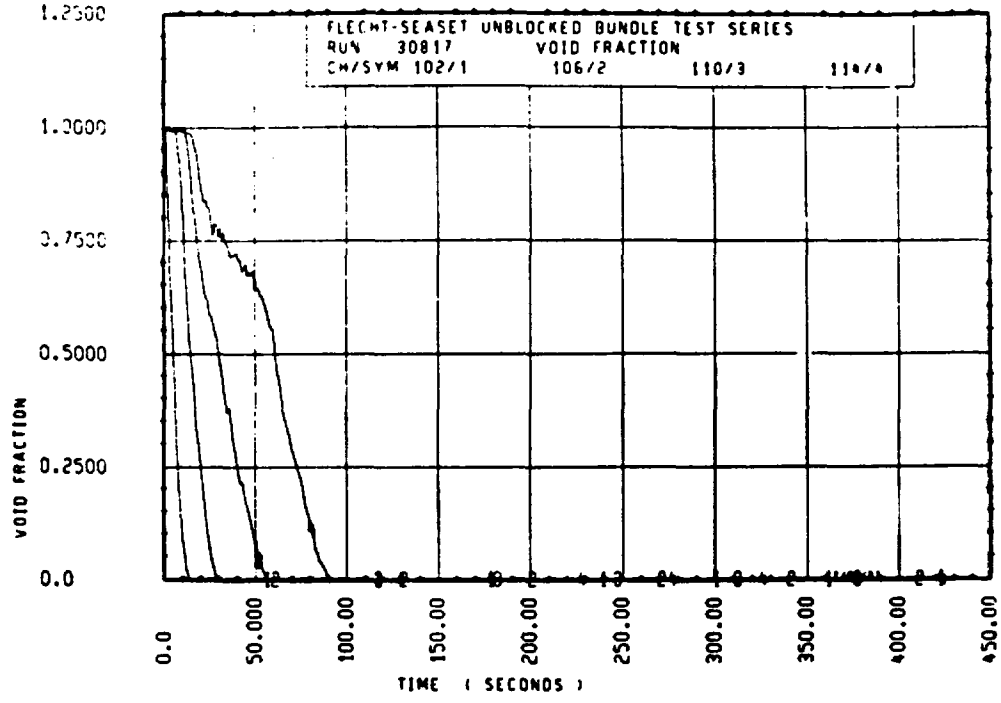

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30817
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE
2.2046
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
-2.2046
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
432.00

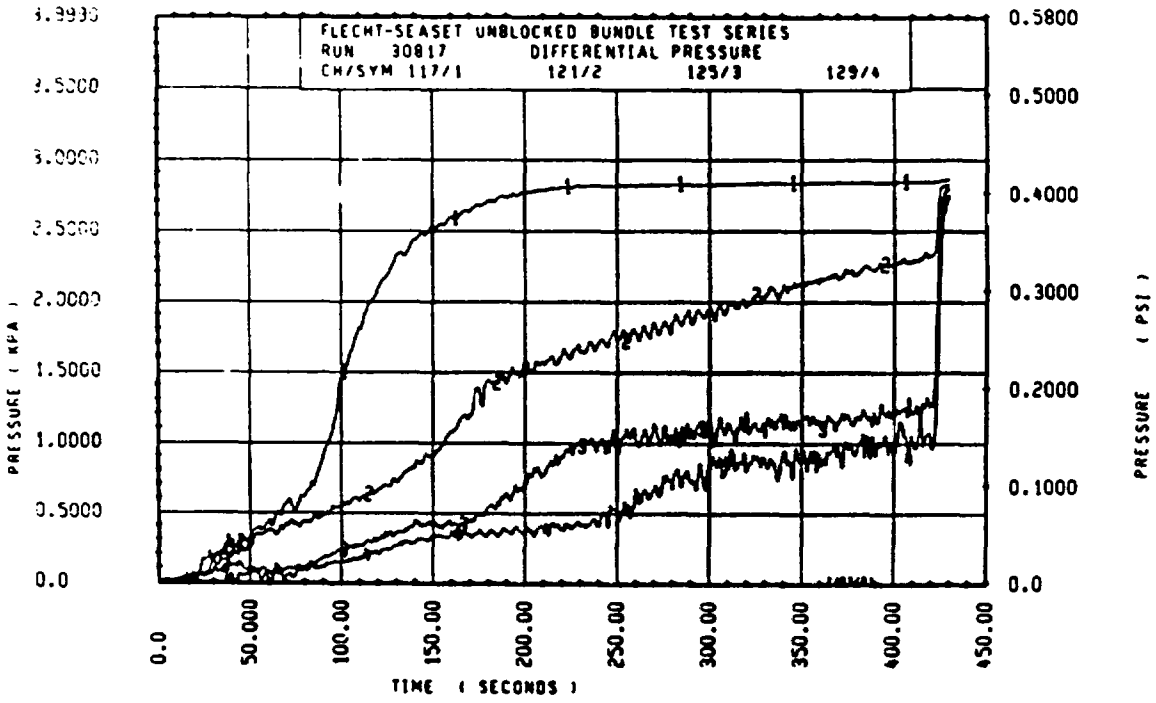

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30817
EFFLUENCE RATE FROM EXHAUST ORIFICE
TIME (SECONDS)
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.1000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
432.00

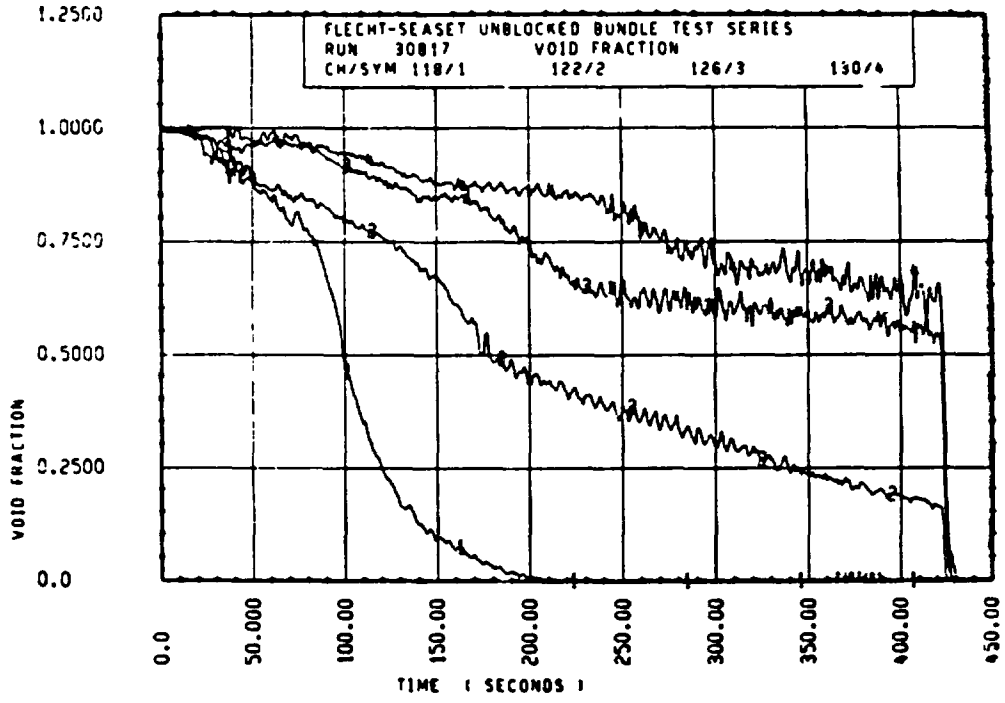

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30817
1-MASS INJECTED 2-TOTAL MASS INVENTORY
3 STEAM OUT 4-LIQUID COLLECTED 5=MASS IN BUNDLE
TIME (SECONDS)
MASS (KG)
MASS (LBM)
318.99
300.00
100.00
50.000
0.0
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-5.1000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
437.00

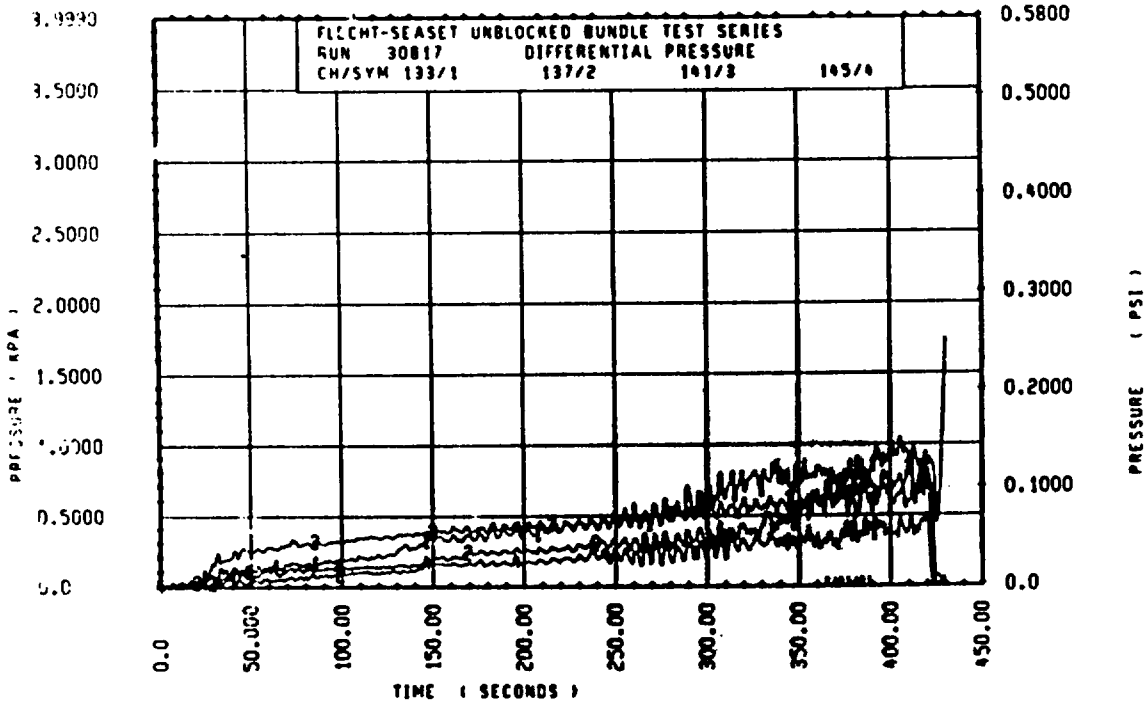

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
432.00
QUENCH TIMES (SECONDS)

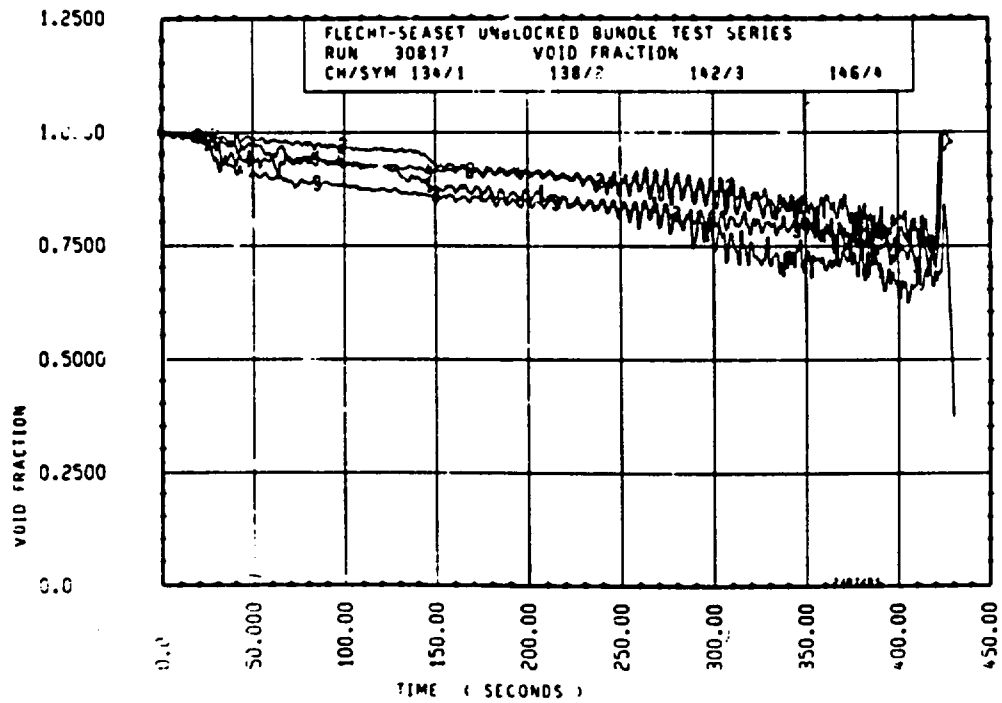

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
0.5000
1.0000
1.5000
2.0000
2.5000
3.0000
3.5000
0.1000
0.2000
0.3000
0.4000
0.5000
0.5800
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
0.0
0.2500
0.5000
0.7500
1.0000
1.2500
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30817 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 30921
Date: 3/13/79
Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	879°C (1614°F)
Rod peak power	1.3 kw/m (0.40 kw/ft)
Flow rate	38.9 mm/sec (1.53 in./sec)
Coolant temperature	52°C (126°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	133°C (272°F)	87°C (188°F)
1.22 m (48 in.)	147°C-155°C (296°F-311°F)	134°C (273°F)
1.83 m (72 in.)	225°C-243°C (437°F-469°F)	258°C-277°C (497°F-530°F)
2.44 m (96 in.)	201°C-208°C (393°F-407°F)	132°C-206°C (270°F-403°F)
2.74 m (108 in.)	133°C-141°C (271°F-286°F)	132°C (269°F)
3.05 m (120 in.)	132°C (270°F)	131°C (268°F)
3.35 m (132 in.)	132°C (269°F)	131°C (268°F)

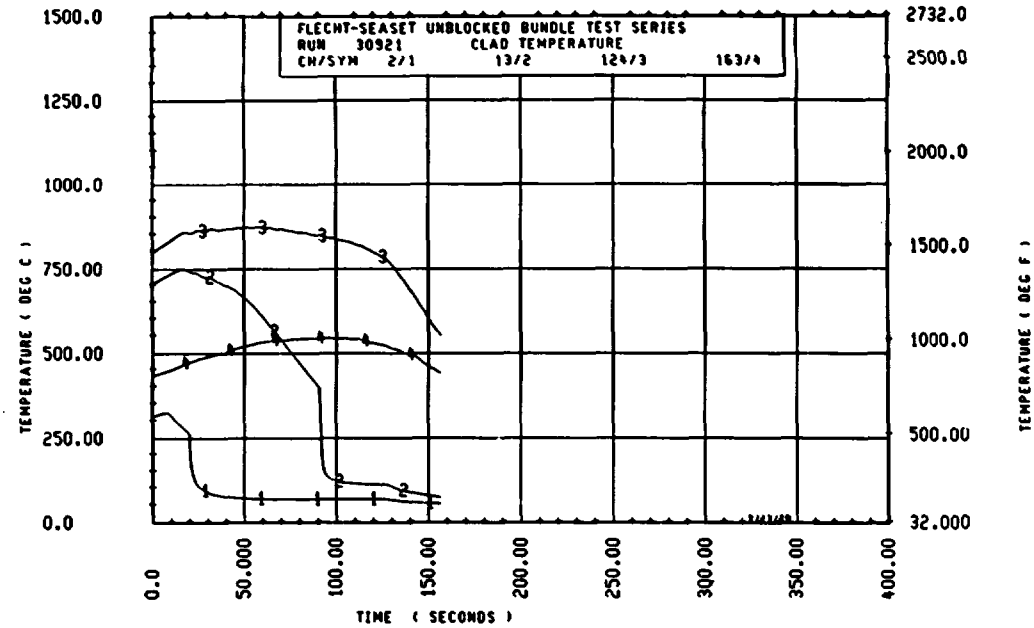
*At 55 seconds after flood

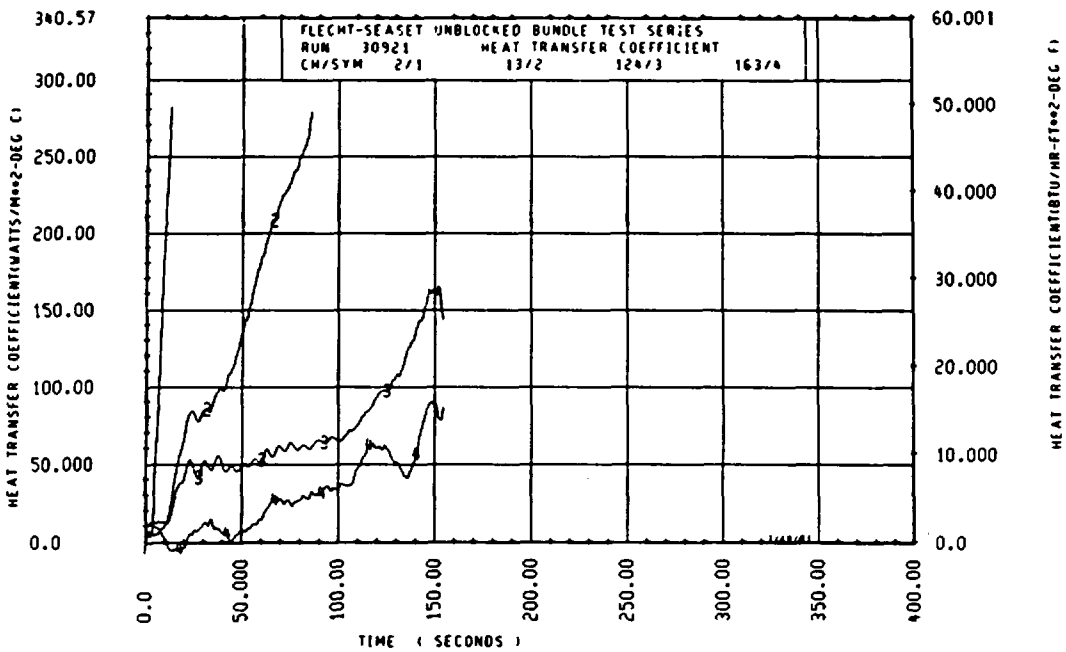
C. Comments

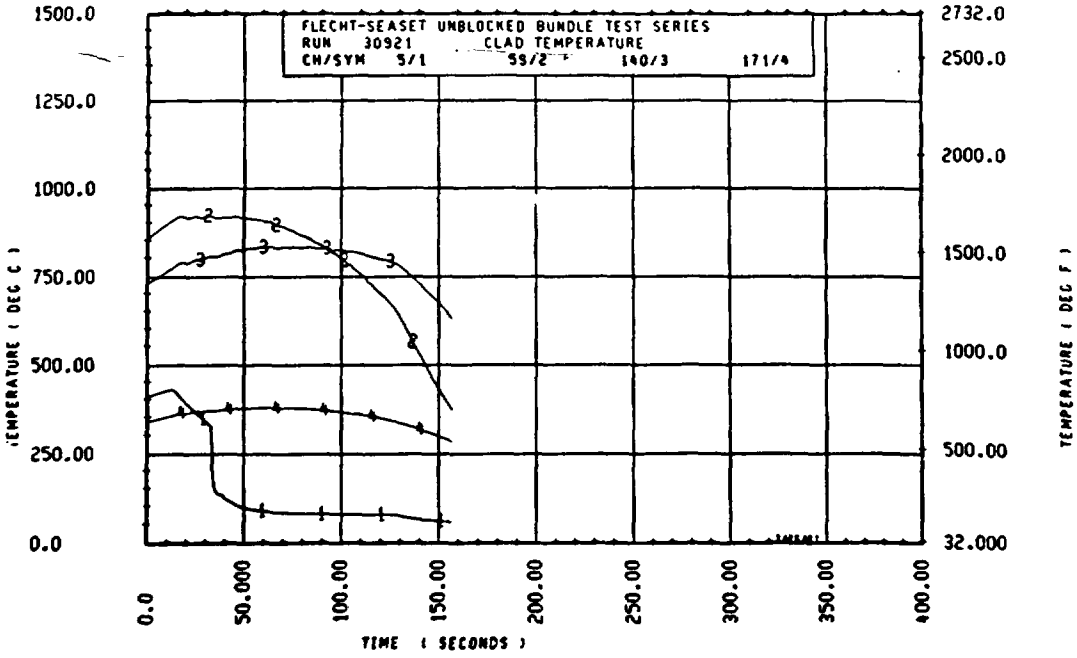
Test scrammed at 125 seconds after flood because of heater rod thermocouple failure.

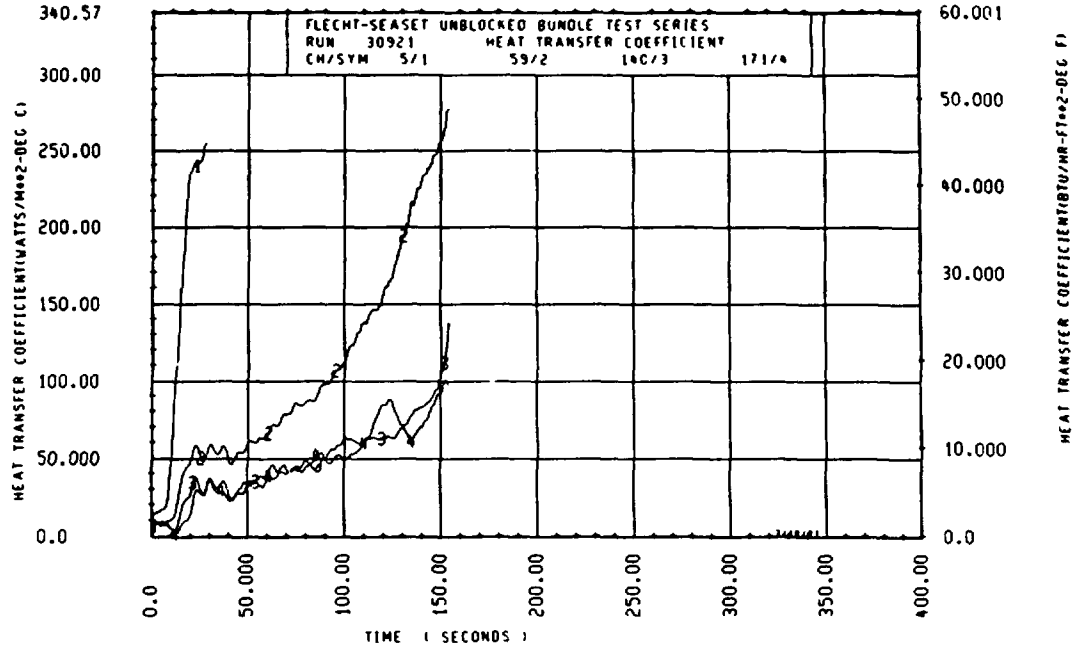
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 30921

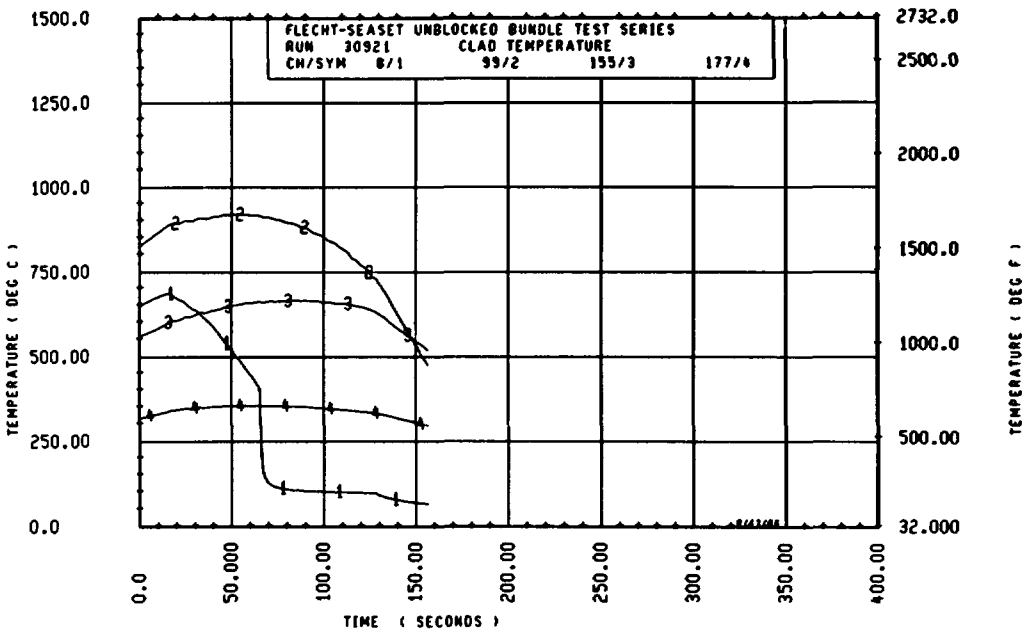
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1253.	1328.	75.	15.5	737.	88.8
2H 6- 0	50	1537.	1633.	96.	17.0	689.	155.5
3C 5- 0	17	1283.	1356.	73.	17.0	735.	126.0
3C 5- 7	28	1384.	1454.	70.	16.0	684.	139.5
4L 8- 0	129	1297.	1481.	184.	64.5	1068.	157.5
4L 8- 6	147	1297.	1478.	181.	64.0	1068.	157.5
5E11- 0	168	645.	718.	73.	89.5	618.	157.5
5J 4- 0	12	1248.	1327.	78.	16.0	732.	90.5
5J 8- 6	146	1114.	1270.	157.	64.0	948.	157.5
5J11- 6	175	582.	648.	66.	45.5	528.	157.5
7E 6- 0	57	1486.	1582.	96.	24.5	667.	144.5
7E 8- 6	142	1115.	1321.	206.	64.0	1034.	157.5
7E10- 0	162	807.	1061.	254.	114.0	953.	157.5
7E11- 6	176	632.	705.	73.	70.0	589.	157.5
7D 6- 4	84	1589.	1692.	102.	16.0	665.	157.5
7D 7- 6	119	1470.	1598.	128.	63.5	994.	157.5
7D 9- 3	151	1004.	1213.	209.	91.0	963.	157.5
7G 5- 0	23	1477.	1573.	96.	16.0	791.	129.4
7J 6- 0	59	1578.	1691.	113.	31.5	673.	157.5
7M 7- 6	120	1441.	1596.	155.	58.0	1018.	157.5
7M 8- 0	132	1287.	1520.	233.	83.5	1138.	157.5
7M 9- 3	152	994.	1233.	238.	115.0	1050.	157.5
8H 4- 0	13	1299.	1379.	80.	16.0	742.	91.3
8H10- 0	163	814.	1013.	199.	89.5	821.	157.5
8H11- 6	177	605.	672.	67.	57.0	561.	157.5
8K 4- 0	14	1270.	1353.	83.	16.0	734.	89.5
8K 6- 6	99	1519.	1688.	169.	51.0	869.	157.5
8K 8- 0	140	1351.	1533.	182.	63.5	1153.	157.5
8K10- 0	164	821.	1086.	265.	106.5	939.	157.5
8N 2- 0	5	774.	809.	35.	12.5	619.	33.4
8N 4- 0	15	1269.	1349.	80.	16.0	742.	87.6
8N 6- 0	61	1544.	1656.	112.	33.0	692.	154.6
8N10- 0	165	815.	1120.	306.	122.0	1009.	157.5
9C 7- 0	109	1473.	1571.	98.	17.0	824.	157.5
9C 9- 3	153	1007.	1214.	207.	90.5	978.	157.5
9G 1- 0	2	600.	618.	18.	8.0	500.	20.0
9G 3- 3	8	1202.	1265.	63.	15.0	758.	65.5
9G11- 0	171	648.	718.	70.	61.5	543.	157.5
9I 5- 0	24	1491.	1590.	98.	17.0	786.	129.5
9I 5-10	46	1629.	1740.	110.	16.5	669.	152.0
10D 6- 6	93	1486.	1616.	130.	56.5	873.	157.5
11E 7- 6	124	1469.	1603.	134.	57.0	1011.	157.5
11E 9- 3	155	1039.	1231.	191.	83.5	955.	157.5
11E11- 0	172	663.	741.	78.	69.5	592.	157.5
12D 4- 0	16	1272.	1349.	76.	16.0	740.	89.5
12D 6- 0	66	1554.	1658.	104.	24.0	677.	156.5
12F 6- 6	102	1526.	1637.	111.	31.5	684.	154.5

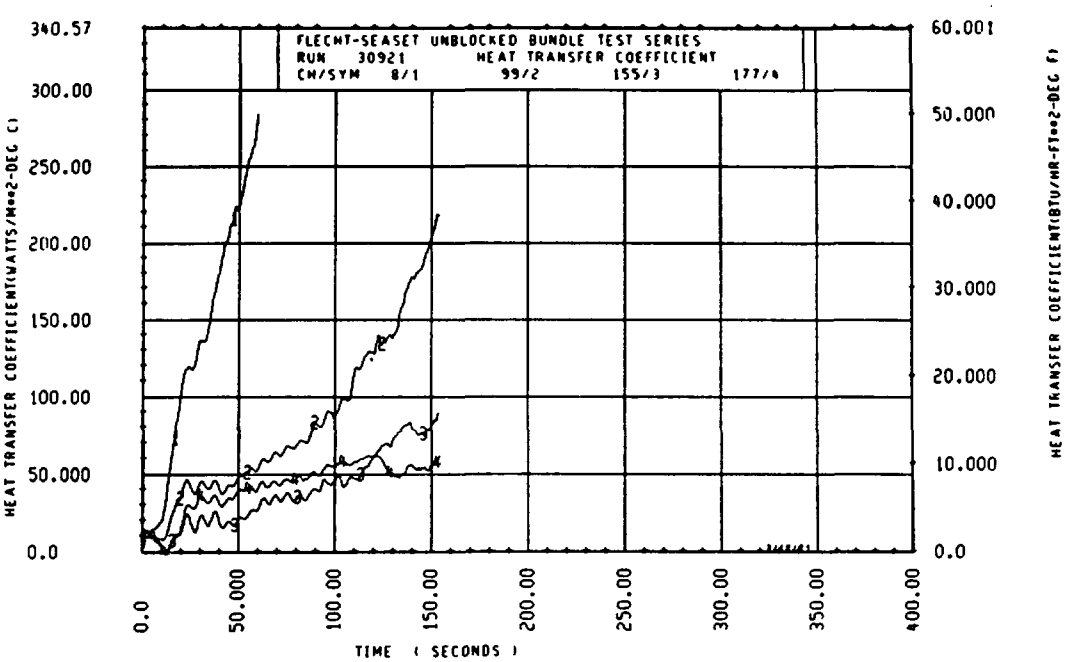

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

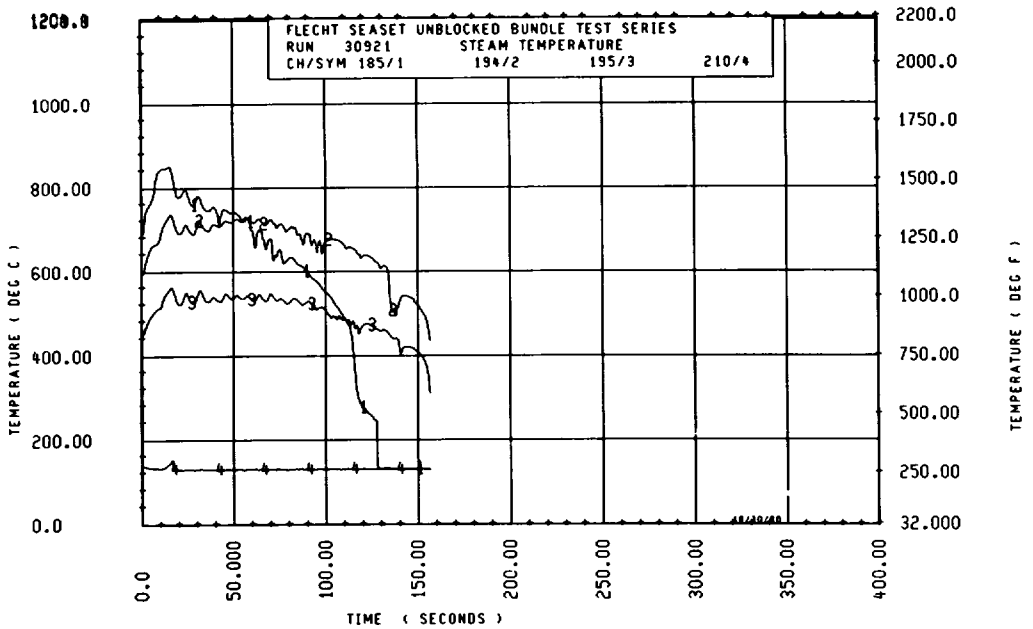

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
60.001
50.000
40.000
30.000
20.000
10.000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

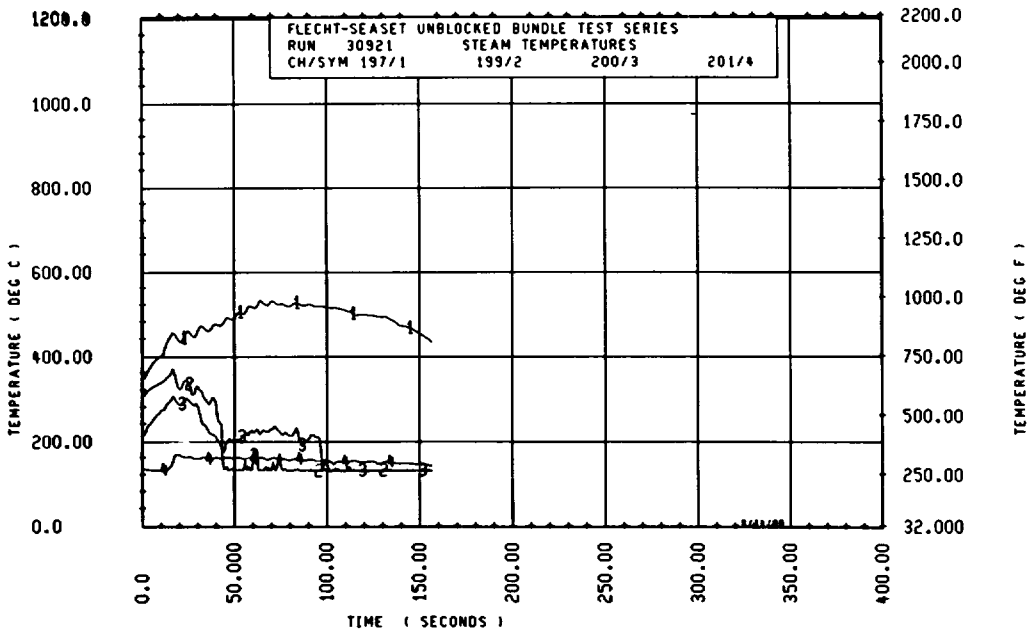

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

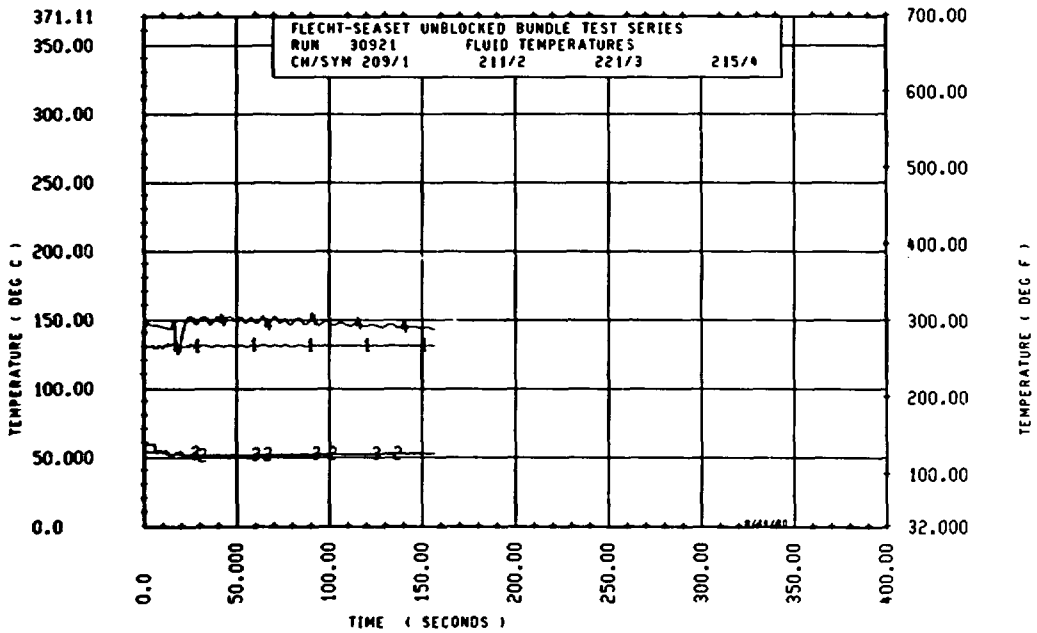

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
60.001
50.000
40.000
30.000
20.000
10.000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

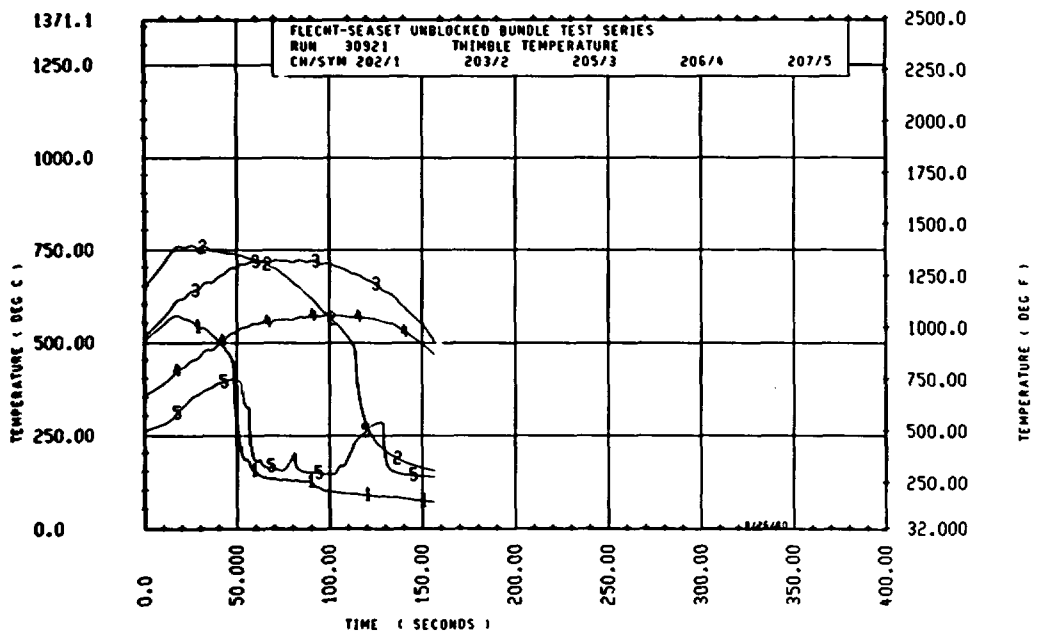

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT(WATTS/M**2-DEG C)
HEAT TRANSFER COEFFICIENT(BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
60.001
50.000
40.000
30.000
20.000
10.000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

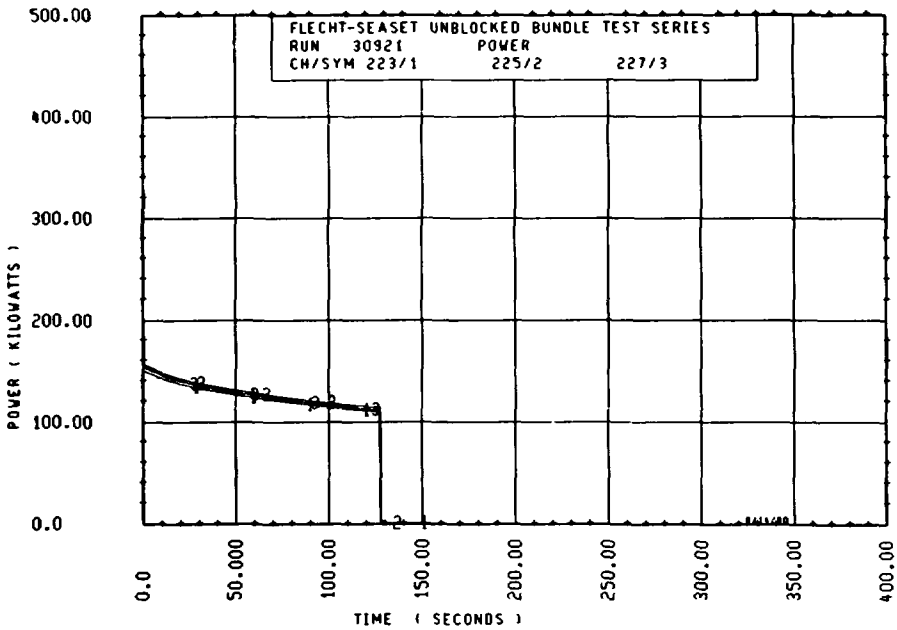

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

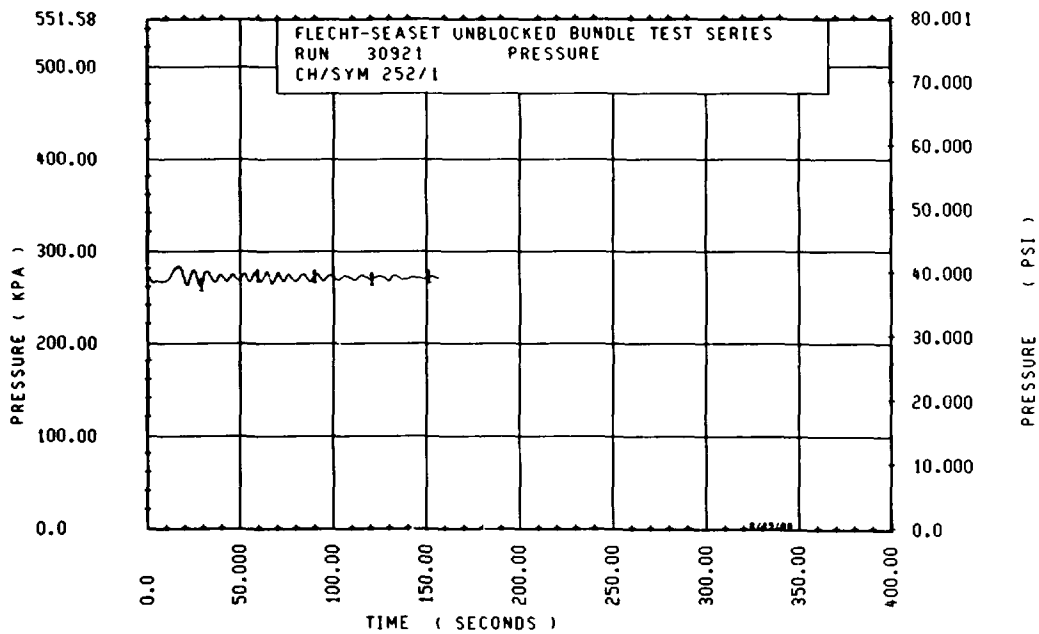

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

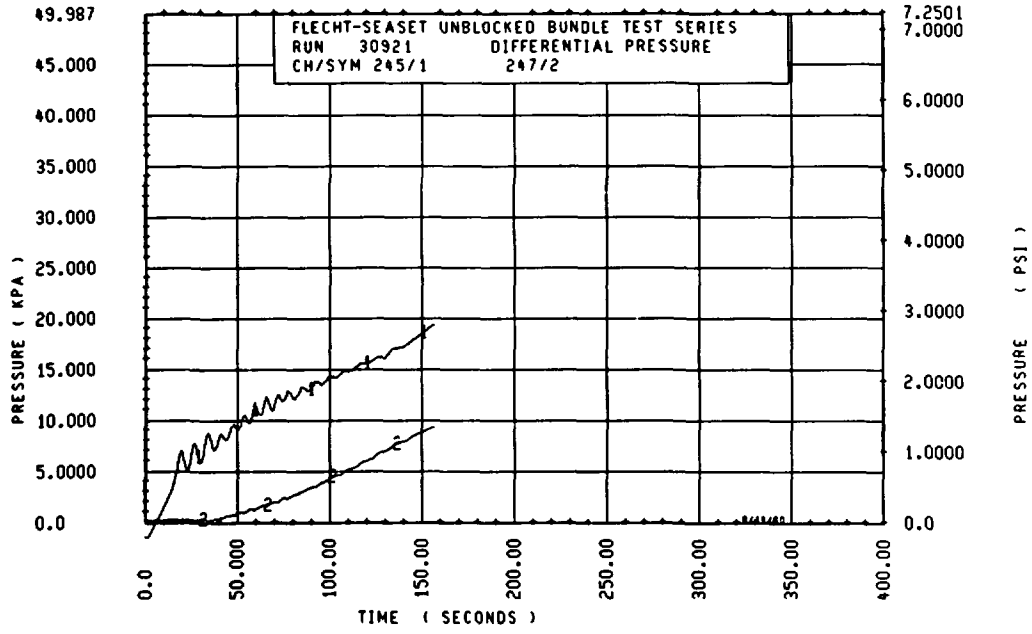


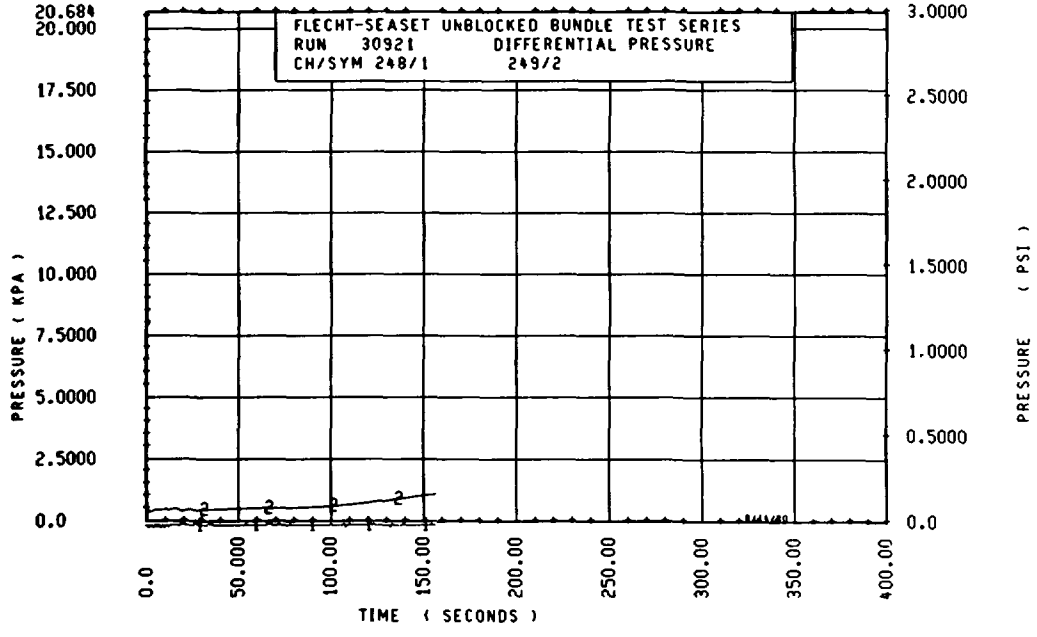


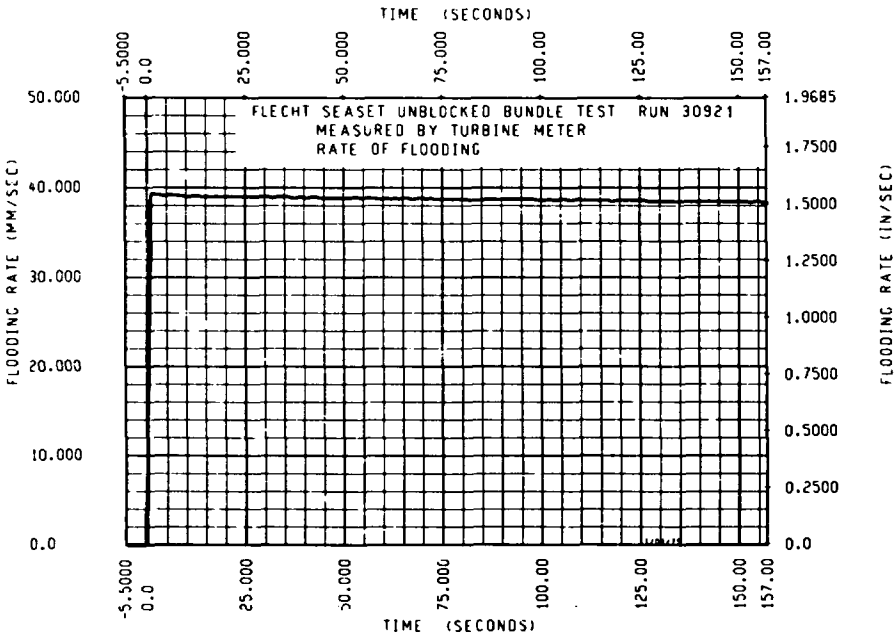
CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.);
CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.);
CH 207-4I, 3.05 m (120 in.)

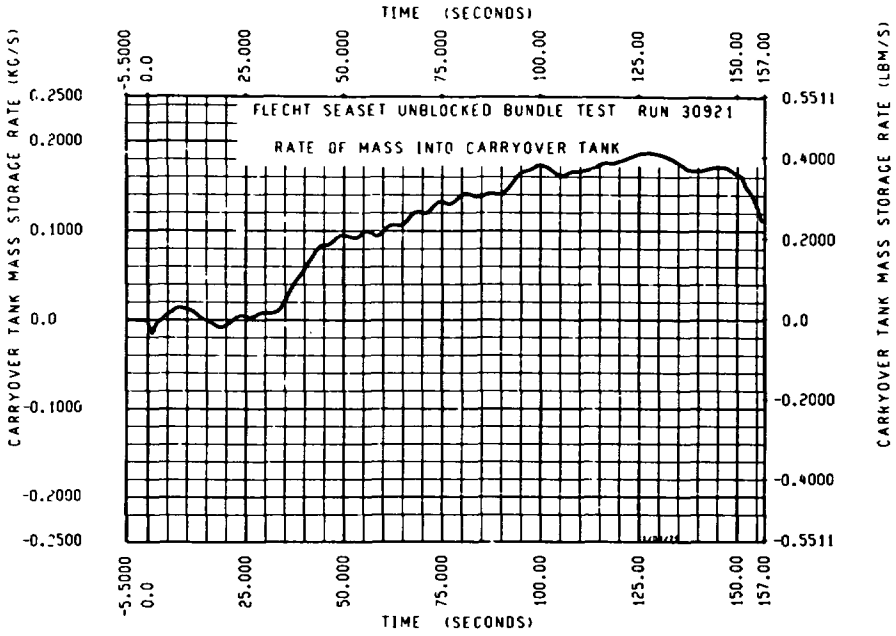

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

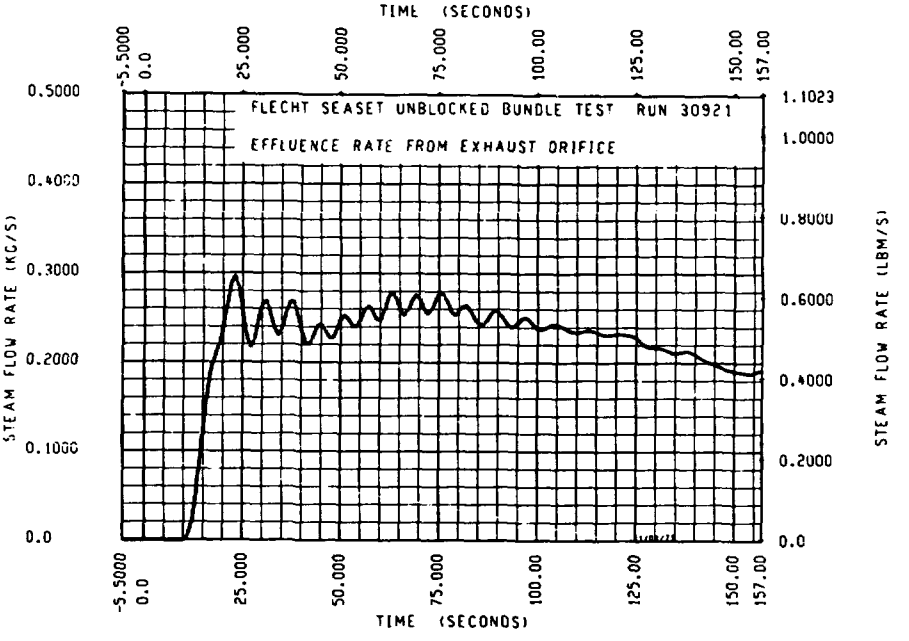

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

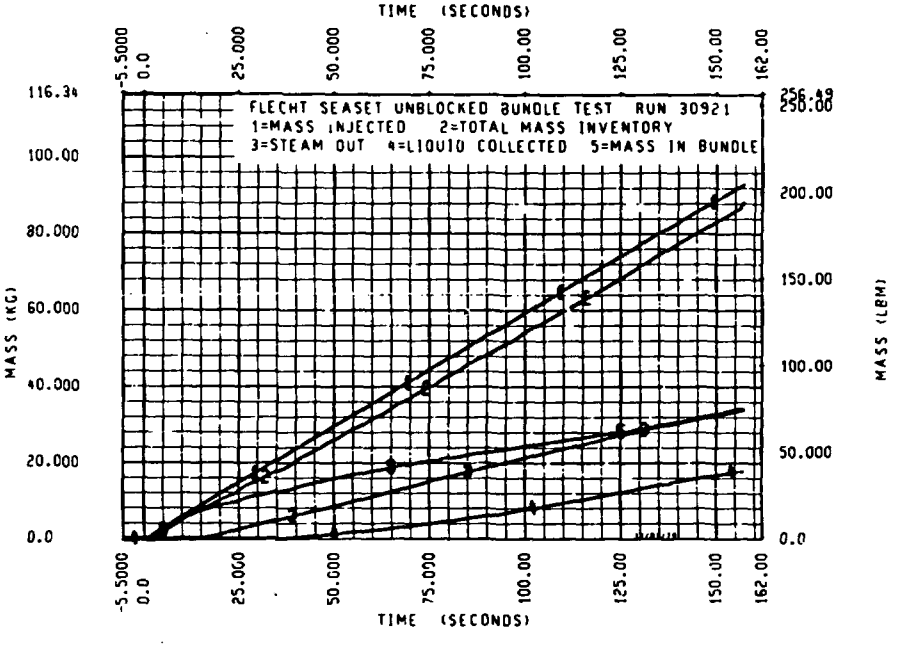

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

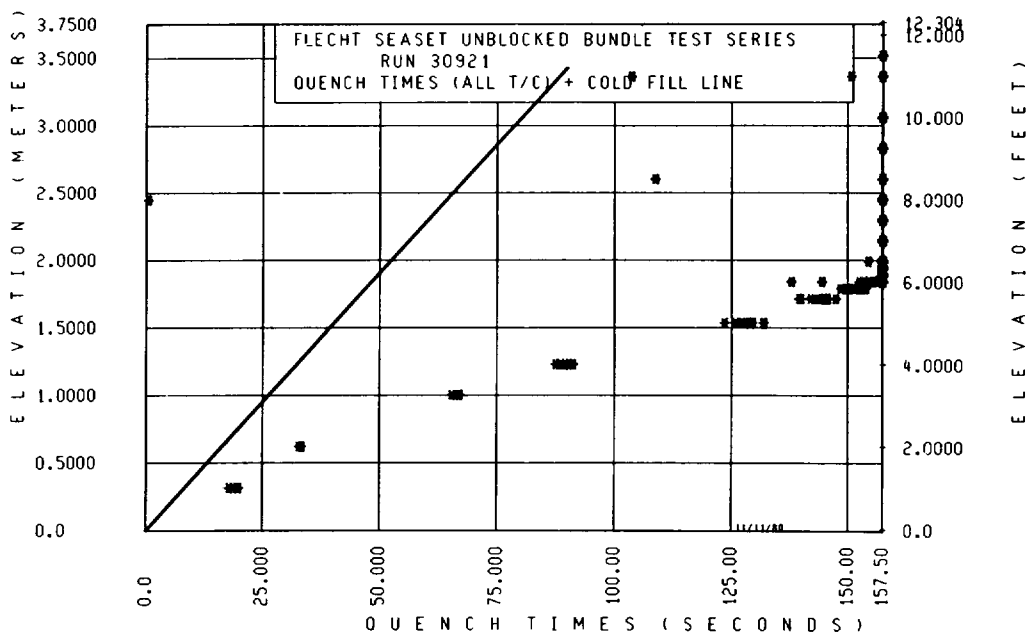

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

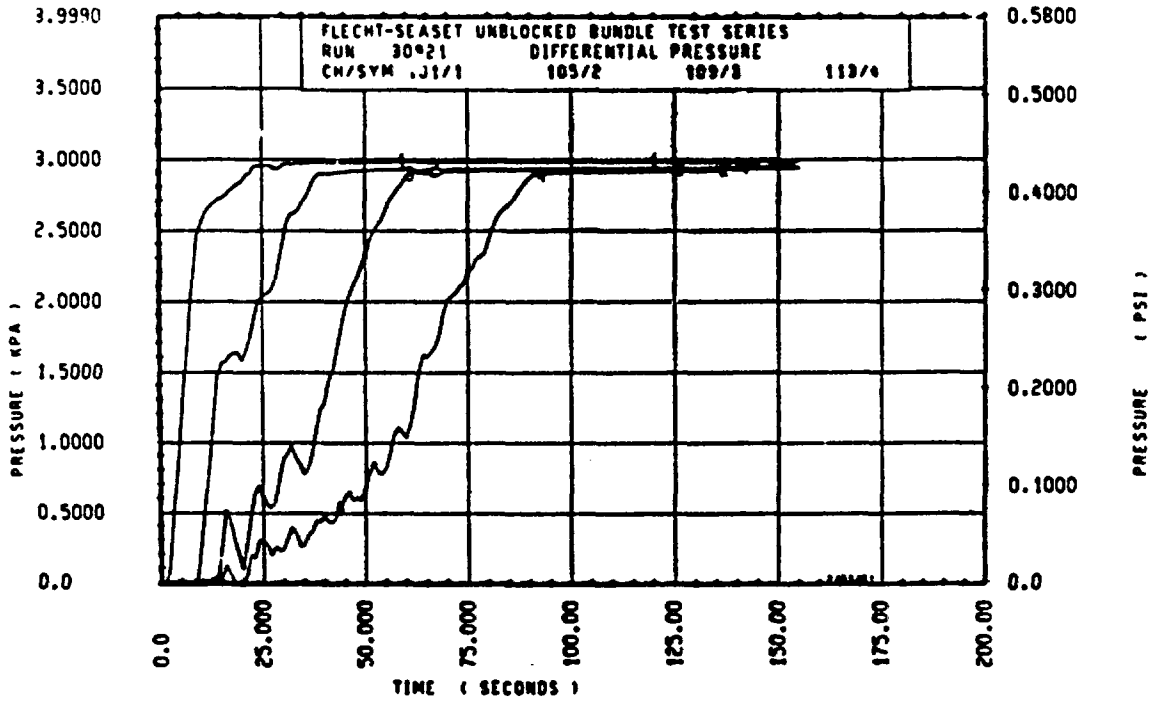

TIME (SECONDS)
-5.5000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
157.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30921
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
FLOODING RATE (IN/SEC)
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0

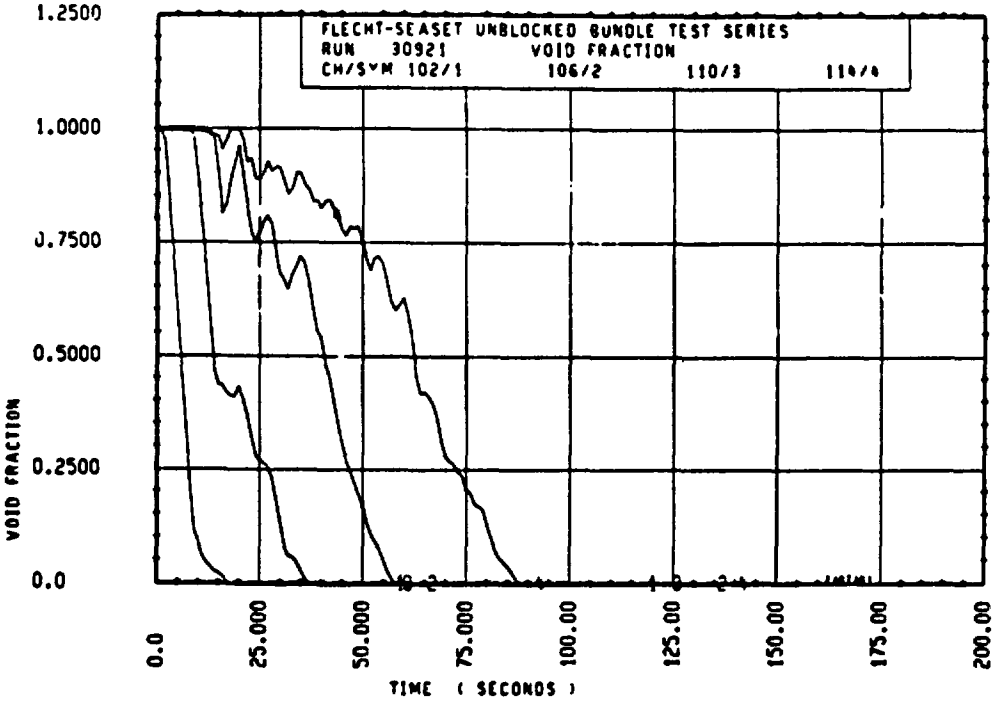

TIME (SECONDS)
-5.5000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
157.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30921
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
0.2500
0.2000
0.1000
0.0
-0.1000
-0.2000
-0.2500
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.5511
0.4000
0.2000
0.0
-0.2000
-0.4000
-0.5511

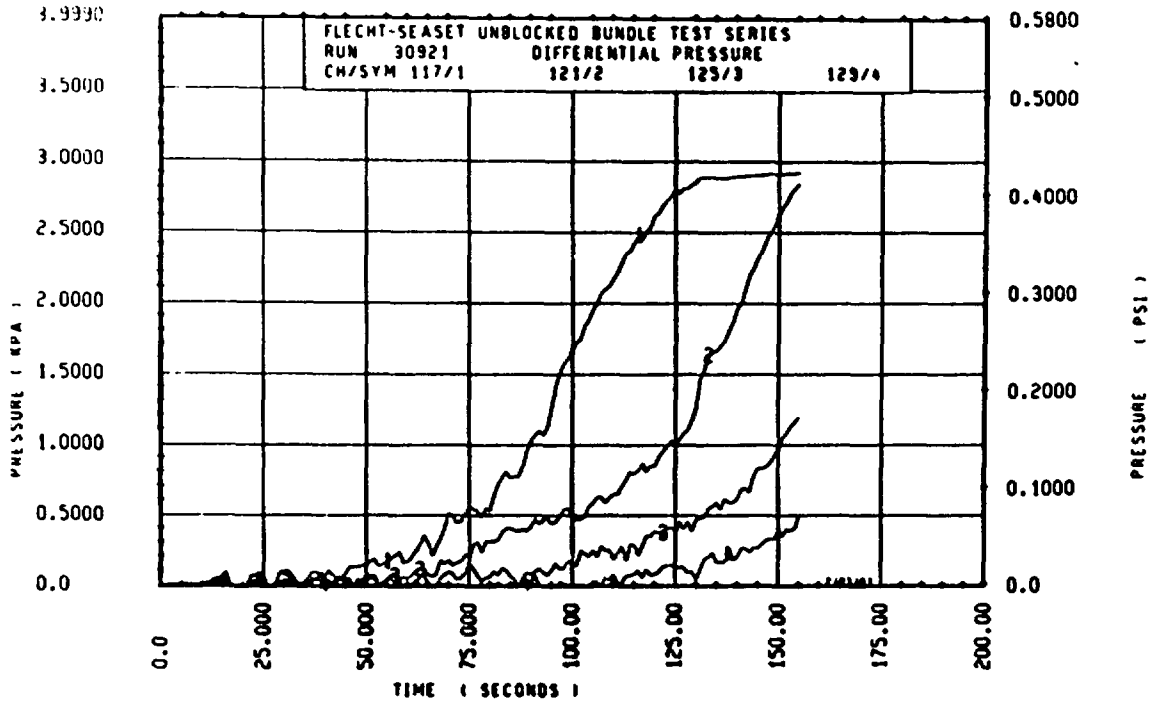

TIME (SECONDS)
-5.5000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
157.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30921
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
STEAM FLOW RATE (LBM/S)
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0

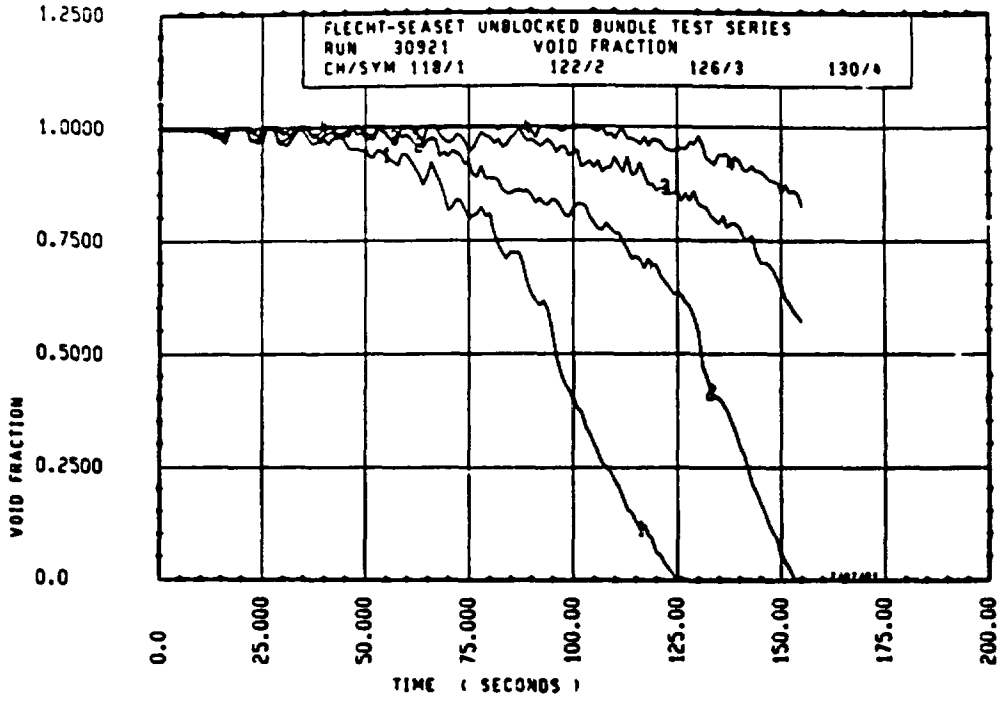

TIME (SECONDS)
-5.5000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
162.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 30921
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
116.34
100.00
80.000
60.000
40.000
20.000
0.0
MASS (LBM)
256.49
250.00
200.00
150.00
100.00
50.000
0.0

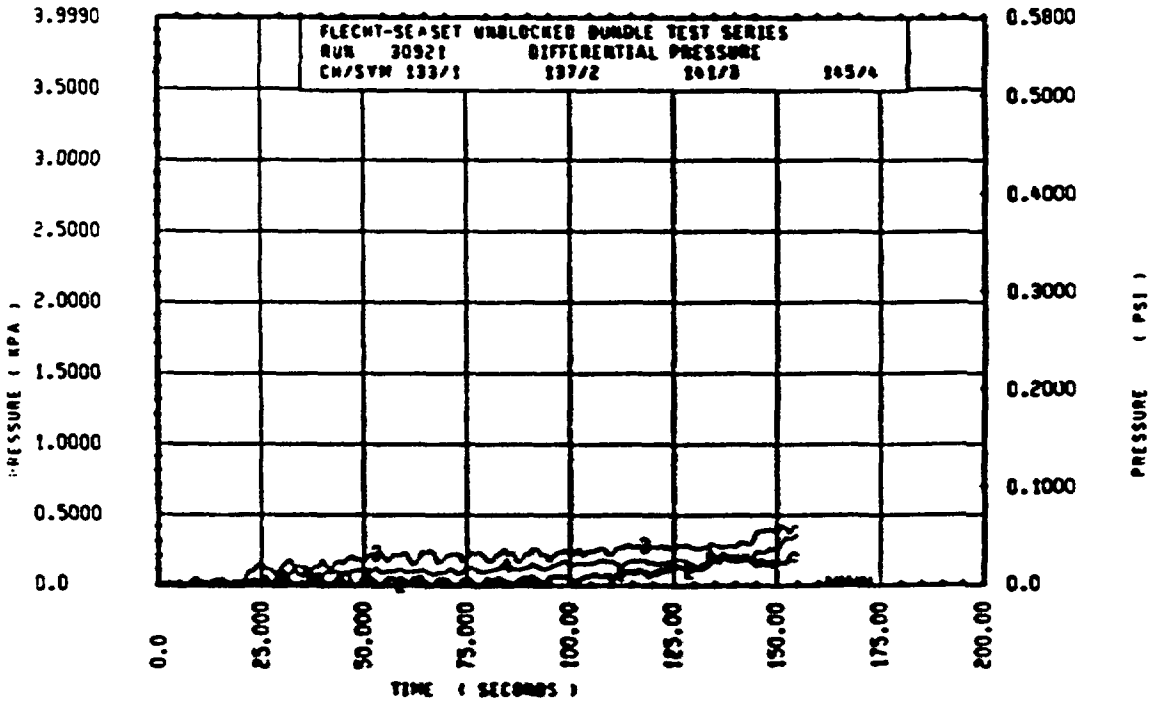

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
157.50
QUENCH TIMES (SECONDS)

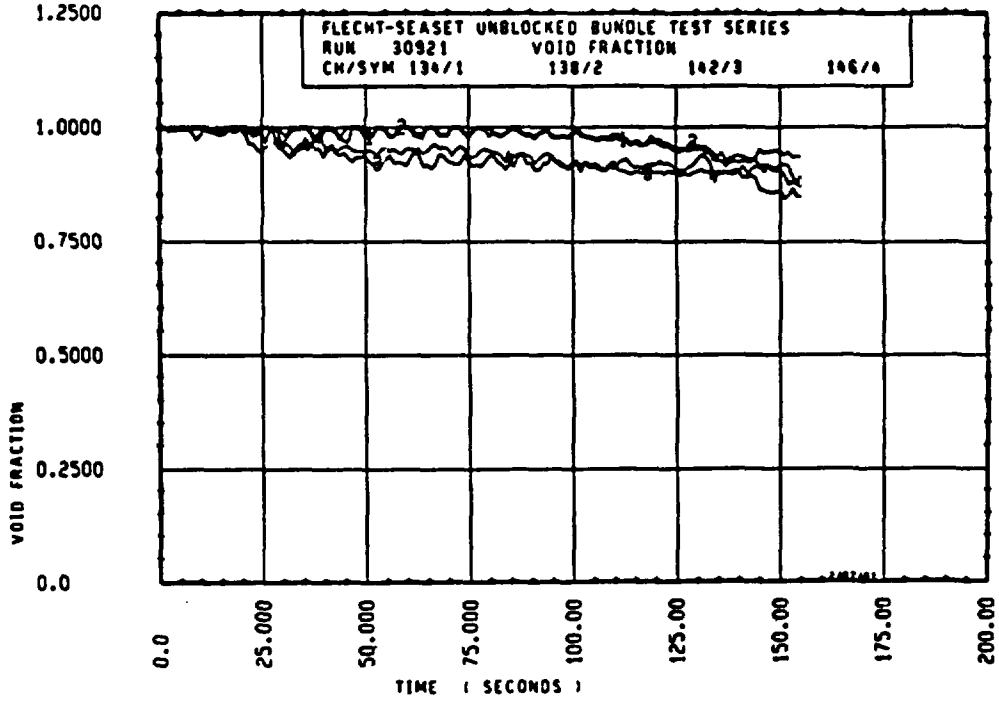

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 30921 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 31021

Date: 3/14/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	879°C (1615°F)
Rod peak power	1.3 kw/m (0.40 kw/ft)
Flow rate	38.6 mm/sec (1.52 in./sec)
Coolant temperature	52°C (126°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	127°C (261°F)	84°C (183°F)
1.22 m (48 in.)	171°C (339°F)	134°C (273°F)
1.83 m (72 in.)	187°C-204°C (369°F-400°F)	141°C-269°C (285°F-516°F)
2.44 m (96 in.)	173°C-187°C (344°F-368°F)	132°C-267°C (270°F-513°F)
2.74 m (108 in.)	162°C (323°F)	132°C (269°F)
3.05 m (120 in.)	141°C-146°C (285°F-295°F)	131°C (268°F)
3.35 m (132 in.)	134°C-139°C (274°F-283°F)	131°C (268°F)

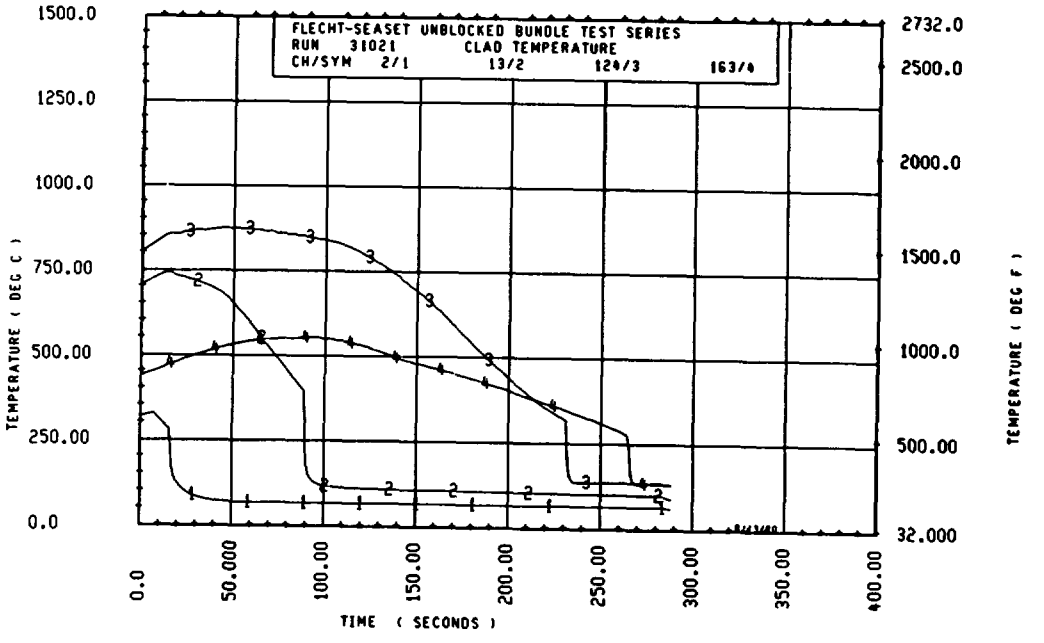
*At 73 seconds after flood

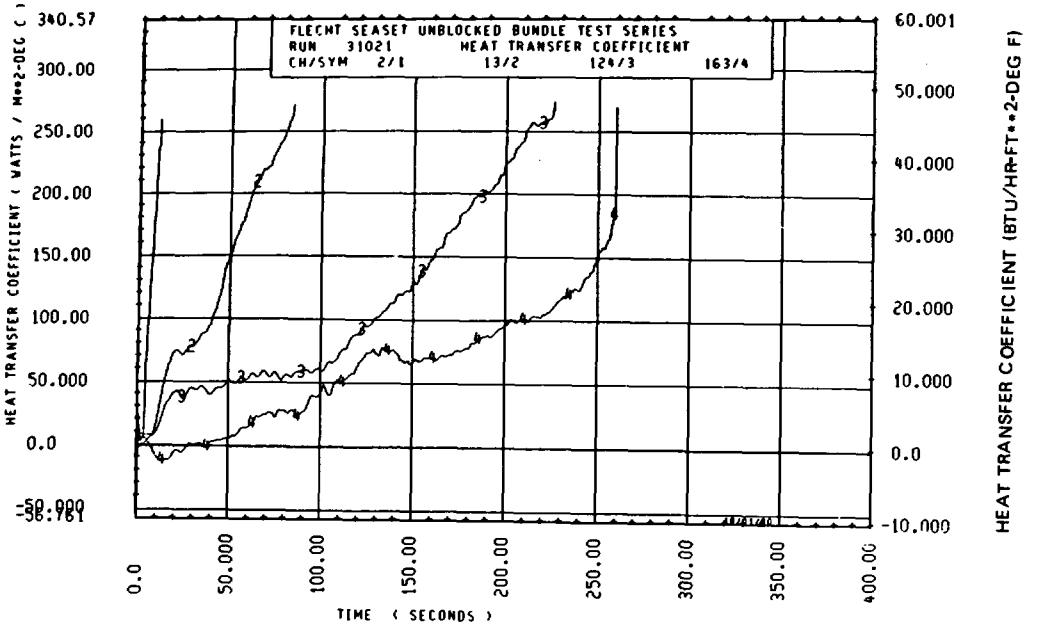
C. Comments

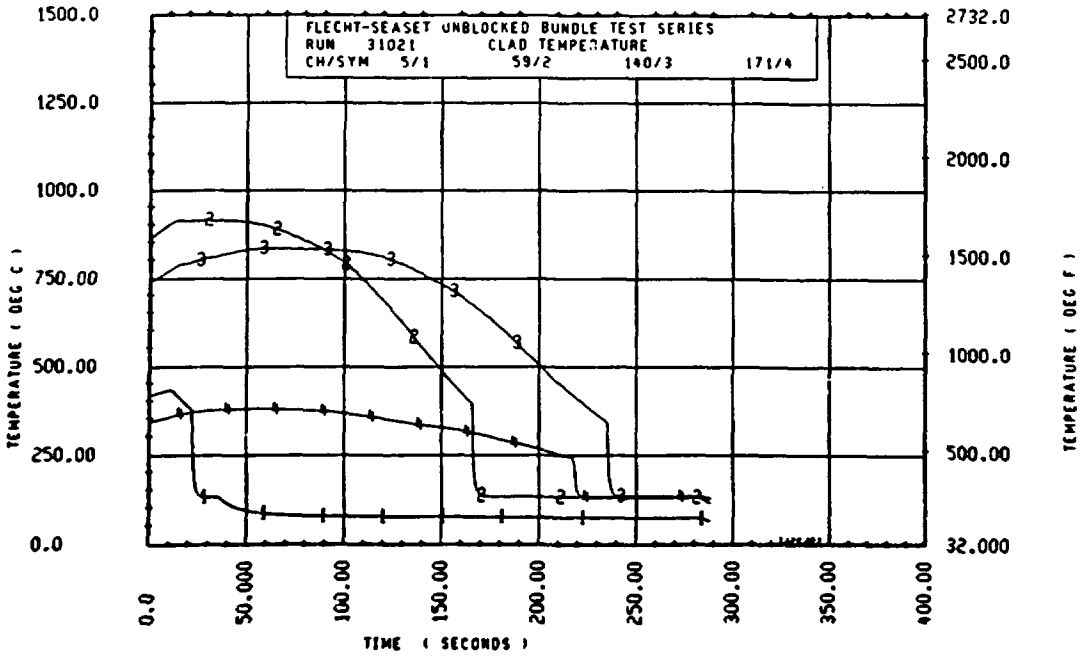
None

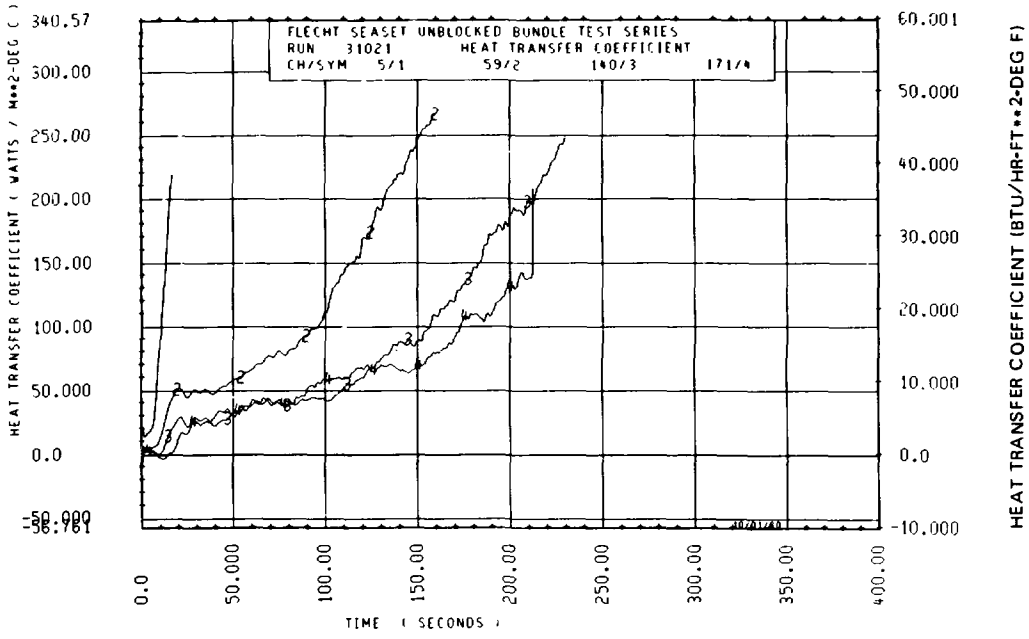
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 31021

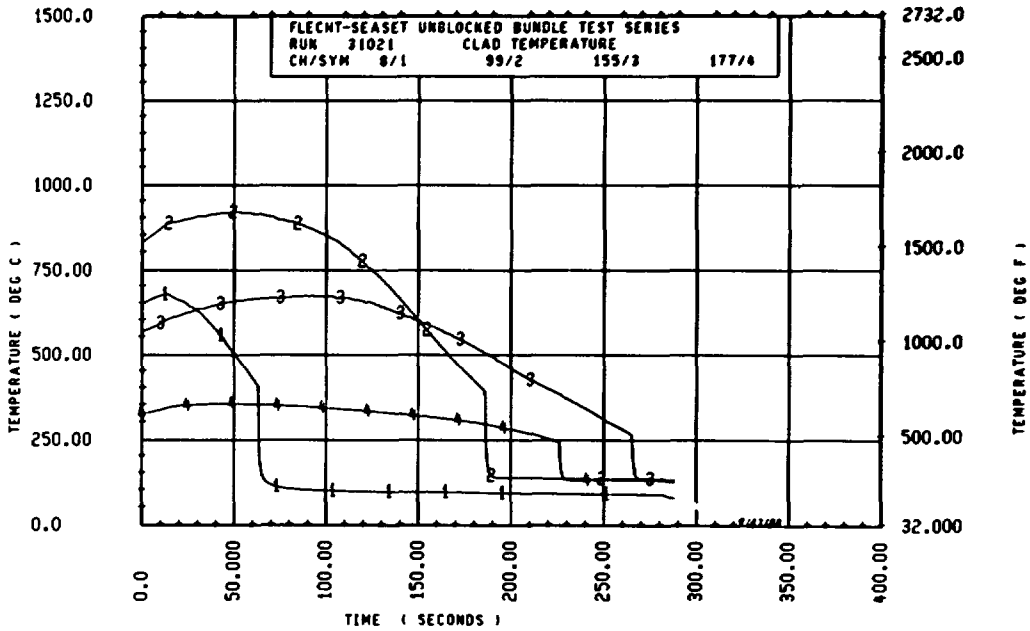
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1259.	1322.	63.	14.0	737.	86.4
2H 6- 0	50	1533.	1613.	80.	15.5	737.	162.8
3C 5- 0	17	1290.	1351.	61.	14.5	731.	124.5
3C 5- 7	28	1387.	1443.	56.	12.5	719.	141.5
4L 8- 0	129	1310.	1502.	192.	70.0	694.	226.0
4L 8- 6	147	1311.	1502.	191.	70.0	694.	226.6
5E11- 0	168	655.	722.	67.	72.5	475.	235.0
5J 4- 0	12	1251.	1316.	65.	14.0	729.	88.5
5J 8- 6	146	1116.	1277.	160.	51.5	646.	249.0
5J11- 6	175	603.	664.	61.	43.5	522.	198.3
7E 6- 0	57	1492.	1578.	85.	29.5	711.	148.0
7E 8- 6	142	1119.	1325.	205.	70.0	654.	248.6
7E10- 0	162	817.	1081.	264.	118.0	539.	269.0
7E11- 6	176	638.	707.	69.	70.0	488.	239.0
7D 6- 4	84	1593.	1687.	94.	29.5	726.	167.0
7D 7- 6	119	1474.	1596.	122.	58.5	688.	210.0
7D 9- 3	151	1012.	1225.	213.	82.0	539.	252.0
7G 5- 0	23	1481.	1561.	80.	14.5	789.	127.9
7J 6- 0	59	1589.	1684.	95.	29.0	743.	165.7
7M 7- 6	120	1453.	1607.	154.	57.5	663.	216.0
7M 8- 0	132	1303.	1551.	248.	88.0	680.	230.3
7M 9- 3	152	1007.	1269.	263.	106.5	554.	254.1
8M 4- 0	13	1303.	1368.	65.	13.0	738.	89.0
8M10- 0	163	825.	1027.	203.	91.5	523.	264.7
8M11- 6	177	619.	674.	55.	43.5	470.	226.0
8K 4- 0	14	1275.	1342.	67.	14.5	731.	87.6
8K 6- 6	99	1528.	1688.	159.	51.0	735.	185.9
8K 8- 0	140	1365.	1538.	173.	58.5	648.	235.0
8K10- 0	164	831.	1104.	273.	106.5	521.	267.0
8N 2- 0	5	785.	814.	29.	11.0	710.	22.0
8N 4- 0	15	1276.	1340.	65.	14.0	741.	85.3
8N 6- 0	61	1553.	1664.	110.	43.5	756.	161.3
8N10- 0	165	825.	1155.	330.	119.5	586.	266.0
9C 7- 0	109	1476.	1566.	89.	29.5	628.	207.0
9C 9- 3	153	1020.	1234.	214.	93.0	573.	257.0
9G 1- 0	2	607.	623.	15.	6.5	535.	16.0
9G 3- 3	8	1203.	1254.	50.	12.5	765.	63.0
9G11- 0	171	653.	720.	68.	55.0	467.	217.8
9J 5- 0	24	1496.	1578.	82.	15.5	787.	128.4
9J 5-10	46	1635.	1726.	91.	14.0	731.	158.0
10D 6- 6	93	1491.	1618.	127.	46.0	739.	183.4
11E 7- 6	124	1480.	1607.	126.	45.0	600.	231.0
11E 9- 3	155	1054.	1245.	191.	92.5	506.	265.0
11E11- 0	172	667.	747.	80.	50.0	476.	230.0
12D 4- 0	16	1278.	1339.	62.	13.0	735.	87.3
12D 6- 0	66	1563.	1654.	91.	29.5	751.	163.7
13G 6- 6	102	1532.	1634.	102.	28.5	738.	160.4

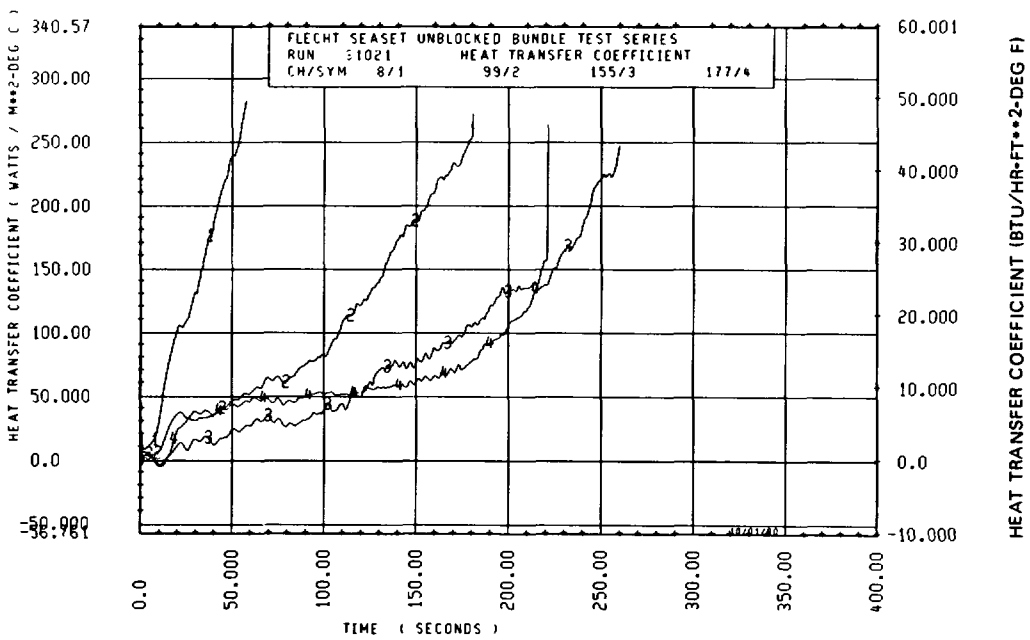

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

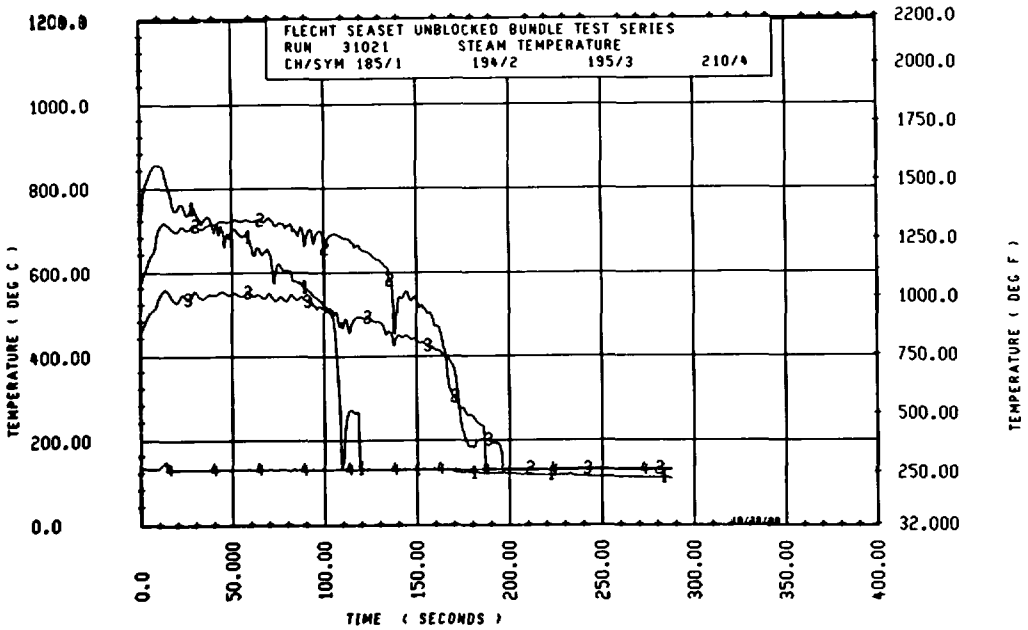

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

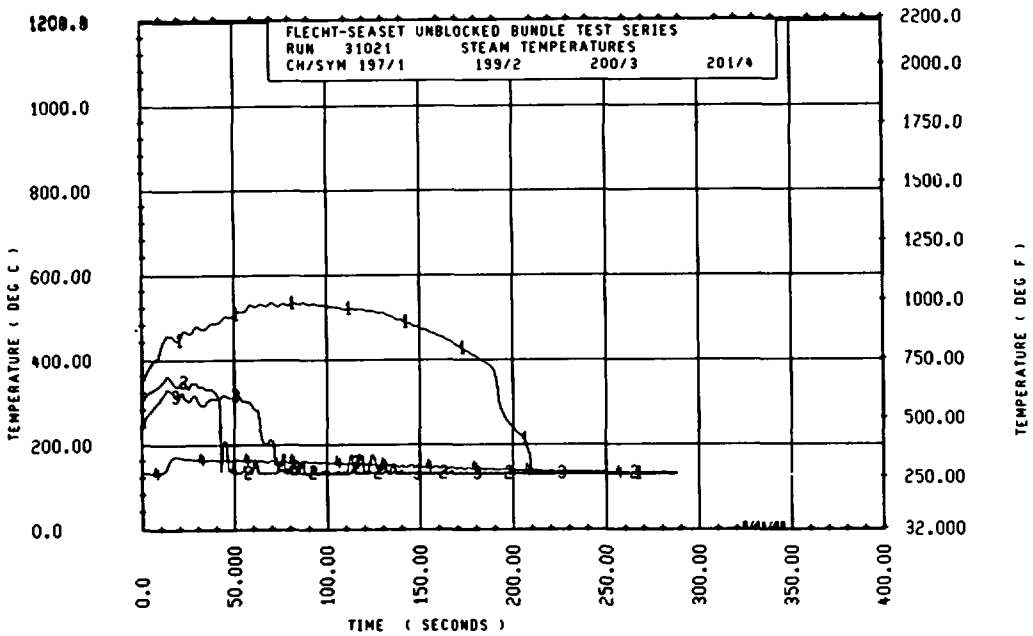

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

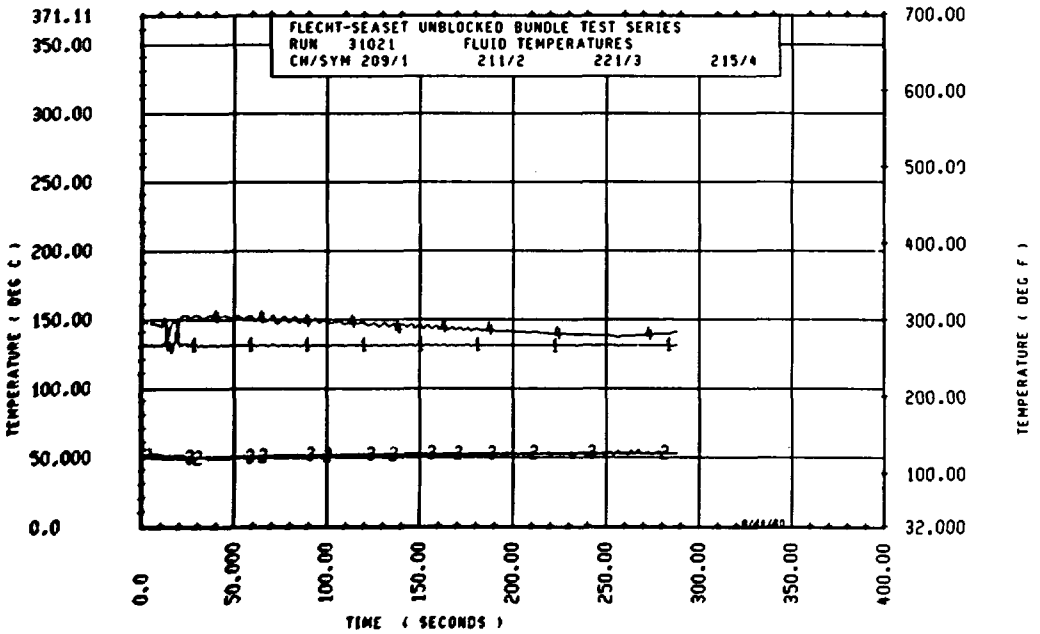

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

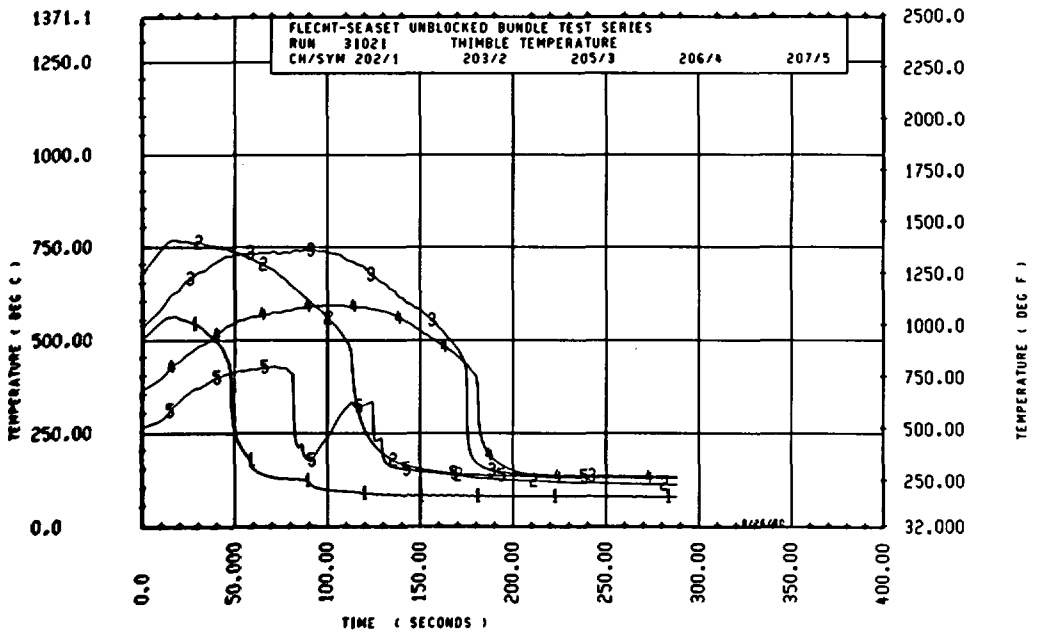

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

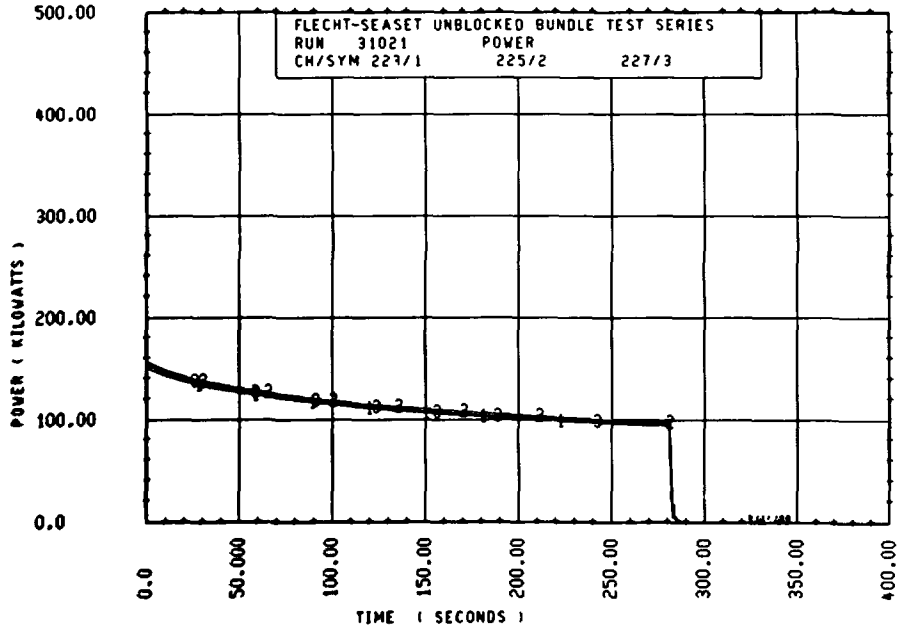

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

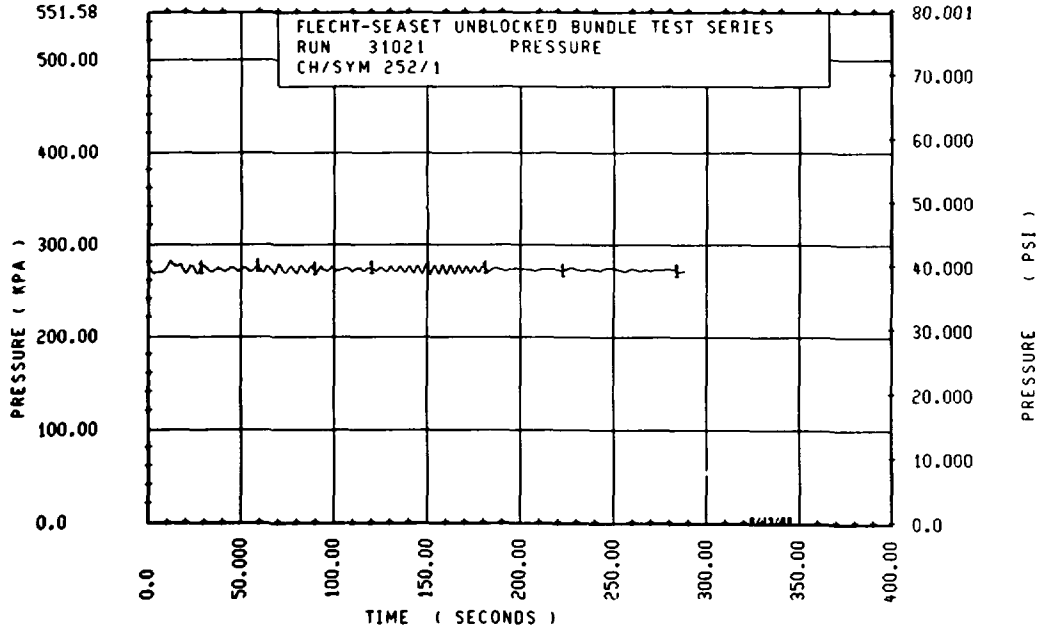

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

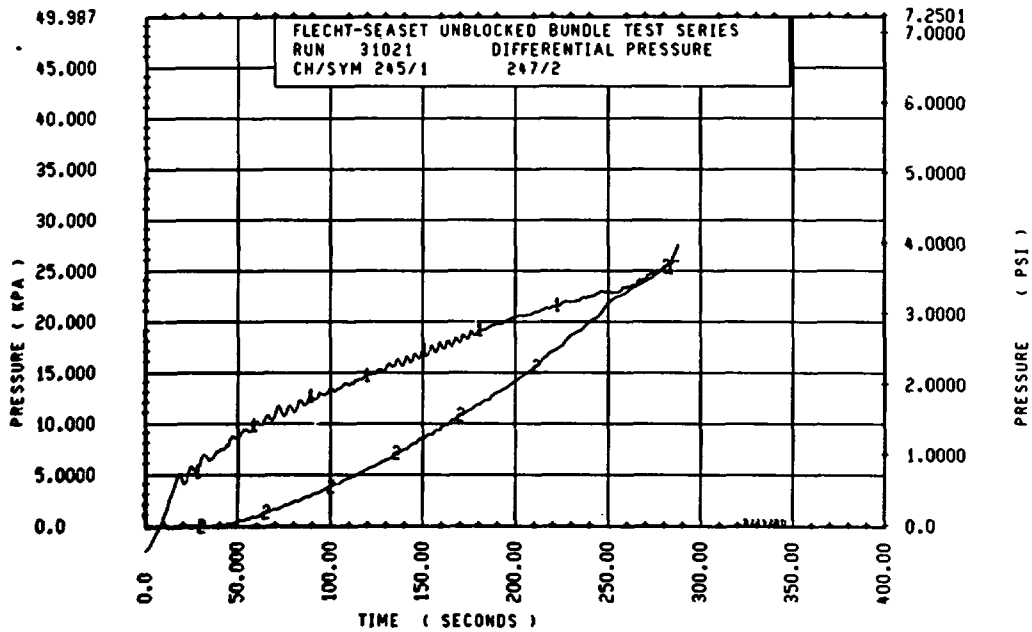


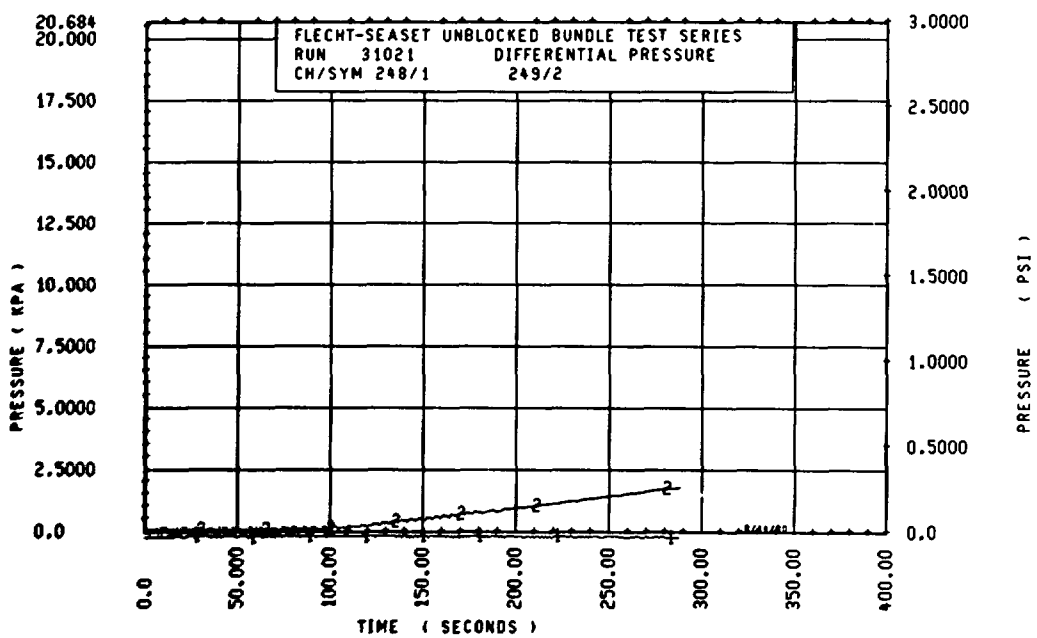


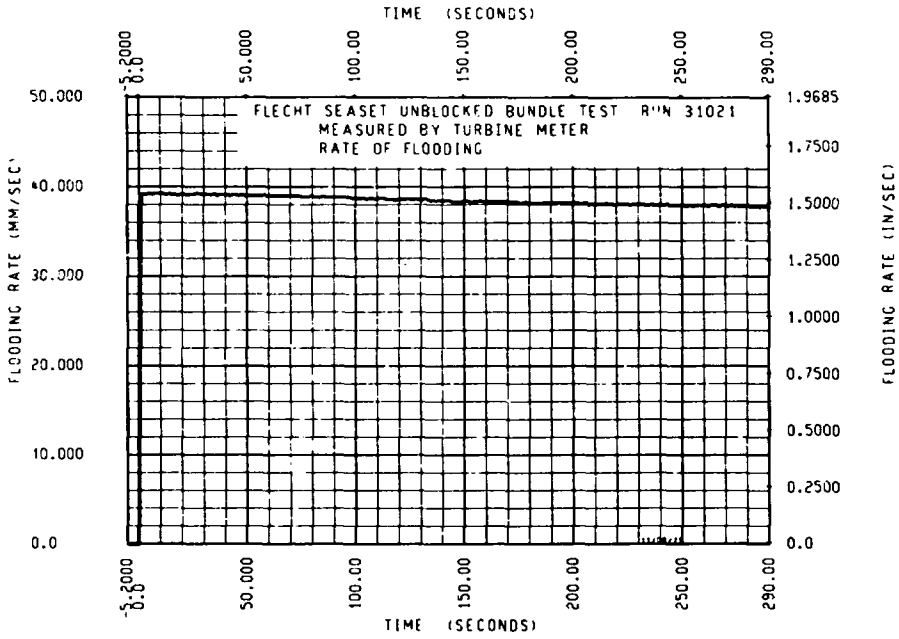
CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.); CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

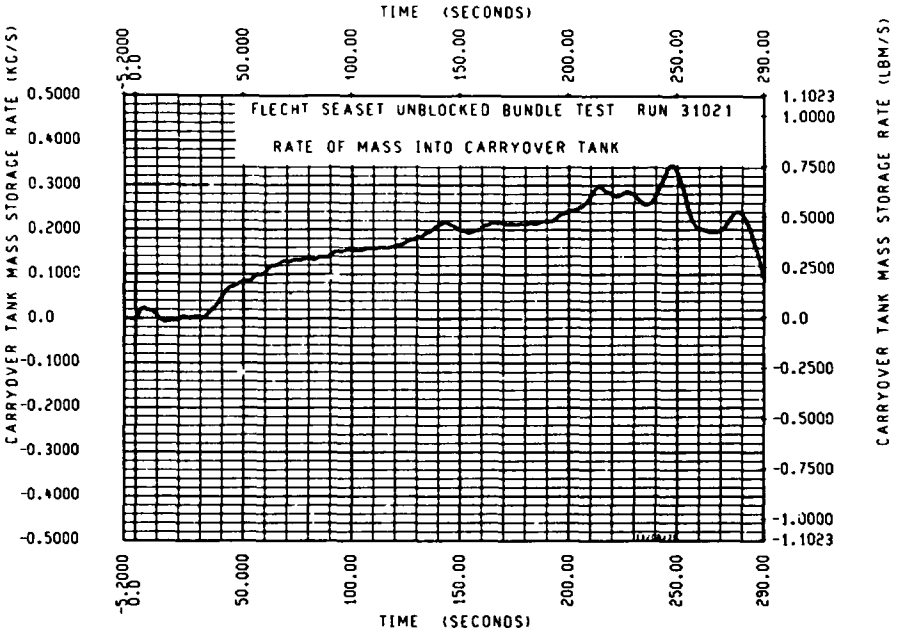

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 POWER
CH/SYM 227/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

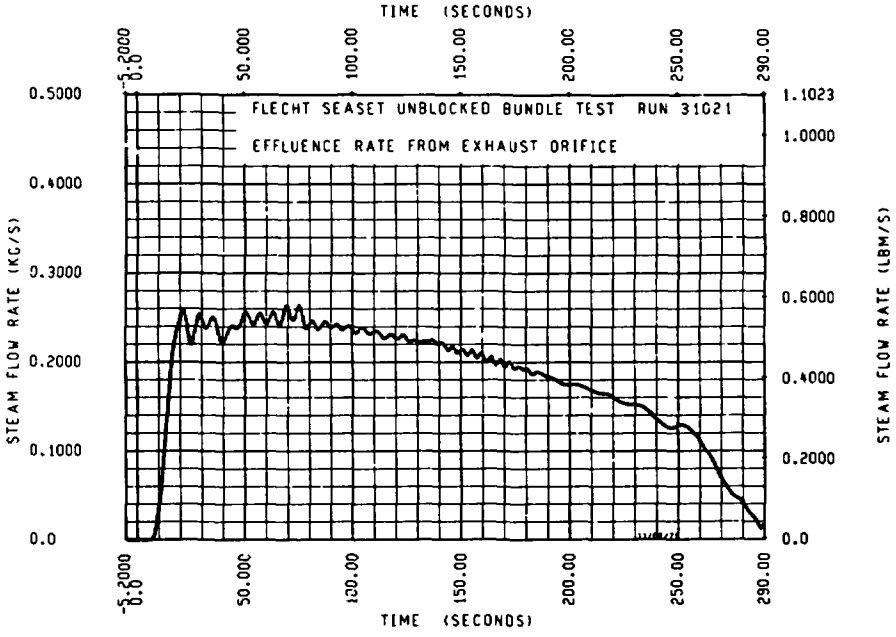

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

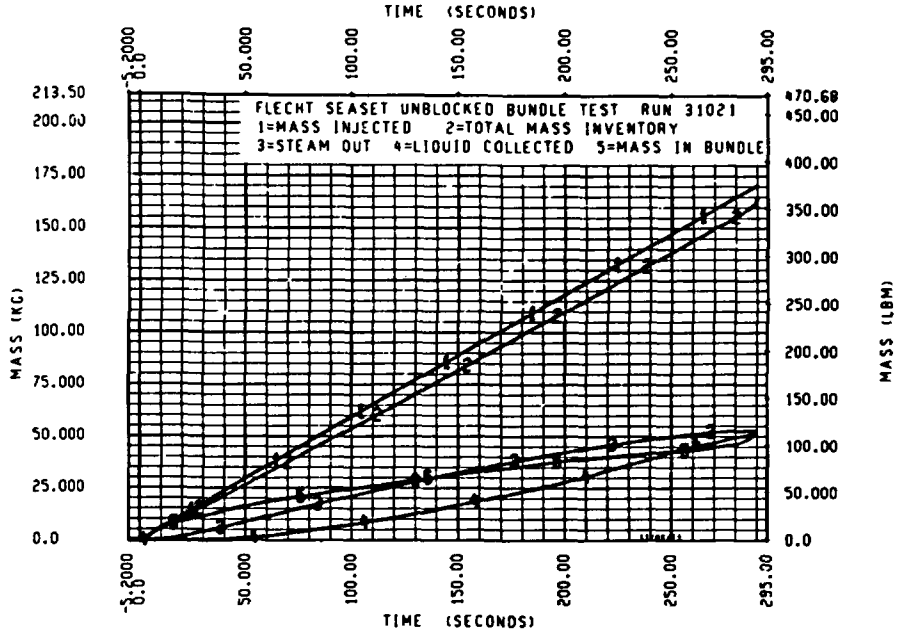

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

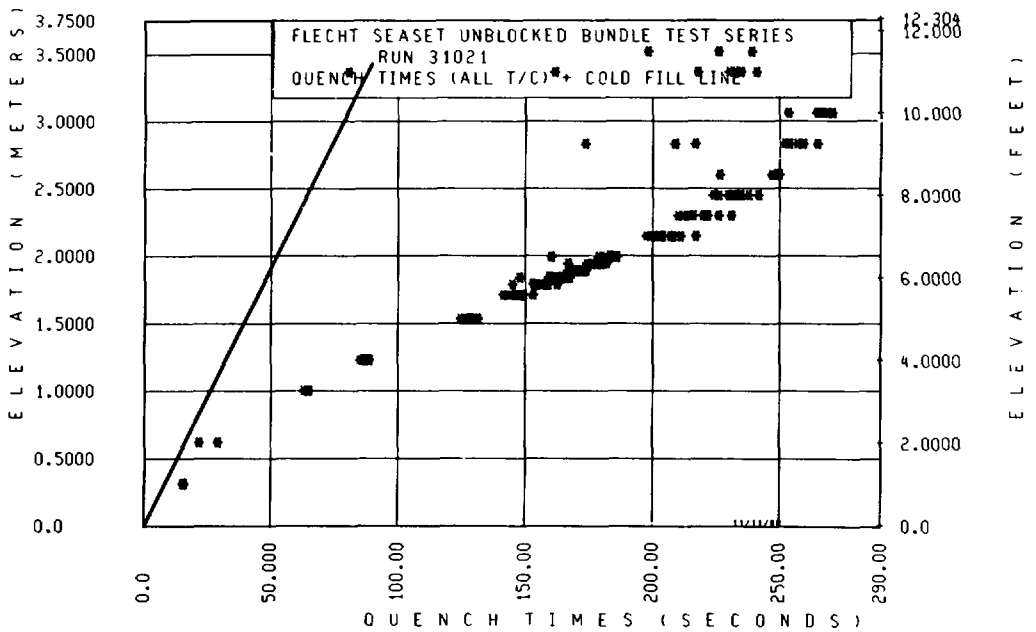

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

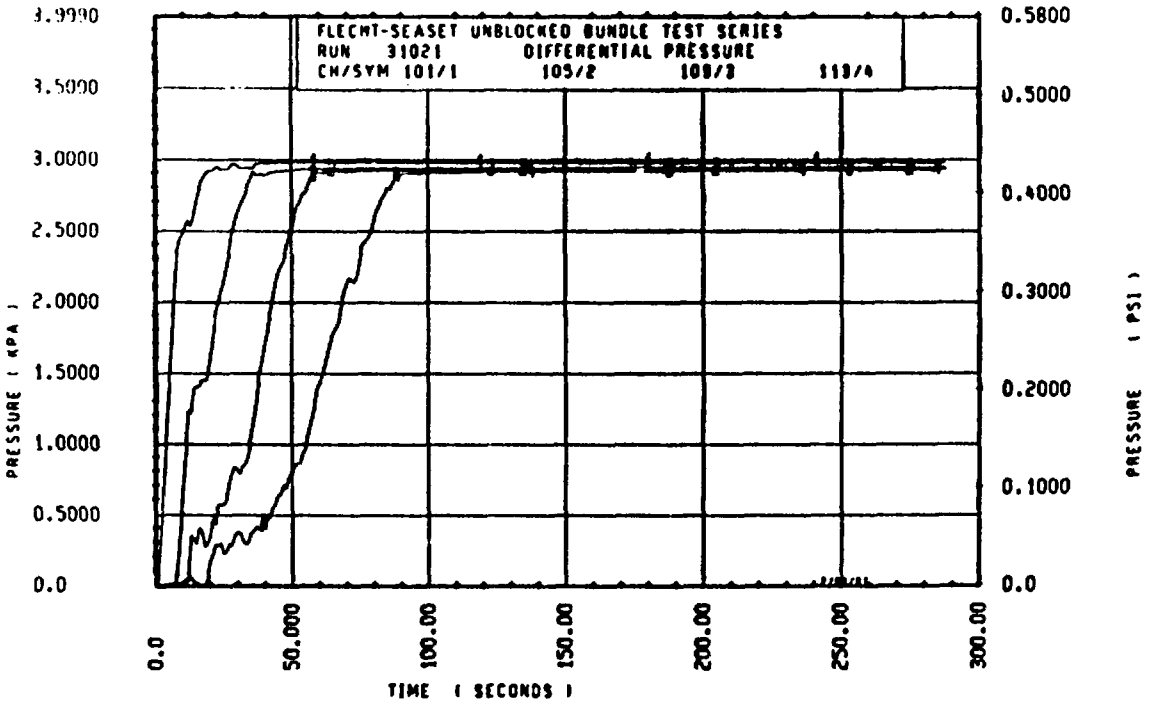

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31021
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
-5.2000
0.0
50.000
100.00
150.00
200.00
250.00
290.00
FLOODING RATE (MM/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
FLOODING RATE (IN/SEC)
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0

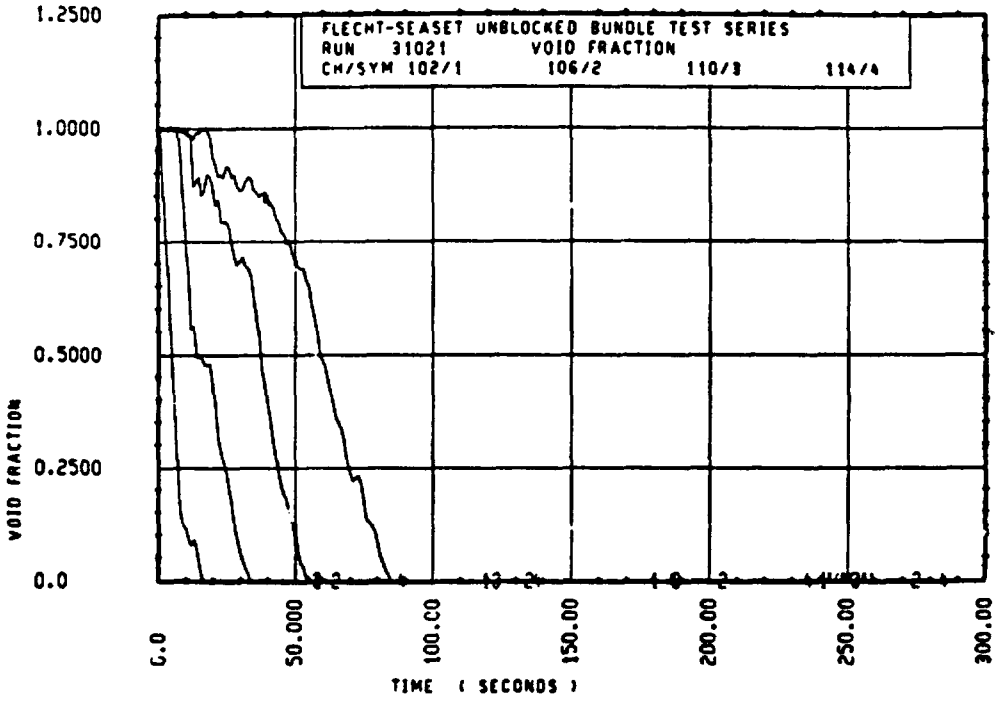

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31021
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
-5.2000
0.0
50.000
100.00
150.00
200.00
250.00
290.00
CARRYOVER TANK MASS STORAGE RATE (KG/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
-0.1000
-0.2000
-0.3000
-0.4000
-0.5000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
1.1023
1.0000
0.7500
0.5000
0.2500
0.0
-0.2500
-0.5000
-0.7500
-1.0000
-1.1023

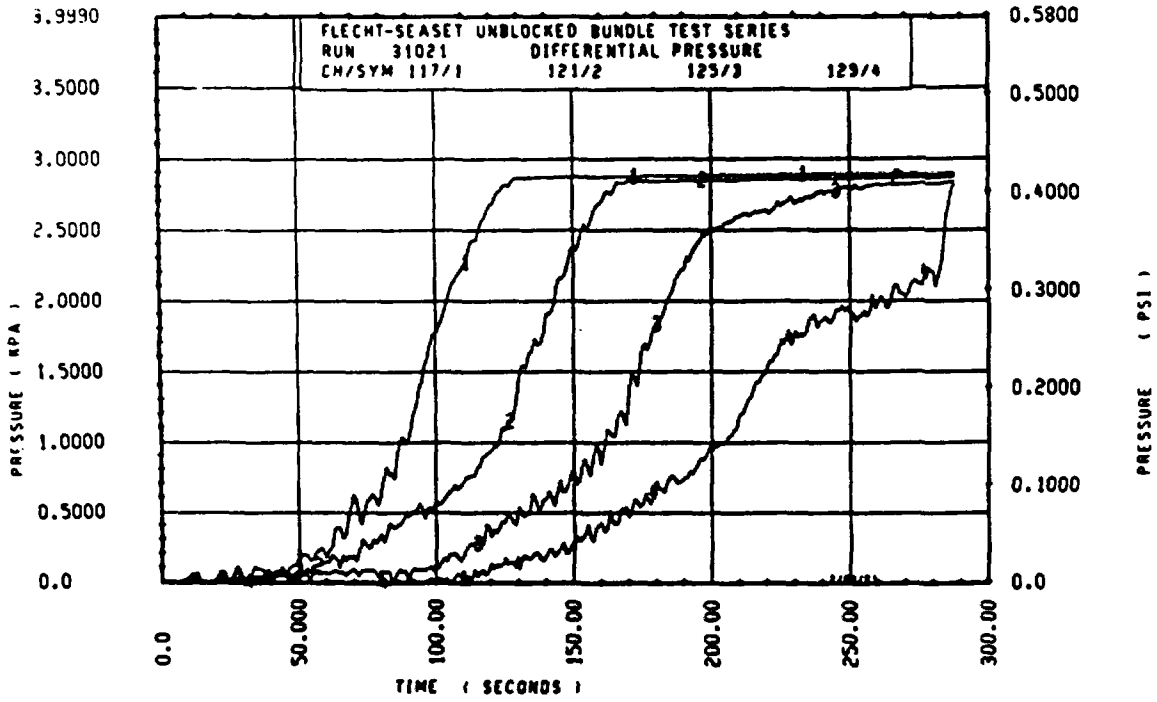

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31021
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.2000
0.0
50.000
100.00
150.00
200.00
250.00
290.00

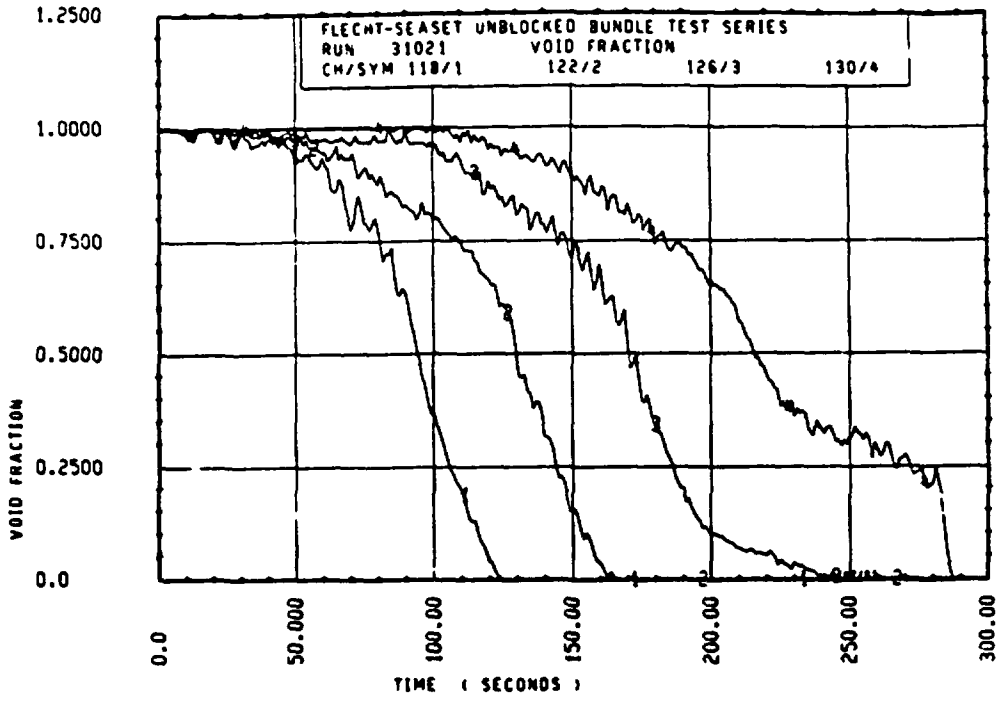

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31021
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
213.50
200.00
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
470.68
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-5.2000
0.0
50.000
100.00
150.00
200.00
250.00
295.00

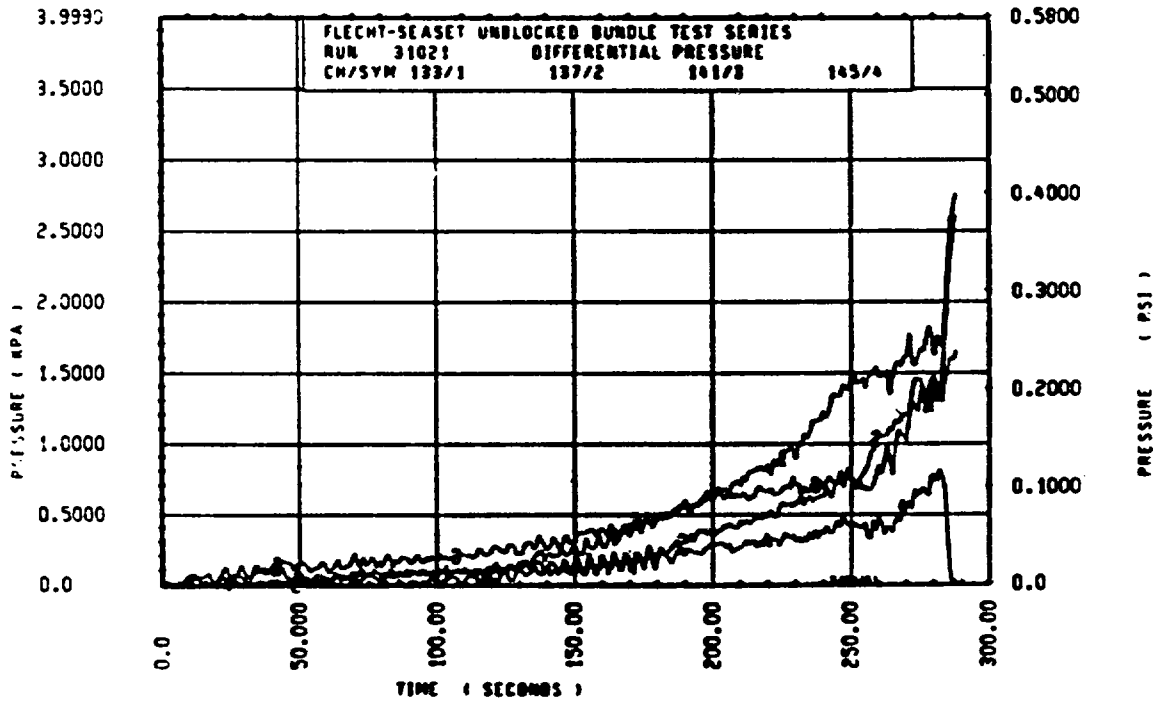

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021
QUENCH TIMES (ALL T/C)*+ COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
290.00
QUENCH TIMES (SECONDS)

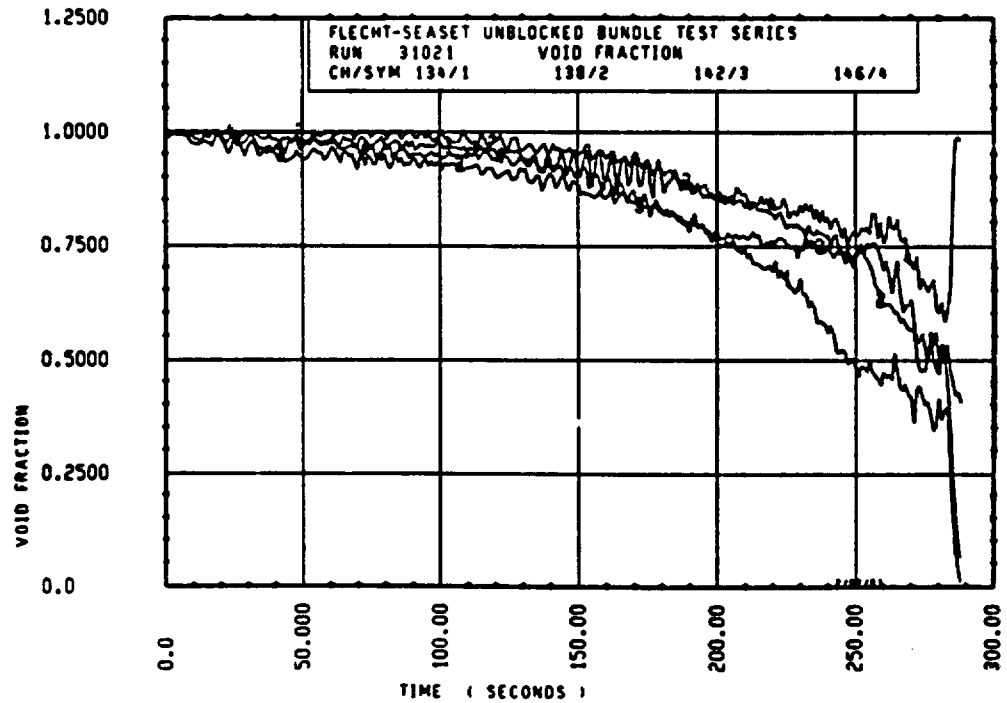

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
PRESSURE (PSI)
0.0
50.000
100.00
150.00
200.00
250.00
300.00
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31021 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
VOID FRACTION
0.0
50.000
100.00
150.00
200.00
250.00
300.00
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 31108
Date: 3/15/79
Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.13 MPa (19 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	871°C (1600°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	79.0 mm/sec (3.11 in./sec)
Coolant temperature	33°C (91°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Hot Rod Quench Time Temperature*
0.61 m (24 in.)	120°C (248°F)	42°C (108°F)
1.22 m (48 in.)	127°C-134°C (261°F-274°F)	57°C-63°C (134°F-145°F)
1.83 m (72 in.)	149°C-160°C (301°F-320°F)	106°C-110°C (222°F-230°F)
2.44 m (96 in.)	128°C-151°C	110°C (230°F) (262°F-304°F)
2.74 m (108 in.)	119°C (247°F)	110°C (230°F)
3.05 m (120 in.)	116°C (241°F)	110°C (230°F)
3.35 m (132 in.)	115°C (239°F)	110°C (230°F)

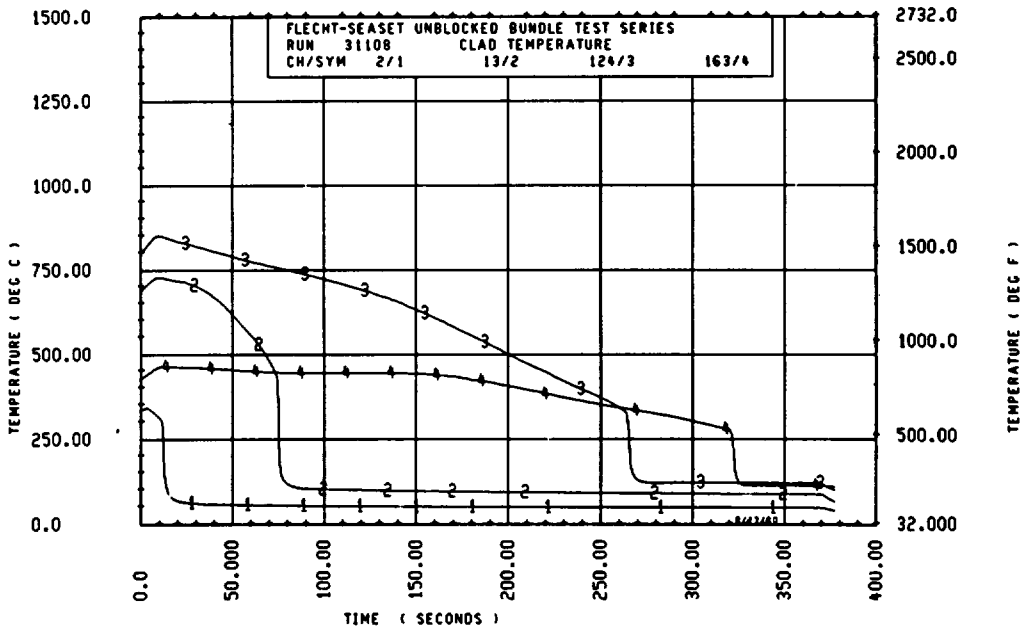
*At 156 seconds after flood

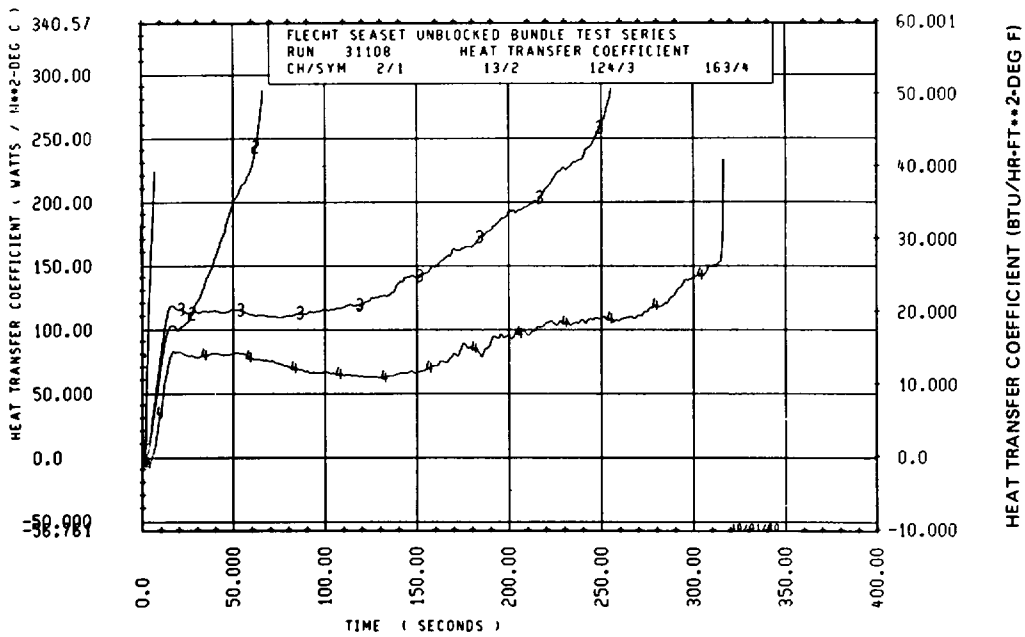
C. Comments

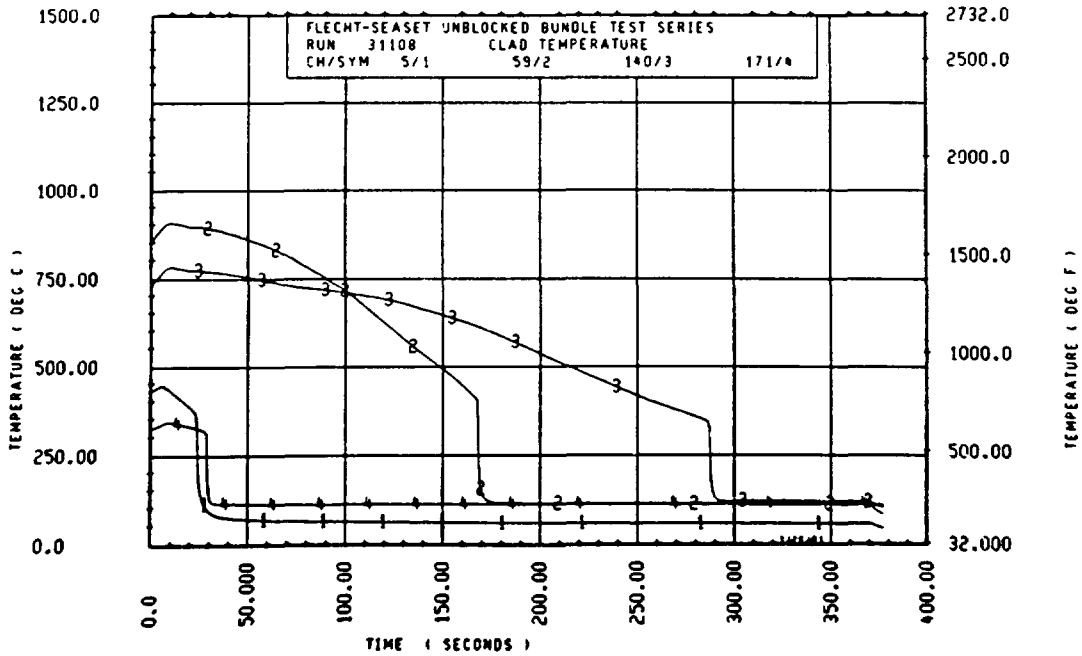
None

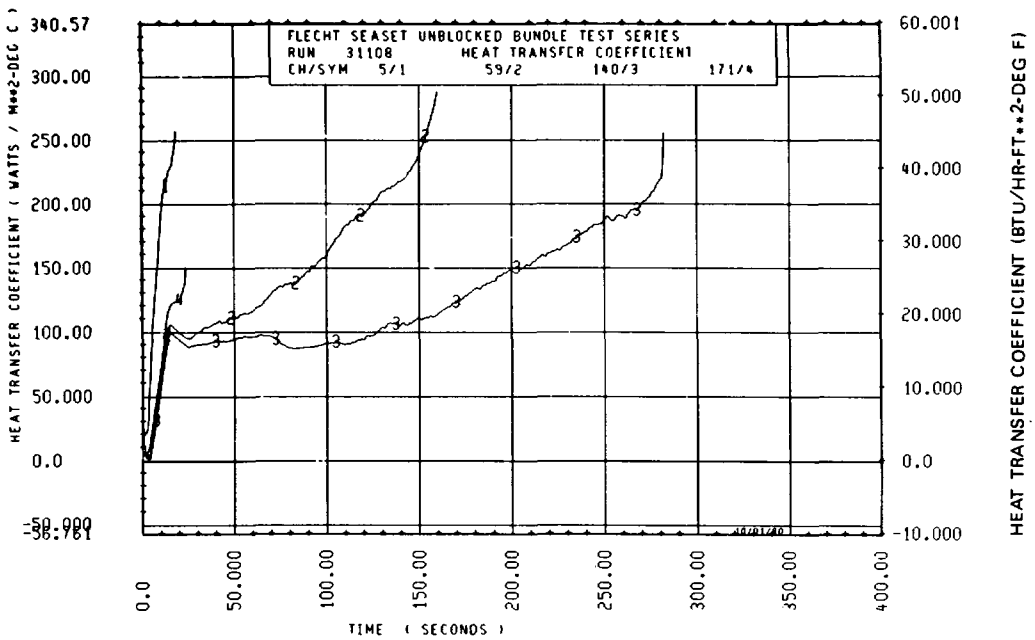
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 31108

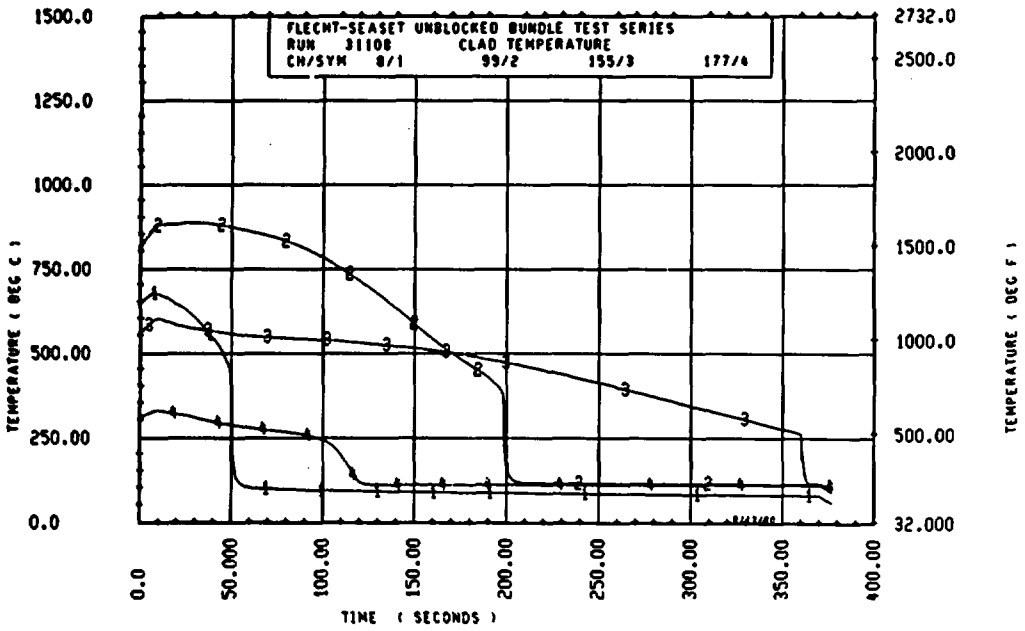
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1232.	1303.	71.	9.0	770.	73.4
2H 6- 0	50	1524.	1620.	96.	10.0	718.	165.4
3C 5- 0	17	1313.	1403.	90.	36.0	805.	117.4
3C 5- 7	28	1412.	1483.	71.	9.0	744.	144.8
4L 8- 0	129	1299.	1393.	94.	11.0	657.	279.0
4L 8- 6	147	1301.	1396.	95.	10.5	661.	279.0
5E11- 0	168	626.	664.	38.	9.0	368.	243.7
5J 4- 0	12	1221.	1292.	72.	9.5	782.	73.9
5J 8- 6	146	1091.	1168.	77.	9.5	672.	317.4
5J11- 6	175	579.	615.	36.	9.5	246.	135.5
7E 6- 0	57	1475.	1568.	93.	12.5	723.	142.5
7E 8- 6	142	1096.	1178.	81.	9.0	704.	313.9
7E10- 0	162	799.	878.	79.	28.0	516.	355.9
7E11- 6	176	613.	647.	34.	9.0	244.	174.0
7D 6- 4	84	1543.	1635.	93.	9.5	712.	173.5
7D 7- 6	119	1472.	1564.	91.	9.0	665.	254.8
7D 9- 3	151	985.	1054.	69.	9.5	532.	330.9
7G 5- 0	23	1476.	1561.	85.	9.5	852.	116.9
7J 6- 0	59	1569.	1668.	99.	10.0	751.	167.8
7M 7- 6	120	1452.	1544.	92.	9.5	651.	262.8
7M 8- 0	132	1296.	1393.	96.	10.5	631.	290.0
7M 9- 3	152	995.	1064.	68.	9.5	561.	310.9
8H 4- 0	13	1268.	1342.	73.	9.5	791.	74.8
8H10- 0	163	804.	871.	67.	11.5	498.	321.5
8H11- 6	177	591.	627.	36.	9.5	246.	120.0
8K 4- 0	14	1238.	1314.	76.	10.0	789.	73.5
8K 6- 6	99	1505.	1629.	123.	25.5	685.	198.3
8K 8- 0	140	1351.	1443.	92.	10.0	649.	286.9
8K10- 0	164	811.	874.	62.	11.0	244.	244.0
8N 2- 0	5	810.	838.	27.	5.5	677.	23.9
8N 4- 0	15	1248.	1321.	73.	10.0	800.	73.0
8N 6- 0	61	1538.	1636.	98.	10.0	713.	164.8
8N10- 0	165	804.	880.	75.	26.0	524.	350.0
9C 7- 0	109	1477.	1566.	88.	9.0	668.	232.9
9C 9- 3	153	1003.	1073.	70.	9.5	537.	341.0
9G 1- 0	2	636.	649.	13.	3.0	570.	12.0
9G 3- 3	8	1197.	1253.	56.	8.5	827.	50.0
9G11- 0	171	619.	653.	34.	8.5	597.	29.0
9I 5- 0	24	1489.	1581.	92.	11.0	817.	116.1
9I 5-10	46	1624.	1720.	96.	9.5	737.	156.4
10D 6- 6	93	1475.	1585.	110.	34.0	737.	196.9
11E 7- 6	124	1470.	1564.	94.	9.5	602.	264.7
11E 9- 3	155	1045.	1116.	71.	9.5	503.	360.0
11E11- 0	172	636.	672.	36.	9.0	414.	236.6
12D 4- 0	16	1260.	1334.	74.	10.0	828.	73.3
12D 6- 0	66	1551.	1653.	101.	11.5	727.	165.9
13G 6- 6	102	1512.	1606.	94.	9.5	706.	164.9

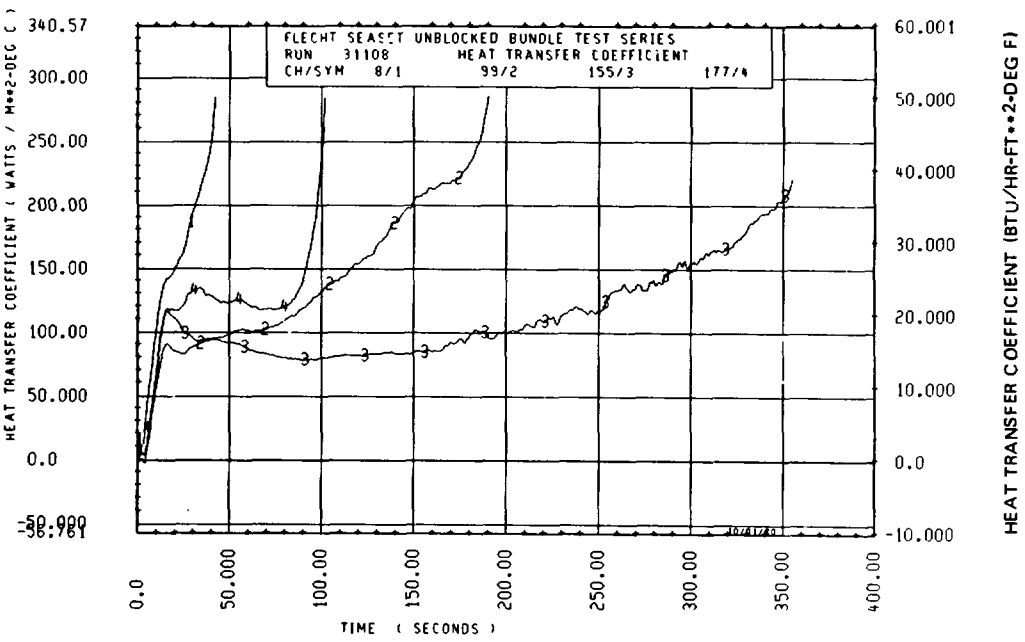

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

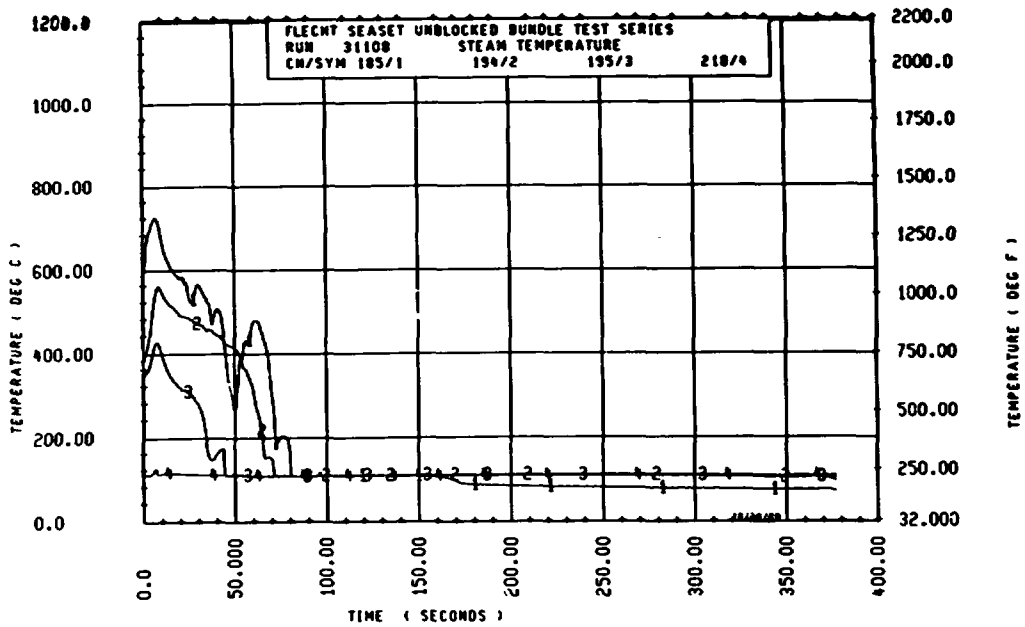

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

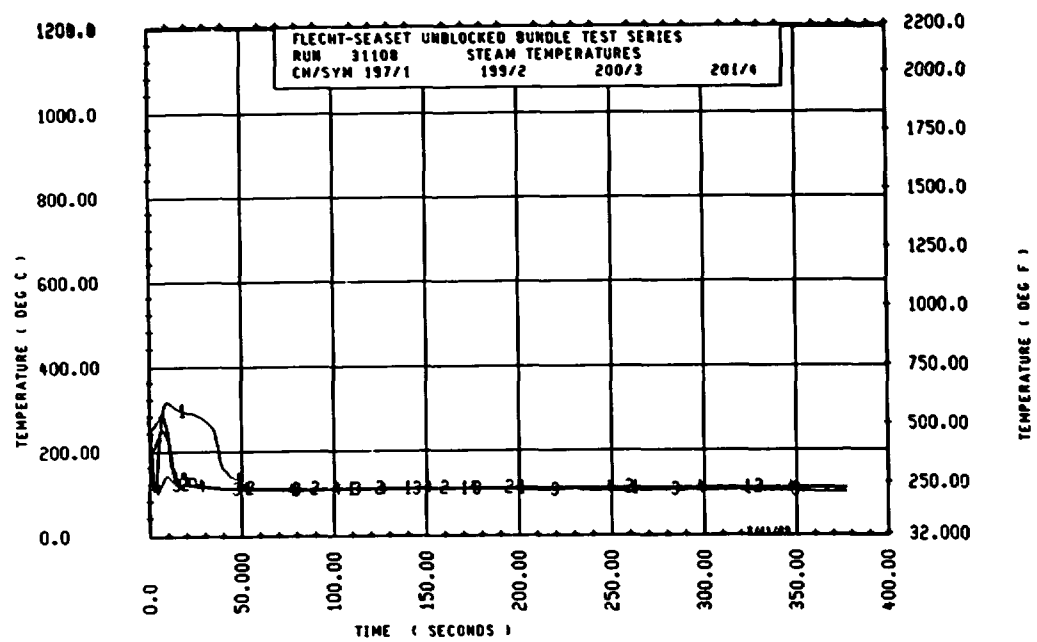

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

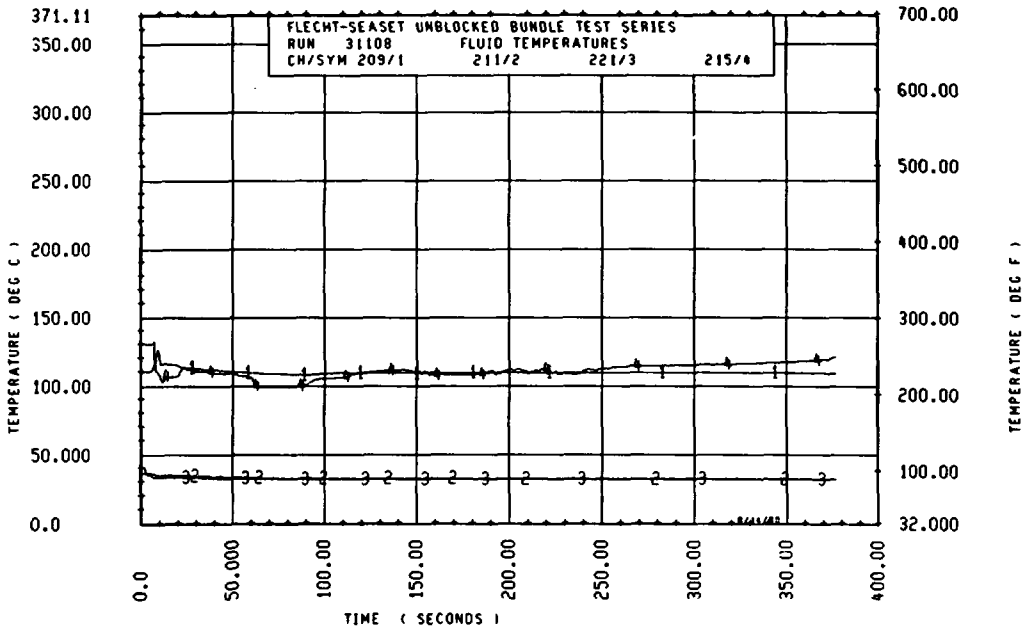

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-36.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

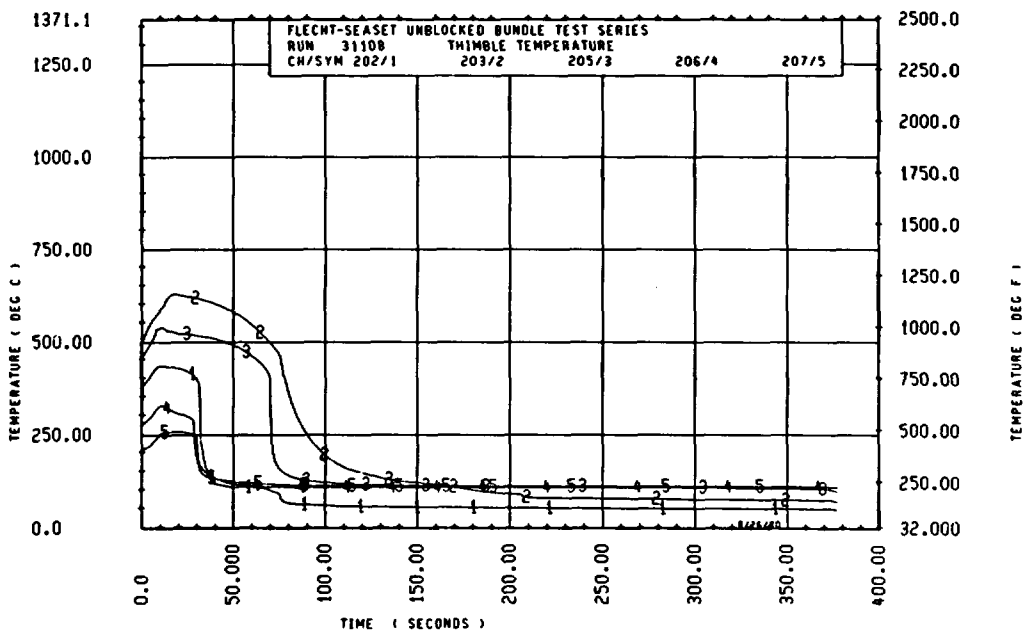

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

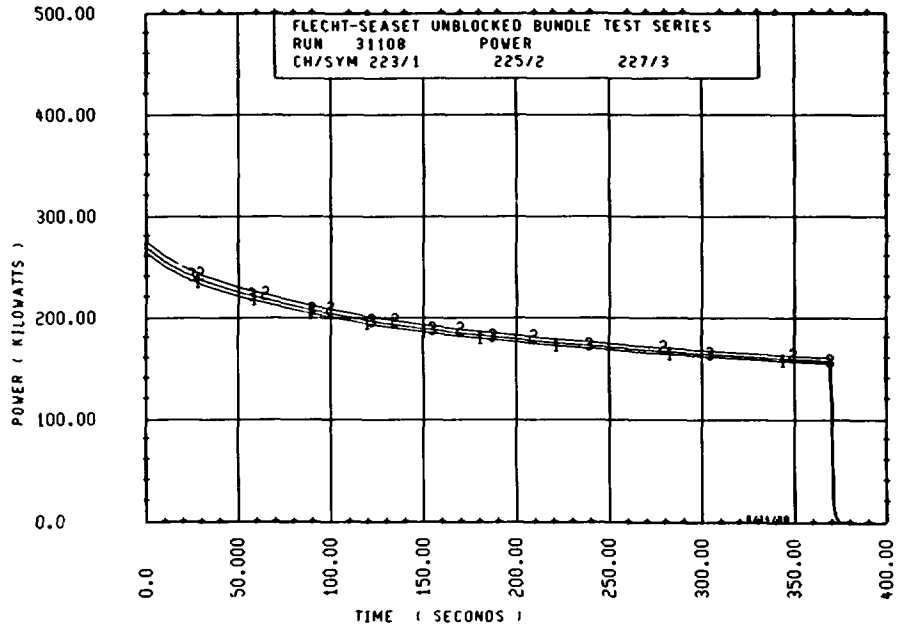

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 218/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

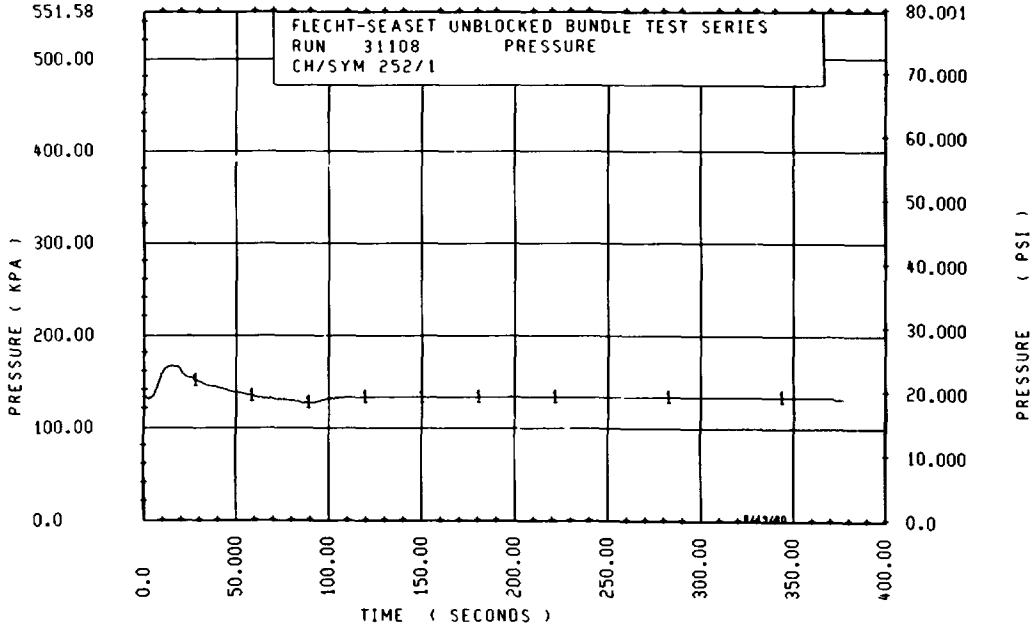

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

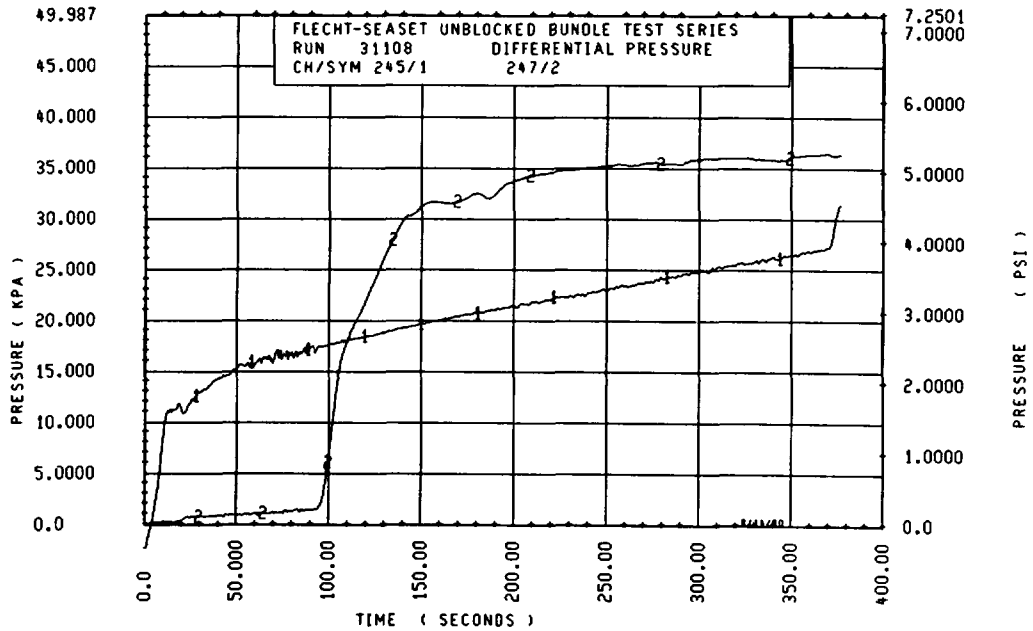


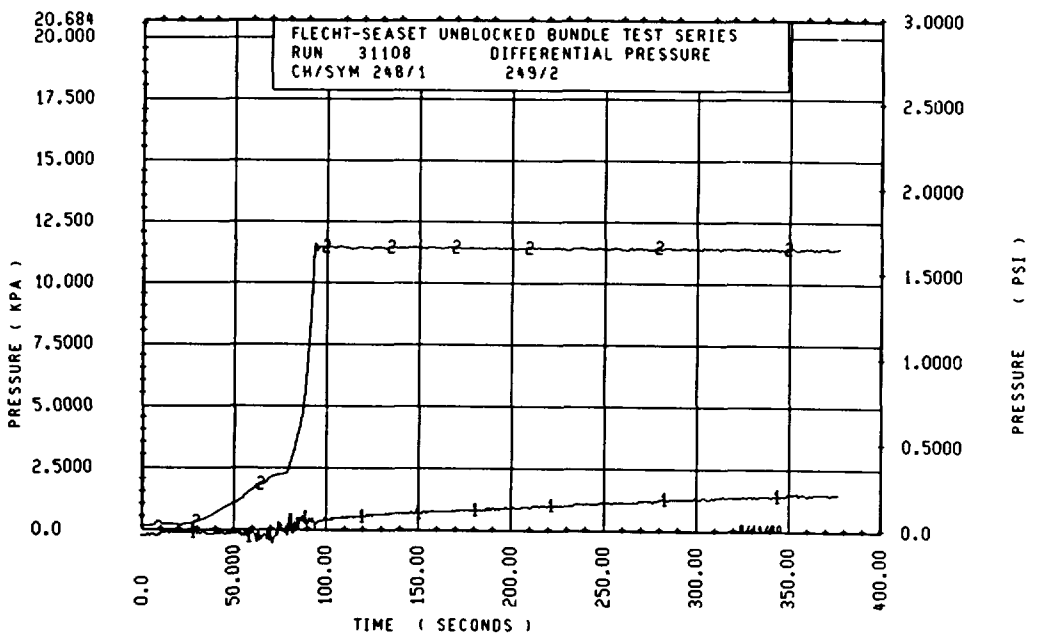


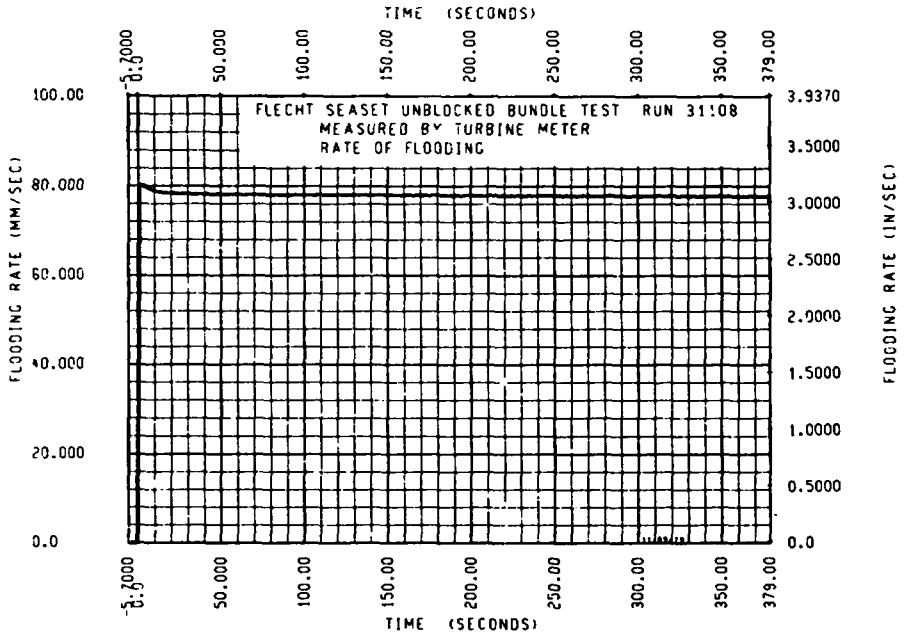
CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.); CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

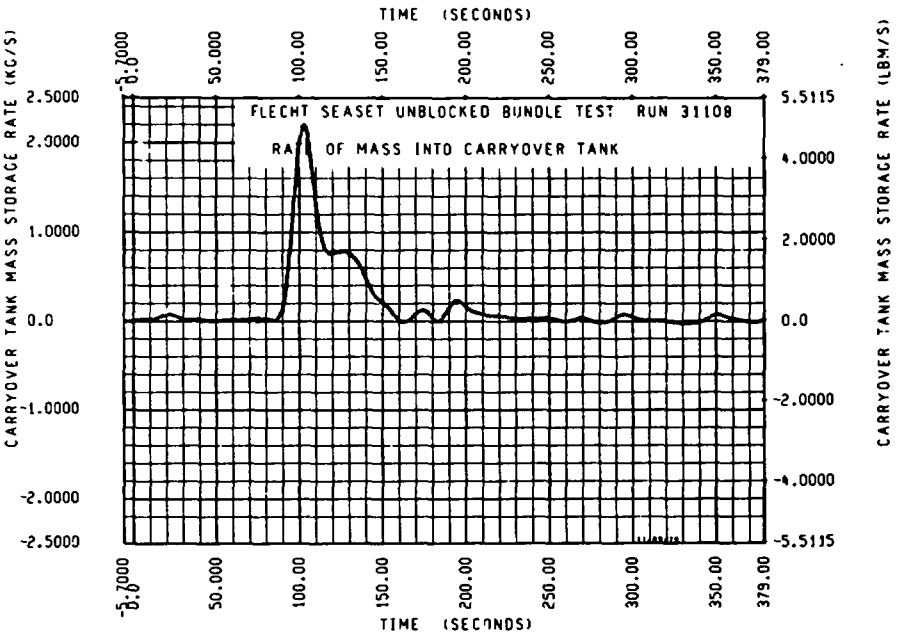

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

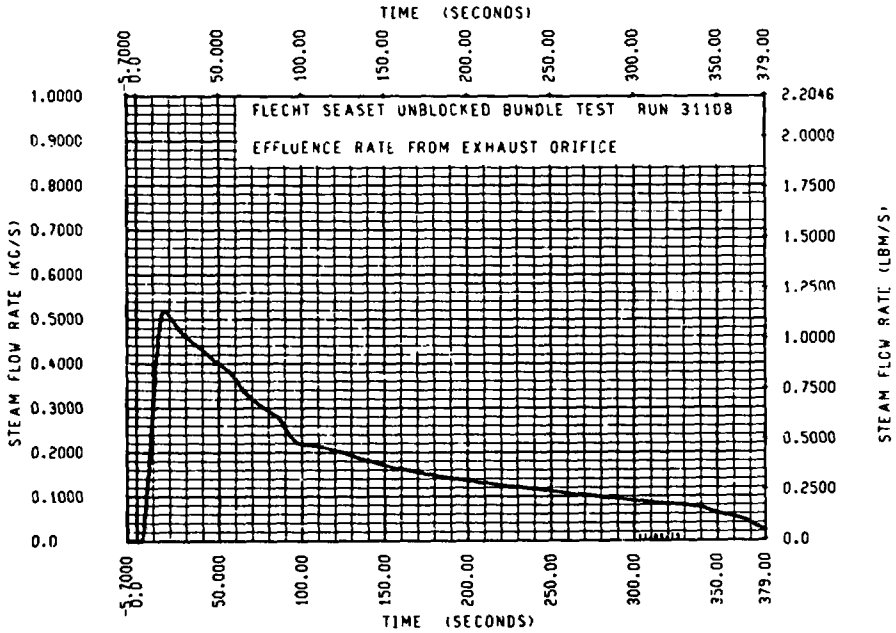

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

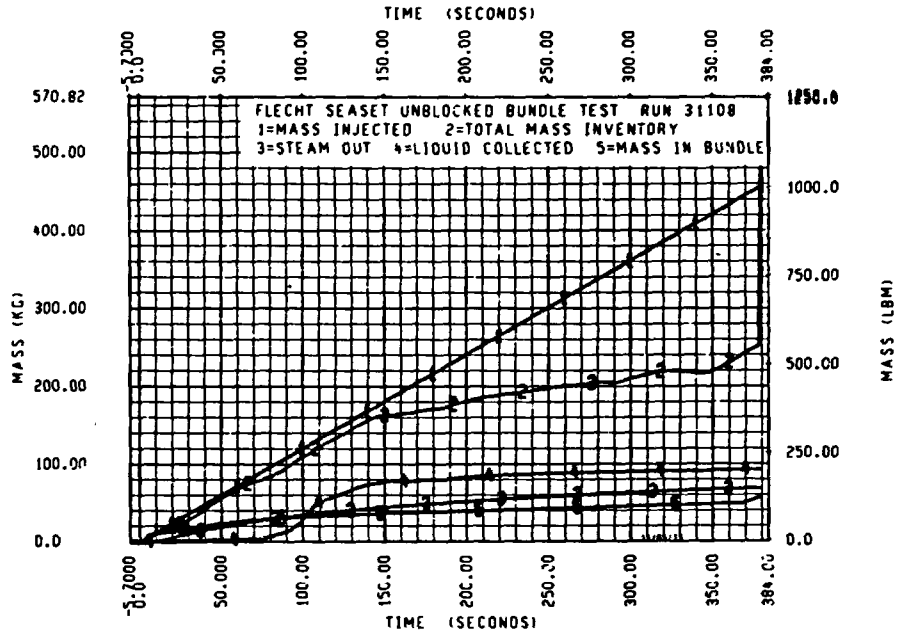

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

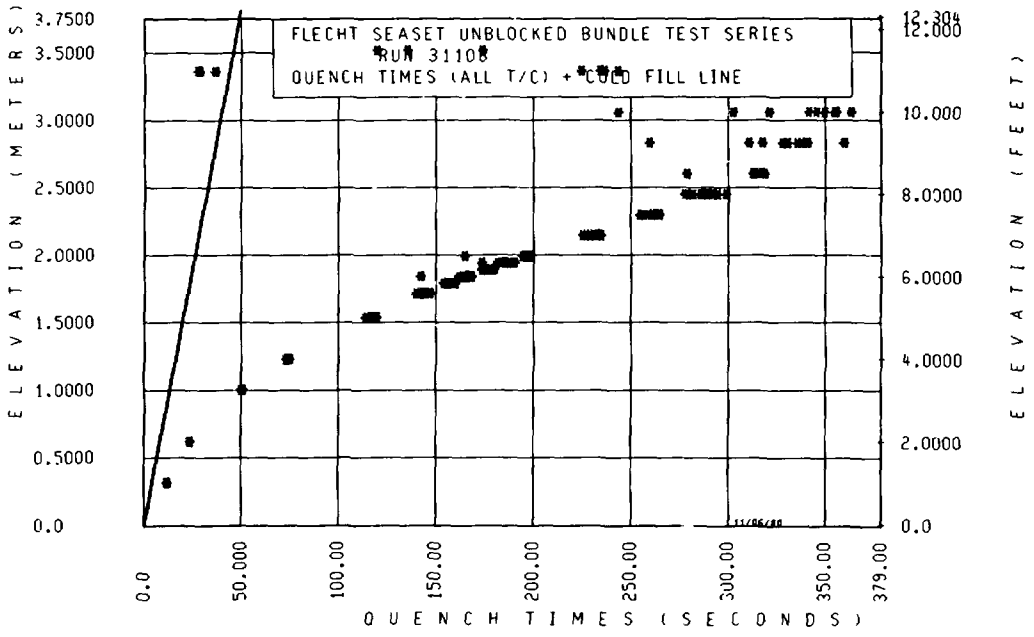

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

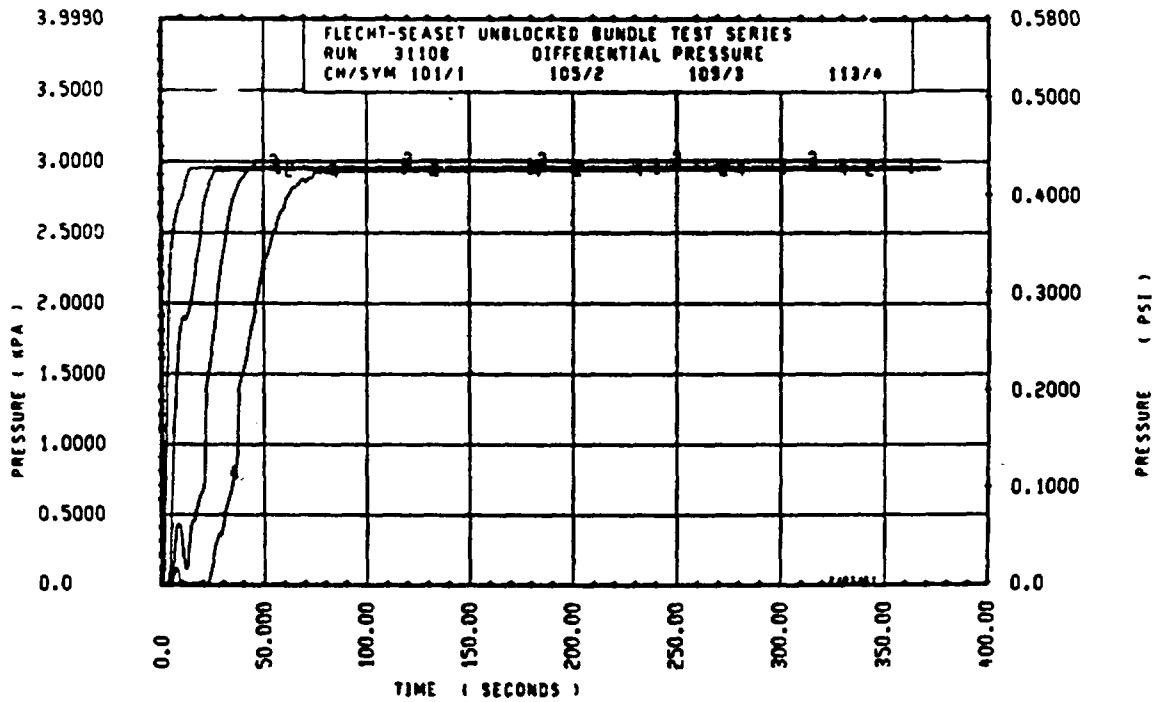

TIME (SECONDS)
-5.7000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
379.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31108
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
100.00
80.000
60.000
40.000
20.000
0.0
FLOODING RATE (IN/SEC)
3.9370
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0

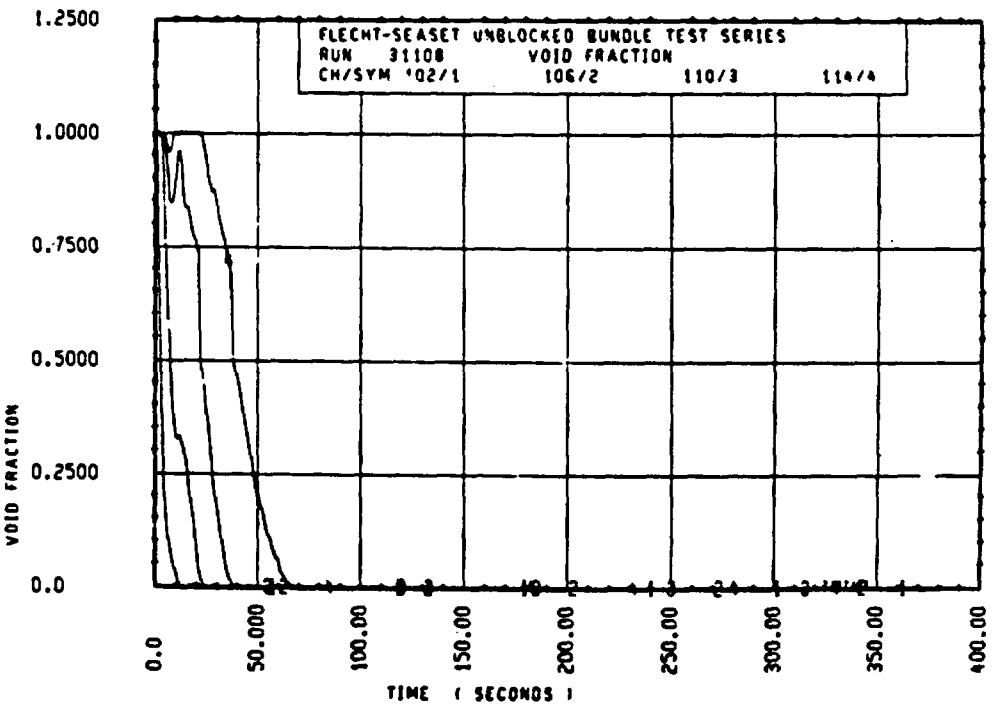

TIME (SECONDS)
-5.7000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
379.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31108
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
2.5000
2.0000
1.0000
0.0
-1.0000
-2.0000
-2.5000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
5.5115
4.0000
2.0000
0.0
-2.0000
-4.0000
-5.5115

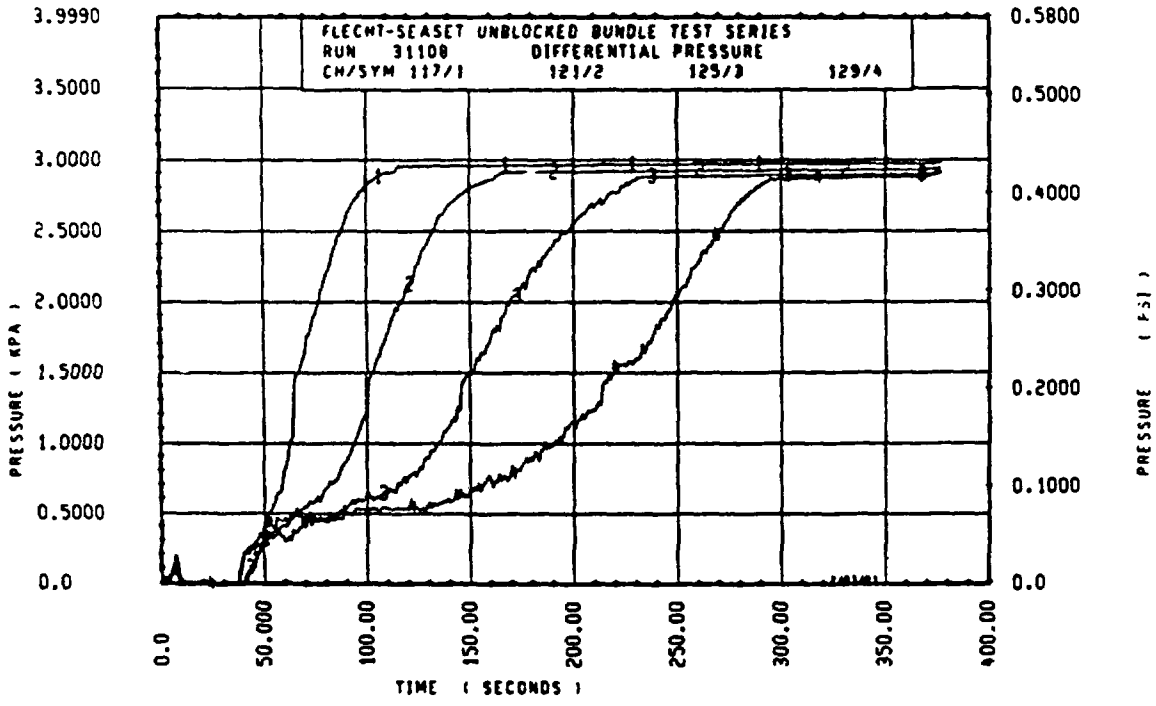

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31108
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
2.2046
2.0000
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.7000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
379.00

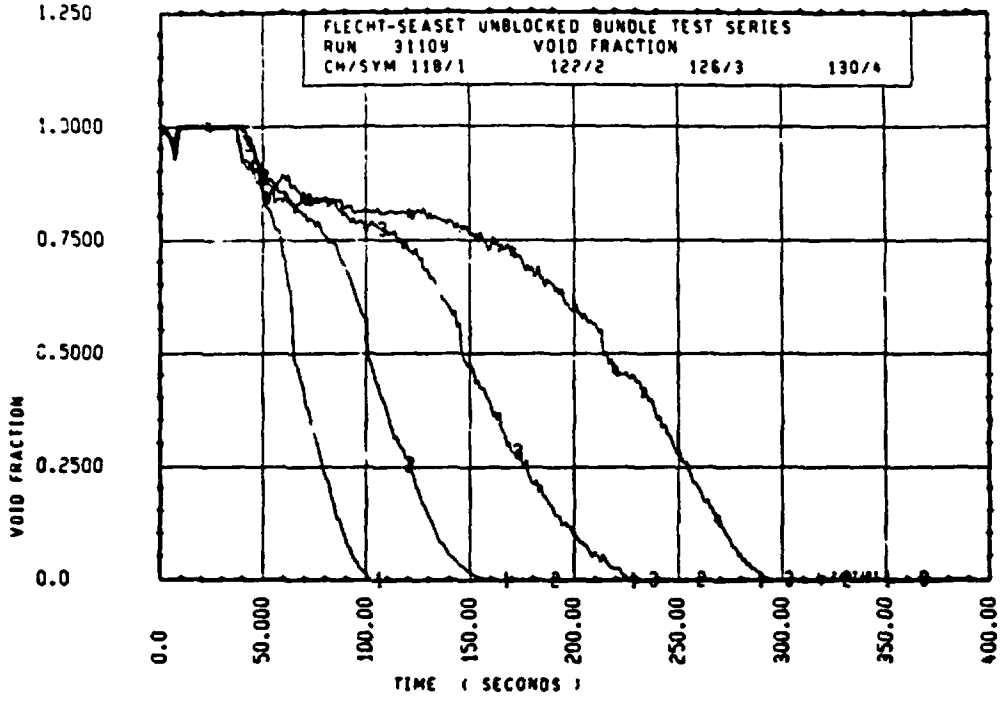

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31108
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
570.82
500.00
400.00
300.00
200.00
100.00
0.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-5.7000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
379.00

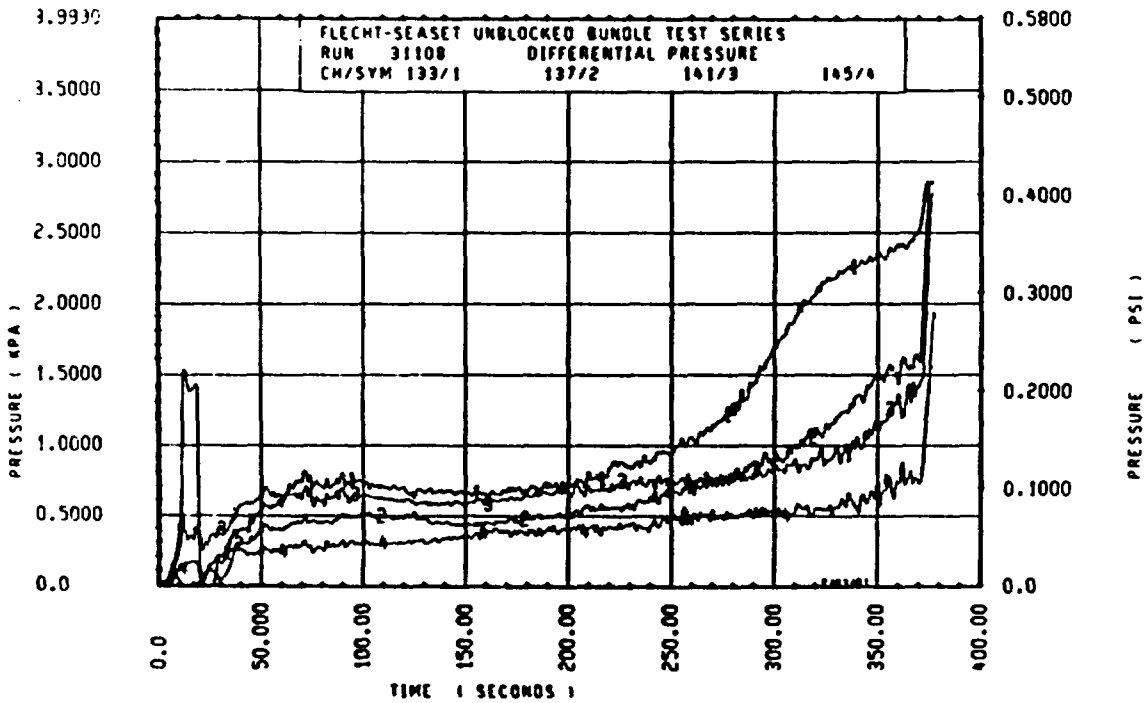

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
379.00
QUENCH TIMES (SECONDS)

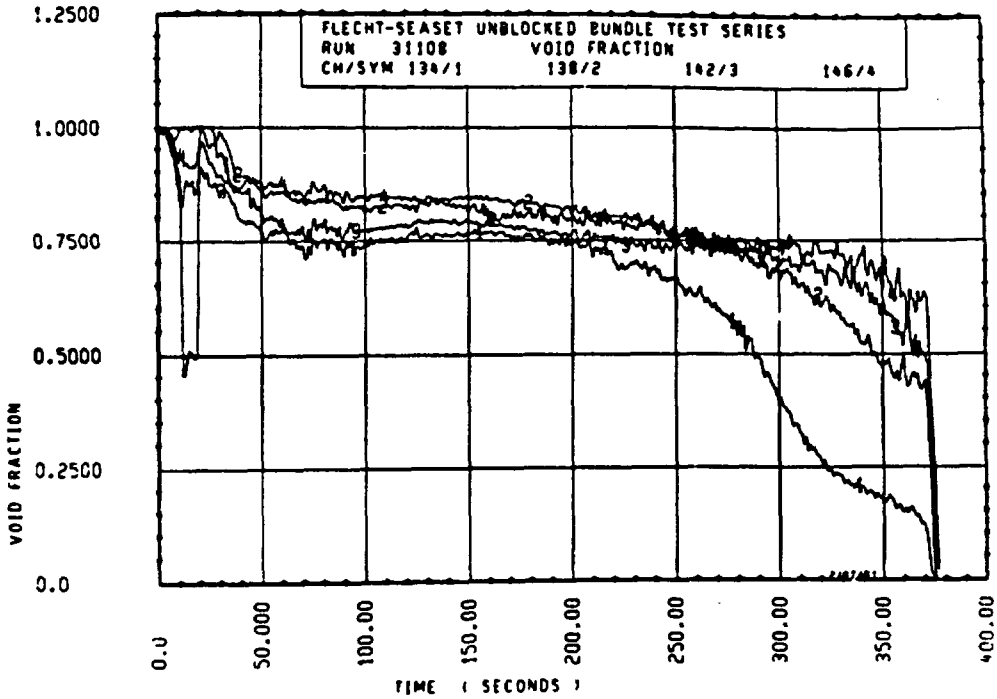

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31109 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.250
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31108 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 31203

Date: 3/16/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	872°C (1601°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	38.4 mm/sec (1.51 in./sec)
Coolant temperature	52°C (126°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	123°C (253°F)	72°C (162°F)
1.22 m (48 in.)	151°C-157°C (309°F-315°F)	113°C (236°F)
1.83 m (72 in.)	171°C-182°C (340°F-360°F)	134°C (274°F)
2.44 m (96 in.)	162°C-170°C (323°F-339°F)	133°C-381°C (271°F-717°F)
2.74 m (108 in.)	150°C-155°C (301°F-311°F)	132°C (270°F)
3.05 m (120 in.)	133°C-143°C (271°F-289°F)	124°C-132°C (256°F-269°F)
3.35 m (132 in.)	134°C-138°C (273°F-280°F)	132°C (269°F)

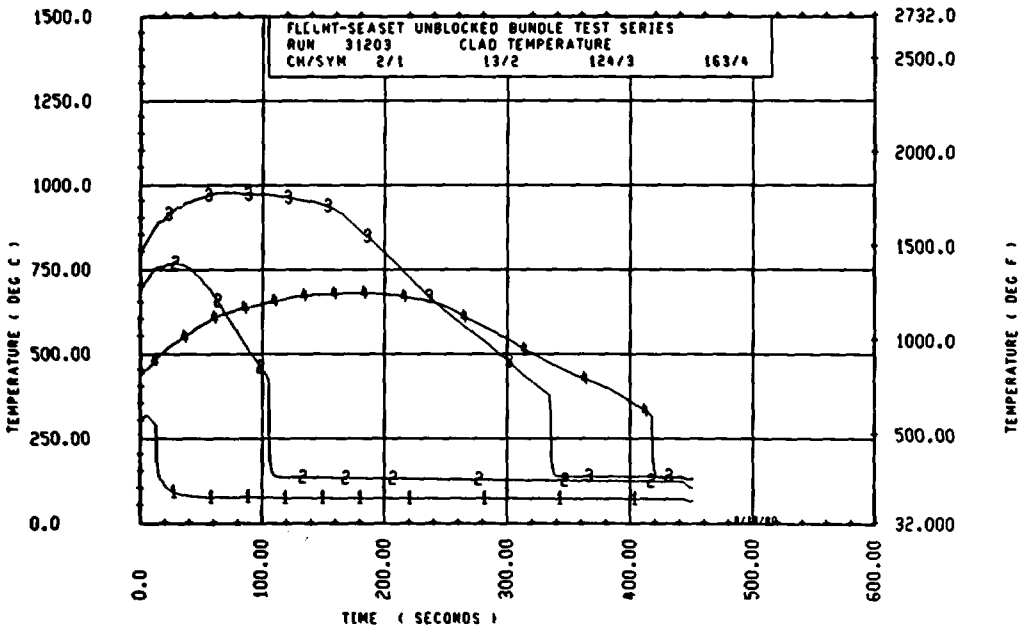
*At 156 seconds after flood

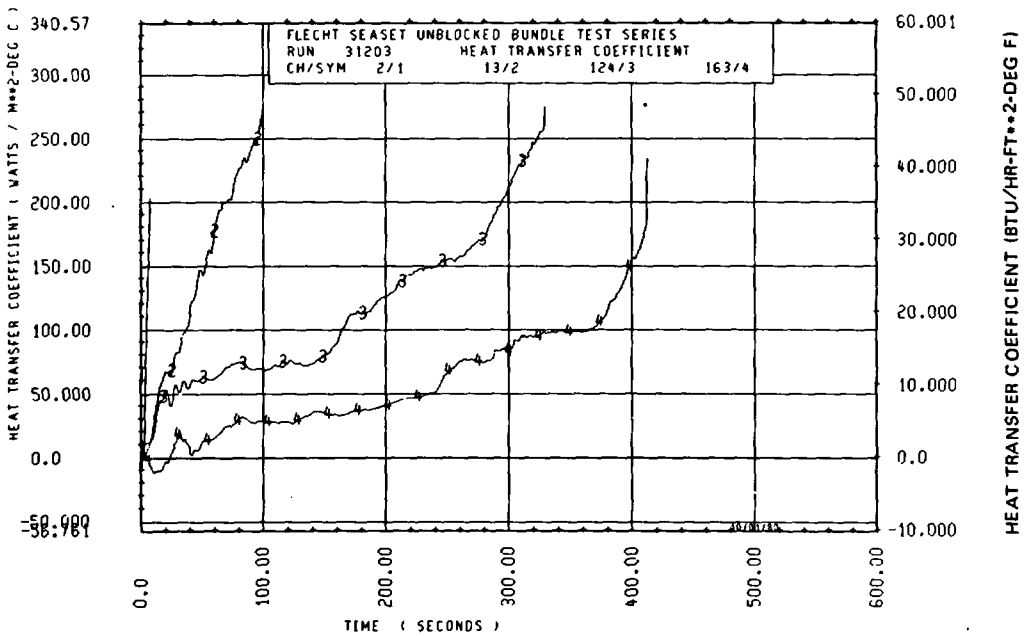
C. Comments

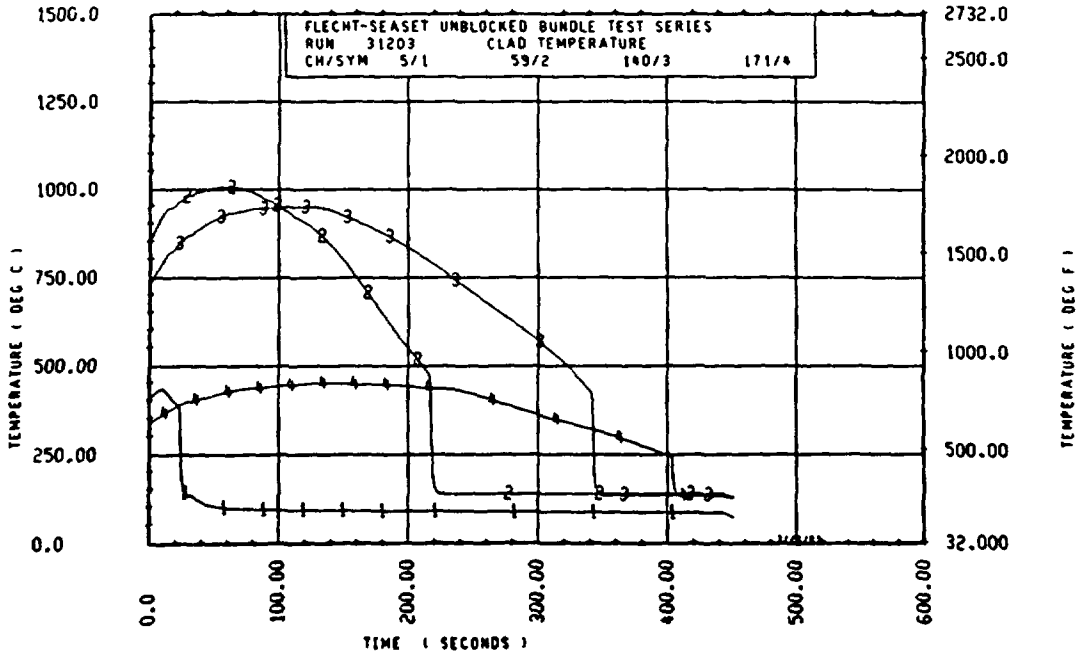
None

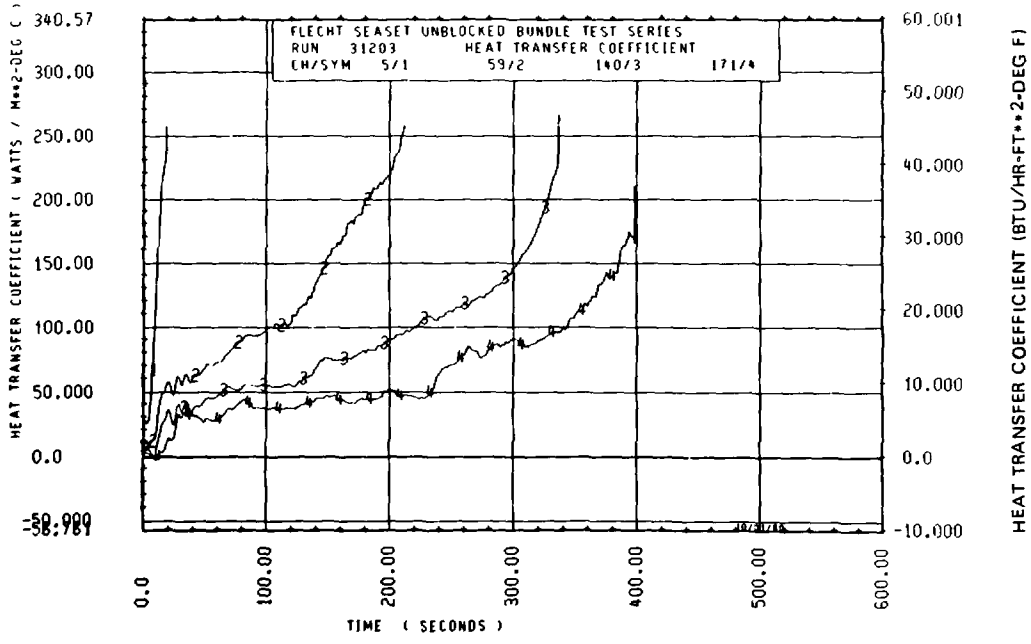
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 31203

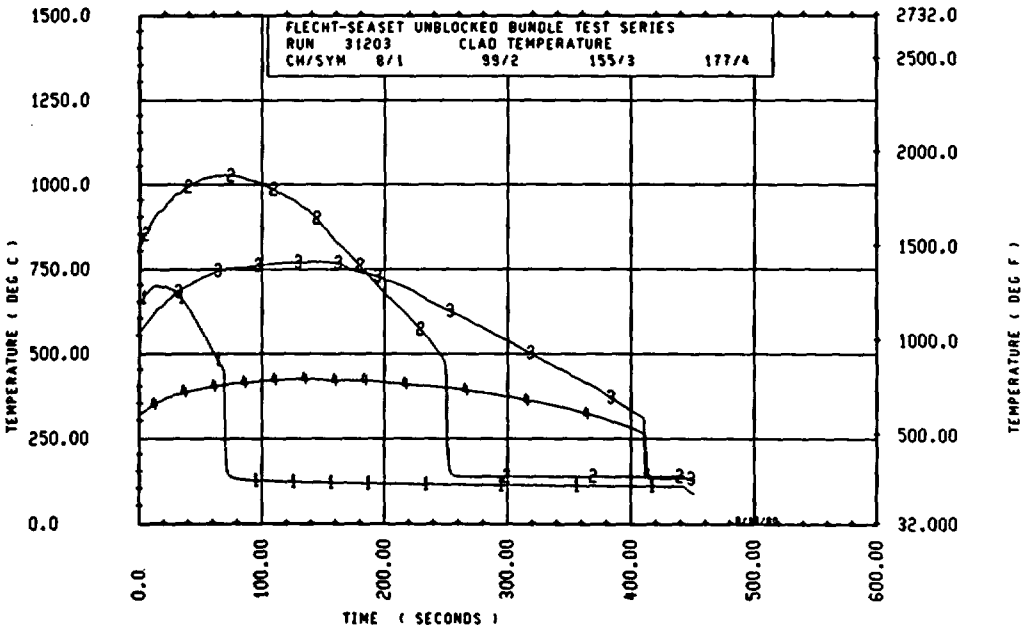
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1238.	1370.	132.	28.0	809.	100.5
2H 8- 0	50	1525.	1798.	273.	55.5	888.	213.8
3C 5- 0	17	1320.	1472.	152.	61.5	815.	157.9
3C 5- 7	28	1408.	1540.	132.	28.5	802.	188.9
4L 8- 0	129	1301.	1696.	396.	91.5	833.	322.7
4L 8- 6	147	1303.	1697.	394.	91.5	838.	322.9
5E11- 0	168	646.	843.	196.	147.5	513.	399.0
5J 4- 0	12	1227.	1362.	135.	28.5	776.	105.0
5J 8- 6	146	1101.	1511.	409.	137.5	738.	366.9
5J11- 6	175	597.	790.	192.	145.0	621.	341.7
7B 6- 0	57	1473.	1711.	237.	46.5	787.	196.4
7B 8- 6	142	1107.	1471.	364.	118.5	715.	375.0
7B10- 0	162	813.	1248.	435.	148.0	613.	418.0
7B11- 6	176	636.	806.	170.	128.5	460.	435.0
7D 6- 4	84	1558.	1817.	259.	53.0	861.	221.0
7D 7- 6	119	1472.	1755.	283.	63.5	824.	296.0
7D 9- 3	151	998.	1394.	396.	147.5	656.	380.0
7G 5- 0	23	1487.	1664.	176.	45.0	900.	158.9
7J 6- 0	59	1570.	1845.	275.	59.0	879.	217.0
7M 7- 6	120	1451.	1808.	357.	79.5	807.	308.0
7M 8- 0	132	1297.	1759.	461.	89.5	795.	335.0
7M 9- 3	152	1003.	1415.	412.	111.5	659.	382.0
8M 4- 0	13	1275.	1415.	140.	28.5	798.	105.0
8M10- 0	163	820.	1255.	434.	168.0	603.	417.0
8M11- 6	177	611.	801.	190.	131.0	506.	411.0
8K 4- 0	14	1244.	1382.	138.	28.5	783.	103.6
8K 6- 6	99	1505.	1879.	374.	62.5	882.	249.8
8K 8- 0	140	1351.	1743.	392.	113.0	789.	341.9
8K10- 0	164	823.	1292.	469.	166.5	609.	413.0
8N 2- 0	5	770.	819.	49.	10.0	716.	23.9
8N 4- 0	15	1254.	1382.	129.	23.0	816.	99.3
8N 6- 0	61	1537.	1837.	300.	52.5	899.	210.9
8N10- 0	165	816.	1294.	479.	150.5	664.	403.0
9C 7- 0	109	1474.	1714.	240.	60.5	737.	290.6
9C 9- 3	153	1012.	1396.	384.	136.0	649.	390.5
9G 1- 0	2	585.	606.	21.	5.0	550.	13.0
9G 3- 3	8	1201.	1294.	94.	13.5	832.	69.5
9G11- 0	171	644.	846.	202.	128.5	471.	403.0
9I 5- 0	24	1502.	1694.	192.	45.0	879.	158.8
9I 5-10	46	1616.	1868.	251.	52.0	861.	202.8
10D 6- 6	93	1476.	1781.	305.	76.0	857.	251.0
11E 7- 6	124	1472.	1792.	321.	70.0	707.	334.7
11E 9- 3	155	1048.	1418.	370.	137.5	591.	410.0
11E11- 0	172	659.	863.	204.	135.5	507.	393.5
12D 4- 0	16	1264.	1398.	134.	28.5	799.	103.1
12D 6- 0	66	1549.	1811.	262.	58.0	901.	216.2
13G 6- 6	102	1513.	1780.	267.	47.5	857.	213.1

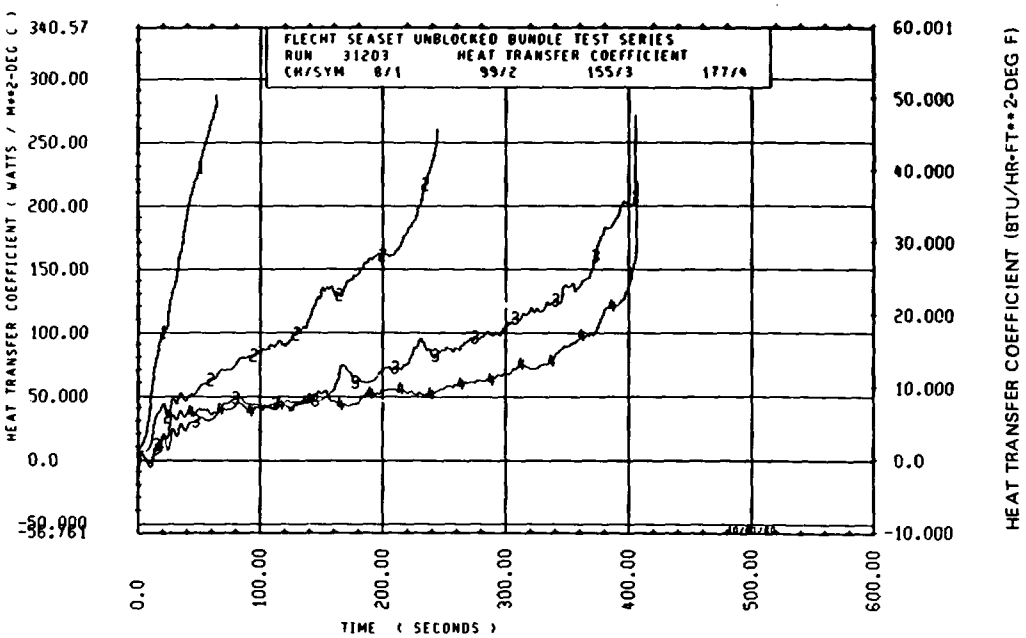

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

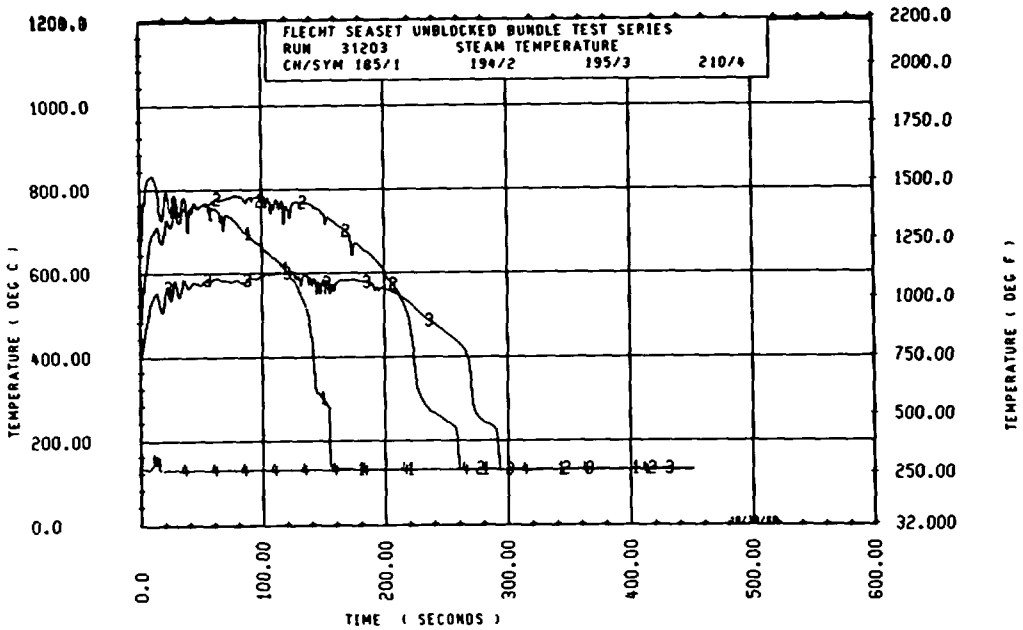

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

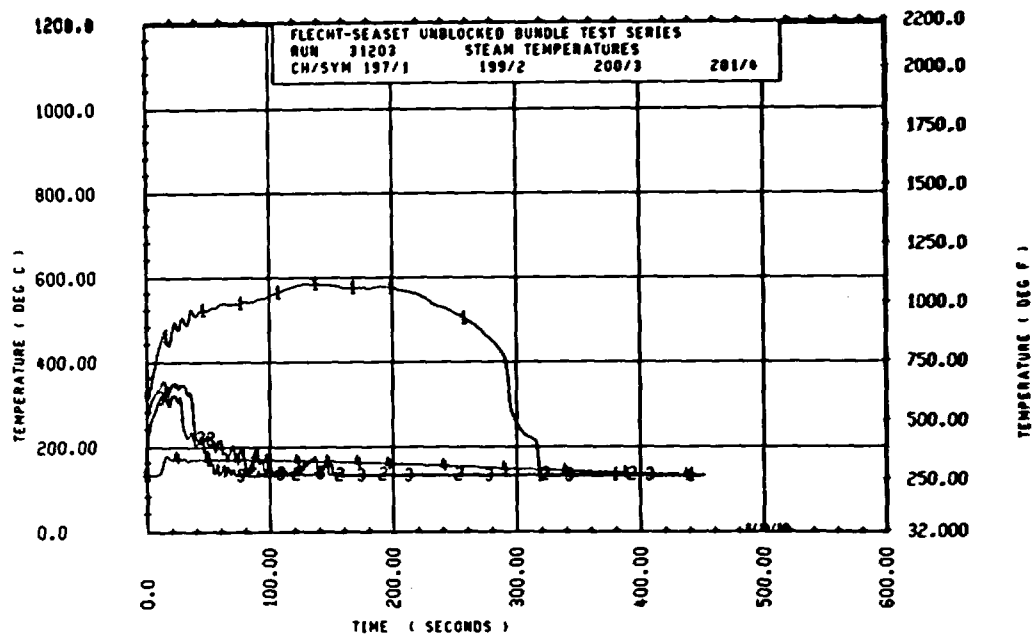

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

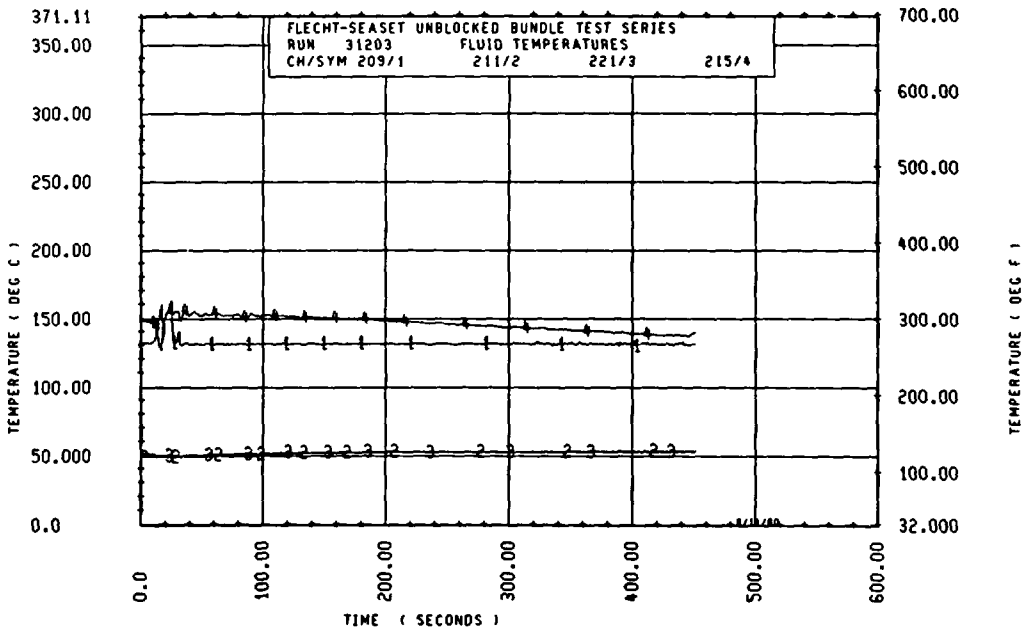

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-58.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

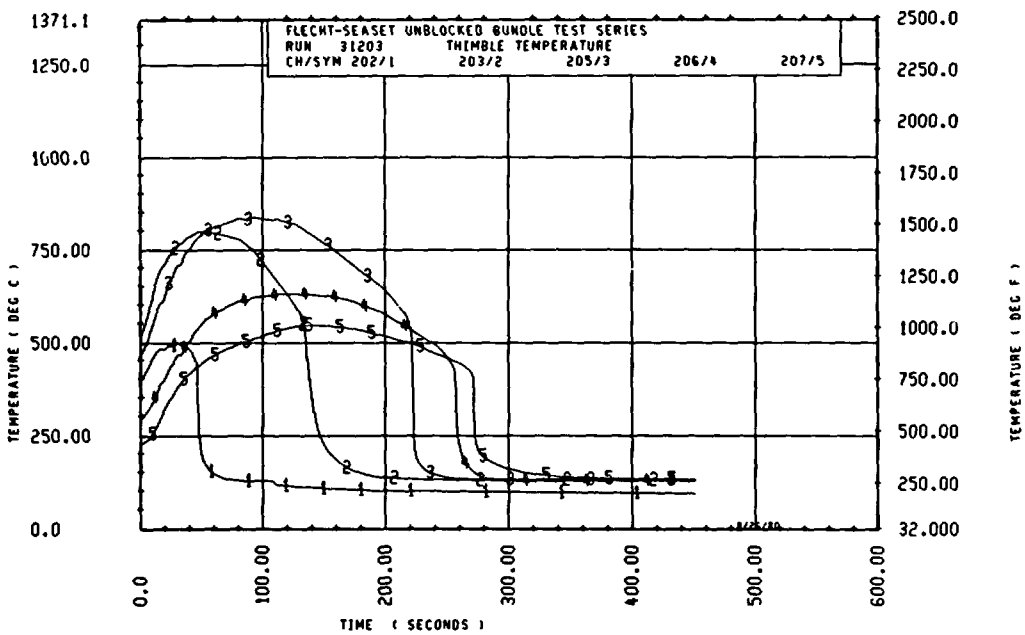

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

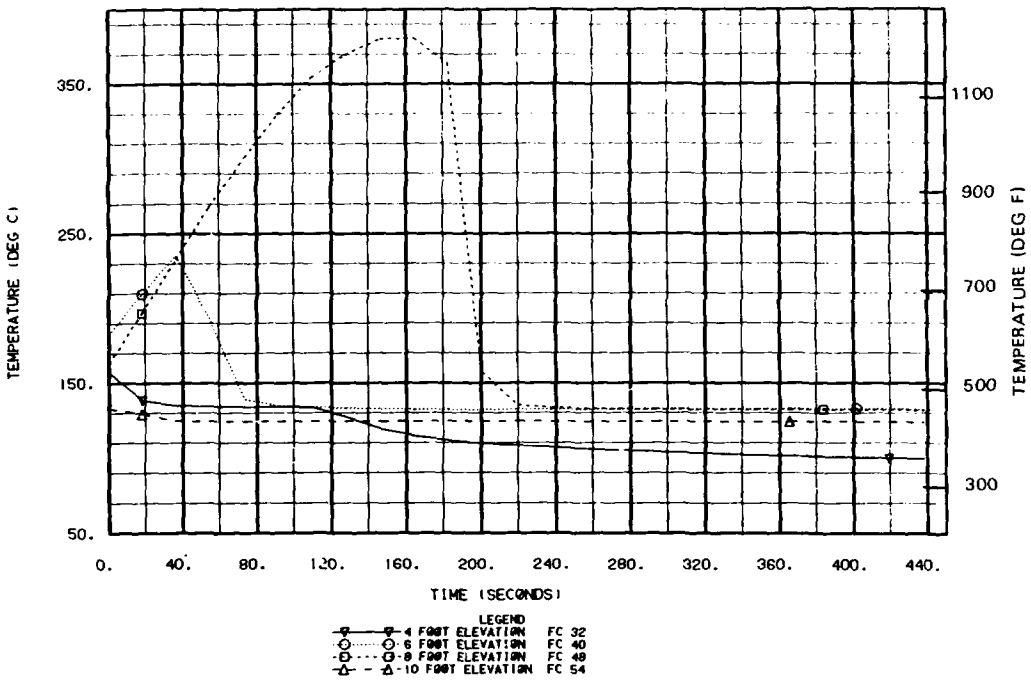

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

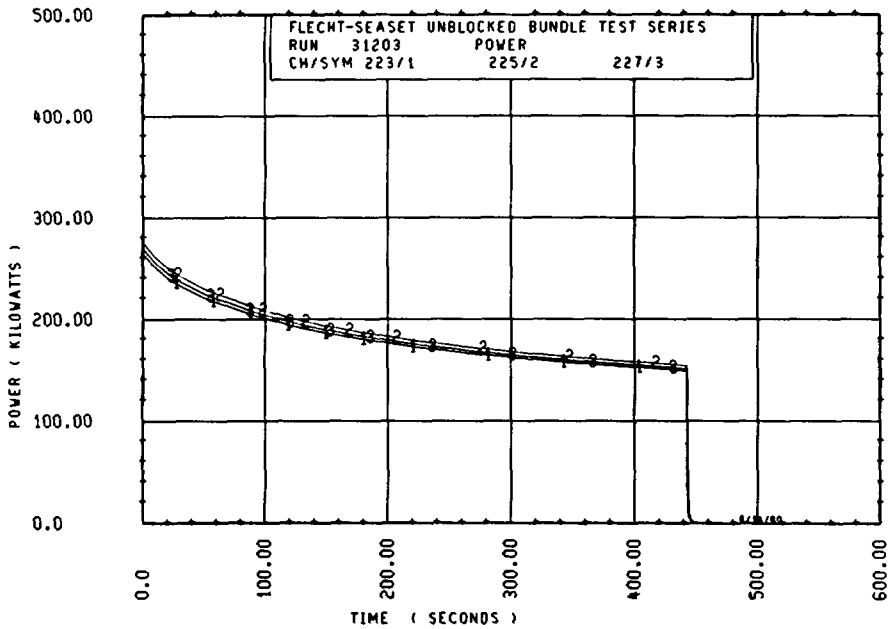


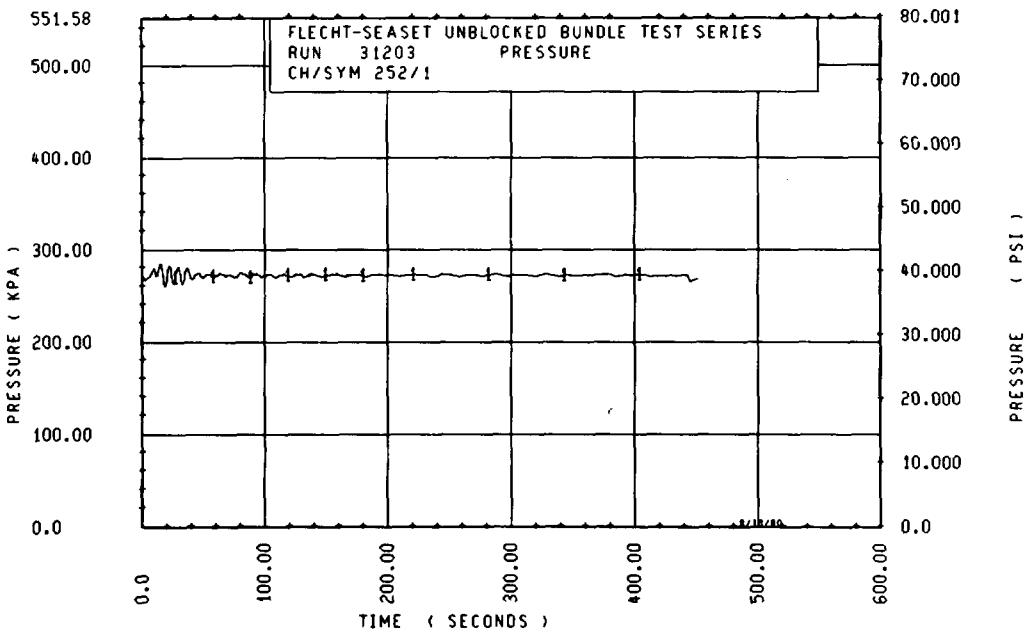


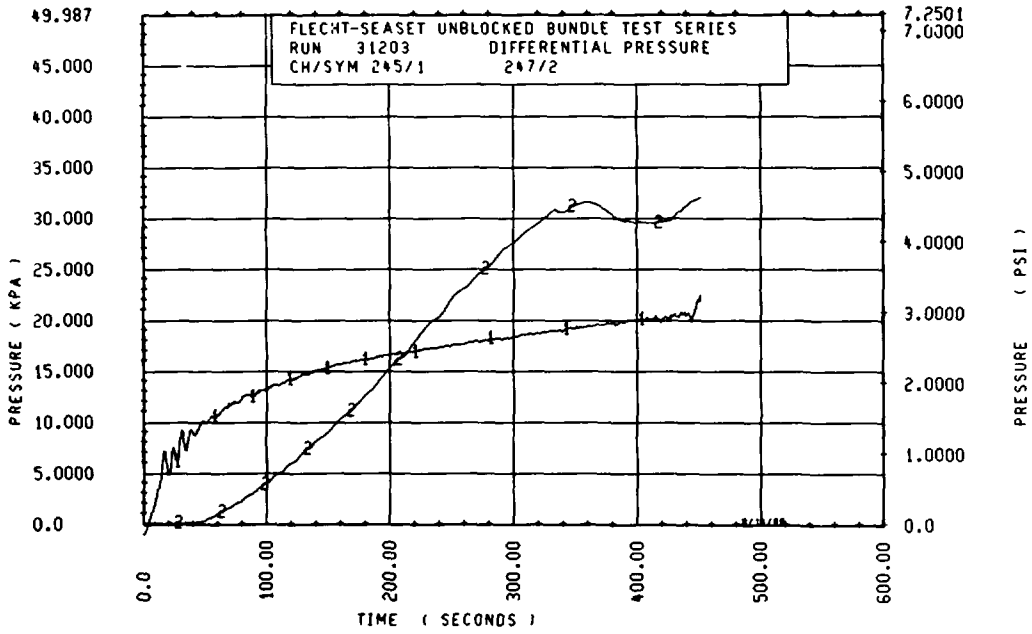
CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.);
CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.);
CH 207-4I, 3.05 m (120 in.)

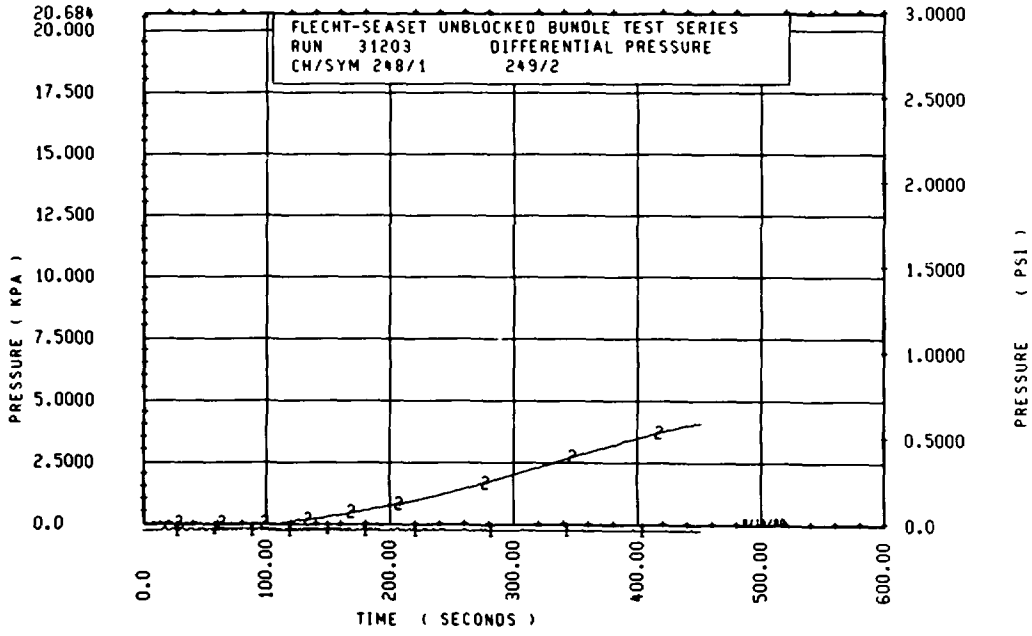
HOUSING TEMPERATURE

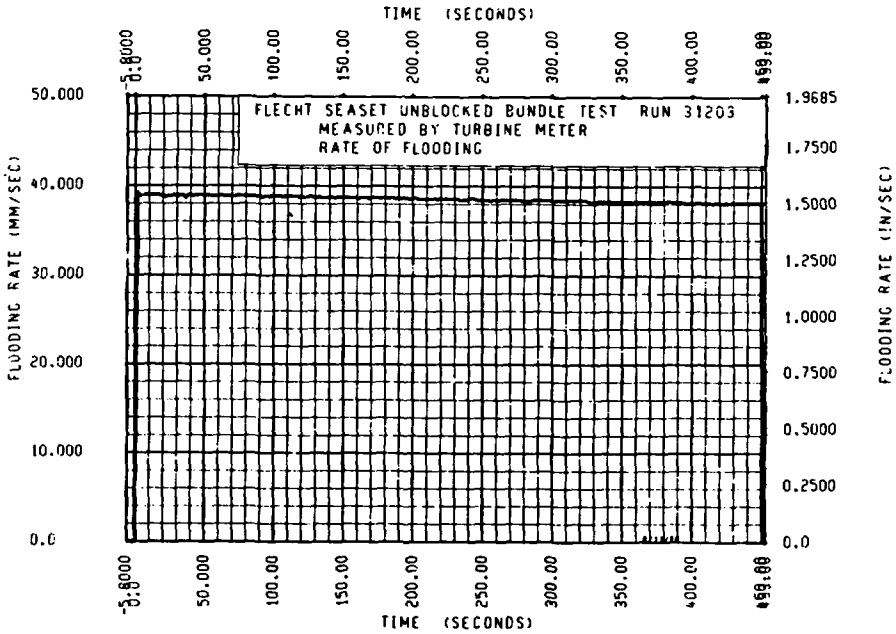


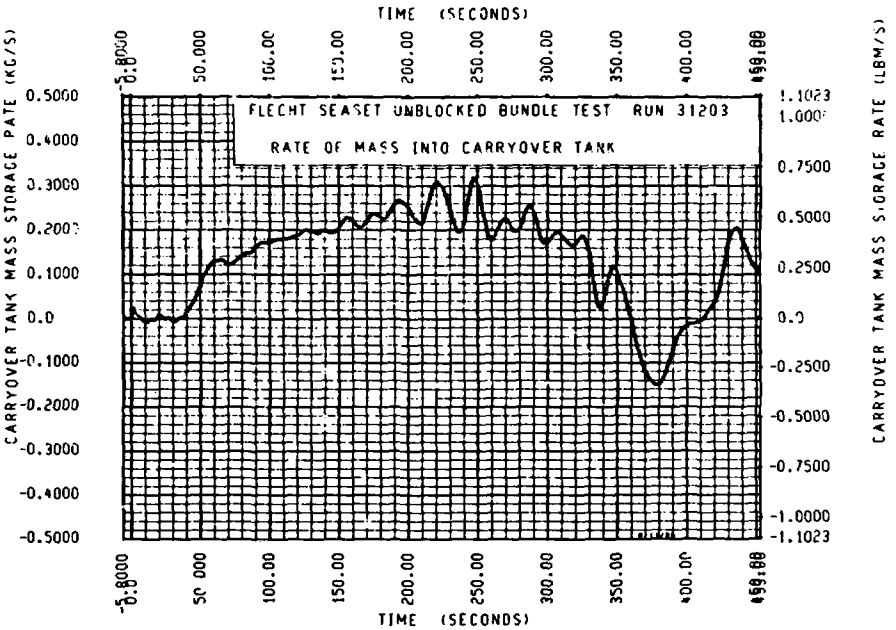

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

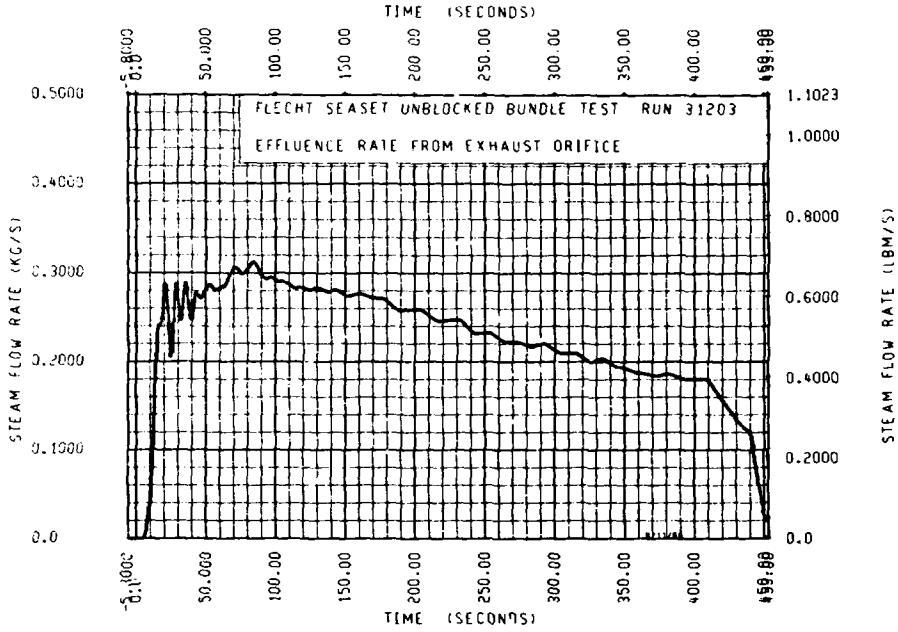

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

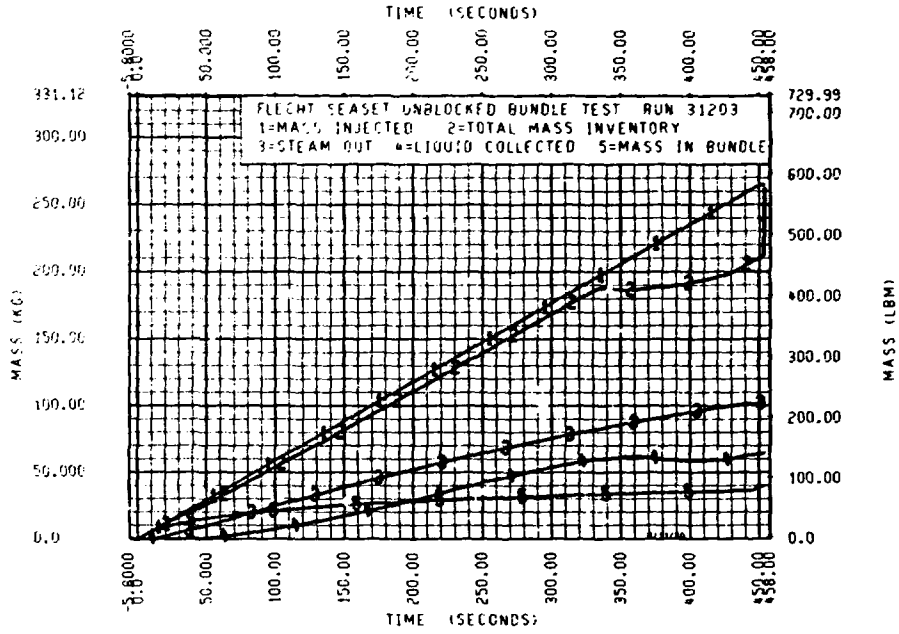

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00

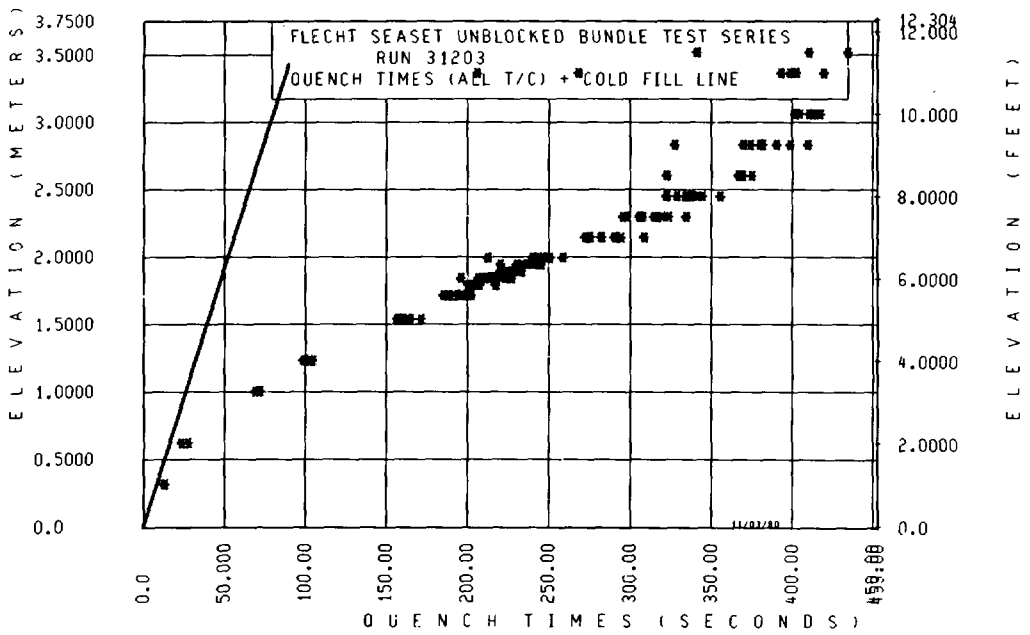

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00

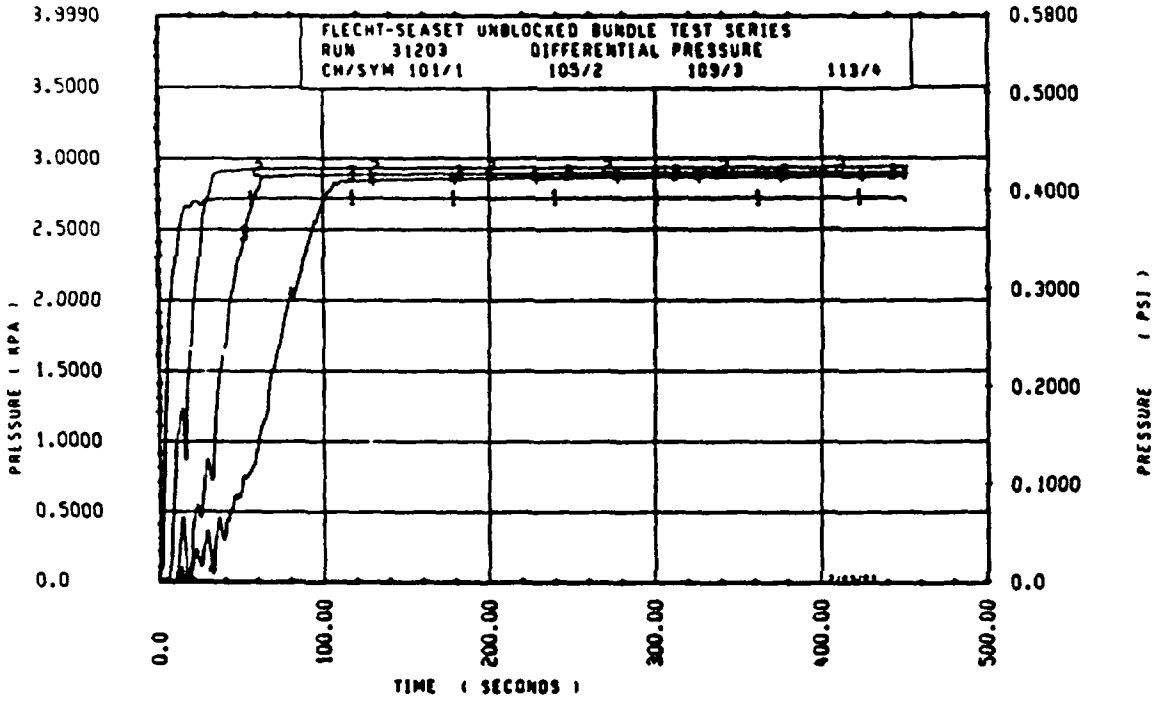

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31203
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.8000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
459.00

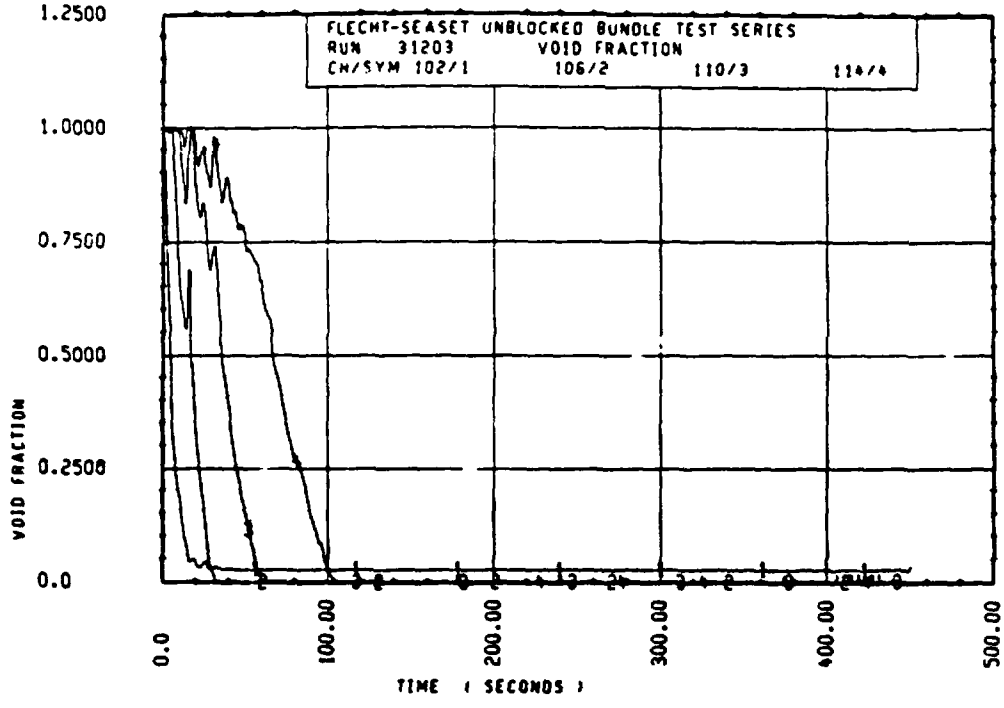

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31203
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
-0.1000
-0.2000
-0.3000
-0.4000
-0.5000
1.1023
1.0000
0.7500
0.5000
0.2500
0.0
-0.2500
-0.5000
-0.7500
-1.0000
-1.1023
-5.8000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
459.00

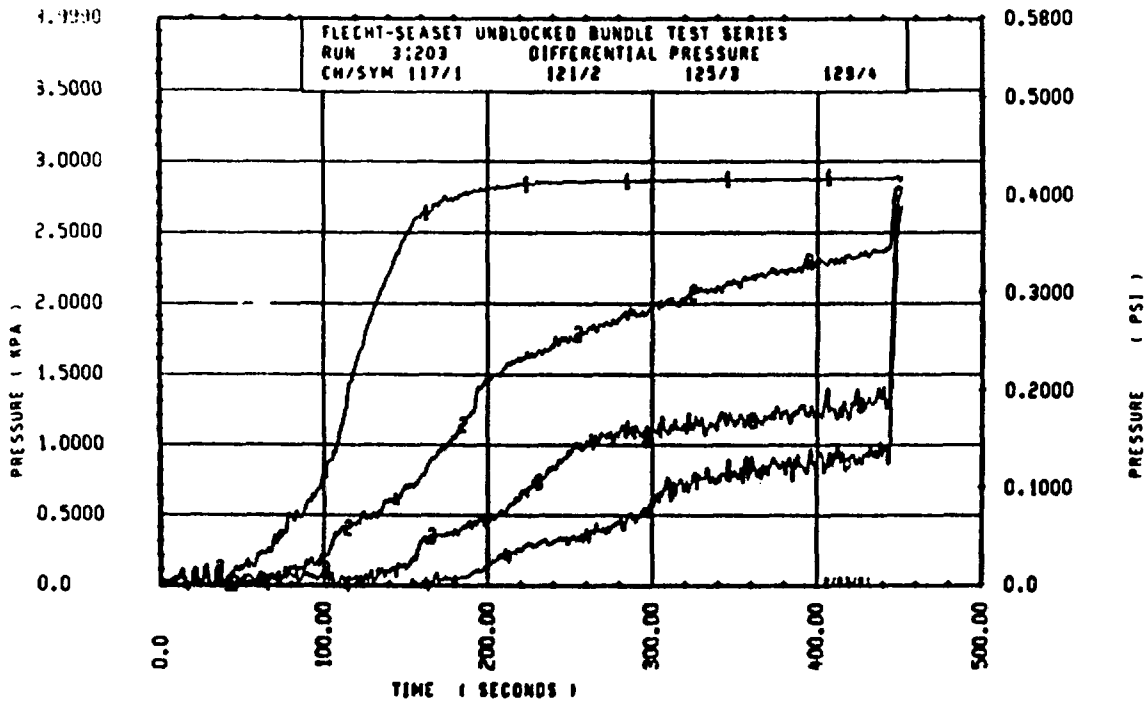

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31203
EFFLUENCE RATE FROM EXHAUST ORIFICE
TIME (SECONDS)
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00

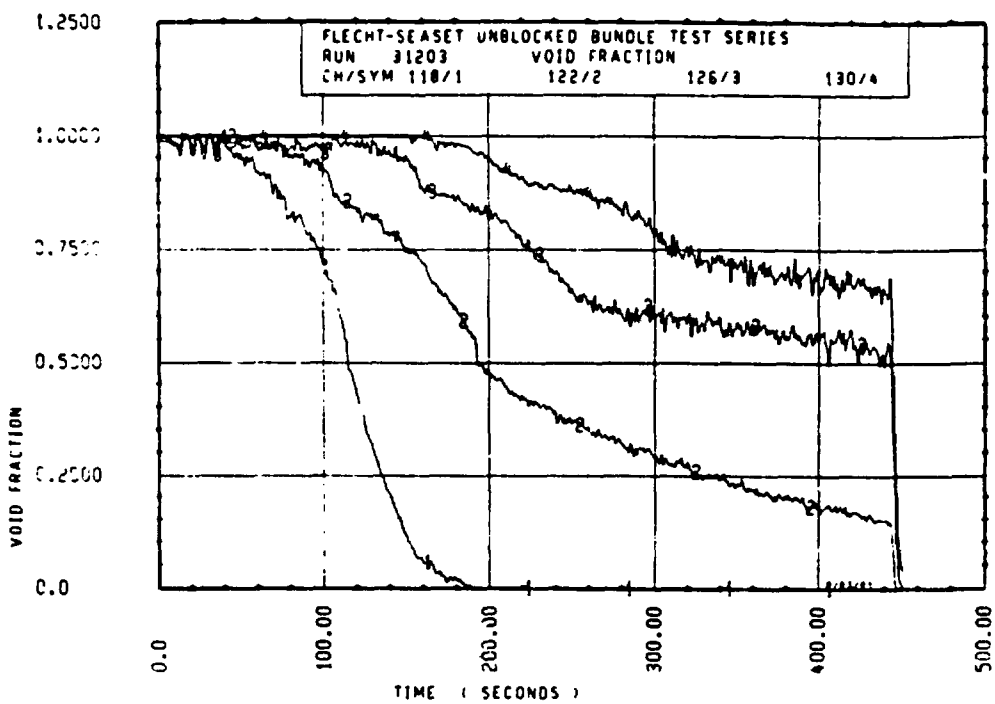

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31203
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
TIME (SECONDS)
MASS (KG)
MASS (LBM)
331.12
300.00
250.00
200.00
150.00
100.00
50.000
0.0
729.99
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00

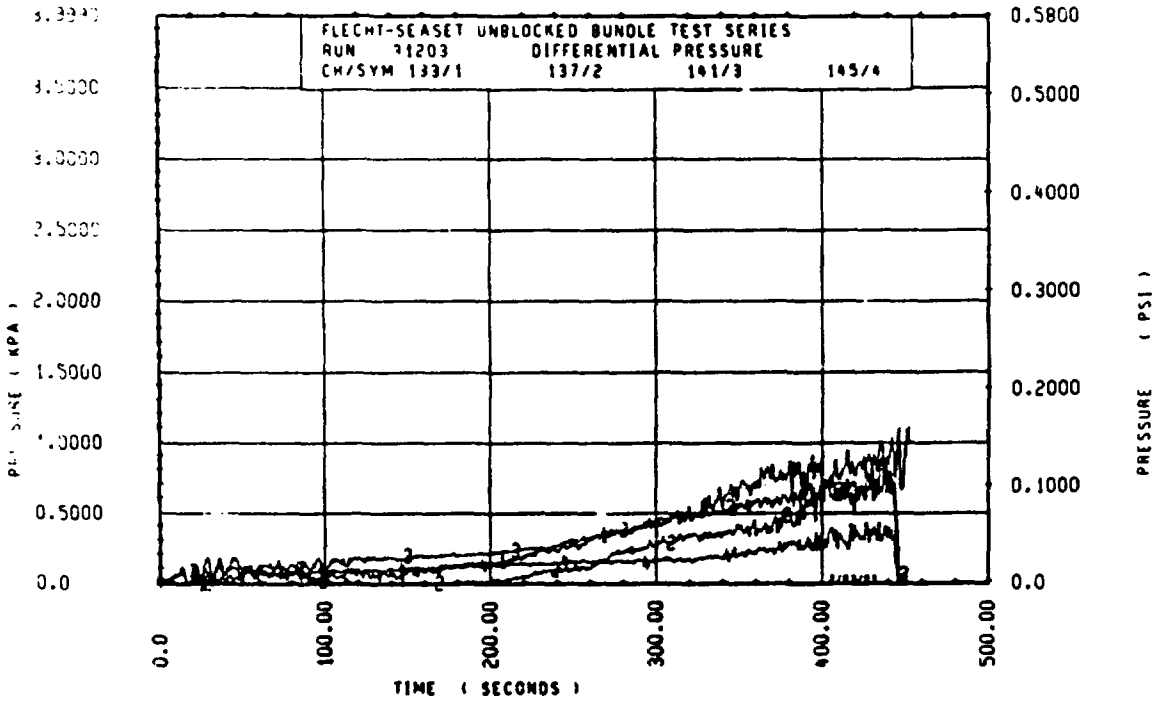

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
QUENCH TIMES (SECONDS)

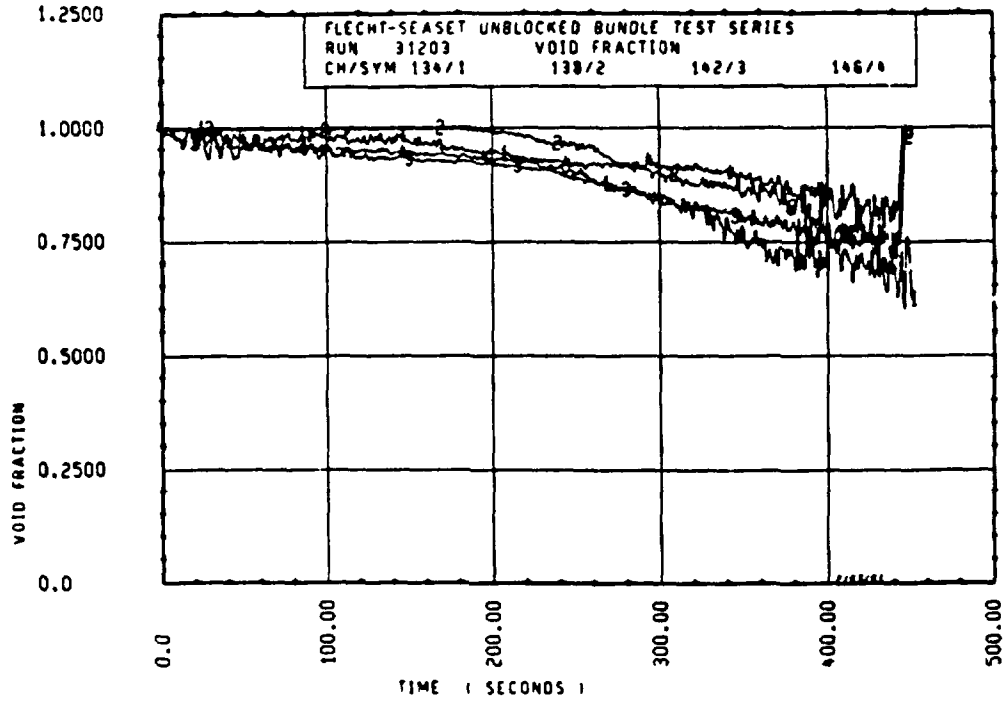

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
0.5000
1.0000
1.5000
2.0000
2.5000
3.0000
3.5000
0.1000
0.2000
0.3000
0.4000
0.5000
0.5800
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
0.0
0.2500
0.5000
0.7500
1.0000
1.2500
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
2.0000
1.5000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
PRESSURE (PSI)
0.0
100.00
200.00
300.00
400.00
500.00
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31203 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
VOID FRACTION
0.0
100.00
200.00
300.00
400.00
500.00
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 31302

Date: 3/21/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	869°C (1597°F)
Rod peak power	2.3 kw/m (0.69 kw/ft)
Flow rate	76.5 mm/sec (3.01 in./sec)
Coolant temperature	52°C (126°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 6J, 11G

B. Housing Temperatures

Elevation	Initial Temperature	Hot Rod Quench Time Temperature*
0.61 m (24 in.)	134°C (273°F)	65°C (149°F)
1.22 m (48 in.)	162°C (324°F)	86°C (186°F)
1.83 m (72 in.)	221°C-267°C (429°F-513°F)	132°C-135°C (270°F-275°F)
2.44 m (96 in.)	166°C-187°C (330°F-368°F)	132°C (269°F)
2.74 m (108 in.)	154°C-188°C (310°F-370°F)	132°C (270°F)
3.05 m (120 in.)	128°C-141°C (262°F-286°F)	124°C-132°C (255°F-269°F)
3.35 m (132 in.)	132°C (270°F)	132°C (269°F)

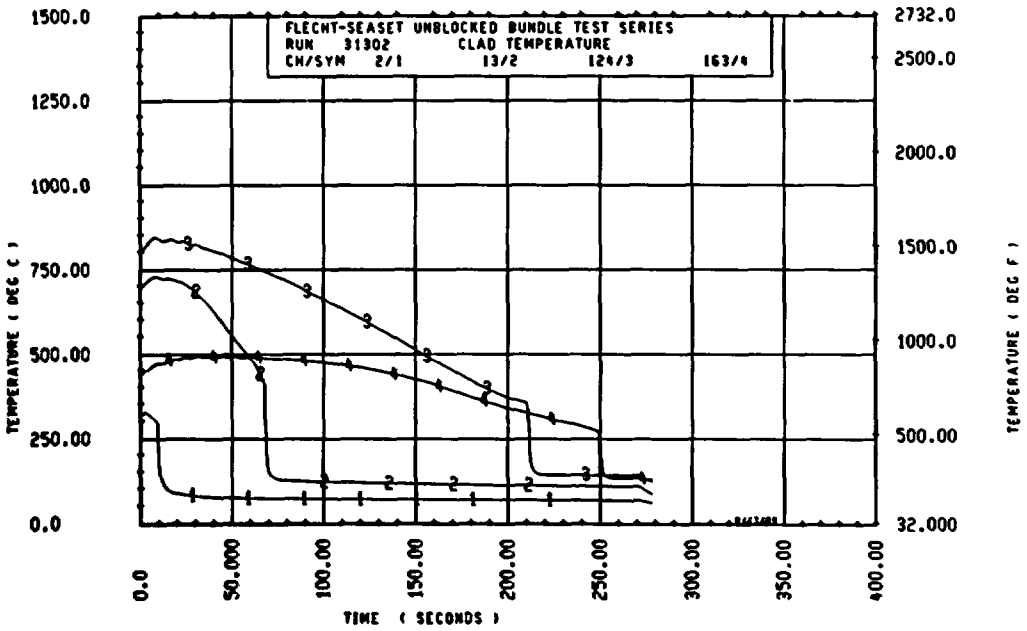
*At 124 seconds after flood

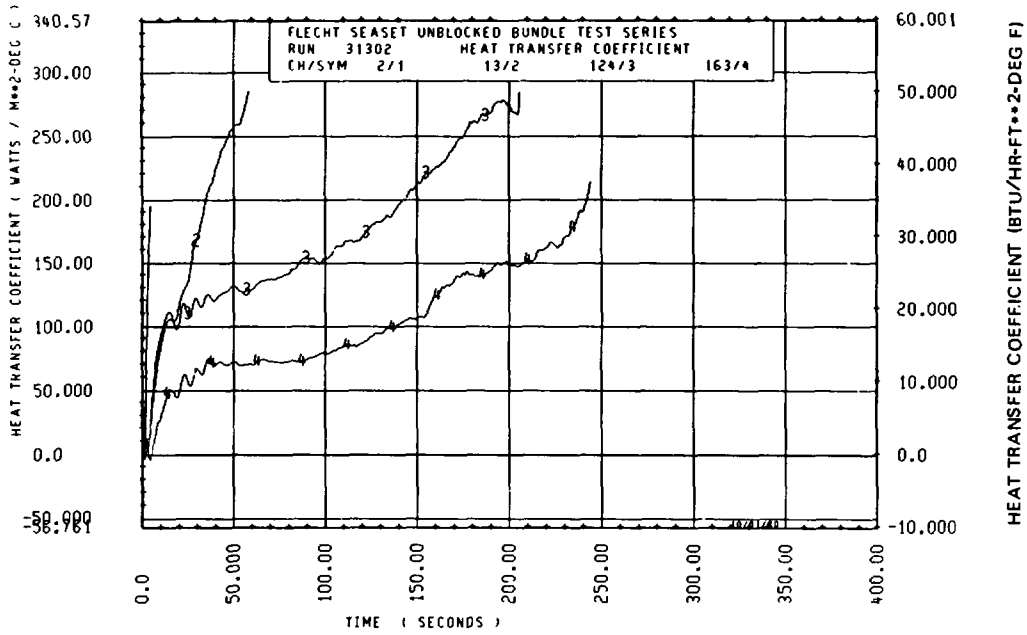
C. Comments

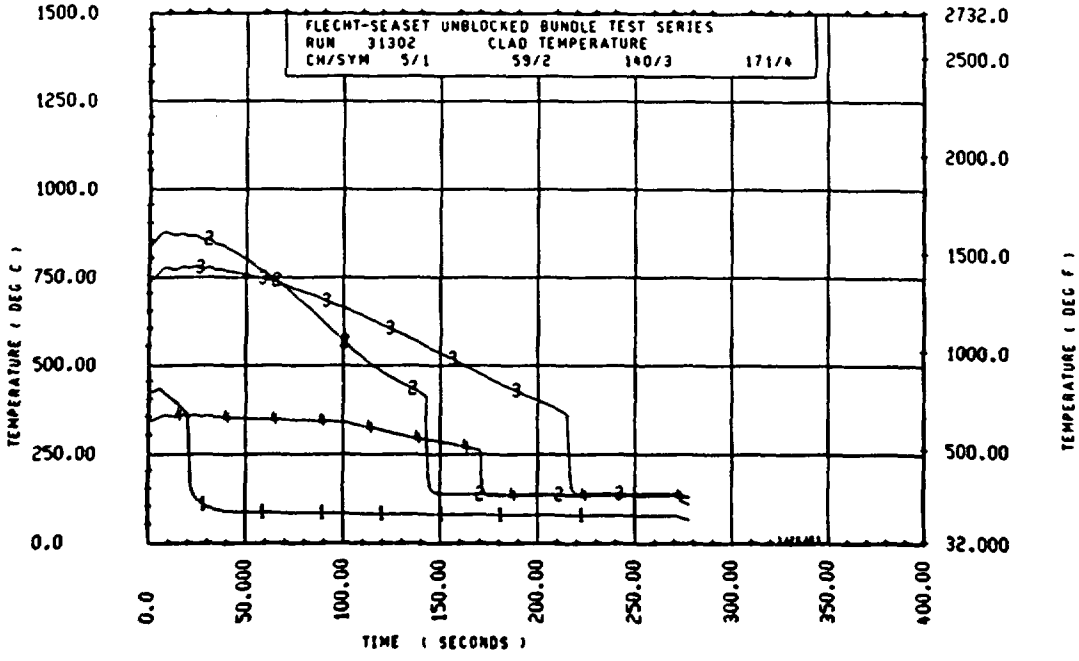
Rods 6J and 11G were disconnected prior to this test because of low resistance, and were replaced after this test.

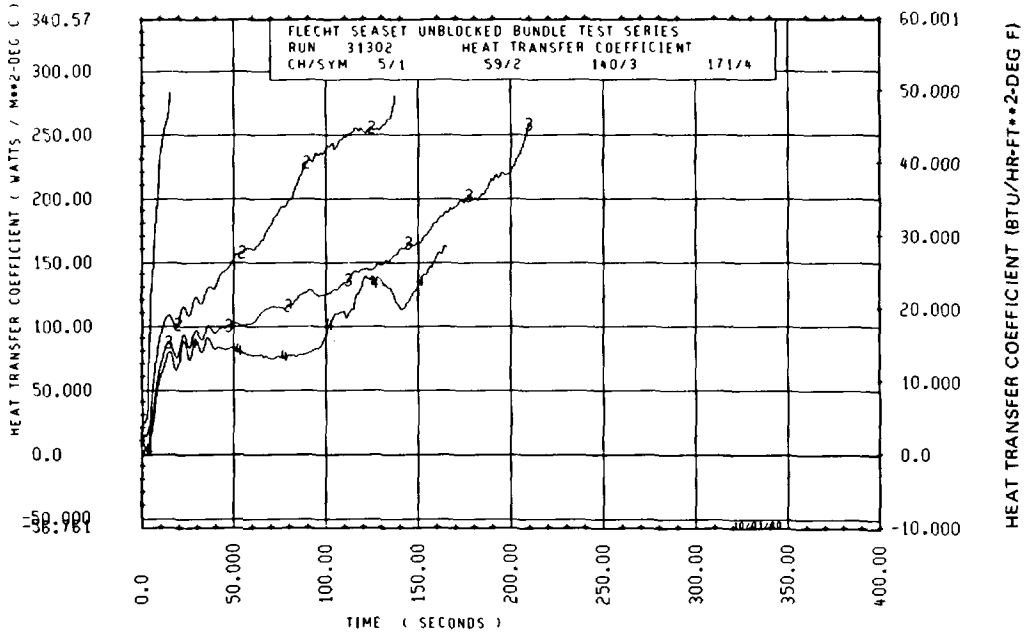
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 31302

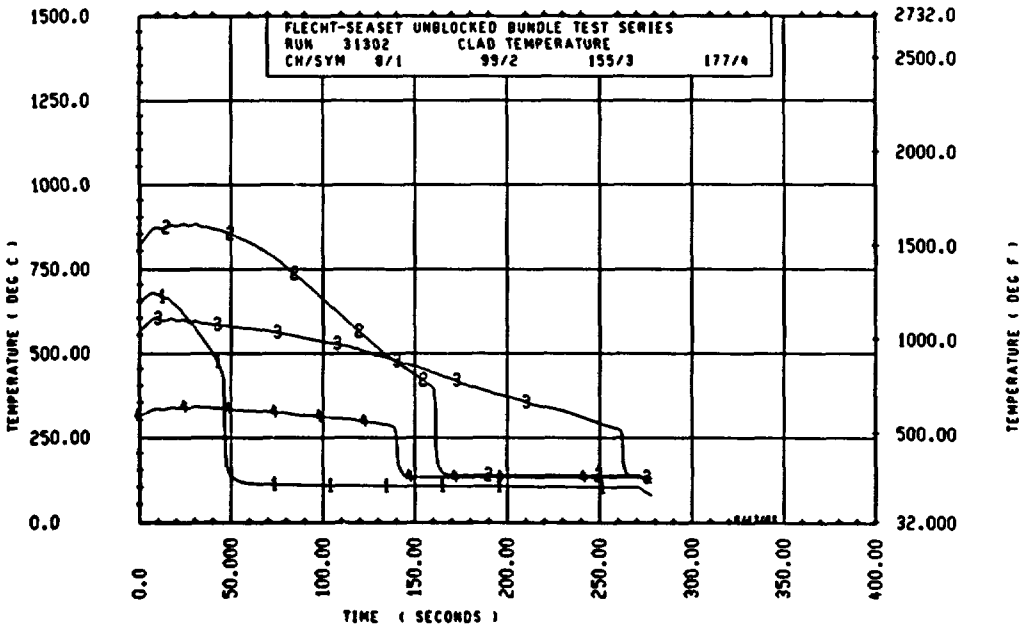
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1250.	1312.	62.	7.5	755.	66.5
2H 6- 0	50	1551.	1634.	83.	16.5	759.	139.5
3C 5- 0	17	1327.	1387.	60.	7.0	783.	104.5
3C 5- 7	28	1426.	1488.	62.	7.5	750.	125.5
4L 8- 0	129	1311.	1412.	101.	23.0	696.	210.0
4L 8- 4	147	1312.	1414.	102.	23.0	700.	210.0
5E11- 0	168	647.	689.	42.	23.5	690.	182.5
5J 4- 0	**BAD THERMOCOUPLE DATA*						
5J 8- 6	**BAD THERMOCOUPLE DATA*						
5J11- 6	**BAD THERMOCOUPLE DATA*						
7B 6- 0	57	1479.	1557.	78.	8.0	724.	124.5
7B 8- 6	142	1113.	1187.	74.	17.0	692.	233.5
7B10- 0	162	817.	928.	112.	31.5	531.	258.0
7B11- 6	176	637.	678.	41.	30.5	364.	189.2
7D 6- 4	84	1598.	1681.	83.	7.5	752.	146.0
7D 7- 6	119	1465.	1551.	86.	8.0	703.	193.0
7D 9- 3	151	1005.	1068.	63.	8.0	568.	235.8
7G 5- 0	23	1494.	1567.	73.	7.5	851.	103.3
7J 6- 0	**BAD THERMOCOUPLE DATA*						
7M 7- 6	120	1455.	1537.	81.	8.0	693.	198.6
7M 8- 0	132	1307.	1421.	114.	24.0	675.	213.0
7M 9- 3	152	1011.	1078.	67.	17.0	568.	238.0
8H 4- 0	13	1281.	1345.	64.	8.0	765.	68.0
8H10- 0	163	828.	921.	93.	31.0	518.	249.0
8H11- 6	177	601.	648.	47.	30.5	536.	138.9
8K 4- 0	14	1252.	1317.	65.	8.5	755.	67.0
8K 6- 6	99	1509.	1623.	115.	23.5	739.	160.7
8K 8- 0	140	1351.	1437.	85.	23.5	680.	215.0
8K10- 0	164	829.	920.	91.	30.5	508.	251.0
8N 2- 0	5	788.	814.	26.	5.0	675.	20.5
8N 4- 0	15	1258.	1322.	63.	8.0	771.	66.0
8N 6- 0	61	1543.	1628.	84.	7.5	749.	139.9
8N10- 0	165	825.	943.	118.	60.5	559.	253.5
9C 7- 0	109	1461.	1541.	80.	7.5	693.	186.0
9C 9- 3	153	1020.	1083.	63.	8.5	563.	246.0
9G 1- 0	2	611.	623.	12.	3.0	568.	9.1
9G 3- 3	8	1203.	1255.	51.	7.0	801.	46.0
9G11- 0	171	646.	680.	35.	17.0	503.	170.5
9I 5- 0	24	1506.	1581.	75.	7.5	837.	102.9
9I 5-10	46	1612.	1696.	84.	7.5	777.	134.0
10D 6- 6	93	1484.	1584.	100.	30.5	743.	161.4
11E 7- 6	124	1471.	1554.	82.	8.0	671.	210.8
11E 9- 3	155	1055.	1119.	64.	8.0	515.	261.9
11E11- 0	172	657.	693.	36.	17.0	470.	191.5
12D 4- 0	14	1273.	1334.	61.	7.5	767.	67.1
12D 6- 0	66	1564.	1646.	82.	8.0	757.	140.7
13G 6- 6	**BAD THERMOCOUPLE DATA*						

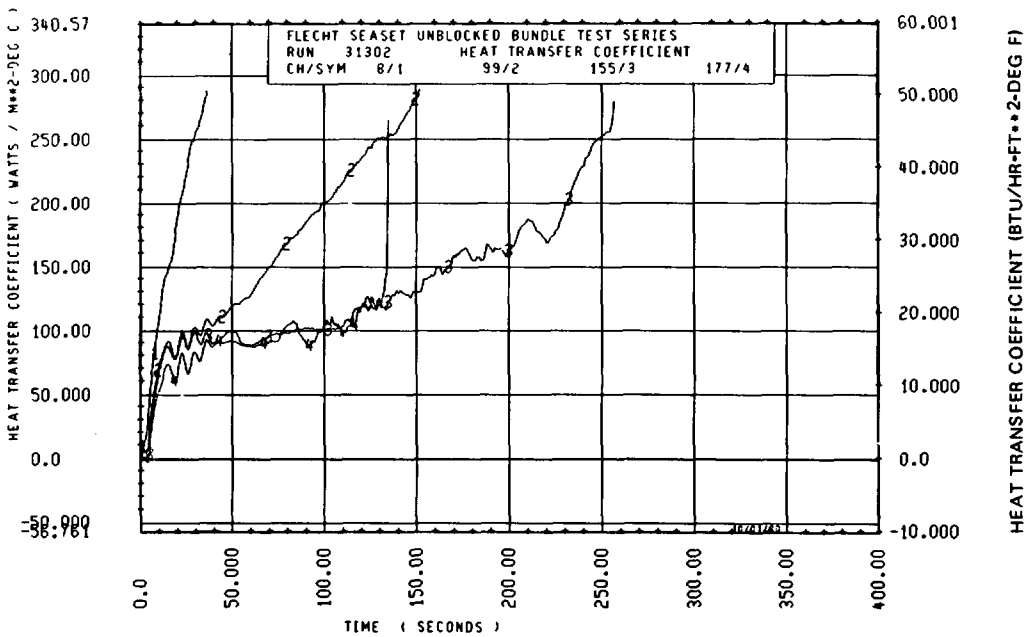

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

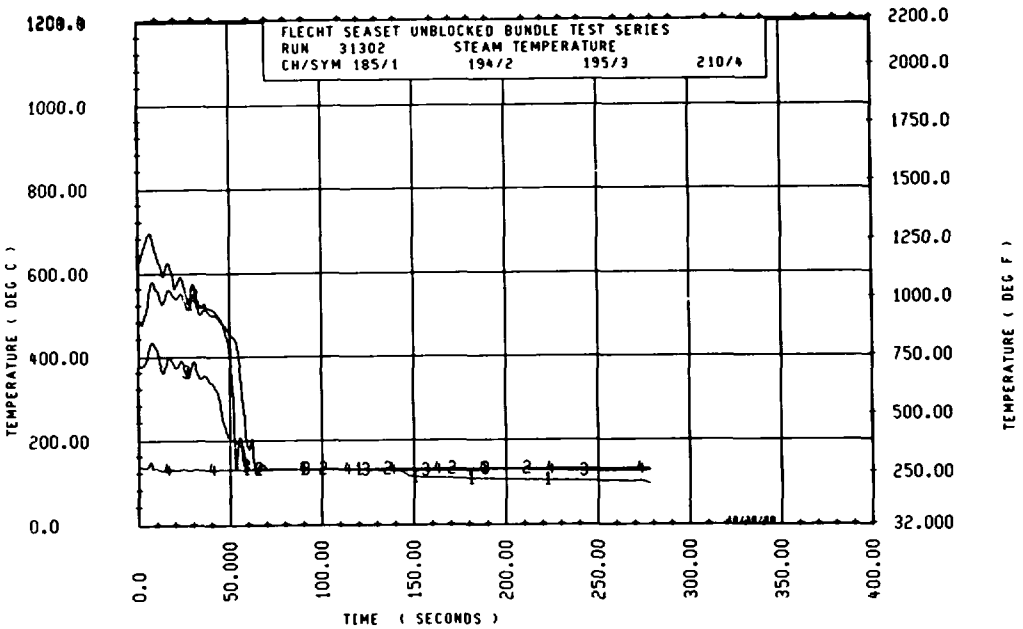

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

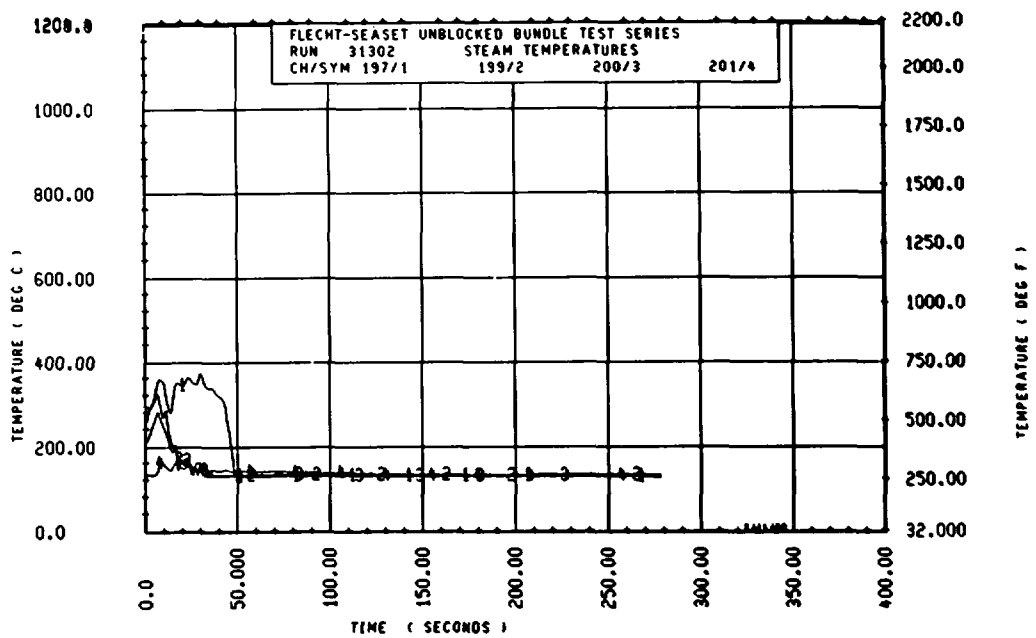

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

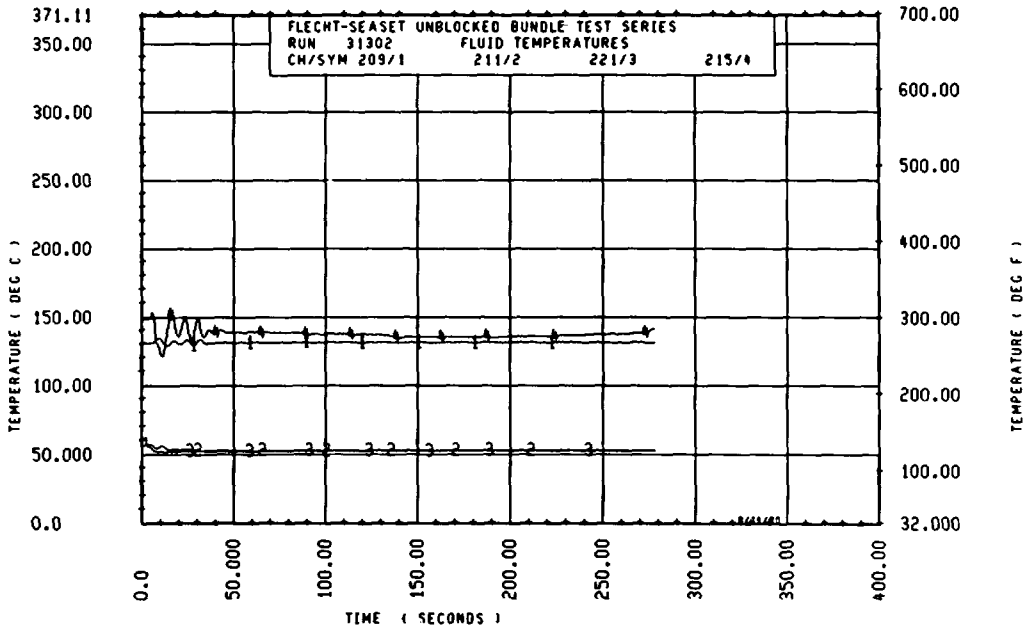

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-36.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

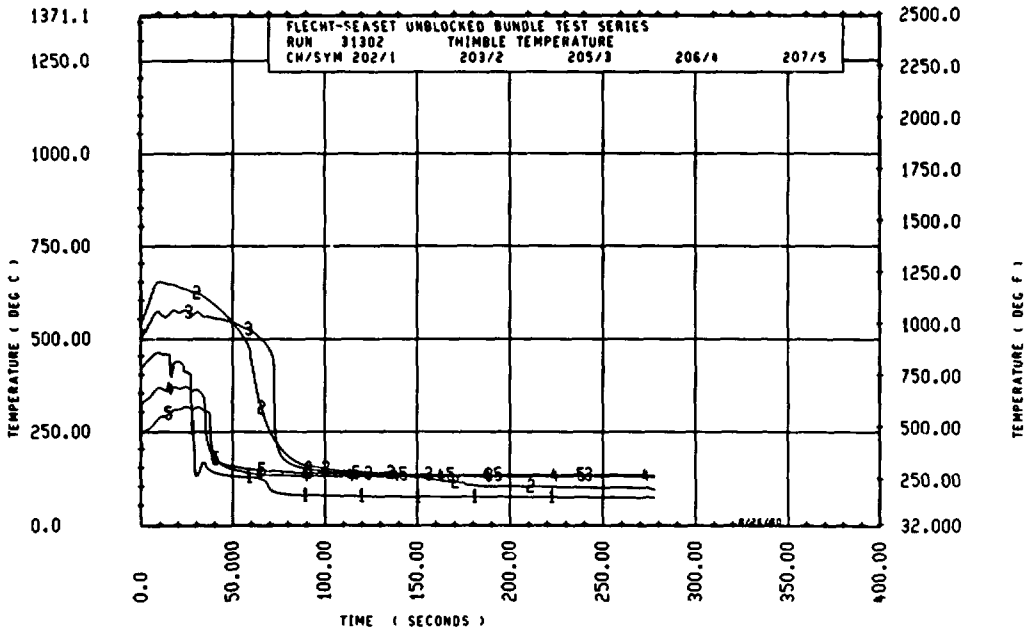

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

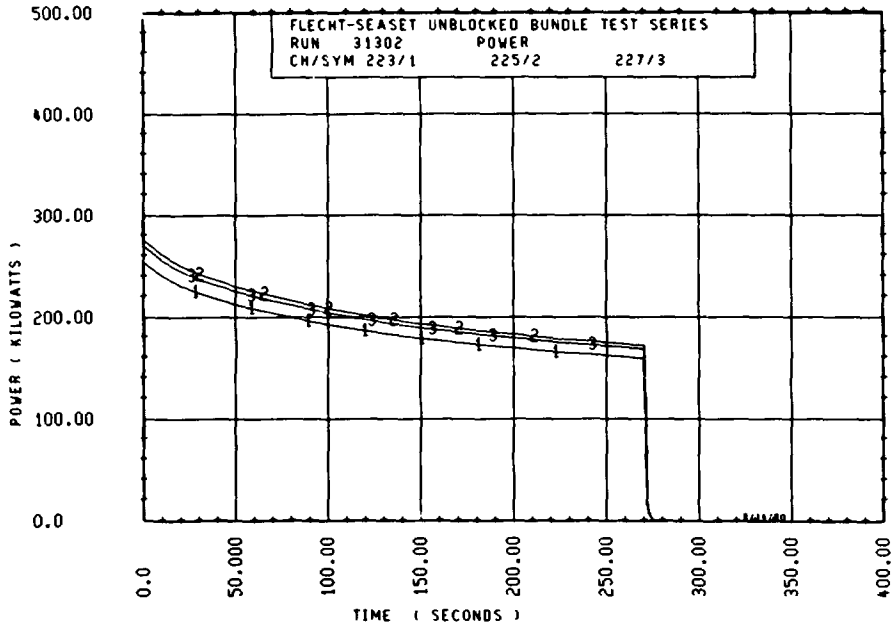

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

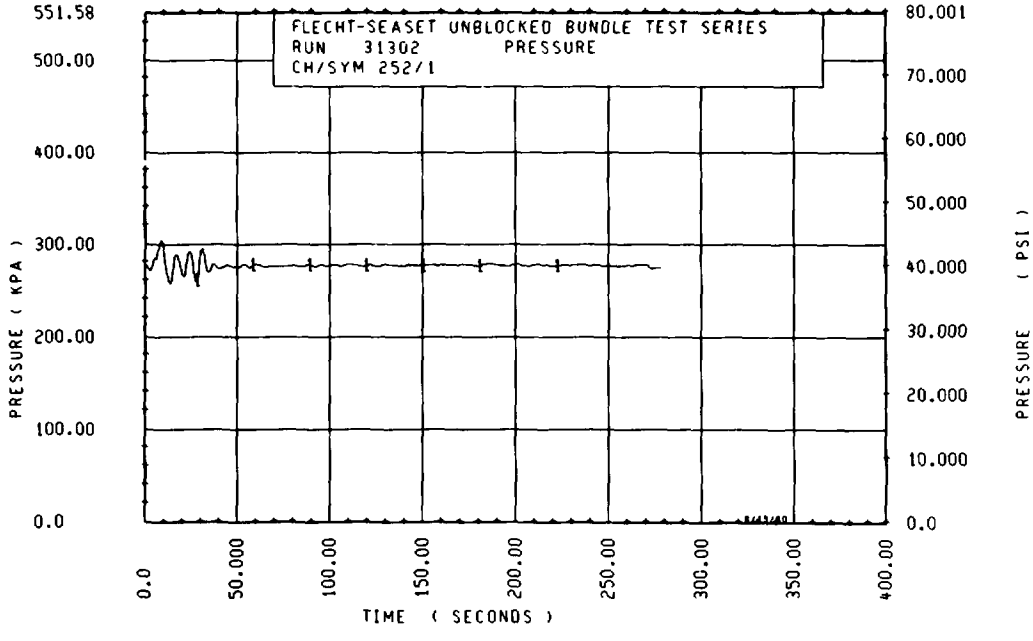

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

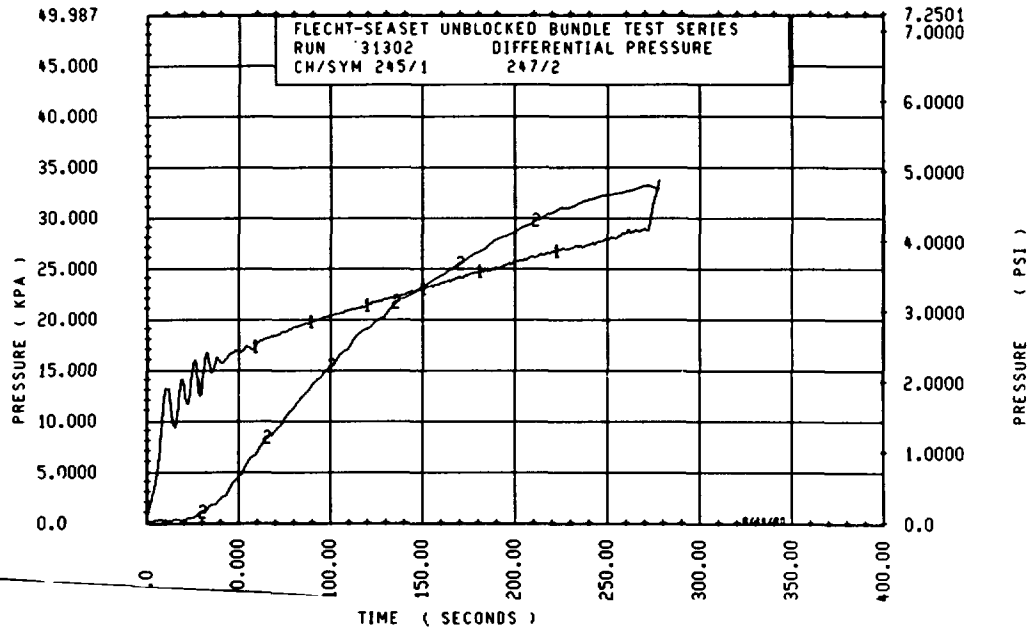


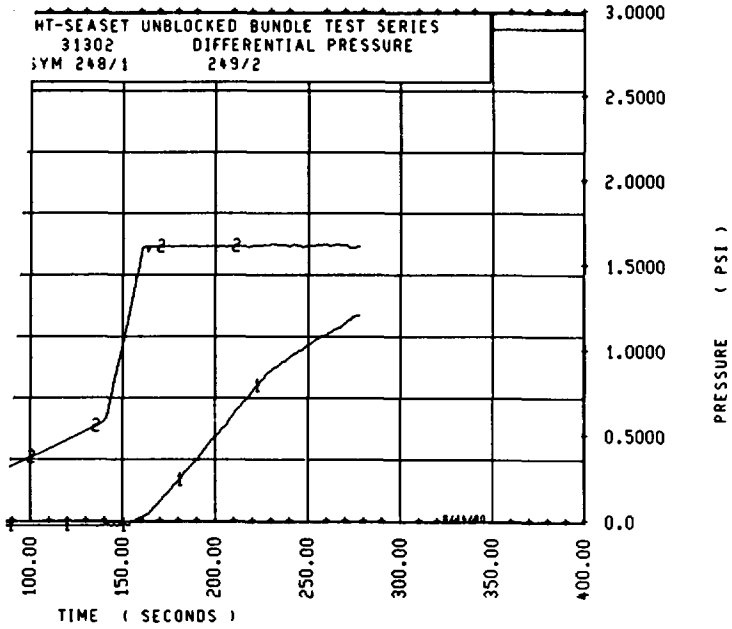


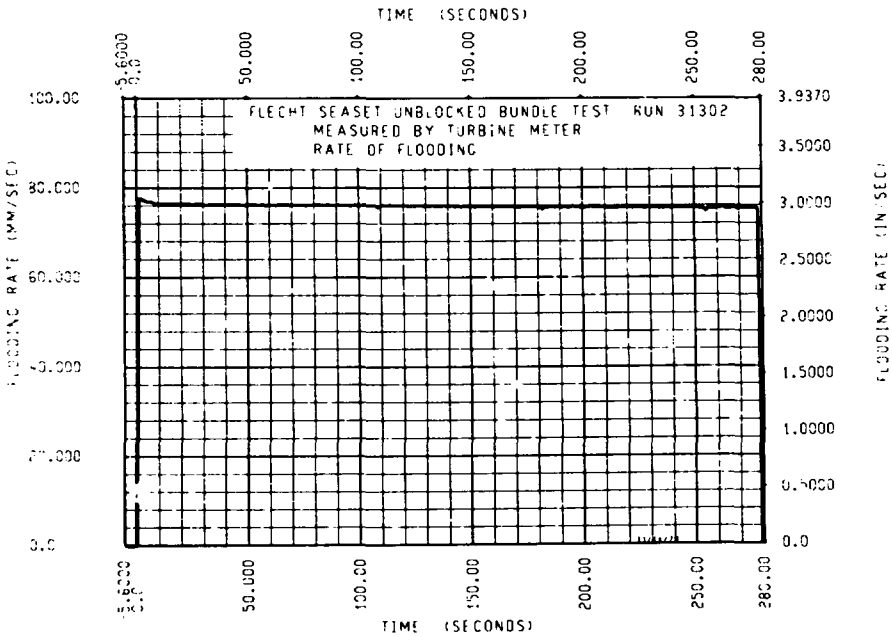
CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.); CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

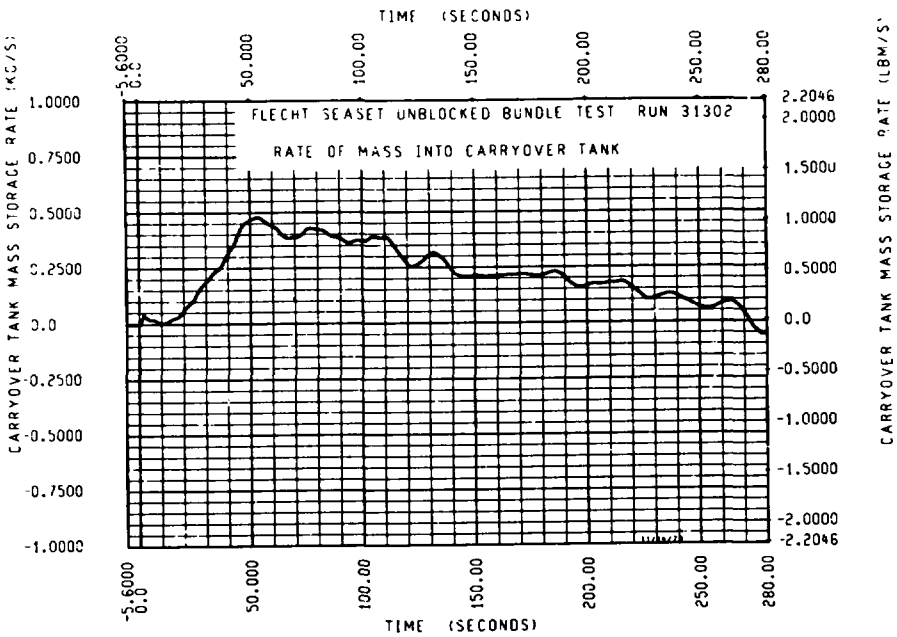

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

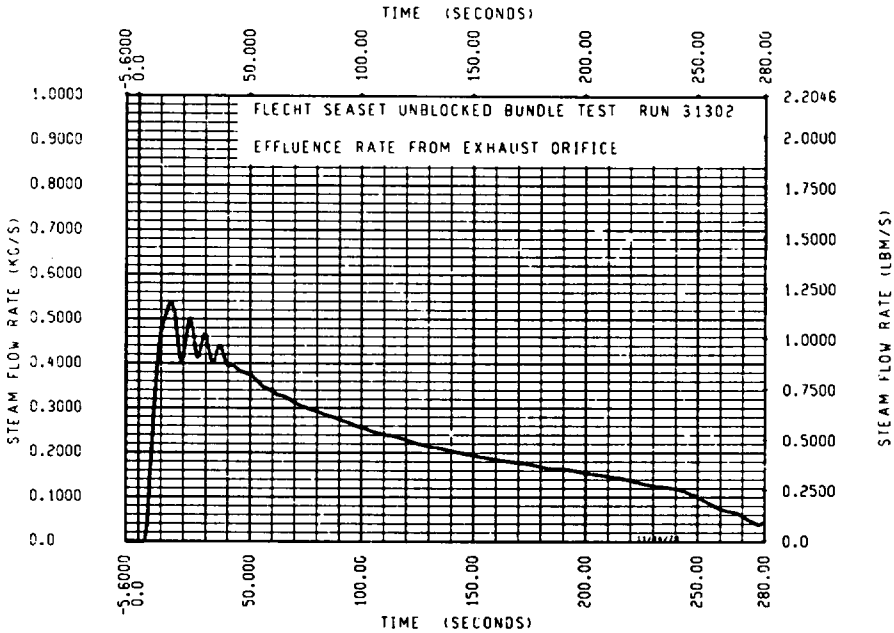

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

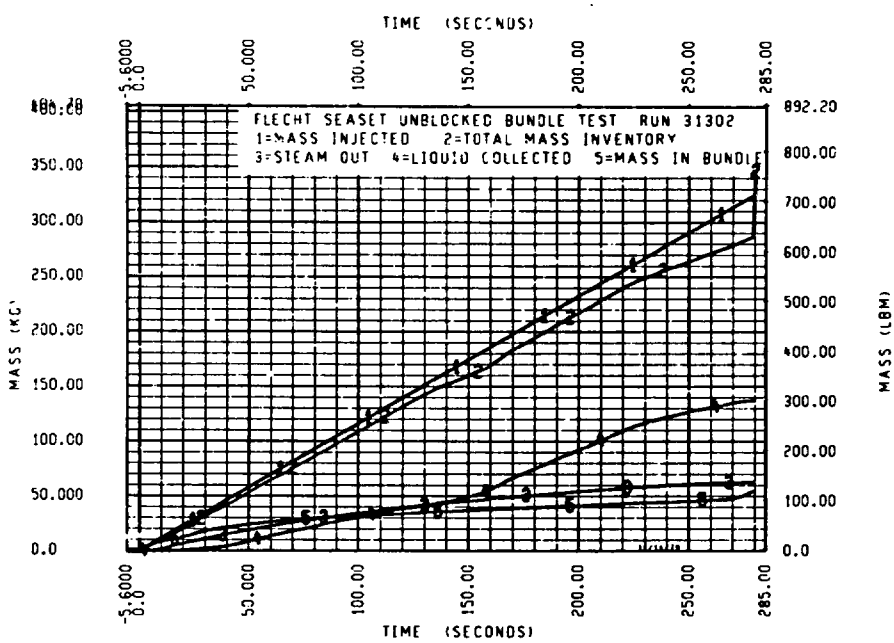

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
PRESSURE (PSI)
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

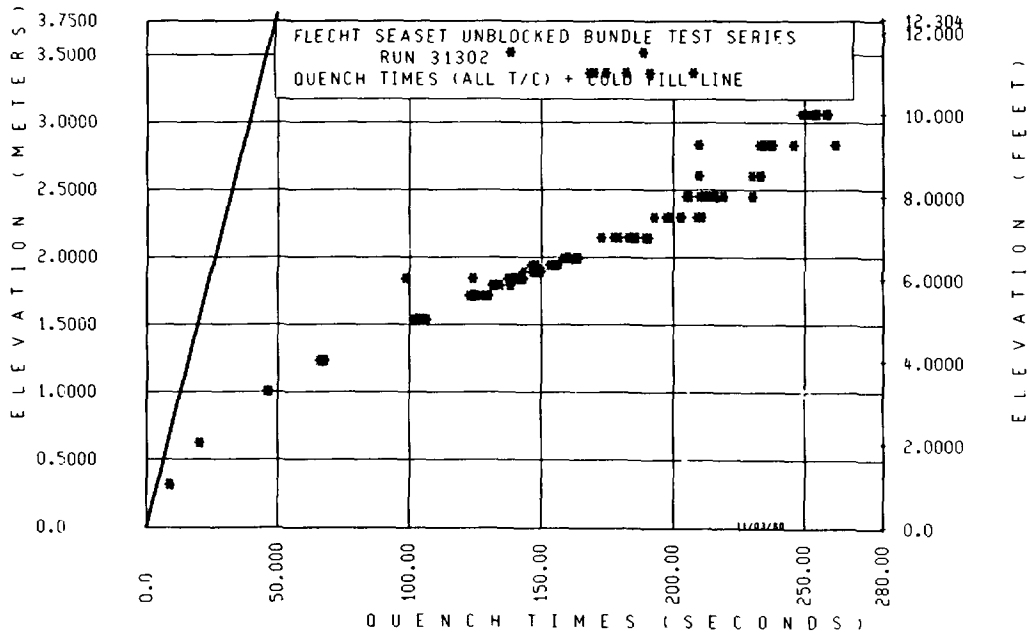

HT-SEASET UNBLOCKED BUNDLE TEST SERIES
31302 DIFFERENTIAL PRESSURE
SYM 248/1 249/2
PRESSURE (PSI)
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

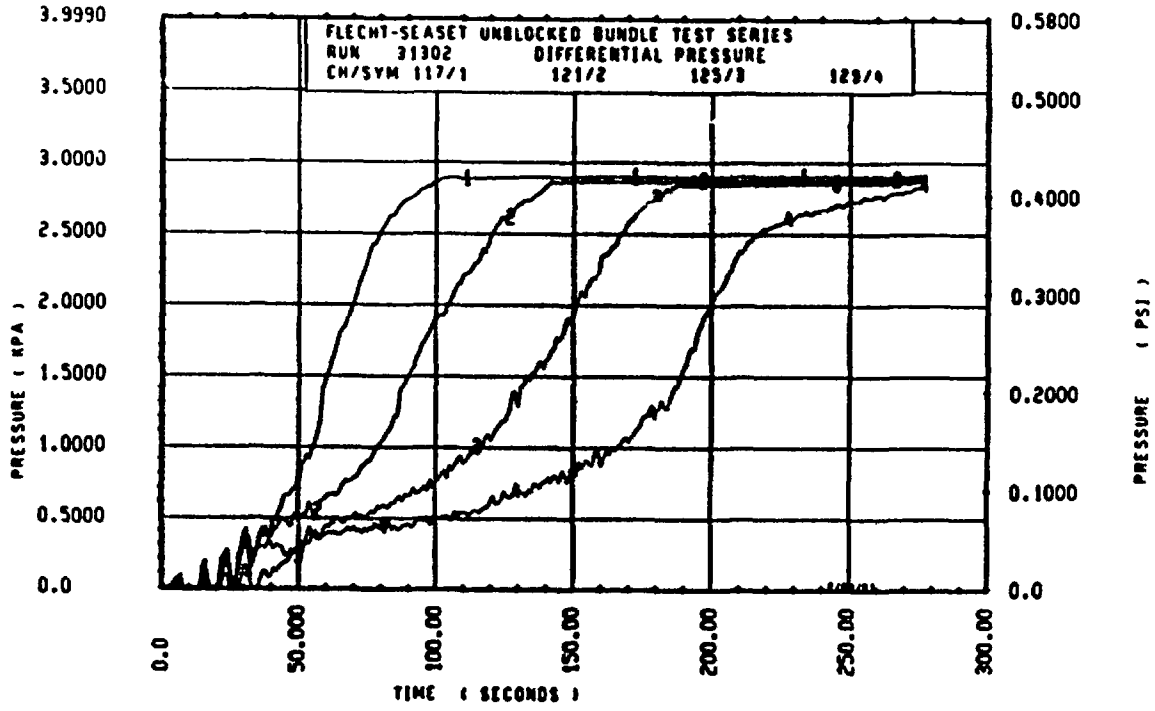

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31302
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
100.00
80.000
60.000
40.000
20.000
0.0
3.9370
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
-5.6000
0.0
50.000
100.00
150.00
200.00
250.00
280.00

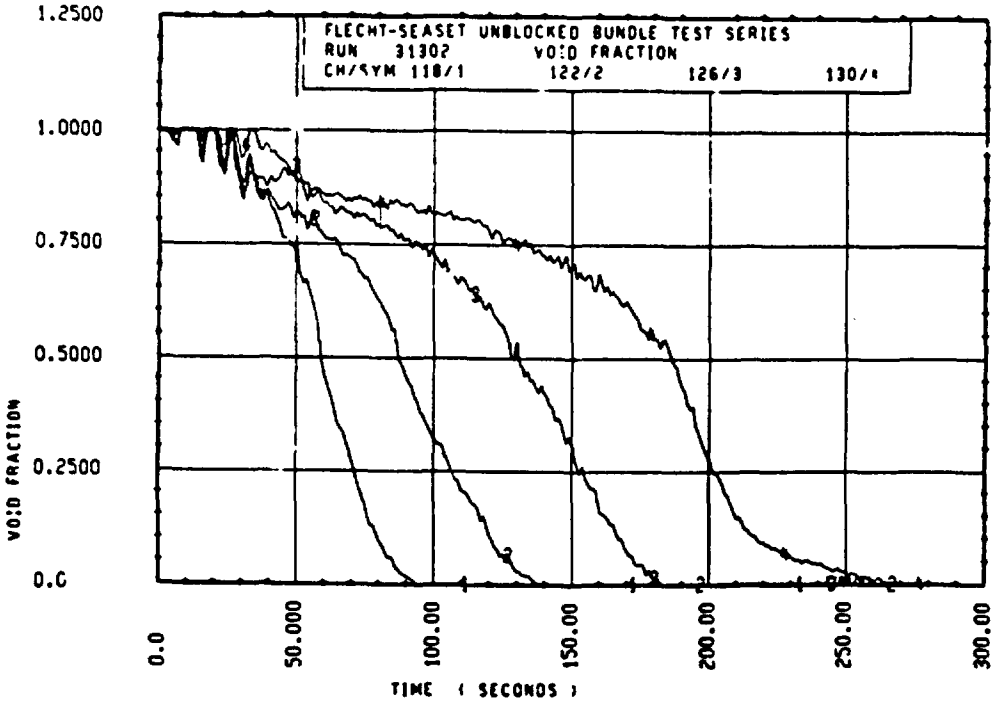

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31302
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
1.0000
0.7500
0.5000
0.2500
0.0
-0.2500
-0.5000
-0.7500
-1.0000
2.2046
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
-2.2046
-5.6000
0.0
50.000
100.00
150.00
200.00
250.00
280.00

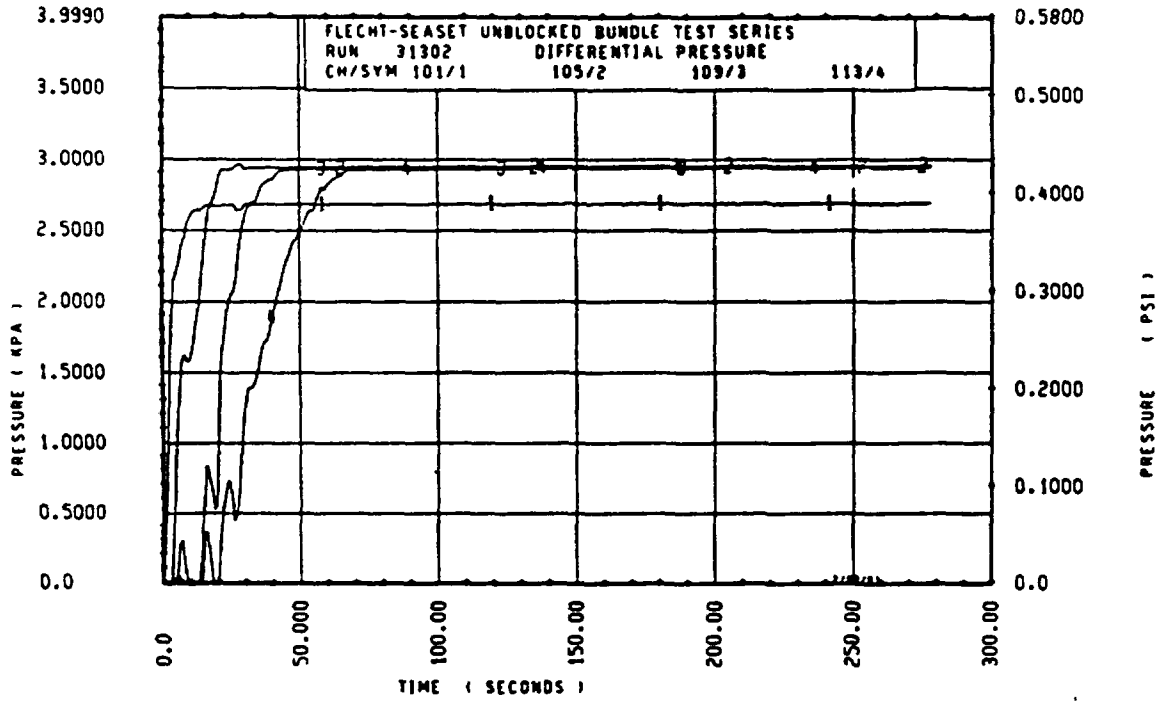

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31302
EFFLUENCE RATE FROM EXHAUST ORIFICE
TIME (SECONDS)
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
-5.6000
0.0
50.000
100.00
150.00
200.00
250.00
280.00
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
2.2046
2.0000
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0

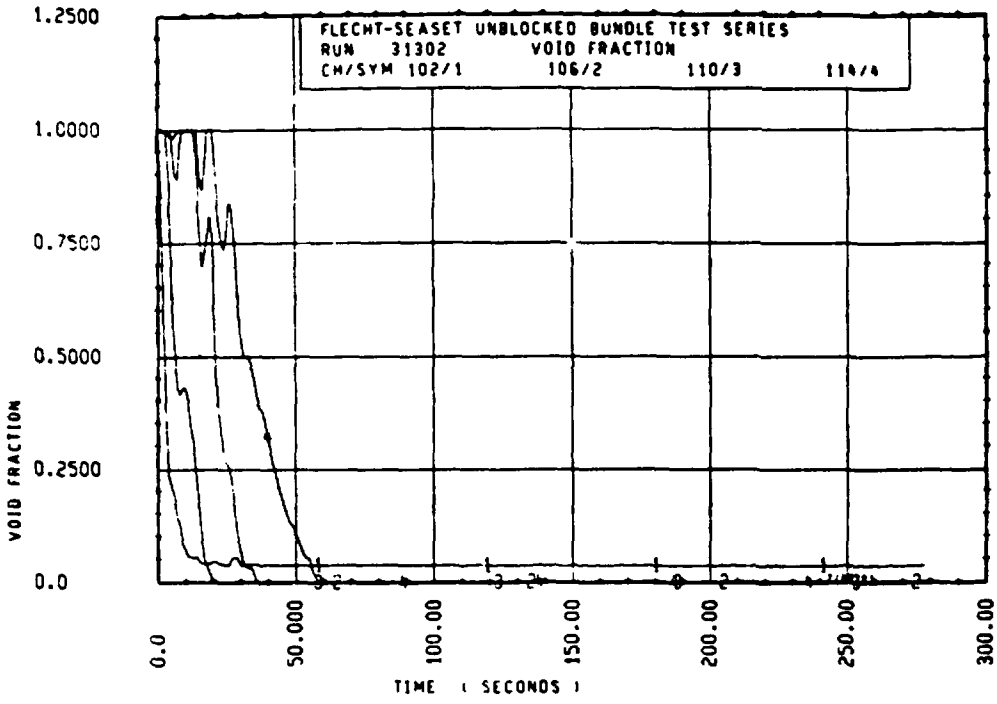

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31302
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
TIME (SECONDS)
MASS (KG)
MASS (LBM)
-5.6000
0.0
50.000
100.00
150.00
200.00
250.00
285.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
892.20
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0

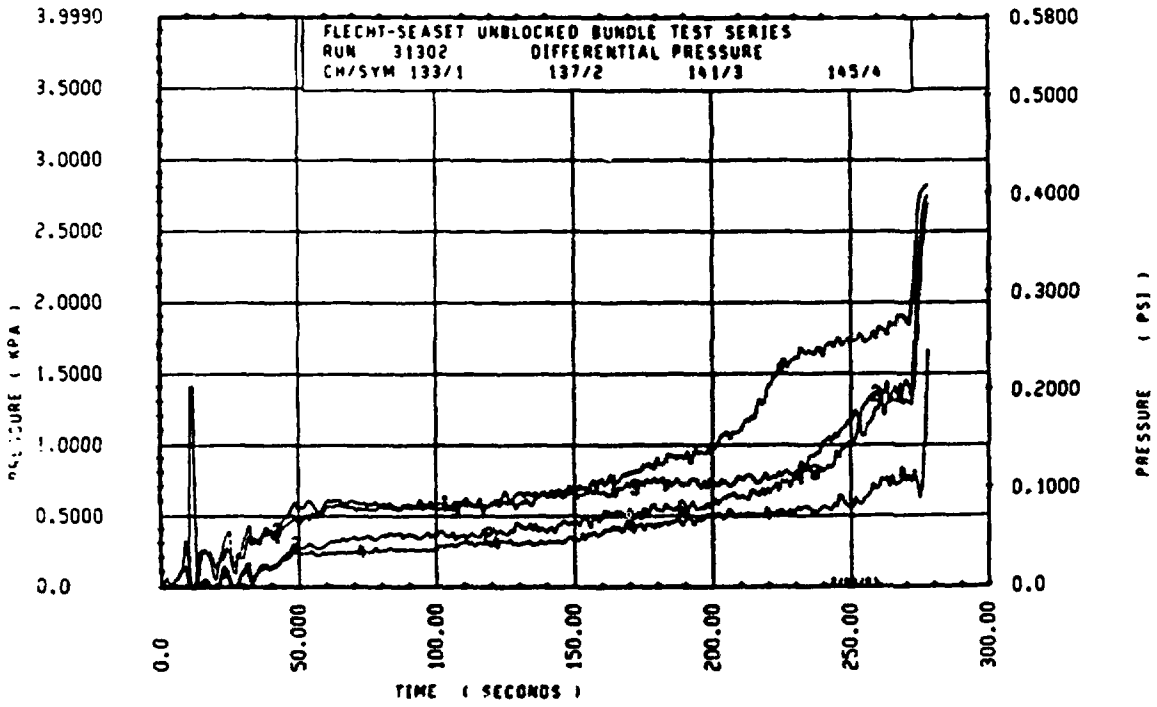

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
280.00
QUENCH TIMES (SECONDS)

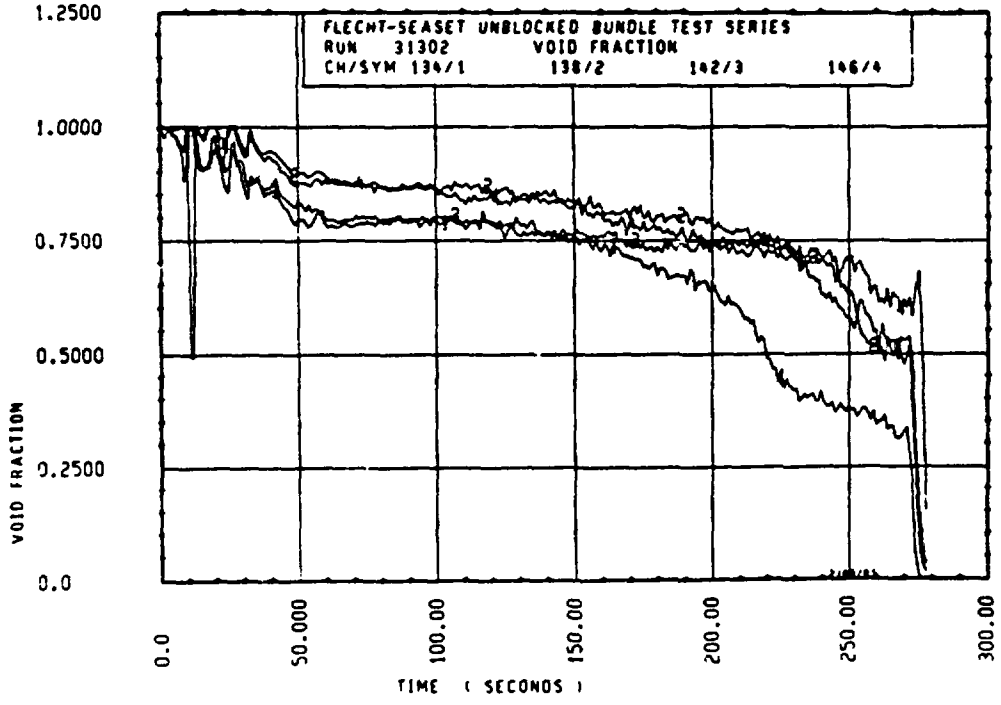

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
PRESSURE (PSI)
0.0
50.000
100.00
150.00
200.00
250.00
300.00
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31302 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
VOID FRACTION
0.0
50.000
100.00
150.00
200.00
250.00
300.00
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 31504

Date: 4/18/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	863°C (1585°F)
Rod peak power	2.3 kw/m (0.7 kw/ft)
Flow rate	24.6 mm/sec (0.97 in./sec)
Coolant temperature	51°C (123°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	142°C (288°F)	79°C (175°F)
1.22 m (48 in.)	151°C-158°C (304°F-316°F)	134°C (274°F)
1.83 m (72 in.)	184°C-239°C (364°F-462°F)	136°C (276°F)
2.44 m (96 in.)	157°C-176°C (315°F-348°F)	134°C-596°C (273°F-1104°F)
2.74 m (108 in.)	160°C-168°C (320°F-335°F)	133°C (271°F)
3.05 m (120 in.)	139°C-143°C (282°F-290°F)	132°C-242°C (270°F-467°F)
3.35 m (132 in.)	134°C-138°C) (273°F-281°F)	132°C (269°F)

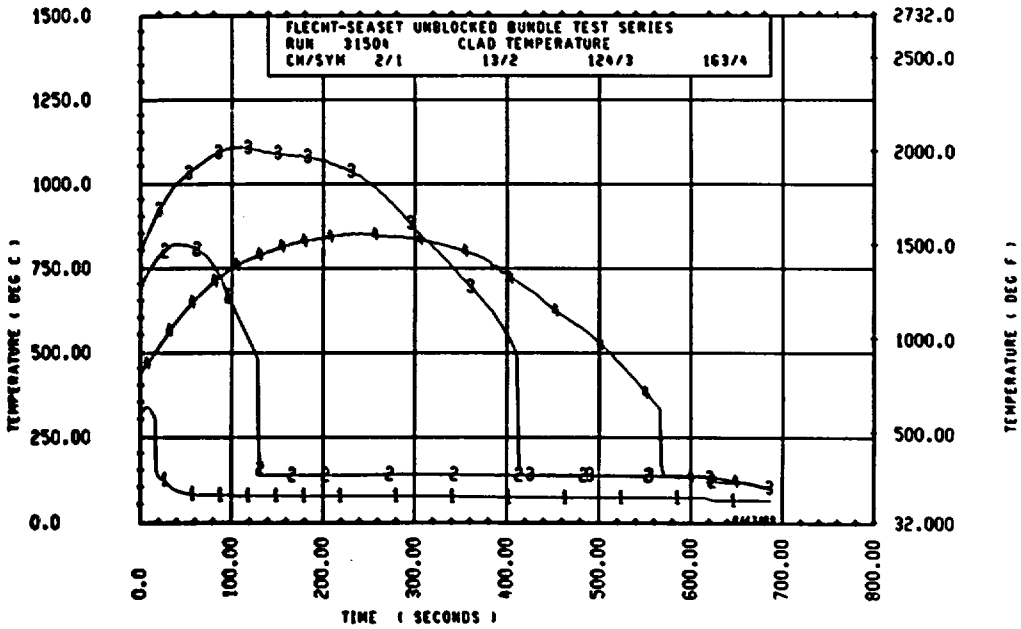
* At 279 seconds after flood

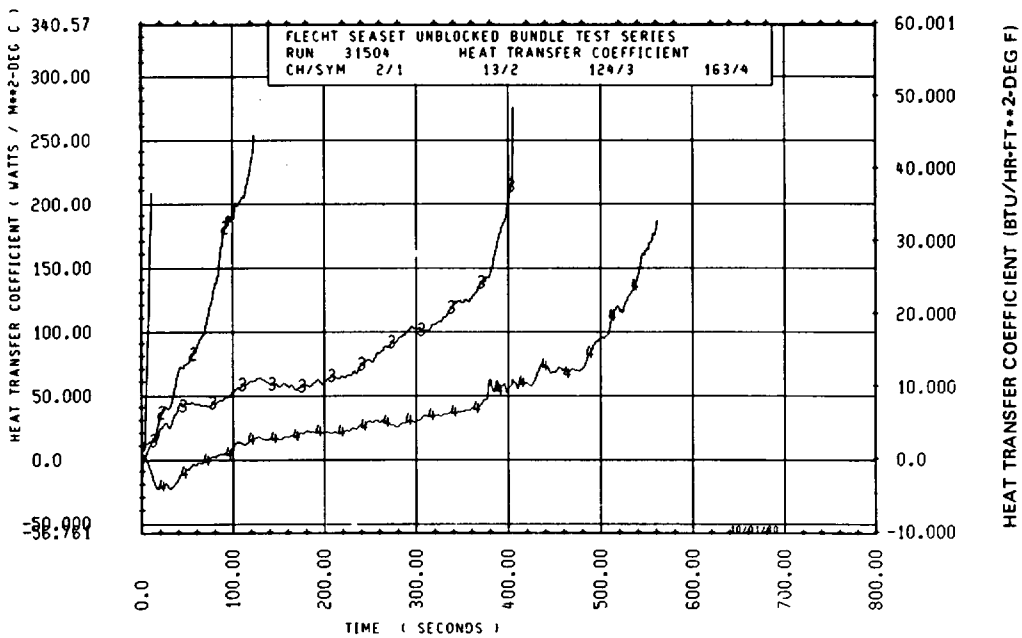
C. Comments

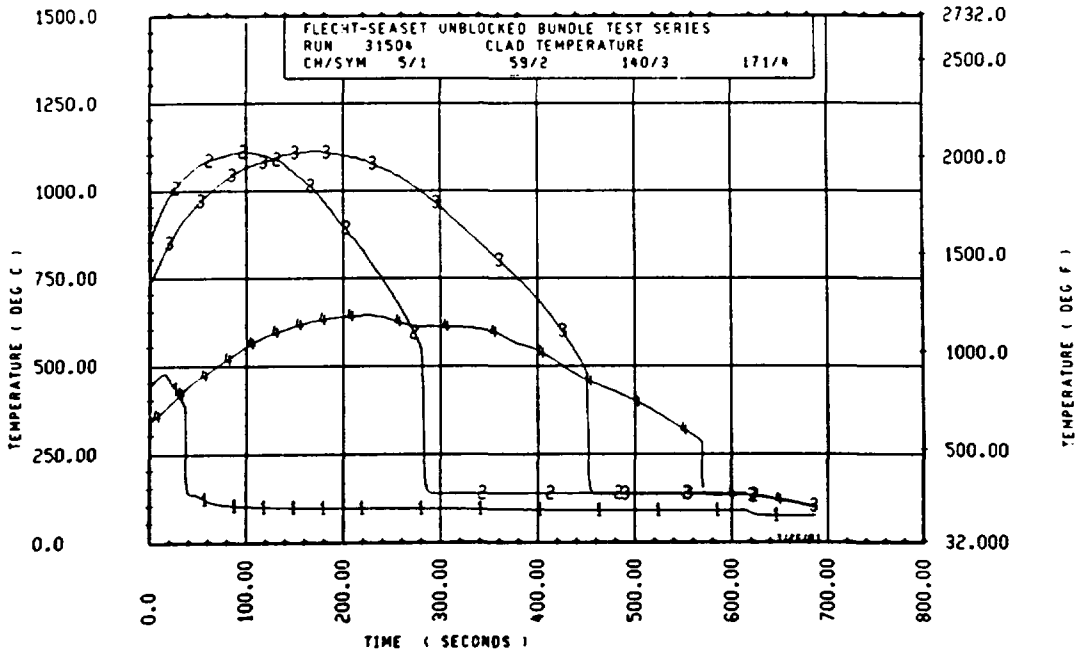
Flooding rate was approximately 3 percent lower than nominal.

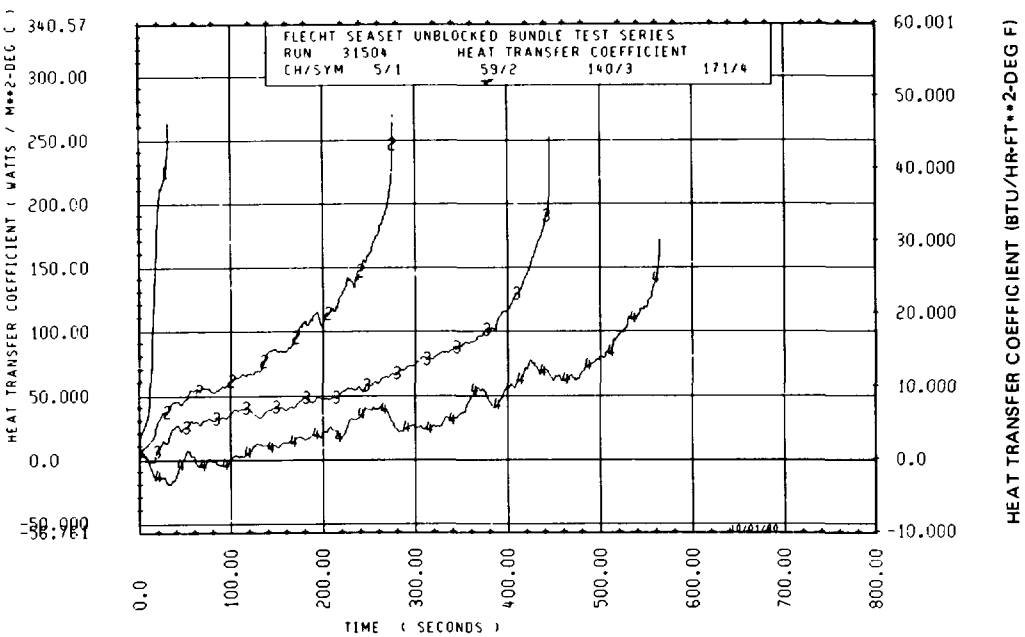
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 31504

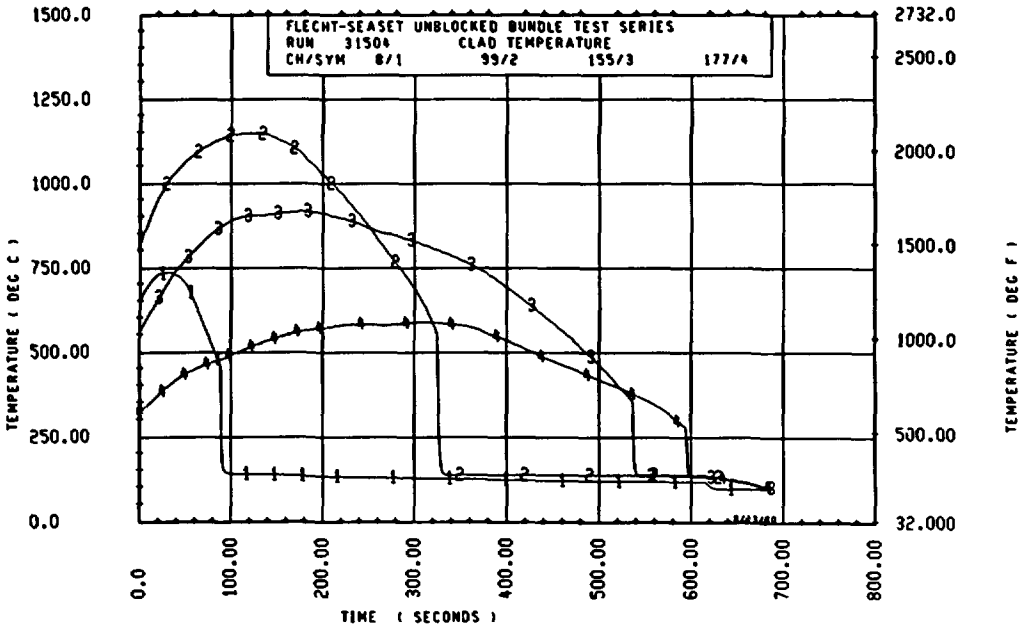
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2N 4- 0	10	1247.	1483.	235.	47.5	854.	124.2
2N 6- 0	50	1542.	1950.	408.	96.5	959.	274.3
3C 5- 0	17	1331.	1545.	214.	50.0	839.	201.0
3C 5- 7	28	1432.	1617.	184.	42.5	885.	241.8
4L 8- 0	129	1302.	1953.	652.	121.0	875.	439.8
4L 8- 6	147	1303.	1948.	645.	121.5	892.	439.8
5E11- 0	168	650.	1263.	613.	276.0	552.	582.0
5J 4- 0	12	1234.	1471.	237.	42.0	831.	130.4
5J 8- 6	146	1106.	1754.	648.	185.0	711.	497.9
5J11- 6	175	602.	1081.	480.	220.0	680.	546.0
7B 6- 0	57	1485.	1856.	372.	81.5	880.	249.8
7B 8- 6	142	1108.	1678.	570.	140.0	716.	493.9
7B10- 0	162	818.	1453.	635.	184.0	670.	561.0
7B11- 6	176	637.	1107.	470.	294.0	574.	588.0
7D 6- 4	84	1579.	2039.	460.	92.5	969.	287.8
7D 7- 6	119	1466.	1981.	515.	99.5	928.	394.5
7D 9- 3	151	998.	1666.	668.	203.0	709.	514.6
7G 5- 0	23	1489.	1777.	287.	62.0	942.	200.9
7J 6- 0	59	1578.	2033.	456.	98.0	965.	281.2
7N 7- 6	120	1452.	2053.	601.	129.0	870.	408.4
7N 8- 0	132	1300.	2018.	718.	137.0	869.	449.0
7N 9- 3	152	1005.	1698.	694.	147.5	729.	519.3
8H 4- 0	13	1280.	1508.	229.	36.5	872.	128.8
8H10- 0	163	824.	1565.	741.	232.0	632.	566.0
8H11- 6	177	616.	1092.	476.	303.0	531.	594.2
8K 4- 0	14	1248.	1484.	235.	37.0	869.	126.9
8K 6- 6	99	1507.	2101.	593.	129.5	1012.	324.8
8K 8- 0	140	1350.	2037.	687.	166.0	887.	450.6
8K10- 0	164	828.	1606.	778.	223.0	710.	556.1
8N 2- 0	5	828.	897.	68.	15.0	724.	37.0
8N 4- 0	15	1259.	1501.	242.	51.5	885.	122.8
8N 6- 0	61	1544.	2033.	489.	93.0	977.	272.1
8N10- 0	165	819.	1547.	728.	175.5	713.	549.0
9C 7- 0	109	1475.	1929.	454.	93.5	795.	372.9
9C 9- 3	153	1013.	1646.	633.	175.5	709.	522.0
9G 1- 0	2	615.	644.	28.	7.5	584.	16.0
9G 3- 3	8	1213.	1358.	145.	32.0	859.	89.0
9G11- 0	171	646.	1195.	549.	223.0	543.	569.0
9I 5- 0	24	1500.	1814.	314.	71.0	962.	195.9
9I 5-10	46	1628.	2031.	403.	97.0	990.	257.7
10D 6- 6	93	1479.	1920.	441.	120.0	924.	329.7
11E 7- 6	124	1472.	2027.	555.	111.5	902.	410.7
11E 9- 3	155	1049.	1684.	635.	175.0	668.	536.0
11E11- 0	172	657.	1159.	502.	186.0	531.	571.0
12D 4- 0	16	1271.	1496.	224.	36.5	853.	127.1
12D 6- 0	66	1559.	1976.	417.	88.0	1000.	273.8
13G 6- 6	102	1526.	1968.	443.	95.0	927.	277.6

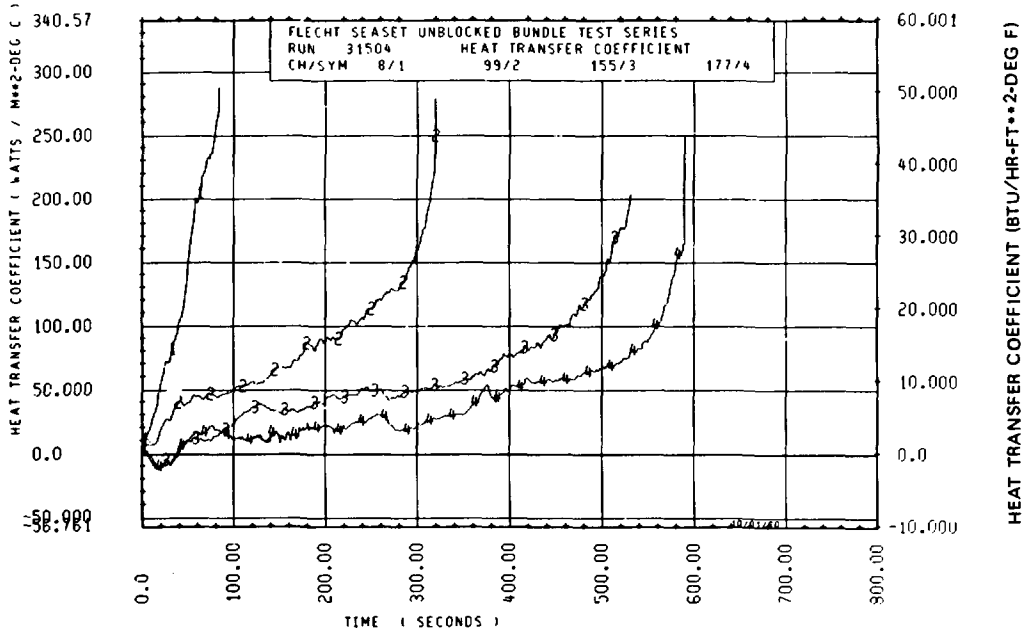

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

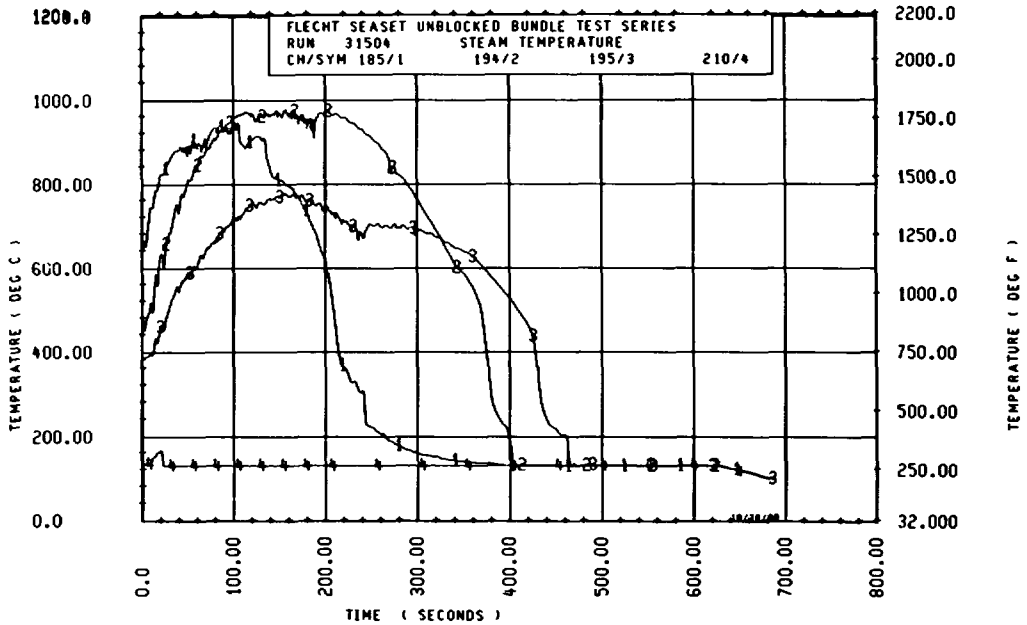

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

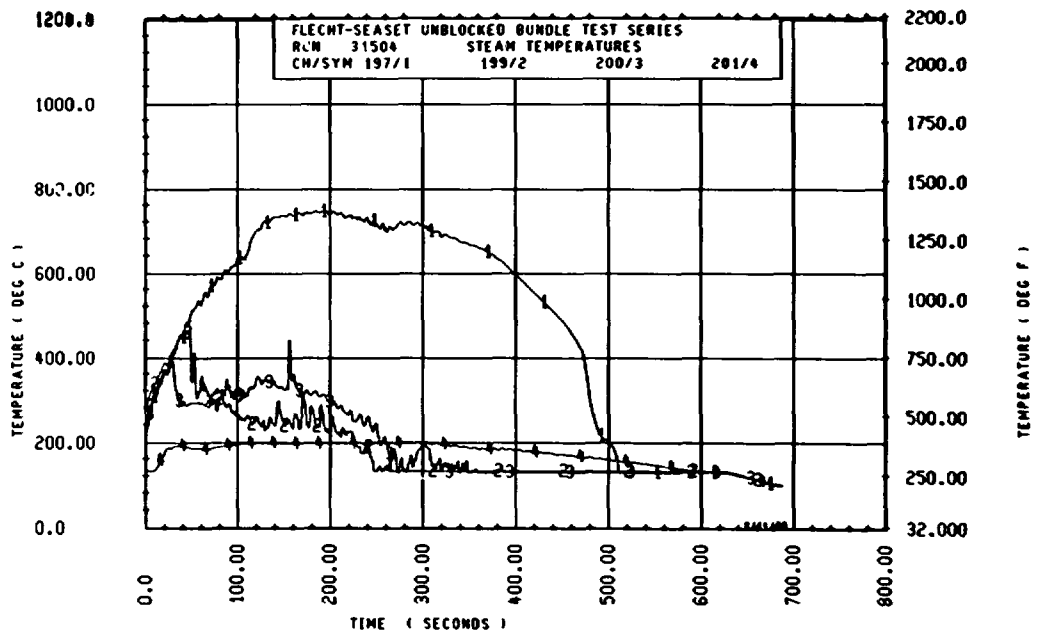

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

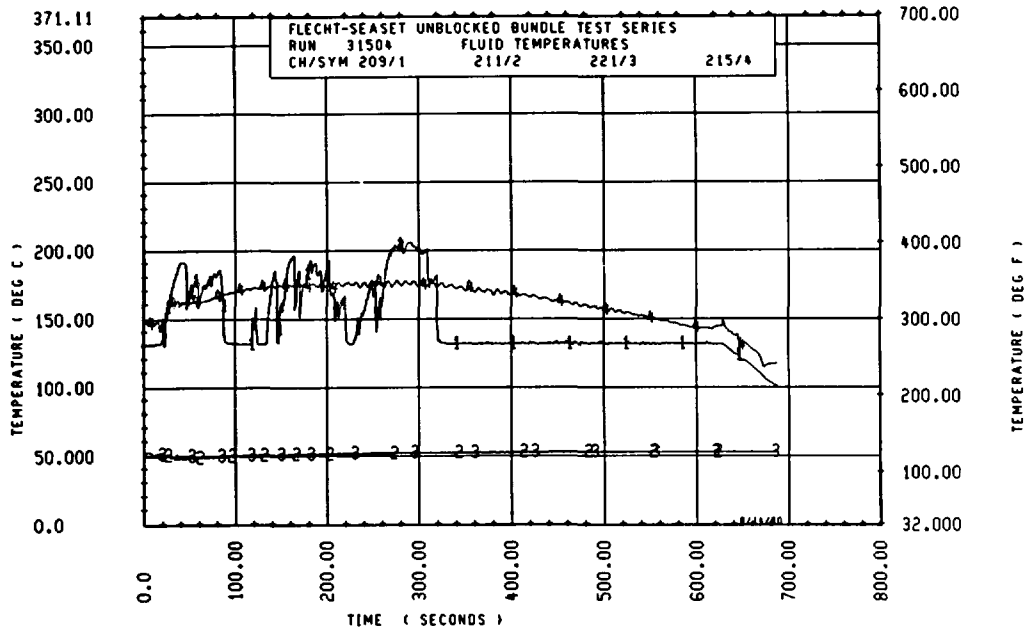

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

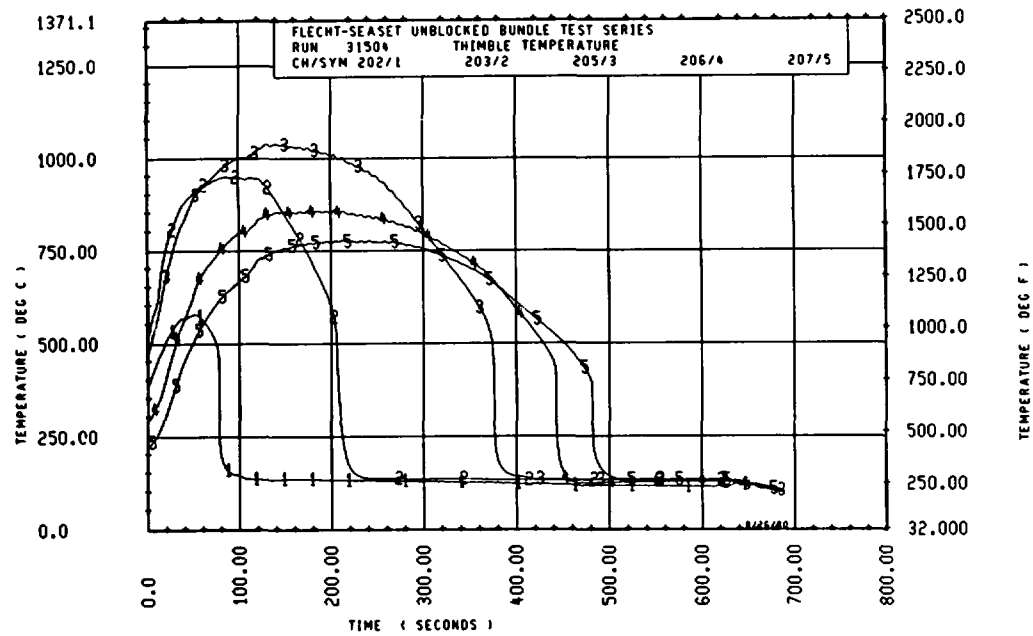

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

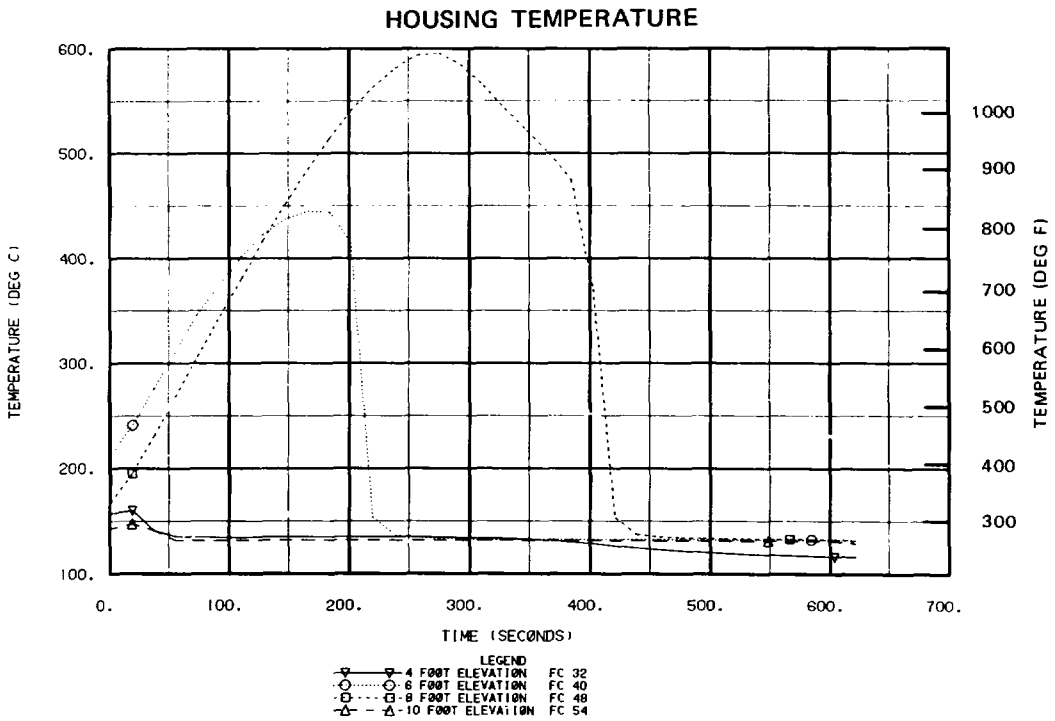

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

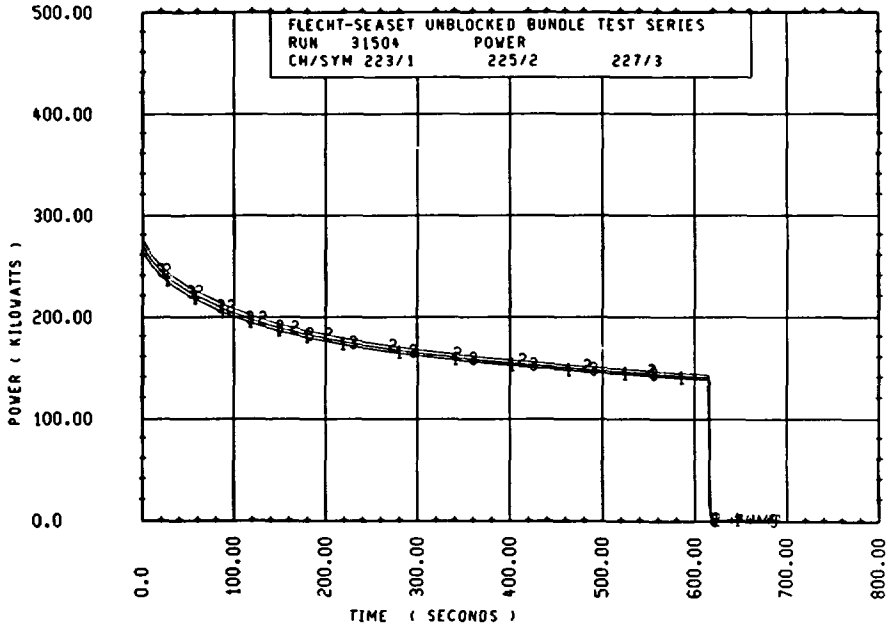

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

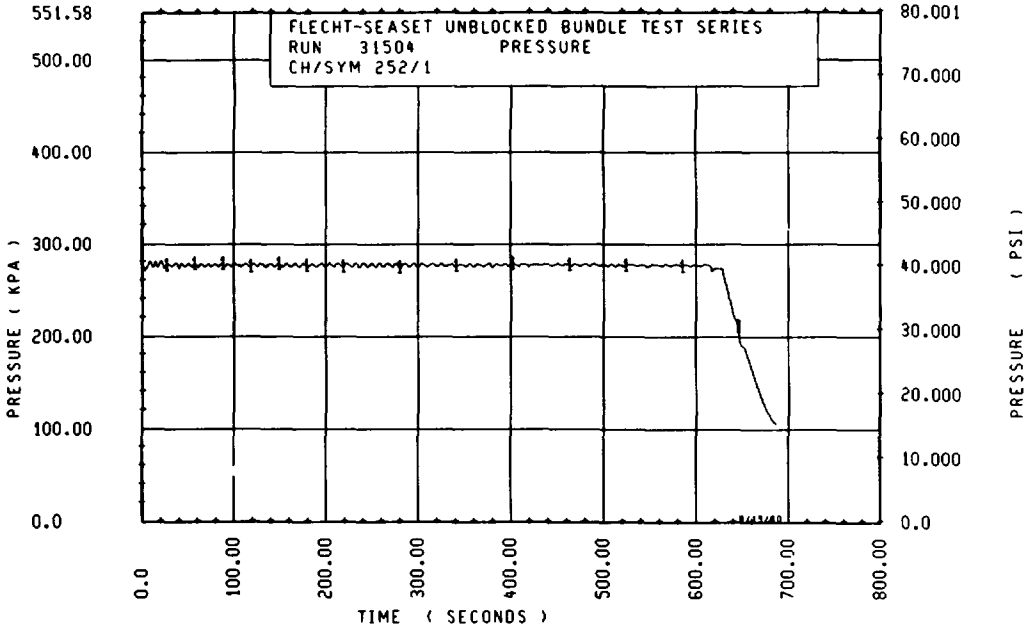


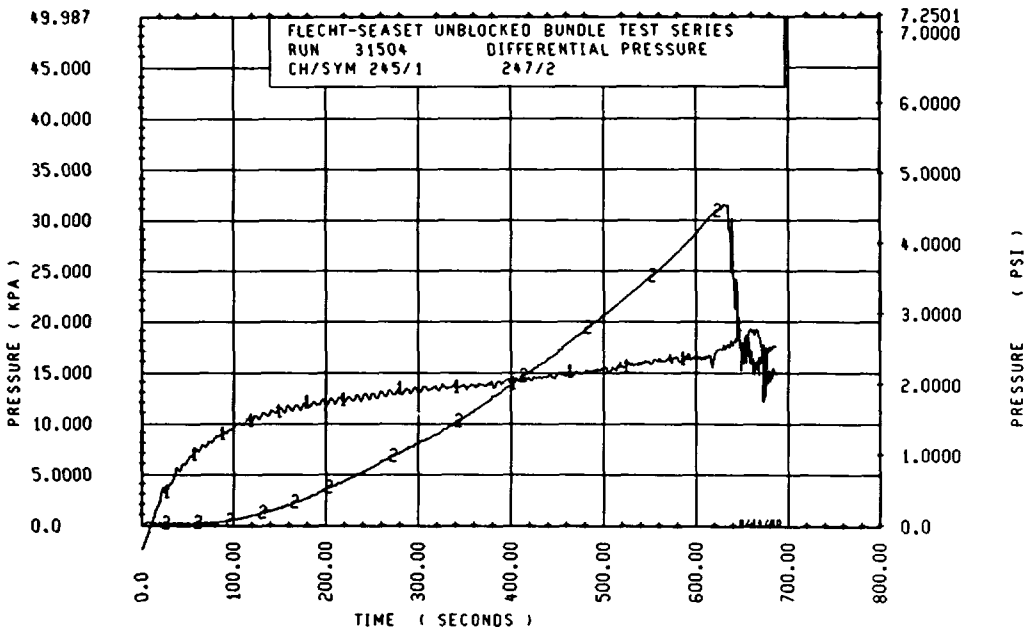


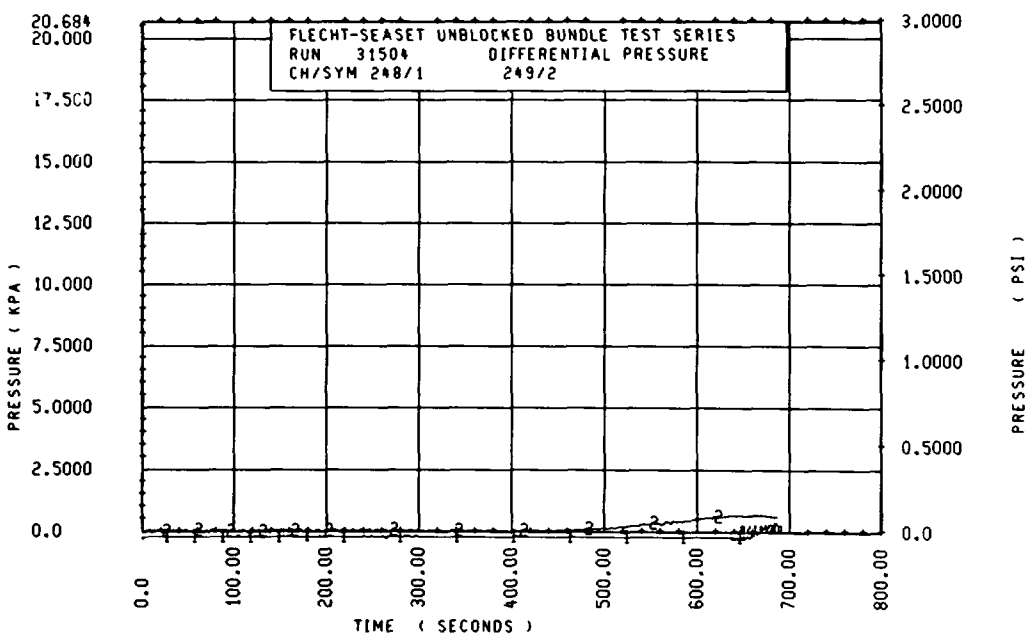
CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.); CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

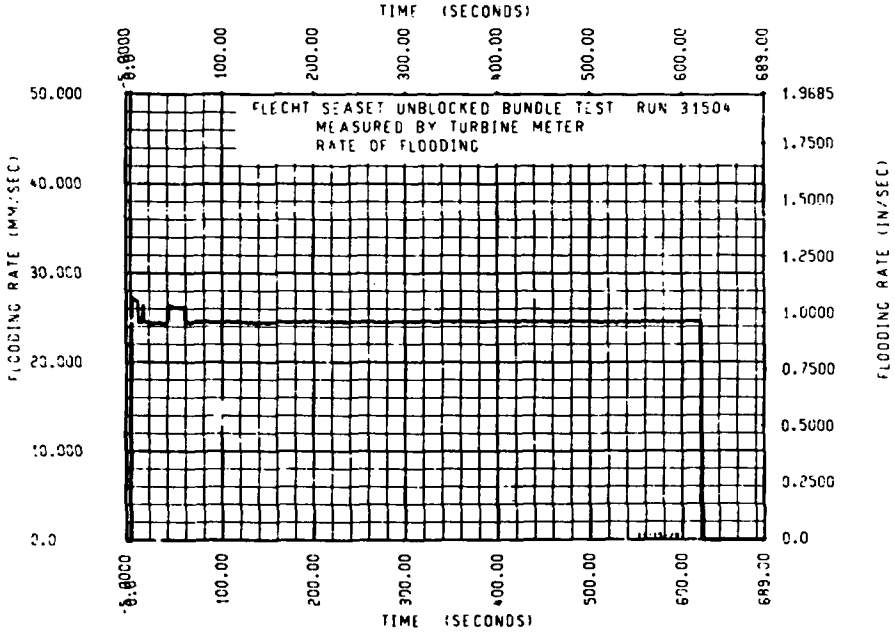

HOUSING TEMPERATURE
600.
500.
400.
300.
200.
100.
TEMPERATURE (DEG C)
1000
900
800
700
600
500
400
300
TEMPERATURE (DEG F)
0.
100.
200.
300.
400.
500.
600.
700.
TIME (SECONDS)
LEGEND
4 FOOT ELEVATION FC 32
6 FOOT ELEVATION FC 40
8 FOOT ELEVATION FC 48
10 FOOT ELEVATION FC 54

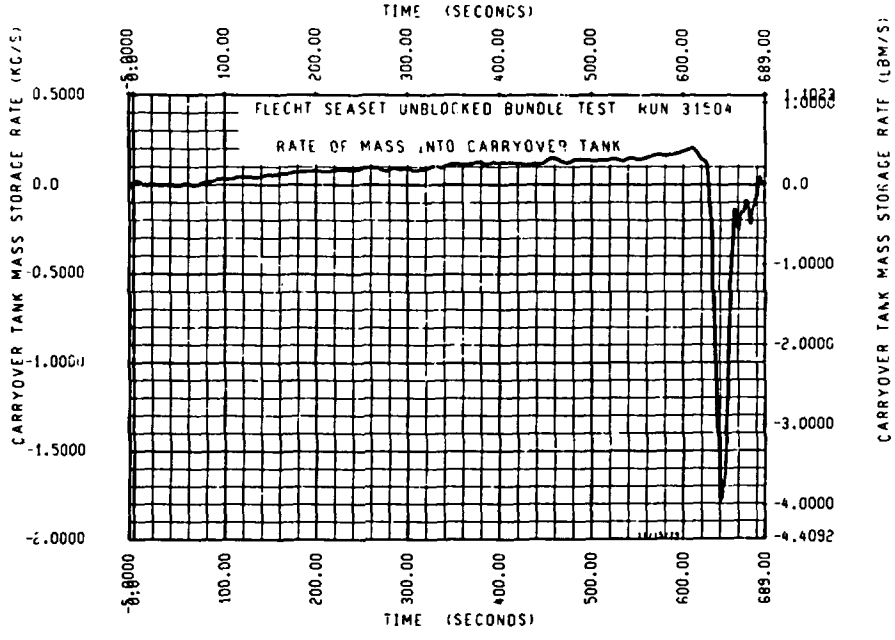

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

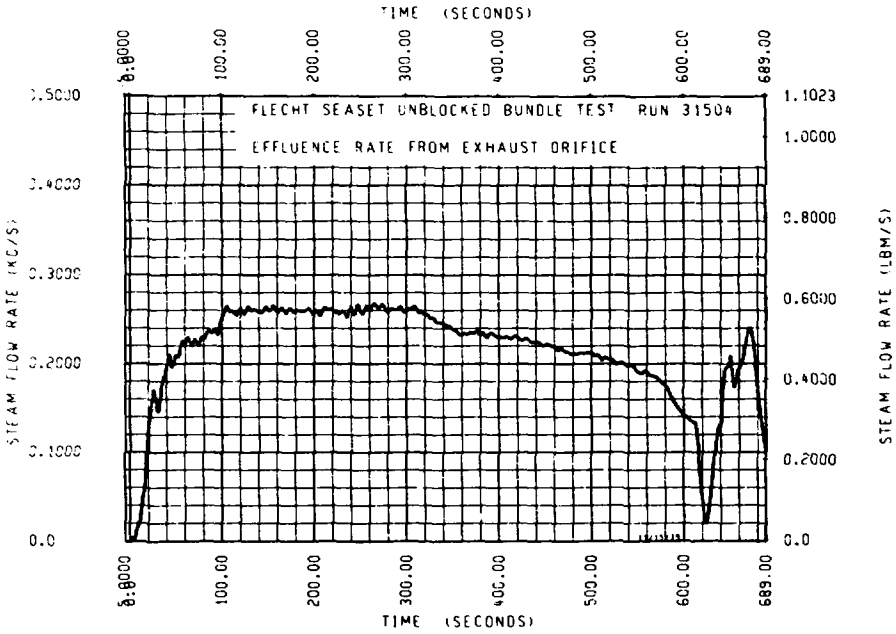

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

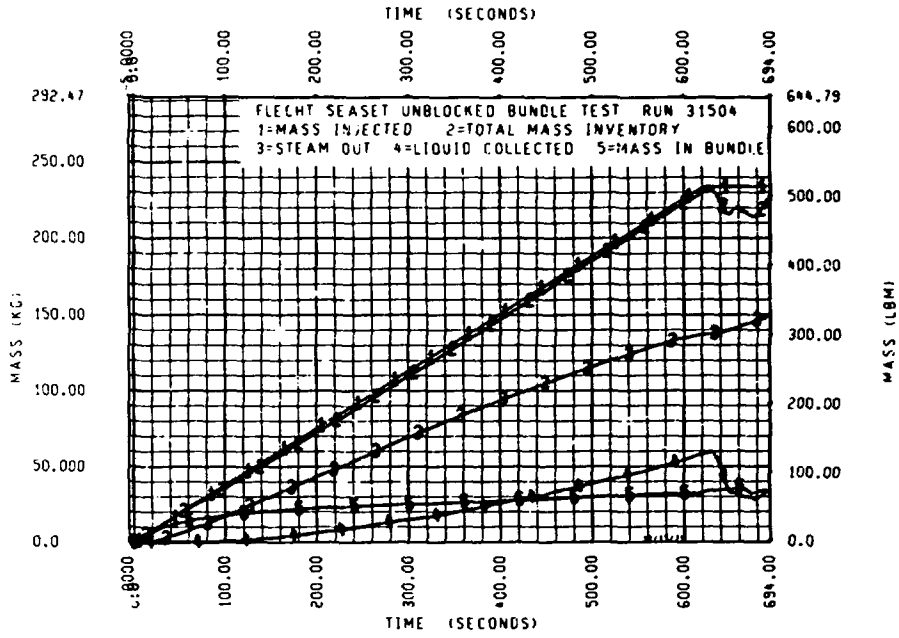

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

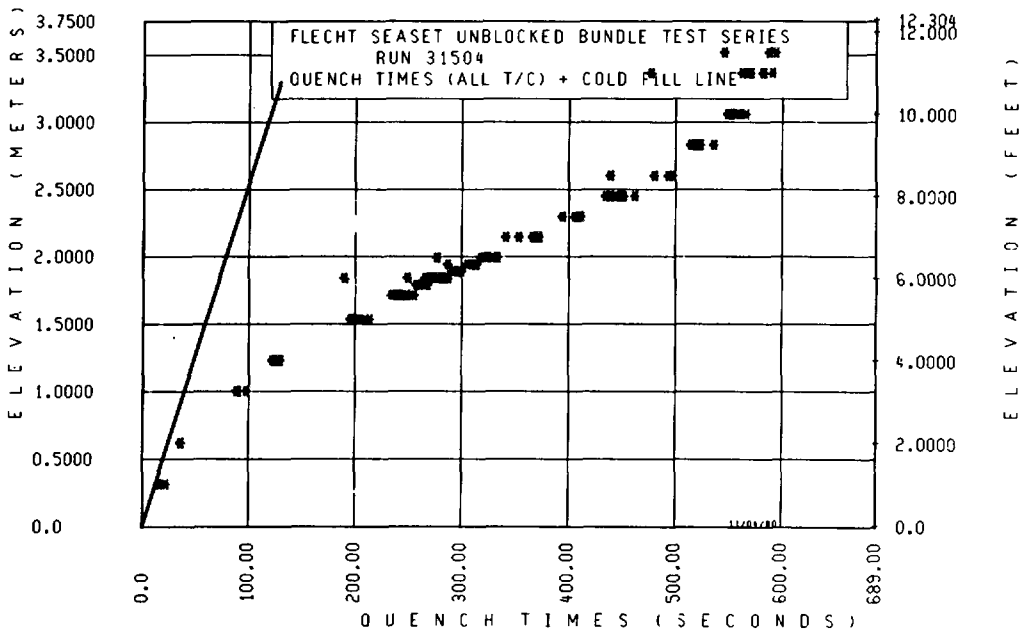

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

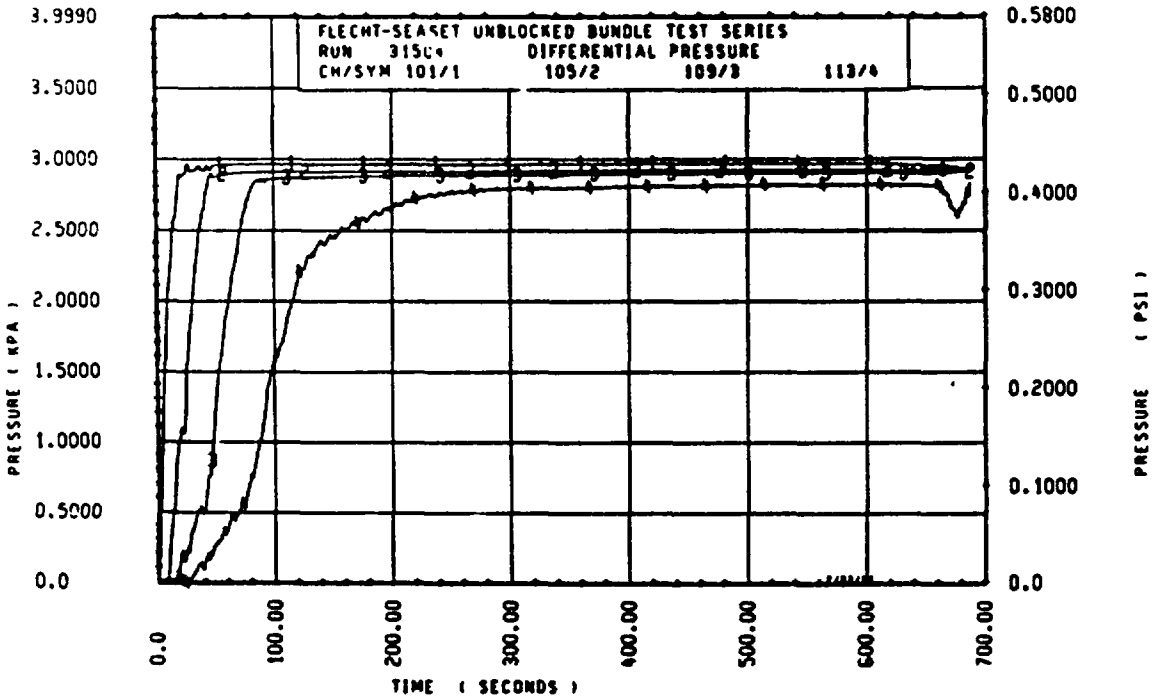

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31504
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-8.0000
100.00
200.00
300.00
400.00
500.00
600.00
689.00

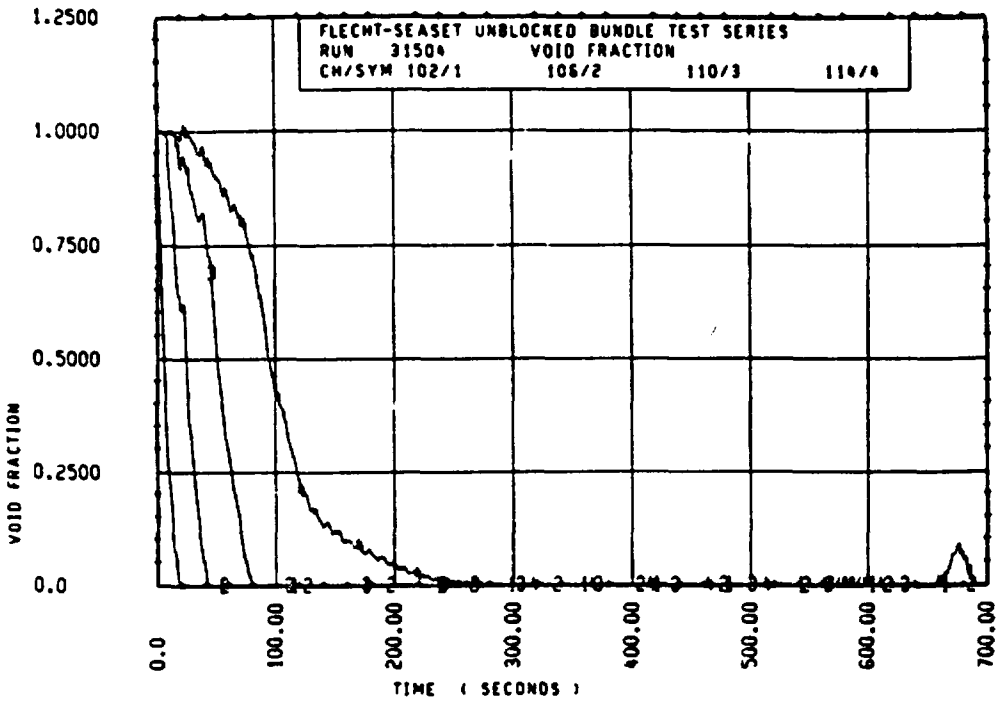

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31504
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
1.0000
0.0
-1.0000
-2.0000
-3.0000
-4.0000
-4.4092
-8.0000
100.00
200.00
300.00
400.00
500.00
600.00
689.00

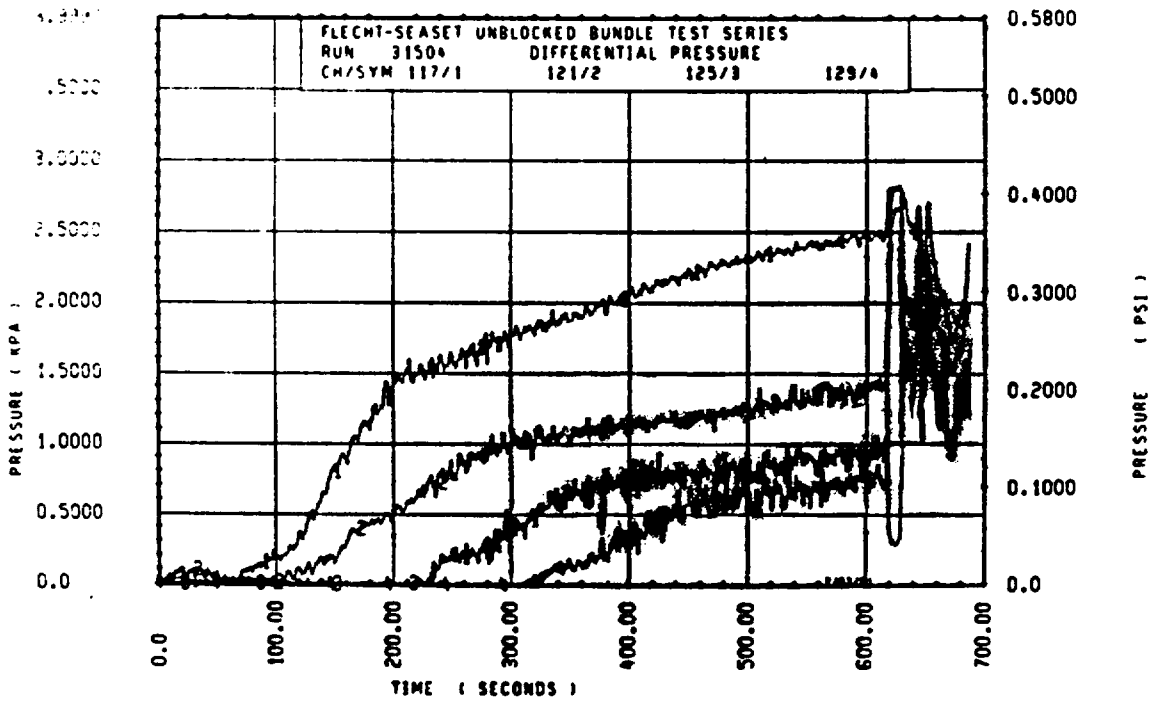

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31504
EFFLUENCE RATE FROM EXHAUST ORIFICE
TIME (SECONDS)
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.0
0.1000
0.2000
0.3000
0.4000
0.5000
0.2000
0.4000
0.6000
0.8000
1.0000
1.1023
100.00
200.00
300.00
400.00
500.00
600.00
689.00

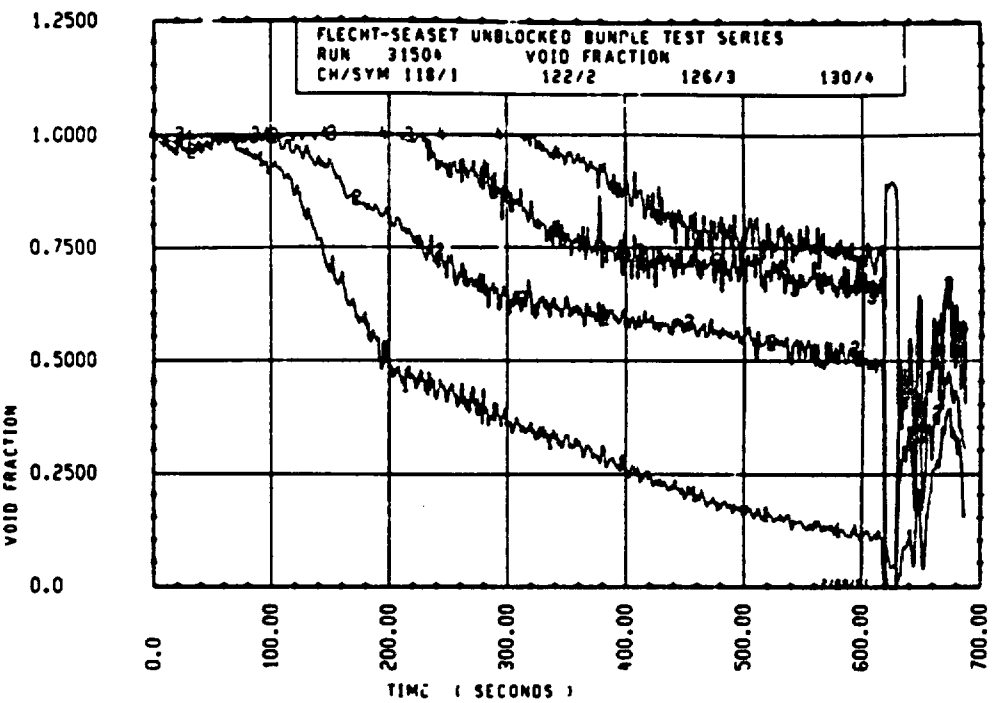

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31504
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
TIME (SECONDS)
MASS (KG)
MASS (LBM)
0.0
50.000
100.00
150.00
200.00
250.00
292.47
100.00
200.00
300.00
400.00
500.00
600.00
644.79
694.00

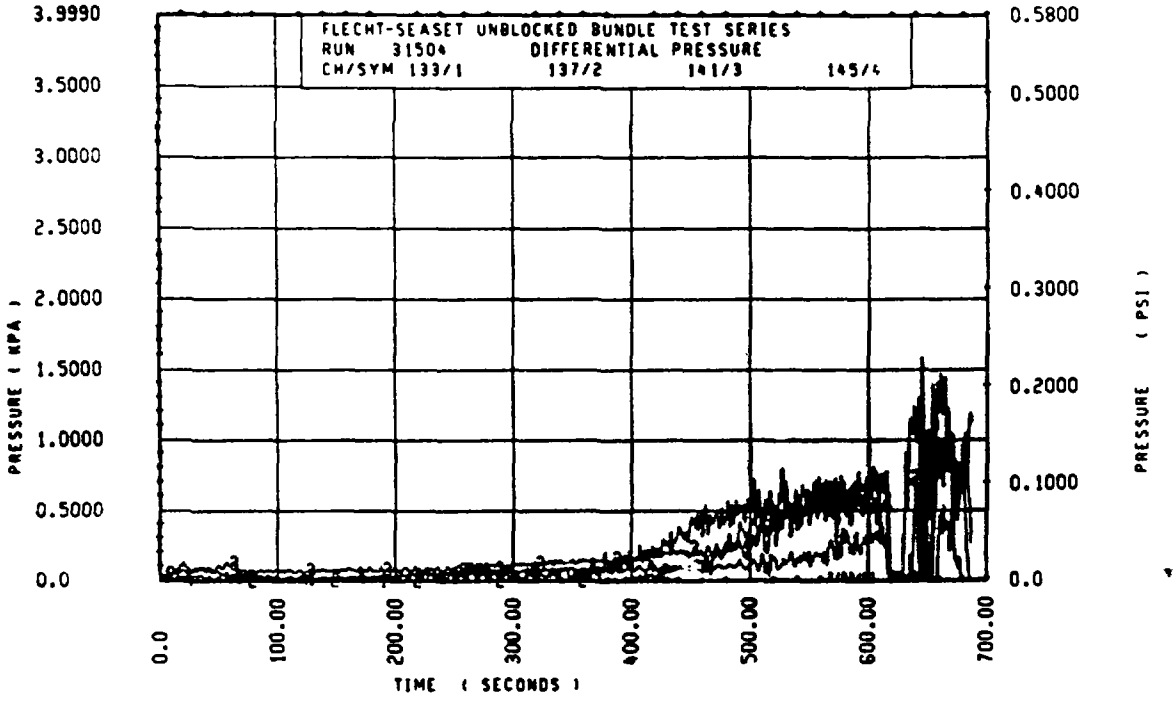

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
689.00
QUENCH TIMES (SECONDS)

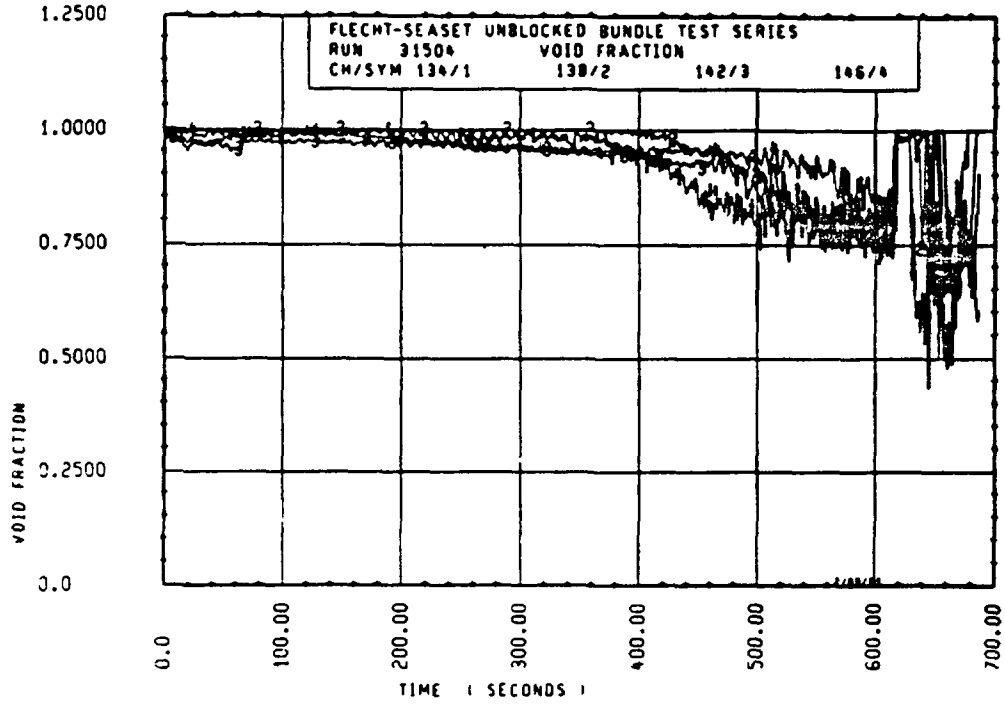

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
0.5000
1.0000
1.5000
2.0000
0.1000
0.2000
0.3000
0.4000
0.5000
0.5800
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
0.0
0.2500
0.5000
0.7500
1.0000
1.2500
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31504 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 31615
Date: 4/19/79
Forced Reflood Test

A. Run Conditions

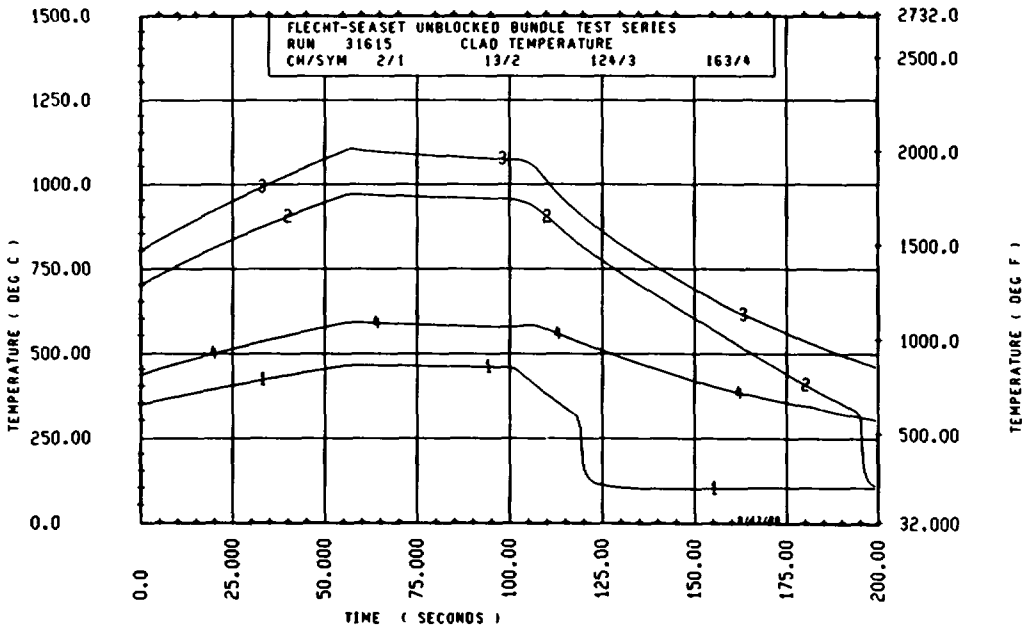
Upper plenum pressure	0.14 MPa (20 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	876°C (1609°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	0
Coolant temperature	--
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

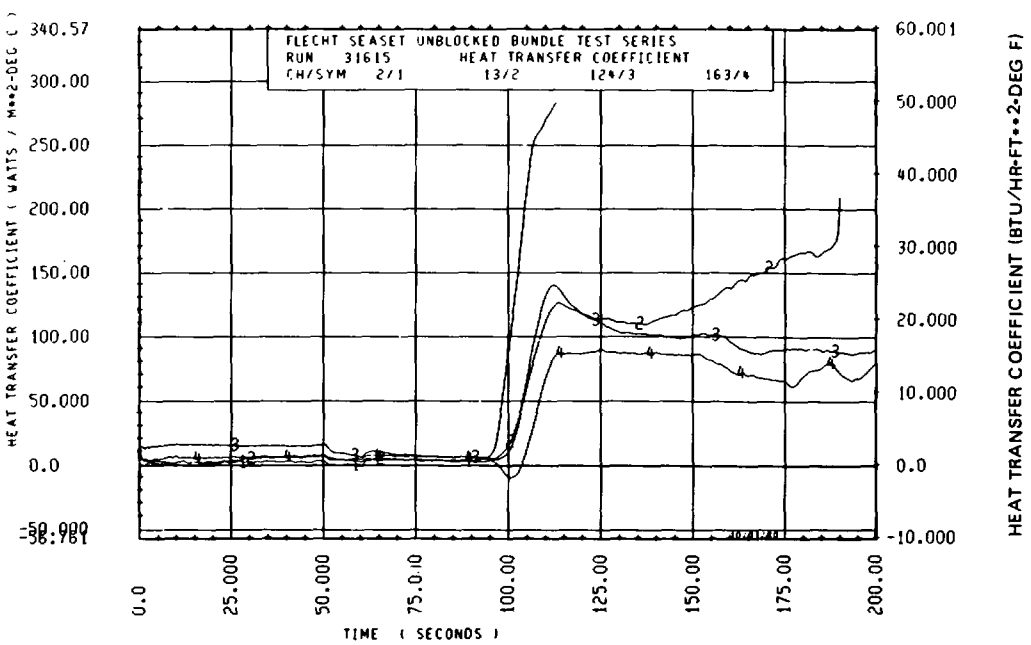
B. Housing Temperatures

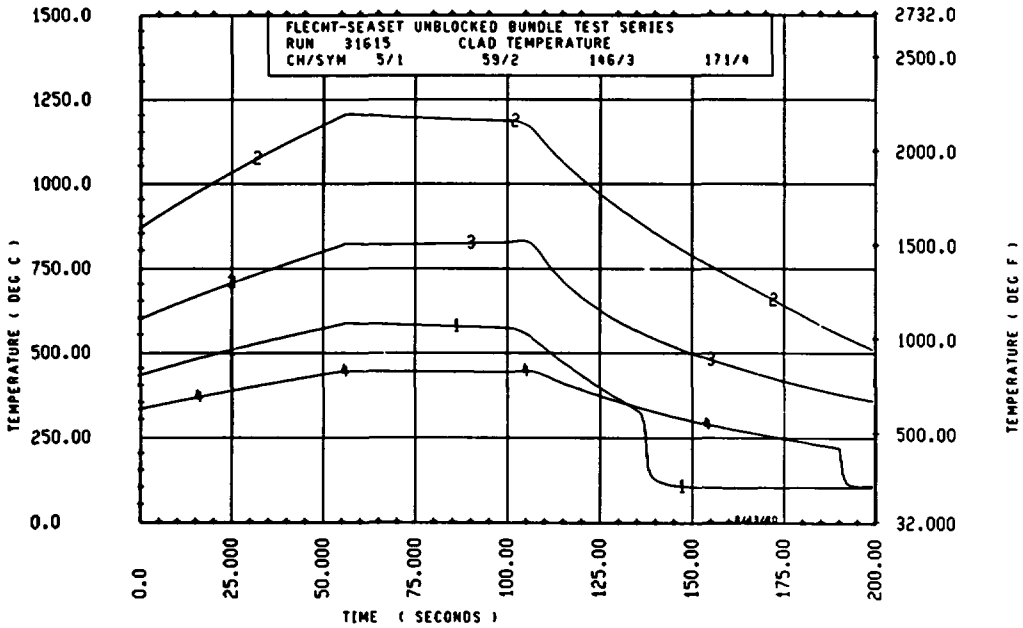
Elevation	Initial Temperature	Maximum Temperature
0.61 m (24 in.)		
1.22 m (48 in.)		
1.83 m (72 in.)		
2.44 m (96 in.)	(No housing temperatures available)	
2.74 m (108 in.)		
3.05 m (120 in.)		
3.35 m (132 in.)		

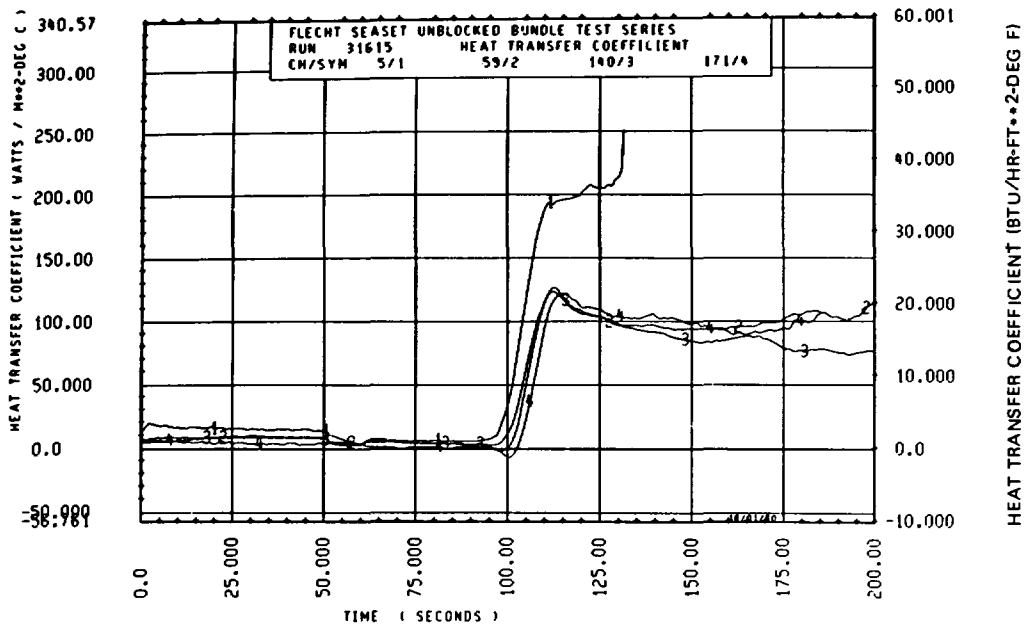
C. Comments

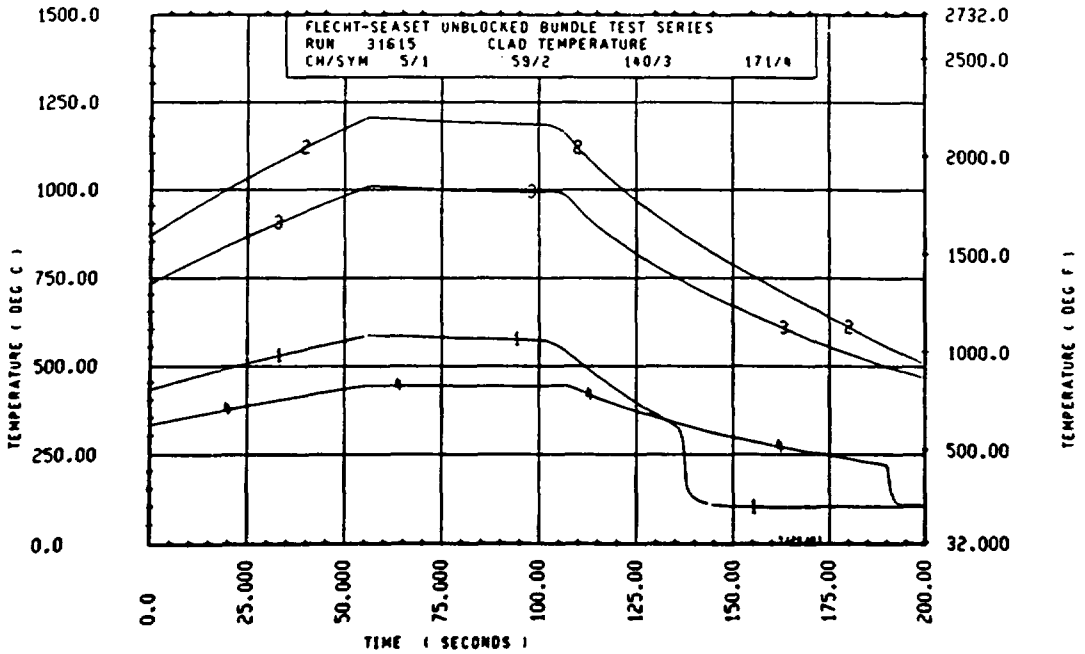
Reflood water was inadvertently diverted from test bundle. After approximately 60 seconds of heatup from 871°C to 1204°C (1600°F to 2200°F), power was scrammed on overtemperature and bundle was reflooded.

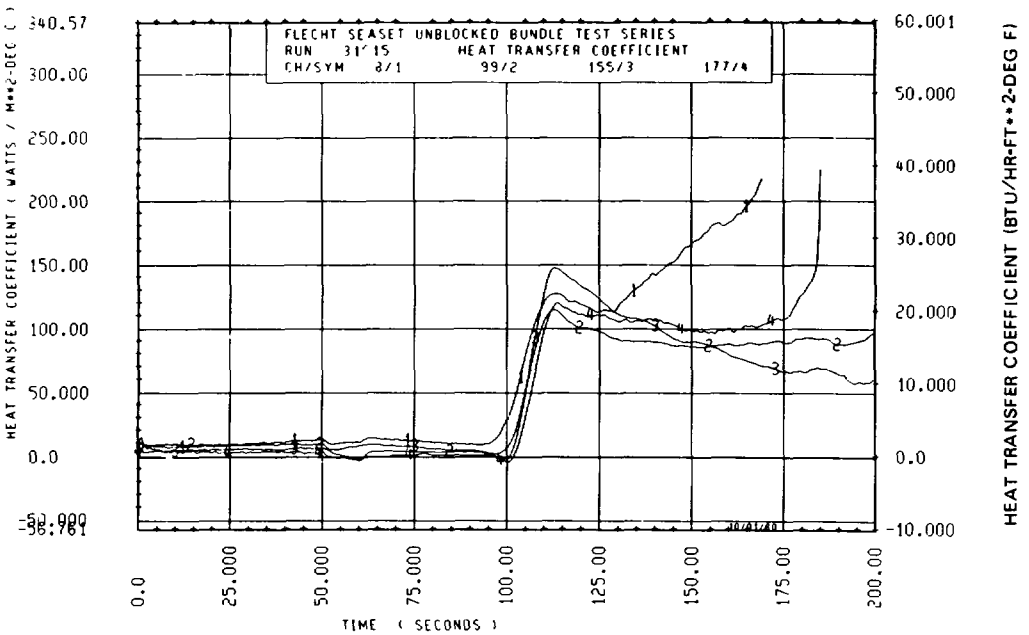

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31615 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

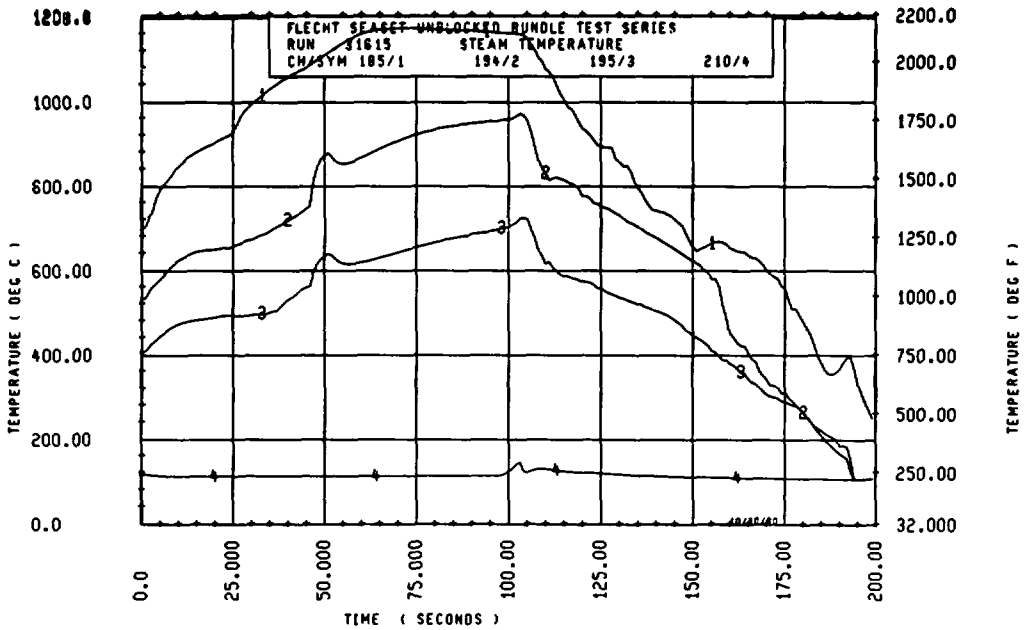

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31615 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-58.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

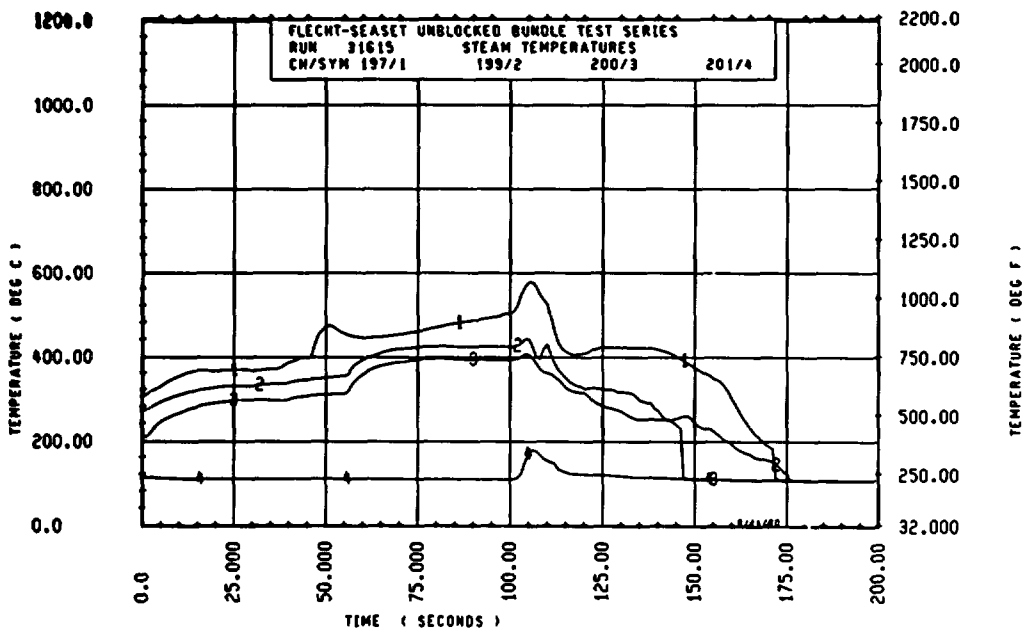

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31615 CLAD TEMPERATURE
CH/SYM 5/1 59/2 146/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

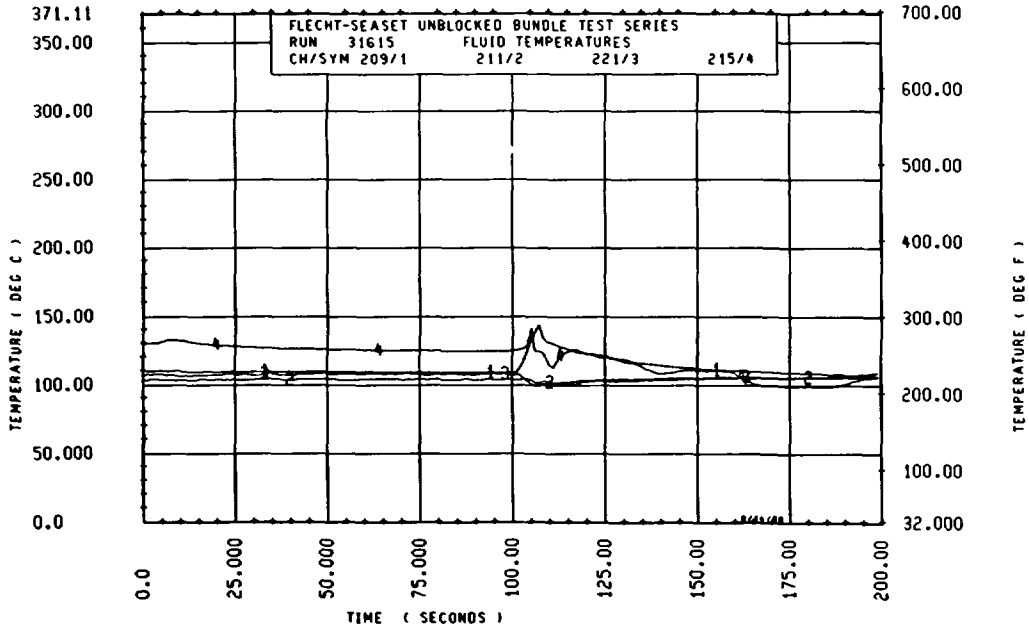

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31615 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

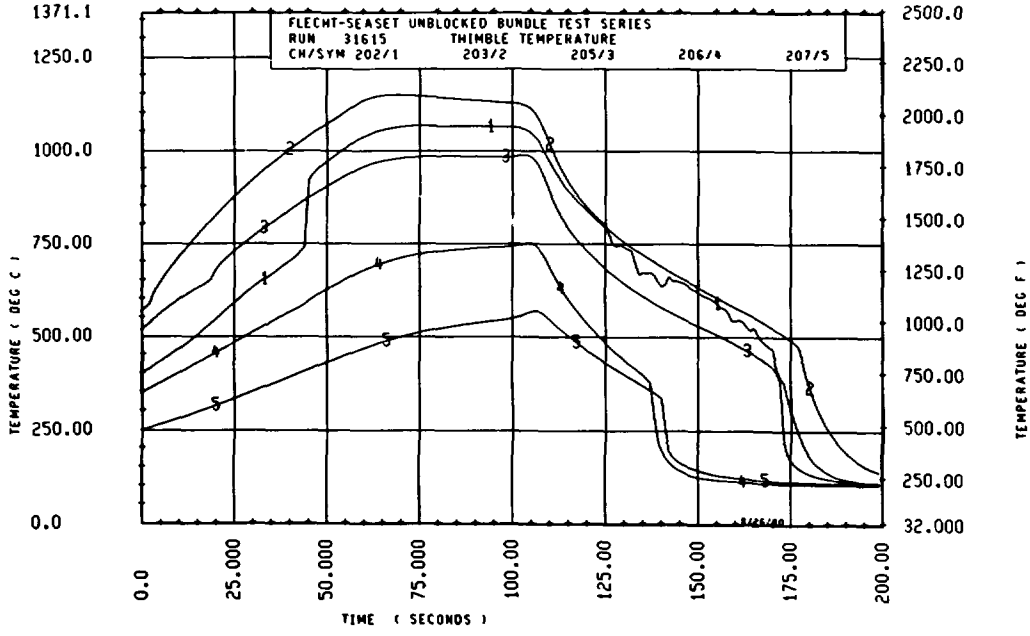

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31615 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31615 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-36.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

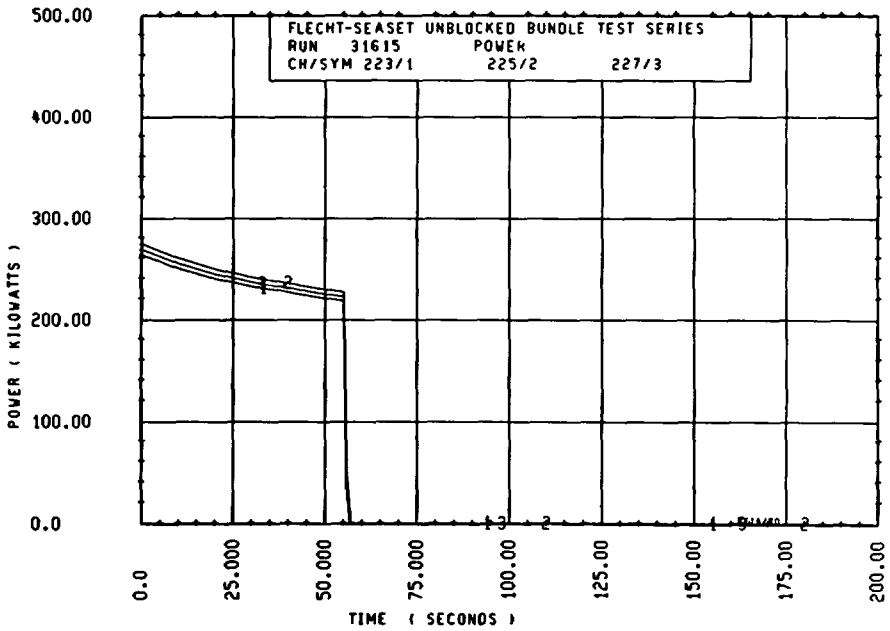

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31615 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

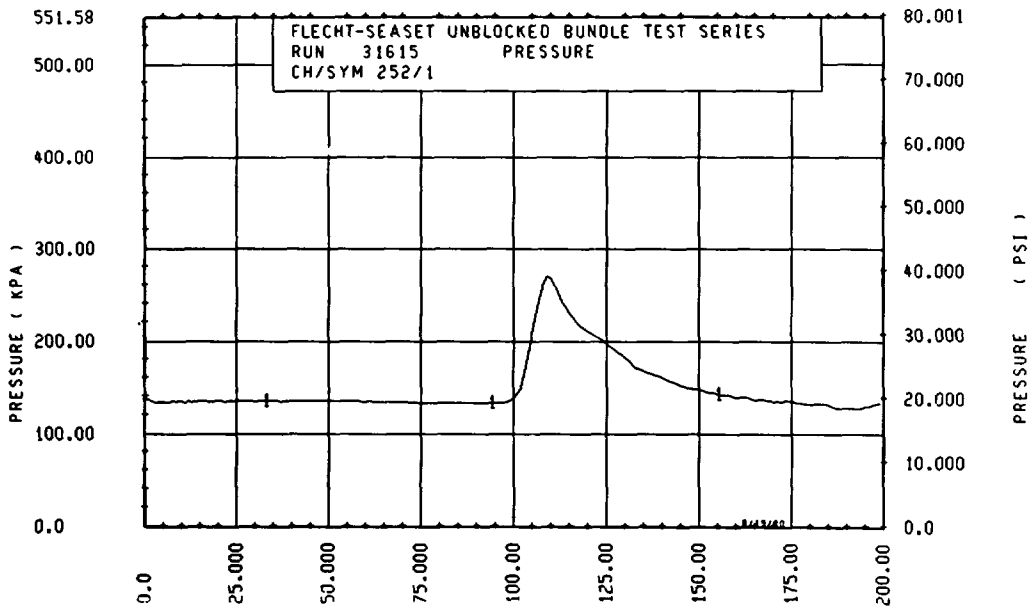

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31615 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

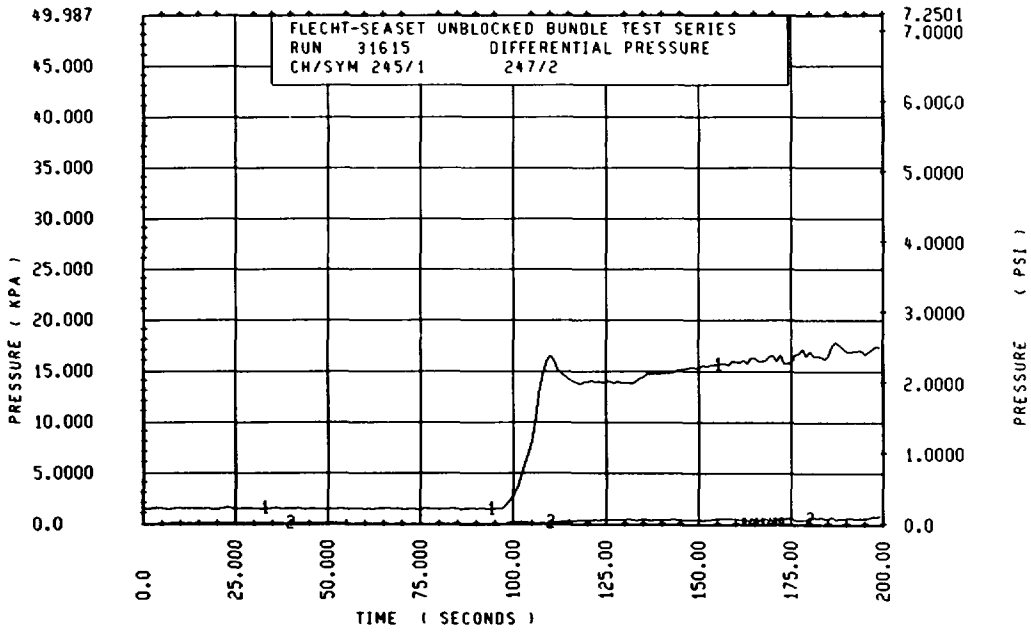


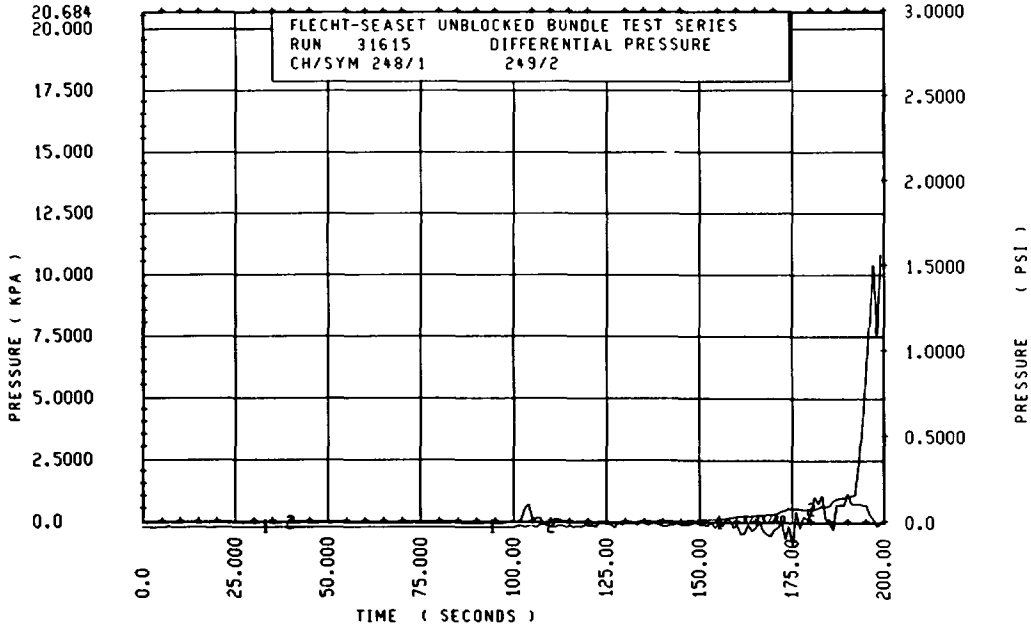


CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.);
CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.);
CH 207-4I, 3.05 m (120 in.)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31615 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31615 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31615 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31615 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 31701

Date: 4/25/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	872°C (1601°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	155 mm/sec (6.1 in./sec)
Coolant temperature	53°C (127°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Hot Rod Quench Time Temperature*
0.61 m (24 in.)	84°C (184°F)	60°C (140°F)
1.22 m (48 in.)	134°C (274°F)	74°C (166°F)
1.83 m (72 in.)	137°C (279°F)	83°C (182°F)
2.44 m (96 in.)	132°C (270°F)	129°C (265°F
2.74 m (108 in.)	132°C (270°F)	132°C (270°F)
3.05 m (120 in.)	131°C (268°F)	132°C (269°F)
3.35 m (132 in.)	131°C (269°F)	132°C (269°F)

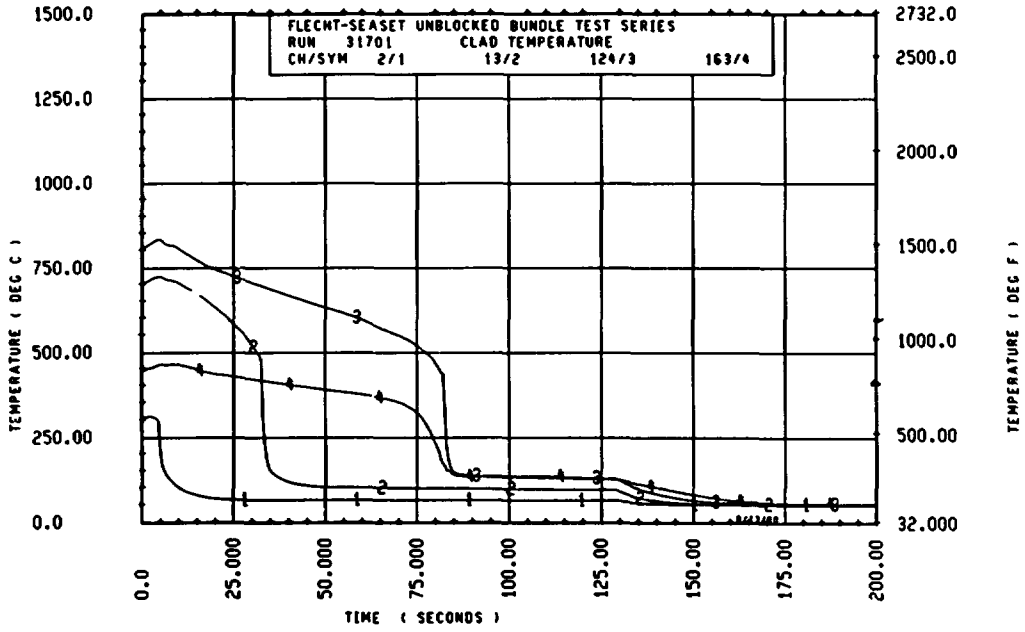
*At 55 seconds after flood

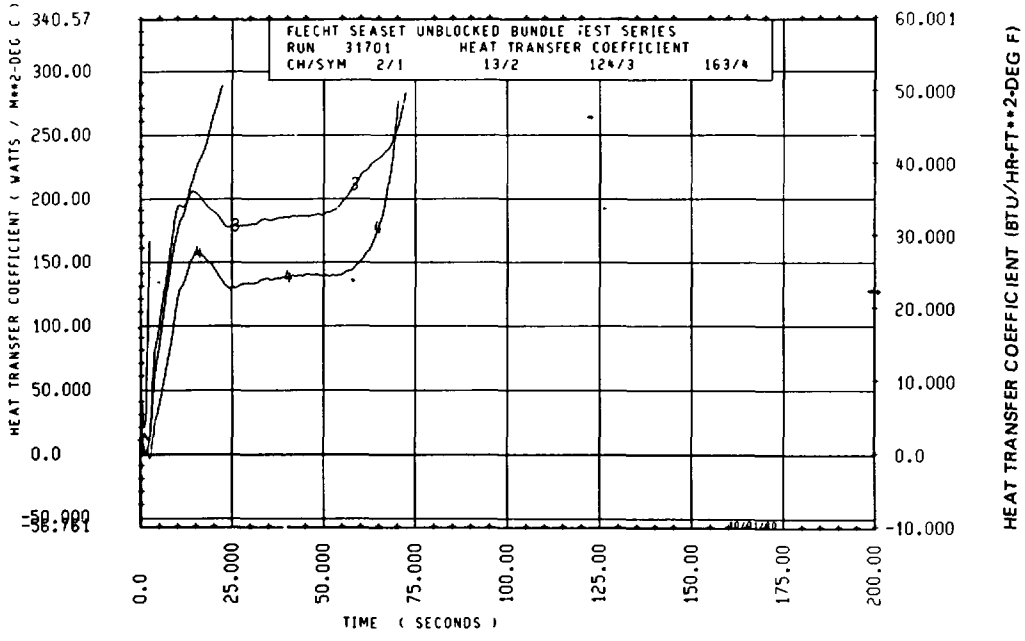
C. Comments

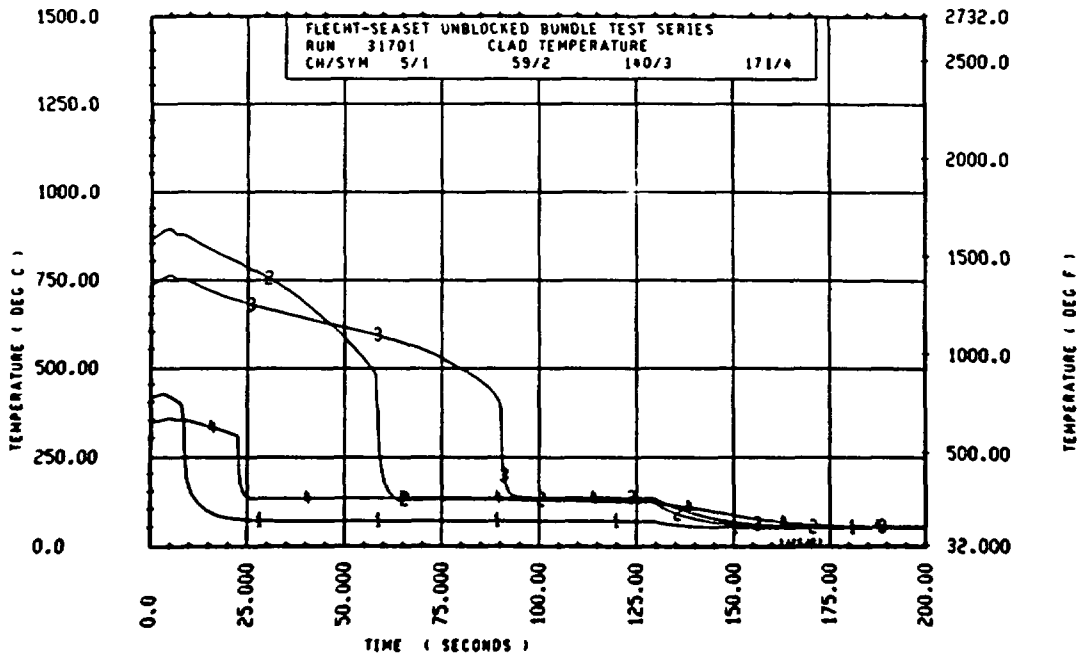
The steam separator filled and an unknown quantity of water exited exhaust orifice; however, there was an acceptable mass balance through time of bundle quench.

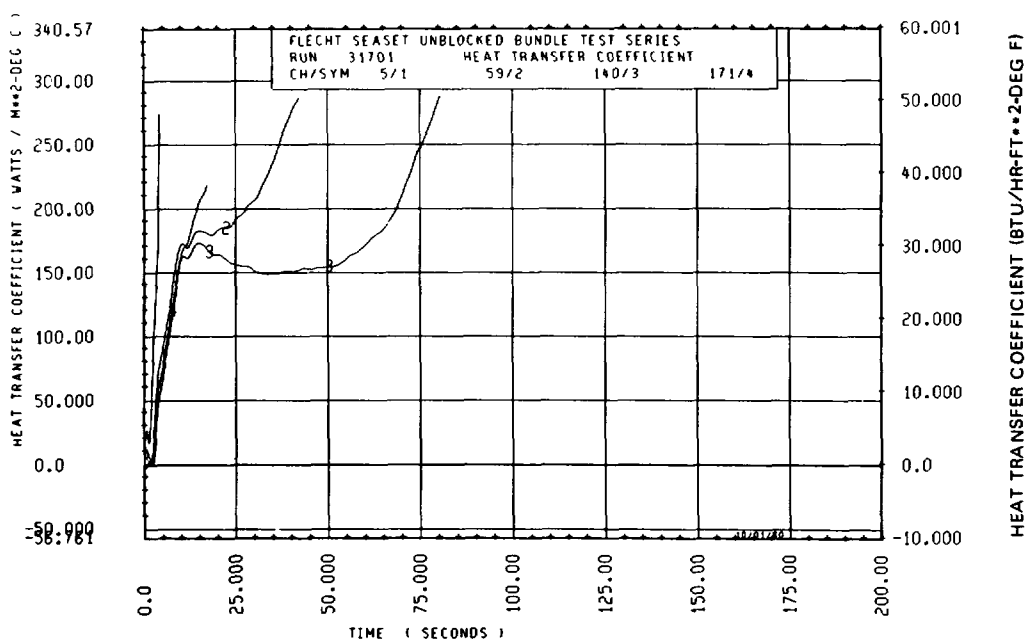
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 31701

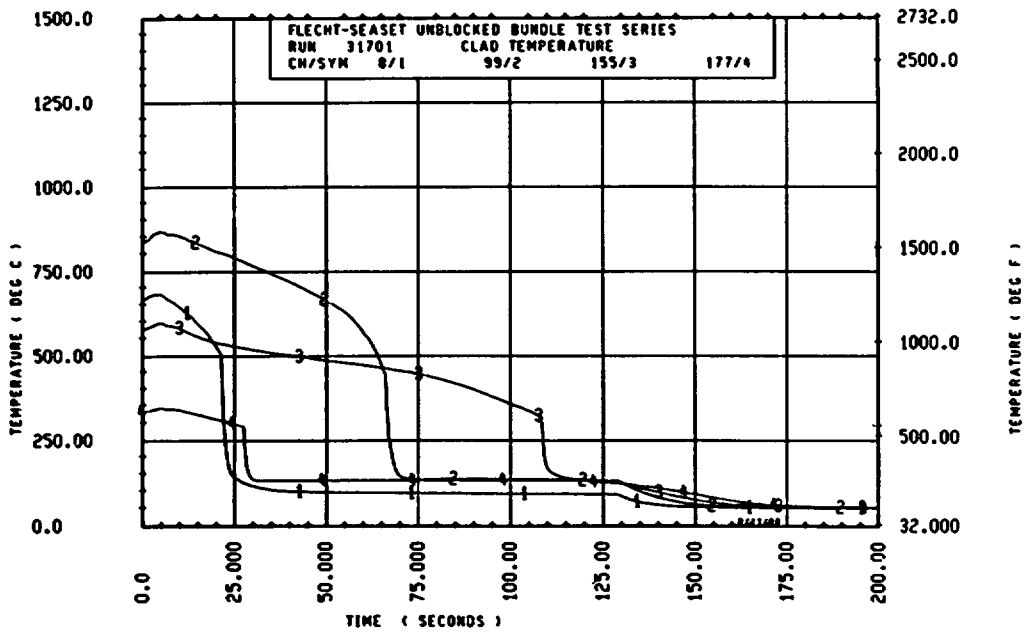
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1267.	1306.	39.	4.5	883.	31.9
2H 6- 0	50	1563.	1615.	52.	4.5	1004.	58.3
3C 5- 0	17	1340.	1379.	39.	4.0	923.	47.5
3C 5- 7	28	1452.	1491.	40.	4.5	966.	53.8
4L 8- 0	129	1317.	1367.	49.	5.0	803.	88.0
4L 8- 6	147	1319.	1369.	49.	5.0	800.	88.0
5E11- 0	168	662.	685.	22.	5.0	582.	22.4
5J 4- 0	12	1251.	1290.	39.	4.5	866.	32.5
5J 8- 6	144	1123.	1163.	40.	4.5	672.	101.5
5J11- 6	175	610.	631.	21.	5.0	536.	29.0
7E 6- 0	57	1497.	1546.	49.	4.5	935.	53.4
7B 8- 6	142	1121.	1163.	42.	5.0	688.	101.3
7B10- 0	162	837.	875.	38.	9.5	555.	114.5
7E11- 6	176	648.	667.	19.	4.5	410.	83.1
7D 6- 4		1619.	1671.	52.	4.5	913.	59.4
7D 7- 6		1482.	1532.	51.	4.5	776.	73.2
7D 9- 3	[illegible]	1012.	1048.	36.	4.5	581.	107.4
7G 5- 0	23	1486.	1532.	46.	4.5	900.	43.0
7J 6- 0	59	1590.	1643.	53.	4.5	898.	58.0
7M 7- 6	120	1467.	1515.	48.	4.5	819.	80.0
7M 8- 0	132	1318.	1370.	51.	5.0	701.	91.0
7M 9- 3	152	1023.	1059.	37.	5.0	589.	108.5
8H 4- 0	13	1297.	1335.	38.	4.5	902.	32.5
8H10- 0	163	837.	870.	33.	5.5	388.	81.2
8H11- 6	177	634.	654.	20.	5.0	556.	27.5
8K 4- 0	14	1266.	1307.	41.	4.5	902.	31.9
8K 6- 6	99	1536.	1594.	58.	5.0	941.	63.8
8K 8- 0	140	1358.	1407.	48.	4.5	759.	90.0
8K10- 0	164	837.	869.	32.	5.0	560.	87.7
8N 2- 0	5	784.	802.	19.	3.0	740.	8.2
8N 4- 0	15	1279.	1318.	40.	4.5	908.	31.6
8N 6- 0	61	1568.	1622.	54.	4.5	934.	60.0
8N10- 0	165	839.	877.	38.	8.5	564.	95.2
9C 7- 0	109	1484.	1532.	48.	4.5	793.	63.8
9C 9- 3	153	1037.	1074.	37.	5.0	572.	107.9
9G 1- 0	2	587.	595.	8.	2.0	569.	4.5
9G 3- 3	8	1231.	1263.	32.	4.0	938.	21.5
9G11- 0	171	657.	677.	20.	4.5	589.	22.5
9I 5- 0	24	1504.	1552.	47.	4.5	832.	42.4
9I 5-10	46	1640.	1694.	54.	4.5	952.	55.4
10D 6- 6	93	1501.	1546.	45.	4.5	877.	61.9
11E 7- 6	124	1483.	1532.	49.	4.5	817.	82.1
11E 9- 3	155	1070.	1109.	39.	4.5	601.	108.4
11E11- 0	172	669.	690.	21.	4.5	582.	26.9
12D 4- 0	16	1291.	1331.	40.	4.5	898.	33.0
12D 6- 0	66	1576.	1629.	53.	4.5	958.	59.9
13G 6- 6	102	1541.	1594.	53.	4.5	821.	52.9

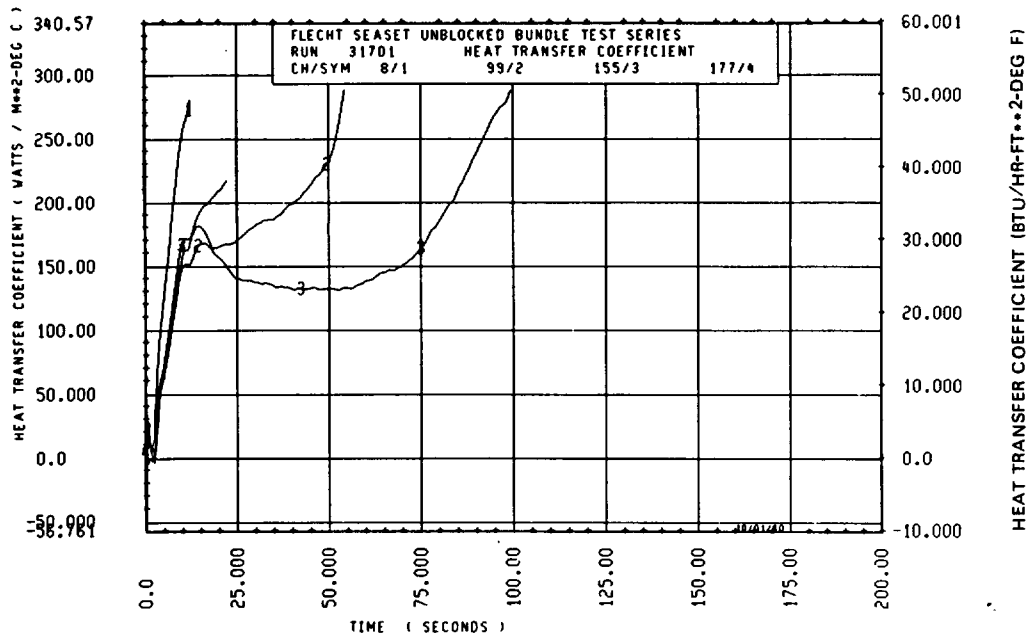

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

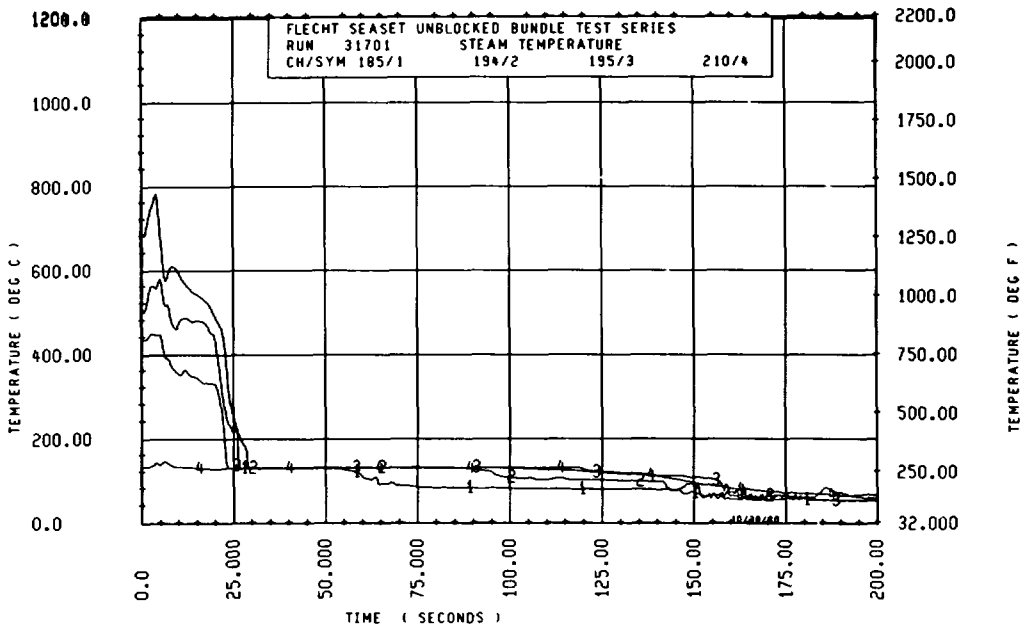

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-58.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

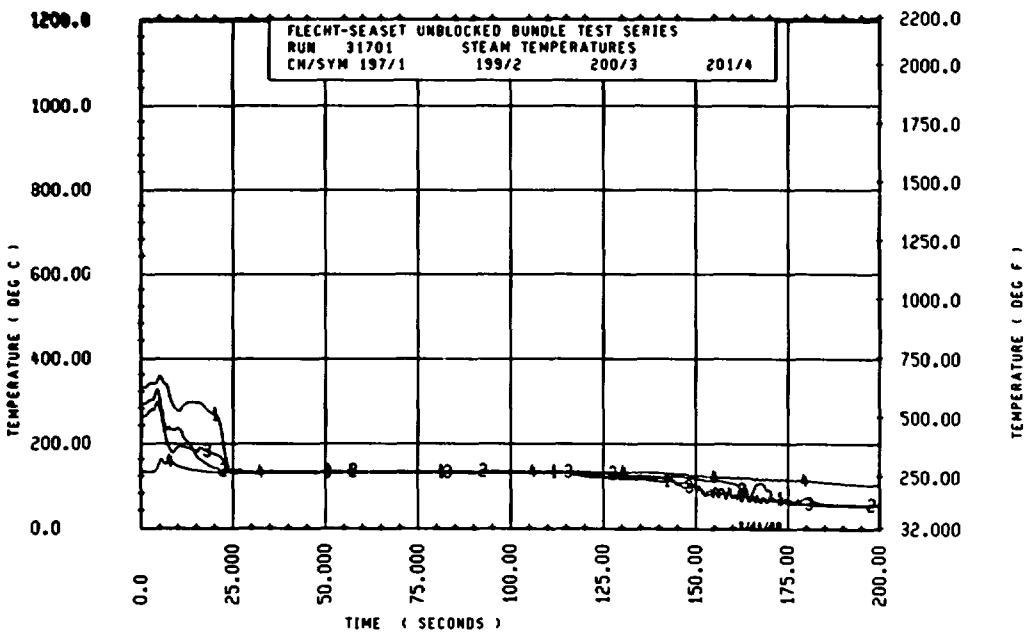

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

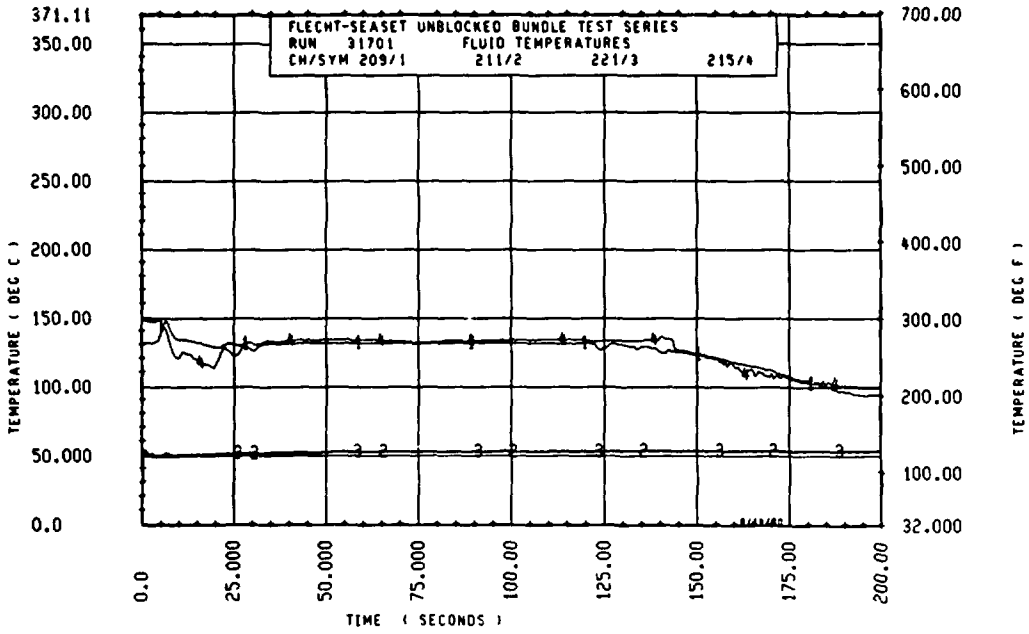

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

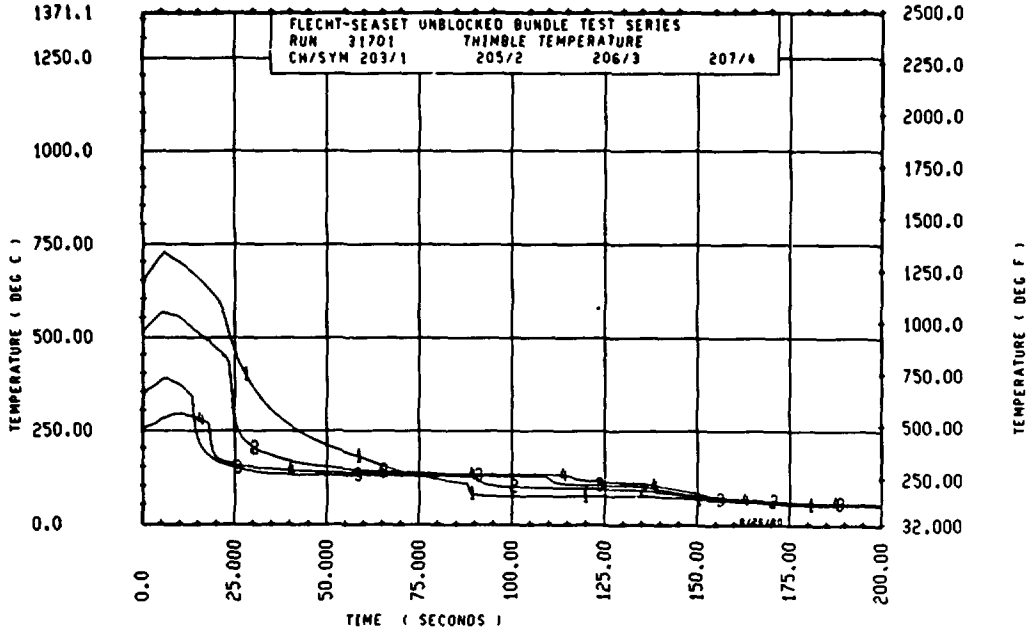

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)

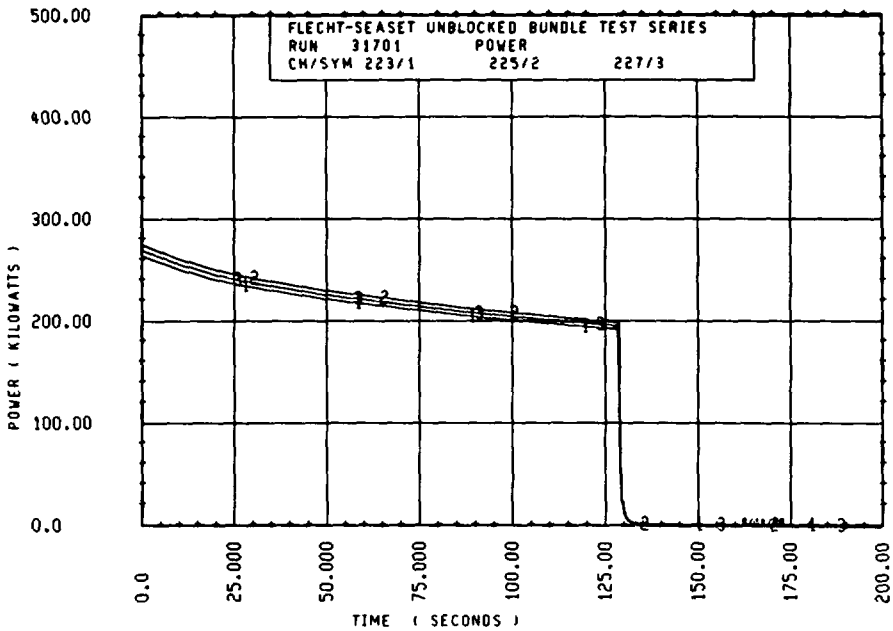

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

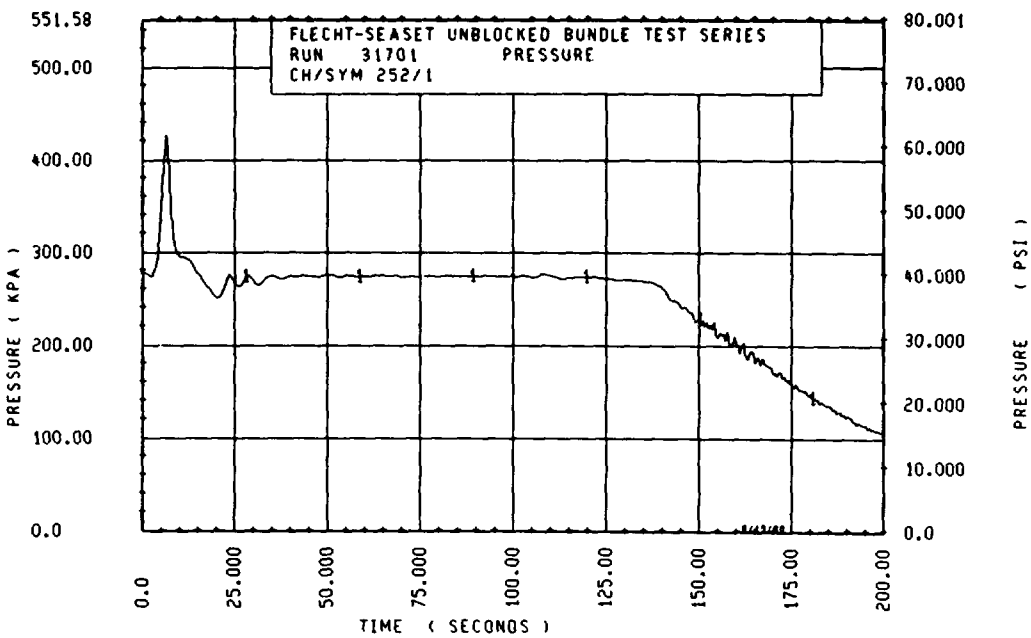

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

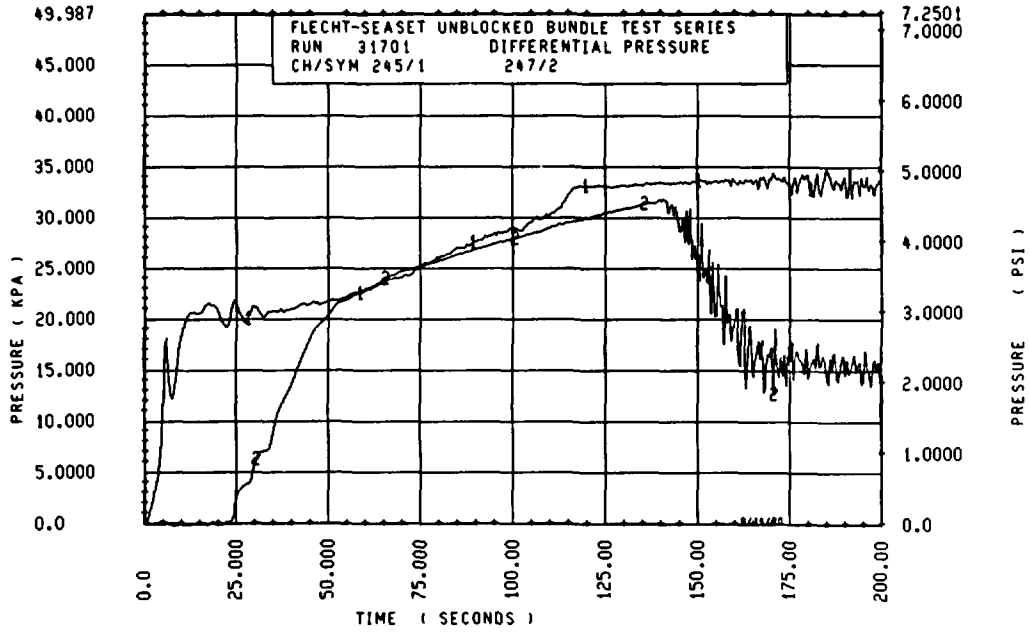


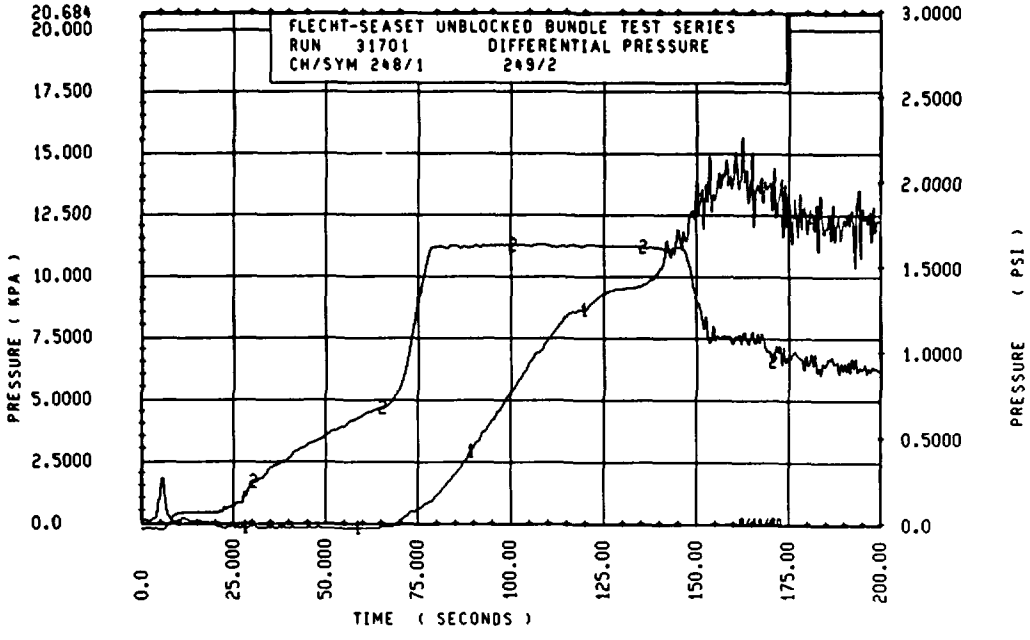


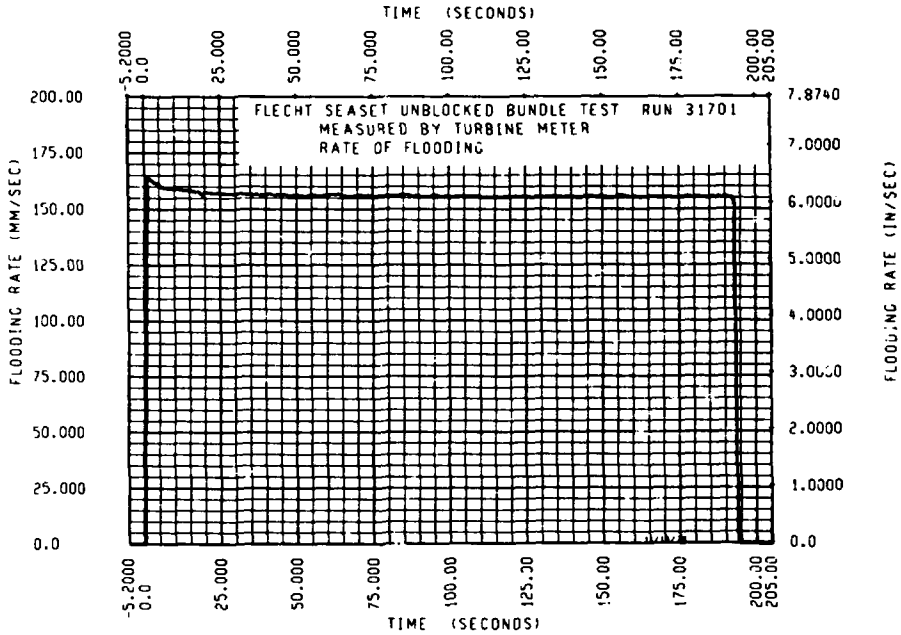
CH 203-4I, 1.83 m (72 in.); CH 205-7L, 2.44 m (96 in.);
CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

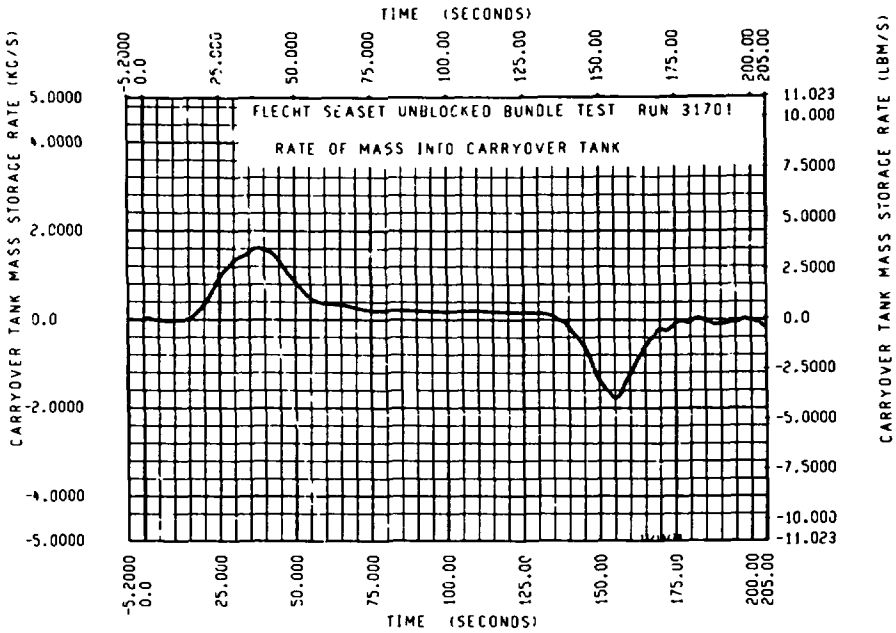

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

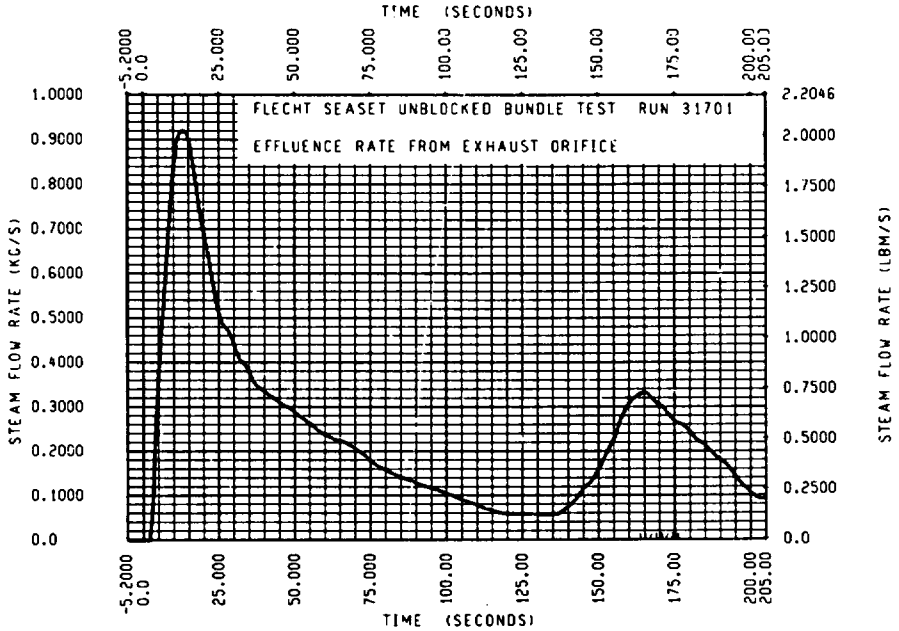

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

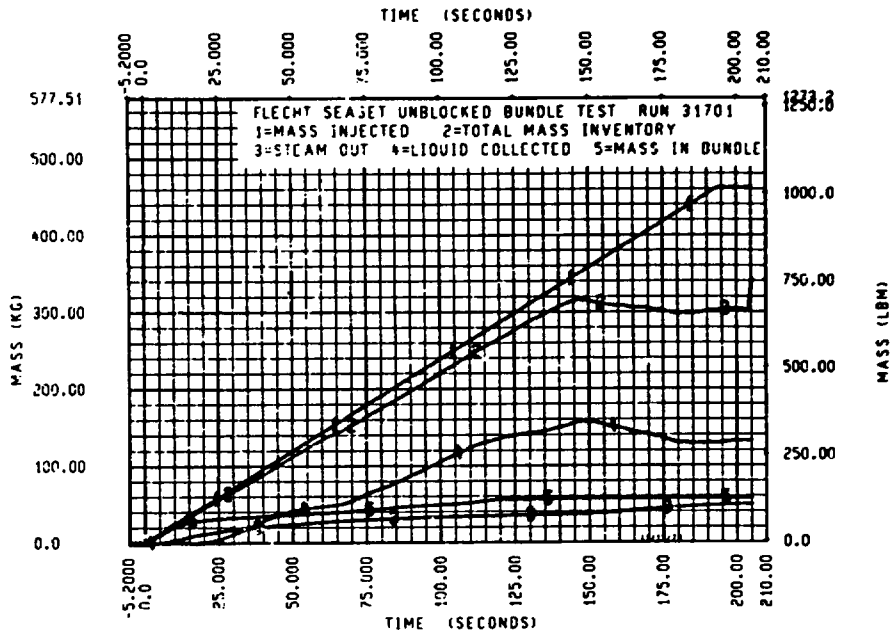

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

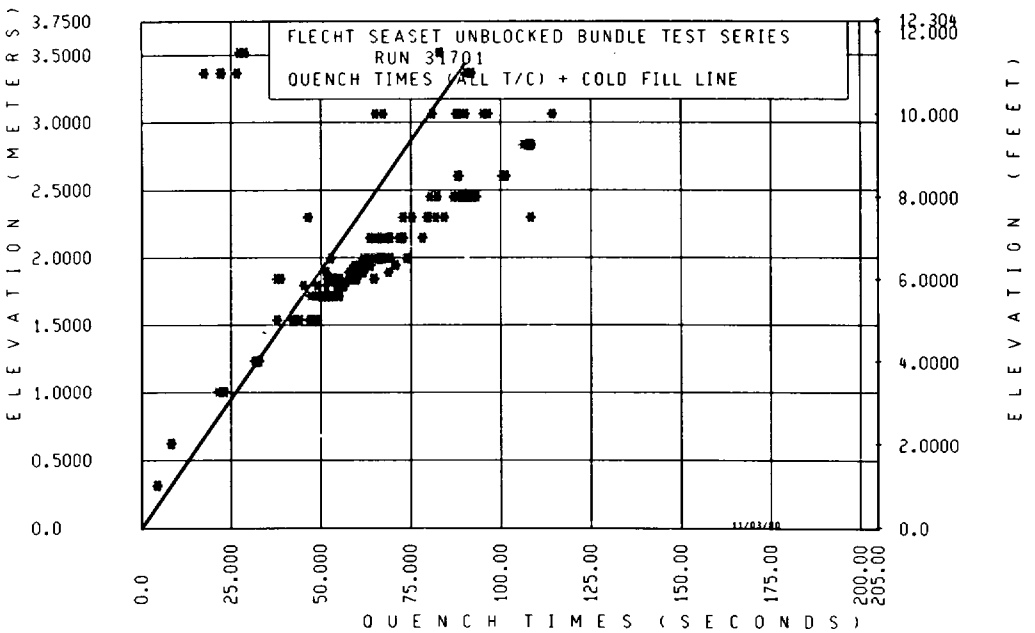

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

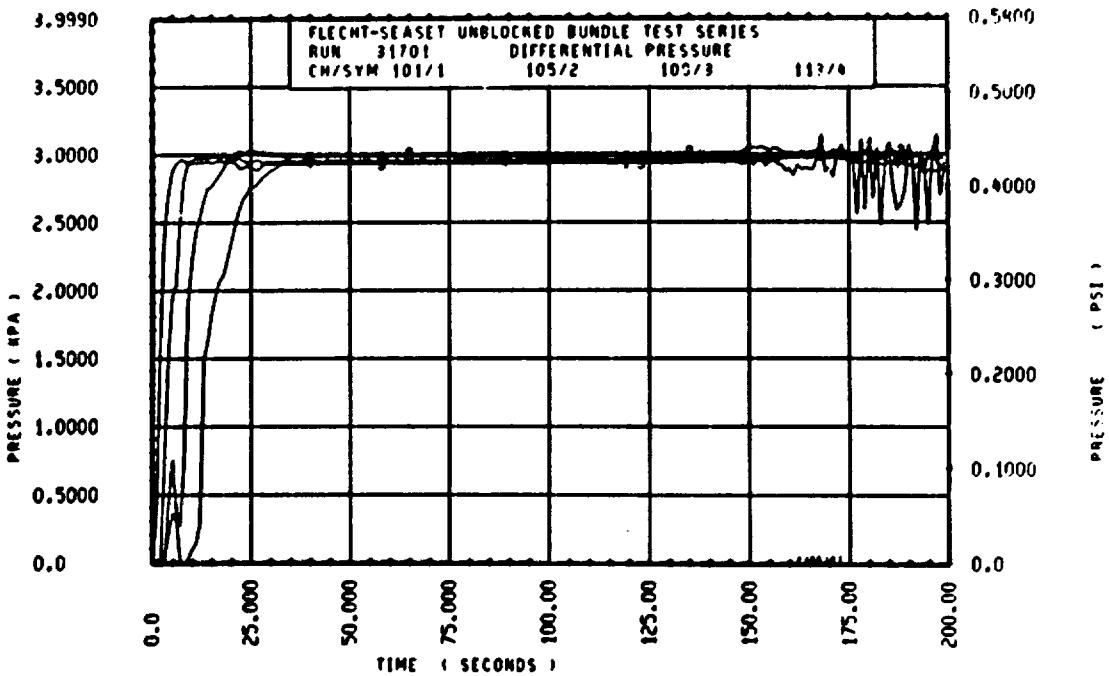

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31701
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
-5.2000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
205.00
200.00
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
7.8740
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0

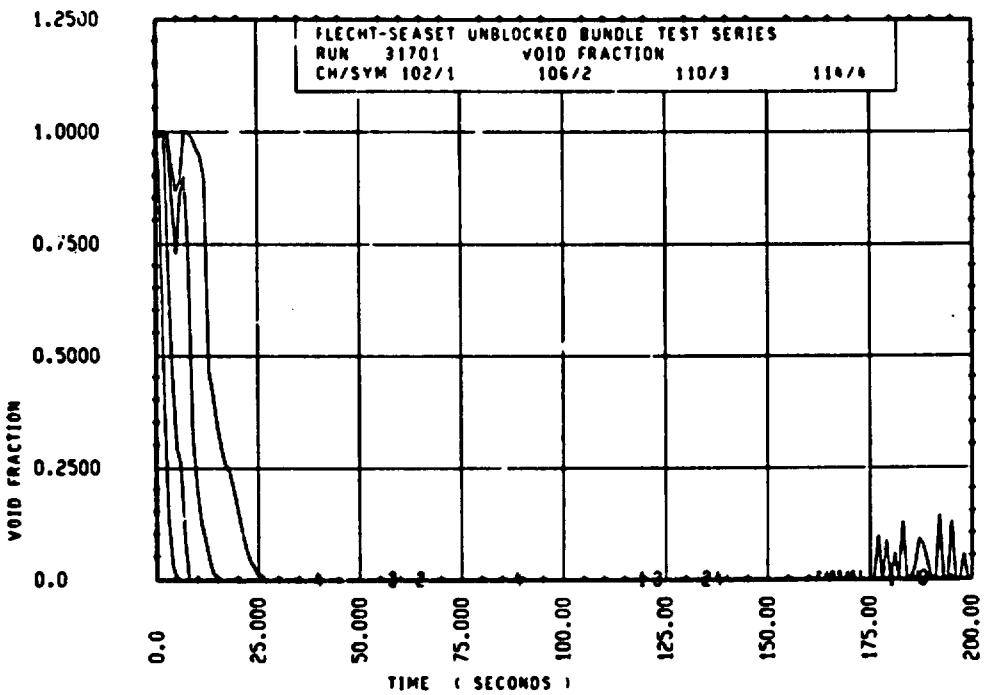

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31701
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
-5.2000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
205.00
5.0000
4.0000
2.0000
0.0
-2.0000
-4.0000
-5.0000
11.023
10.000
7.5000
5.0000
2.5000
0.0
-2.5000
-5.0000
-7.5000
-10.000
-11.023

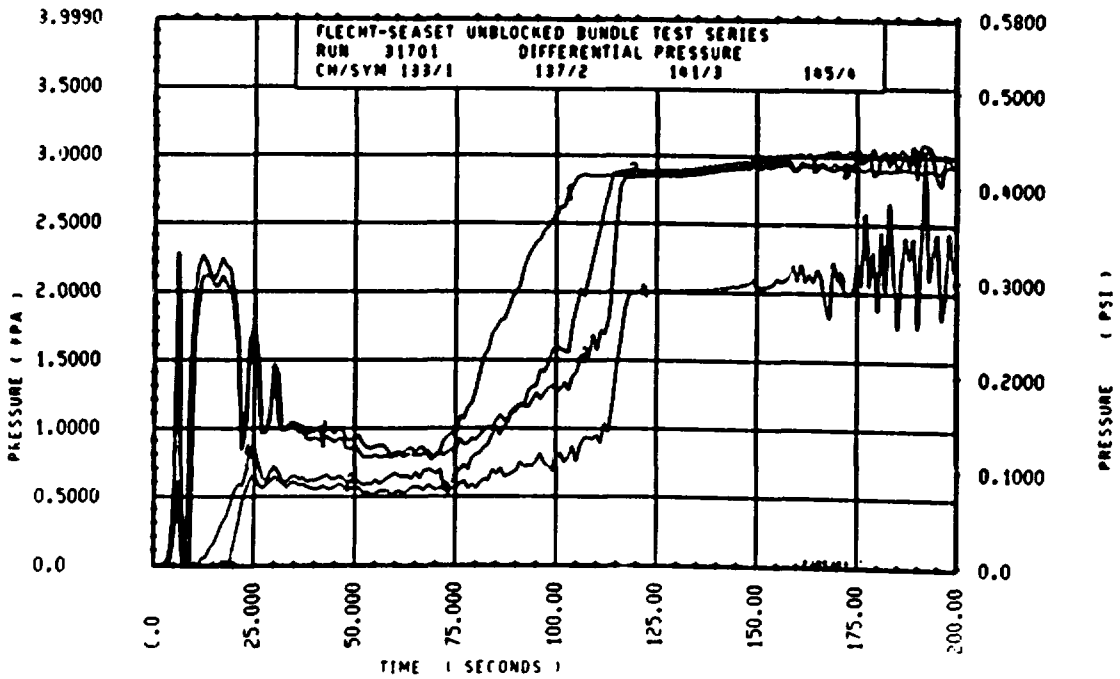

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31701
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
2.2046
2.0000
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.2000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
205.00

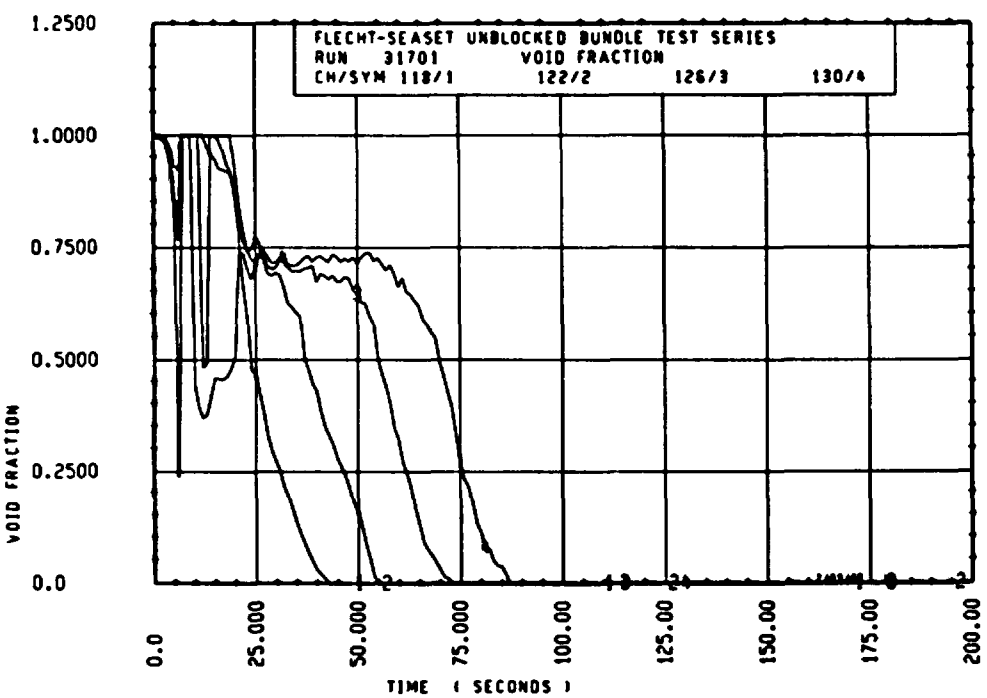

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31701
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
577.51
500.00
400.00
300.00
200.00
100.00
0.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-5.2000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
210.00

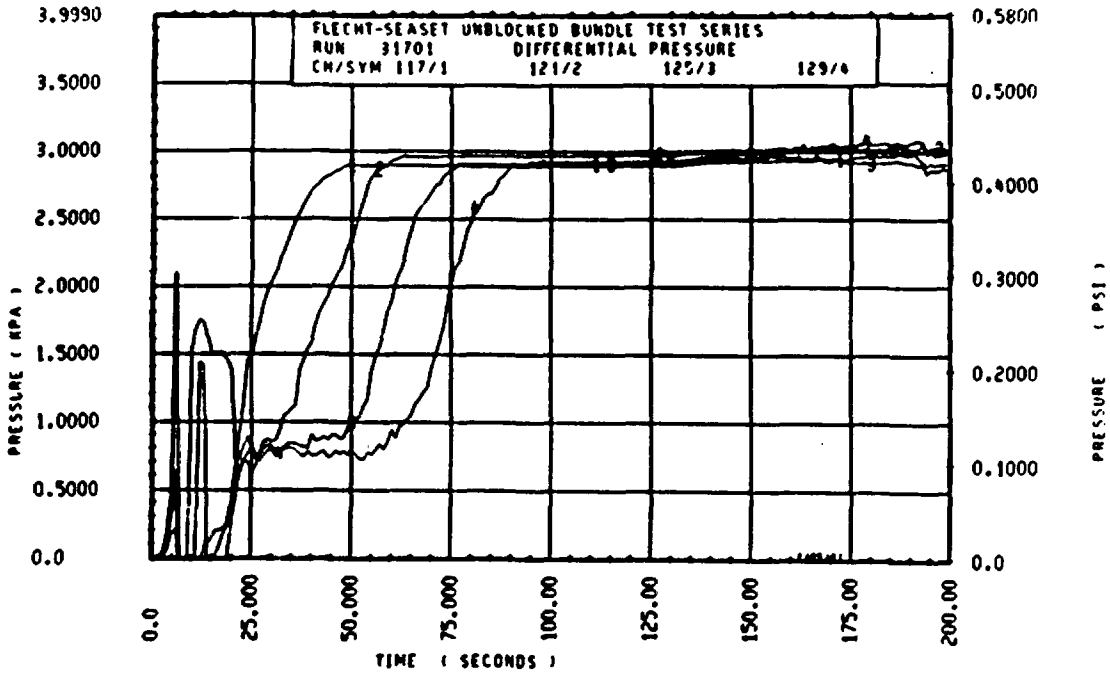

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
205.00
QUENCH TIMES (SECONDS)

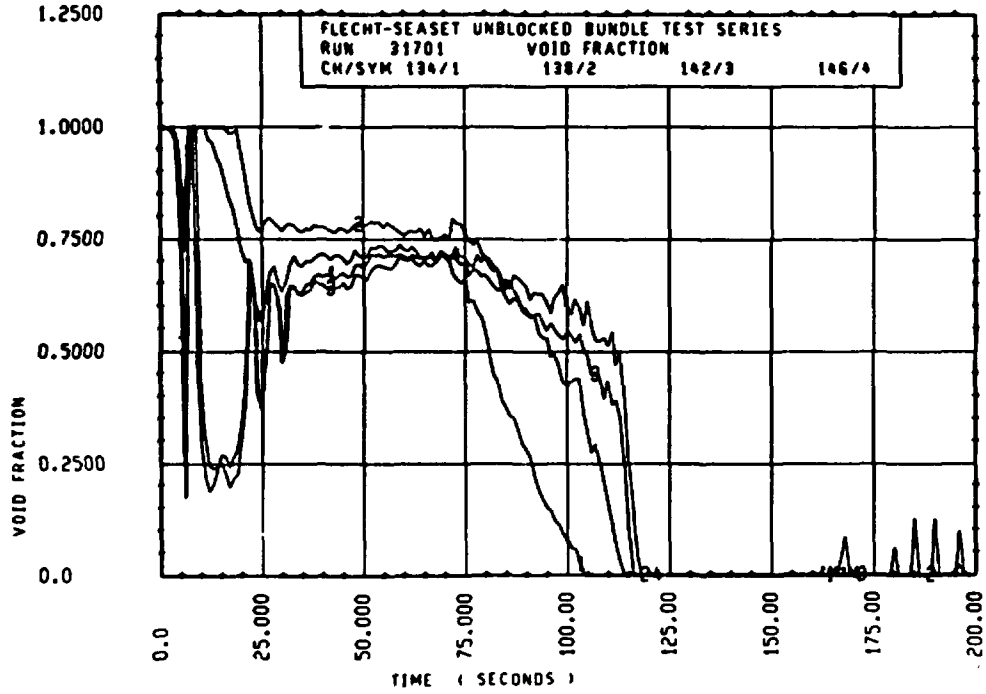

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (MPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31701 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 31805

Date: 4/26/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	871°C (1600°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	21 mm/sec (0.81 in./sec)
Coolant temperature	51°C (124°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	127°C (261°F)	85°C (185°F)
1.22 m (48 in.)	159°C-161°C (319°F-322°F)	135°C (275°F)
1.83 m (72 in.)	188°C-232°C (370°F-450°F)	200°C-525°C (392°F-977°F)
2.44 m (96 in.)	166°C-176°C (330°F-348°F)	361°C-717°C (682°F-1322°F)
2.74 m (108 in.)	157°C-166°C (314°F-331°F)	134°C (273°F)
3.05 m (120 in.)	140°C-146°C (284°F-295°F)	132°C-340°C (270°F-644°F)
3.35 m (132 in.)	135°C-139°C (275°F-283°F)	132°C (270°F)

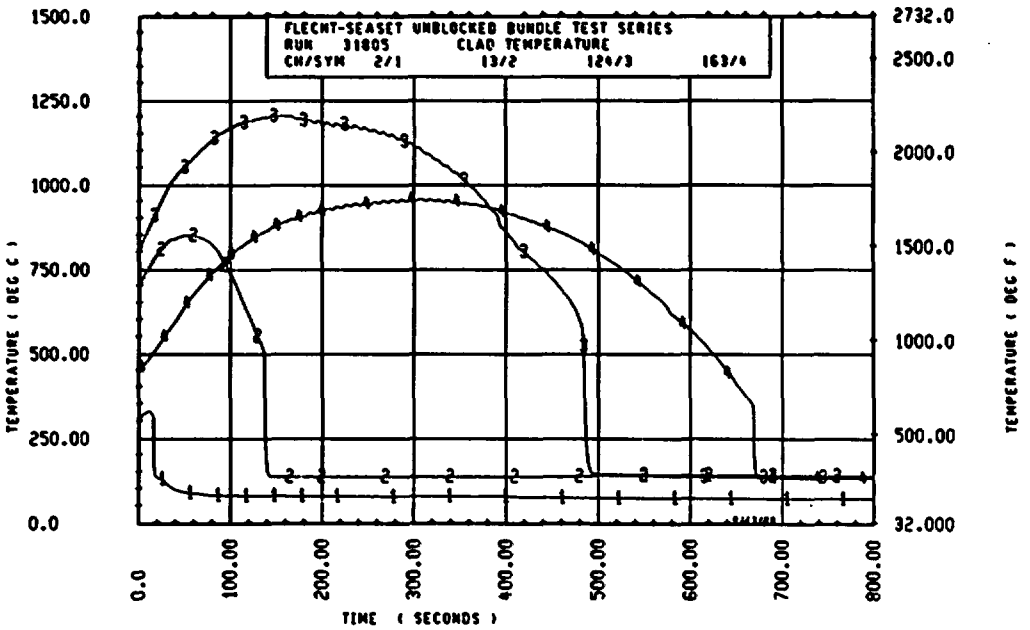
*At 294 seconds after flood

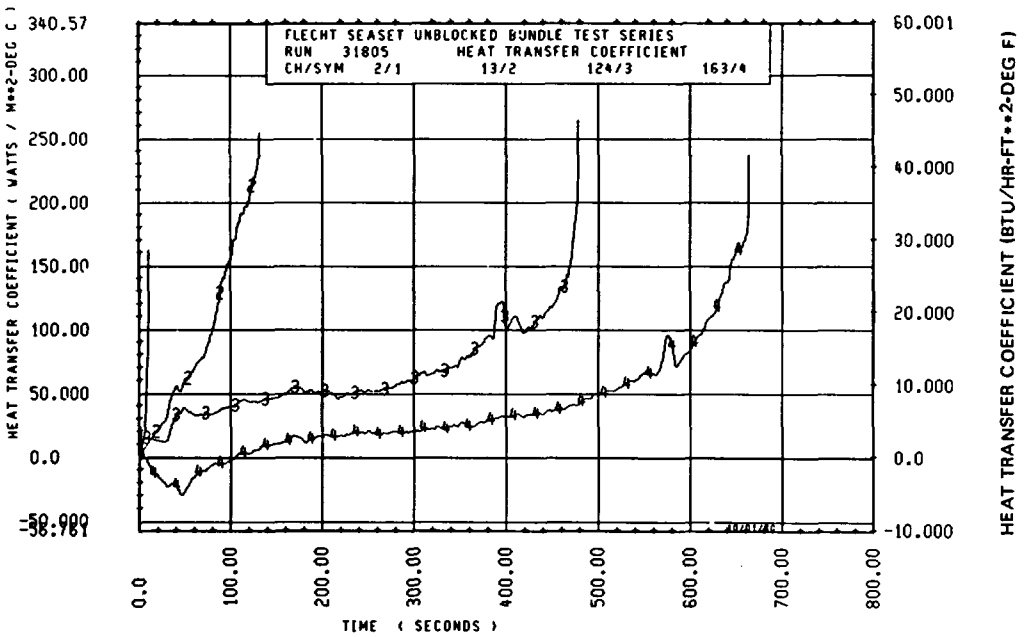
C. Comments

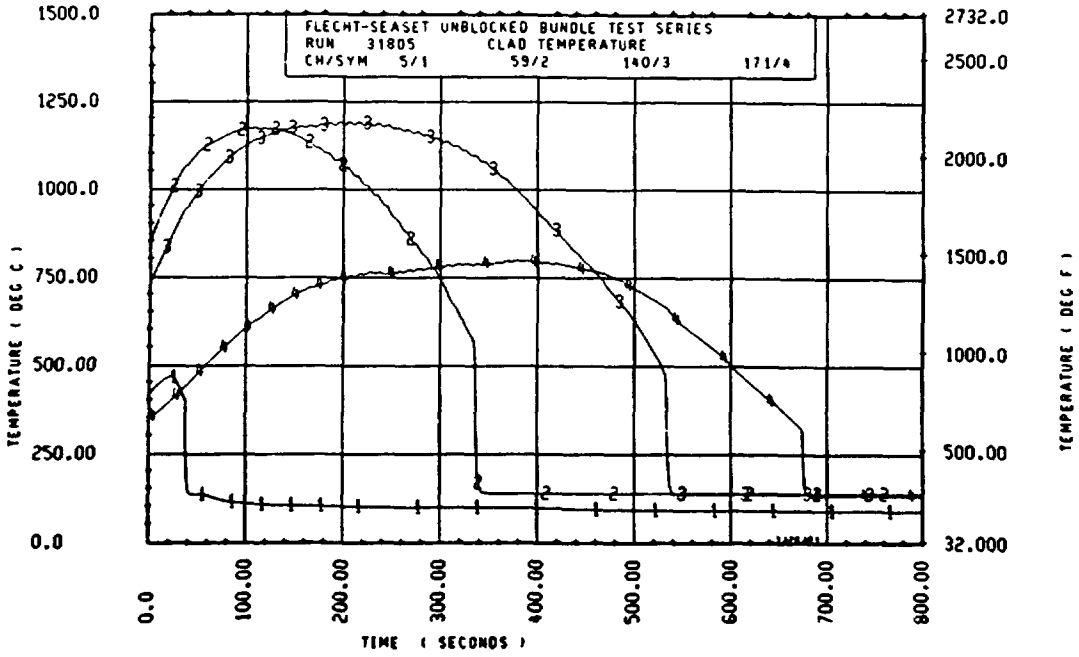
Pressure oscillations occurred throughout test.

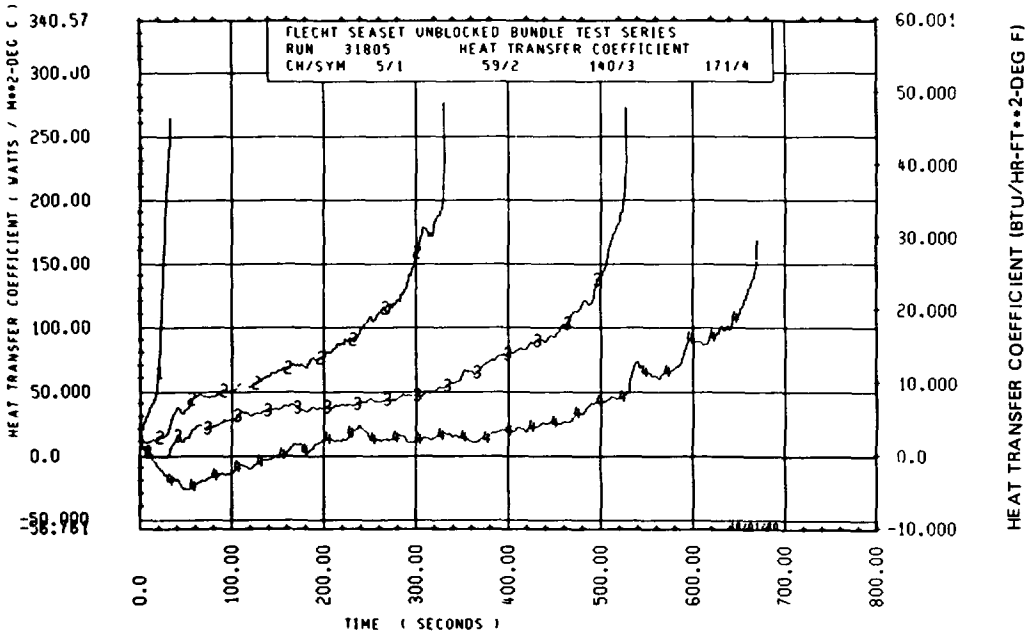
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 31805

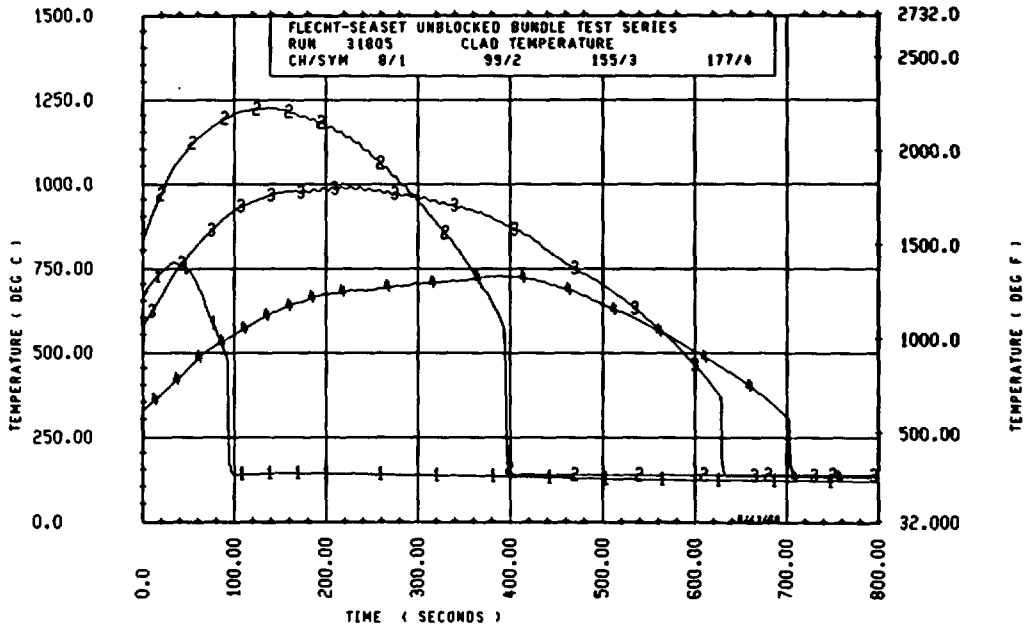
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2N 4- 0	10	1267.	1536.	269.	47.5	905.	133.9
2N 6- 0	50	1560.	2033.	473.	108.5	1045.	333.7
3C 5- 0	17	1349.	1628.	278.	67.5	926.	224.9
3C 5- 7	28	1456.	1730.	274.	73.0	853.	283.9
4L 8- 0	129	1319.	2032.	712.	185.5	799.	535.0
4L 8- 6	147	1321.	2025.	704.	176.0	804.	535.6
5E11- 0	168	663.	1376.	713.	287.0	597.	478.0
5J 4- 0	12	1244.	1526.	282.	51.5	882.	139.5
5J 8- 6	146	1120.	1890.	770.	226.0	677.	582.6
5J11- 6	175	616.	1246.	631.	367.0	591.	690.0
7B 6- 0	57	1497.	1911.	414.	99.0	1020.	280.6
7B 8- 6	142	1120.	1771.	650.	175.5	692.	583.9
7B10- 0	162	839.	1553.	714.	195.5	673.	656.0
7B11- 6	176	650.	1240.	590.	266.0	582.	690.8
7D 6- 4	84	1612.	2158.	546.	107.0	978.	346.9
7D 7- 6	119	1482.	2110.	628.	145.0	915.	479.8
7D 9- 3	151	1015.	1829.	815.	206.0	738.	606.8
7G 5- 0	23	1485.	1858.	372.	65.0	1000.	218.8
7J 6- 0	59	1568.	2147.	579.	108.5	1008.	335.8
7N 7- 6	120	1455.	2139.	684.	175.5	937.	491.9
7N 8- 0	132	1315.	2107.	792.	186.0	832.	527.3
7N 9- 3	152	1024.	1842.	818.	217.0	799.	601.9
8N 4- 0	13	1295.	1565.	269.	50.0	923.	137.4
8N10- 0	163	840.	1756.	917.	306.0	658.	667.9
8N11- 6	177	627.	1342.	714.	390.0	579.	702.0
8K 4- 0	14	1265.	1543.	278.	50.0	912.	135.3
8K 6- 6	99	1537.	2239.	701.	136.0	1040.	393.6
8K 8- 0	140	1357.	2180.	822.	206.0	866.	532.7
8K10- 0	164	839.	1764.	925.	296.0	715.	658.9
8N 2- 0	5	787.	879.	92.	23.0	753.	37.8
8N 4- 0	15	1279.	1557.	278.	57.5	913.	133.4
8N 6- 0	61	1570.	2132.	561.	118.5	1066.	337.7
8N10- 0	165	841.	1633.	792.	216.0	710.	651.0
9C 7- 0	109	1481.	2030.	549.	118.5	815.	443.6
9C 9- 3	153	1038.	1799.	761.	206.0	717.	611.0
9G 1- 0	2	590.	629.	39.	11.0	600.	15.5
9G 3- 3	8	1232.	1414.	182.	33.0	891.	93.0
9G11- 0	171	660.	1471.	811.	378.0	610.	674.0
9I 5- 0	24	1505.	1899.	394.	84.0	1014.	219.7
9I 5-10	46	1632.	2149.	517.	105.0	1015.	306.8
10D 6- 6	93	1501.	1975.	474.	156.0	934.	389.3
11E 7- 6	124	1481.	2202.	721.	155.5	1016.	483.7
11E 9- 3	155	1074.	1817.	743.	226.0	687.	627.9
11E11- 0	172	672.	1415.	743.	367.0	557.	685.0
12D 4- 0	16	1292.	1552.	260.	43.5	931.	135.4
12D 6- 0	66	1577.	2055.	478.	97.0	1024.	329.6
13G 6- 6	102	1519.	2075.	556.	108.0	952.	330.6

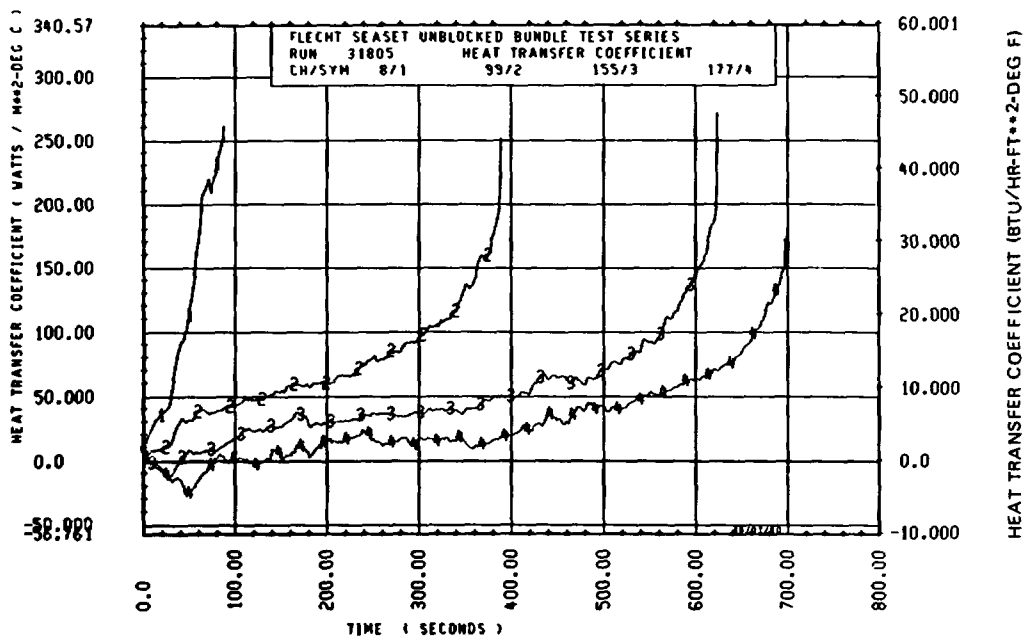

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

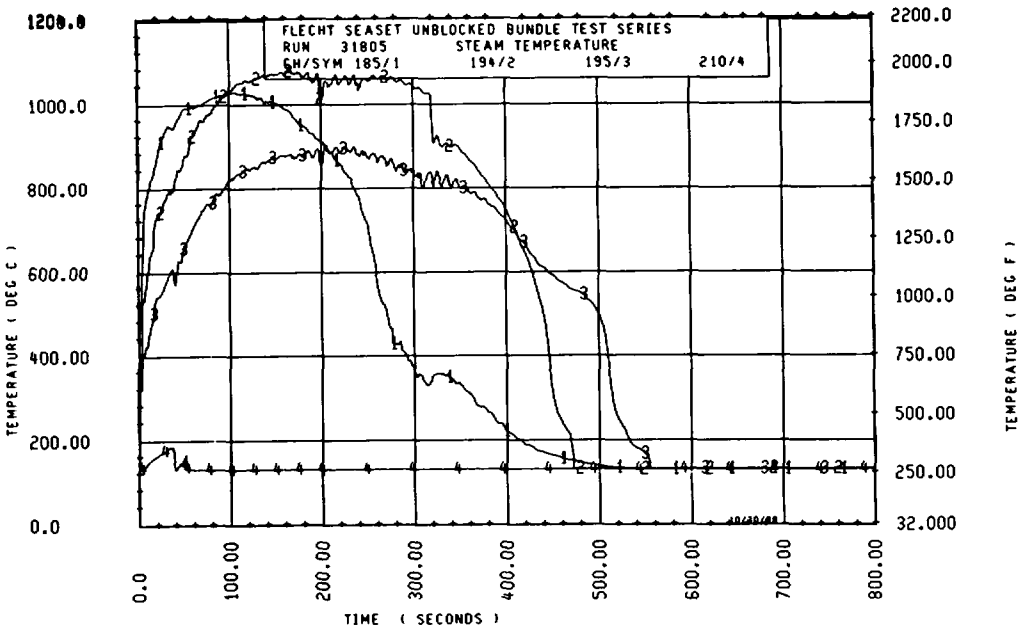

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

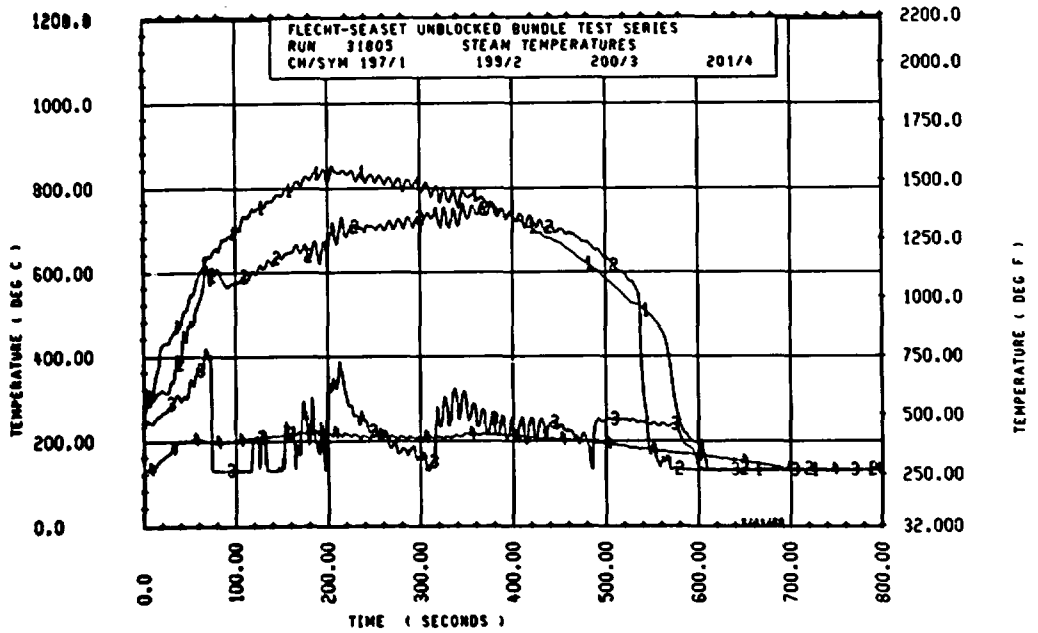

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

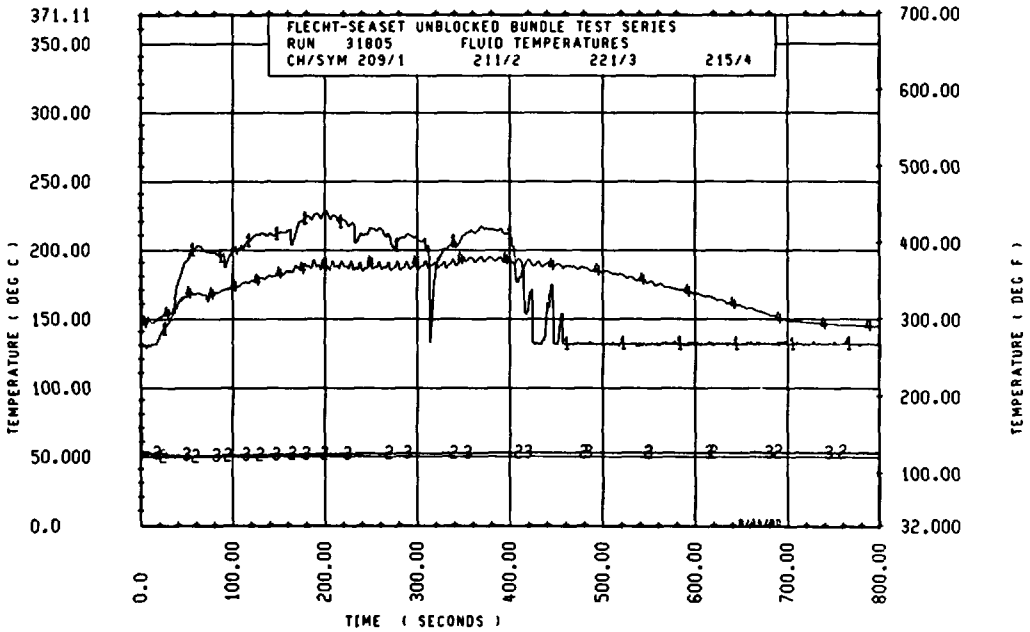

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)

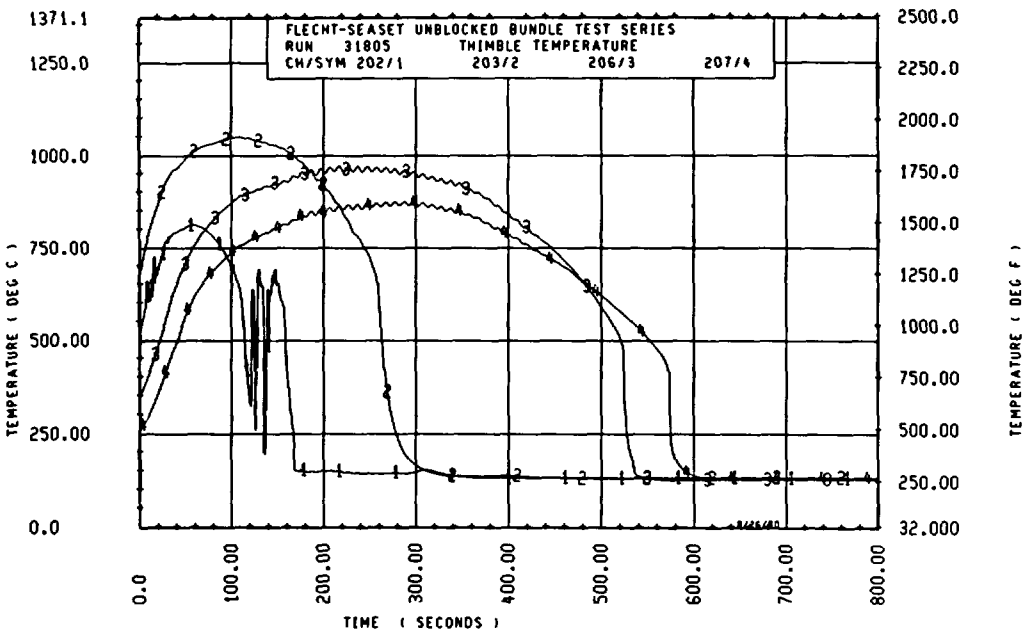

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

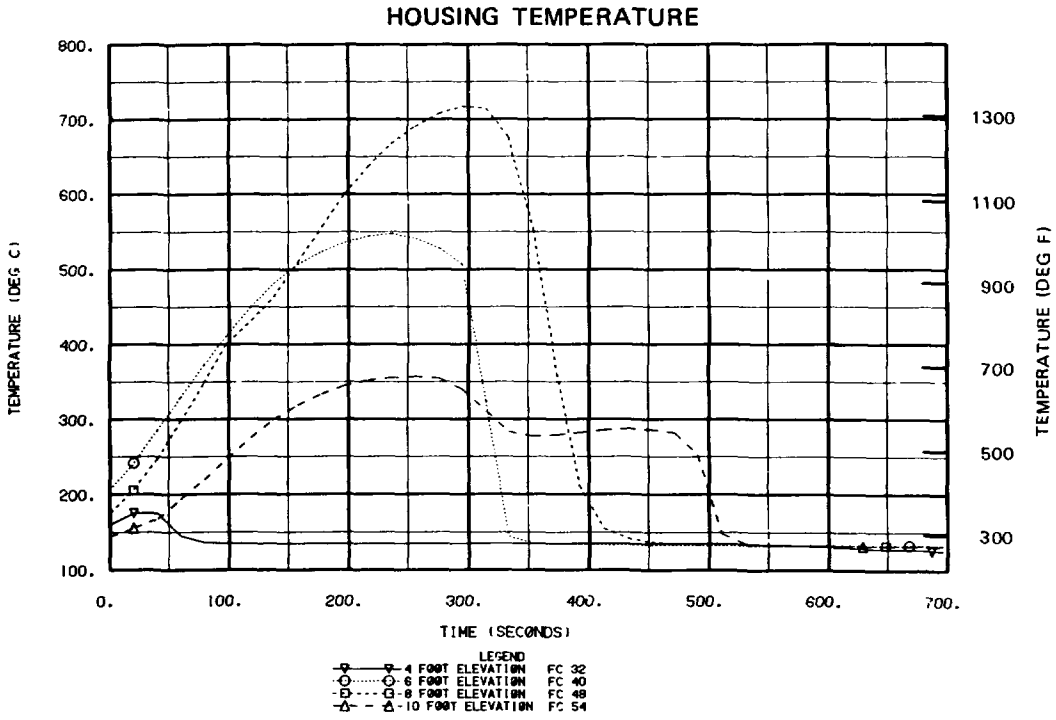

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

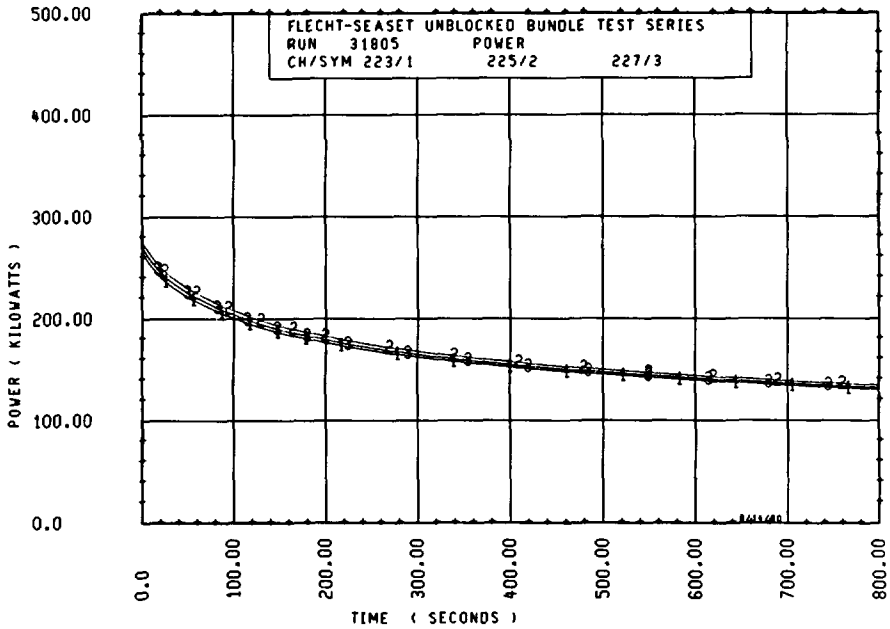

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

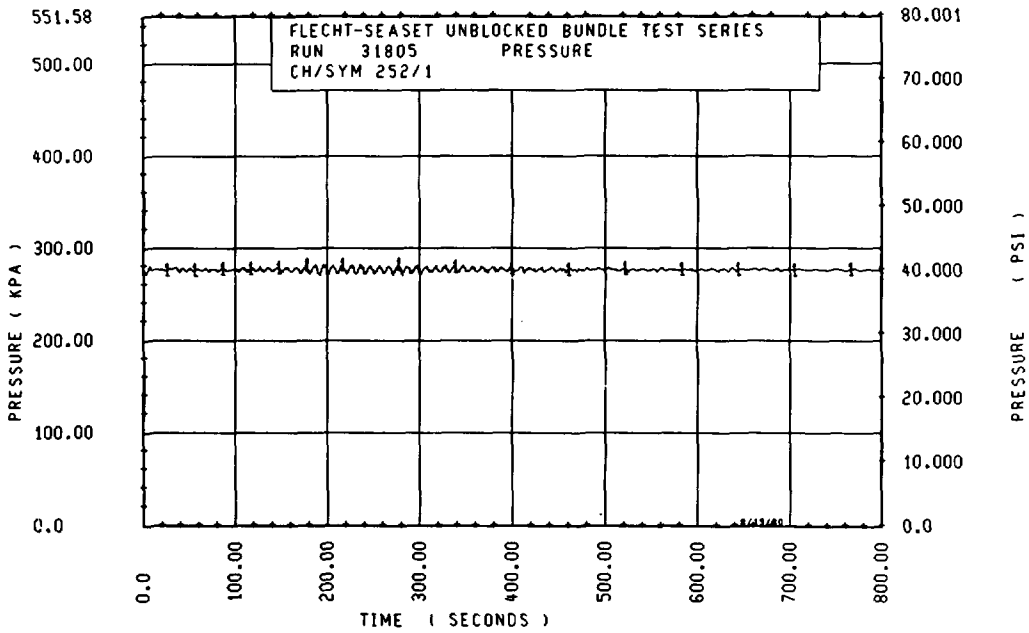


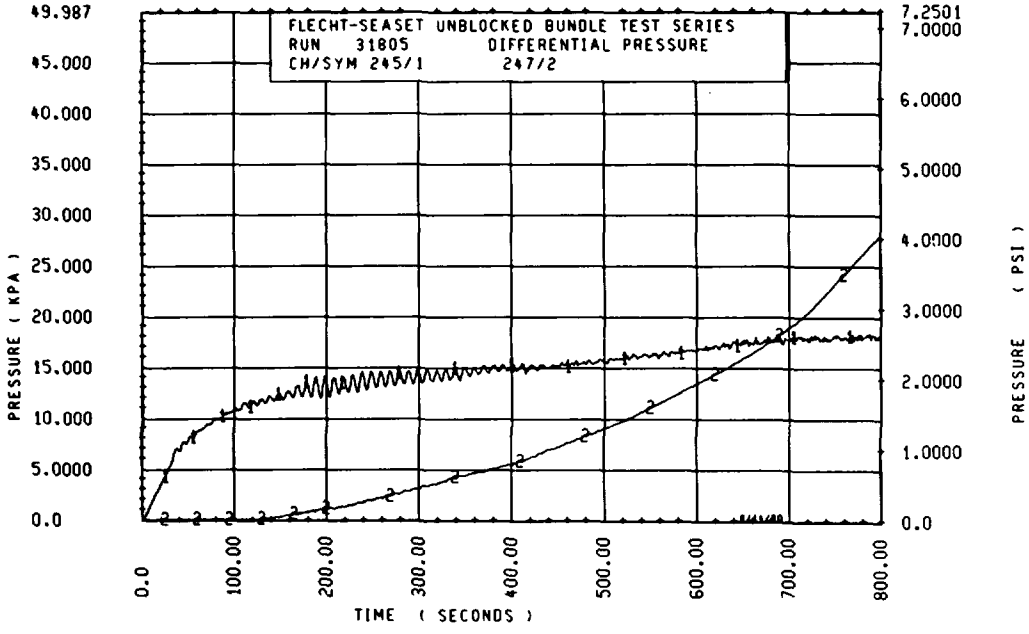


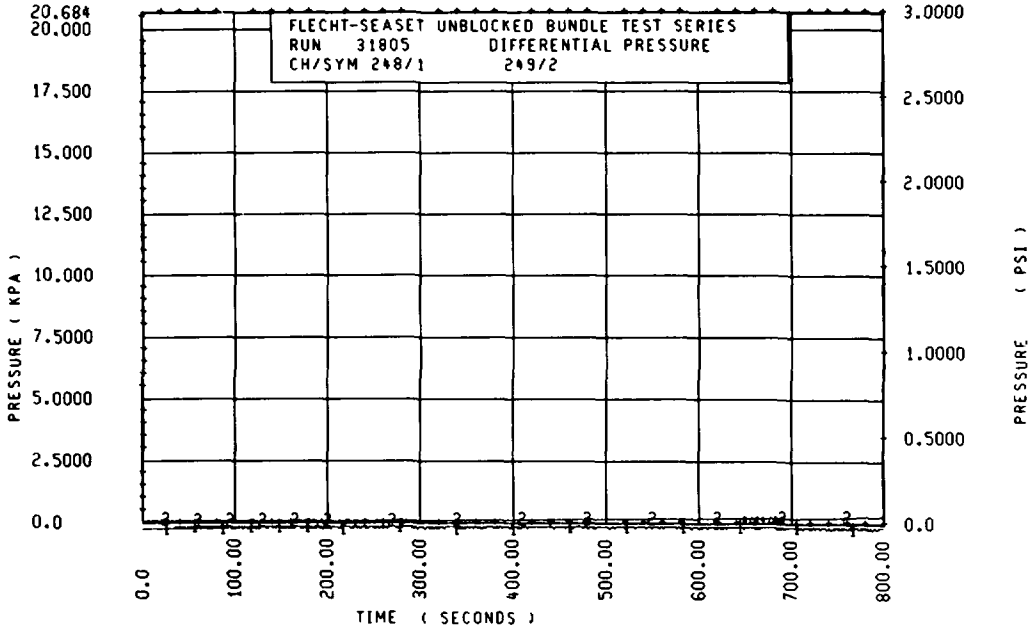
CH 202-7L, 1.22 m (48 in.); CH 203-4I, 1.83 m (72 in.),
CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

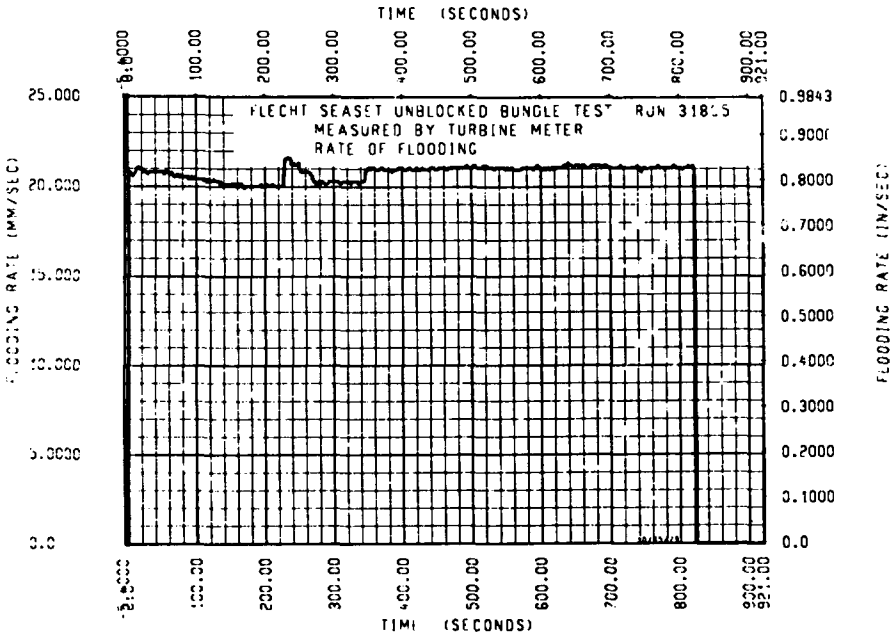

HOUSING TEMPERATURE
TEMPERATURE (DEG C)
800.
700.
600.
500.
400.
300.
200.
100.
TEMPERATURE (DEG F)
1300
1100
900
700
500
300
0.
100.
200.
300.
400.
500.
600.
700.
TIME (SECONDS)
LEGEND
4 FOOT ELEVATION FC 32
6 FOOT ELEVATION FC 40
8 FOOT ELEVATION FC 48
10 FOOT ELEVATION FC 54

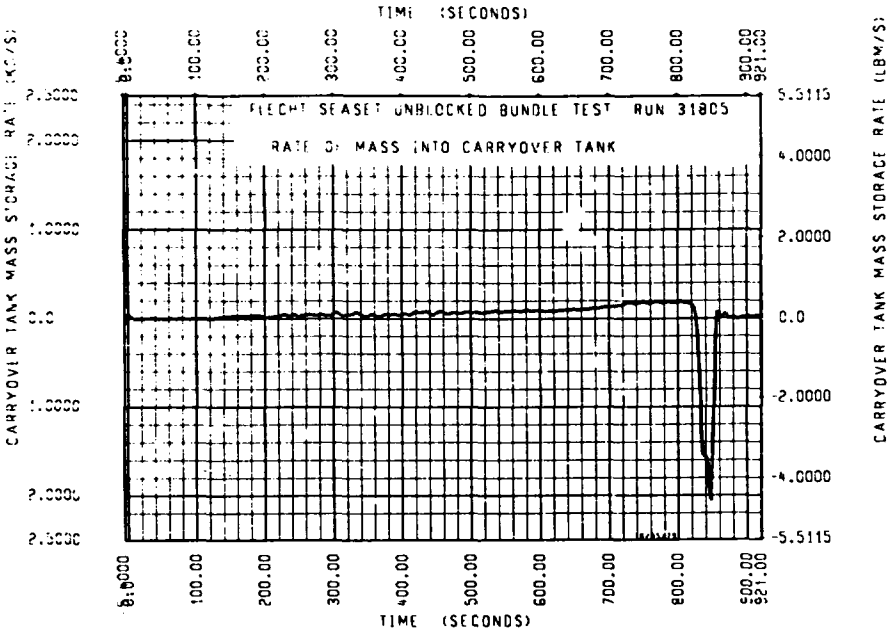

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

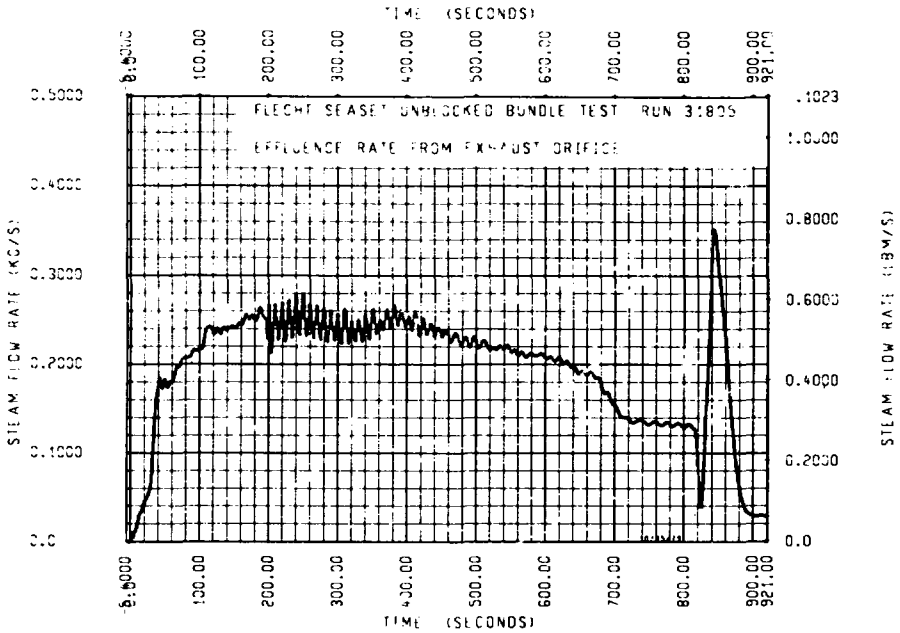

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

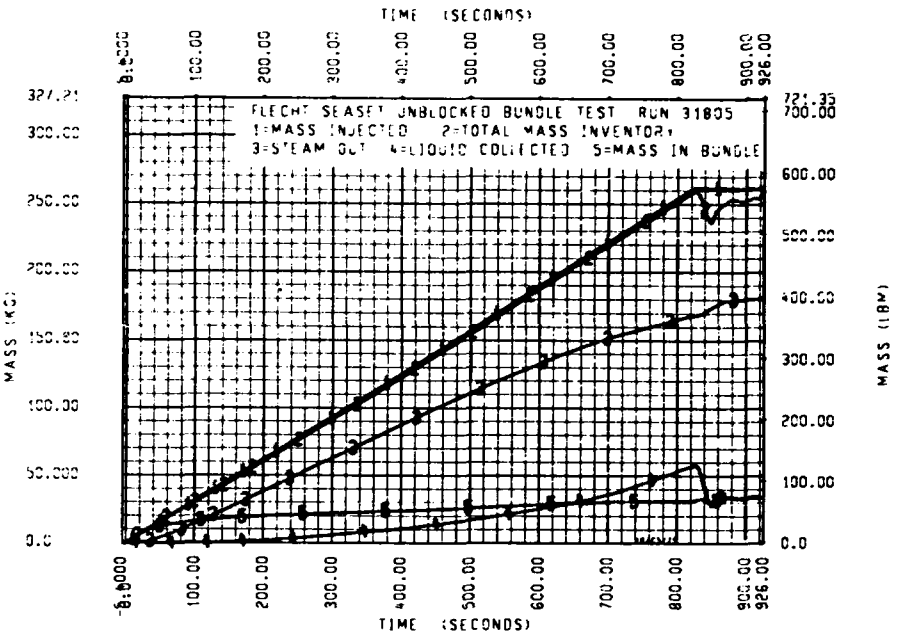

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

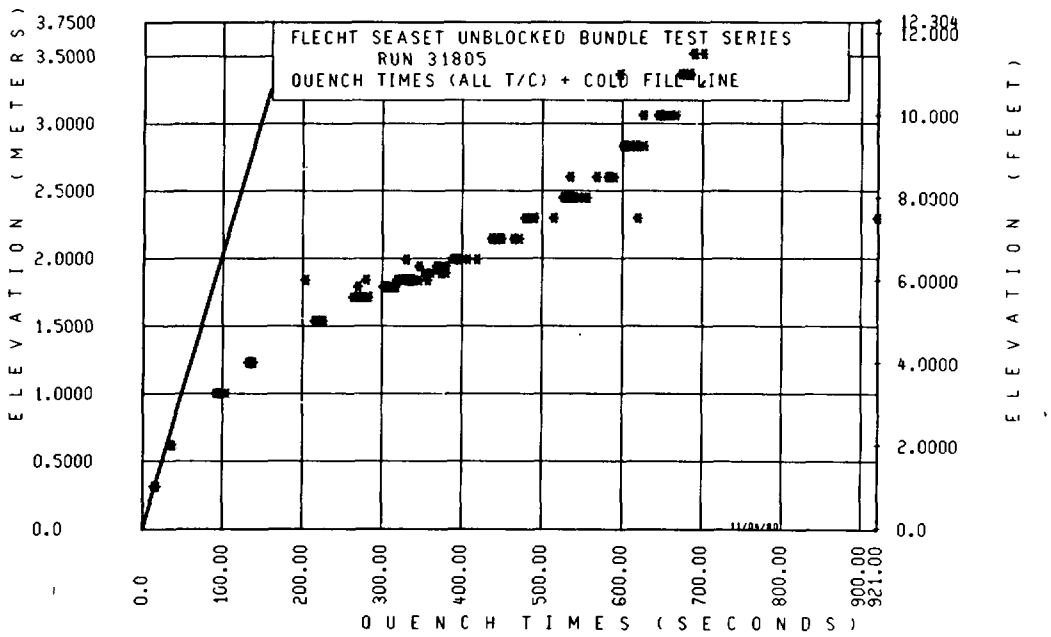

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

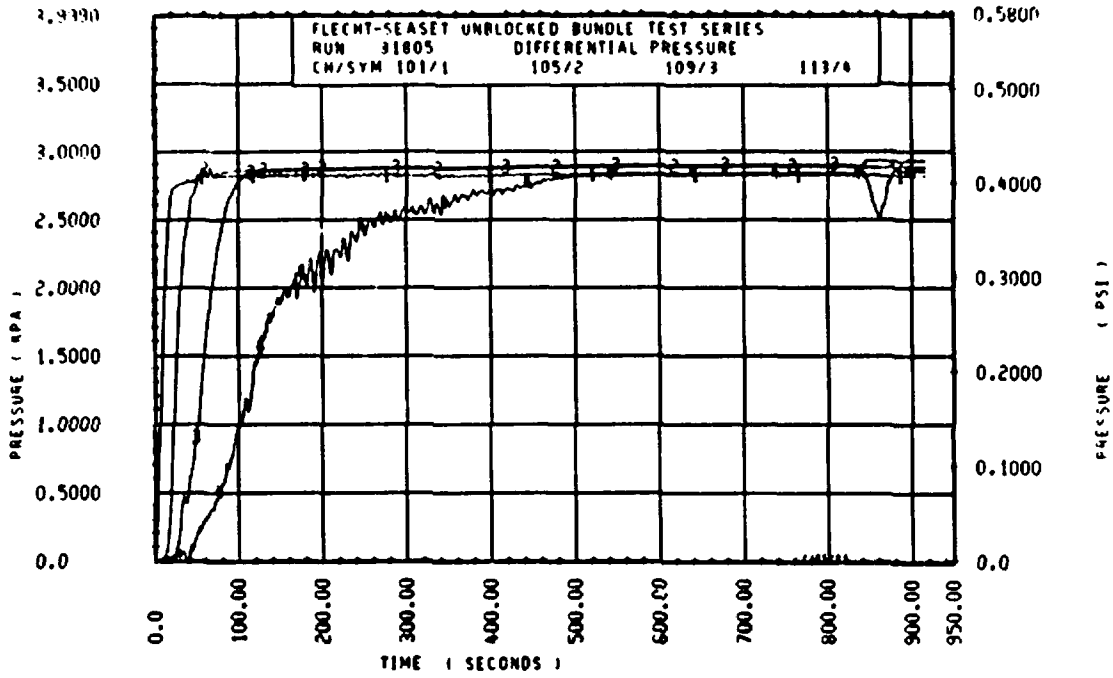

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31805
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
25.000
20.000
15.000
10.000
5.0000
0.0
0.9843
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
921.00

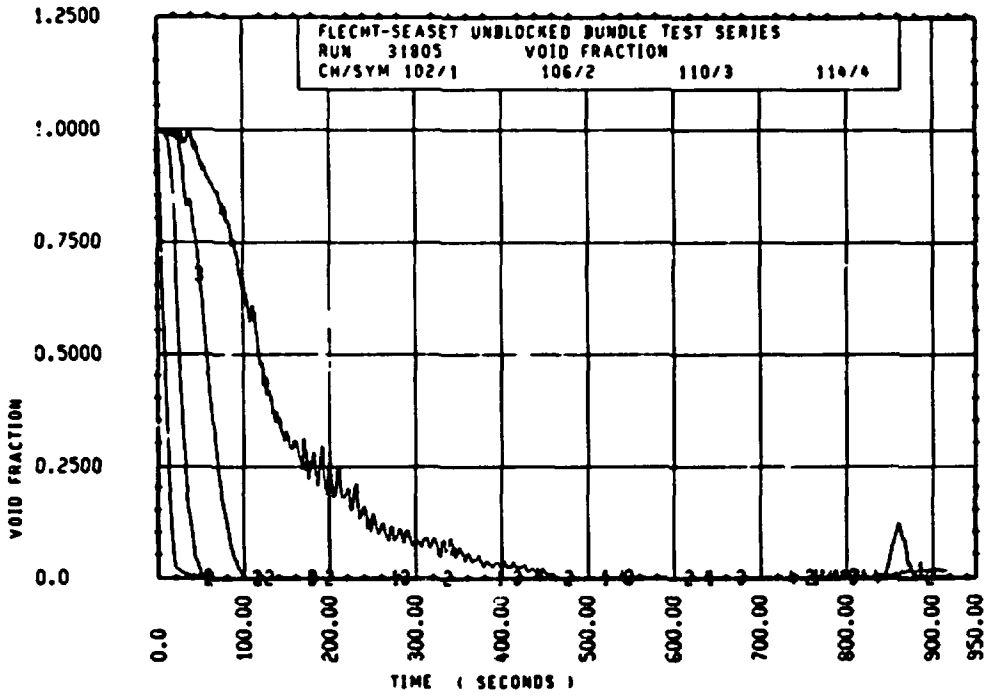

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31805
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
5.5115
4.0000
2.0000
0.0
-2.0000
-4.0000
-5.5115
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
921.00

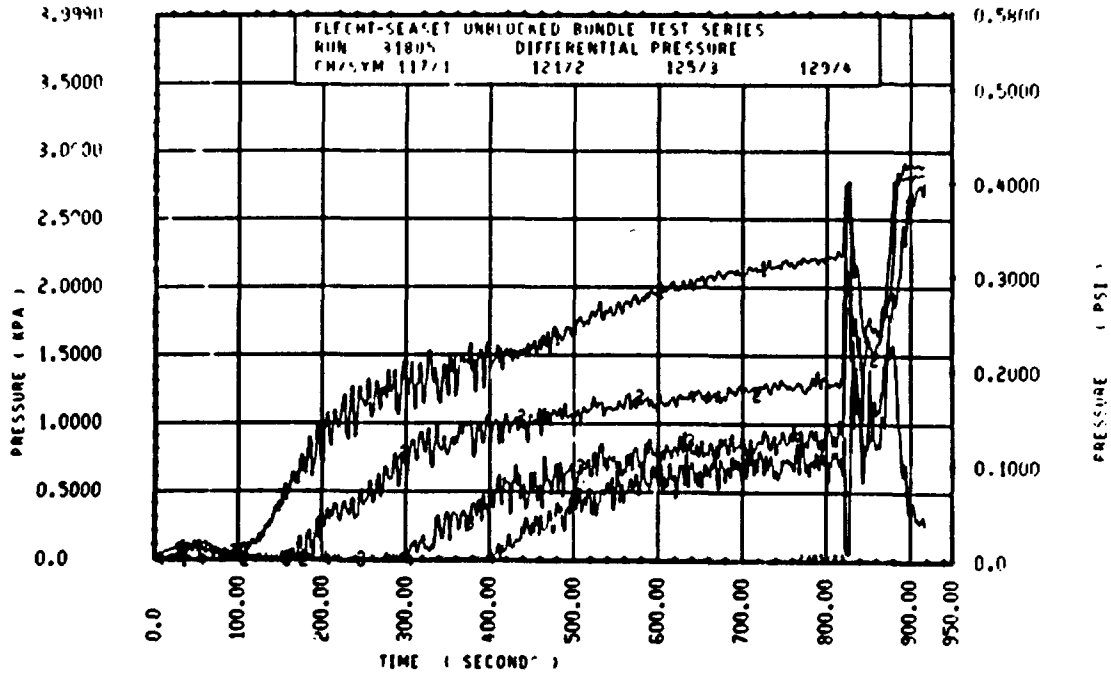

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31805
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-8.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
921.00

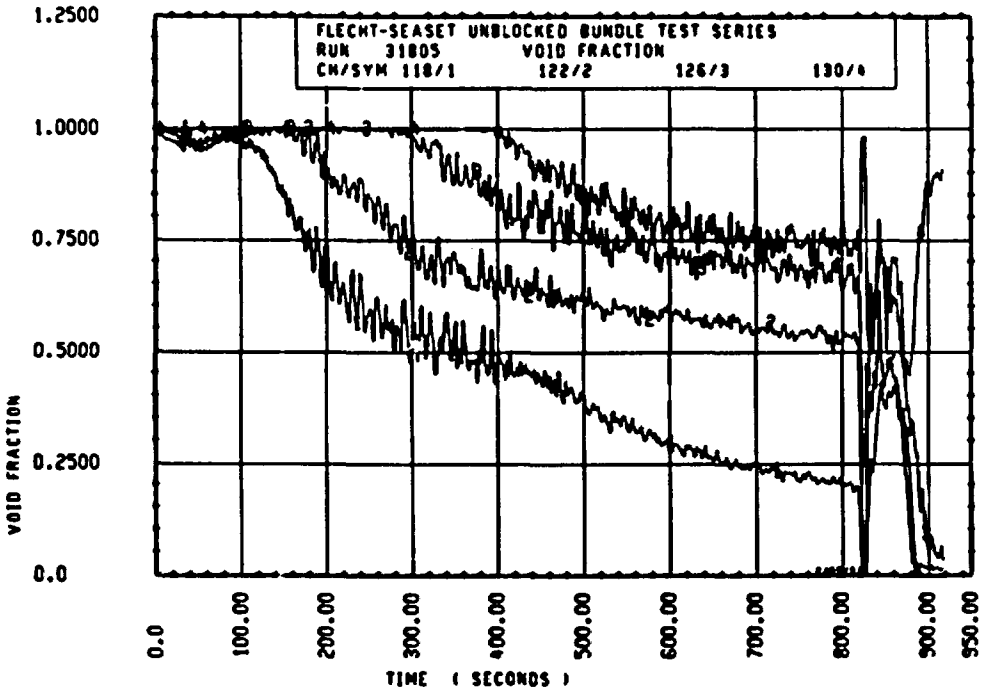

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31805
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
327.21
300.00
250.00
200.00
150.00
100.00
50.000
0.0
721.35
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-8.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
926.00

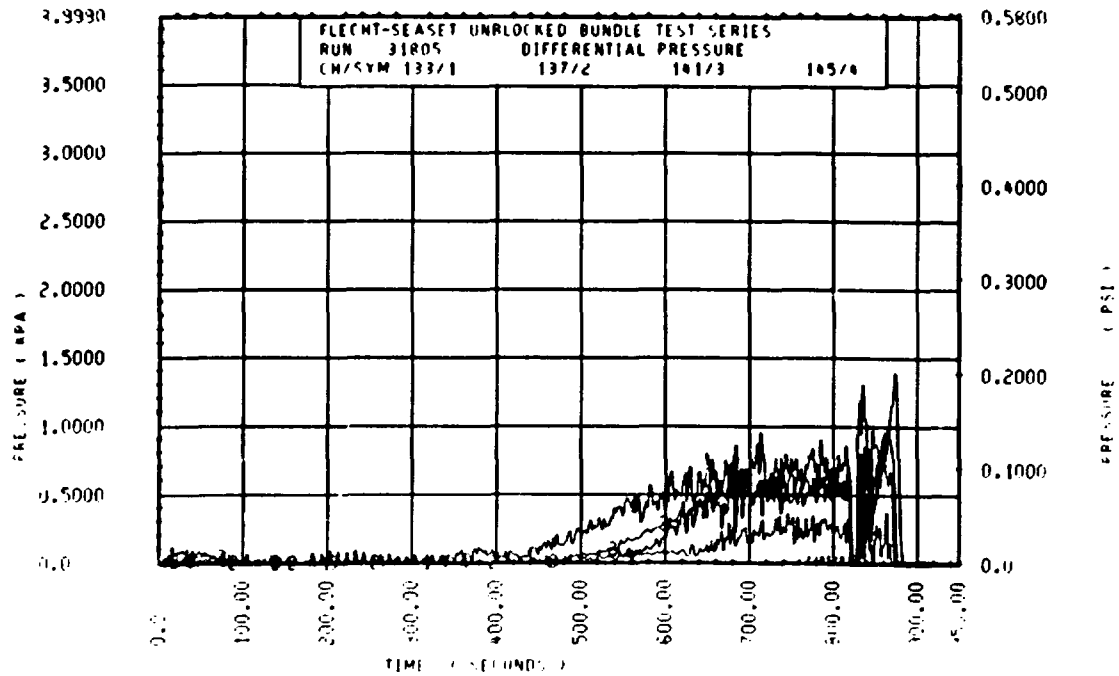

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
921.00
QUENCH TIMES (SECONDS)

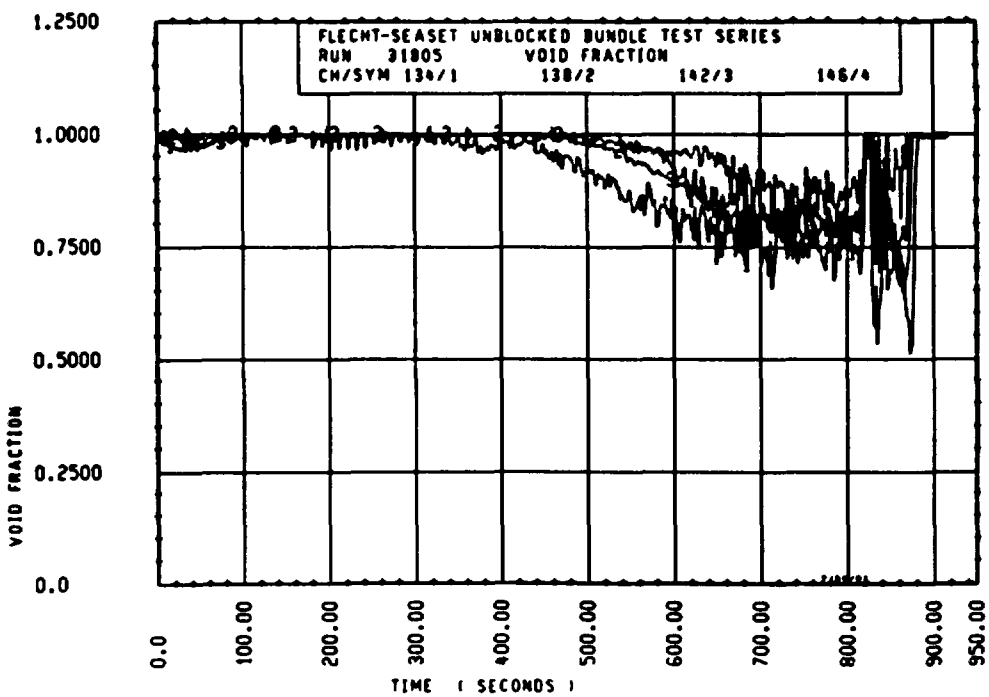

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
950.00
0.5000
0.4000
0.3000
0.2000
0.1000
1.0000
1.5000
2.0000
2.5000
3.0000
3.5000


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
950.00
0.2500
0.5000
0.7500
1.0000
1.2500


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
100.00
200.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31805 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
VOID FRACTION
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
950.00
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 31922

Date: 4/30/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.14 MPa (20 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	883°C (1621°F)
Rod peak power	1.3 kw/m (0.40 kw/ft)
Flow rate	27.2 mm/sec (1.07 in./sec)
Coolant temperature	35°C (95°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	113°C (236°F)	57°C (135°F)
1.22 m (48 in.)	139°C-166°C (283°F-331°F)	111°C (232°F)
1.83 m (72 in.)	202°C-227°C (396°F-440°F)	154°C-411°C (309°F-772°F)
2.44 m (96 in.)	191°C-201°C (376°F-394°F)	121°C-358°C (249°F-677°F)
2.74 m (108 in.)	123°C-166°C (254°F-330°F)	114°C (231°F)
3.05 m (120 in.)	112°C-124°C (234°F-255°F)	110°C (230°F)
3.35 m (132 in.)	110°C (230°F)	110°C (230°F)

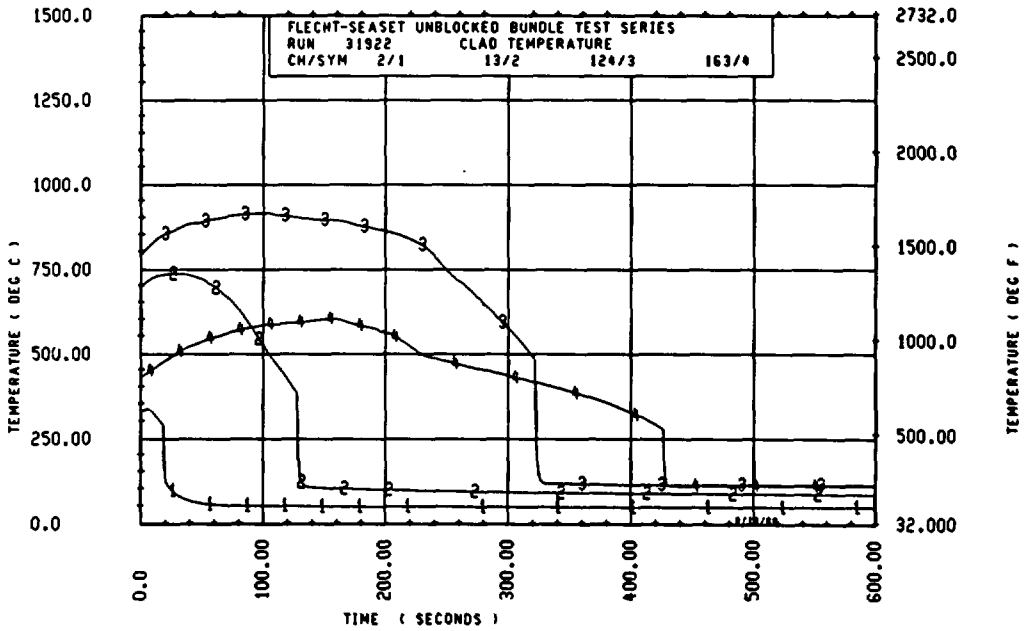
*At 118 seconds after flood

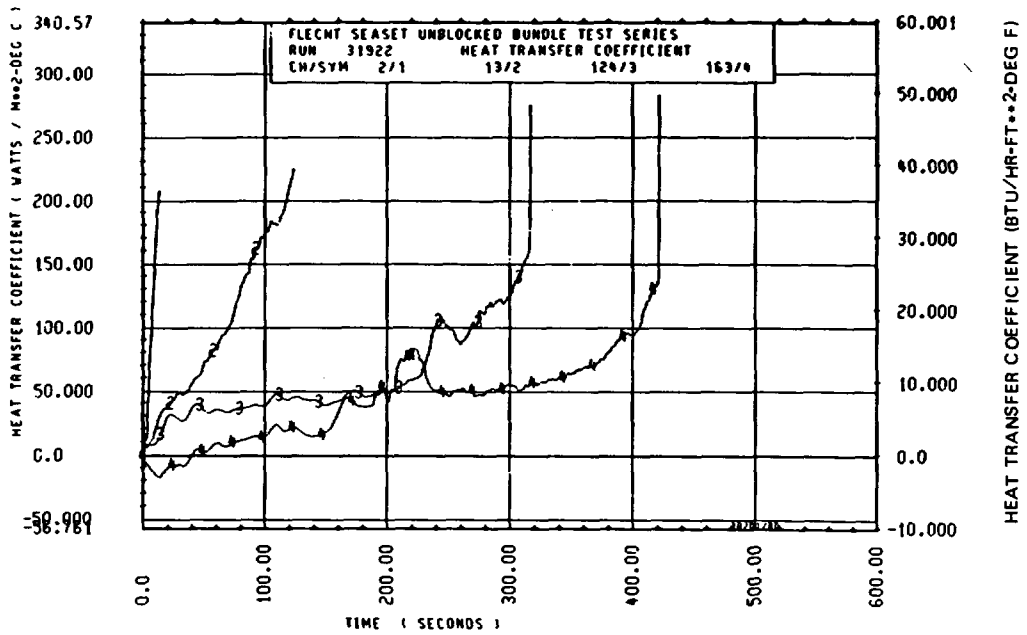
C. Comments

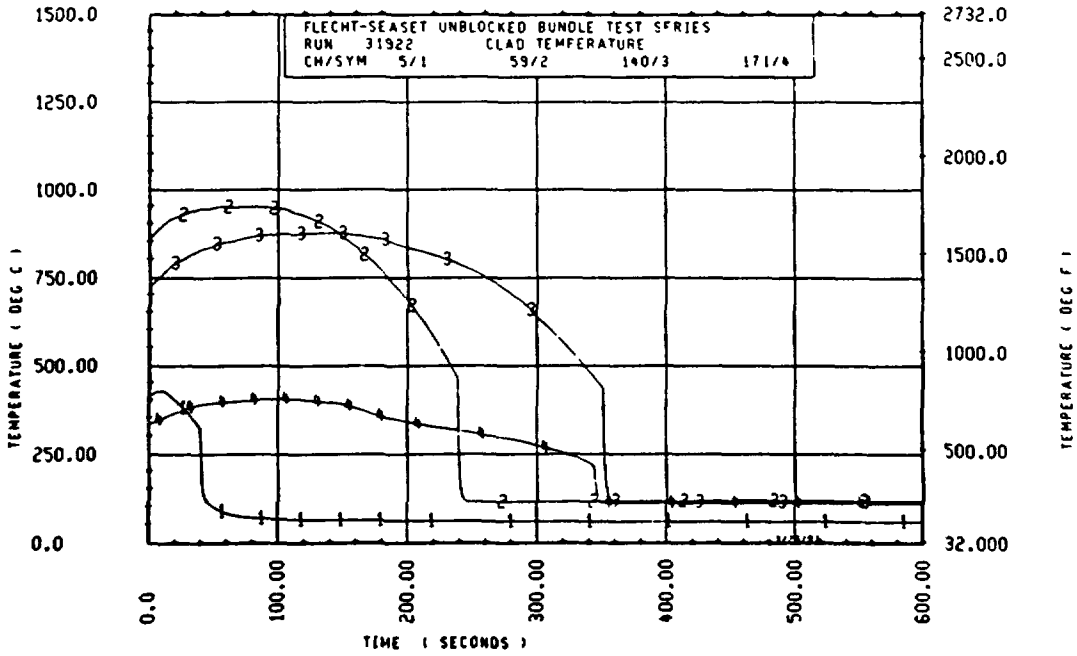
The carryover tank, upper plenum, and steam separator filled with water during test.

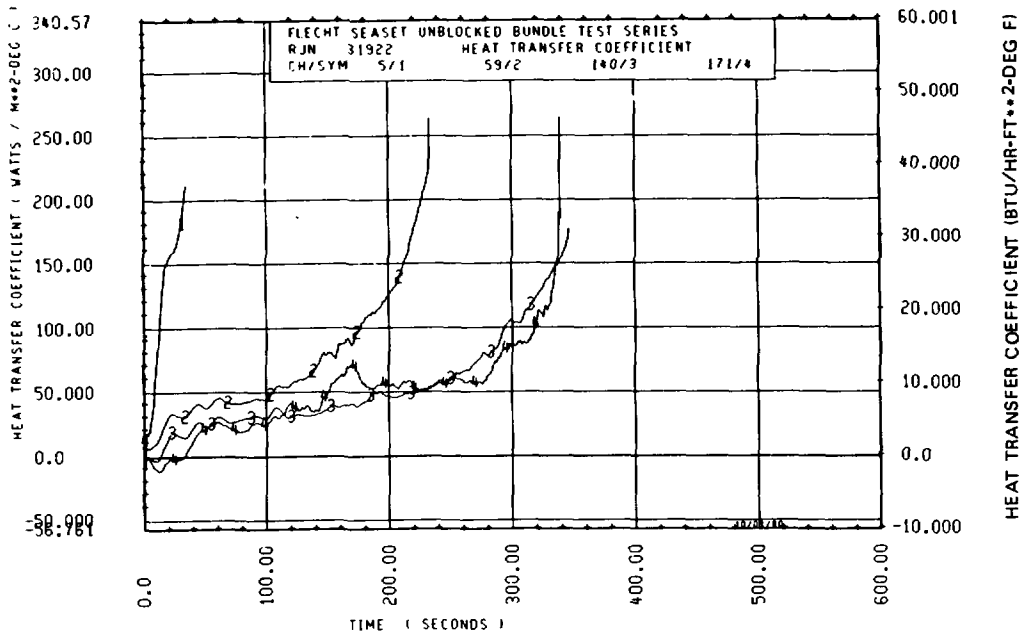
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 31922

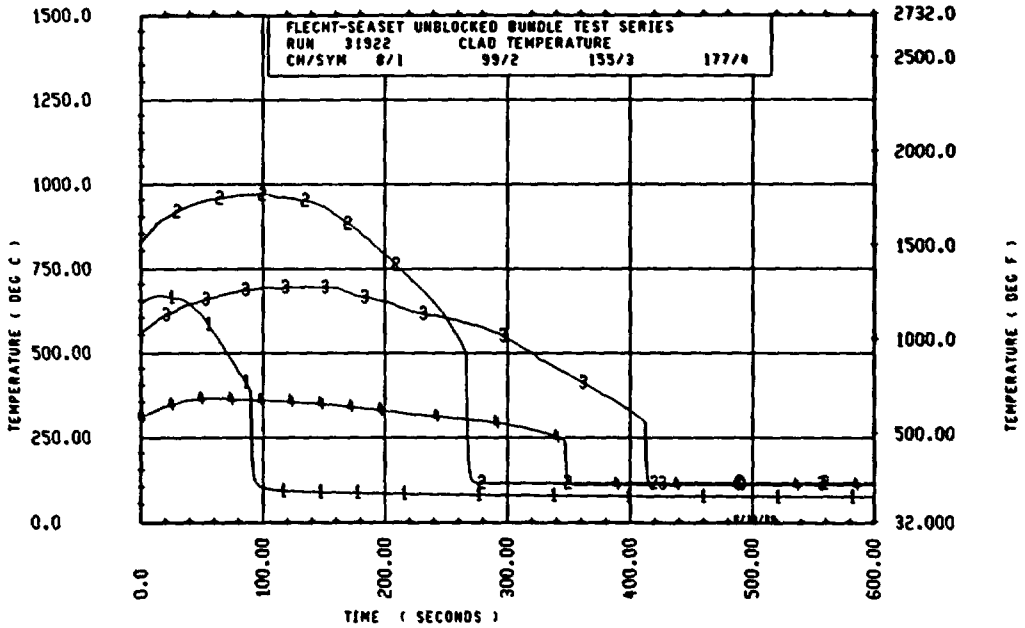
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1237.	1307.	70.	34.5	698.	126.4
2H 6- 0	50	1503.	1657.	15	68.0	925.	229.2
3C 5- 0	17	1278.	1352.	74.	37.5	697.	186.4
3C 5- 7	28	1349.	1428.	59.	35.5	714.	218.9
4L 8- 0	129	1275.	1515.	240.	75.0	734.	351.4
4L 8- 6	147	1275.	1513.	238.	74.5	736.	351.7
5E11- 0	168	631.	754.	122.	75.5	456.	382.0
5J 4- 0	12	1234.	1319.	85.	34.0	689.	129.4
5J 8- 6	146	1104.	1331.	227.	104.0	652.	388.9
5J11- 6	175	565.	700.	135.	85.5	515.	292.0
7B 6- 0	57	1456.	1586.	130.	53.0	720.	215.0
7B 8- 6	142	1093.	1316.	224.	87.5	676.	384.9
7B10- 3	162	797.	1128.	330.	215.0	541.	435.0
7B11- 6	176	611.	752.	141.	119.5	417.	425.0
7D 6- 6	84	1574.	1749.	174.	74.0	858.	238.0
7D 7- 6	119	1448.	1657.	209.	75.0	899.	310.6
7D 9- 3	151	1000.	1265.	265.	152.0	626.	395.0
7G 5- 0	23	1472.	1579.	107.	38.0	847.	173.9
7J 6- 0	59	1578.	1745.	167.	56.0	862.	238.6
7M 7- 6	120	1410.	1647.	237.	117.5	826.	323.0
7M 8- 0	132	1274.	1610.	336.	128.5	800.	349.9
7M 9- 3	152	979.	1331.	352.	179.0	683.	378.0
8H 4- 0	13	1294.	1361.	68.	24.5	721.	128.0
8H10- 0	163	811.	1118.	307.	151.5	533.	426.0
8H11- 6	177	593.	692.	99.	61.5	469.	346.8
8K 4- 0	14	1263.	1340.	77.	25.0	691.	128.5
8K 6- 6	99	1522.	1777.	254.	91.0	934.	266.0
8K 8- 0	140	1337.	1610.	274.	141.0	810.	351.0
8K10- 0	164	814.	1137.	323.	163.5	579.	419.0
8N 2- 0	5	783.	805.	23.	8.5	615.	40.1
8N 4- 0	15	1248.	1319.	72.	37.0	736.	123.9
8N 6- 0	61	1518.	1714.	196.	66.0	927.	234.3
8N10- 0	165	796.	1211.	415.	185.5	586.	426.1
9C 7- 0	109	1427.	1604.	177.	72.0	694.	295.0
9C 9- 3	153	999.	1268.	269.	156.5	586.	406.5
9G 1- 0	2	630.	640.	11.	5.5	551.	18.6
9G 3- 3	8	1199.	1238.	9.	15.0	728.	90.0
9G11- 0	171	636.	766.	130.	102.0	404.	344.2
9I 5- 0	24	1486.	1598.	112.	37.0	838.	178.4
9I 5-10	46	1630.	1768.	137.	39.0	837.	224.2
10D 6- 6	93	1479.	1672.	194.	99.5	813.	268.0
11E 7- 6	124	1460.	1680.	219.	101.5	901.	321.6
11E 9- 3	155	1039.	1283.	243.	134.5	559.	412.0
11E11- 0	172	653.	799.	147.	92.0	496.	357.7
12D 4- 0	16	1254.	1321.	67.	23.0	703.	126.4
12D 6- 0	66	1524.	1654.	129.	71.5	871.	233.9
13G 6- 6	102	1506.	1685.	179.	74.0	850.	234.9

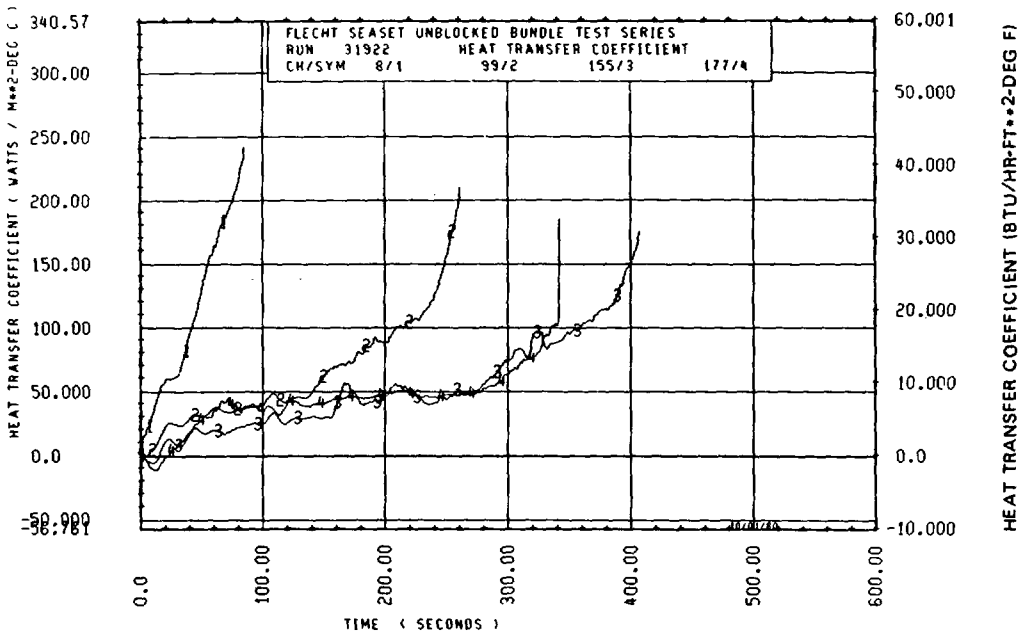

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

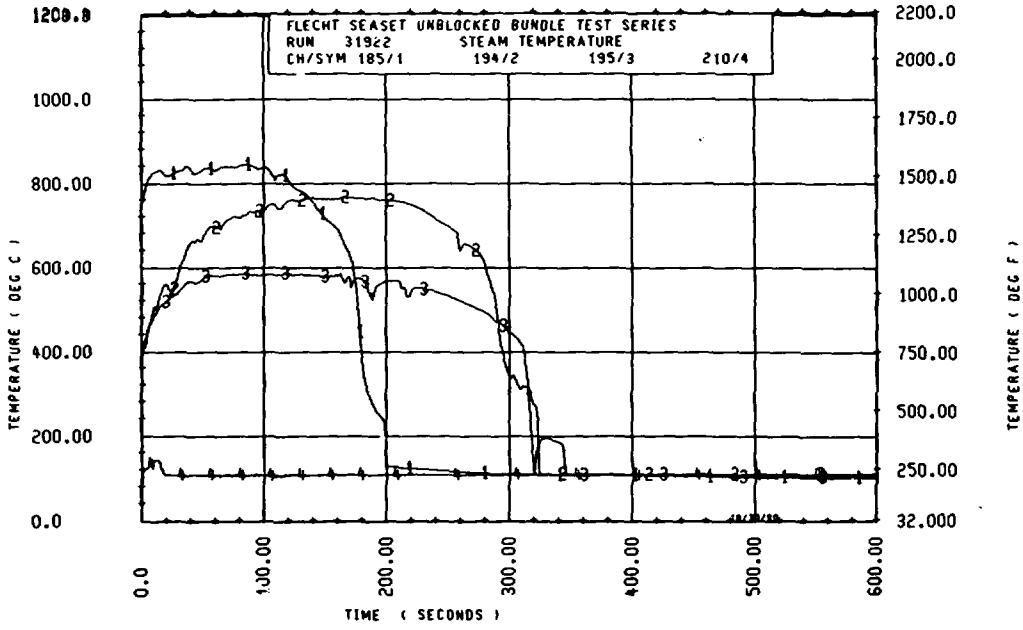

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

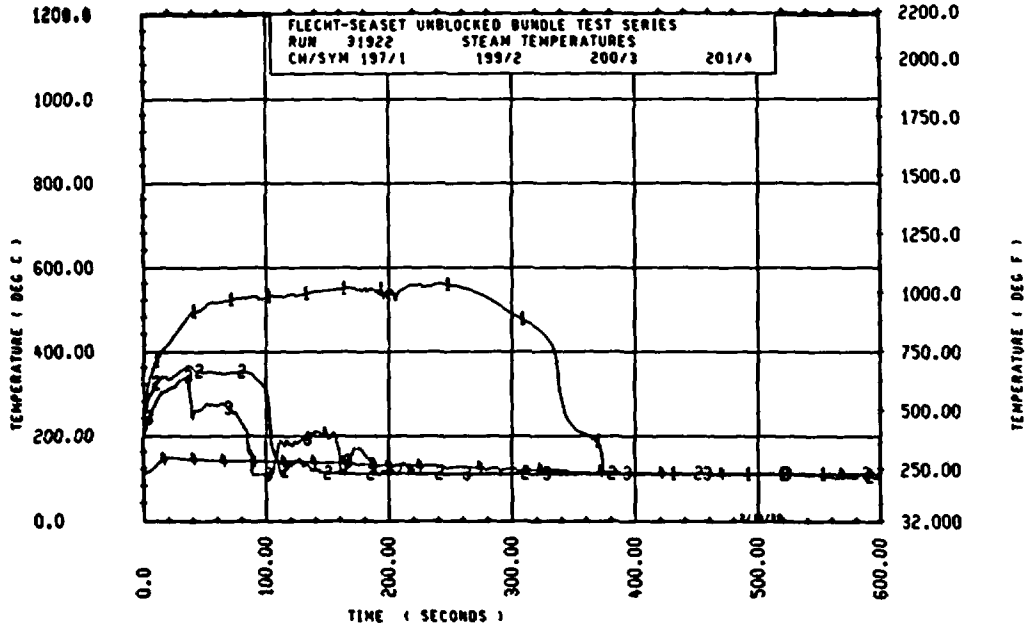

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

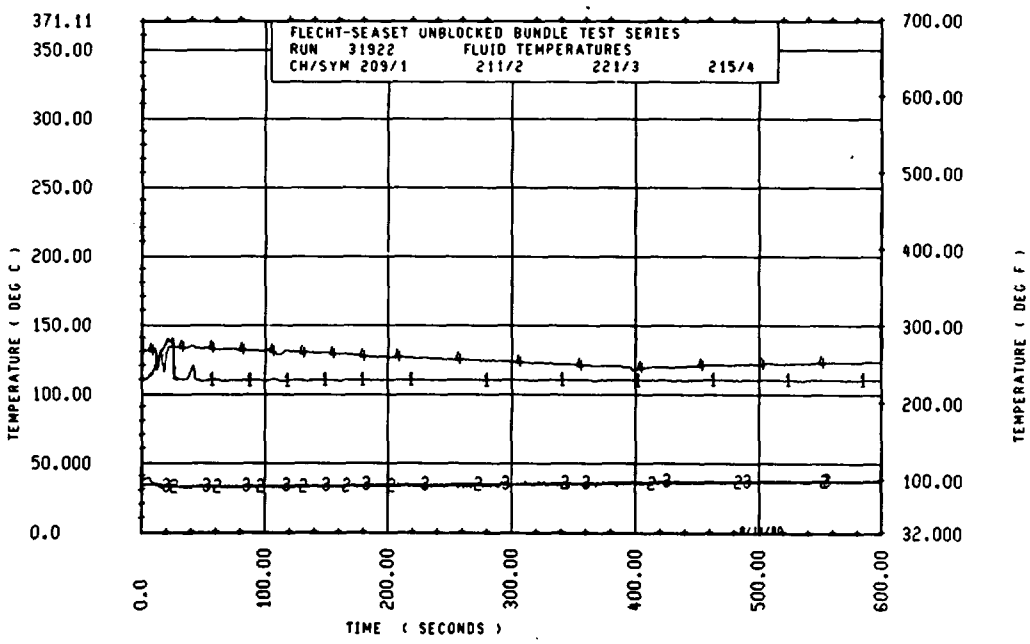

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-58.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

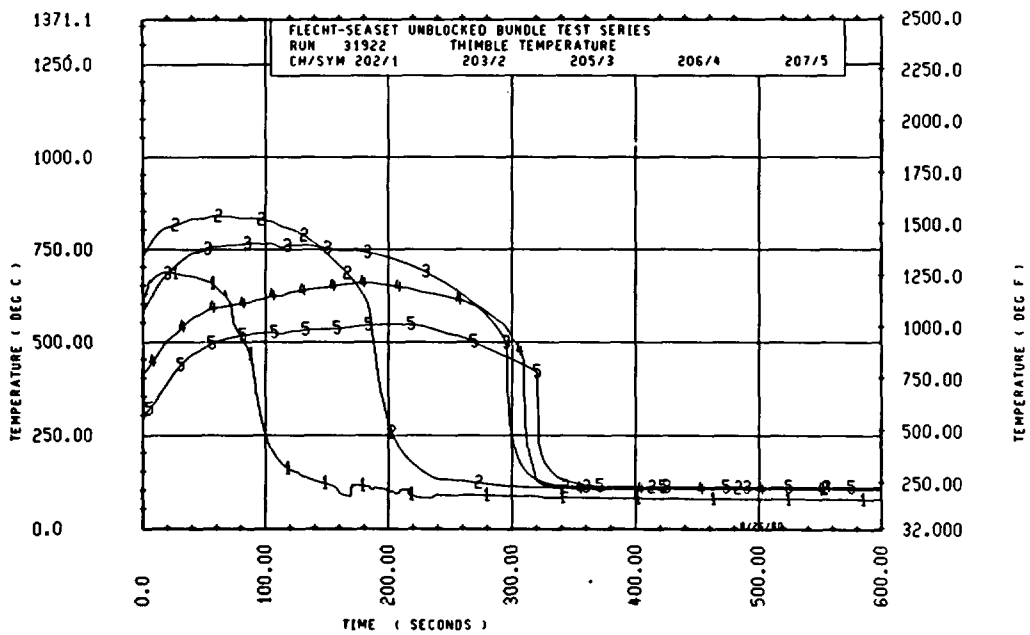

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

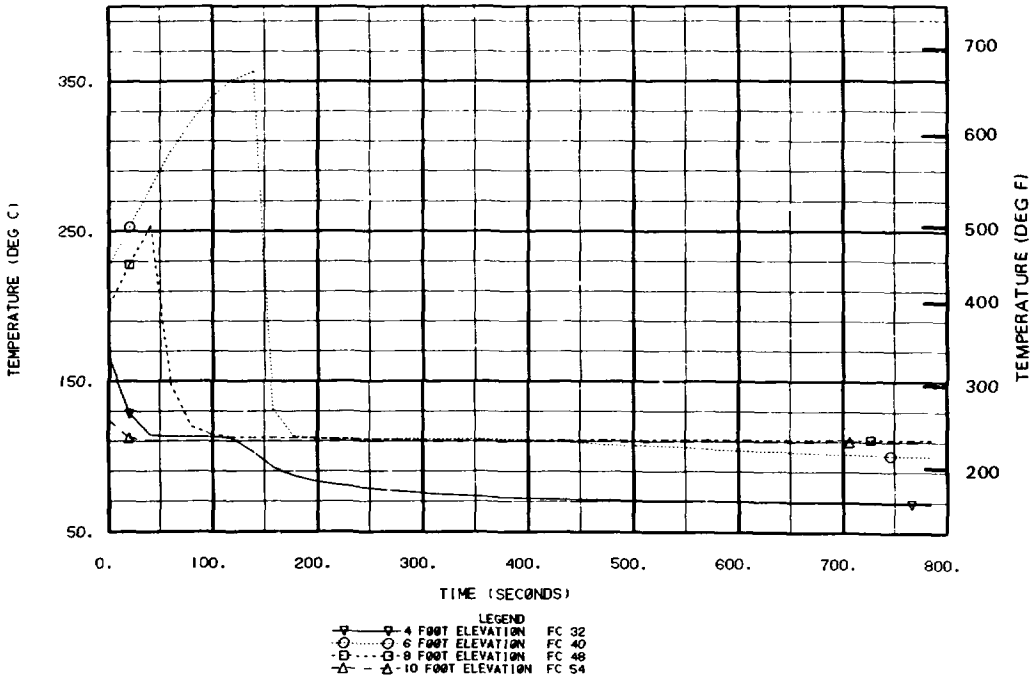

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

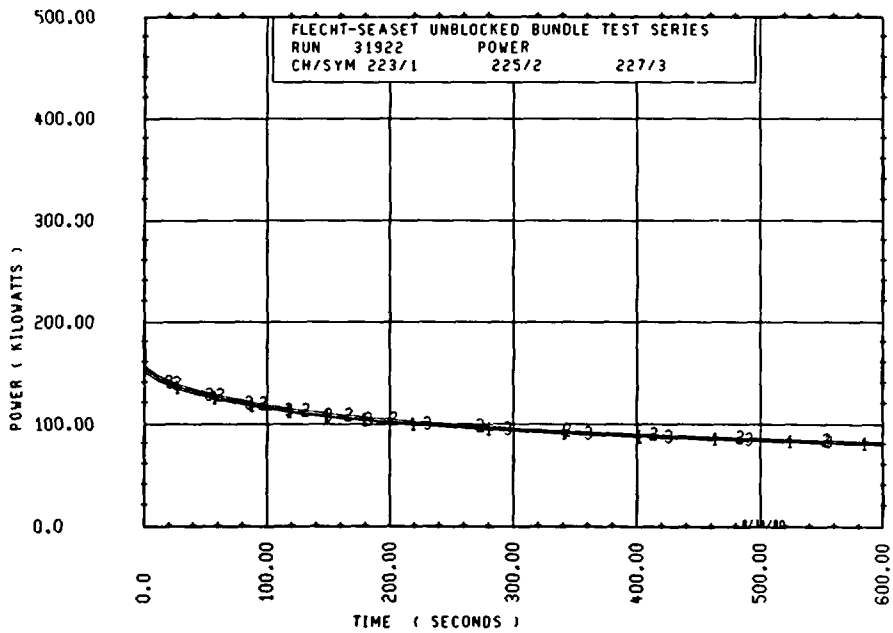


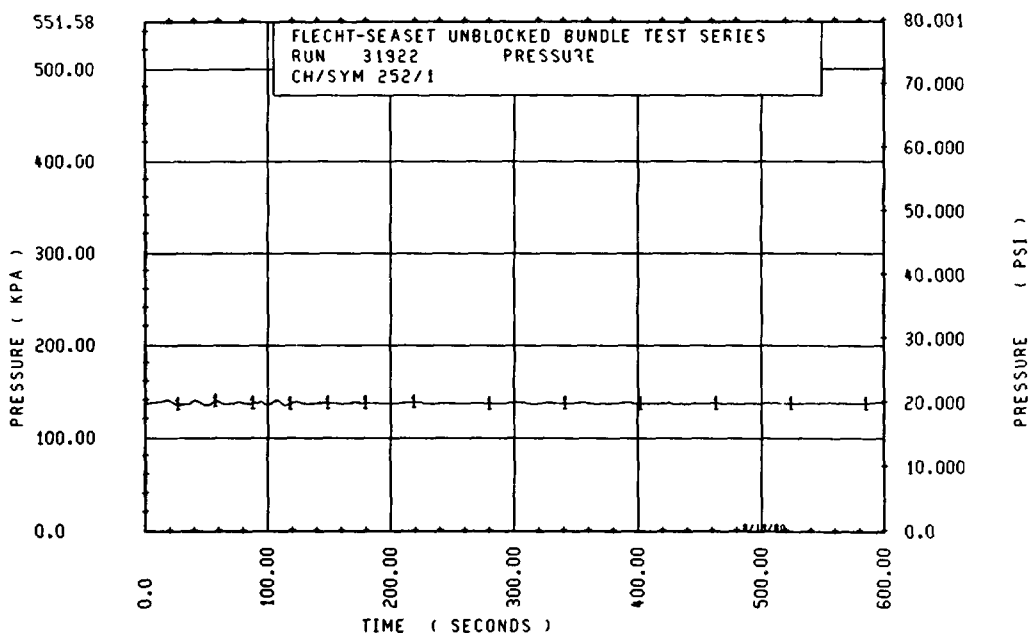


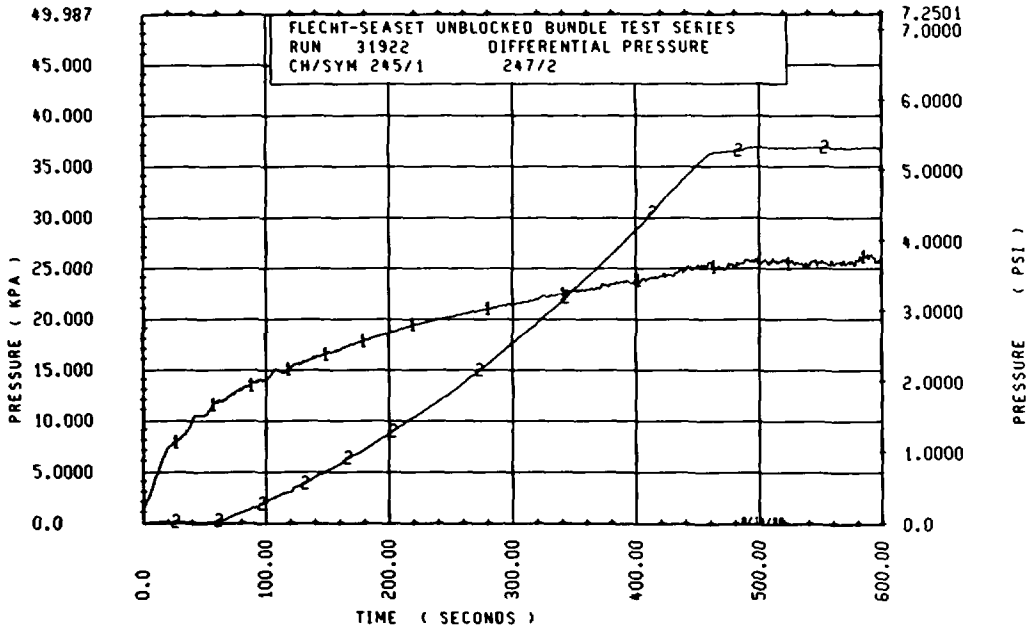
CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.); CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

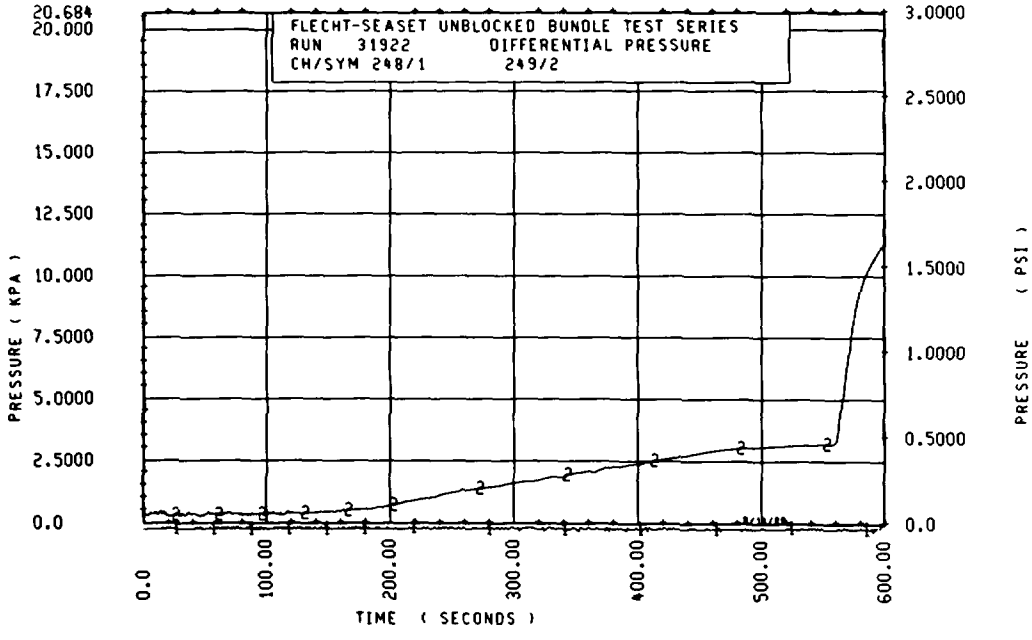
HOUSING TEMPERATURE

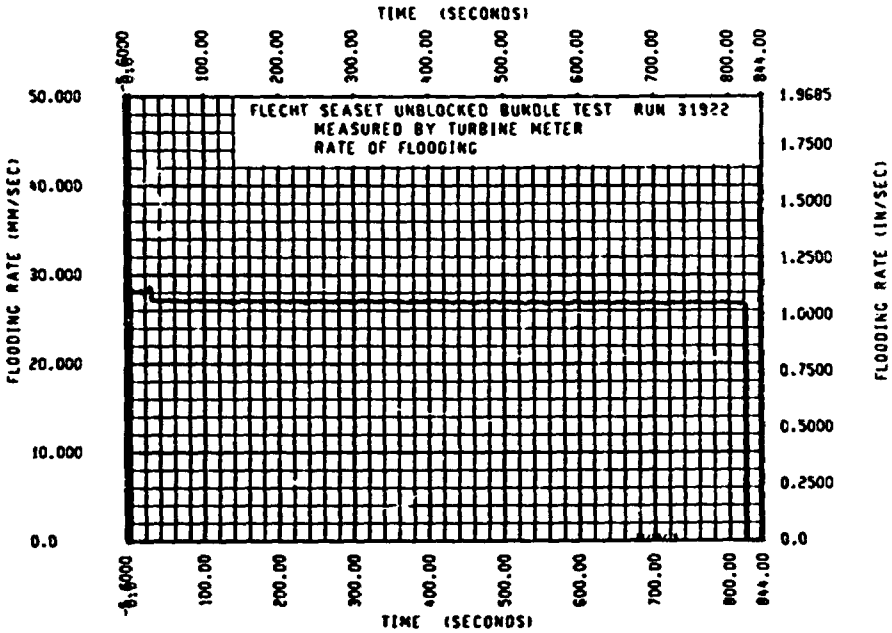


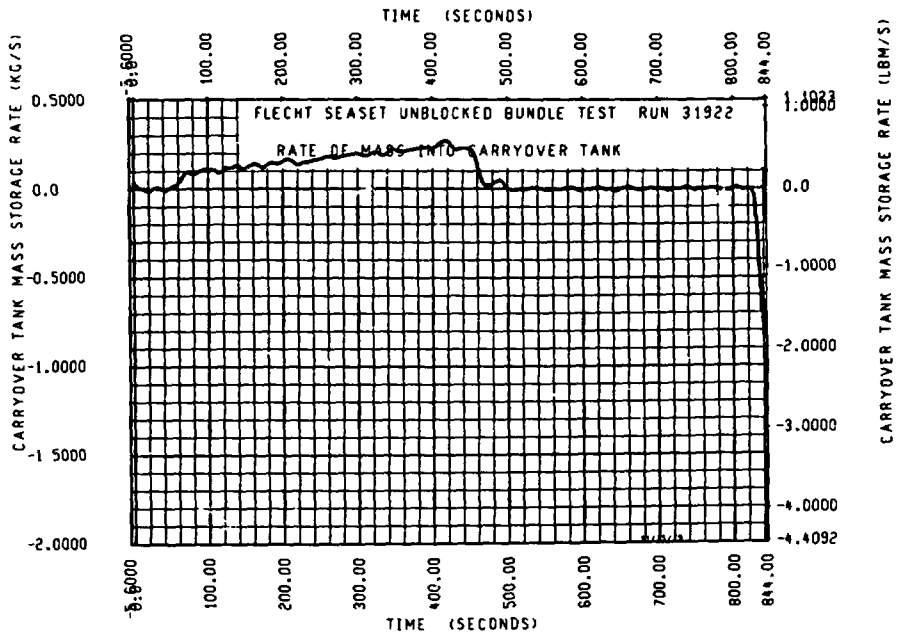

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

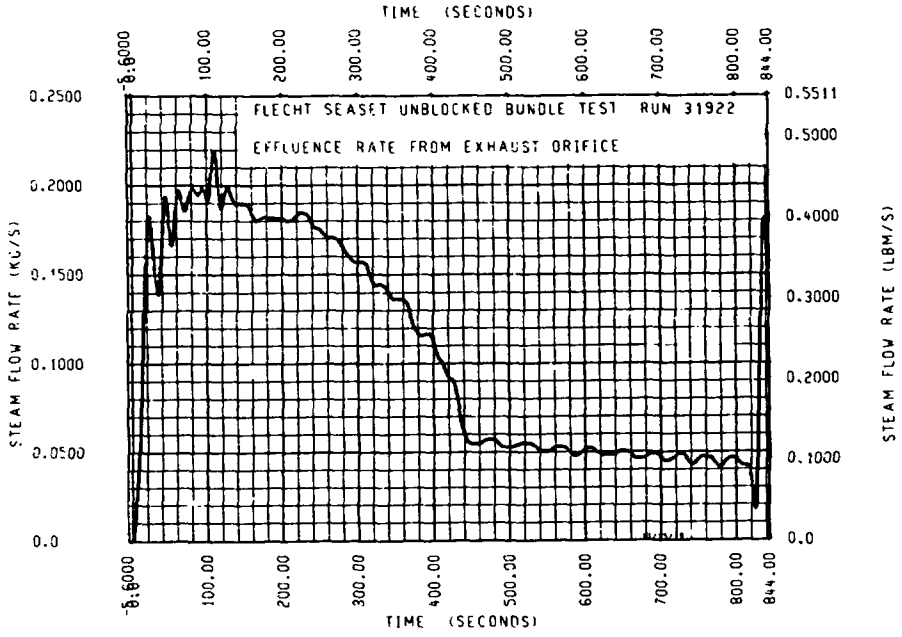

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

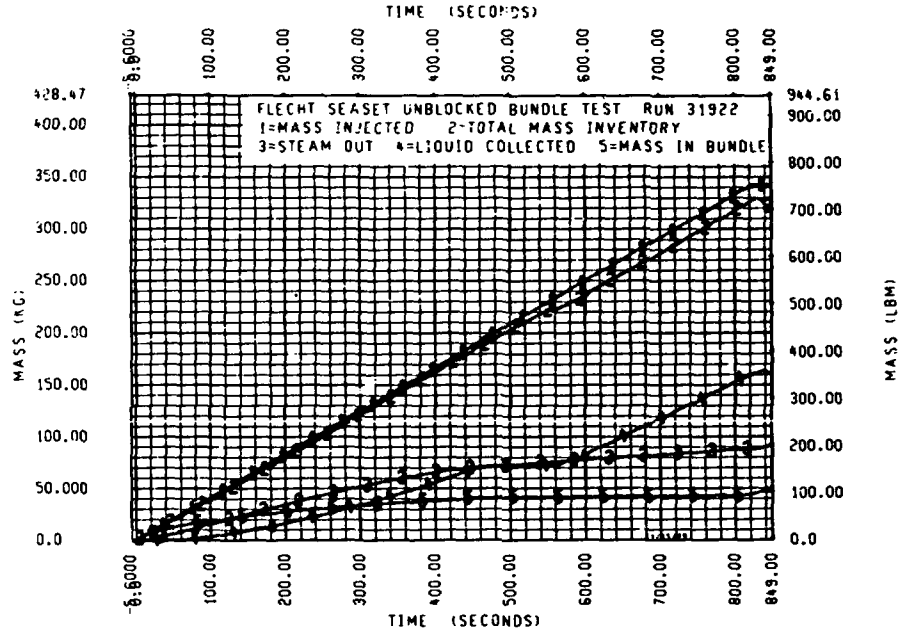

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

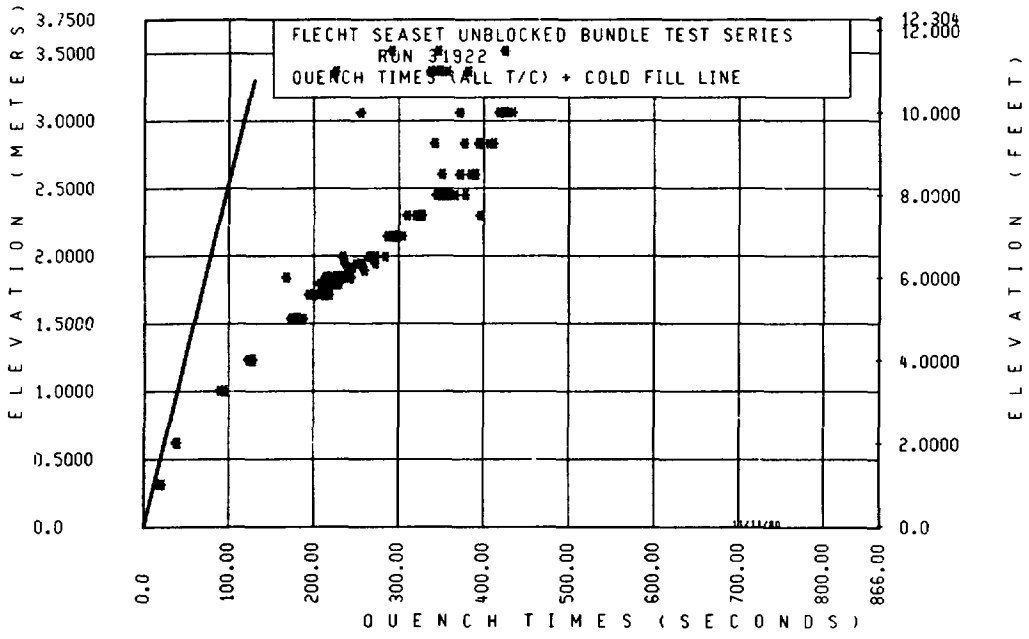

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

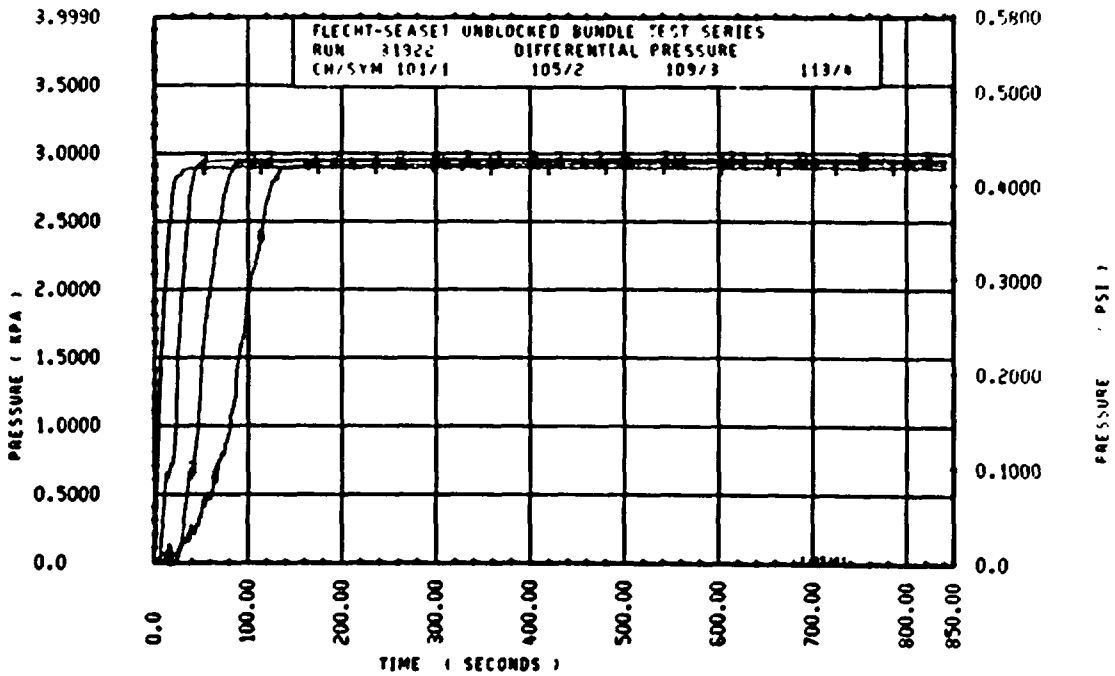

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31922
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-8.6000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
844.00

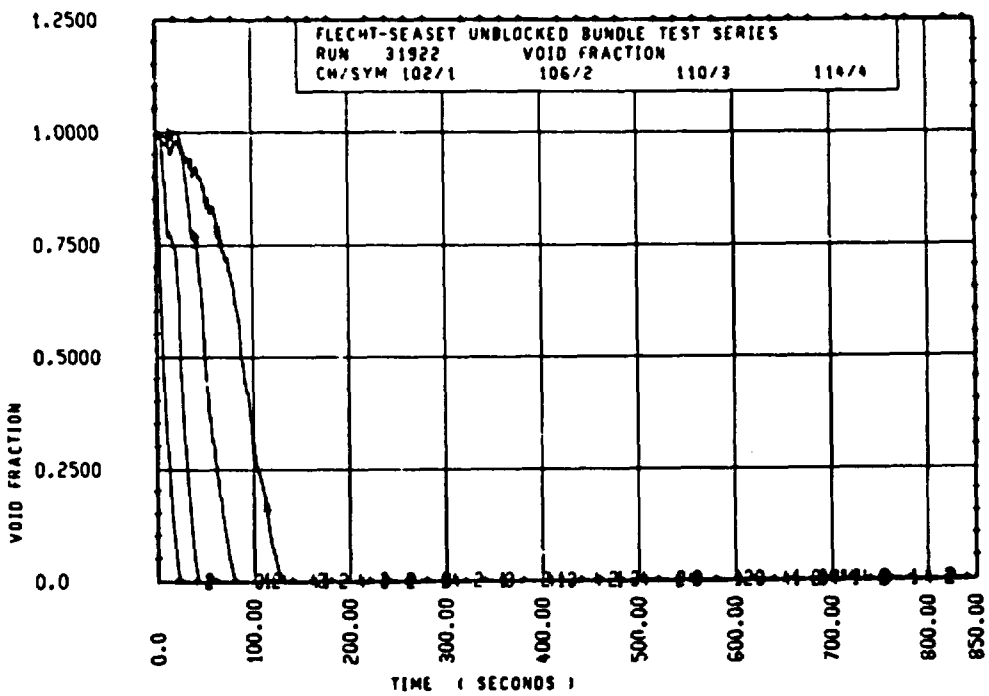

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31922
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
1.1023
1.0000
0.0
-1.0000
-2.0000
-3.0000
-4.0000
-4.4092
-8.6000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
844.00

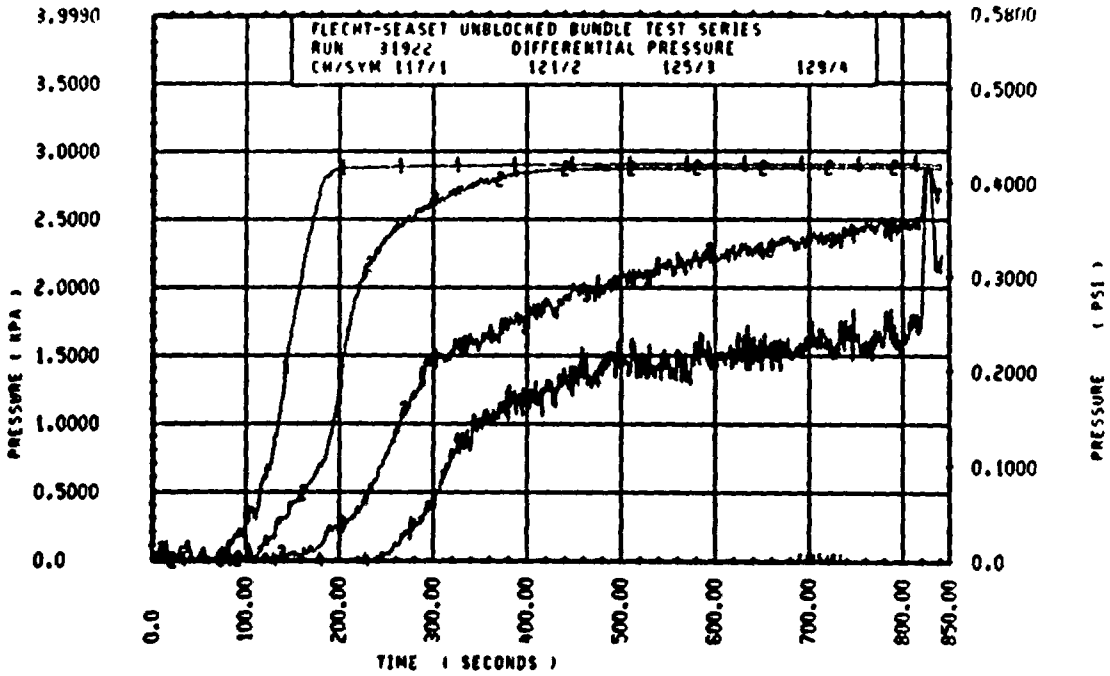

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31922
EFFLUENCE RATE FROM EXHAUST ORIFICE
TIME (SECONDS)
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.2500
0.2000
0.1500
0.1000
0.0500
0.0
0.5511
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
-8.6000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
844.00

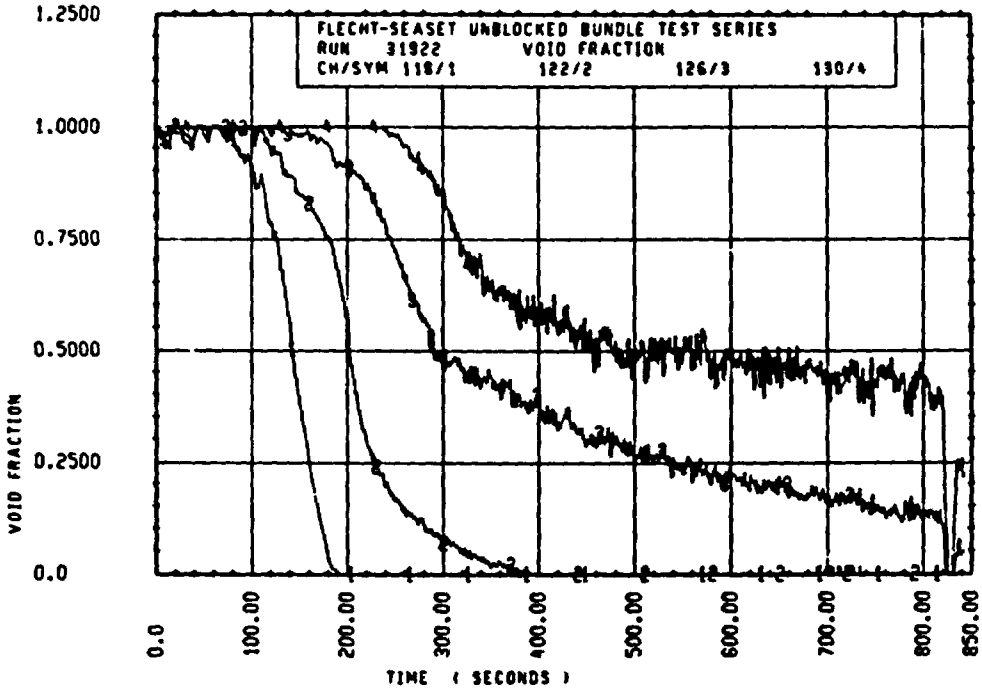

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 31922
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
TIME (SECONDS)
MASS (KG)
MASS (LBM)
428.47
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
944.61
900.00
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-8.6000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
849.00

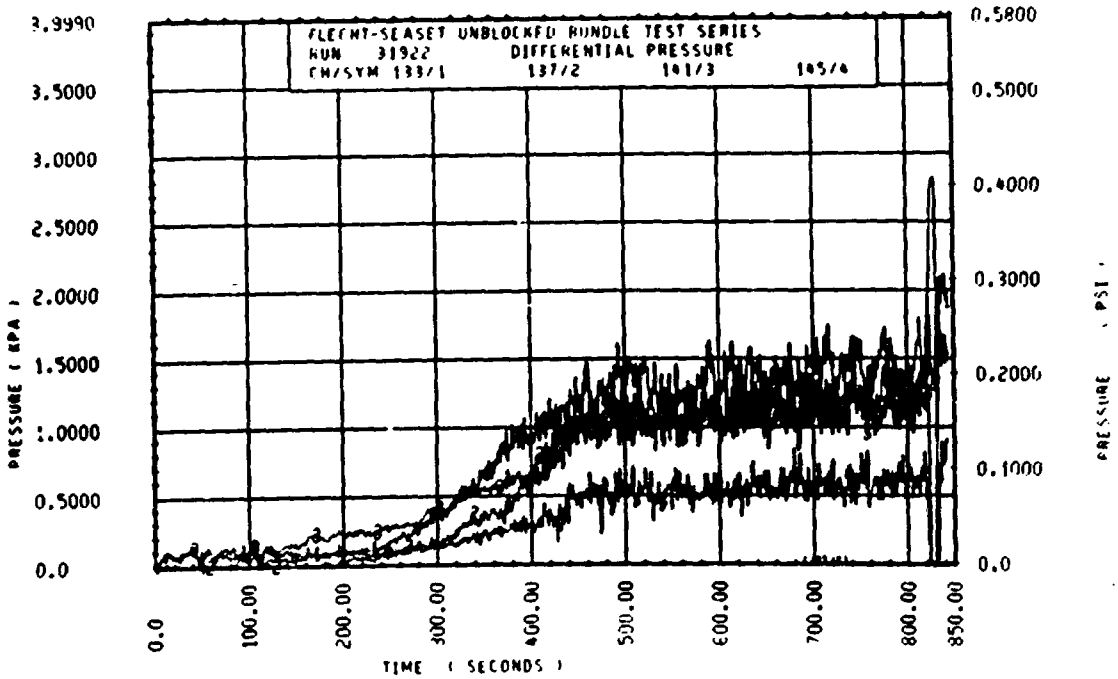

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
866.00
QUENCH TIMES (SECONDS)

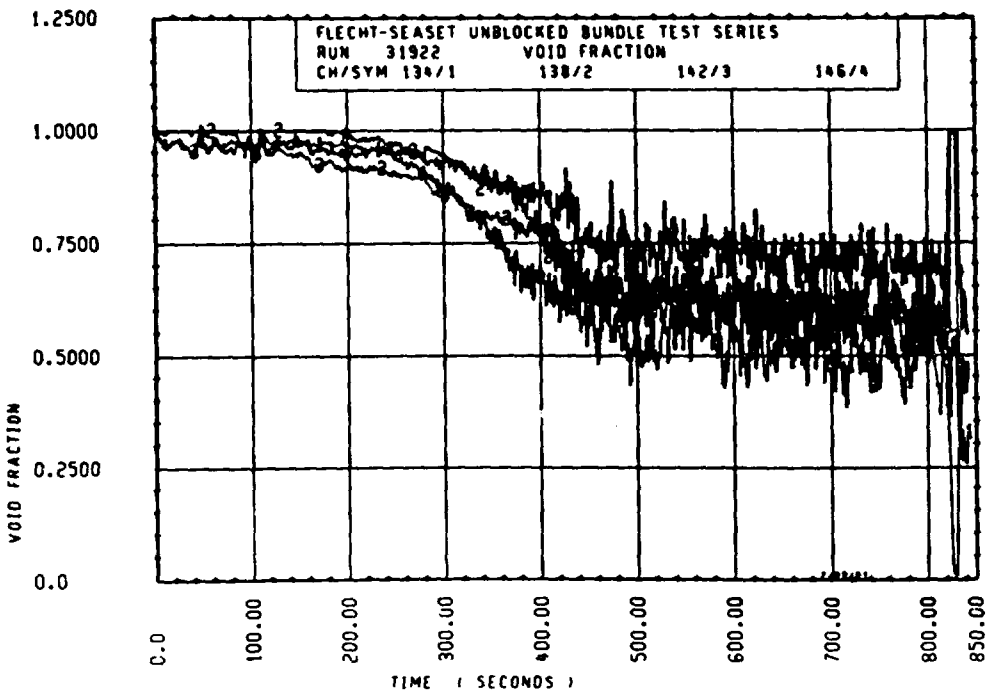

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (MPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 31922 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 32013

Date: 5/1/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.41 MPa (60 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	887°C (1629°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	26.4 mm/sec (1.04 in./sec)
Coolant temperature	66°C (150°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	155°C (311°F)	92°C (198°F)
1.22 m (48 in.)	169°C-174°C (337°F-346°F)	147°C (297°F)
1.83 m (72 in.)	191°C-206°C (376°F-403°F)	148°C-151°C (299°F-304°F)
2.44 m (96 in.)	183°C-191°C (361°F-375°F)	484°C-623°C (904°F-1154°F)
2.74 m (108 in.)	166°C-173°C (331°F-344°F)	147°C-428°C (296°F-802°F)
3.05 m (120 in.)	155°C-163°C (311°F-325°F)	146°C-362°C (294°F-684°F)
3.35 m (132 in.)	148°C-155°C (298°F-311°F)	146°C (295°F)

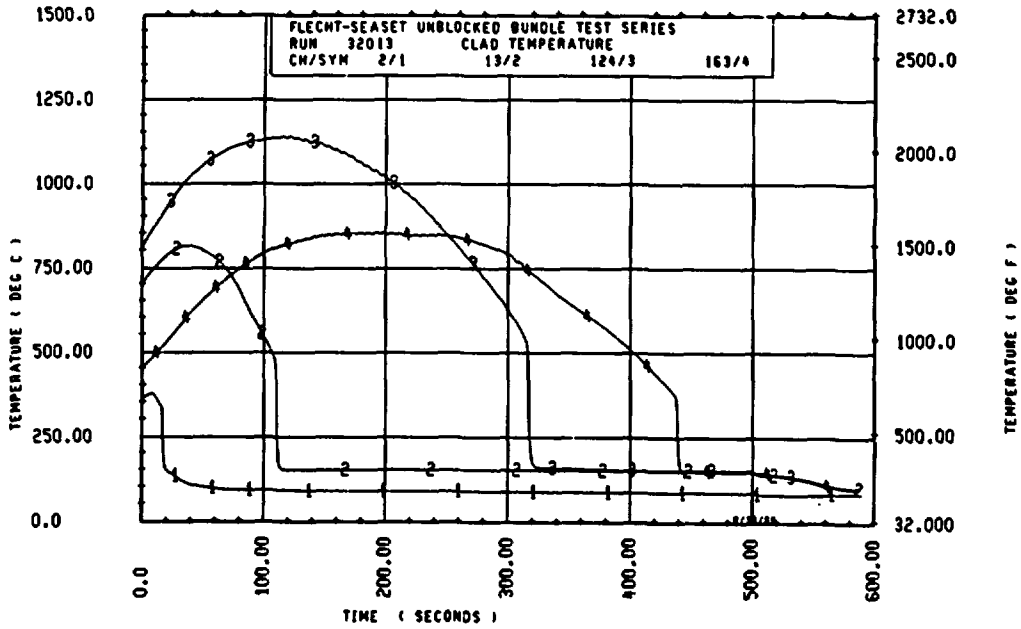
*At 216 seconds after flood

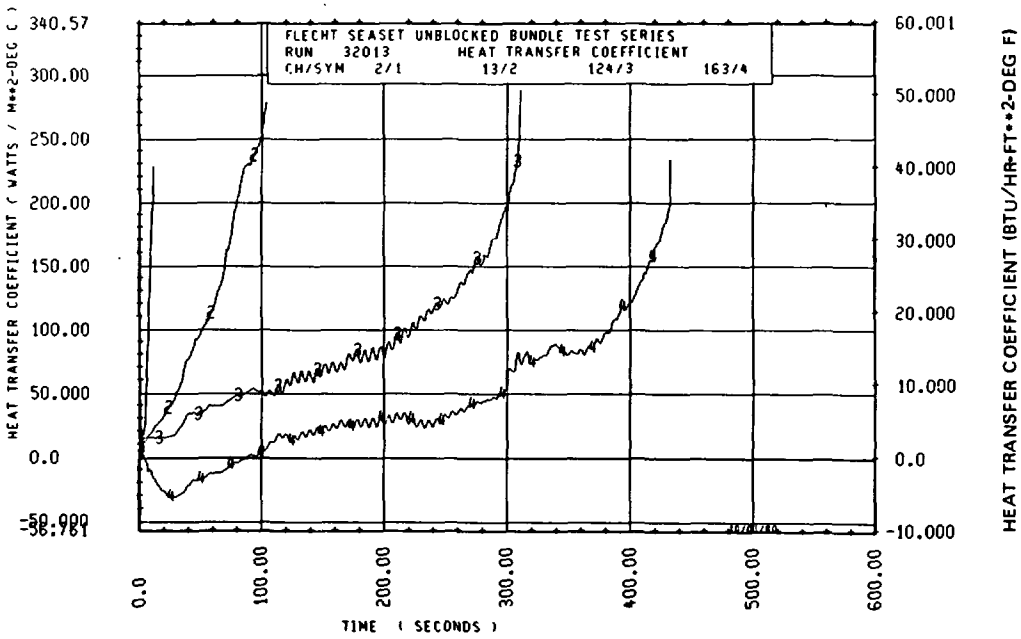
C. Comments

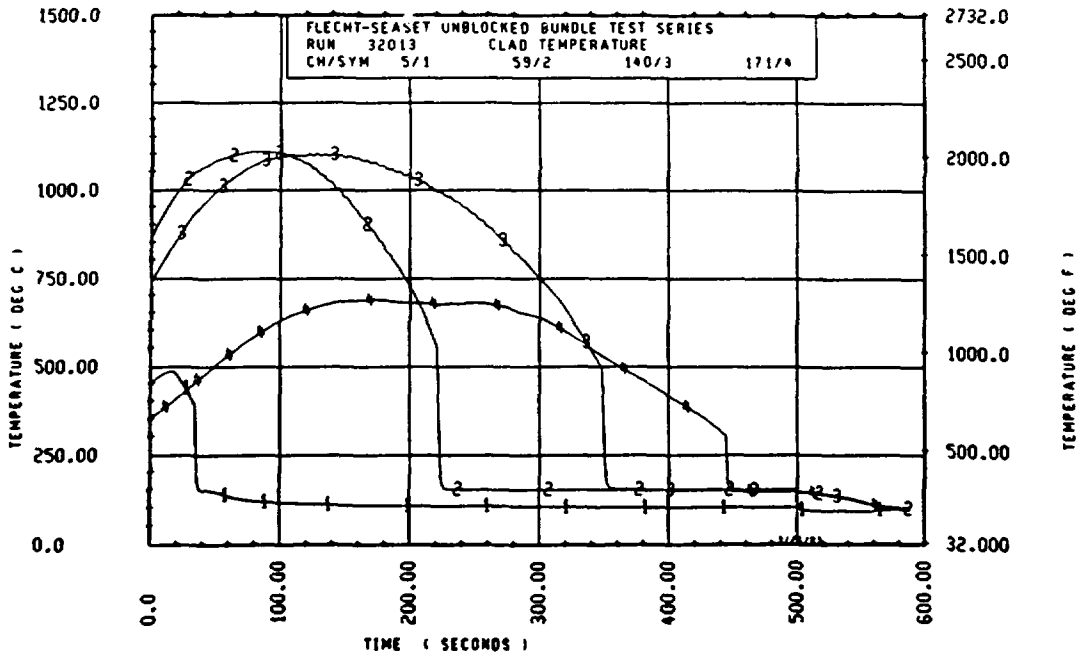
A 5-percent increase in flooding rate occurred approximately 20 percent of the way through the test.

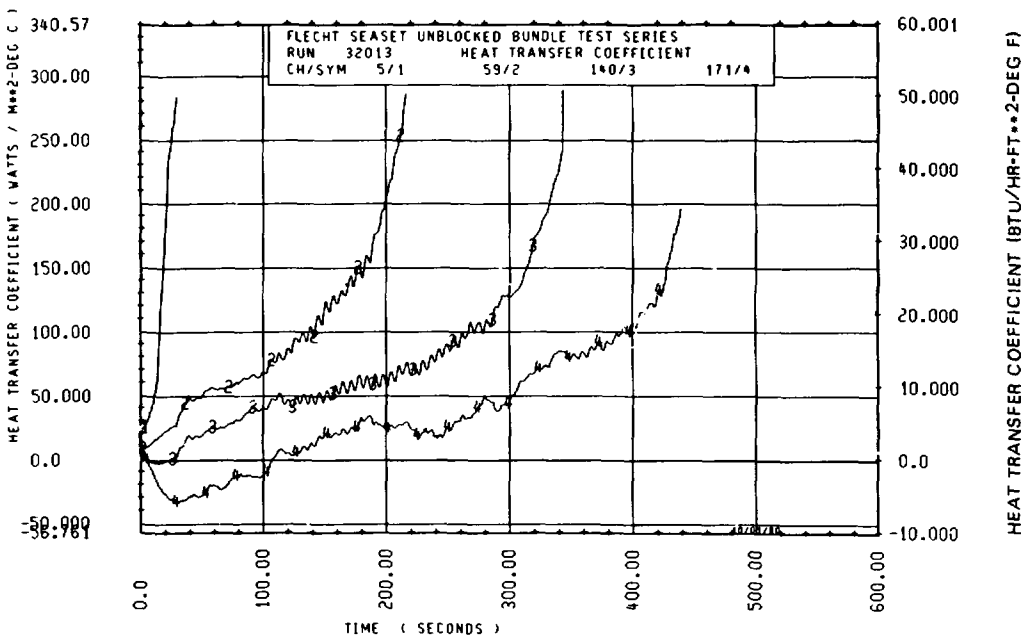
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 32013

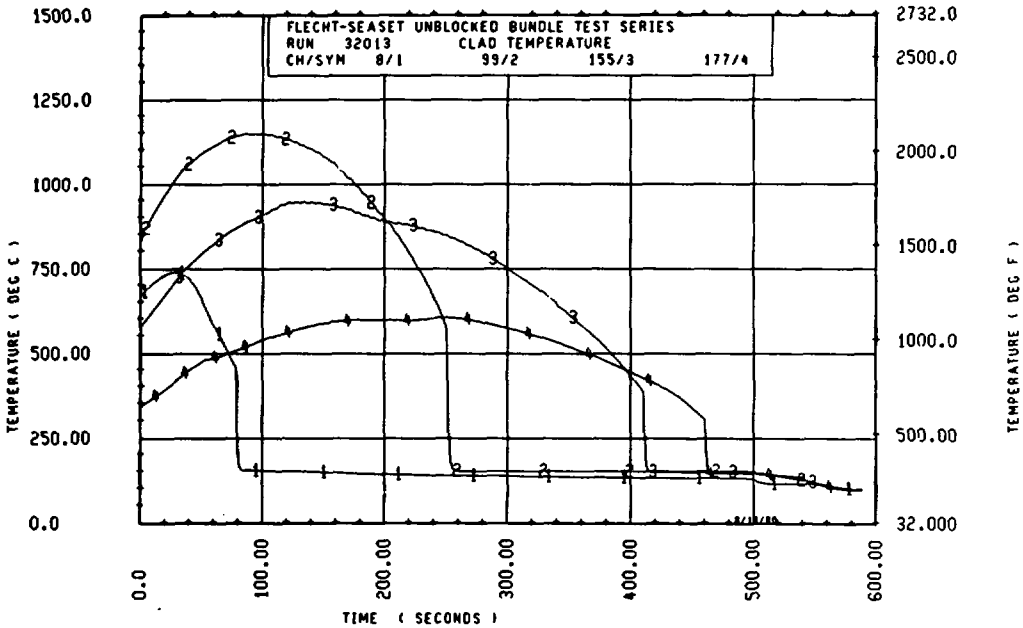
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1270.	1471.	201.	34.0	890.	106.0
2H 8- 0	50	1557.	1948.	390.	81.5	1036.	218.4
3C 5- 0	17	1352.	1553.	201.	46.5	893.	164.4
3C 5- 7	28	1440.	1646.	206.	56.5	905.	196.0
4L 8- 0	129	1317.	1905.	588.	87.0	908.	339.8
4L 8- 6	147	1320.	1903.	582.	87.0	915.	339.9
5E11- 0	168	678.	1277.	599.	232.0	620.	447.0
5J 4- 0	12	1250.	1461.	211.	38.0	835.	112.0
5J 8- 6	146	1117.	1740.	623.	128.0	737.	379.9
5J11- 6	175	641.	1107.	466.	244.0	574.	461.0
7B 6- 0	57	1498.	1823.	325.	55.0	970.	192.8
7B 8- 6	142	1126.	1670.	544.	114.0	692.	389.5
7B10- 0	162	847.	1526.	678.	147.0	669.	434.9
7B11- 6	176	666.	1187.	521.	179.0	591.	459.0
7D 6- 4	84	1612.	2031.	418.	80.0	1017.	220.7
7D 7- 6	119	1479.	2020.	541.	114.0	985.	305.8
7D 9- 3	151	1023.	1724.	701.	134.0	770.	398.3
7G 5- 0	23	1500.	1771.	271.	51.0	972.	158.9
7J 6- 0	59	1594.	2031.	437.	79.0	1027.	221.2
7M 7- 6	120	1469.	2039.	570.	115.0	959.	316.9
7M 8- 0	132	1330.	2009.	679.	121.0	905.	346.9
7M 9- 3	152	1023.	1764.	741.	166.0	834.	394.0
8H 4- 0	13	1300.	1501.	201.	39.0	886.	109.9
8H10- 0	163	851.	1571.	720.	192.0	691.	437.7
8H11- 6	177	651.	1123.	472.	250.0	582.	460.0
8K 4- 0	14	1268.	1476.	208.	35.0	880.	107.0
8K 6- 6	99	1536.	2100.	564.	85.5	1064.	250.6
8K 8- 0	140	1367.	2017.	650.	128.0	910.	348.5
8K10- 0	164	848.	1601.	753.	185.0	742.	432.4
8N 2- 0	5	848.	910.	61.	17.0	739.	34.6
8N 4- 0	15	1280.	1494.	215.	39.0	887.	107.0
8N 6- 0	61	1565.	2025.	460.	86.0	1129.	216.9
8N10- 0	165	851.	1612.	761.	192.0	736.	429.0
9C 7- 0	109	1470.	1938.	469.	86.0	836.	282.0
9C 9- 3	153	1048.	1734.	686.	140.0	733.	403.0
9G 1- 0	2	689.	714.	25.	8.0	632.	16.9
9G 3- 3	8	1235.	1364.	129.	29.5	851.	78.9
9G11- 0	171	673.	1275.	601.	172.0	580.	444.0
9I 5- 0	24	1516.	1809.	293.	51.0	1006.	159.9
9I 5-10	46	1635.	2035.	400.	72.0	972.	207.9
10D 6- 6	93	1498.	1890.	393.	114.0	958.	252.9
11E 7- 6	124	1492.	2085.	592.	115.0	975.	315.9
11E 9- 3	155	1072.	1737.	666.	134.0	726.	410.0
11E11- 0	172	685.	1291.	606.	159.0	578.	449.0
12D 4- 0	16	1293.	1491.	198.	34.0	862.	110.0
12D 6- 0	66	1572.	1934.	362.	73.0	1047.	215.0
13G 6- 6	102	1548.	1971.	423.	84.5	990.	219.9

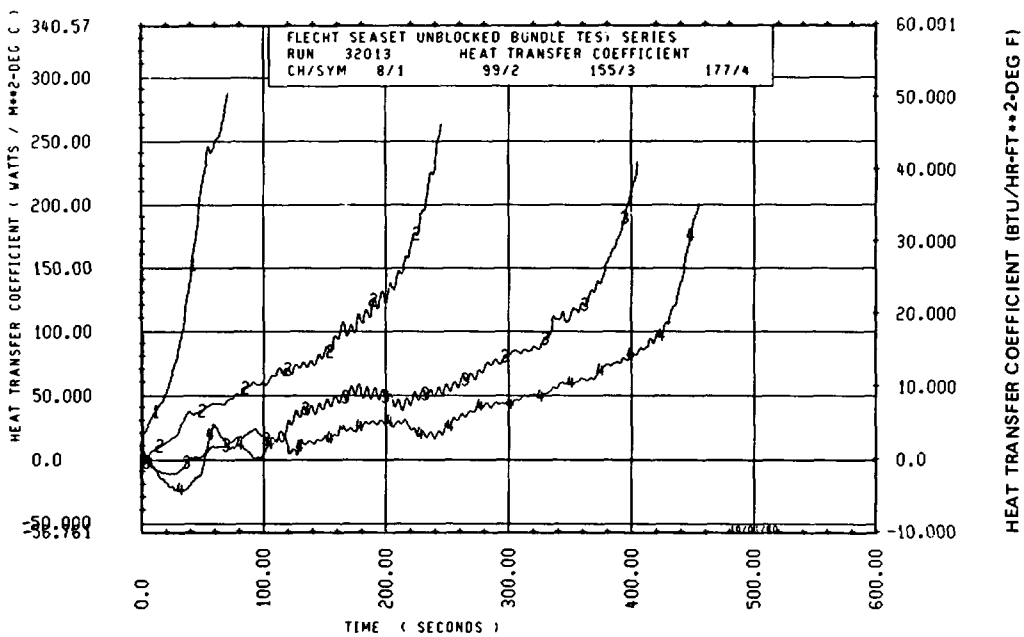

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

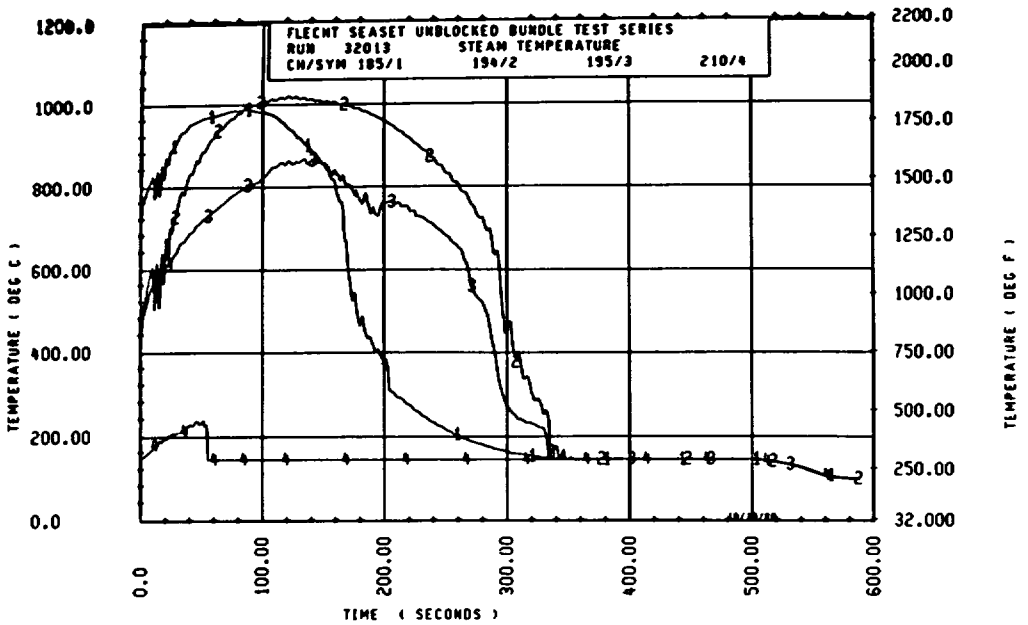

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-58.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

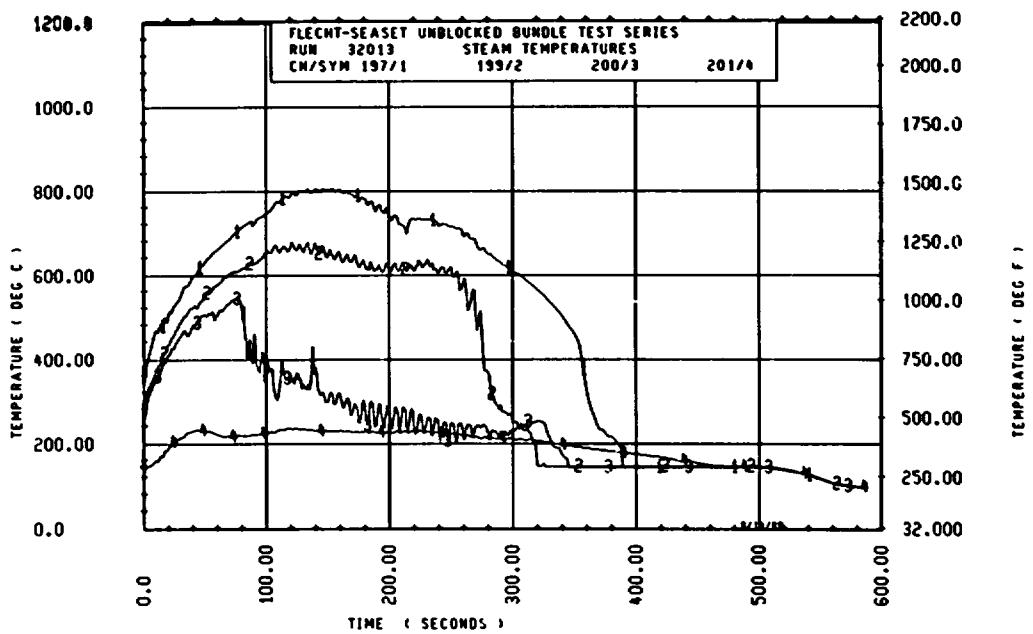

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

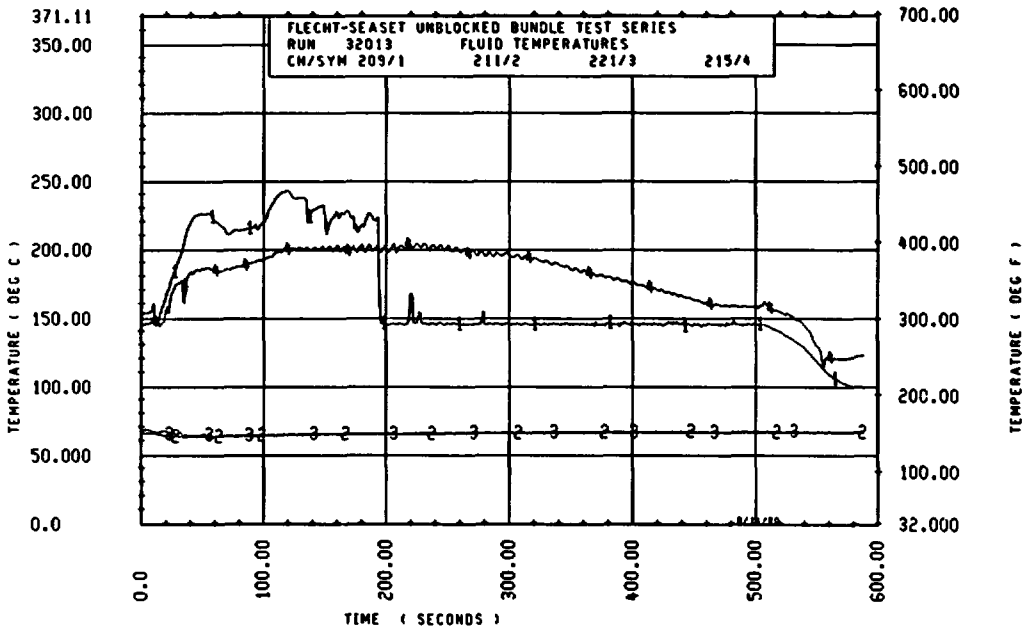

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

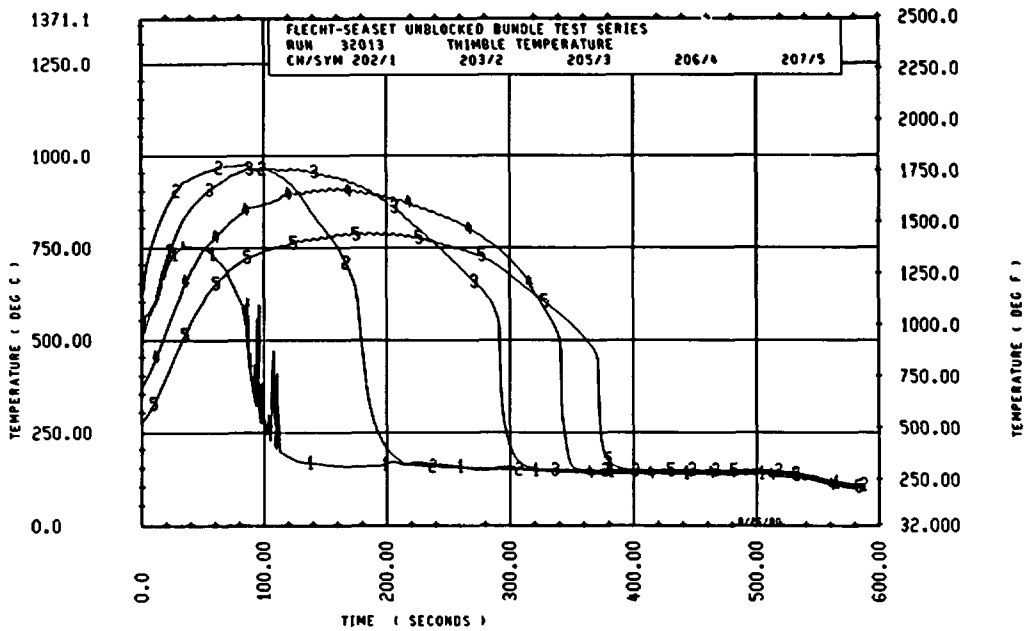

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TESI SERIES
RUN 32013 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

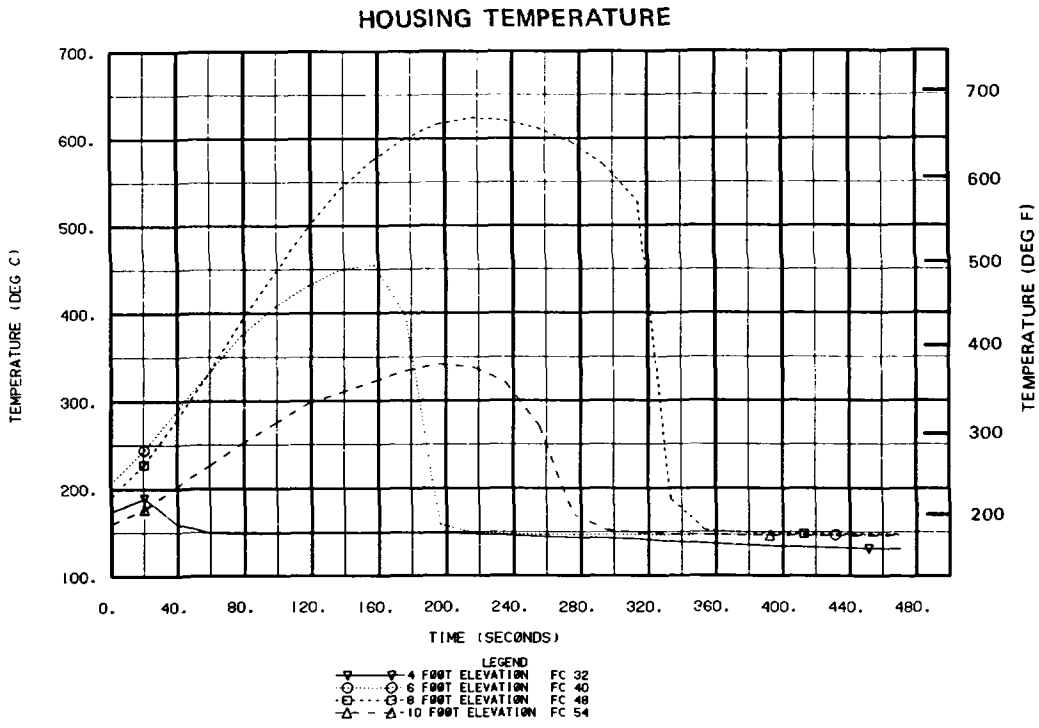

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

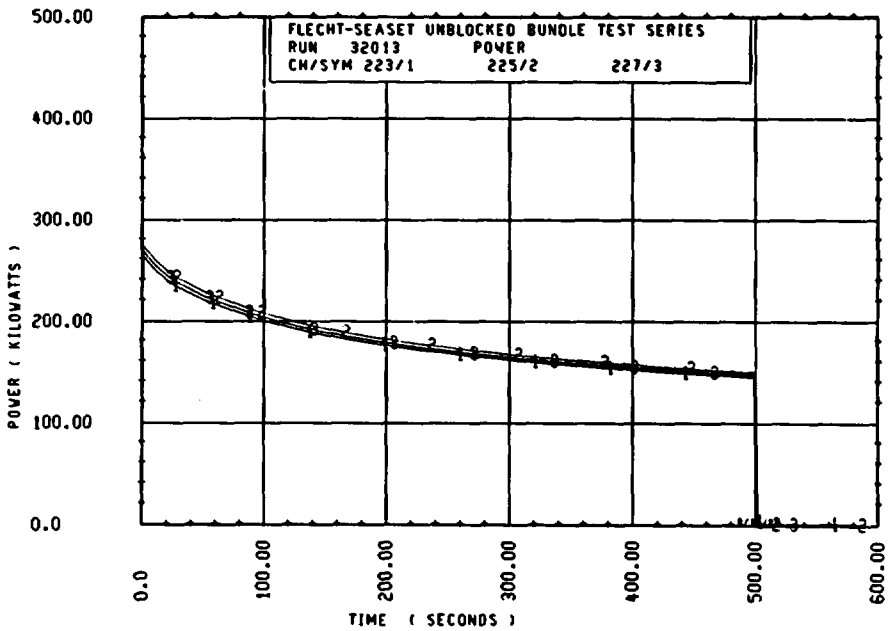

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

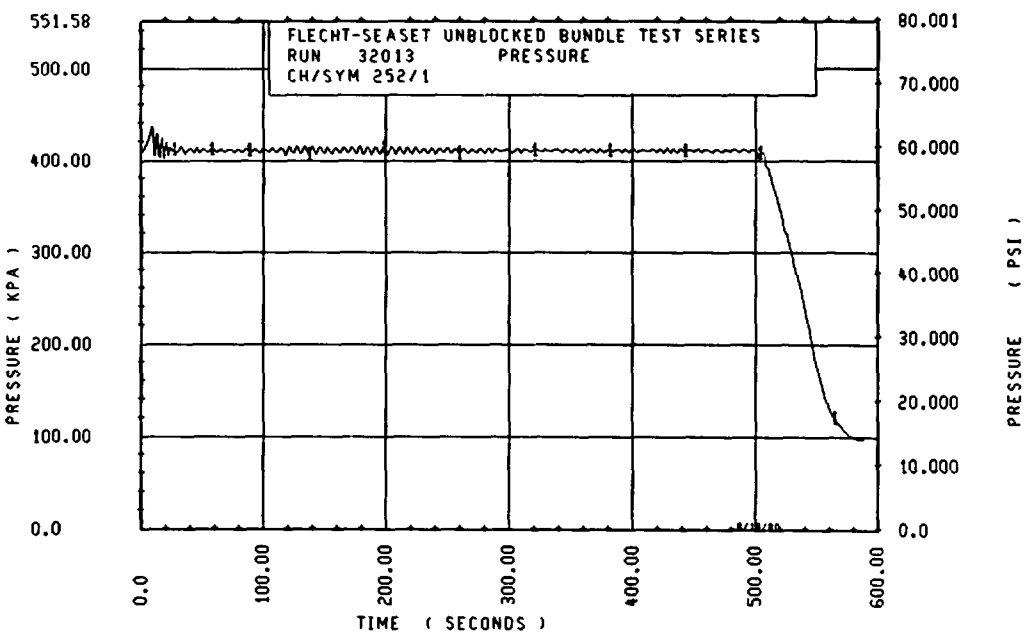


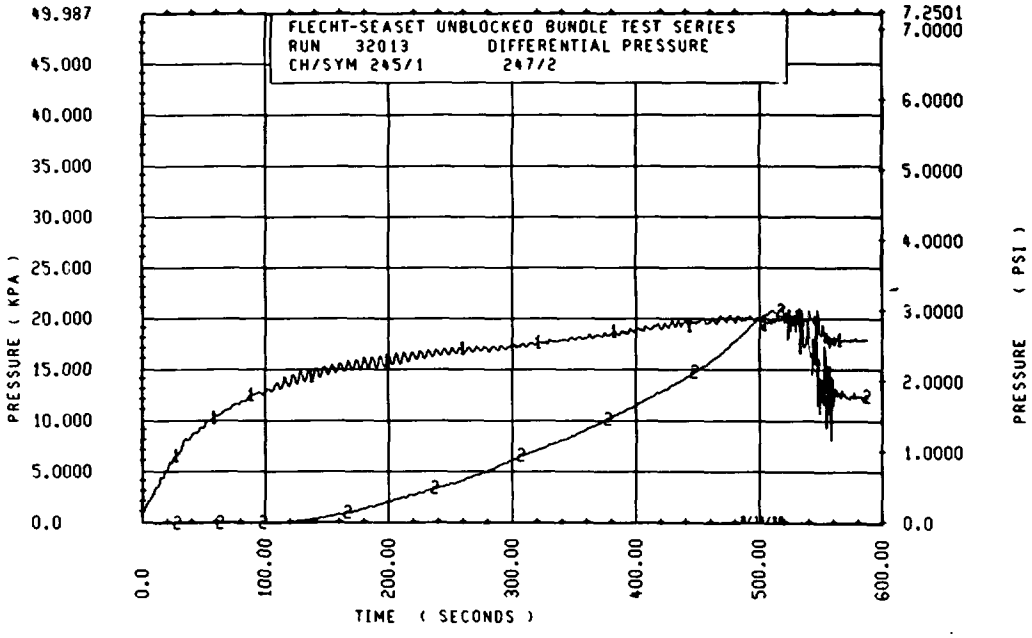


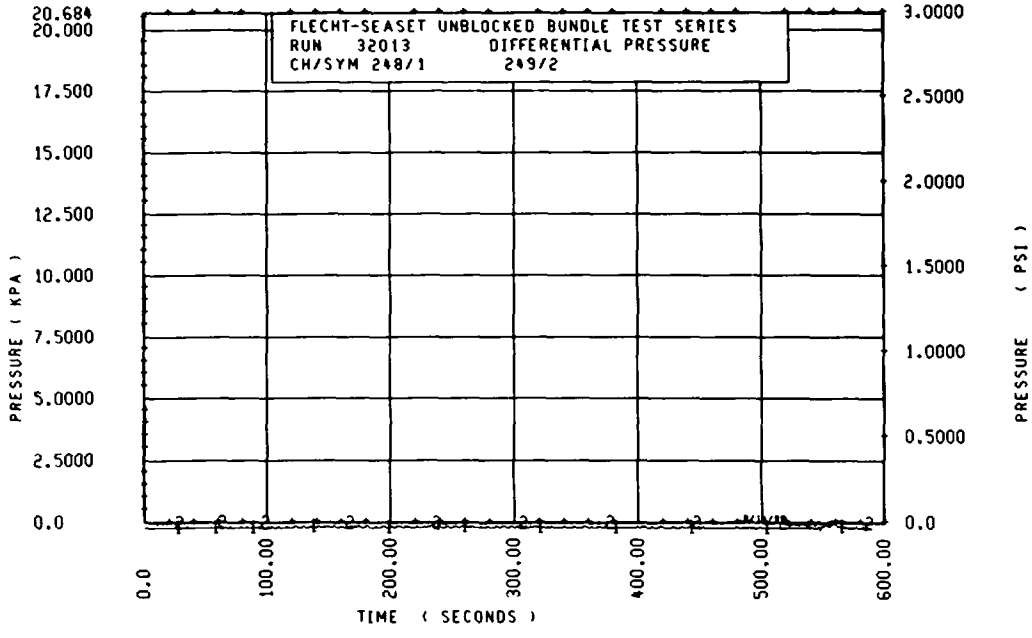
CH 202-7L, 1.21 m (48 in.); CH 203-4I, 1.83 m (72 in.); CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

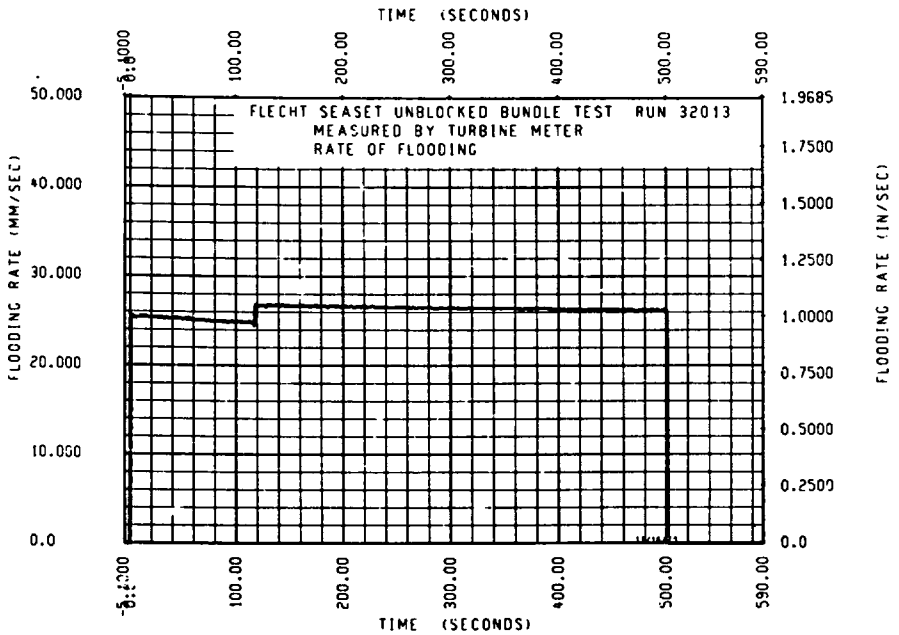

HOUSING TEMPERATURE
TEMPERATURE (DEG C)
700.
600.
500.
400.
300.
200.
100.
TEMPERATURE (DEG F)
700
600
500
400
300
200
0.
40.
80.
120.
160.
200.
240.
280.
320.
360.
400.
440.
480.
TIME (SECØNDS)
LEGEND
4 FØØT ELEVATIØN FC 32
6 FØØT ELEVATIØN FC 40
8 FØØT ELEVATIØN FC 48
10 FØØT ELEVATIØN FC 54

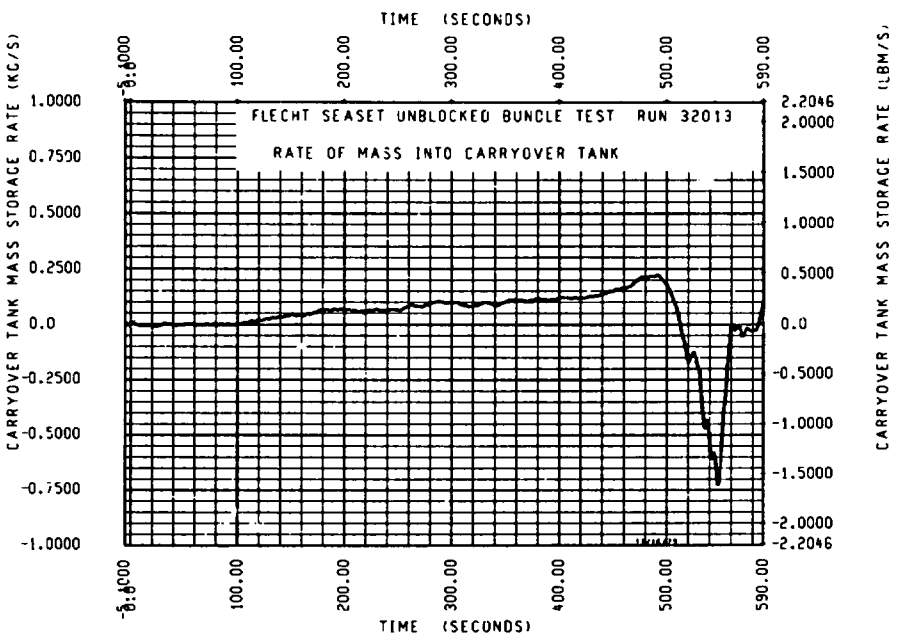

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

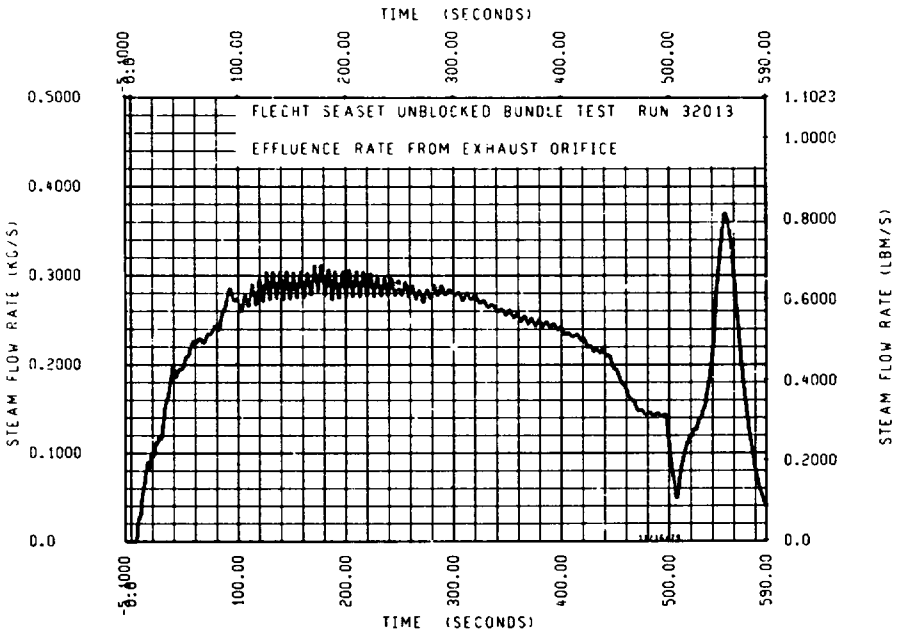

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

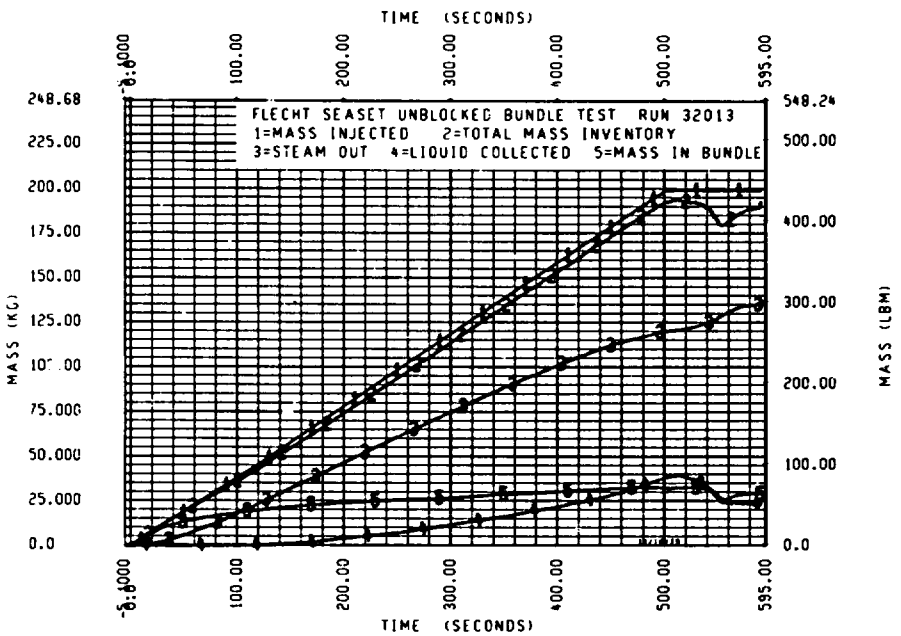

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

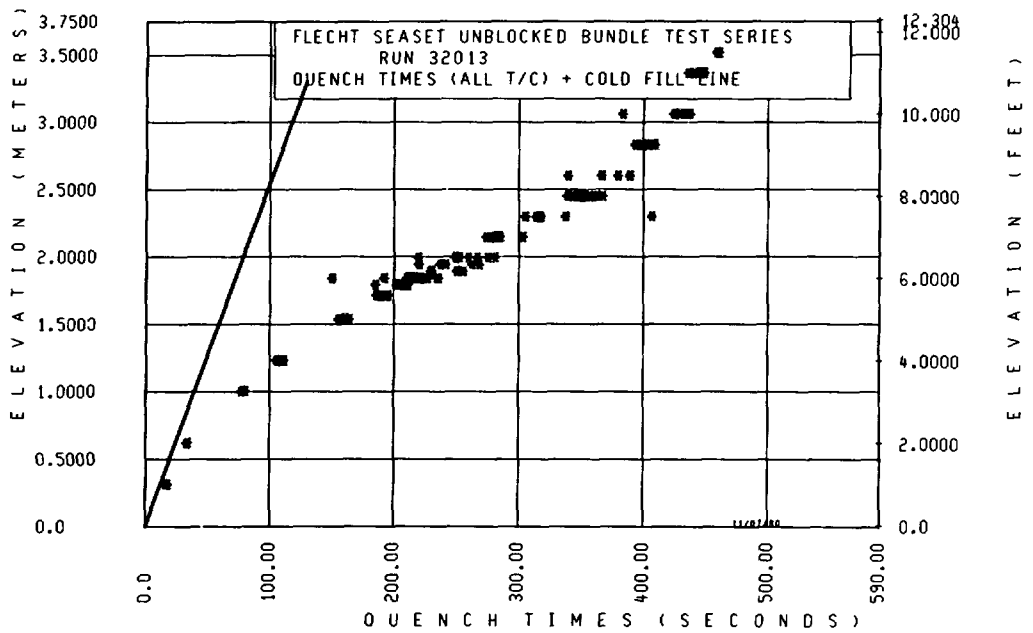

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

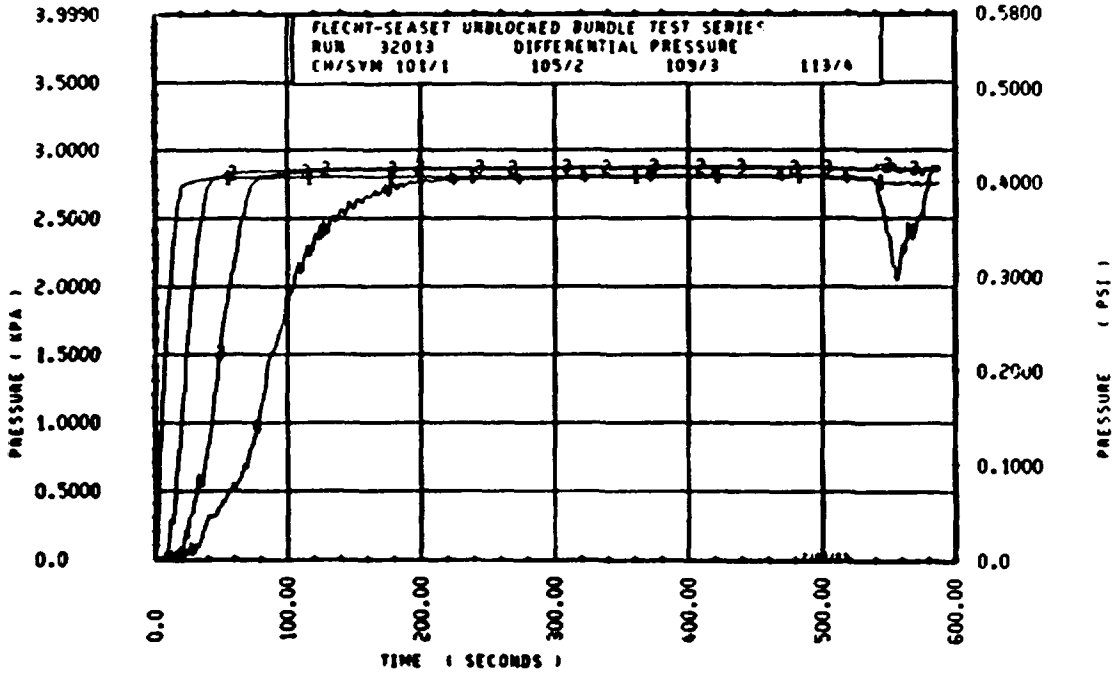

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32013
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
100.00
200.00
300.00
400.00
500.00
590.00

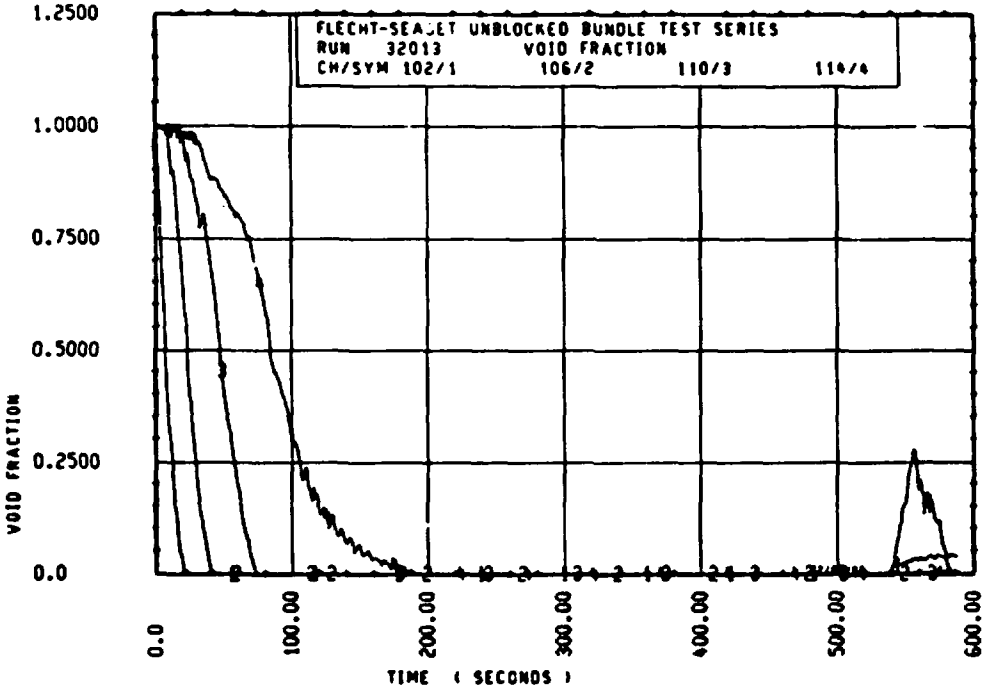

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32013
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
1.0000
0.7500
0.5000
0.2500
0.0
-0.2500
-0.5000
-0.7500
-1.0000
2.2046
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
-2.2046
100.00
200.00
300.00
400.00
500.00
590.00

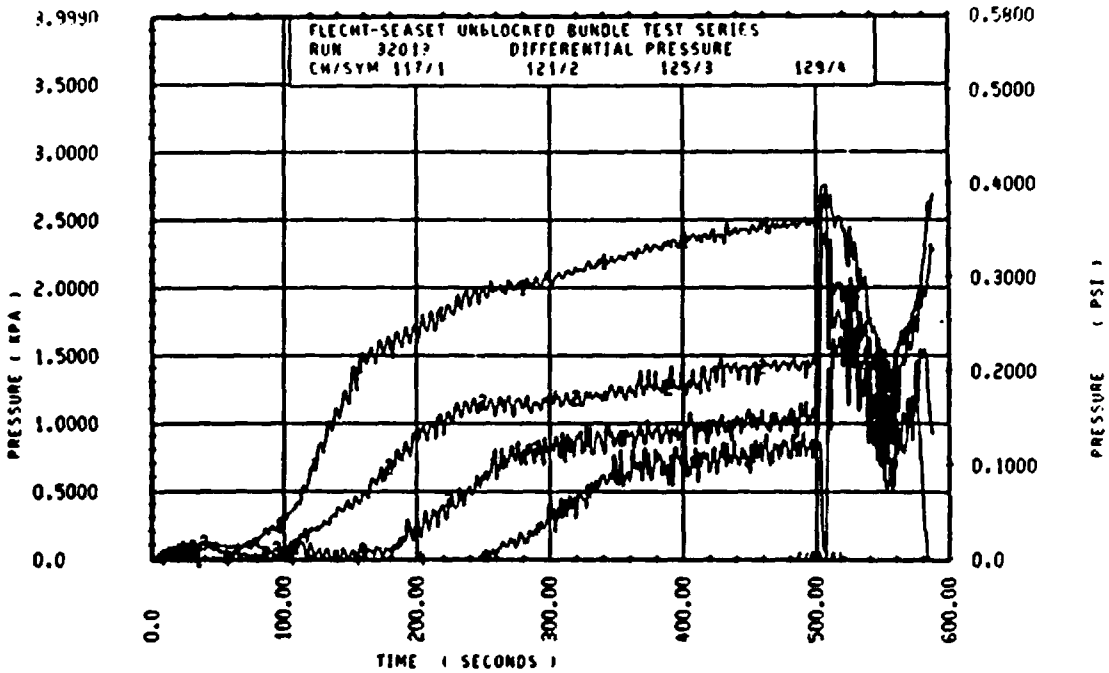

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32013
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
590.00

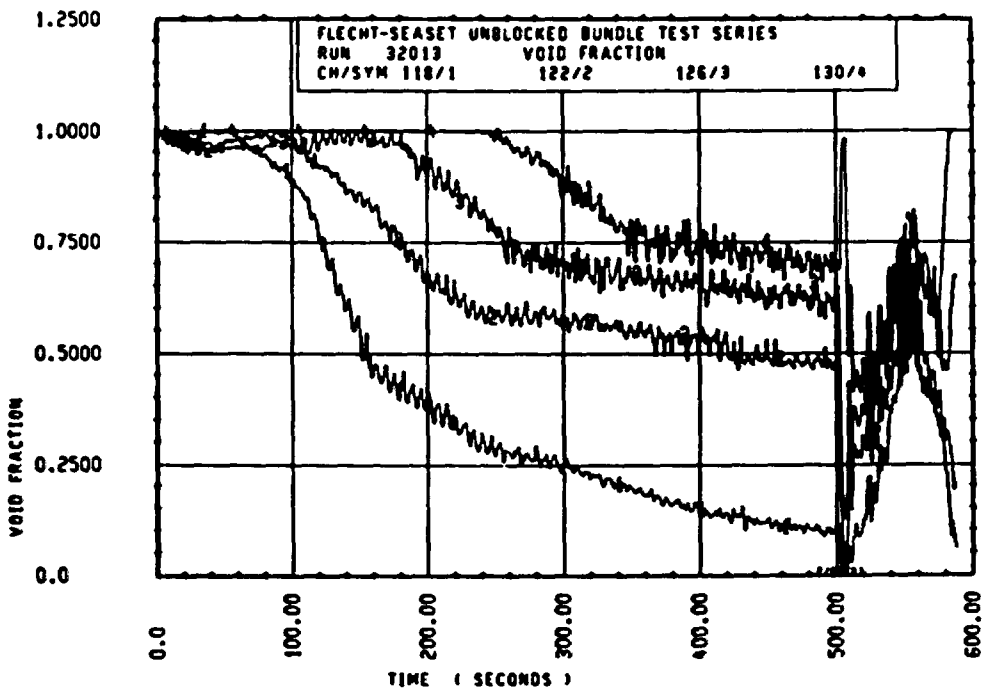

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32013
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
248.68
225.00
200.00
175.00
150.00
125.00
75.000
50.000
25.000
0.0
548.24
500.00
400.00
300.00
200.00
100.00
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
595.00

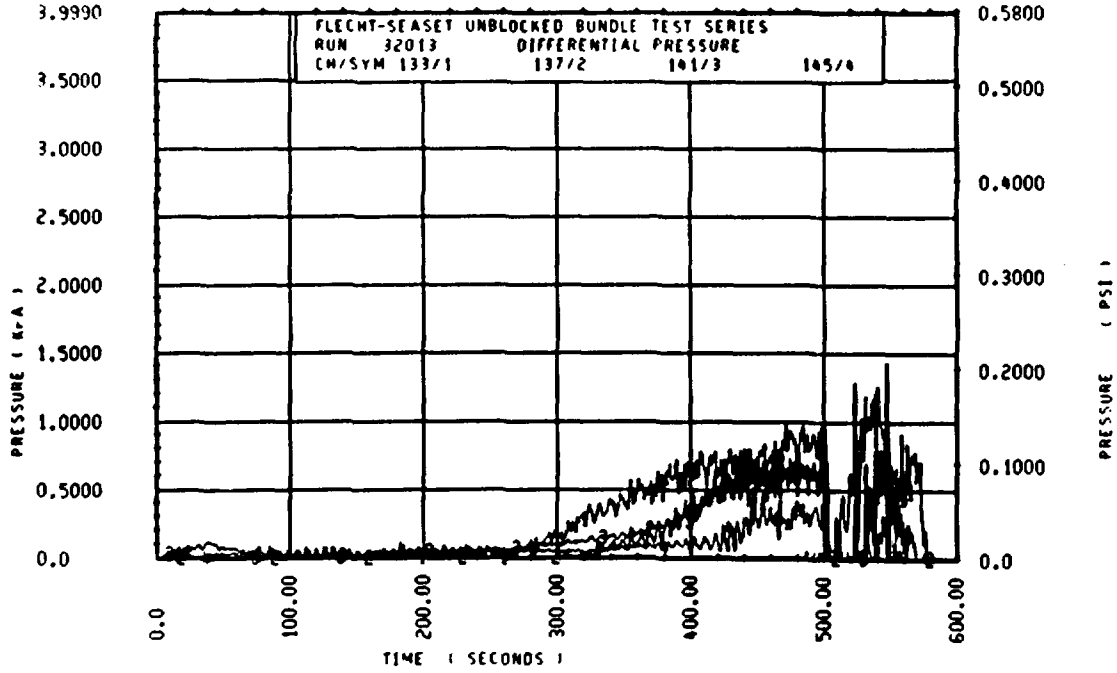

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
590.00
QUENCH TIMES (SECONDS)

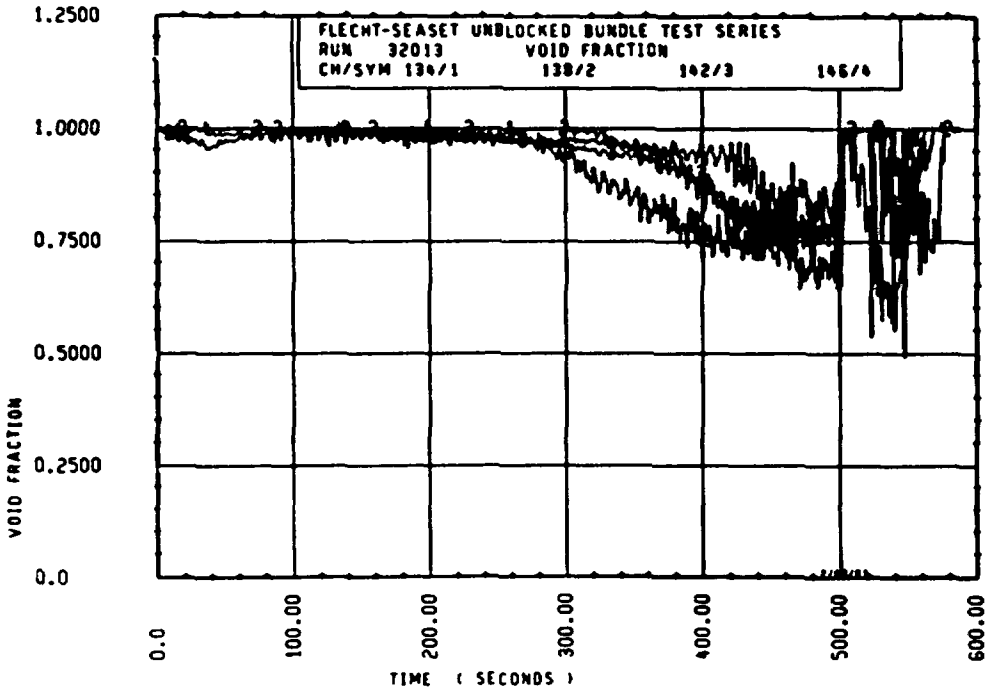

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32013 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 32114

Date: 5/3/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	893°C (1639°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	25 to 31 mm/sec (1.0 to 1.22 in./sec)
Coolant temperature	125°C (257°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	141°C (286°F)	135°C (275°F)
1.22 m (48 in.)	153°C-162°C (307°F-323°F)	135°C (275°F)
1.83 m (72 in.)	178°C-194°C (352°F-382°F)	136°C-478°C (277°F-892°F)
2.44 m (96 in.)	162°C-184°C (324°F-363°F)	133°C-667°C (271°F-1233°F)
2.74 m (108 in.)	147°C-161°C (297°F-321°F)	133°C (272°F)
3.05 m (120 in.)	137°C-146°C (279°F-295°F)	132°C-269°C (270°F-516°F)
3.35 m (132 in.)	132°C-139°C (269°F-282°F)	132°C (270°F)

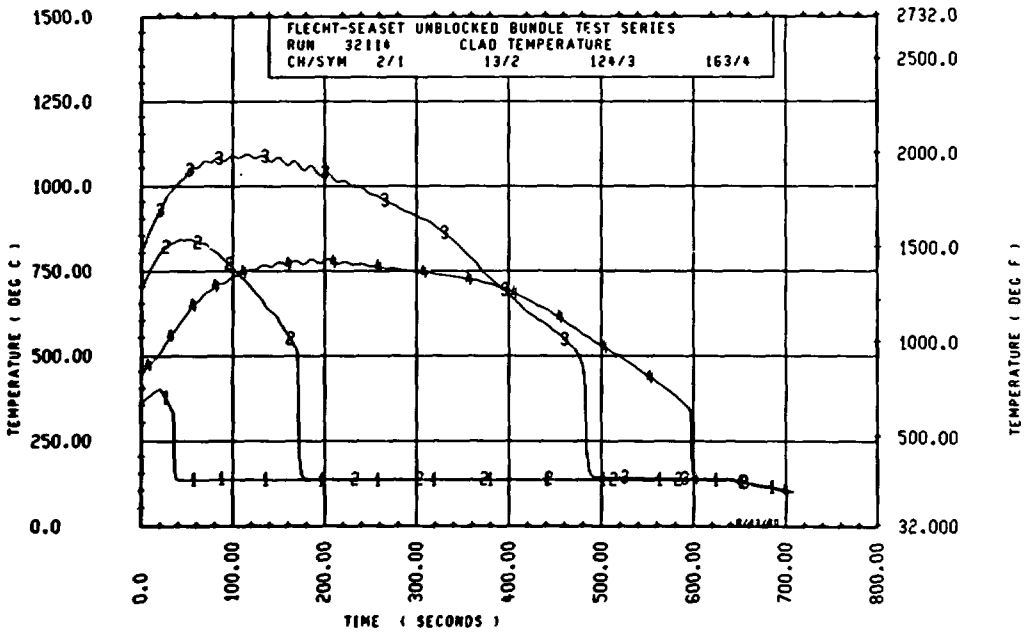
*At 275 seconds after flood

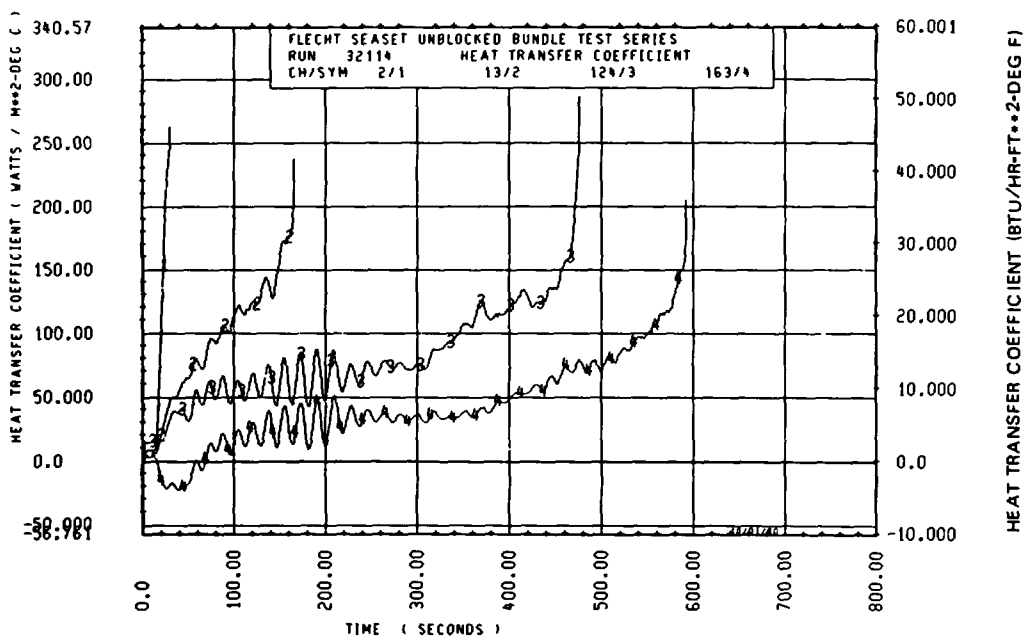
C. Comments

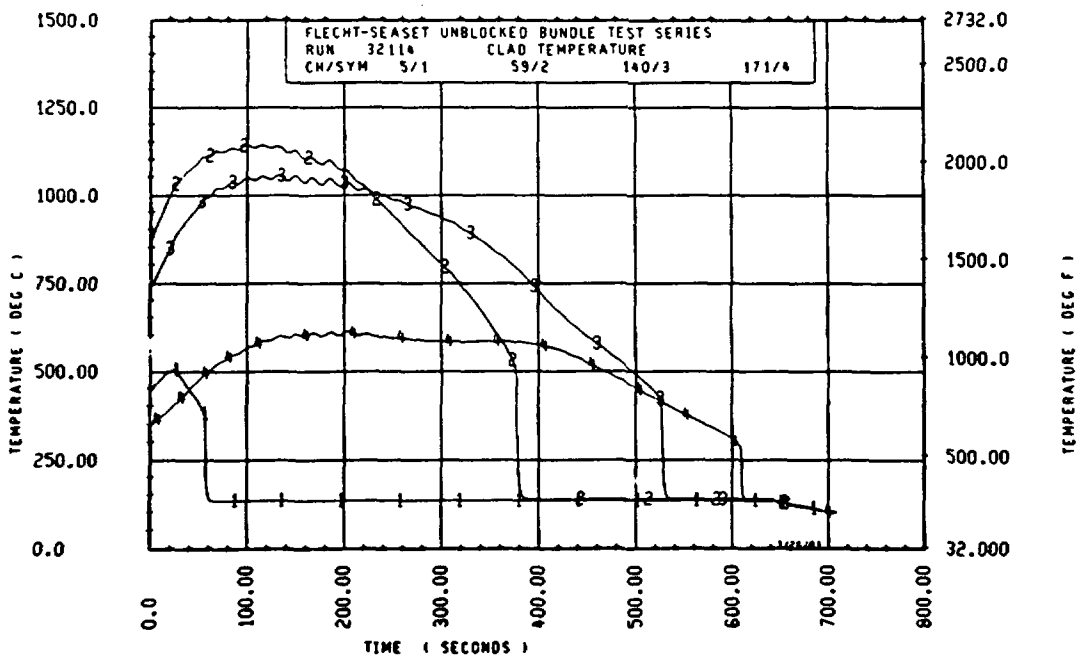
Step increase (22 percent) in flooding rate occurred throughout test and the mass balance was poor.

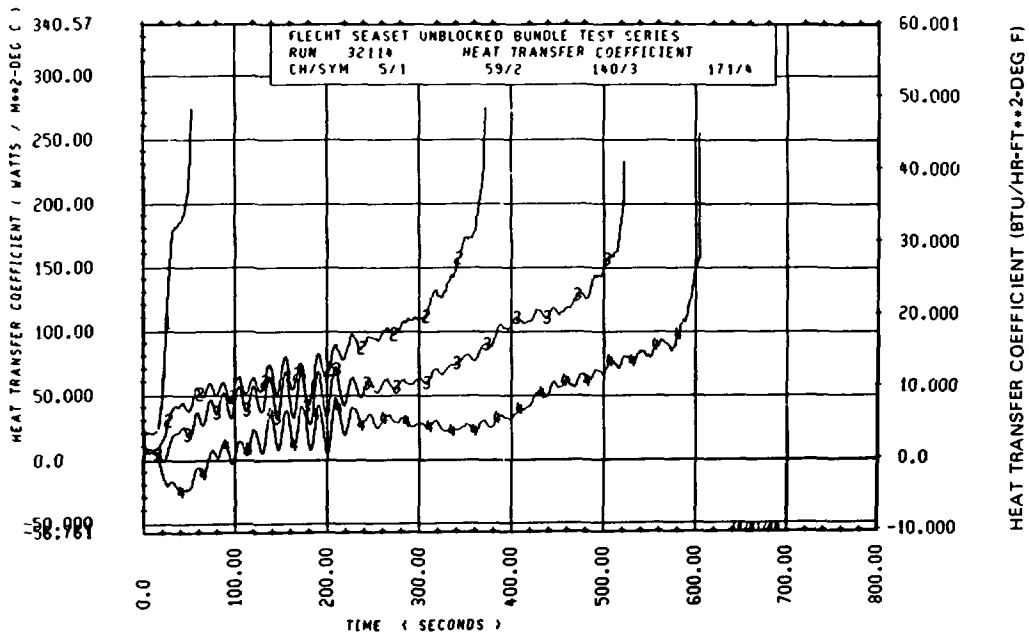
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 32114

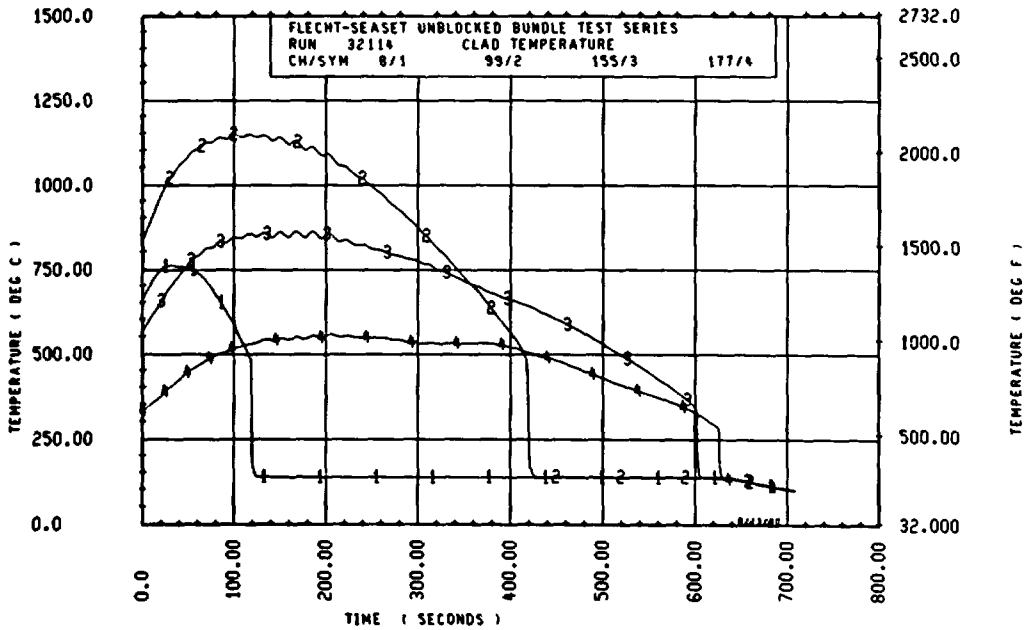
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1264.	1518.	254.	52.5	916.	169.9
2H 6- 0	50	1552.	1929.	377.	68.0	913.	368.8
3C 5- 0	17	1353.	1598.	246.	54.5	757.	278.7
3C 5- 7	28	1436.	1680.	244.	54.5	779.	323.8
4L 8- 0	129	1315.	1823.	507.	84.0	795.	501.9
4L 8- 6	147	1318.	1818.	500.	83.5	804.	502.0
5E11- 0	168	663.	1107.	444.	204.0	538.	614.0
5J 4- 0	12	1240.	1508.	269.	51.5	870.	174.8
5J 8- 6	146	1115.	1623.	508.	185.0	640.	547.9
5J11- 6	175	618.	1003.	385.	203.0	522.	619.0
7B 6- 0	57	1496.	1853.	357.	68.5	921.	321.8
7B 8- 6	142	1119.	1600.	482.	169.0	646.	558.9
7B10- 0	162	837.	1439.	602.	186.0	588.	616.0
7B11- 6	176	647.	1132.	485.	203.0	505.	633.0
7D 6- 4	84	1611.	2052.	441.	83.0	897.	369.6
7D 7- 6	119	1479.	1957.	477.	83.0	828.	468.9
7D 9- 3	151	1016.	1574.	558.	185.0	656.	574.0
7G 5- 0	23	1504.	1819.	315.	53.0	923.	264.6
7J 6- 0	59	1593.	2092.	499.	99.5	922.	376.9
7M 7- 6	120	1469.	1934.	465.	84.0	806.	491.8
7M 8- 0	132	1327.	1888.	561.	98.5	785.	521.1
7M 9- 3	152	1012.	1552.	540.	133.0	684.	560.0
8H 4- 0	13	1293.	1550.	256.	51.0	943.	170.8
8H10- 0	163	835.	1444.	609.	204.0	640.	596.8
8H11- 6	177	631.	1038.	406.	203.0	544.	625.0
8K 4- 0	14	1262.	1532.	270.	52.0	882.	169.7
8K 6- 6	99	1535.	2102.	567.	100.0	876.	417.7
8K 8- 0	140	1360.	1934.	574.	132.0	777.	526.8
8K10- 0	164	836.	1442.	606.	203.0	633.	601.9
8N 2- 0	5	836.	944.	108.	24.5	714.	57.0
8N 4- 0	15	1275.	1527.	251.	53.5	936.	164.8
8N 6- 0	61	1559.	2019.	460.	83.0	1012.	356.3
8N10- 0	165	837.	1406.	569.	185.0	630.	602.0
9C 7- 0	109	1469.	1875.	406.	68.5	708.	444.9
9C 9- 3	153	1036.	1590.	554.	185.0	664.	576.0
9G 1- 0	2	684.	757.	73.	19.5	627.	35.3
9G 3- 3	8	1229.	1404.	176.	31.5	893.	118.8
9G11- 0	171	660.	1138.	478.	204.0	551.	608.8
9I 5- 0	24	1521.	1878.	357.	69.0	929.	267.8
9I 5-10	46	1641.	2060.	419.	68.0	833.	349.7
10D 6- 6	93	1503.	1866.	363.	115.0	832.	406.9
11E 7- 6	124	1487.	2002.	514.	116.0	810.	481.8
11E 9- 3	155	1060.	1584.	524.	185.0	838.	601.0
11E11- 0	172	673.	1157.	484.	204.0	518.	630.0
12D 4- 0	16	1287.	1537.	250.	44.0	923.	169.9
12D 6- 0	66	1570.	1958.	387.	82.0	889.	357.7
13G 6- 6	102	1547.	2000.	453.	99.0	869.	361.8

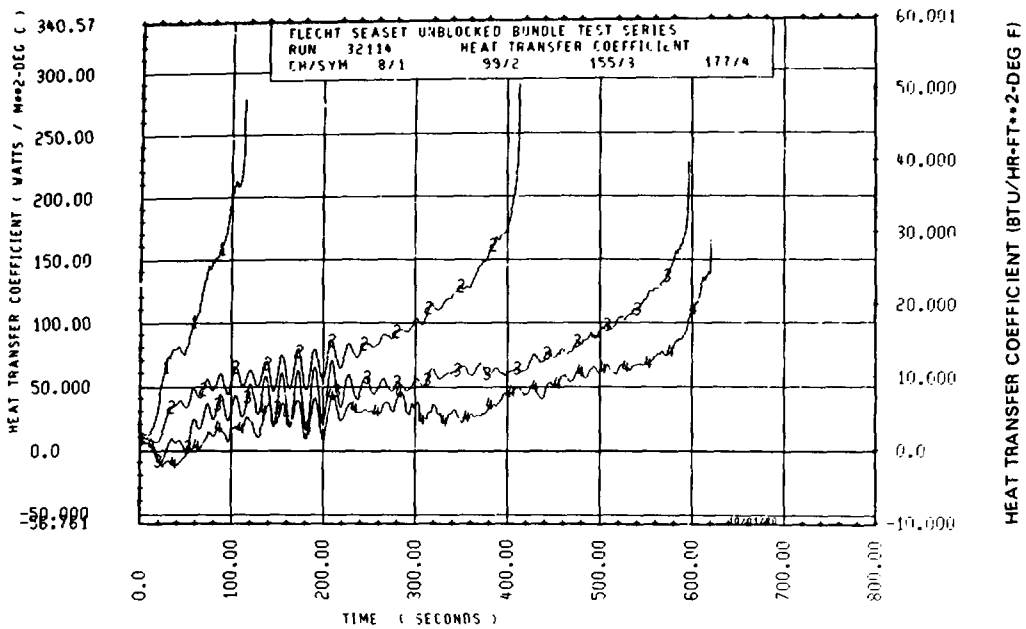

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

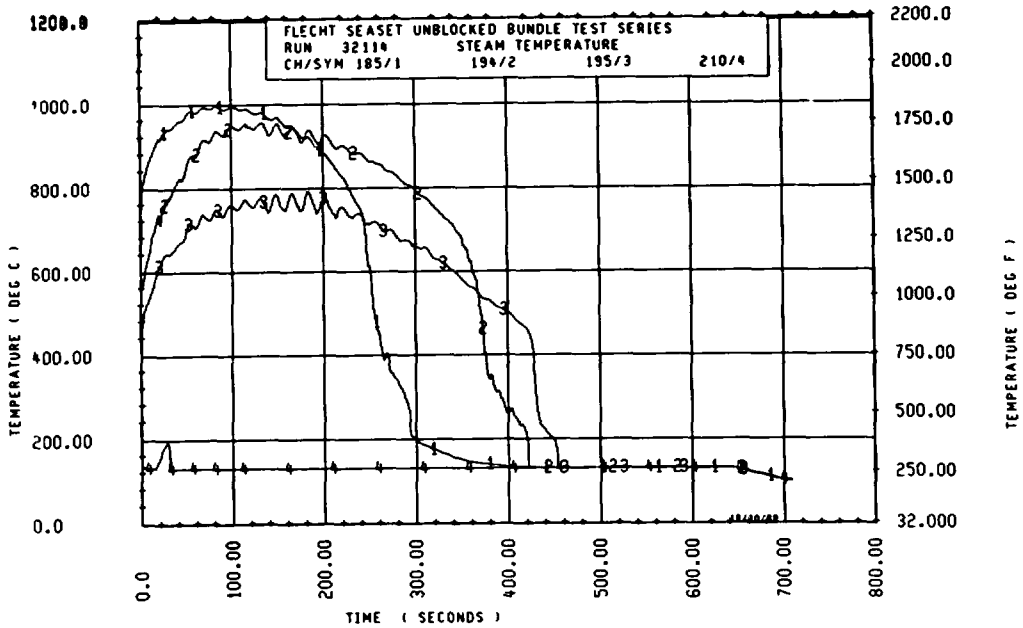

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

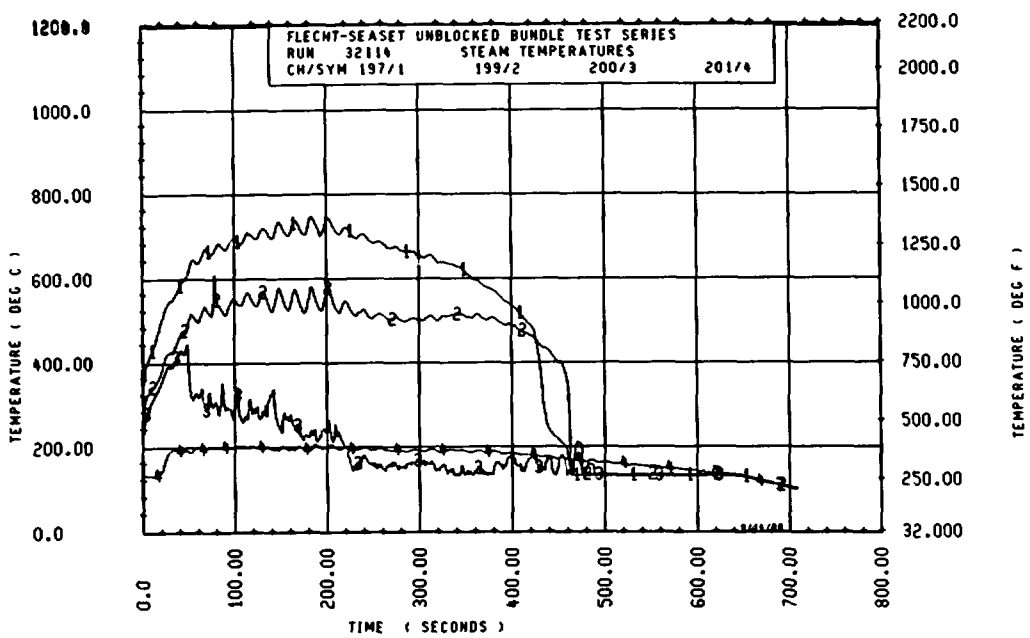

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

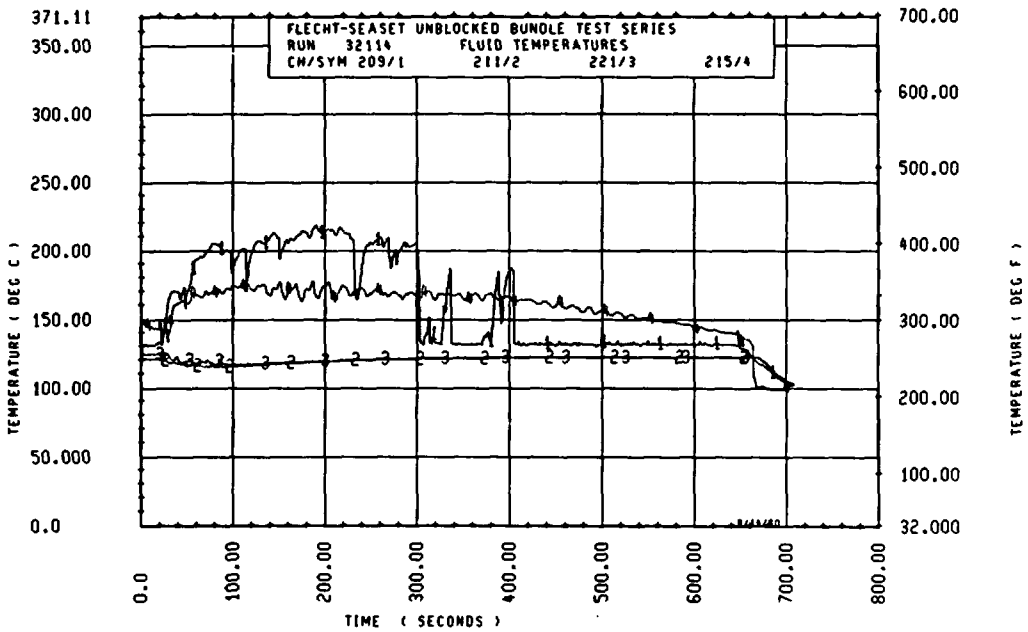

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

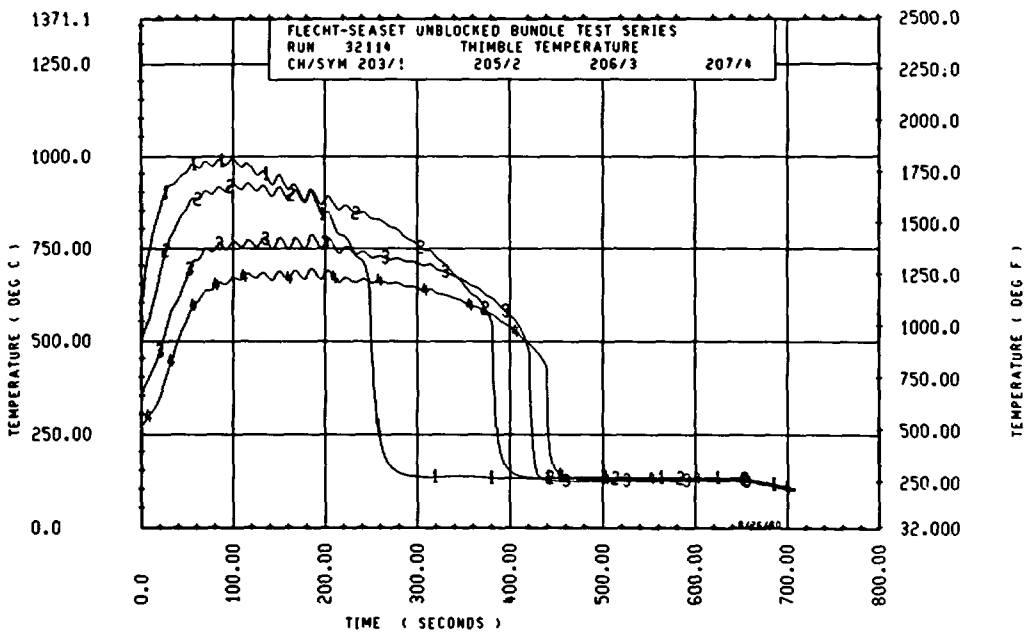

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

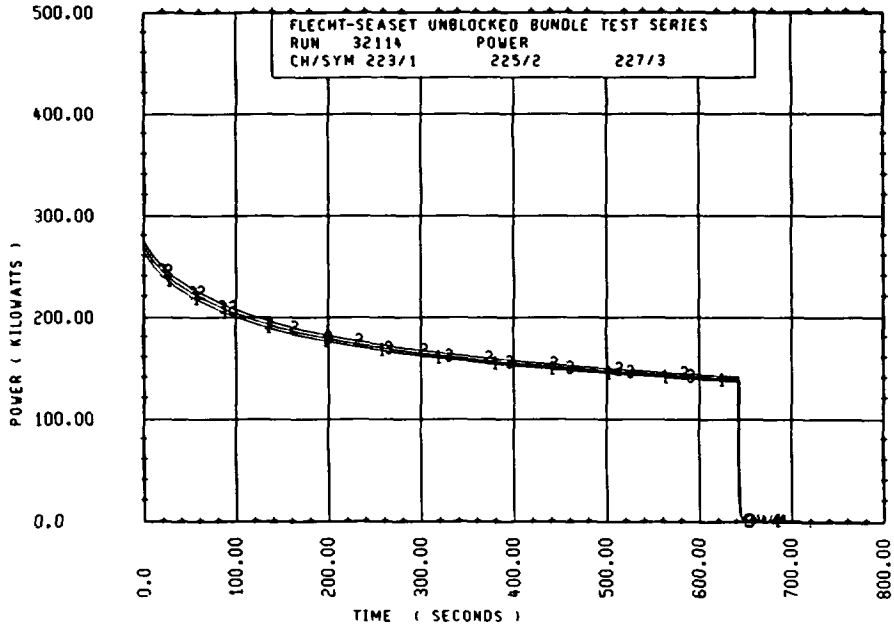

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

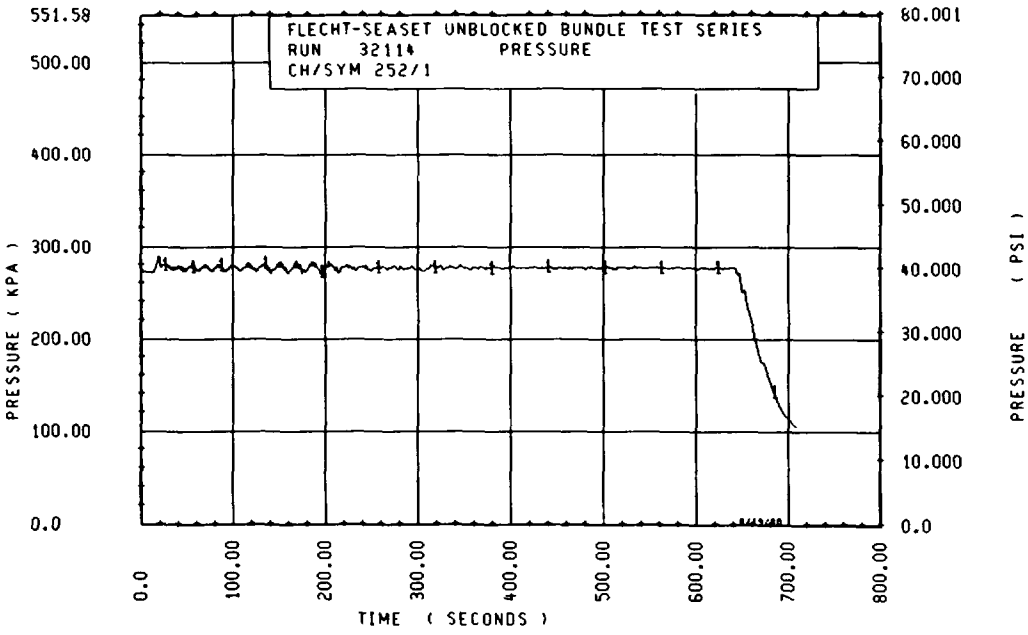

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

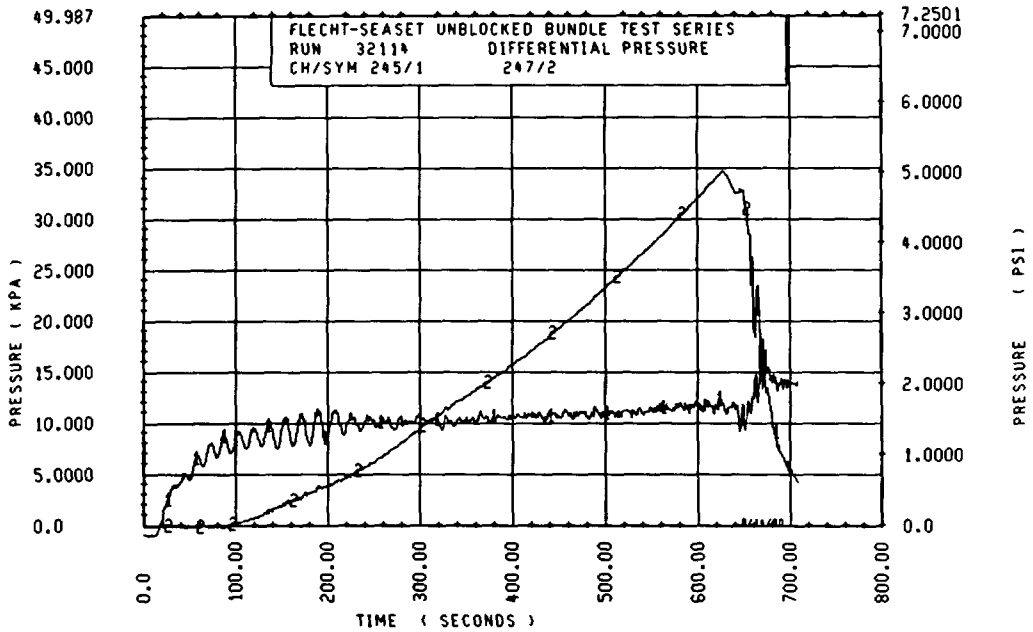


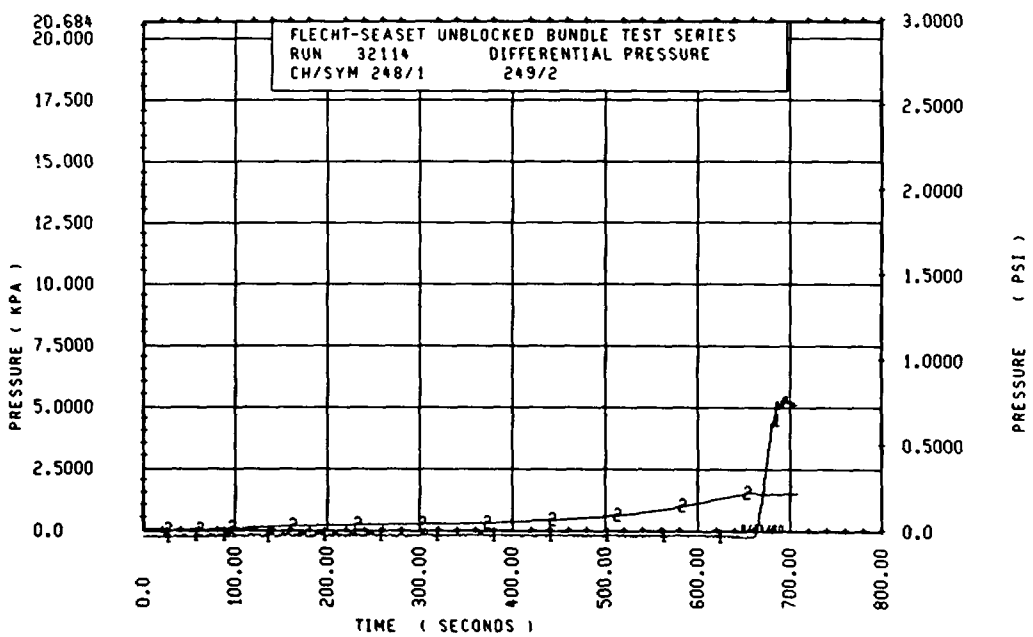


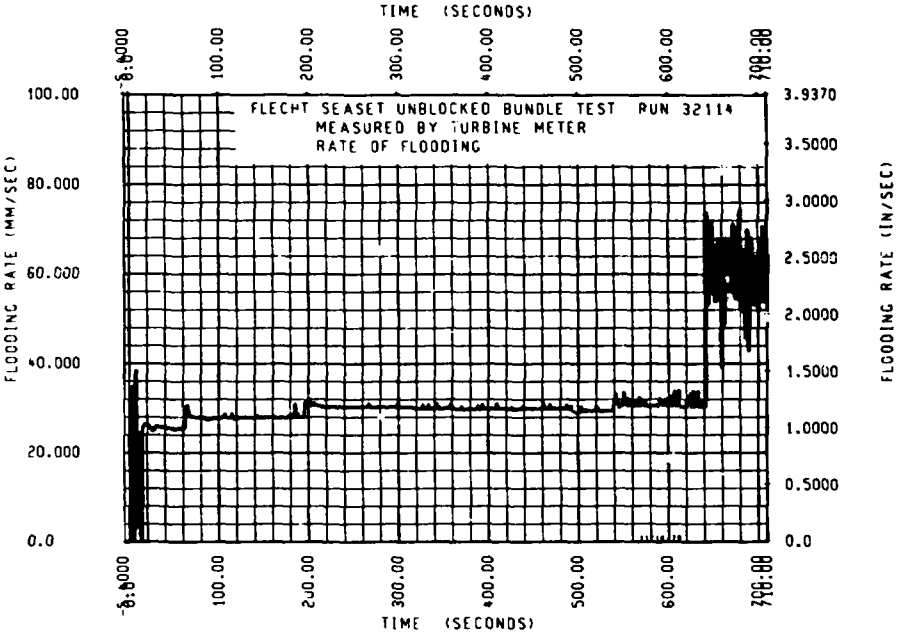
CH 203-4I, 1.83 m (72 in.); CH 205-7L, 2.44 m (96 in.);
CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

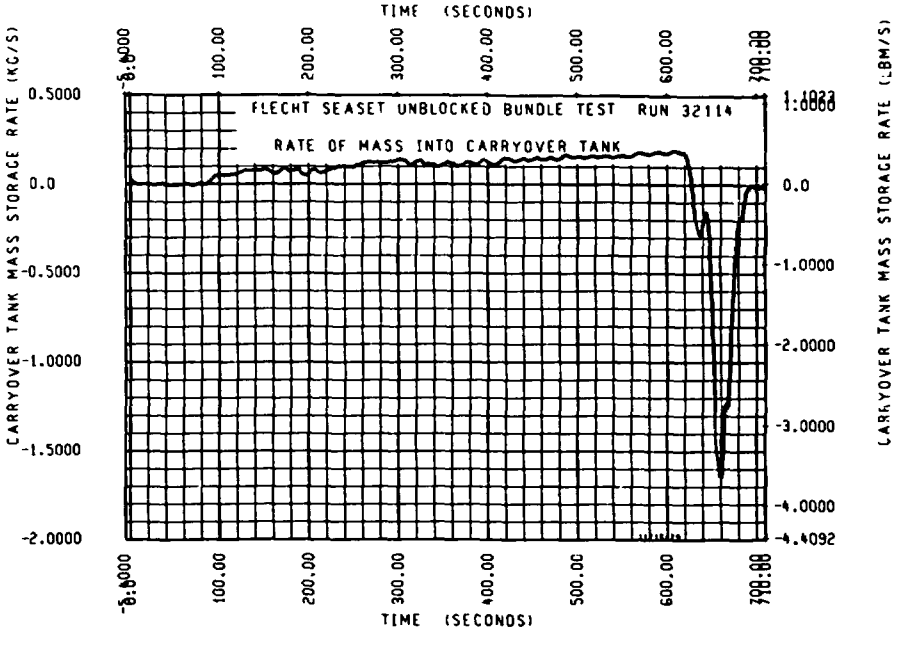

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

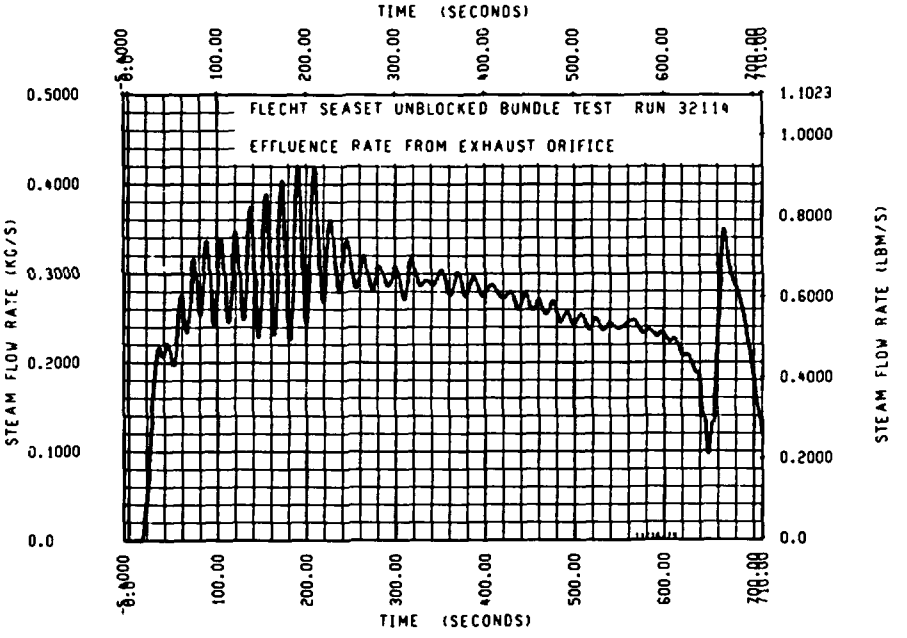

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

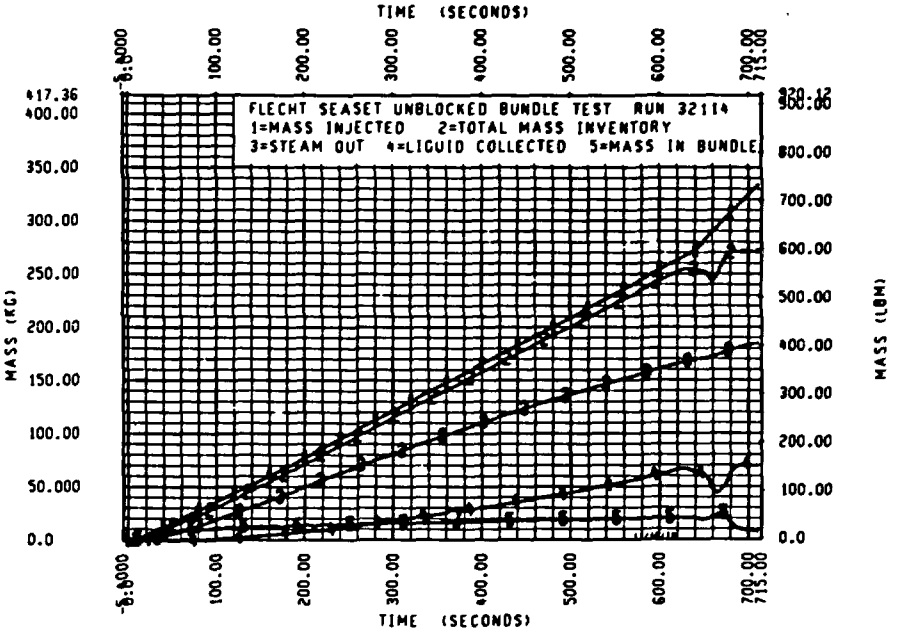

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

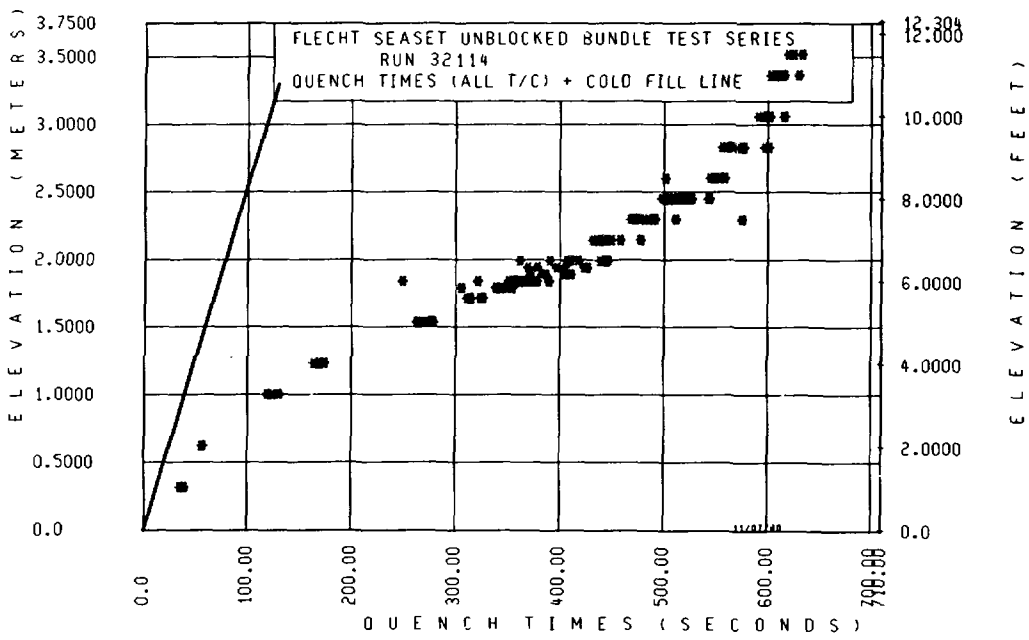

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

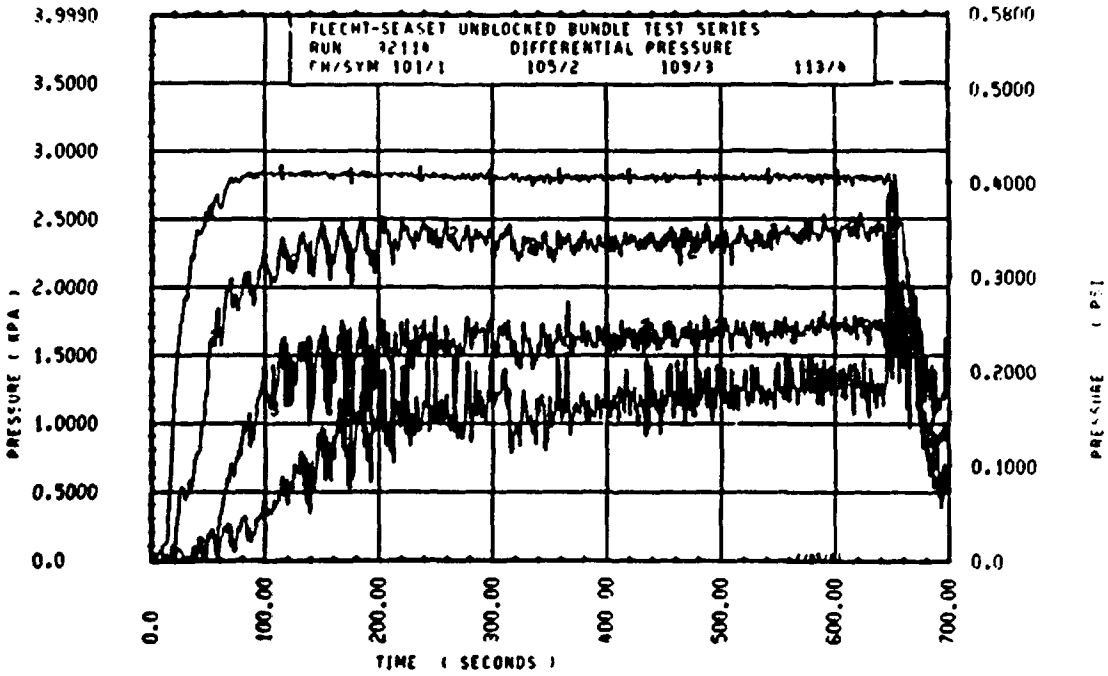

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32114
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
100.00
80.000
60.000
40.000
20.000
0.0
3.9370
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

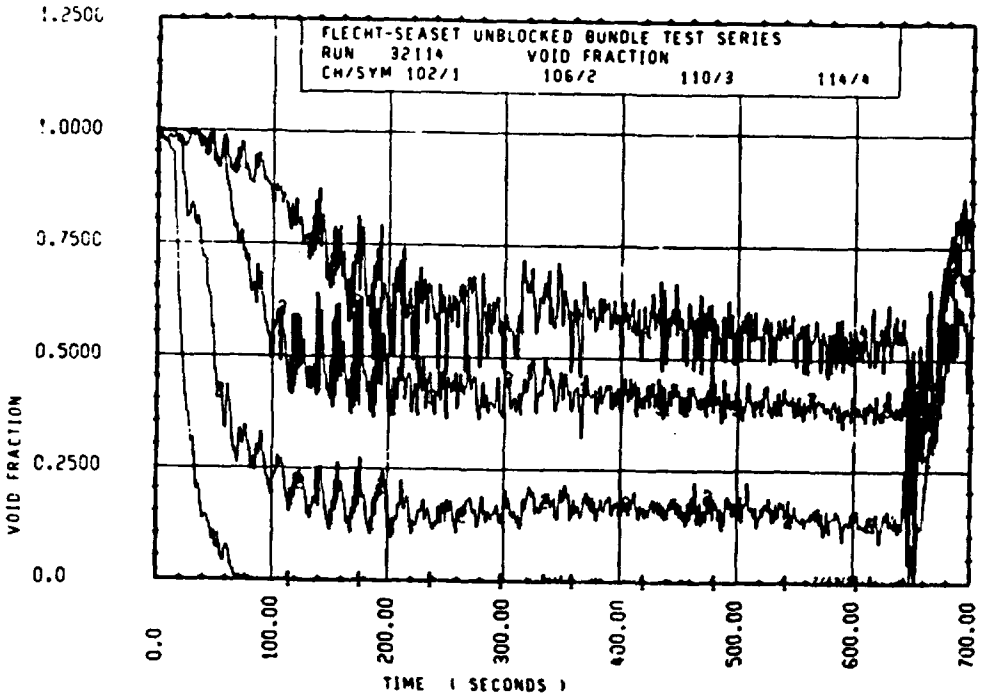

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32114
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
1.0000
0.0
-1.0000
-2.0000
-3.0000
-4.0000
-4.4092
100.00
200.00
300.00
400.00
500.00
600.00

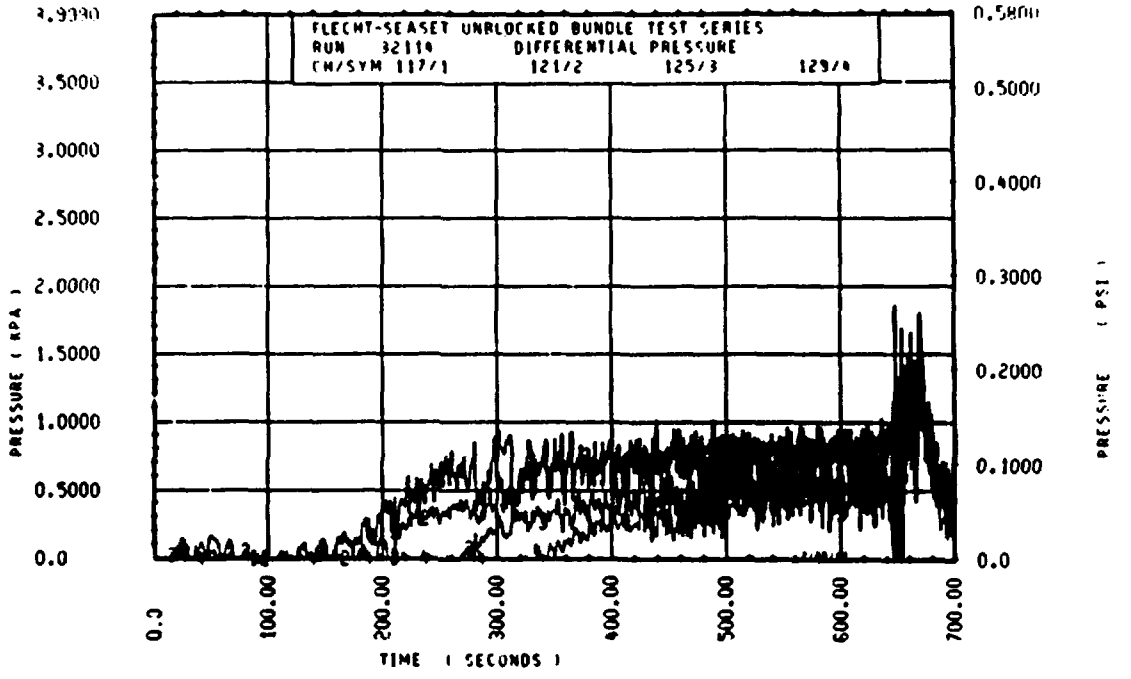

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32114
EFFLUENCE RATE FROM EXHAUST ORIFICE
TIME (SECONDS)
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-6.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00

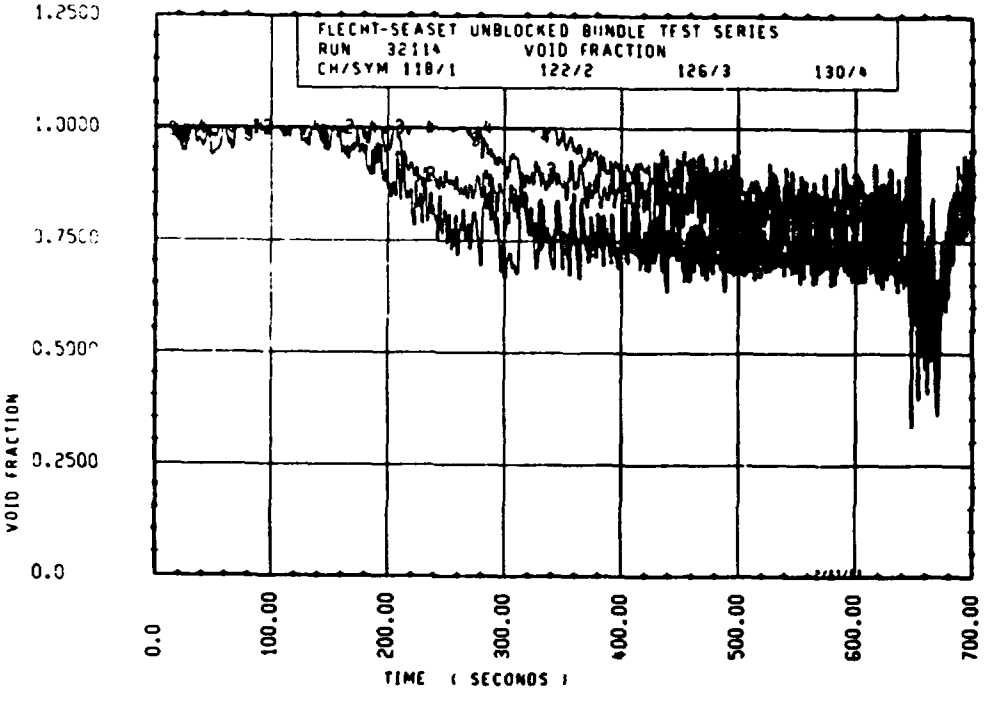

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32114
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
TIME (SECONDS)
MASS (KG)
MASS (LBM)
417.36
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
920.12
900.00
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-6.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
713.00

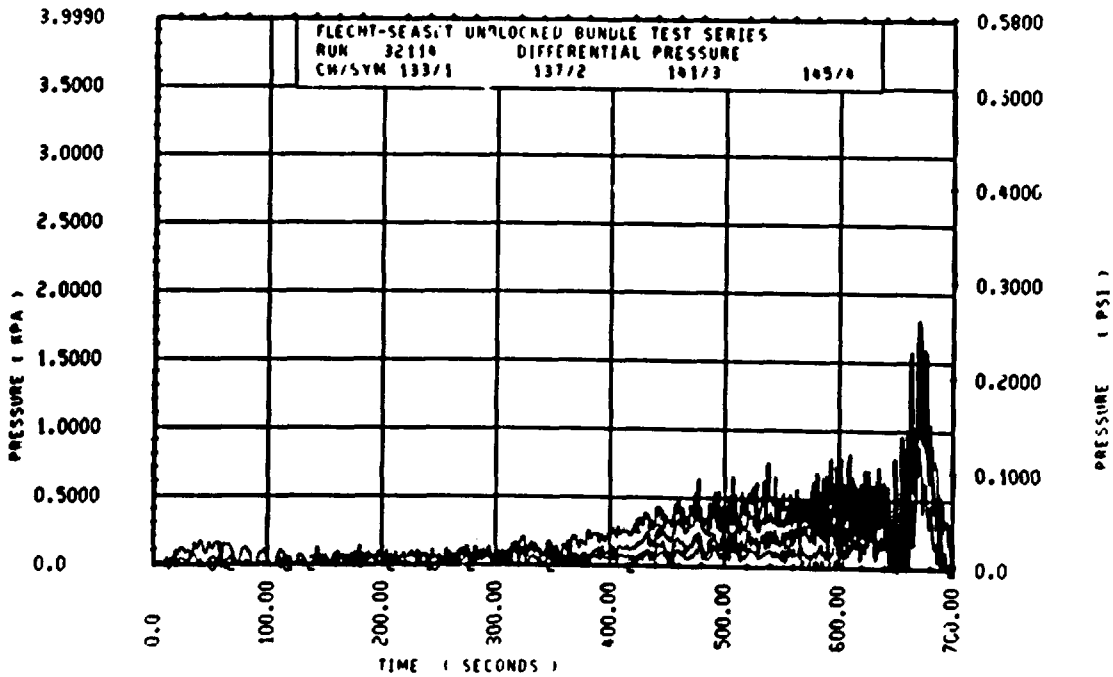

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
QUENCH TIMES (SECONDS)

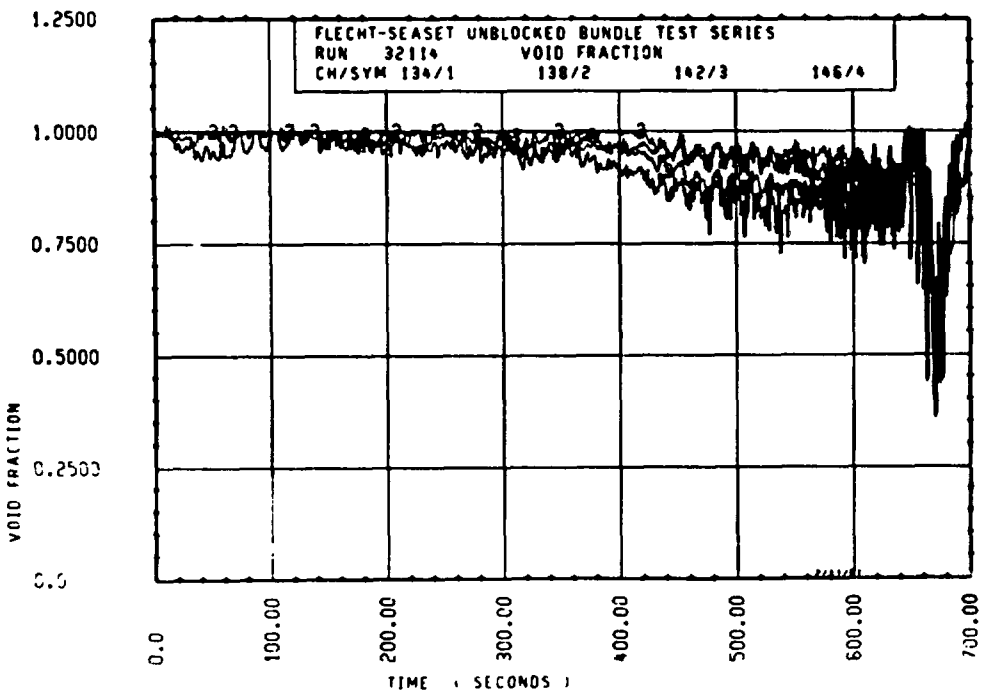

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
0.5000
0.4000
0.3000
0.2000
0.1000
1.0000
1.5000
2.0000
2.5000
3.0000
3.5000


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
0.2500
0.5000
0.7500
1.0000
1.2500


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32114 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 32235

Date: 5/4/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.14 MPa (20 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	888°C (1630°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	165.8 mm/sec (6.53 in./sec) (5 sec) 24.9 mm/sec (0.98 in./sec (200 sec) 15.7 mm/sec (0.62 in./sec) (onward)
Coolant temperature	31°C (88°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	103°C (218°F)	62°C (143°F)
1.22 m (48 in.)	132°C (269°F)	113°C (236°F)
1.83 m (72 in.)	143°C-154°C (289°F-309°F)	112°C-116°C (233°F-240°F)
2.44 m (96 in.)	129°C-133°C (264°F-272°F)	112°C (234°F)
2.59 m (84 in.)	130°C-138°C (267°F-281°F)	111°C-413°C (231°F-776°F)
2.74 m (108 in.)	118°C-122°C (244°F-251°F)	112°C (233°F)
3.05 m (120 in.)	115°C-119°C (239°F-246°F)	111°C (231°F)
3.35 m (132 in.)	114°C (238°F)	110°C (230°F)

*At 215 seconds after flood

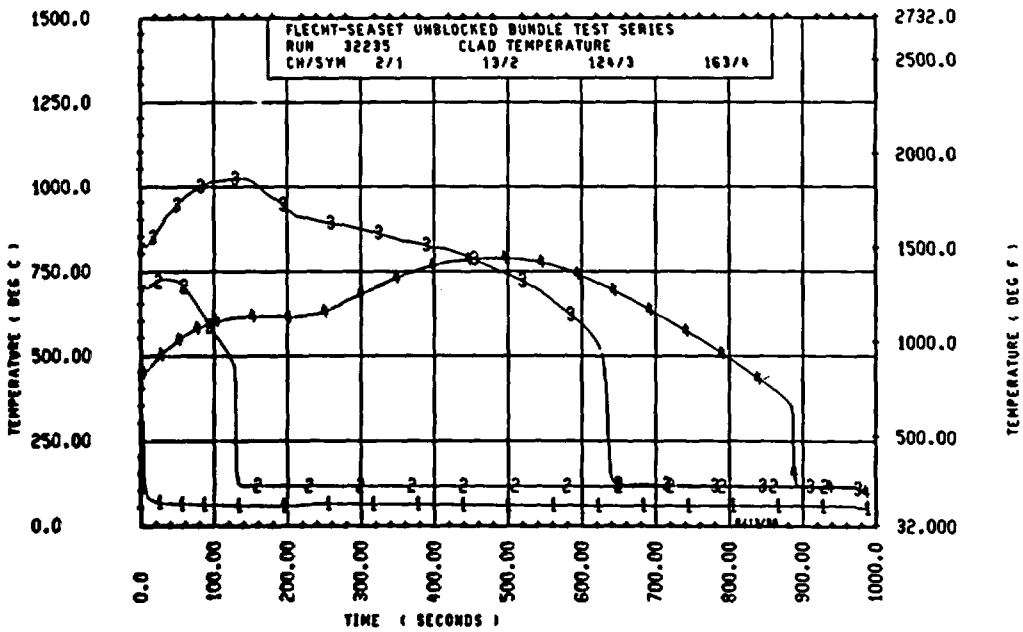
C. Comments

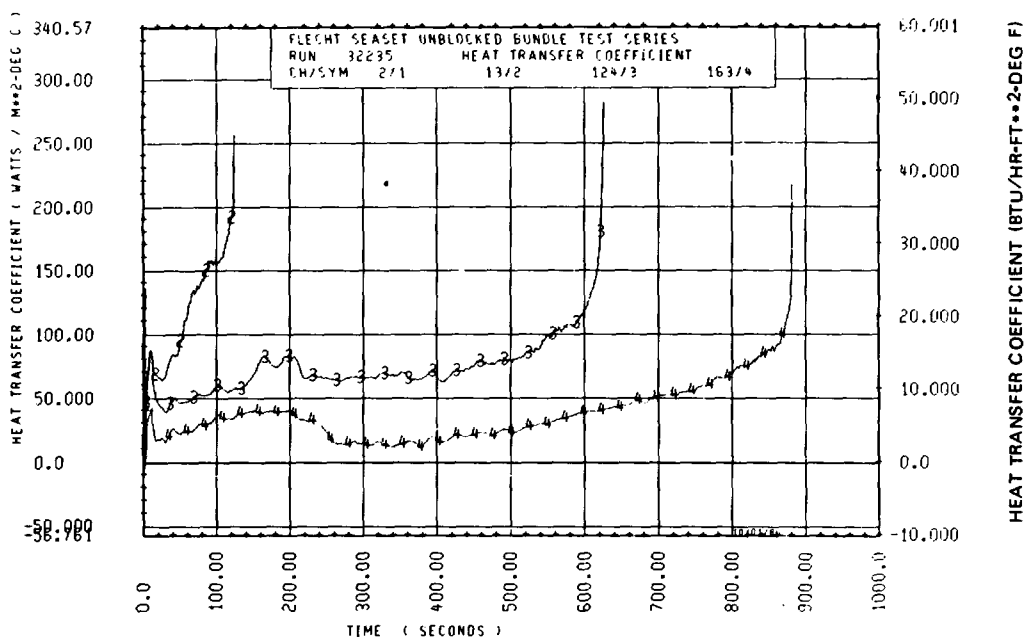
None

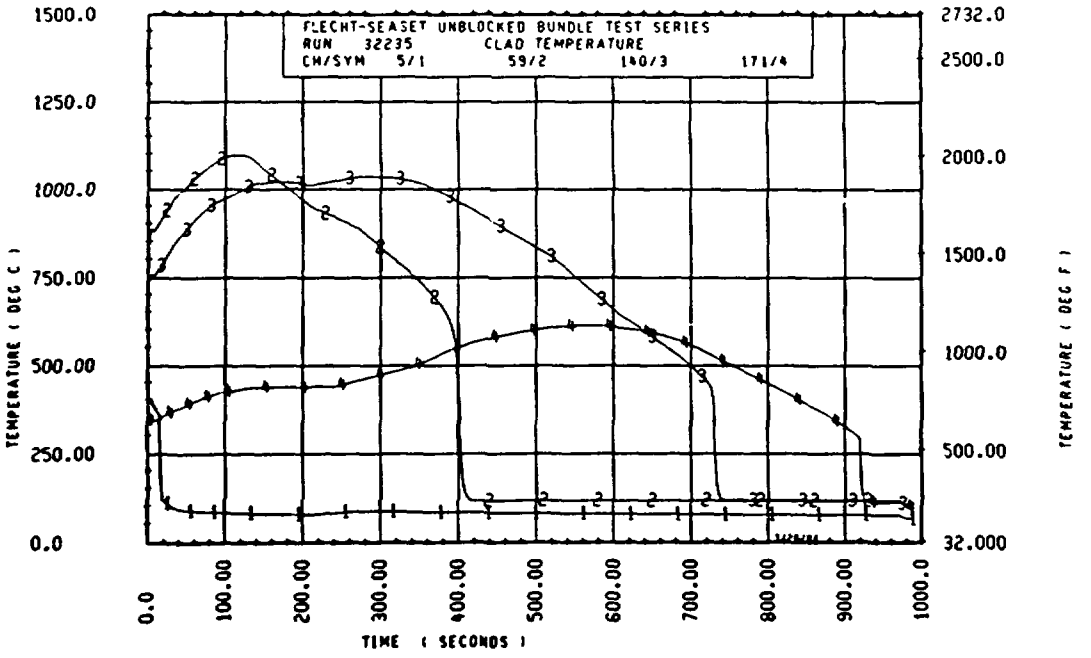
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES

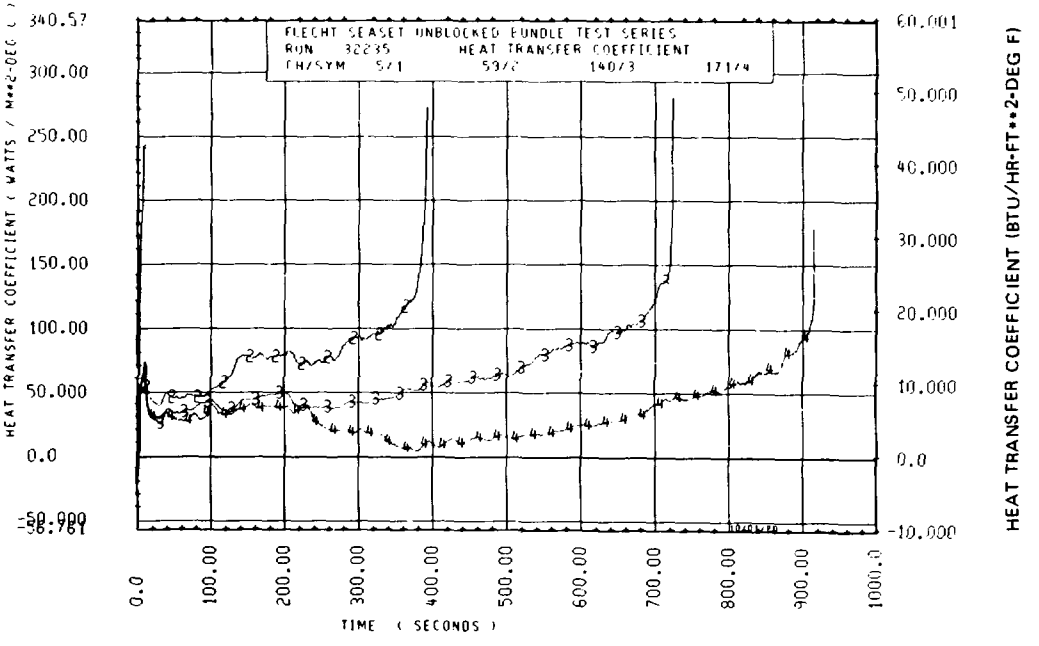
RUN NUMBER 32235

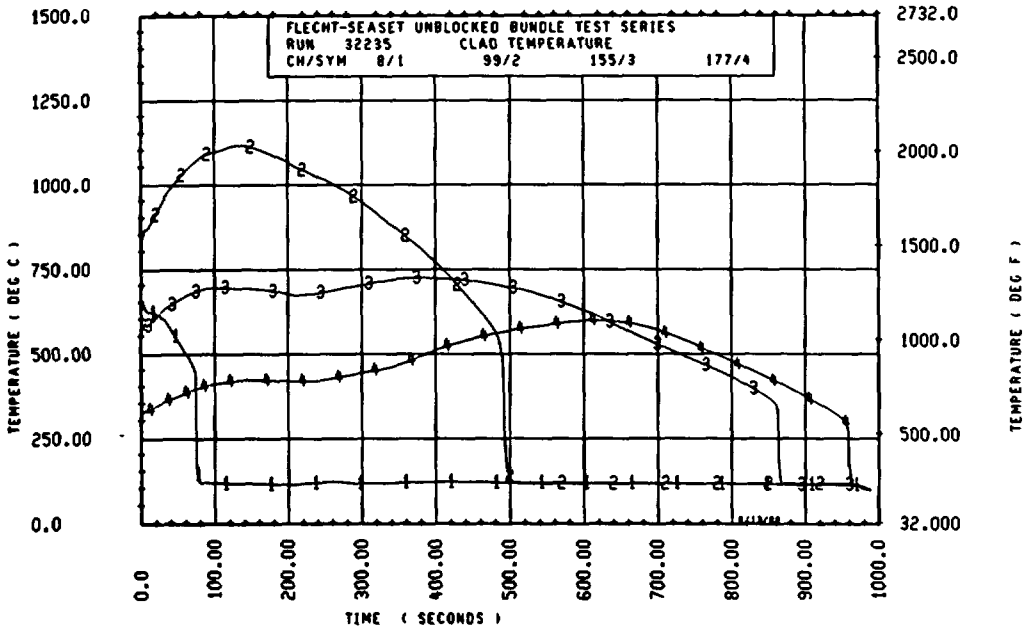
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1232.	1315.	84.	34.5	836.	127.9
2H 6- 0	50	1542.	1849.	306.	77.0	968.	382.7
3C 5- 0	17	1331.	1464.	133.	57.5	777.	235.8
3C 5- 7	28	1630.	1544.	114.	56.0	767.	315.6
4L 8- 0	129	1312.	1679.	367.	95.5	781.	669.5
4L 8- 6	147	1314.	1676.	361.	93.0	764.	670.8
5E11- 0	168	644.	1049.	401.	510.0	536.	926.9
5J 4- 0	12	1215.	1303.	88.	33.5	810.	132.9
5J 8- 6	166	1111.	1490.	379.	281.0	637.	754.3
5J11- 6	175	619.	1018.	399.	510.0	499.	960.9
7B 6- 0	57	1488.	1686.	196.	64.5	898.	305.6
7B 8- 6	142	1108.	1340.	233.	111.0	581.	779.5
7B10- 0	162	818.	1121.	303.	385.0	571.	918.9
7B11- 6	176	625.	912.	287.	454.0	506.	963.9
7D 6- 4	84	1611.	1948.	336.	95.0	825.	403.8
7D 7- 6	119	1467.	1788.	321.	95.5	797.	607.8
7D 9- 3	151	1005.	1354.	349.	406.0	657.	833.9
7G 5- 0	23	1489.	1679.	189.	71.0	1004.	207.7
7J 6- 0	59	1577.	2010.	433.	119.0	913.	398.8
7M 7- 6	120	1462.	1821.	359.	113.0	804.	655.1
7M 8- 0	132	1323.	1792.	470.	117.0	745.	719.2
7M 9- 3	152	1009.	1550.	541.	384.0	685.	819.2
8H 4- 0	13	1266.	1342.	75.	34.5	864.	128.9
8H10- 0	163	821.	1452.	631.	482.0	643.	885.8
8H11- 6	177	611.	1110.	499.	618.0	525.	957.2
8K 4- 0	14	1234.	1304.	70.	35.0	809.	127.3
8K 6- 6	99	1533.	2042.	509.	131.0	843.	490.6
8K 8- 0	140	1354.	1899.	545.	280.0	699.	729.3
8K10- 0	164	824.	1464.	641.	477.0	637.	912.9
8N 2- 0	5	750.	765.	15.	2.5	669.	15.7
8N 4- 0	15	1247.	1304.	57.	33.0	849.	126.8
8N 6- 0	61	1548.	1922.	375.	80.5	1081.	359.3
8N10- 0	165	825.	1419.	595.	355.0	624.	883.9
9C 7- 0	109	1470.	1736.	267.	99.5	734.	558.0
9C 9- 3	153	1024.	1452.	428.	385.0	641.	813.7
9G 1- 0	2	574.	581.	7.	1.5	562.	4.0
9G 3- 3	8	1163.	1194.	31.	3.5	808.	74.4
9G11- 0	171	639.	1138.	499.	557.0	560.	919.2
9J 5- 0	24	1502.	1717.	215.	80.0	1048.	210.7
9J 5-10	46	1638.	1918.	280.	87.0	873.	348.5
10D 6- 6	93	1503.	1849.	345.	144.0	827.	484.5
11E 7- 6	124	1480.	1876.	396.	137.0	736.	632.9
11E 9- 3	155	1056.	1338.	282.	380.0	645.	861.9
11E11- 0	172	649.	1000.	350.	555.0	501.	950.9
12D 4- 0	16	1258.	1327.	69.	31.5	818.	129.7
12D 6- 0	66	1560.	1854.	294.	97.5	936.	382.7
13G 6- 6	102	1536.	1830.	295.	89.5	854.	371.8

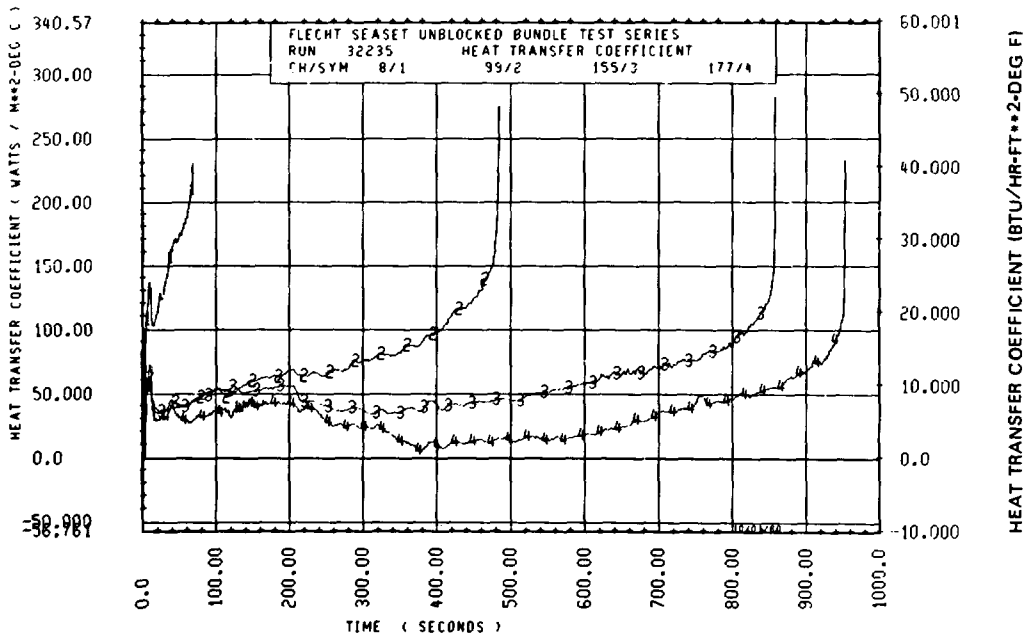

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

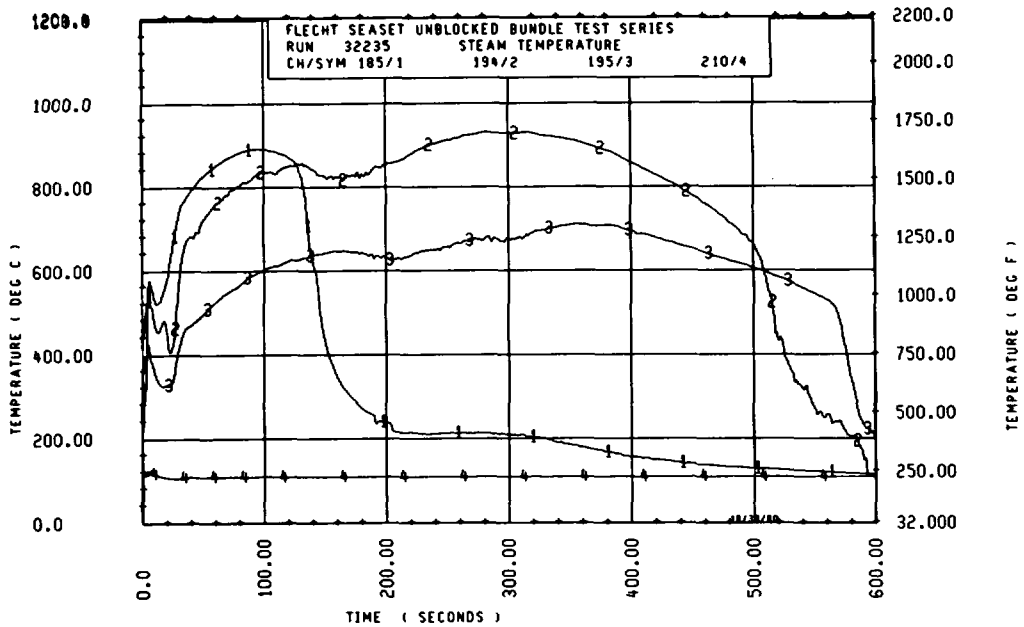

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-36.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

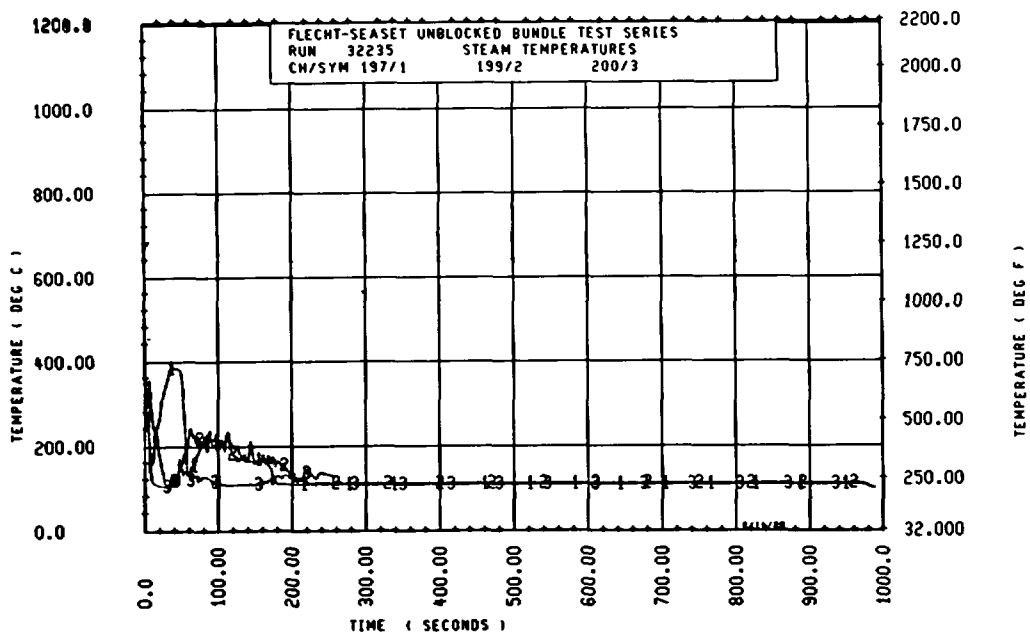

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

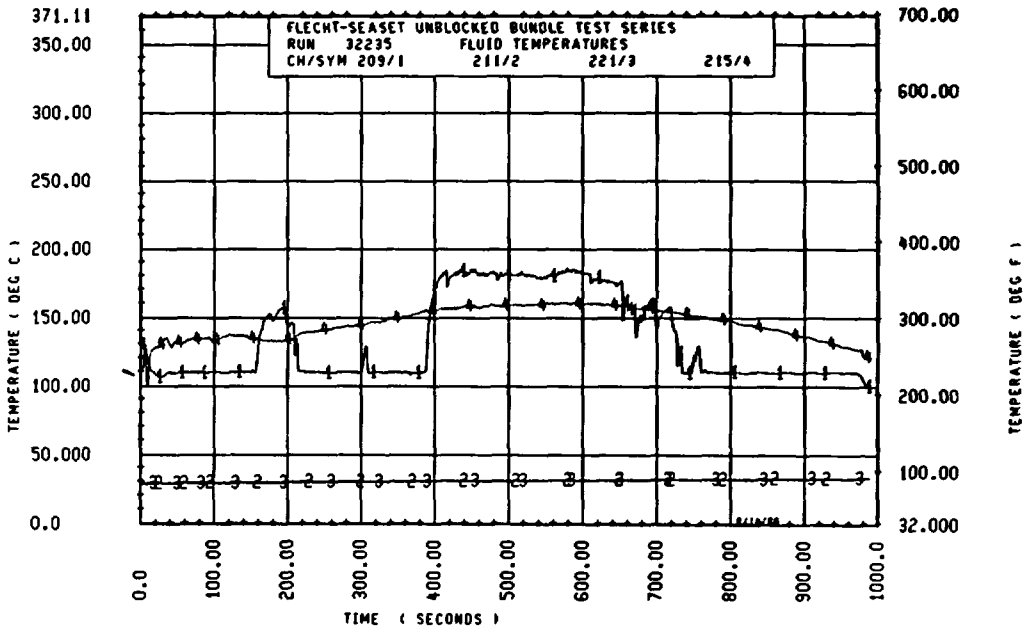

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

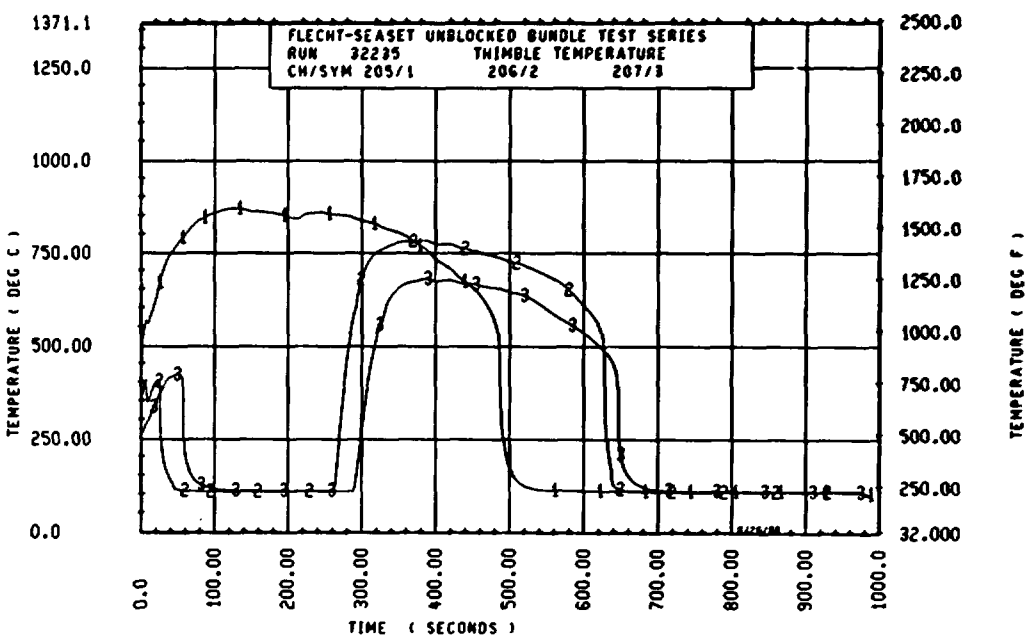

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

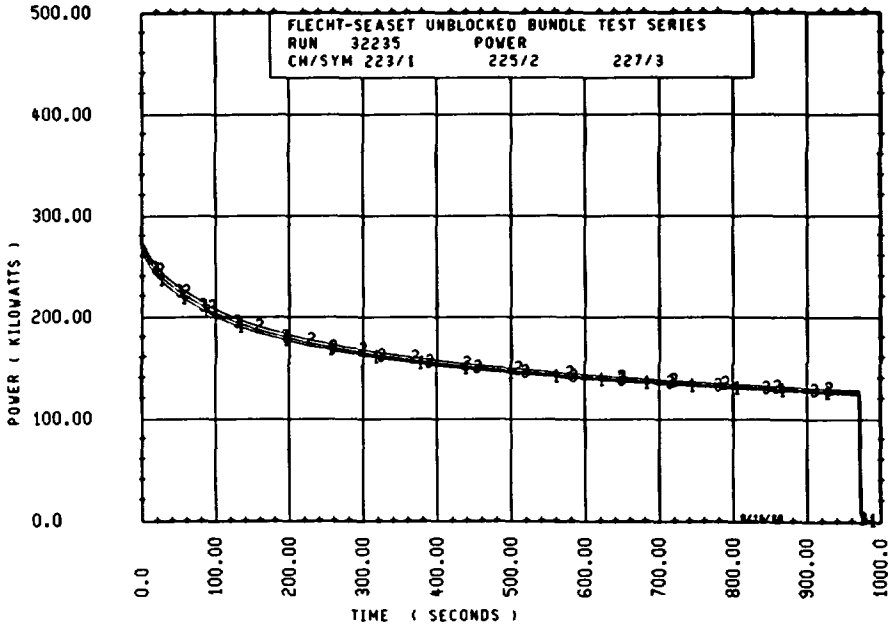

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

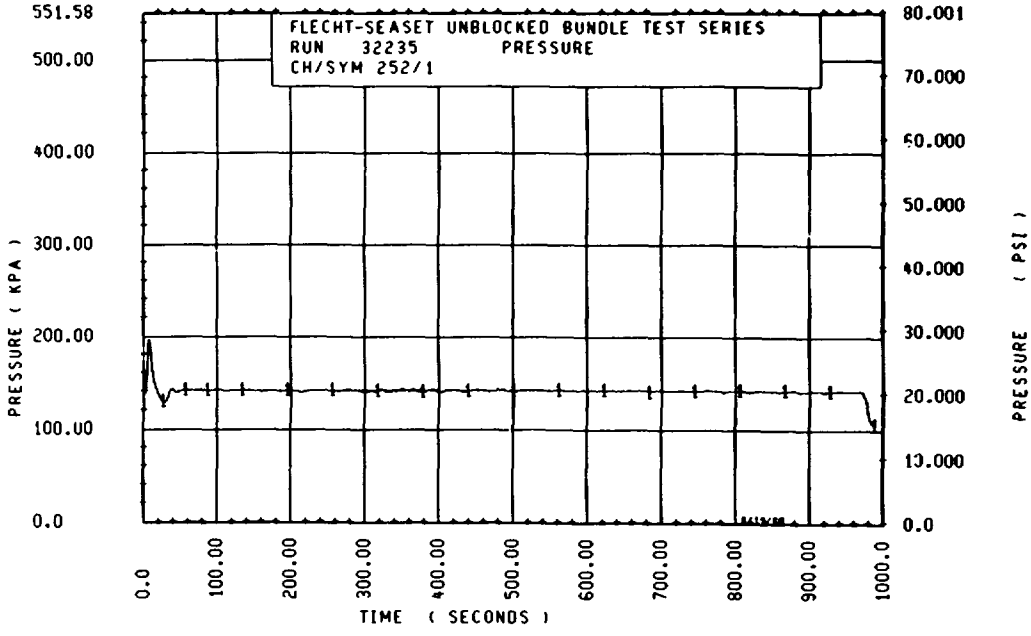

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

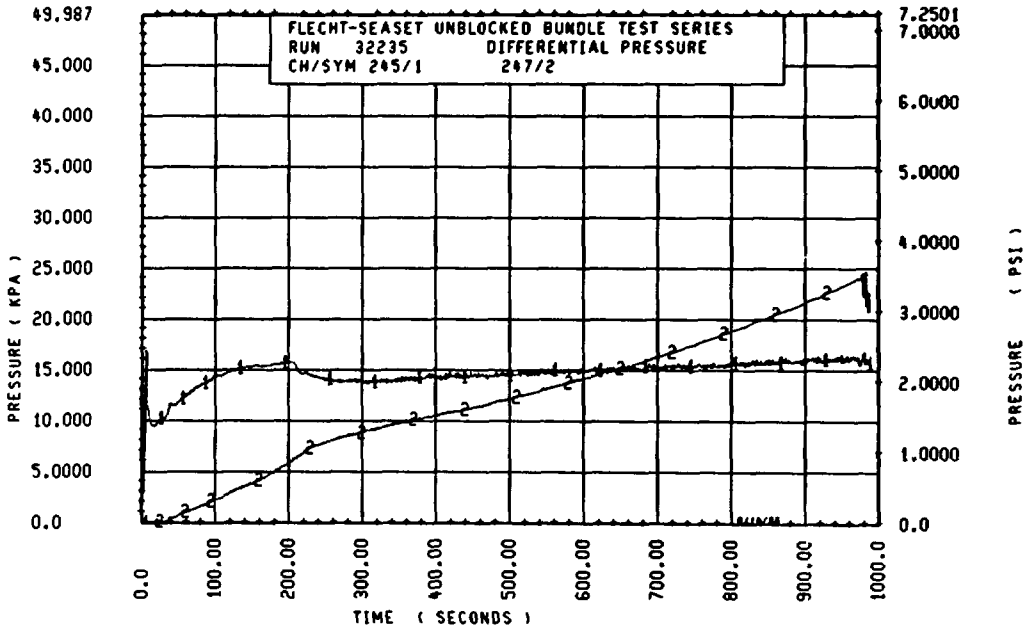


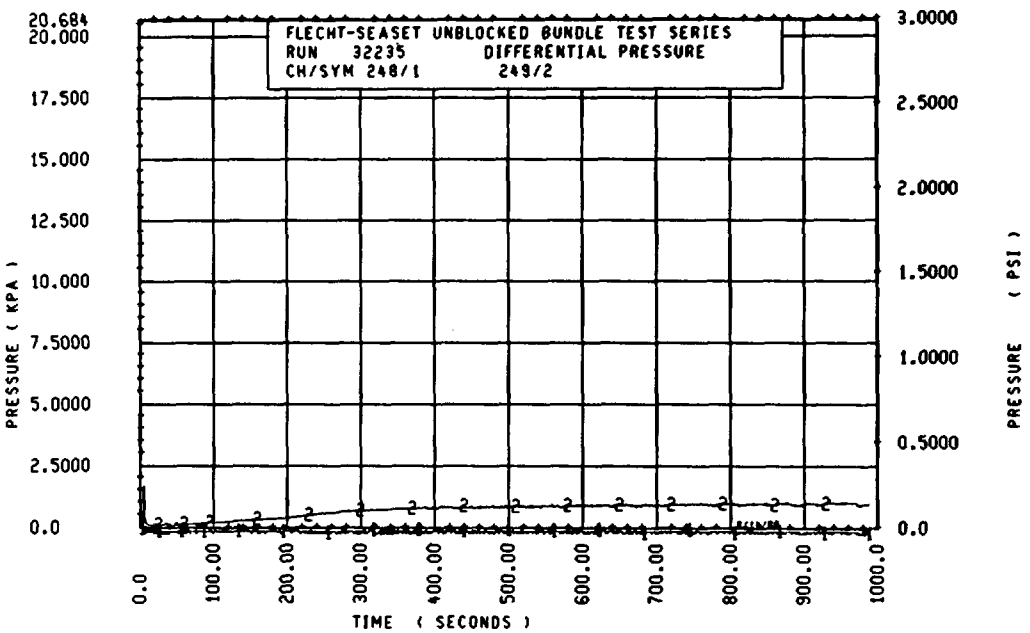


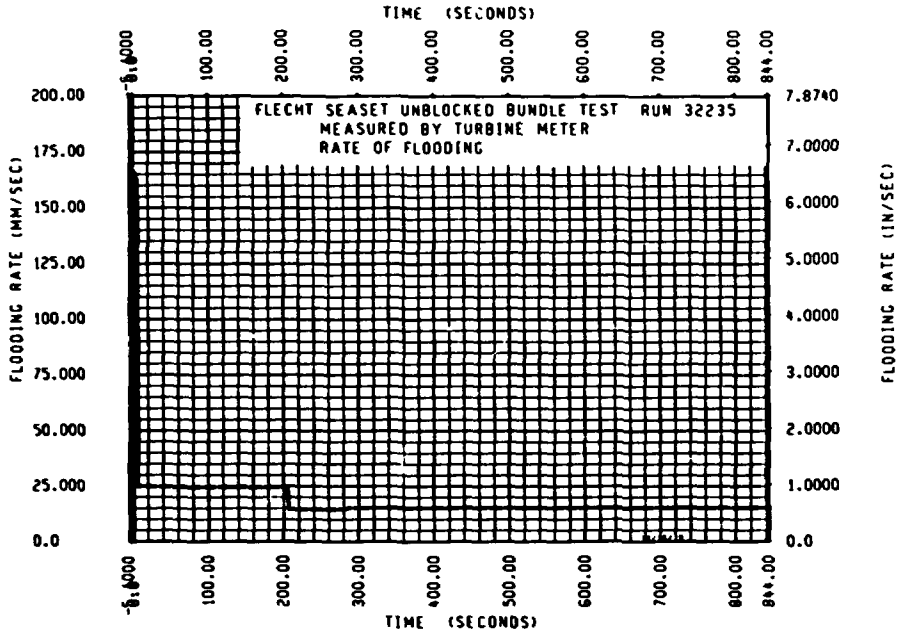
CH 205-7L, 2.44 m (96 in); CH 206-7L, 2.82 m (111 in.);
CH 207-4I, 3.05 m (120 in.)

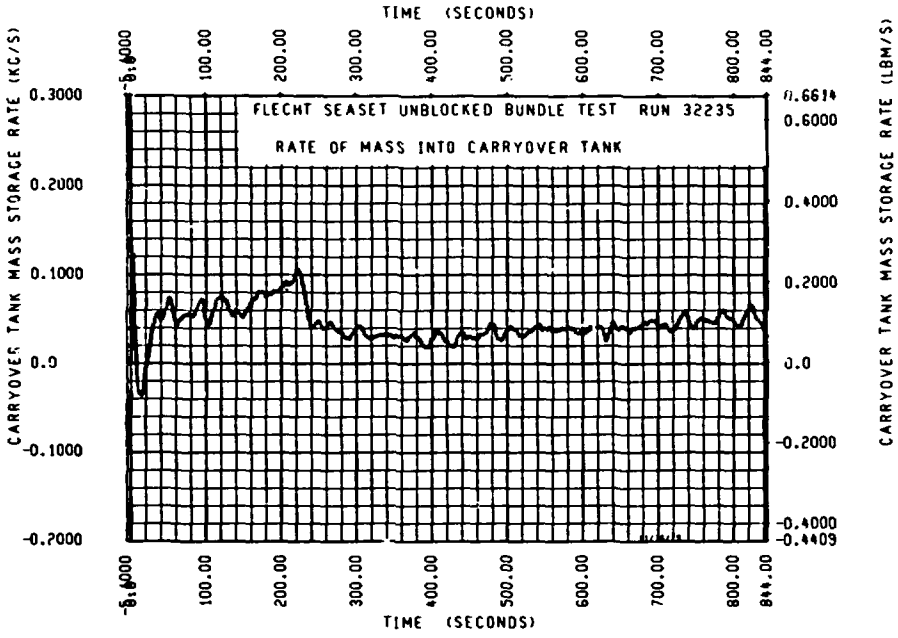

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0
TIME (SECONDS)

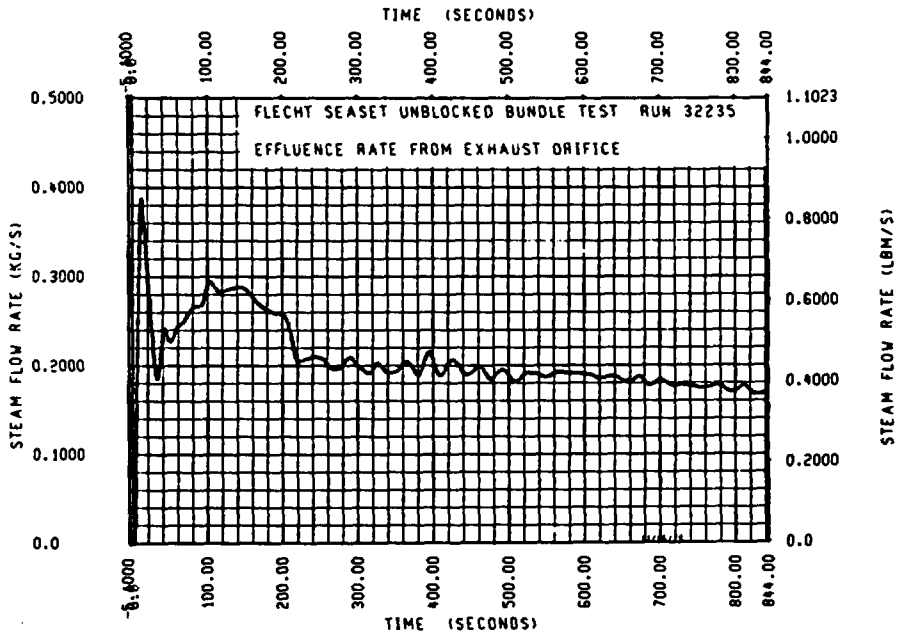

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0
TIME (SECONDS)

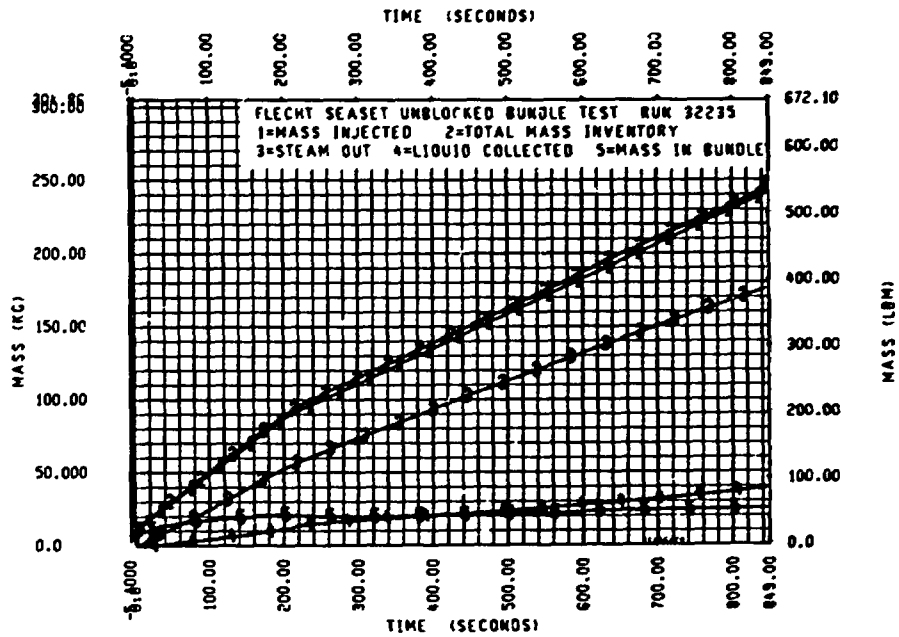

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

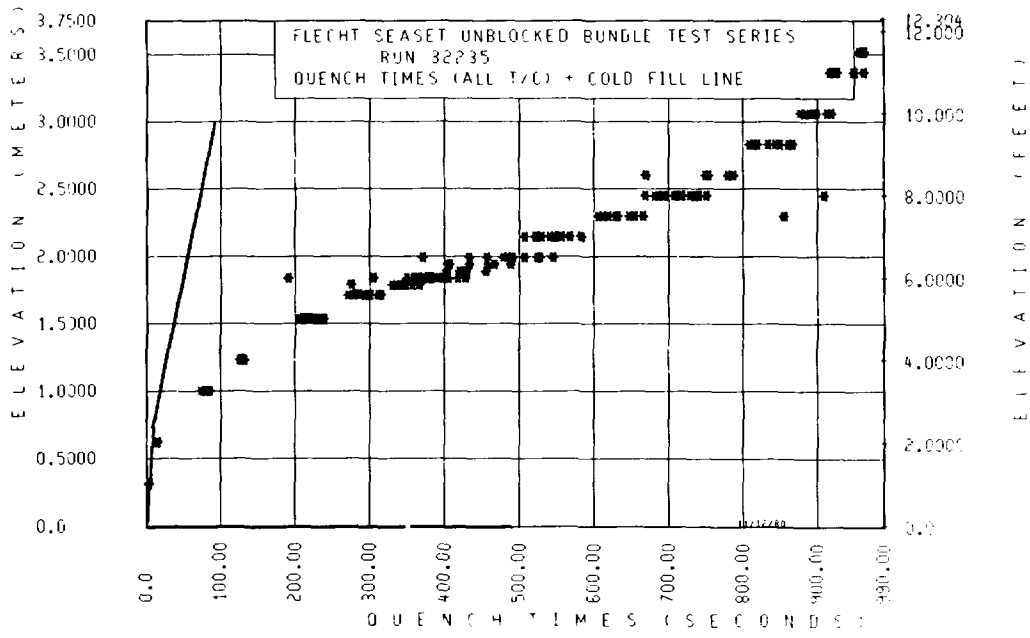

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

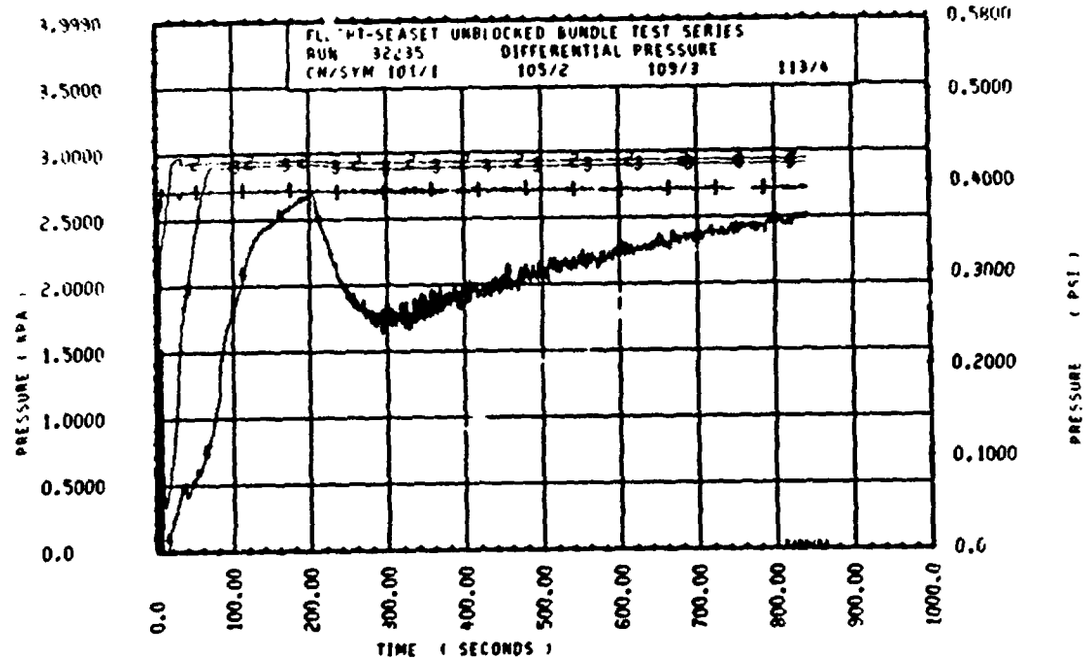

TIME (SECONDS)
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
844.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32235
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
200.00
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
FLOODING RATE (IN/SEC)
7.8740
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0

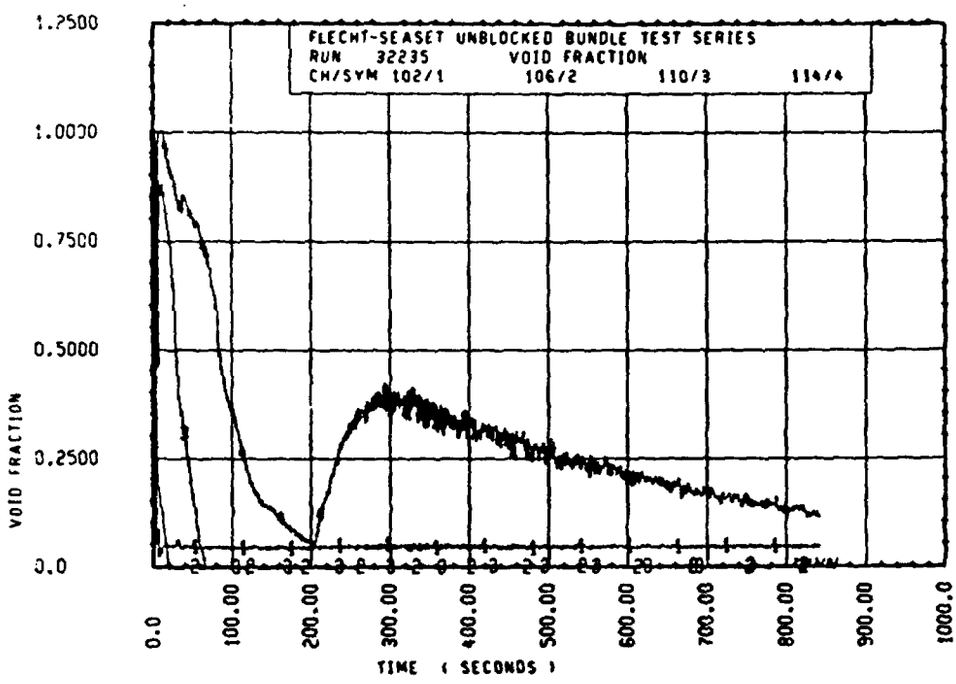

TIME (SECONDS)
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
844.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32235
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
0.3000
0.2000
0.1000
0.0
-0.1000
-0.2000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.6614
0.6000
0.4000
0.2000
0.0
-0.2000
-0.4000
-0.4409

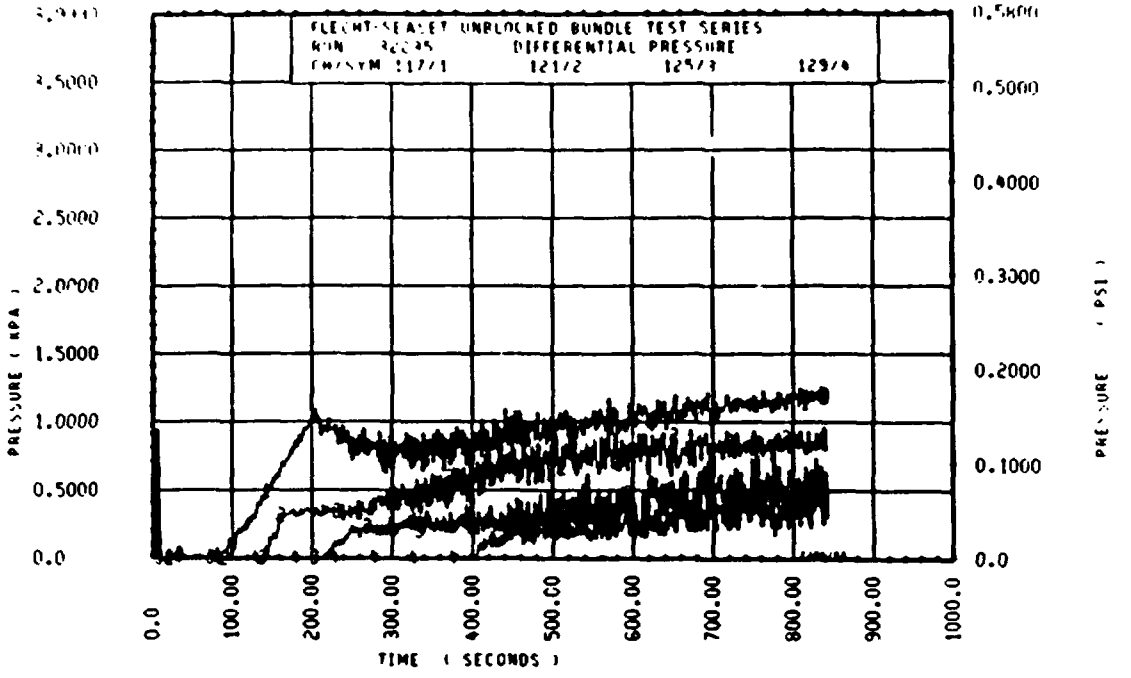

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32235
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
849.00

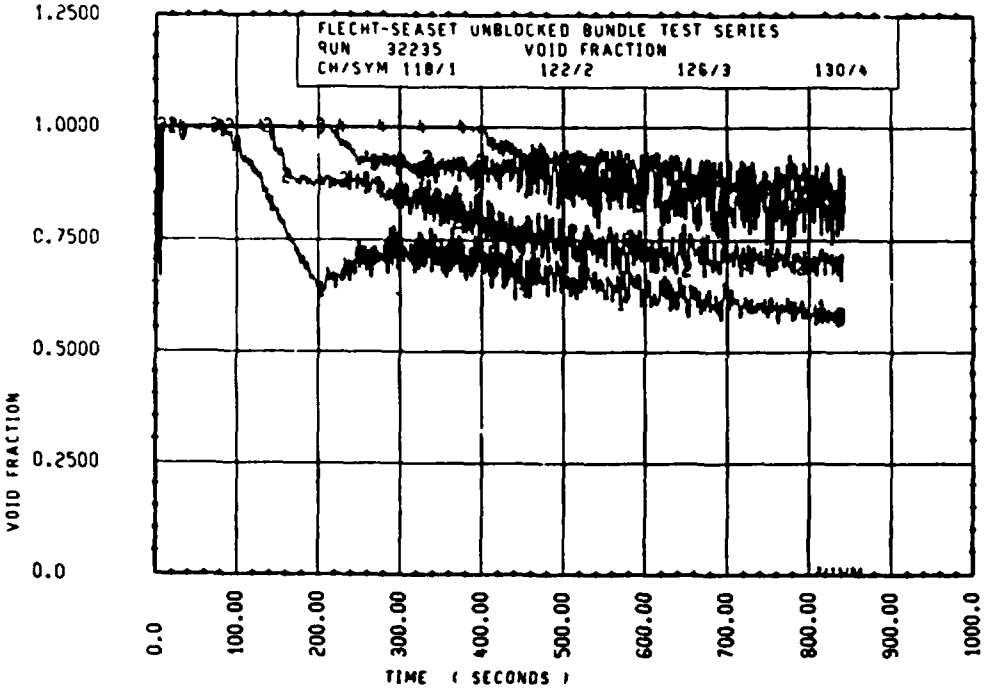

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32235
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
250.00
200.00
150.00
100.00
50.000
0.0
672.10
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
849.00

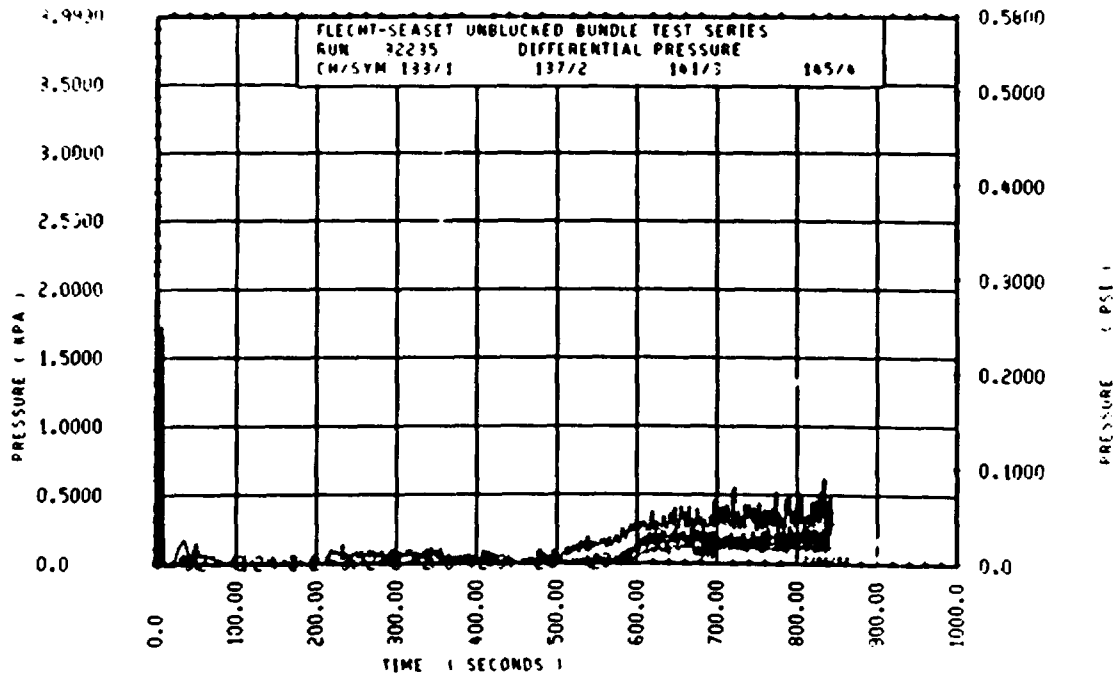

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.000
10.000
8.0000
6.0000
4.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
QUENCH TIMES (SECONDS)

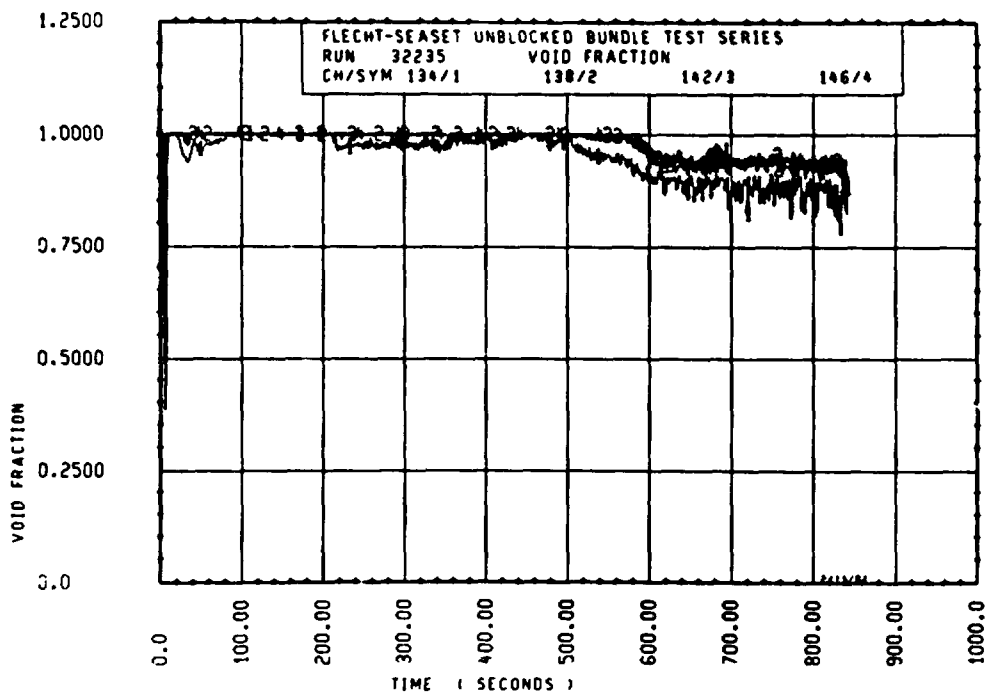

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (MPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32235 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 32333

Date: 5/8/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	889°C (1631°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	162 mm/sec (6.36 in./sec) (5 sec) 21 mm/sec (0.82 in/sec) (onward)
Coolant temperature	53°C (125°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	133°C (271°F)	86°C (186°F)
1.22 m (48 in.)	153°C (307°F)	135°C (275°F)
1.83 m (72 in.)	174°C-203°C (346°F-398°F)	136°C (276°F)
2.44 m (96 in.)	148°C-162°C (298°F-324°F)	138°C-642°C (281°F-1187°F)
2.74 m (108 in.)	142°C-152°C (288°F-305°F)	133°C-461°C (271°F-861°F)
3.05 m (120 in.)	137°C-143°C (279°F-289°F)	133°C-382°C (272°F-719°F)
3.35 m (132 in.)	132°C-139°C (270°F-282°F)	132°C (270°F)

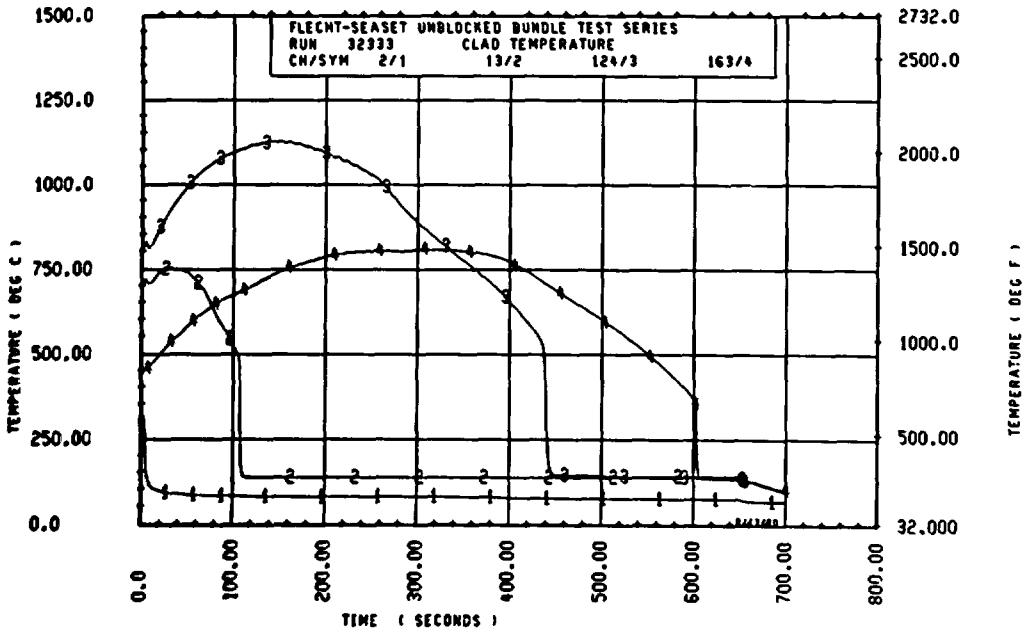
*At 274 seconds after flood

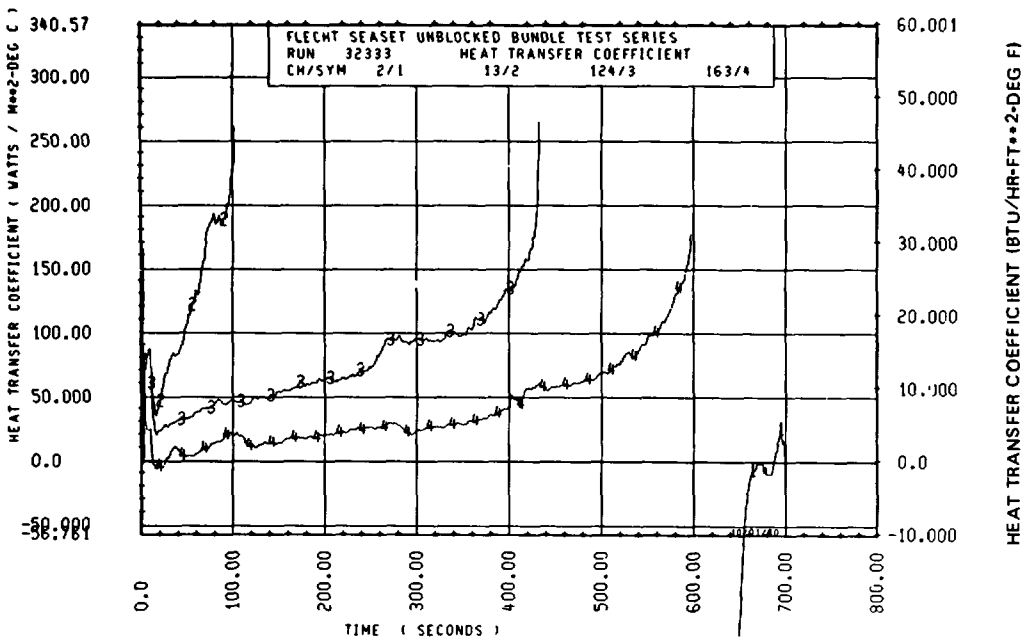
C. Comments

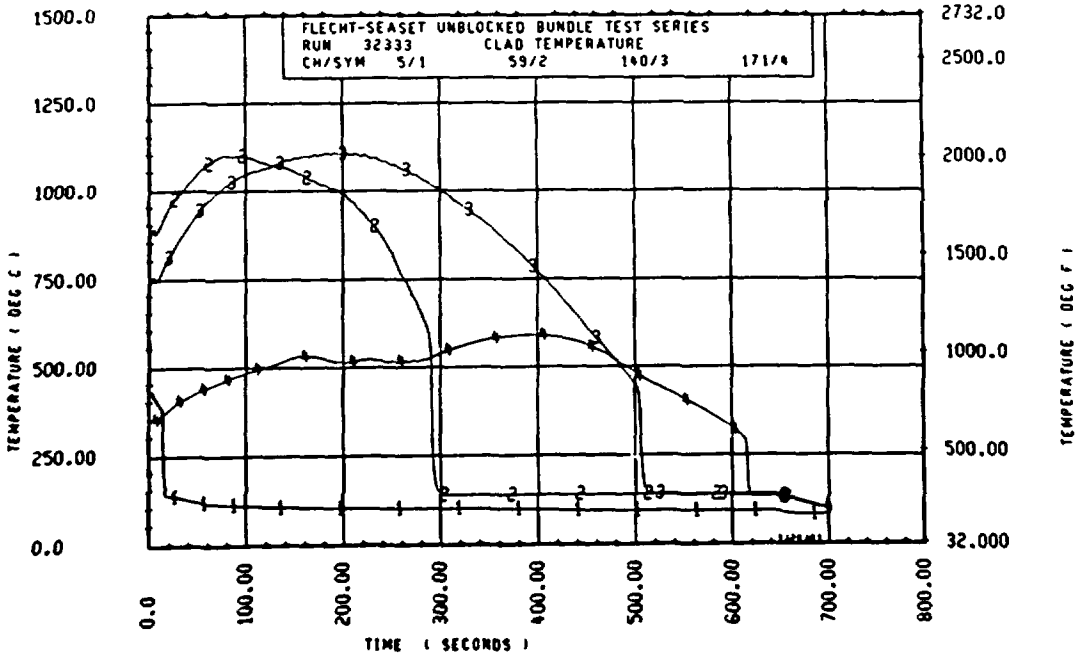
None

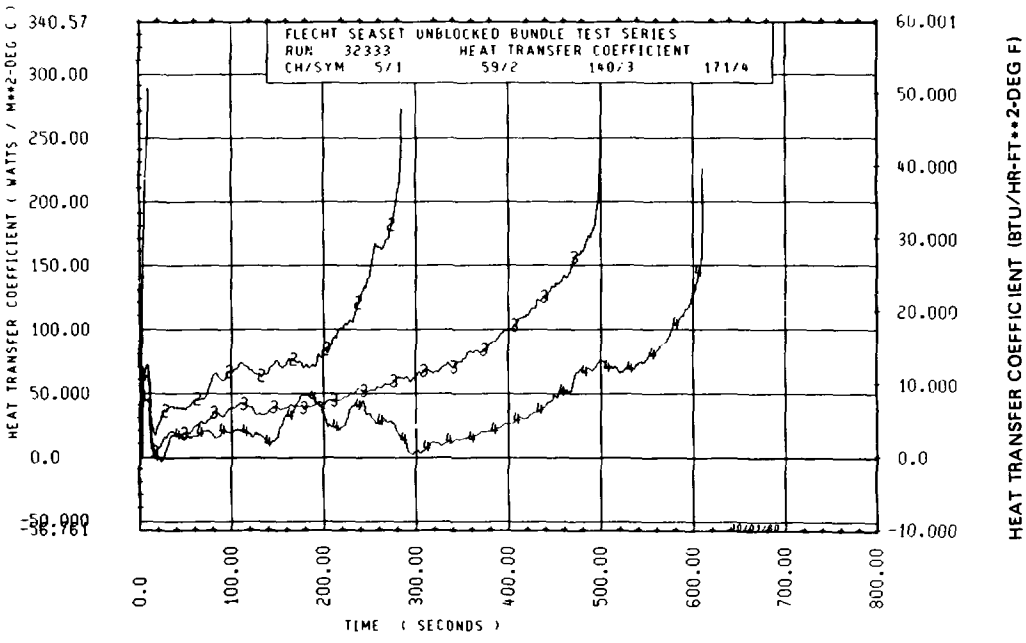
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 32333

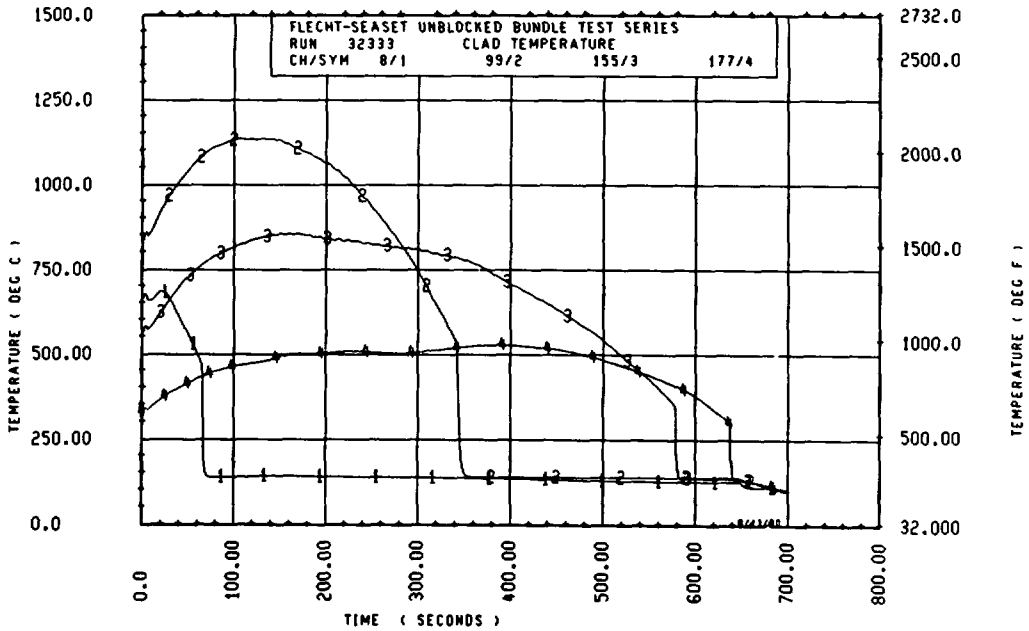
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1261.	1373.	112.	32.0	901.	103.8
2H 6- 0	50	1555.	1881.	326.	79.5	1039.	278.6
3C 5- 0	17	1338.	1468.	130.	46.0	867.	185.9
3C 5- 7	28	1438.	1583.	145.	53.0	892.	231.7
4L 8- 0	129	1309.	1837.	528.	130.0	837.	468.1
4L 8- 6	147	1311.	1828.	517.	130.0	846.	468.5
5E11- 0	168	663.	1243.	581.	329.0	575.	621.1
5J 4- 0	12	1239.	1358.	119.	35.5	867.	109.0
5J 8- 6	146	1115.	1821.	706.	204.0	702.	524.9
5J11- 6	175	632.	1158.	526.	341.0	537.	639.0
7B 6- 0	57	1489.	1724.	236.	62.0	971.	227.8
7E 8- 6	142	1114.	1621.	507.	151.0	668.	541.8
7B10- 0	162	826.	1464.	638.	255.0	627.	604.9
7B11- 6	176	647.	1135.	488.	374.0	564.	634.0
7D 6- 4	84	1616.	1991.	375.	93.5	927.	288.6
7D 7- 6	119	1455.	1989.	534.	128.0	830.	430.0
7D 9- 3	151	1012.	1692.	679.	223.0	668.	570.0
7G 5- 0	23	1497.	1707.	210.	60.5	1007.	177.9
7J 6- 0	59	1587.	2016.	428.	78.5	1048.	289.7
7M 7- 6	120	1457.	1942.	485.	118.0	816.	449.7
7M 8- 0	132	1314.	1925.	610.	151.0	786.	494.8
7M 9- 3	152	1010.	1733.	723.	245.0	726.	563.0
8H 4- 0	13	1291.	1389.	97.	29.5	909.	106.9
8H10- 0	163	827.	1488.	661.	308.0	677.	602.0
8H11- 6	177	628.	983.	355.	386.0	569.	637.0
8K 4- 0	14	1259.	1362.	104.	33.0	890.	104.9
8K 6- 6	99	1518.	2076.	559.	106.0	946.	342.3
8K 8- 0	140	1352.	2027.	675.	192.0	786.	504.7
8K10- 0	164	830.	1540.	710.	308.0	662.	610.4
8N 2- 0	5	799.	815.	16.	3.0	719.	14.4
8N 4- 0	15	1271.	1395.	124.	37.0	915.	103.0
8N 6- 0	61	1541.	1958.	416.	78.0	1136.	267.7
8N10- 0	165	827.	1582.	755.	255.0	684.	596.0
9C 7- 0	109	1445.	1906.	461.	111.0	760.	383.0
9C 9- 3	153	1025.	1670.	645.	183.0	675.	564.3
9G 1- 0	2	598.	606.	7.	1.5	576.	4.4
9G 3- 3	8	1225.	1270.	45.	20.5	871.	65.9
9G11- 0	171	656.	1094.	438.	386.0	557.	614.8
9I 5- 0	24	1511.	1746.	235.	60.5	996.	180.7
9I 5-10	46	1640.	1982.	342.	78.5	977.	256.8
10D 6- 6	93	1497.	1913.	417.	129.0	882.	334.7
11E 7- 6	124	1478.	2063.	586.	151.0	909.	437.8
11E 9- 3	155	1047.	1572.	525.	160.0	661.	578.0
11E11- 0	172	669.	1089.	420.	365.0	545.	618.0
12D 4- 0	16	1284.	1384.	100.	30.5	900.	105.0
12D 6- 0	66	1570.	1903.	333.	90.5	966.	273.9
13G 6- 6	102	1540.	1910.	370.	90.0	945.	273.8

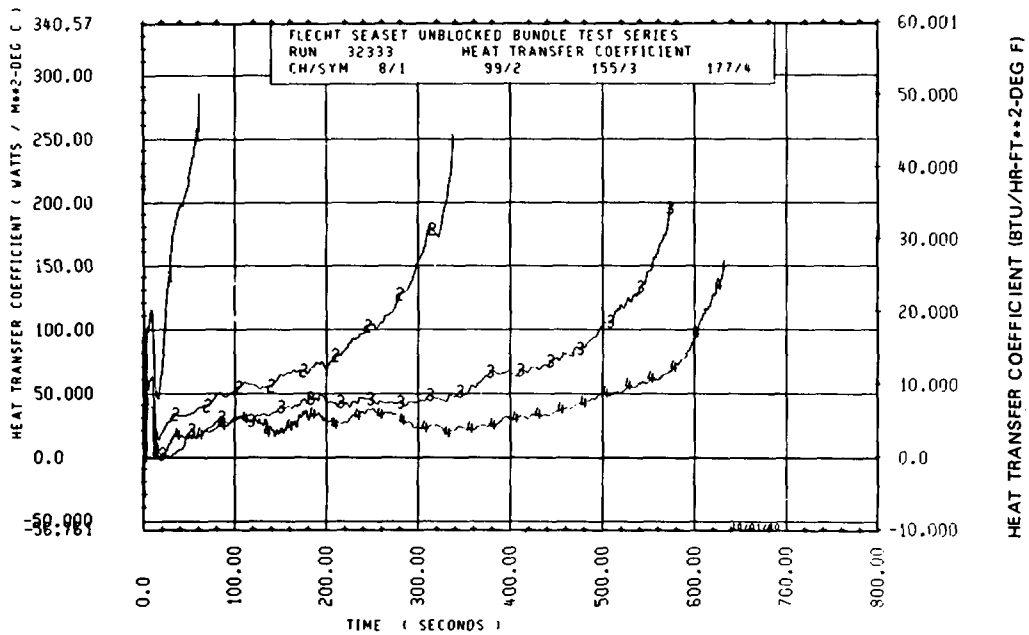

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

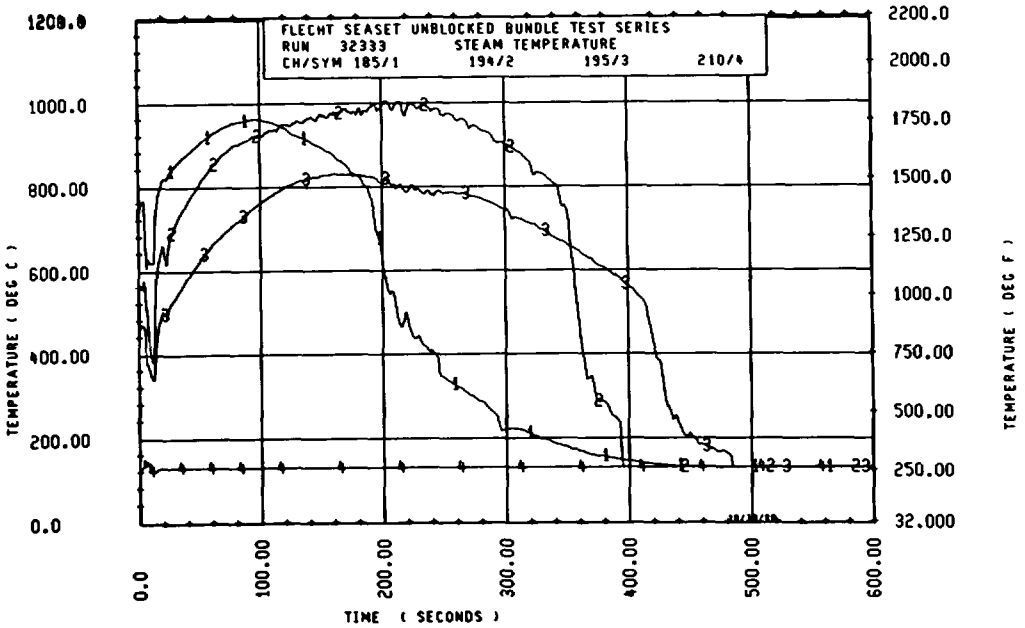

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

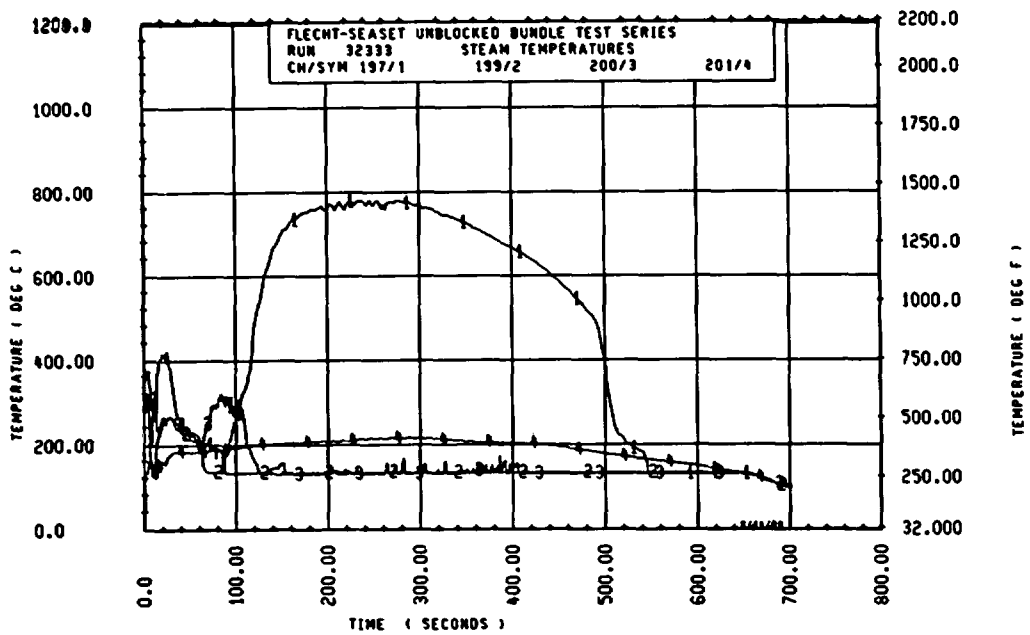

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

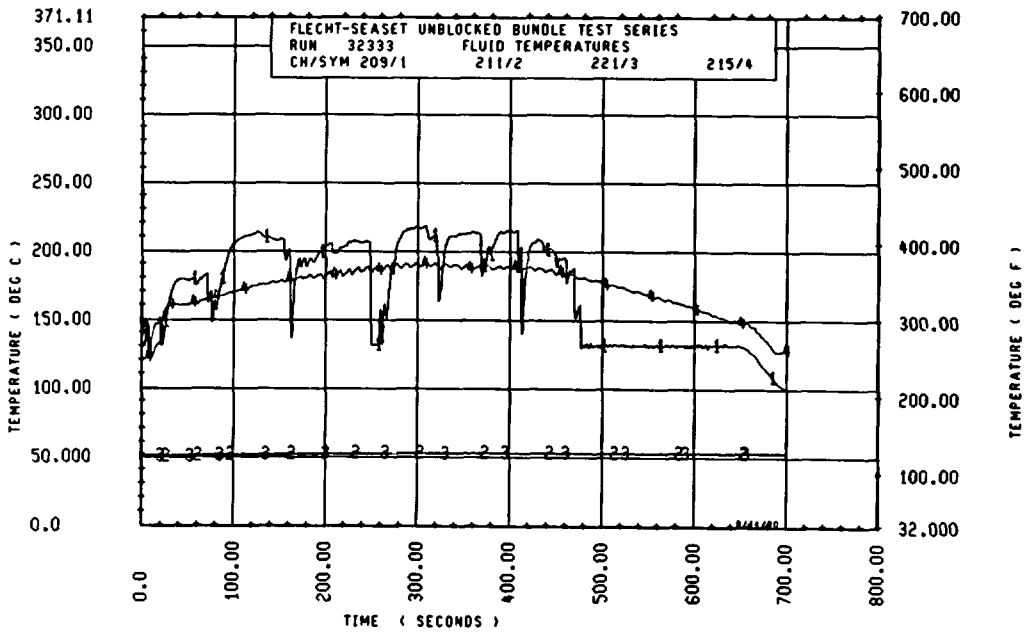

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

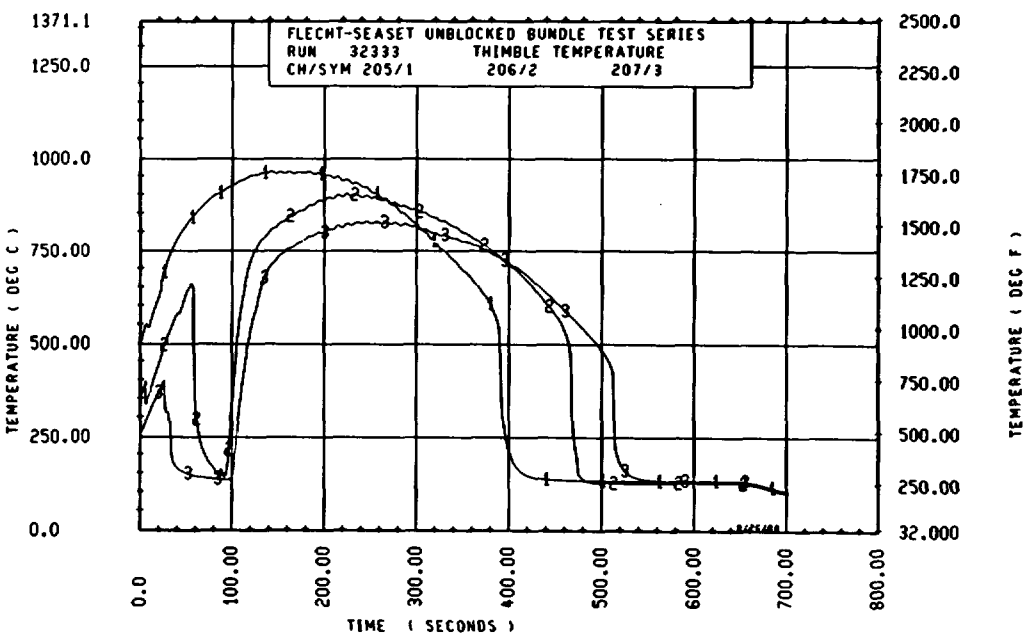

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

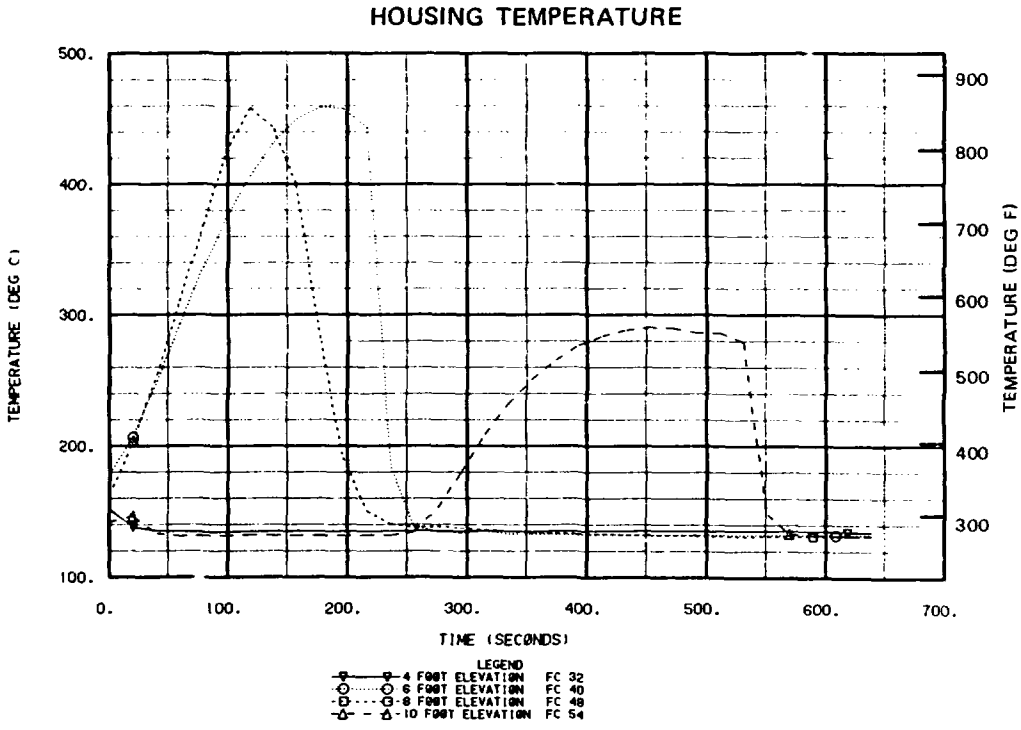

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

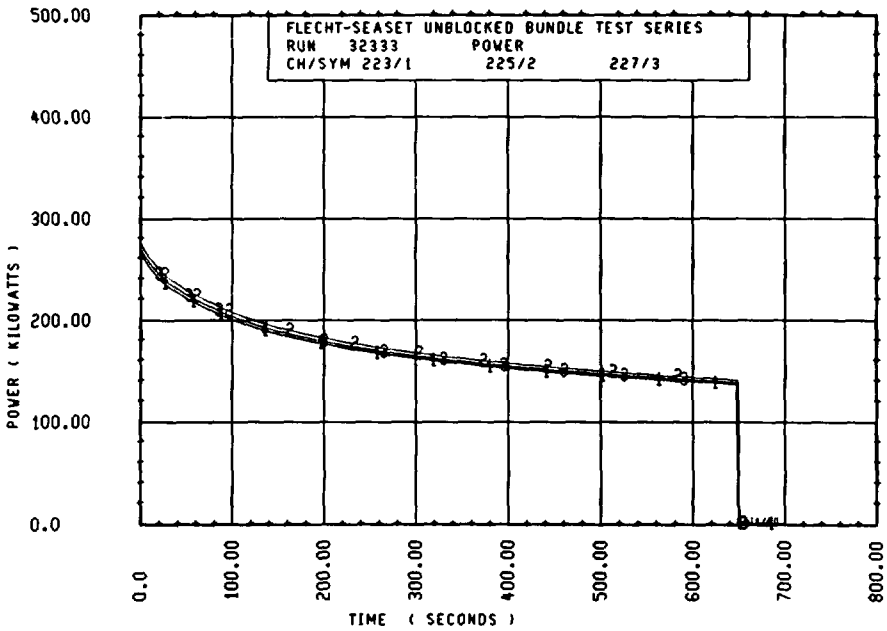

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

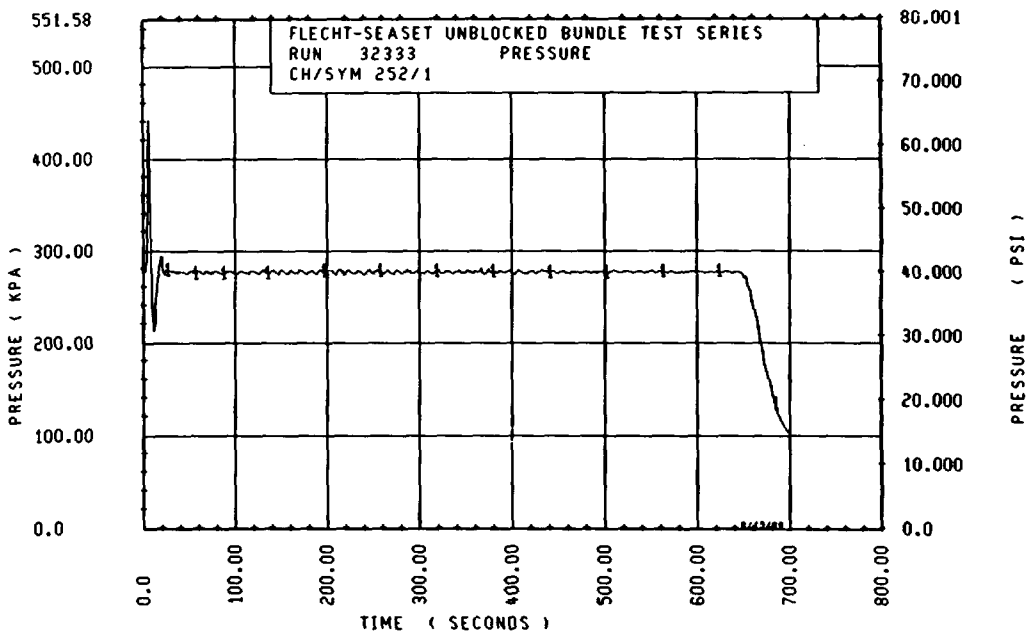


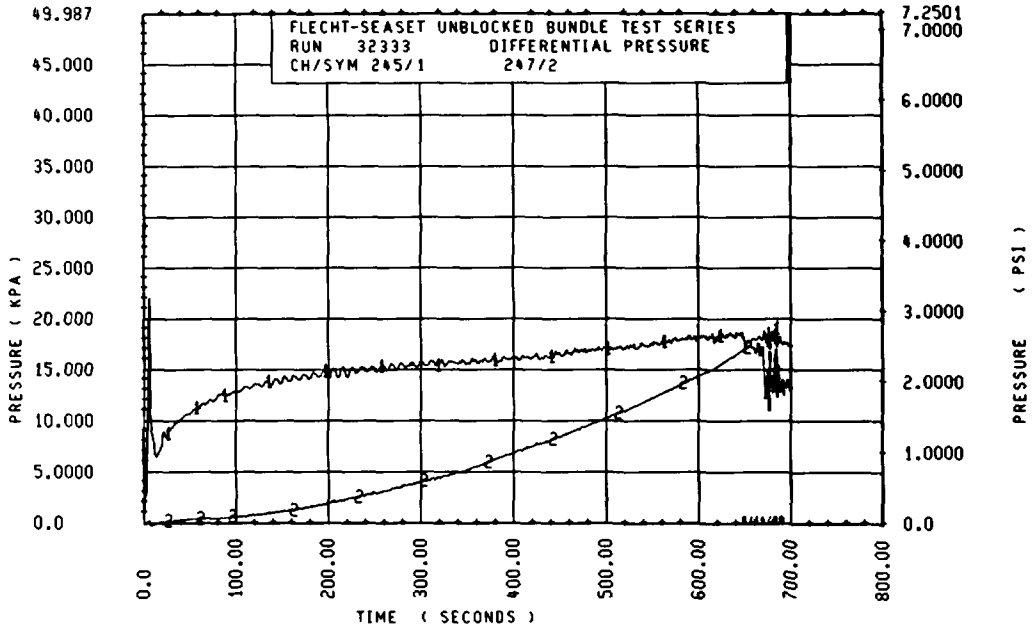


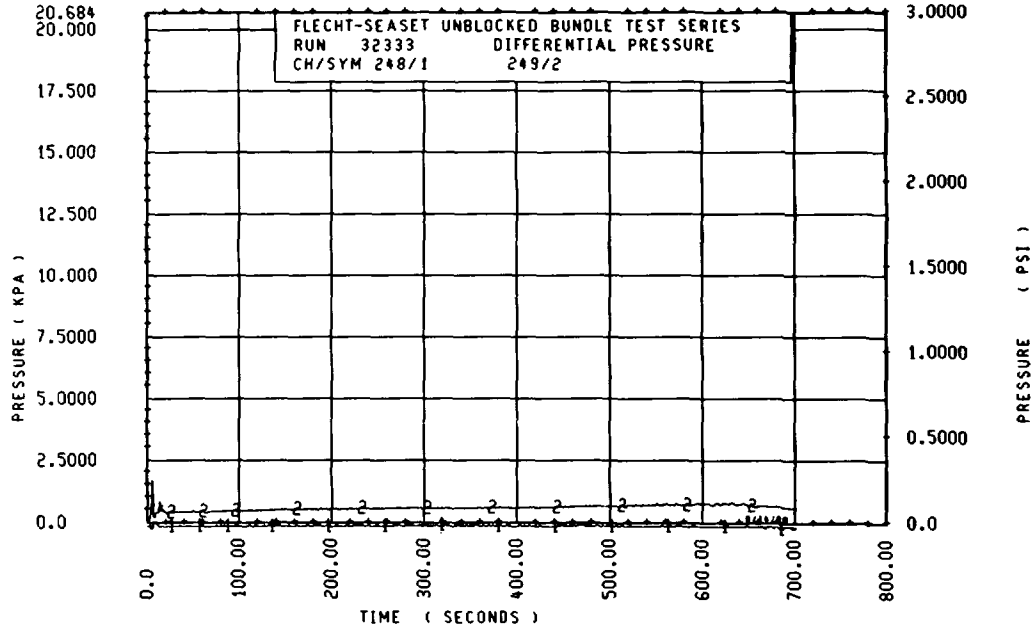
CH 205-7L, 2.44 m (96 in); CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

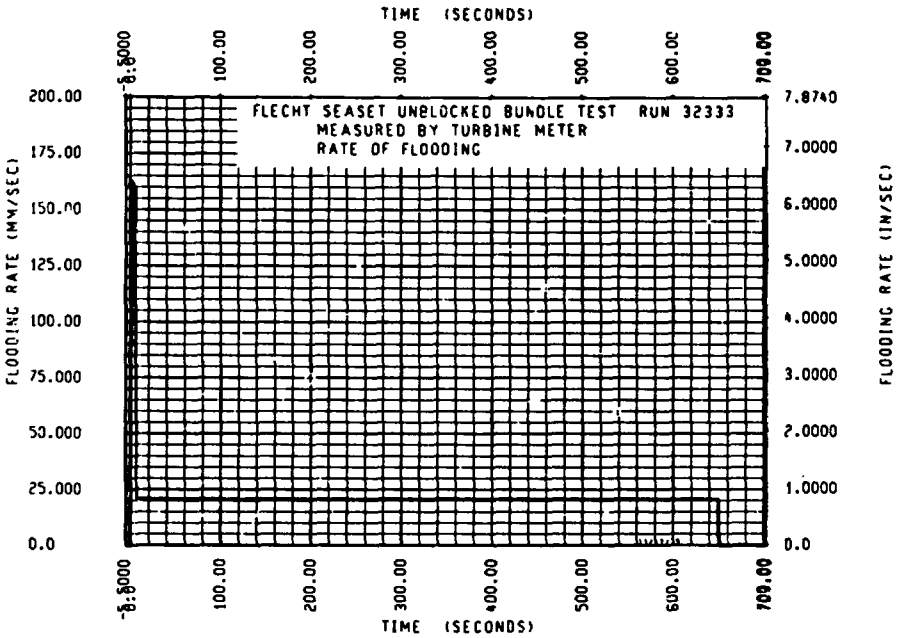

HOUSING TEMPERATURE
TEMPERATURE (DEG C)
500.
400.
300.
200.
100.
TEMPERATURE (DEG F)
900
800
700
600
500
400
300
0.
100.
200.
300.
400.
500.
600.
700.
TIME (SECONDS)
LEGEND
4 FOOT ELEVATION FC 32
6 FOOT ELEVATION FC 40
8 FOOT ELEVATION FC 48
10 FOOT ELEVATION FC 54

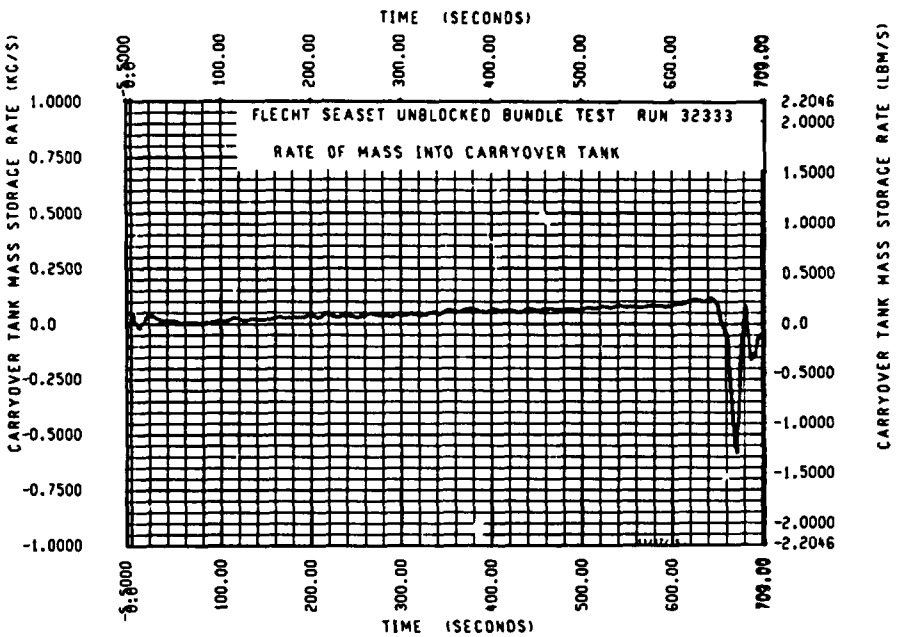

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

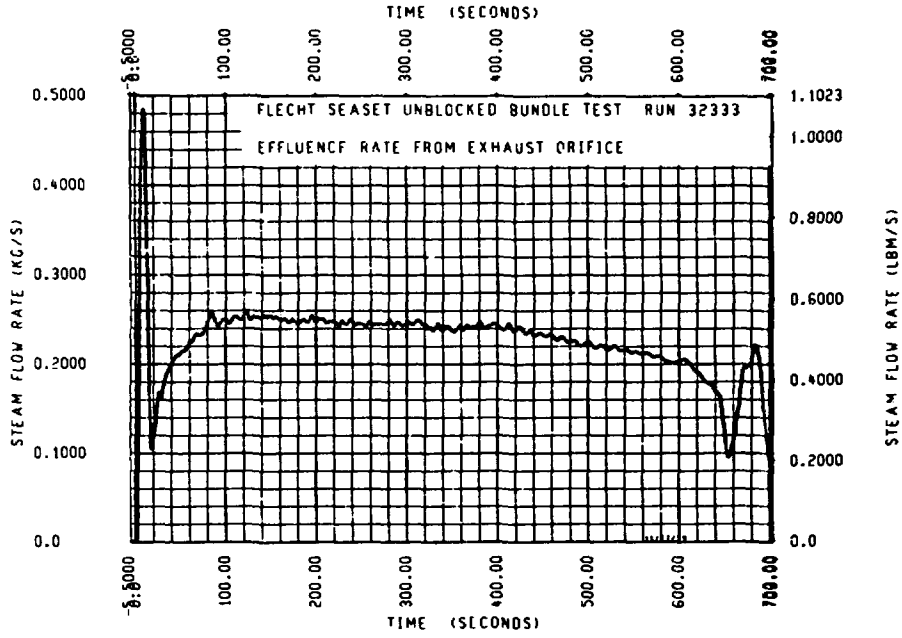

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

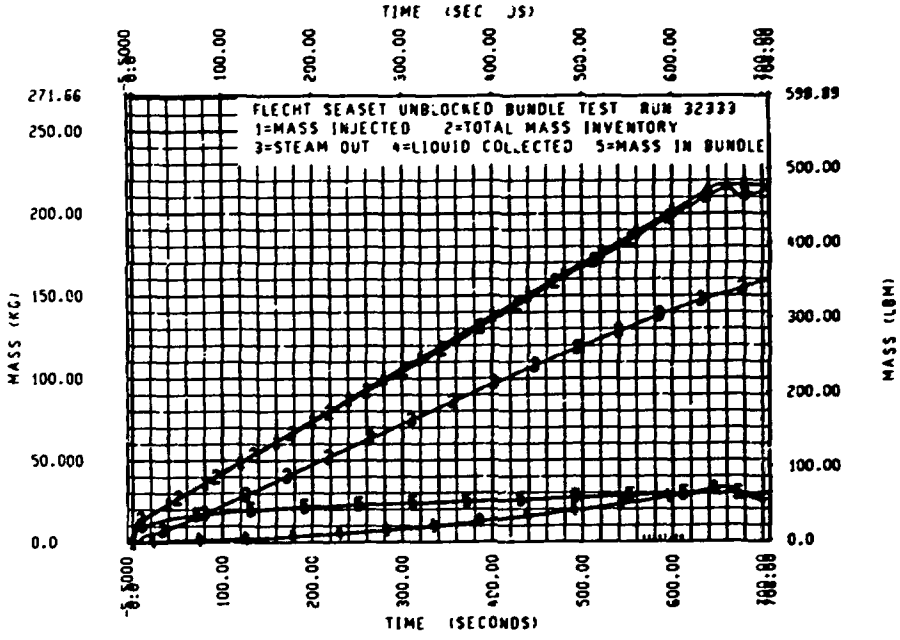

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

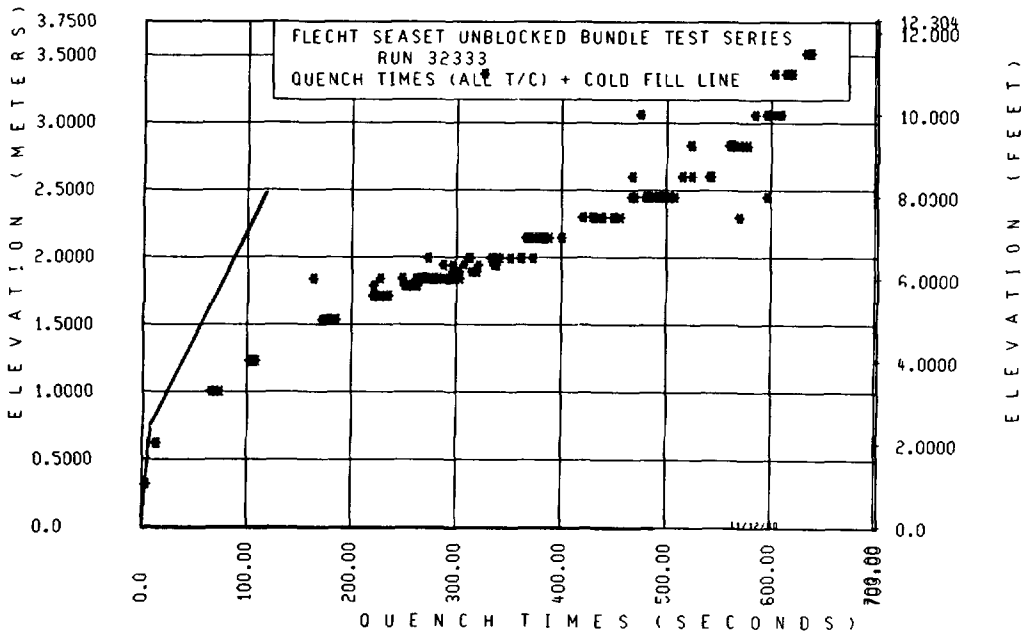

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

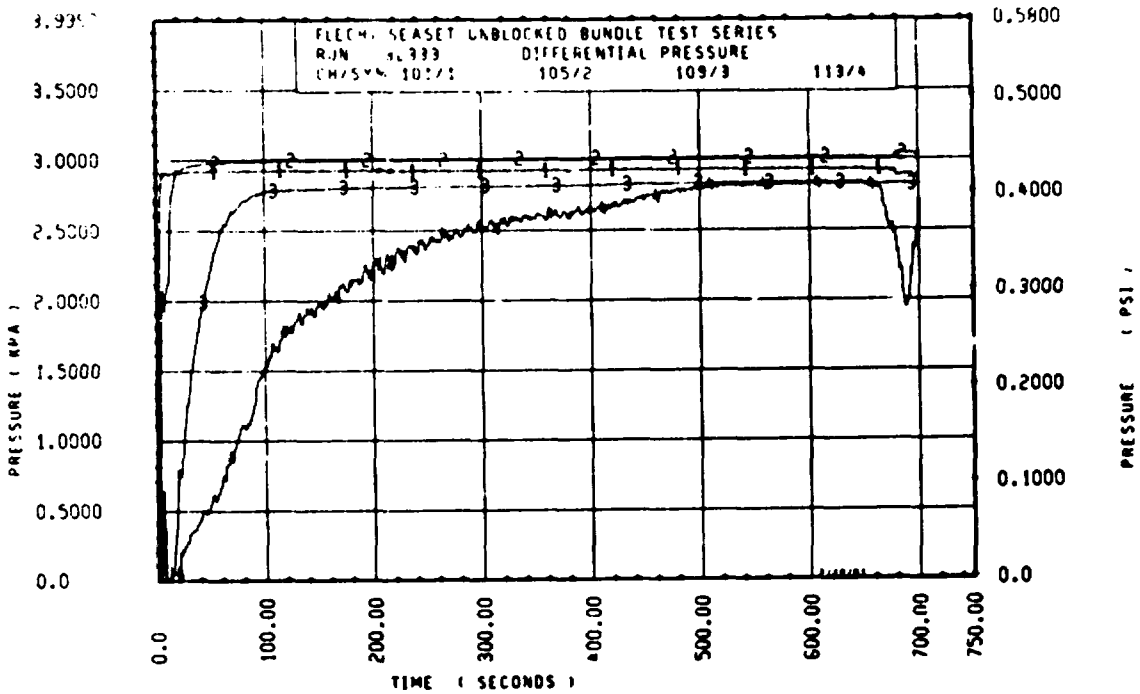

TIME (SECONDS)
-8.5000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32333
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
200.00
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
FLOODING RATE (IN/SEC)
7.8740
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0

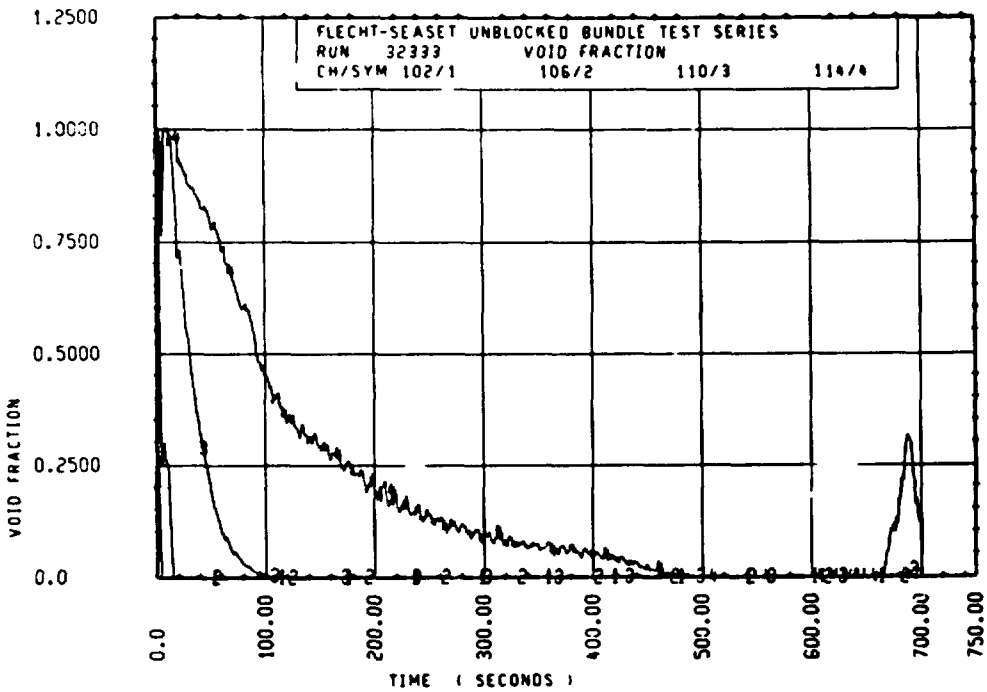

TIME (SECONDS)
-8.5000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32333
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
1.0000
0.7500
0.5000
0.2500
0.0
-0.2500
-0.5000
-0.7500
-1.0000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
2.2046
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
-2.2046

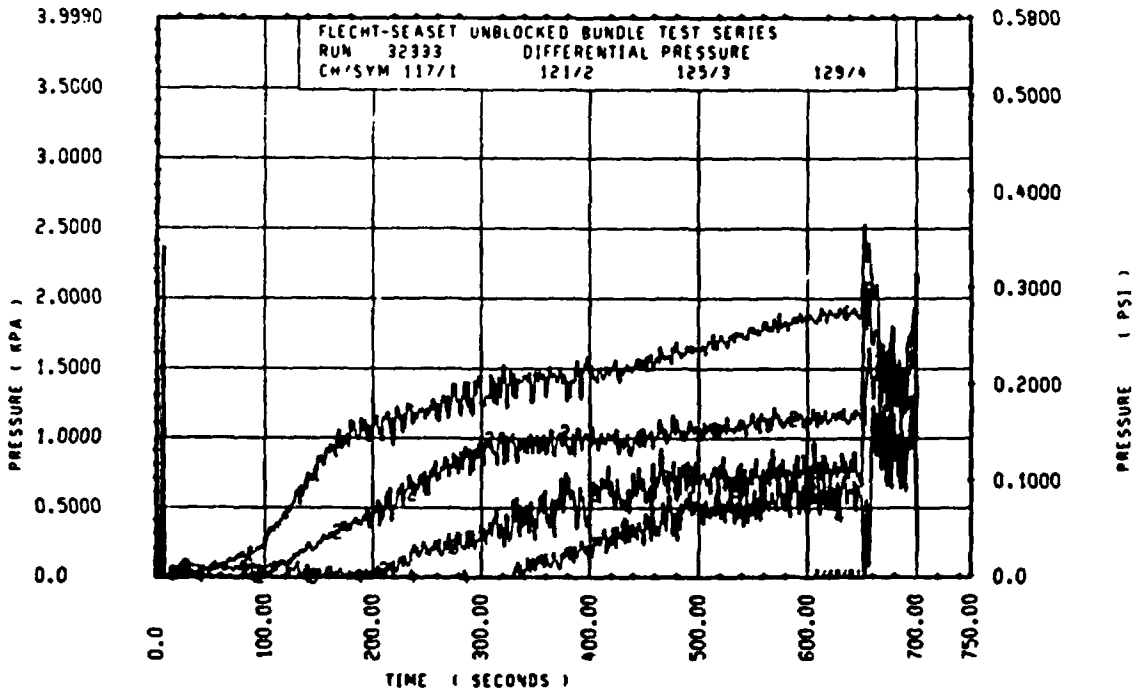

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32333
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00

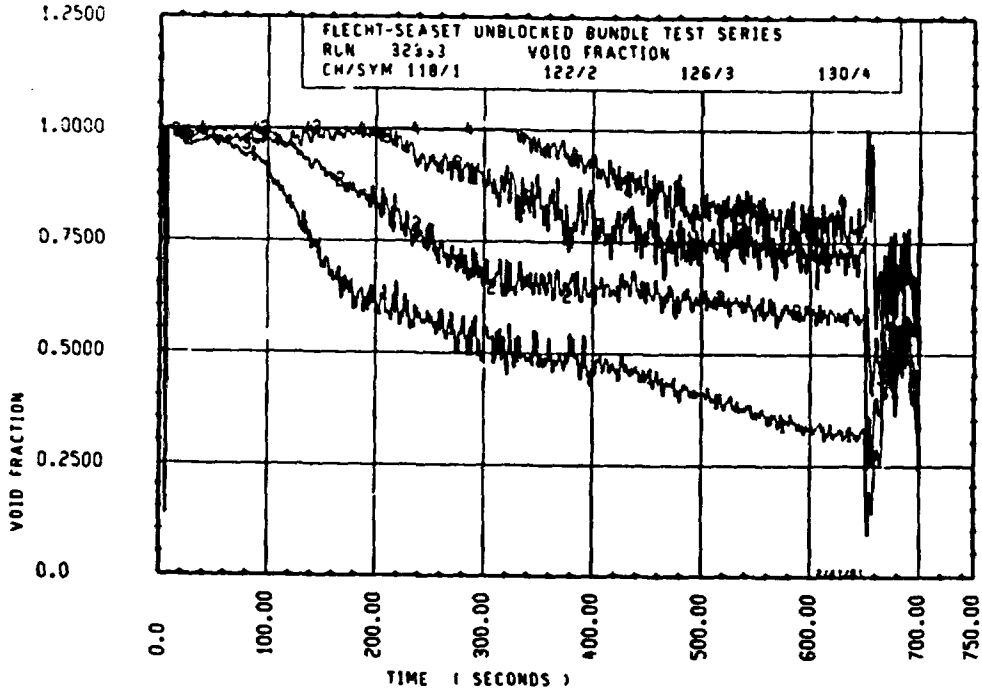

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 32333
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
271.66
250.00
200.00
150.00
100.00
50.000
0.0
598.89
500.00
400.00
300.00
200.00
100.00
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00

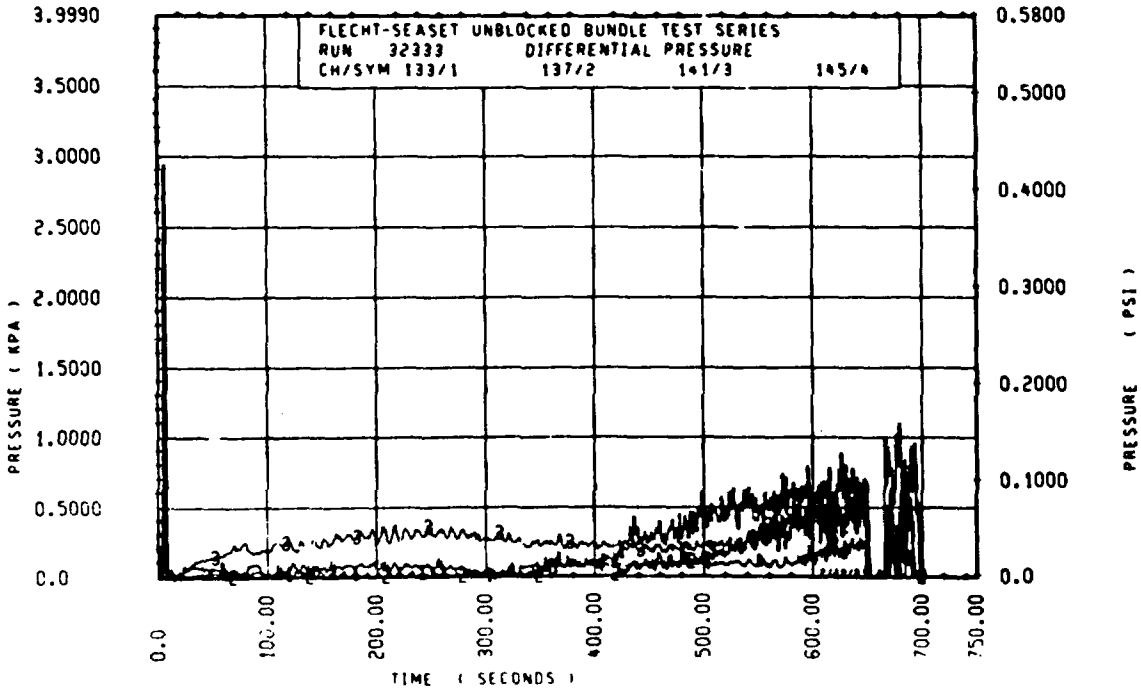

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
QUENCH TIMES (SECONDS)

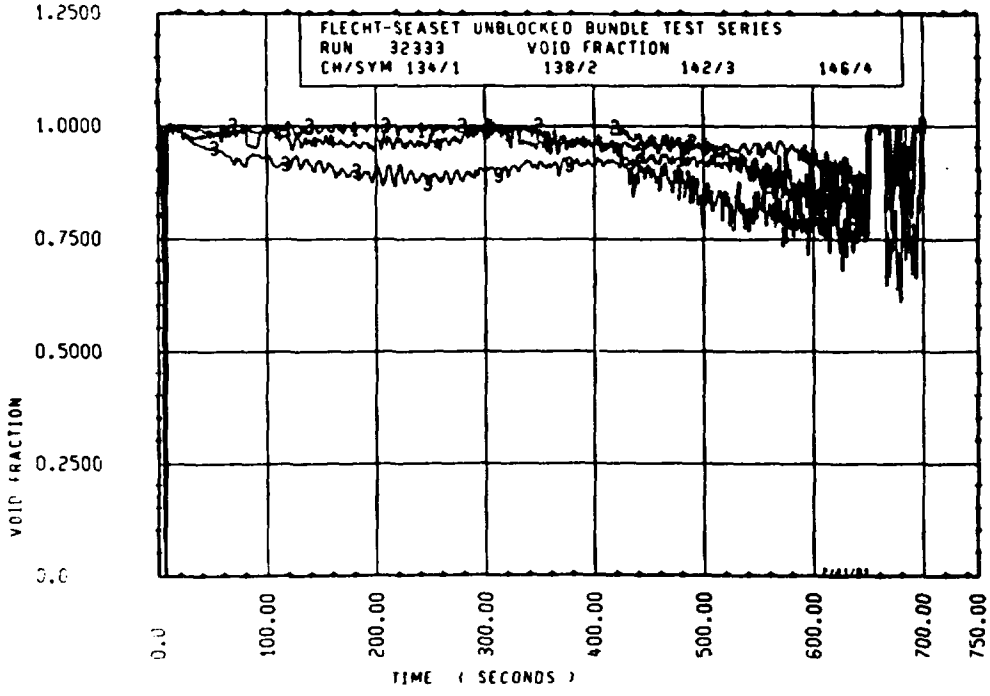

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 DIFFERENTIAL PRESSURE
CH/SYM 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
750.00
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.5000
0.4000
0.3000
0.2000
0.1000


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
750.00
1.2500
1.0000
0.7500
0.5000
0.2500


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
750.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
750.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
750.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32333 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
750.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 32452

Date: 5/11/79

Steam Cooling Test

A. Run Conditions

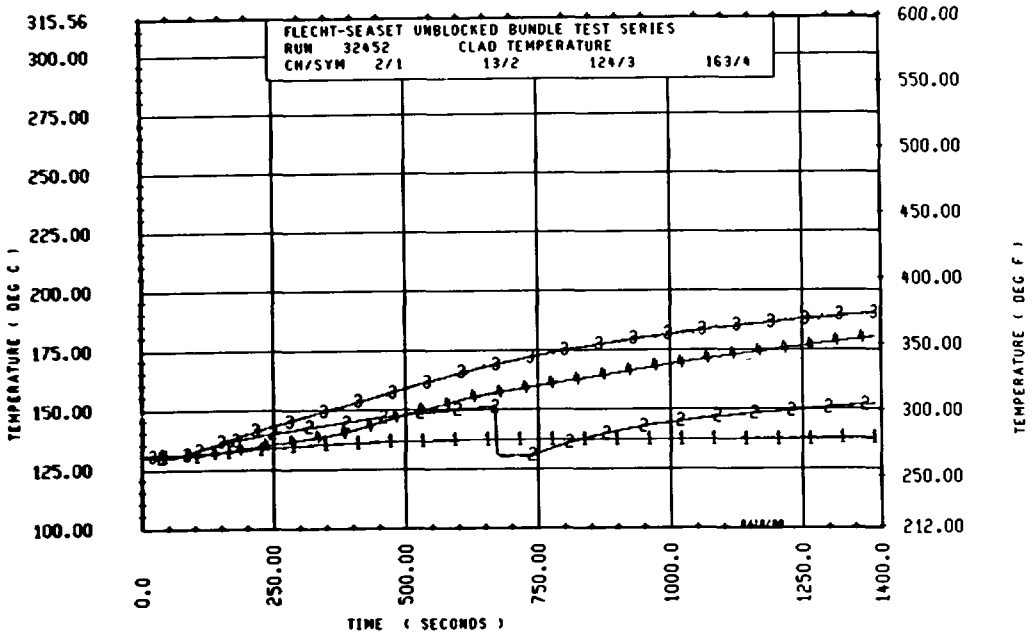
Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	131°C (267°F)
Rod peak power	0.018 kw/m (0.0054 kw/ft)
Flow rate	0.0472 kg/sec (0.104 lb/sec)
Coolant temperature	131°C (268°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G
Inlet Reynolds number	2200

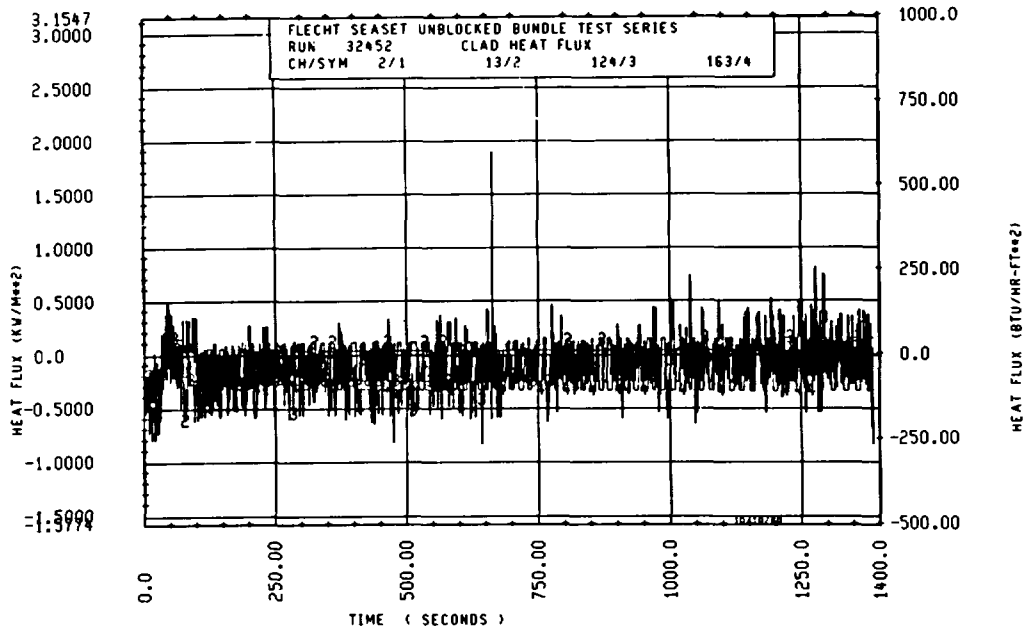
B. Housing Temperatures

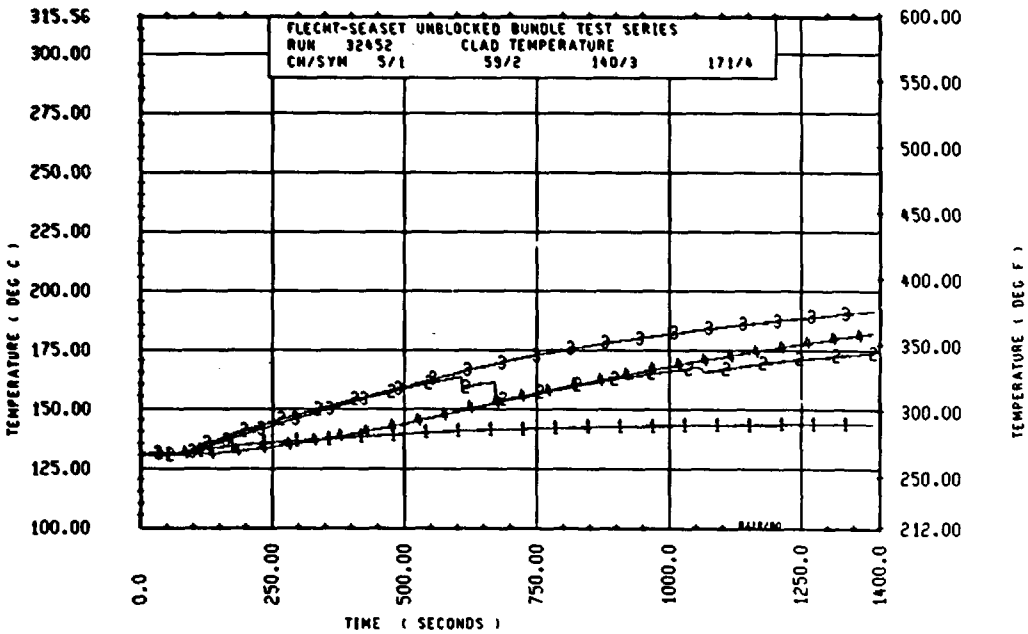
Elevation	Initial Temperature	Maximum Temperature
0.61 m (24 in.)		
1.22 m (48 in.)		
1.83 m (72 in.)		
2.44 m (96 in.)	(No housing temperatures available)	
2.74 m (108 in.)		
3.05 m (120 in.)		
3.35 m (132 in.)		

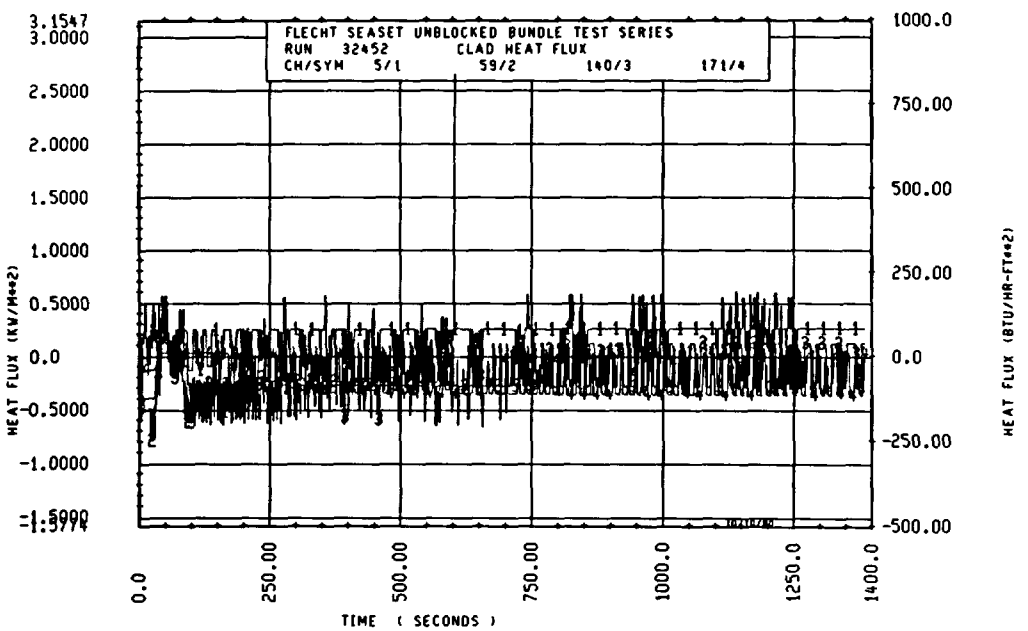
C. Comments

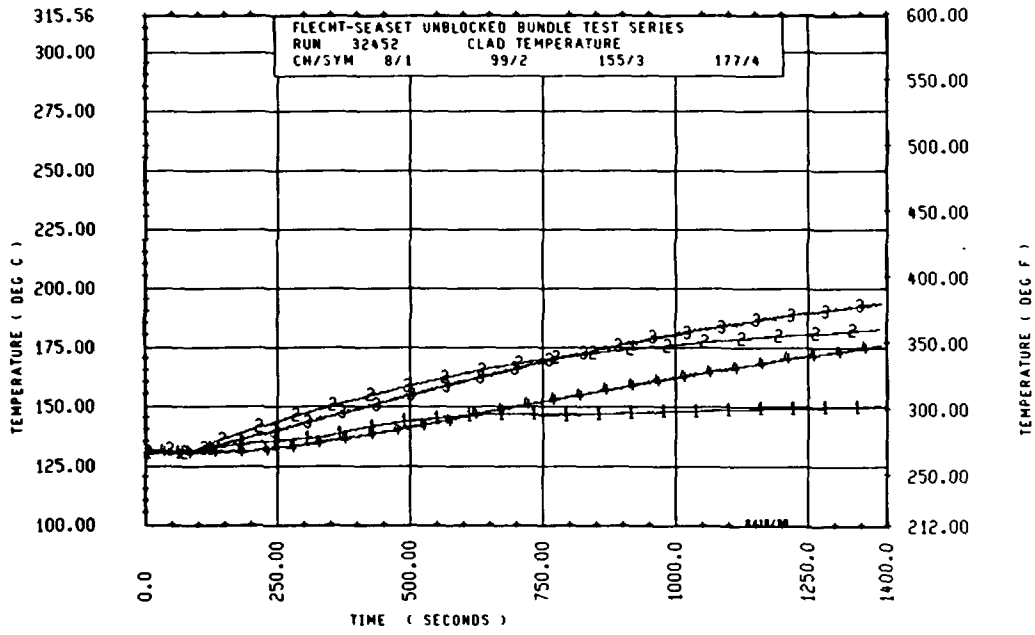
Power in middle zone was approximately 15 percent higher than power in outside and inside power zones.

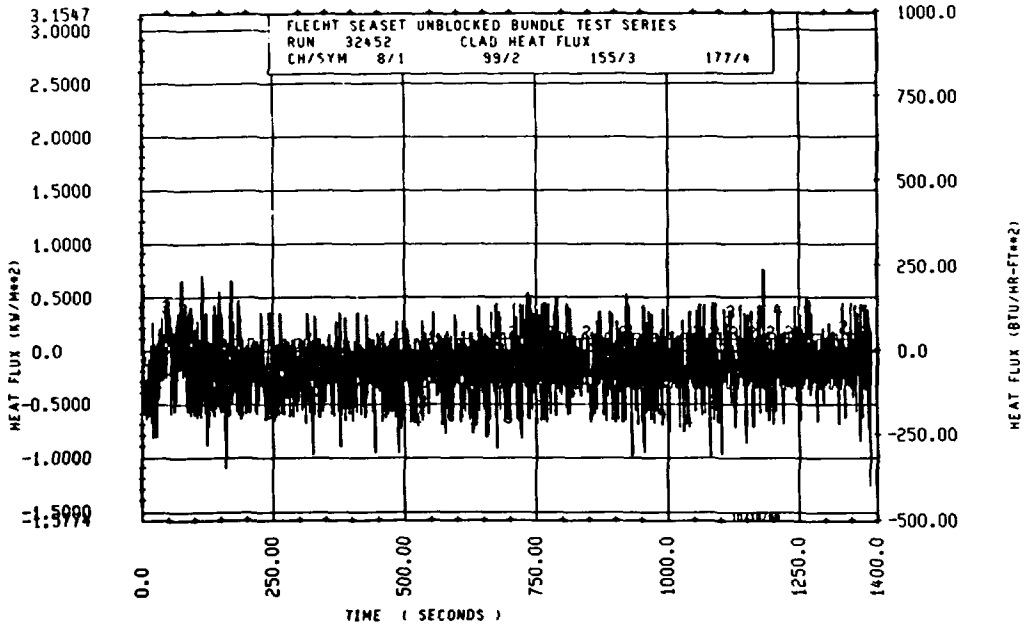

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32452 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

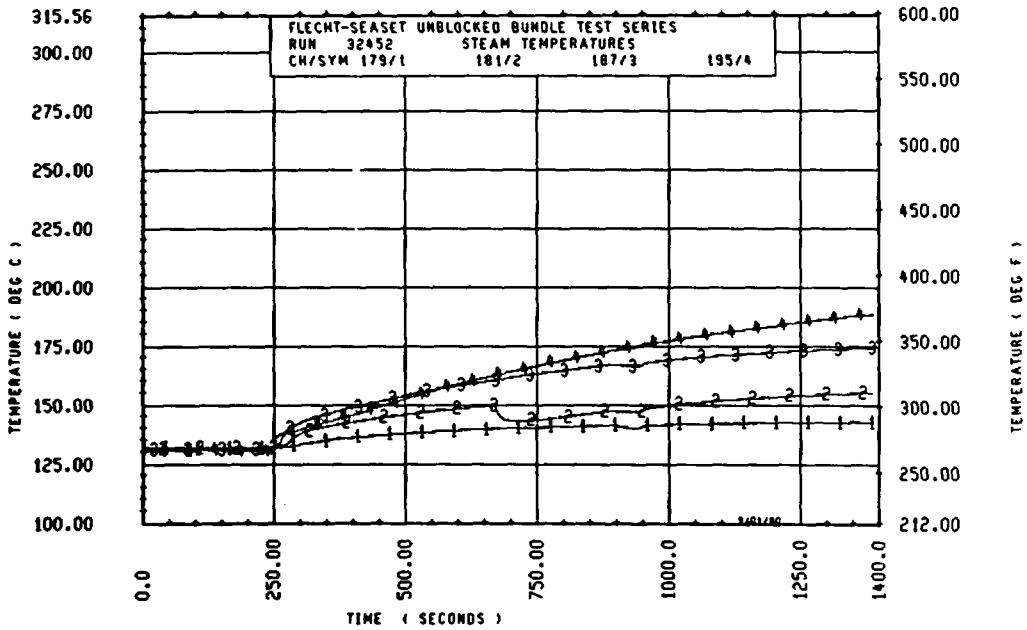

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32452 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)

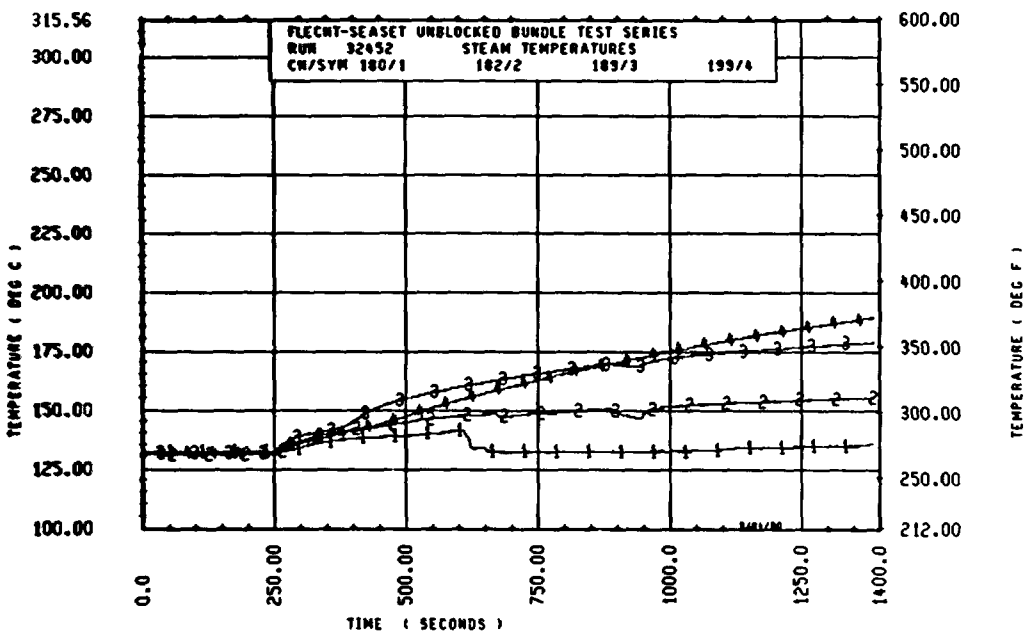

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32452 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

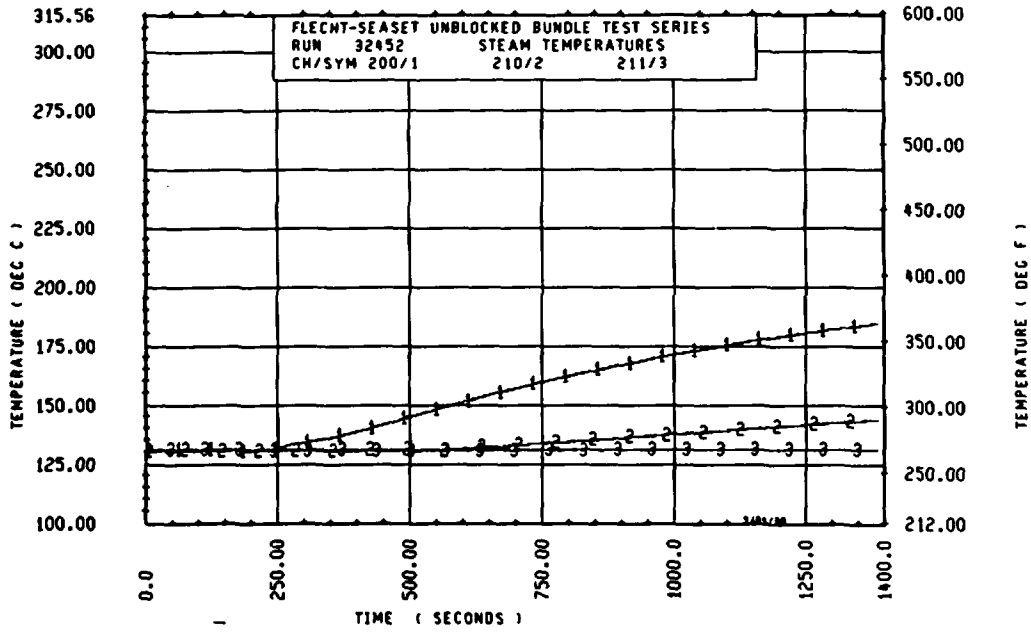

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32452 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)

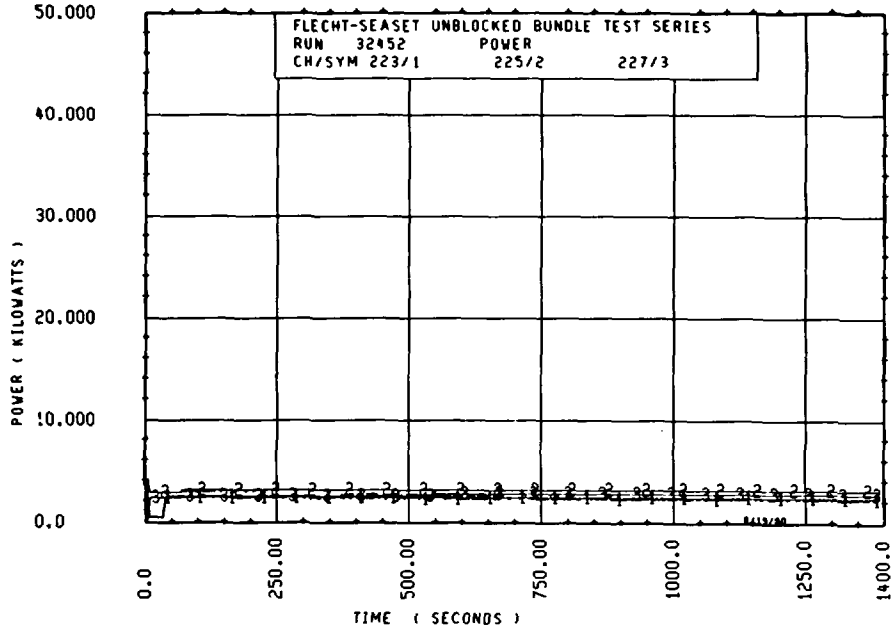

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32452 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32452 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
3.1547
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32452 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32452 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32452 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32452 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
TIME (SECONDS)
50.000
40.000
30.000
20.000
10.000
0.0
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 32652

Date: 5/11/79

Steam Cooling Test

A. Run Conditions

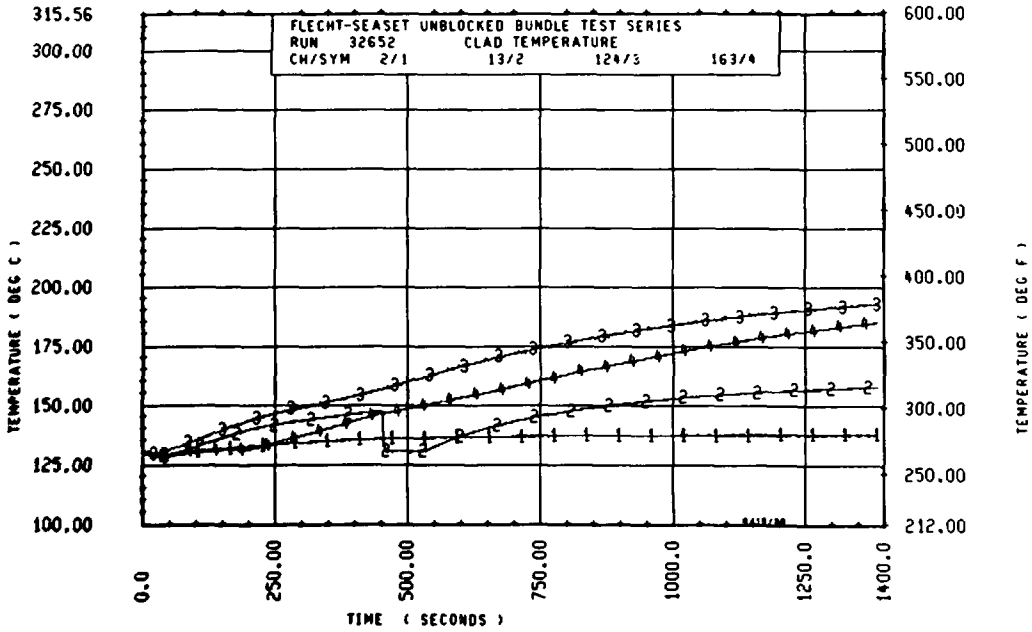
Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	130°C (266°F)
Rod peak power	0.019 kw/m (0.0057 kw/ft)
Flow rate	0.0472 kg/sec (0.104 lb/sec)
Coolant temperature	131°C (268°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G
Inlet Reynolds number	2200

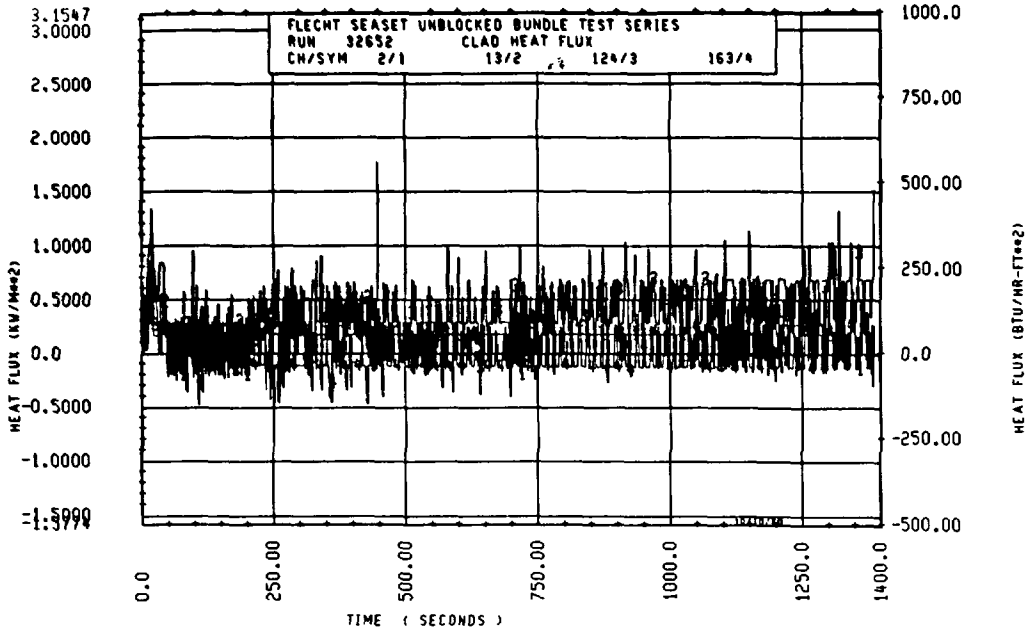
B. Housing Temperatures

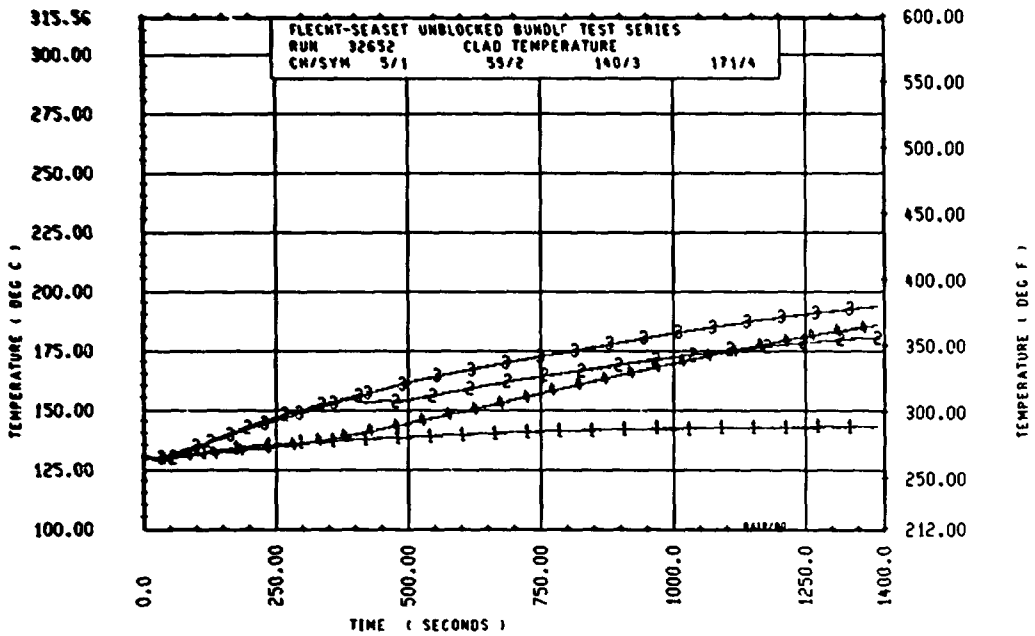
Elevation	Initial Temperature	Maximum Temperature
0.61 m (24 in.)		
1.22 m (48 in.)		
1.83 m (72 in.)		
2.44 m (96 in.)	(No housing temperatures available)	
2.74 m (108 in.)		
3.05 m (120 in.)		
3.35 m (132 in.)		

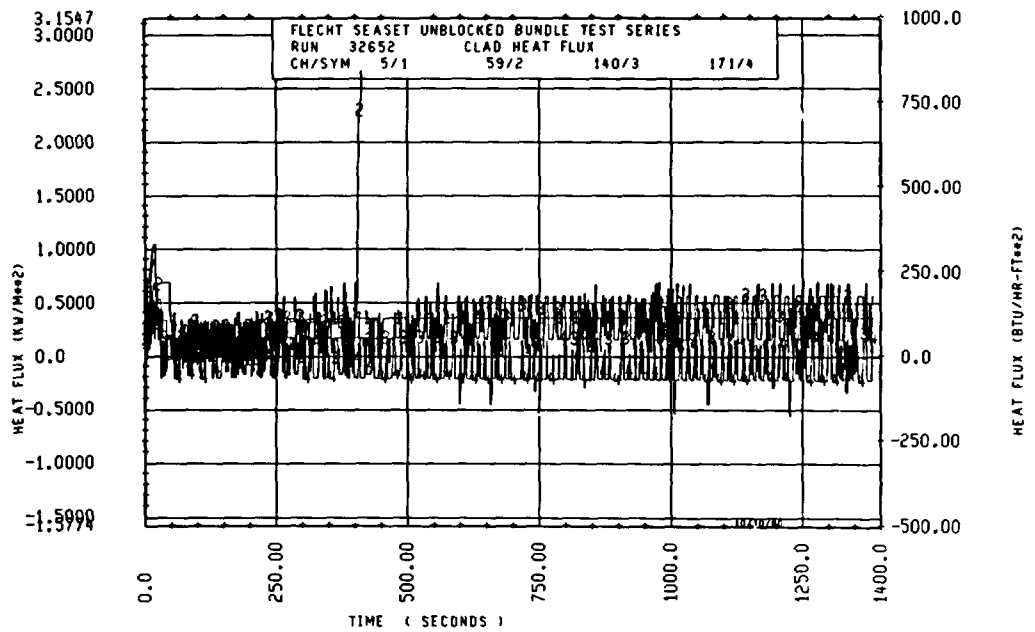
C. Comments

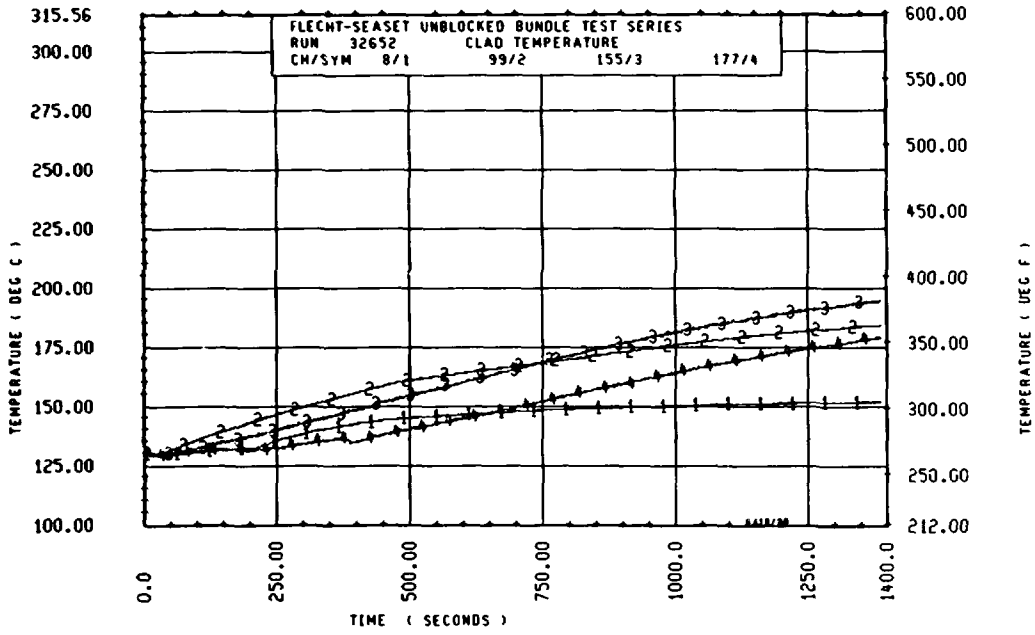
Power in outside zone was approximately 17 percent lower than in the two inside power zones. There was 3.5 percent mass loss through steam probes from 0.99 to 2.13 m (39 to 84 in.) and 3.8 percent mass loss through steam probes from 2.29 to 3.51 m (90 to 138 in.).

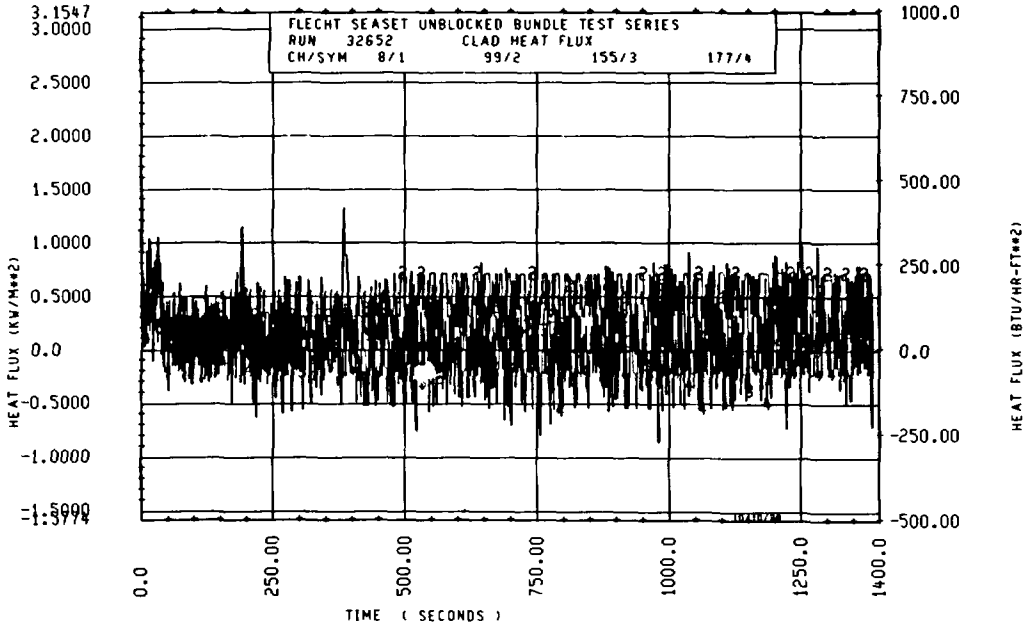

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32652 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

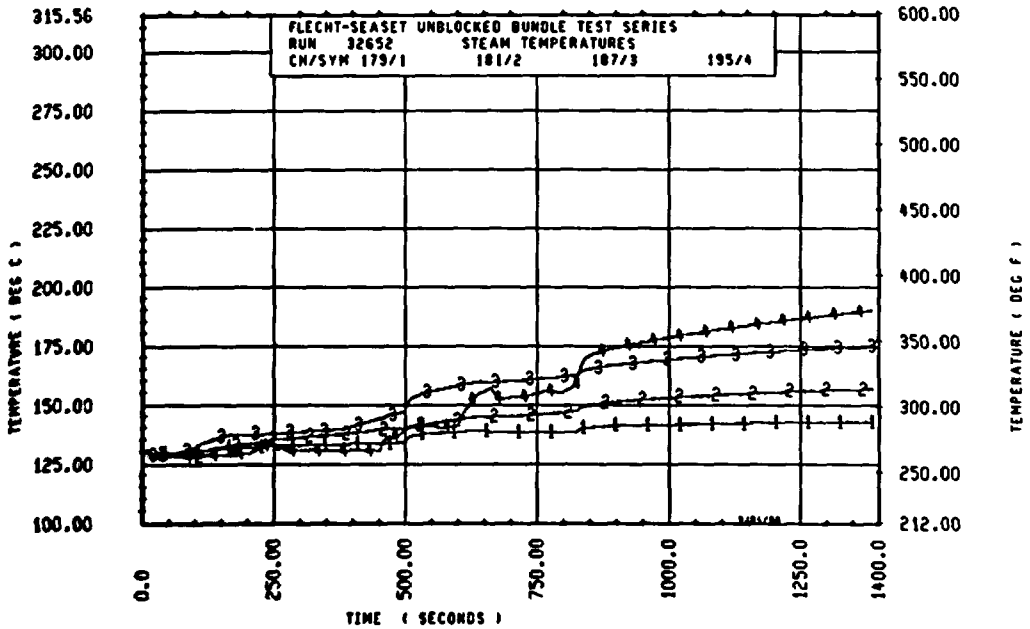

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32652 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
3.1547
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

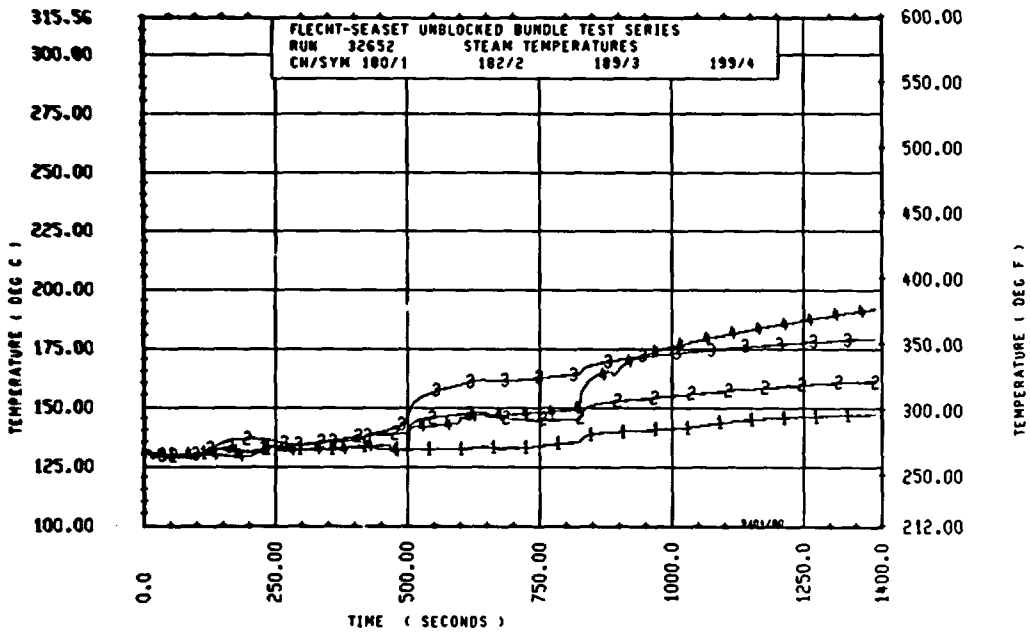

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32652 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

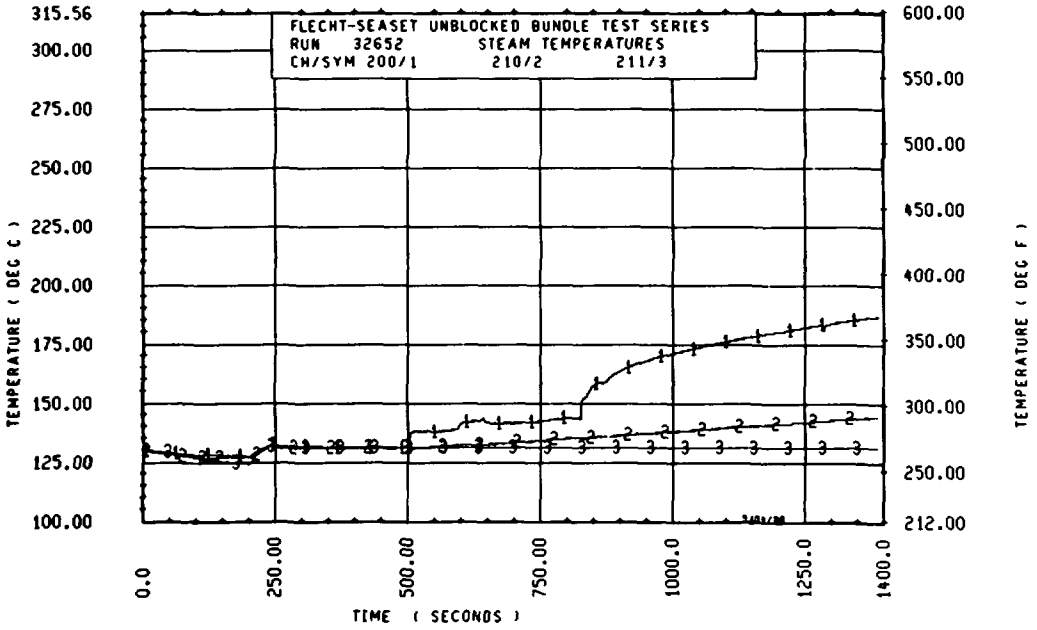

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32652 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)

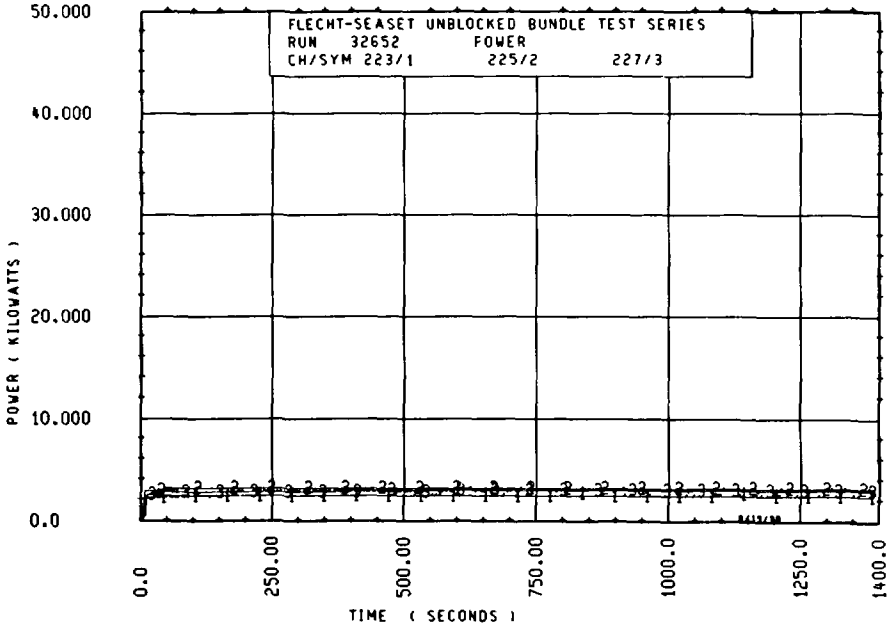

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32652 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32652 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
3.1547
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-1.5774
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32652 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32652 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32652 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32652 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
TIME (SECONDS)
50.000
40.000
30.000
20.000
10.000
0.0
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 32753

Date: 5/14/79

Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	135°C (275°F)
Rod peak power	0.16 kw/m (0.050 kw/ft)
Flow rate	0.36 kg/sec (0.80 lb/sec)
Coolant temperature	132°C (269°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G
Inlet Reynolds number	16720

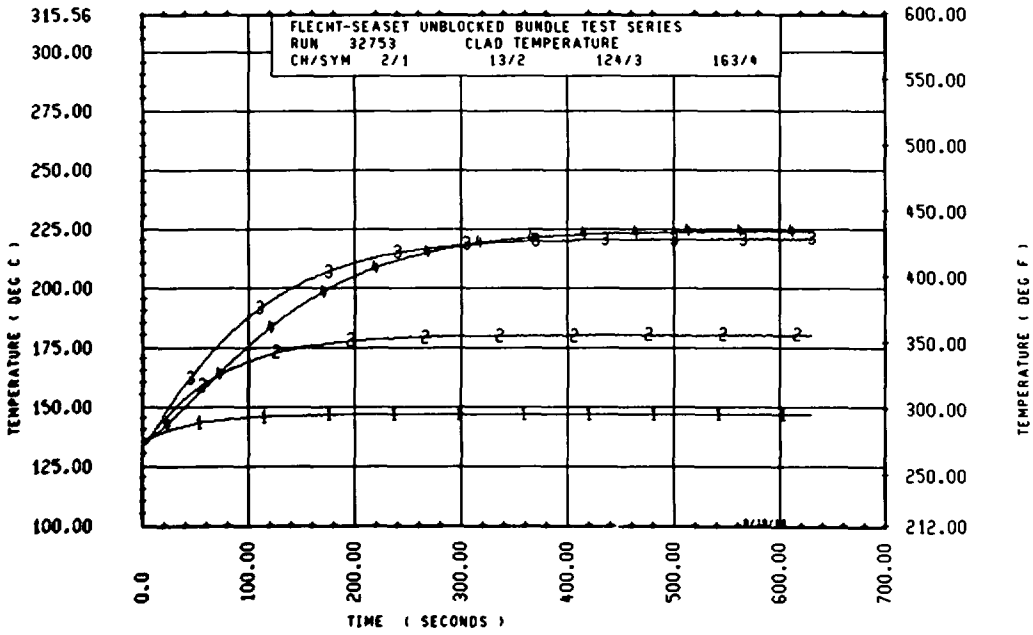
B. Housing Temperatures

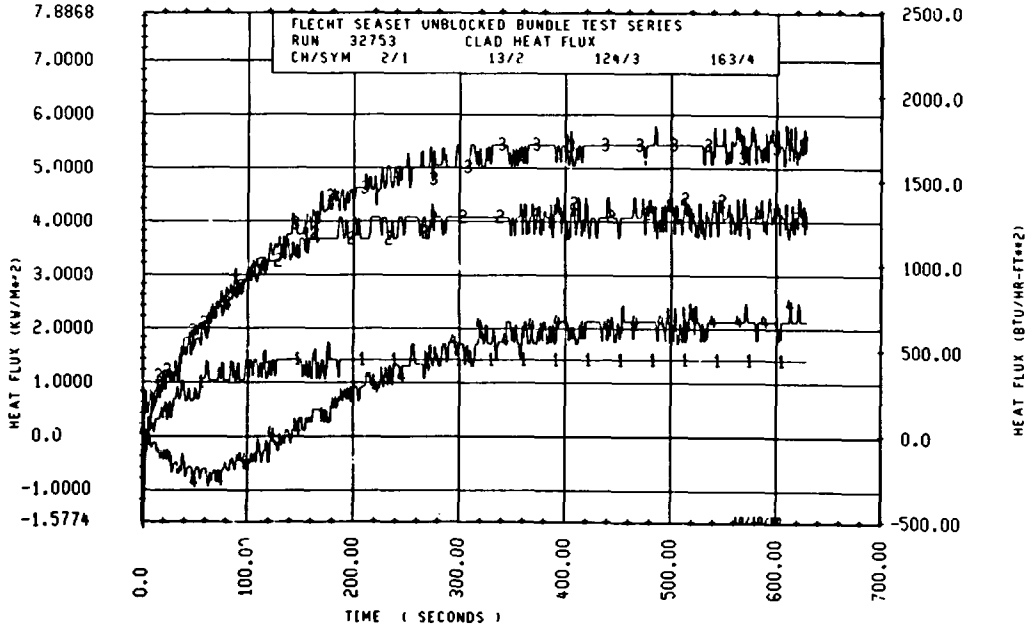
Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	133°C (271°F)	135°C (275°F)
1.22 m (48 in.)	133°C (271°F)	138°C-144°C (280°F-292°F)
1.83 m (72 in.)	131°C-133°C (267°F-272°F)	146°C-160°C (294°F-320°F)
2.44 m (96 in.)	130°C-133°C (266°F-271°F)	169°C-172°C (336°F-341°F)
2.74 m (108 in.)	130°C (266°F)	171°C (340°F)
3.05 m (120 in.)	131°C (267°F)	172°C (341°F)
3.35 m (132 in.)	--	--

*At end of test

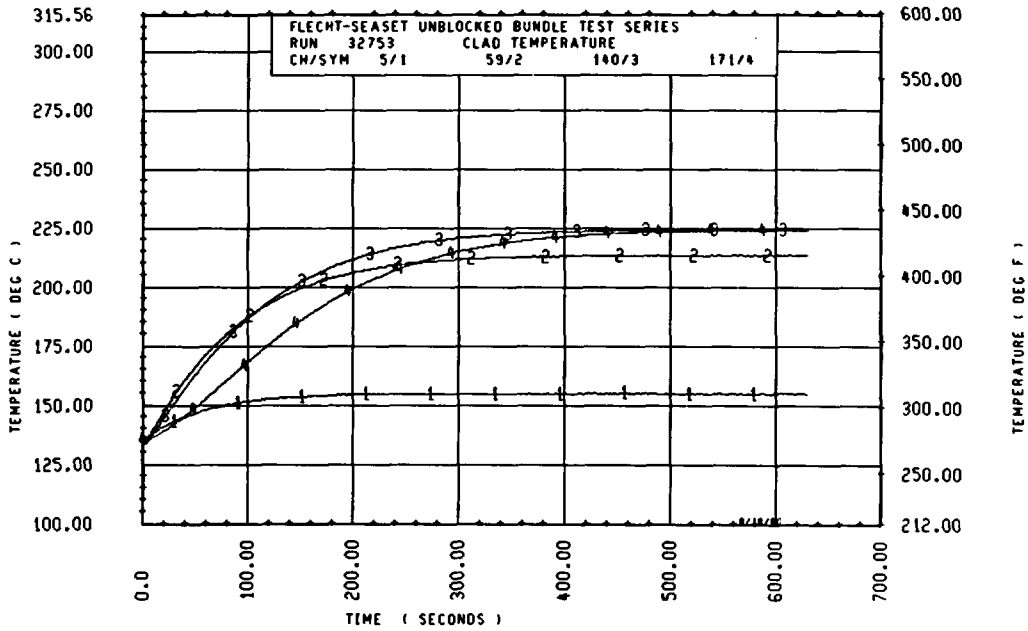
C. Comments

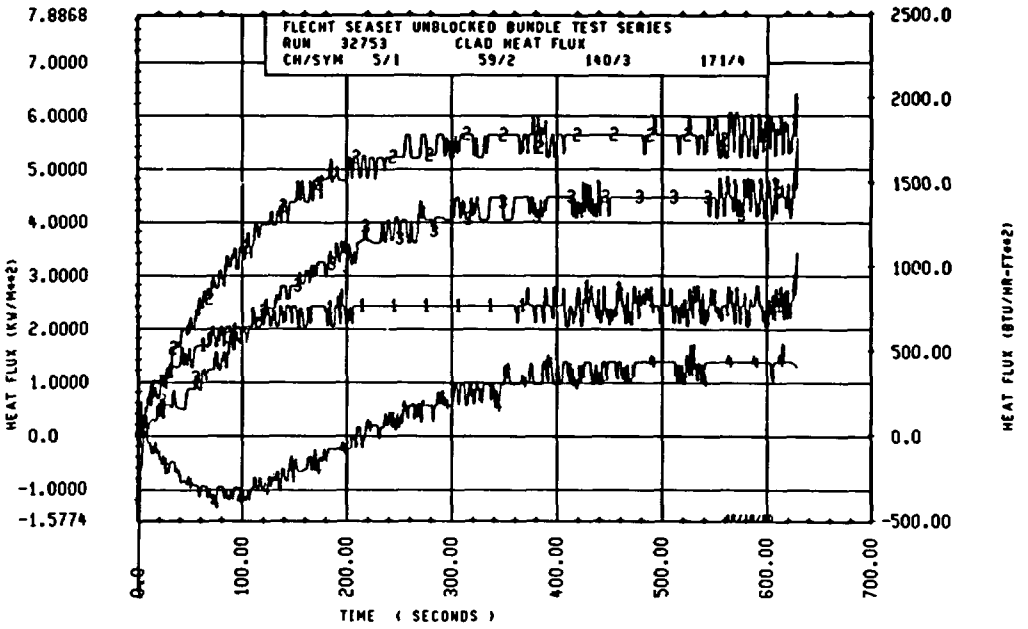
There was 0.58 percent mass loss through steam probes from 0.99 to 2.13 m (39 to 84 in.) and 0.61 percent mass loss through steam probes from 2.29 to 3.51 m (90 to 138 in.).

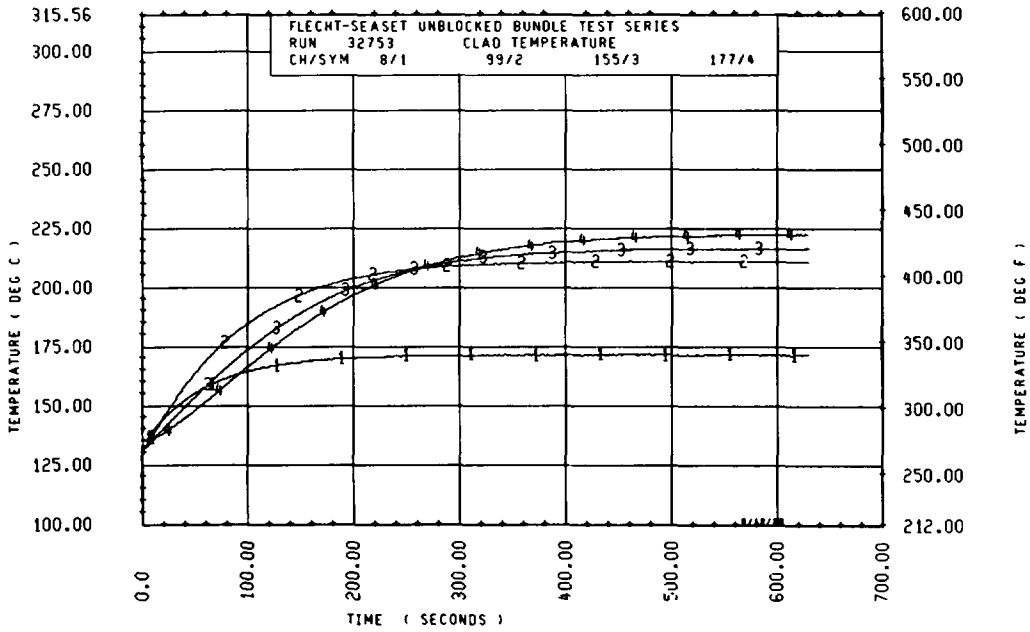

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32753 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00

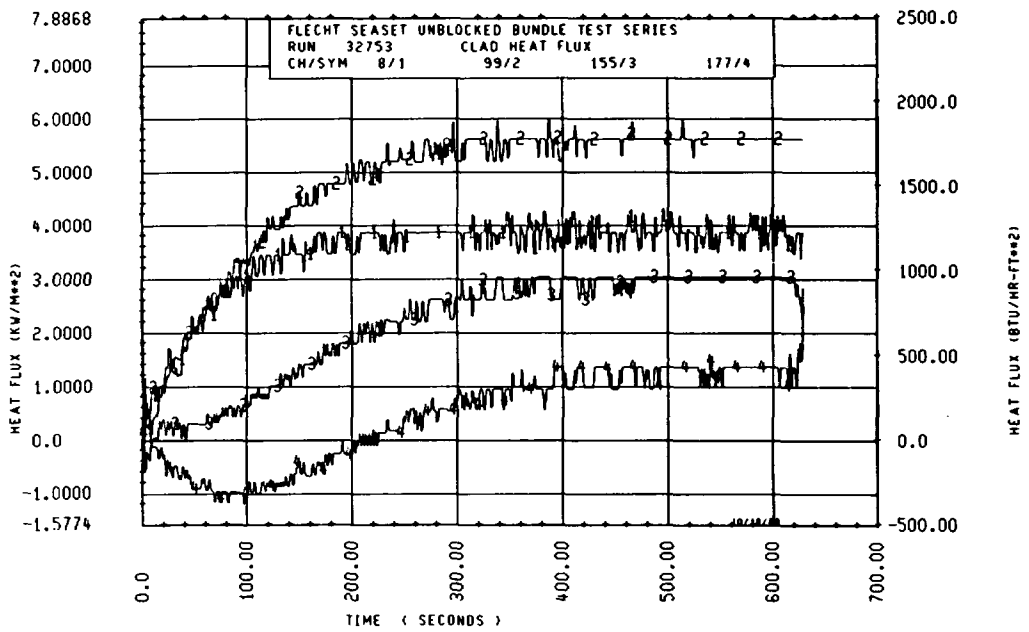

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32753 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
7.8868
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
2500.0
2000.0
1500.0
1000.0
500.00
0.0
-500.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00

32753-2

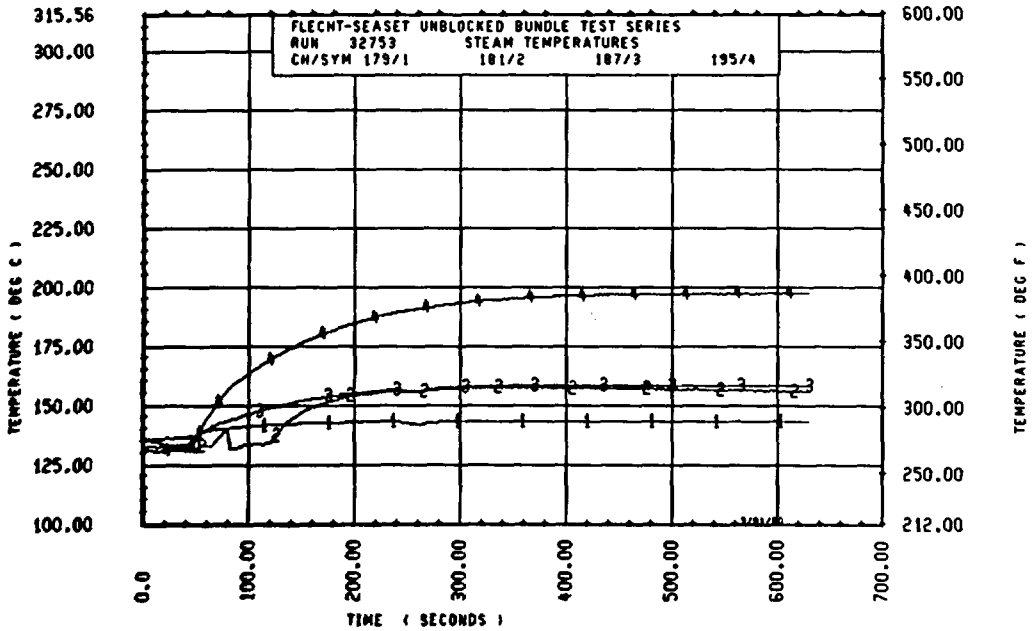

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32753 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00

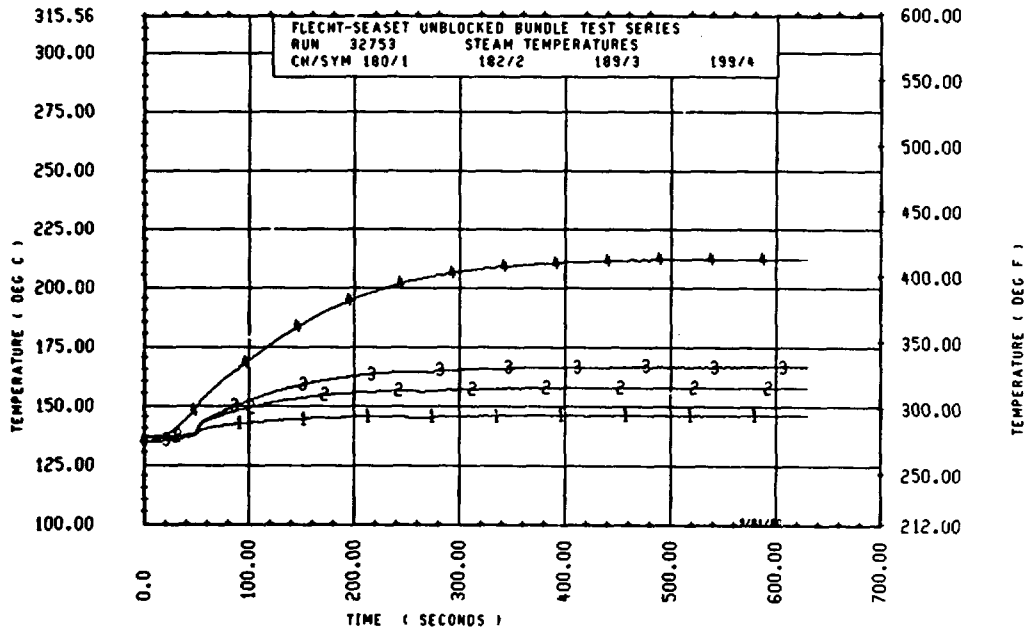

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32753 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
7.8868
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
2500.0
2000.0
1500.0
1000.0
500.00
0.0
-500.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00

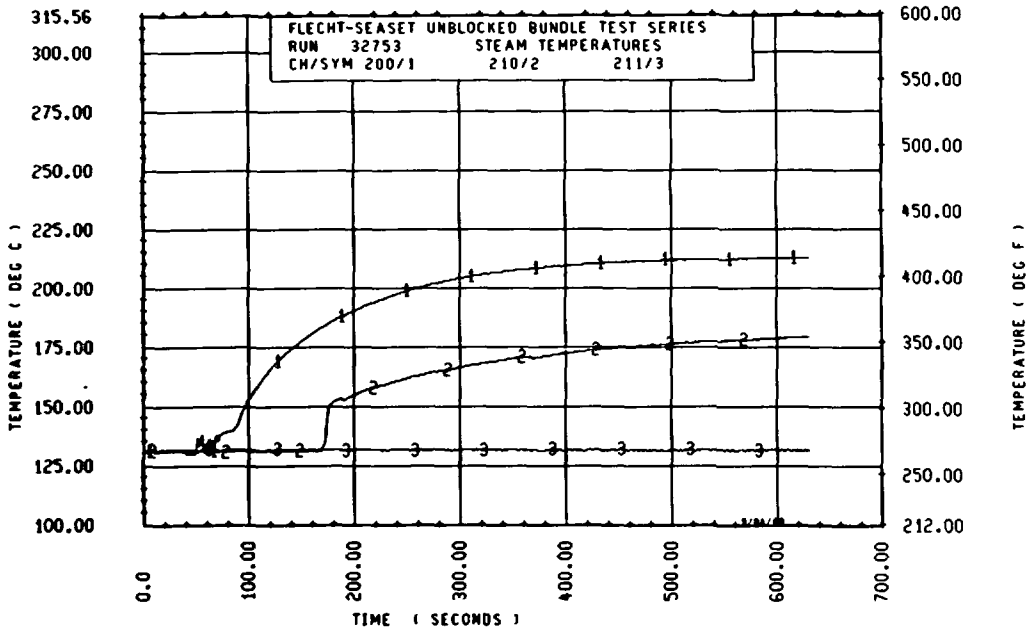

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32753 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00

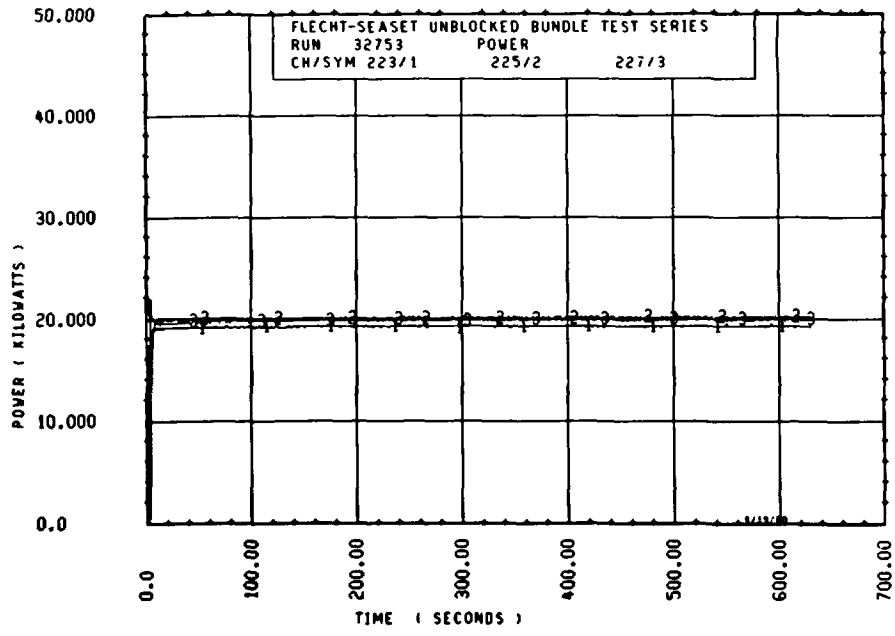

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32753 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
7.8868
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
2500.0
2000.0
1500.0
1000.0
500.00
0.0
-500.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00

32753-4


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32753 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32753 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32753 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32753 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
TIME (SECONDS)
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 32854

Date: 5/14/79

Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	132°C (269°F)
Rod peak power	0.0587 kw/m (0.0179 kw/ft)
Flow rate	0.14 kg/sec (0.30 lb/sec)
Coolant temperature	132°C (269°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G
Inlet Reynolds number	6330

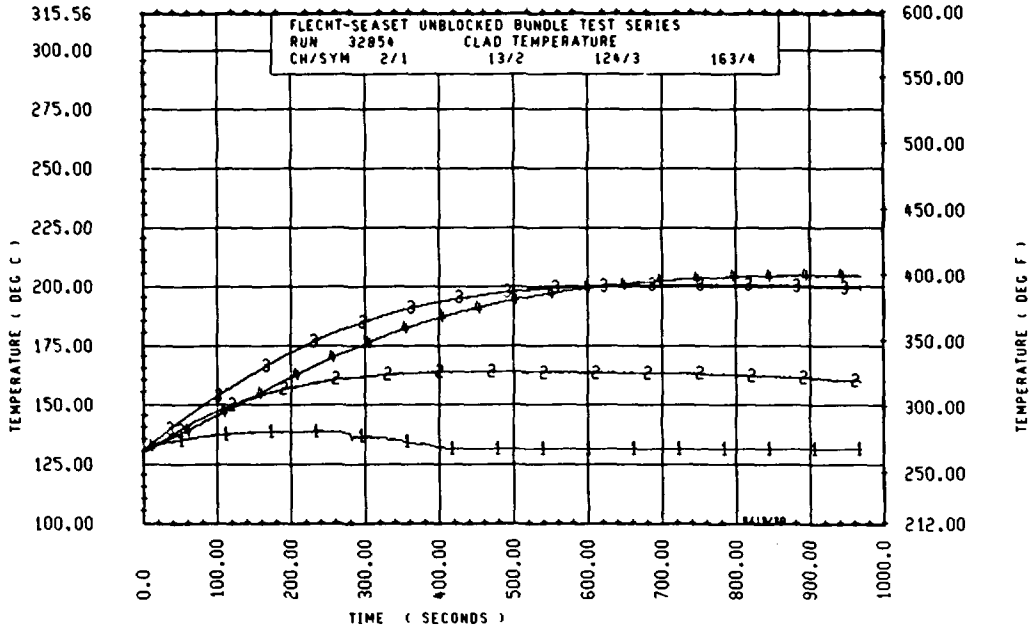
B. Housing Temperatures

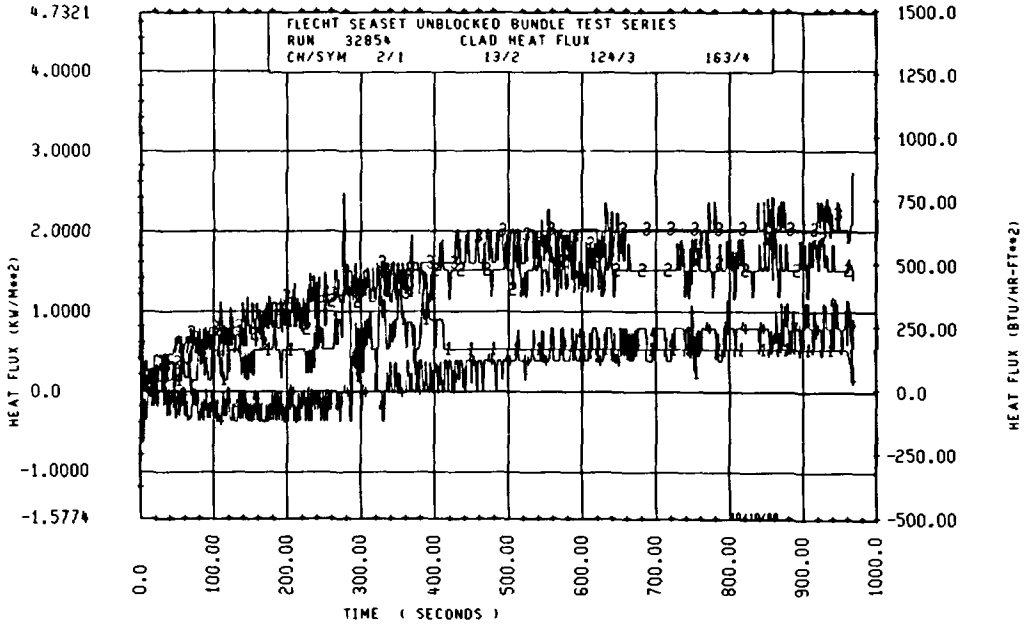
Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	134°C (273°F)	134°C (273°F)
1.22 m (48 in.)	133°C (272°F)	134°C-137°C (274°F-278°F)
1.83 m (72 in.)	131°C-133°C (268°F-272°F)	146°C-150°C (294°F-302°F)
2.44 m (96 in.)	132°C (269°F)	152°C-167°C (306°F-333°F)
2.74 m (108 in.)	131°C (268°F)	162°C (324°F)
3.05 m (120 in.)	131°C (267°F)	158°C (317°F)
3.35 m (132 in.)	--	--

*At end of test

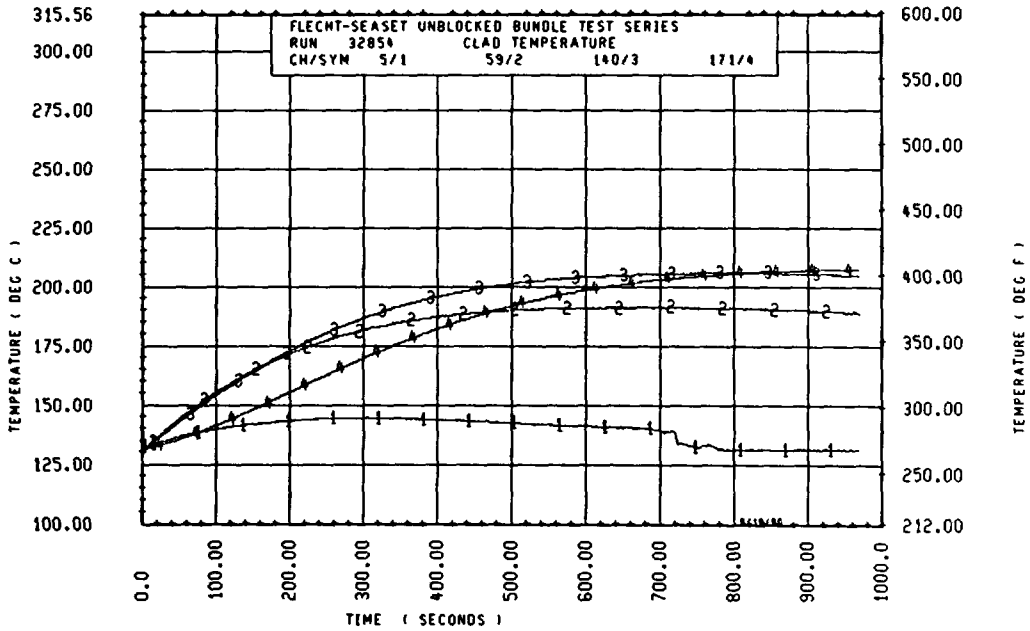
C. Comments

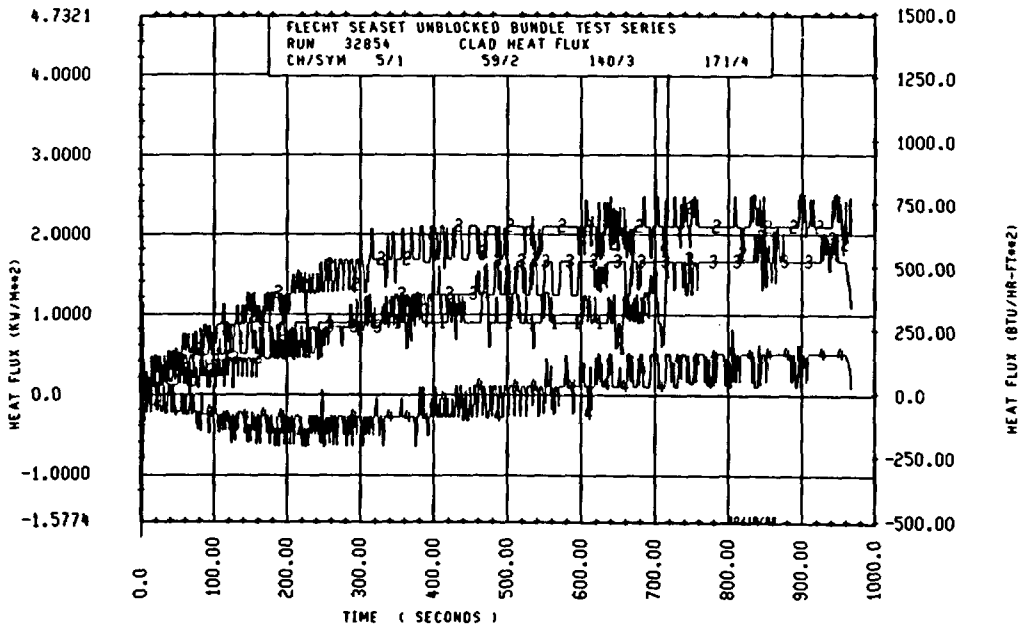
There was 1.9 percent mass loss through steam probes from 0.99 to 2.13 m (39 to 84 in.) and 1.3 percent mass loss through steam probes from 2.29 to 3.51 m (90 to 138 in.).

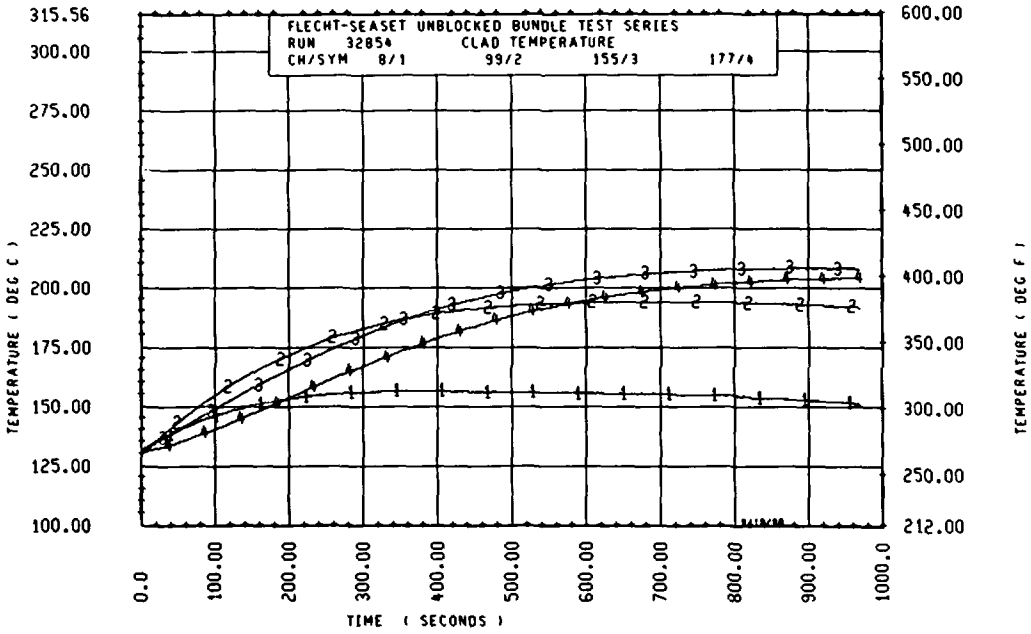

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32854 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

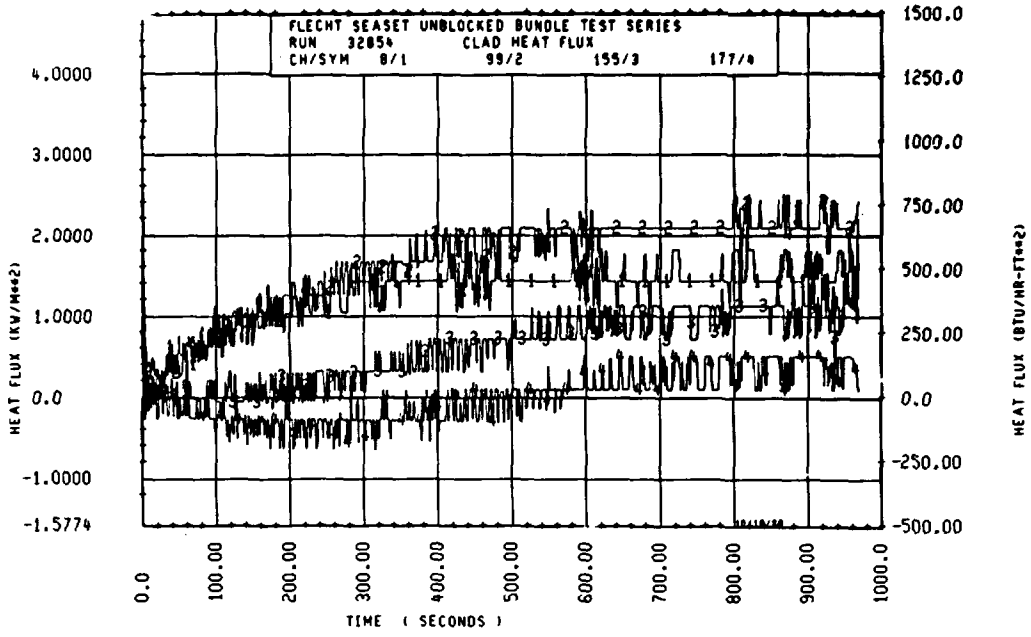

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32854 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.7321
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

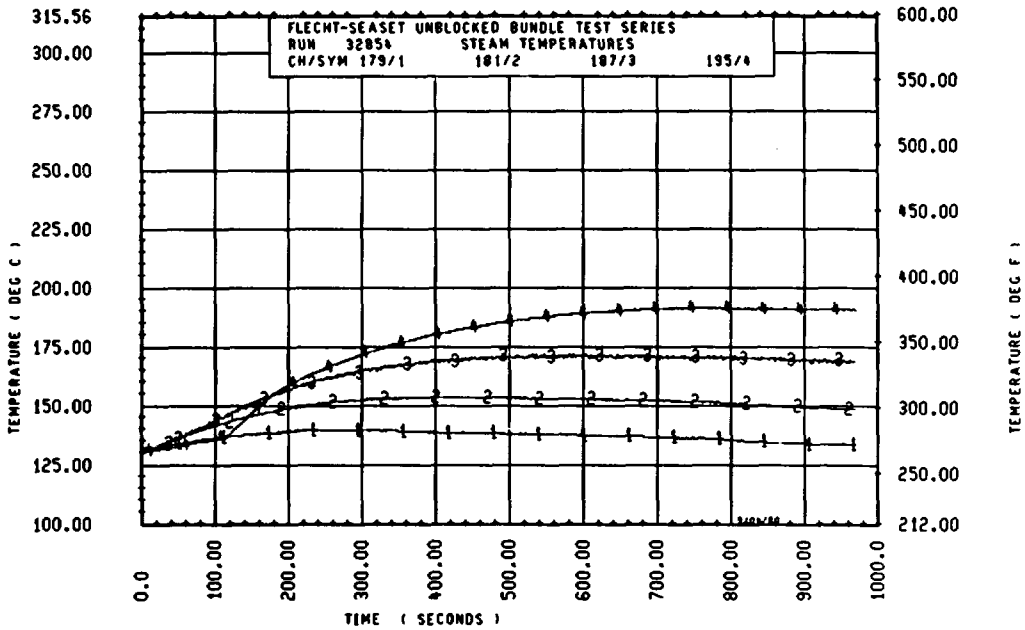
32854-2

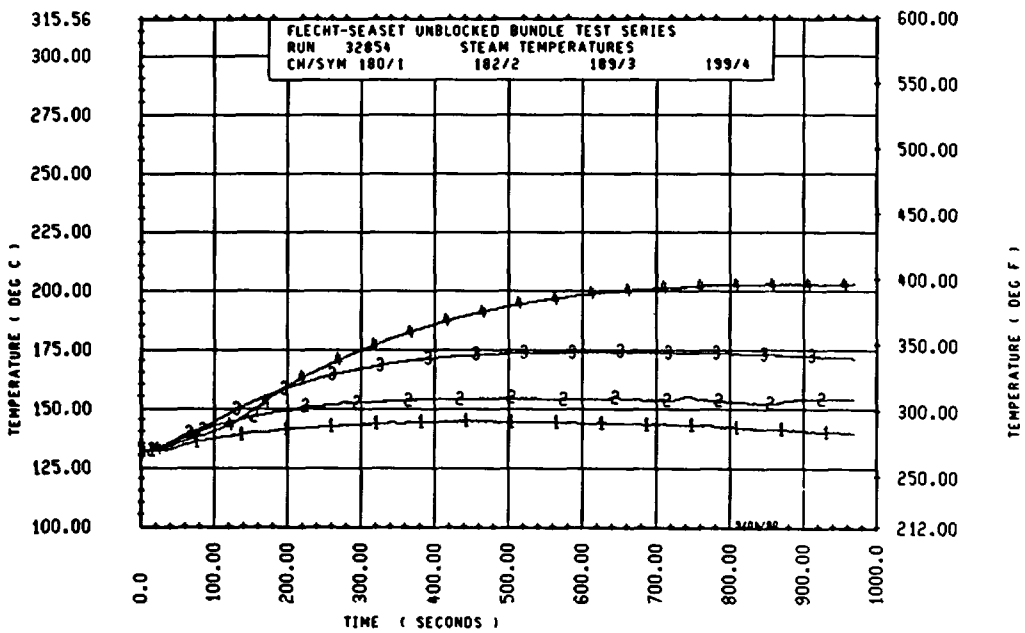

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32854 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

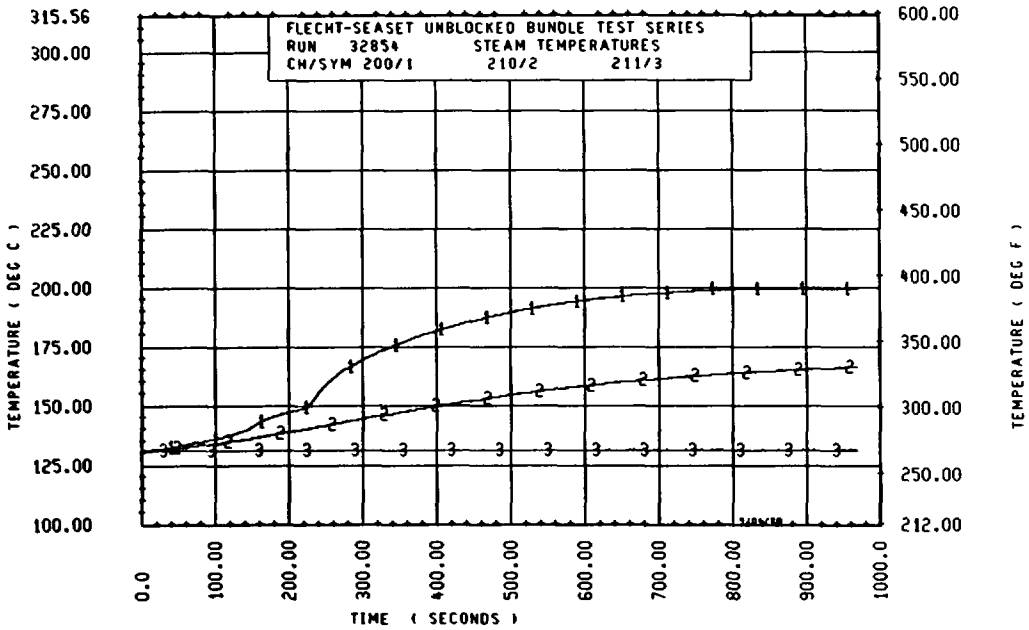

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32854 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.7321
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

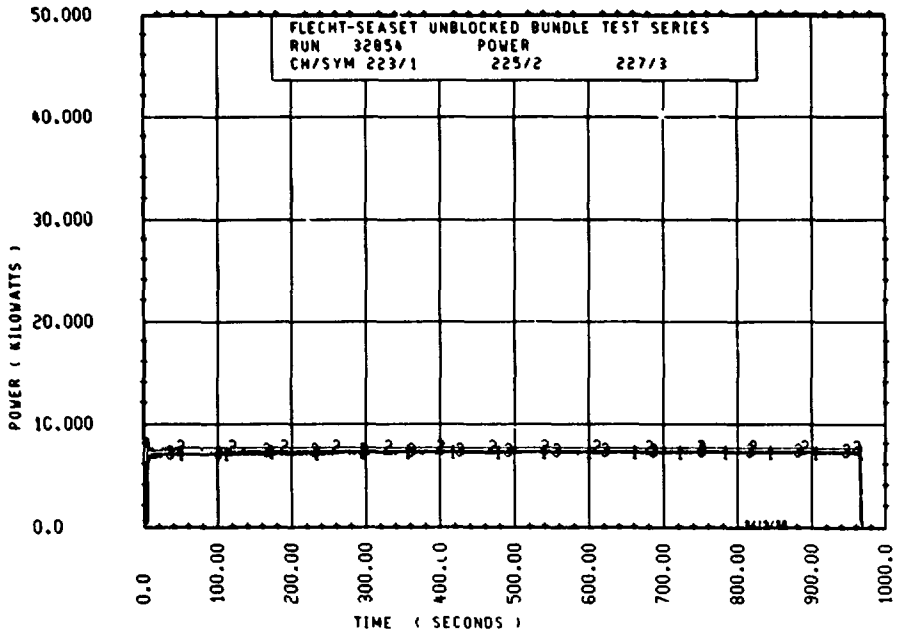

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32854 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32854 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32854 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32854 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32854 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32854 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
TIME (SECONDS)
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 32955

Date: 5/14/79

Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	131°C (268°F)
Rod peak power	0.098 kw/m (0.030 kw/ft)
Flow rate	0.23 kg/sec (0.50 lb/sec)
Coolant temperature	131°C (268°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G
Inlet Reynolds number	10550

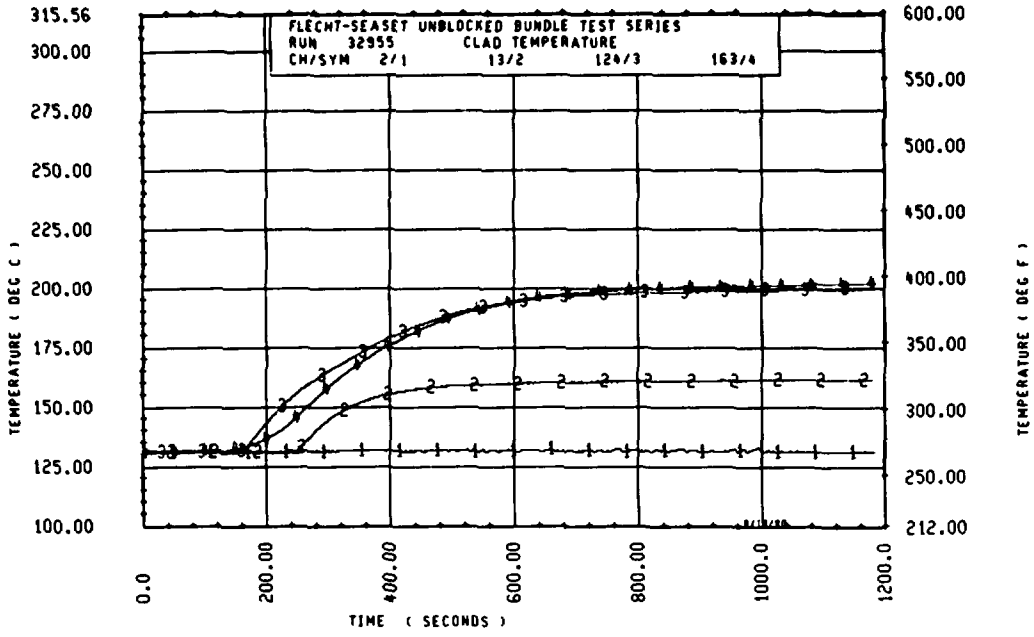
B. Housing Temperatures

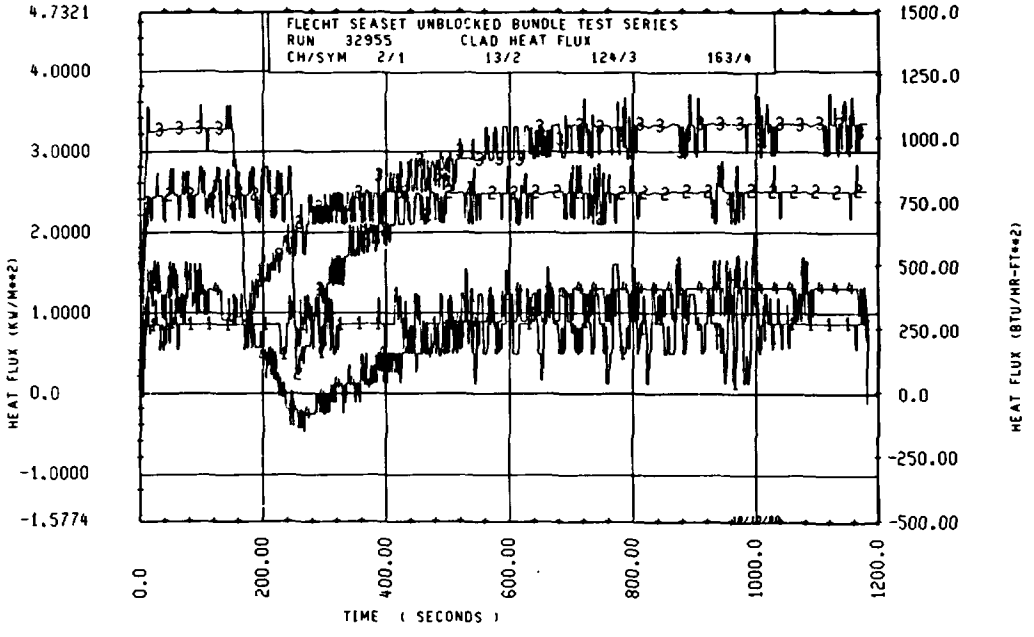
Elevation	Initial Temperature*	Maximum Temperature**
0.61 m (24 in.)	134°C (273°F)	134°C (273°F)
1.22 m (48 in.)	133°C (272°F)	134°C-136°C (273°F-277°F)
1.83 m (72 in.)	132°C-134°C (269°F-273°F)	144°C-151°C (291°F-303°F)
2.44 m (96 in.)	132°C (269°F)	156°C-168°C (312°F-334°F)
2.74 m (108 in.)	132°C (269°F)	164°C (328°F)
3.05 m (120 in.)	131°C (267°F)	160°C (320°F)
3.35 m (132 in.)	--	--

*At 41 seconds after test initiation
**At end of test

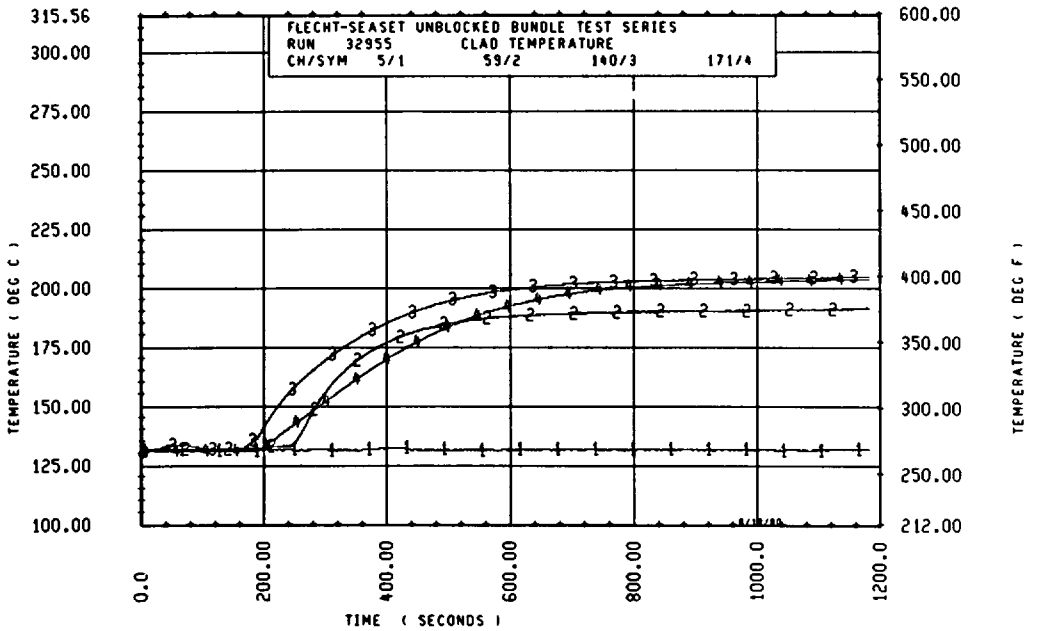
C. Comments

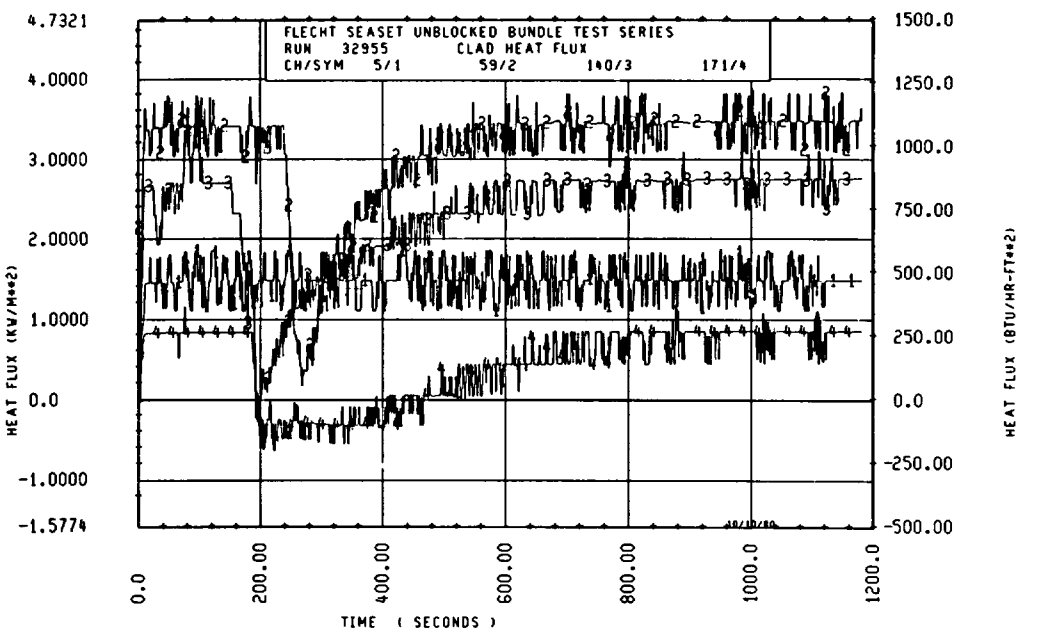
There was 1.2 percent mass loss through steam probes from 0.99 to 2.13 m (39 to 84 in.) and 0.5 percent mass loss through steam probes from 2.29 to 3.51 m (90 to 138 in.).

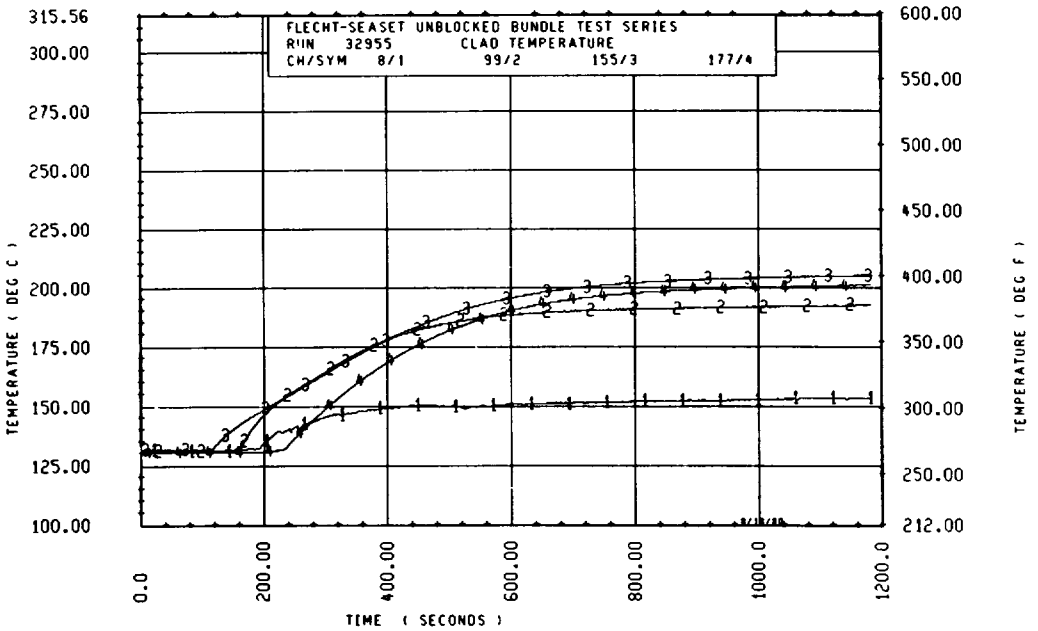

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32955 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0

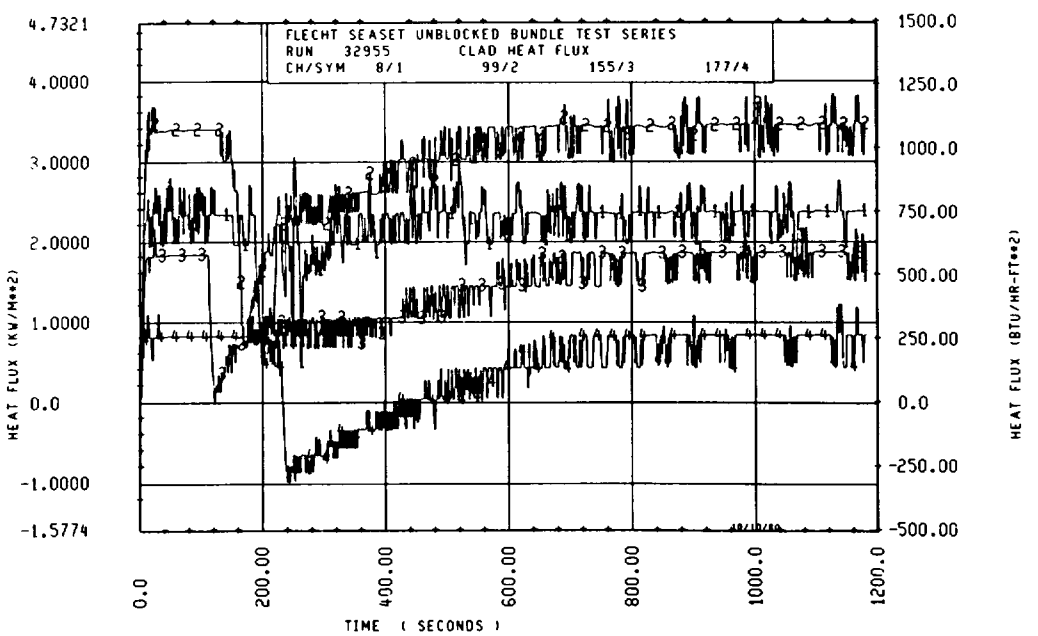

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32955 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.7321
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0

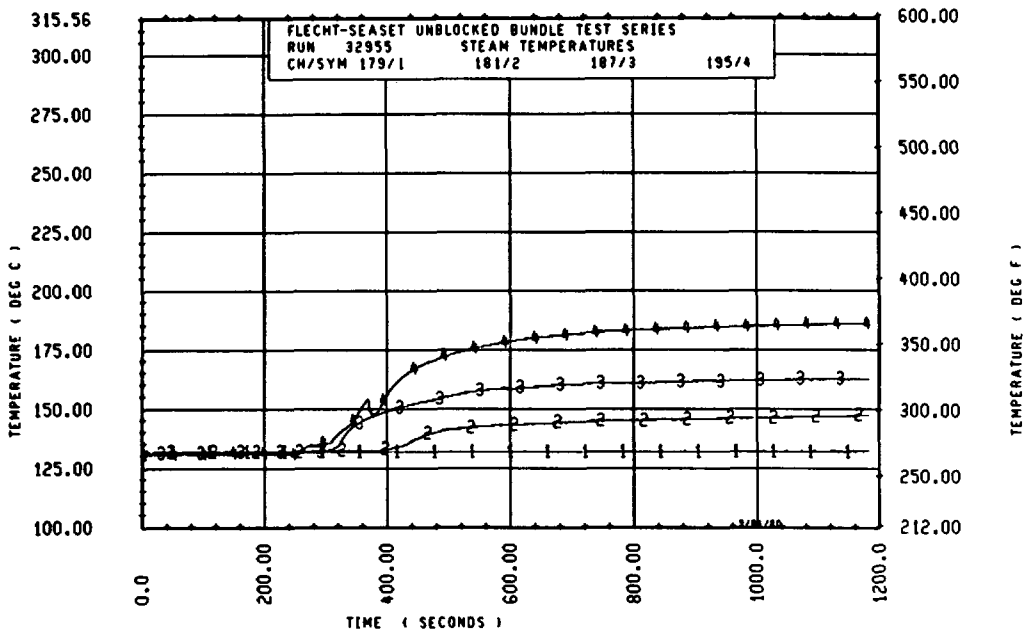
32955-2

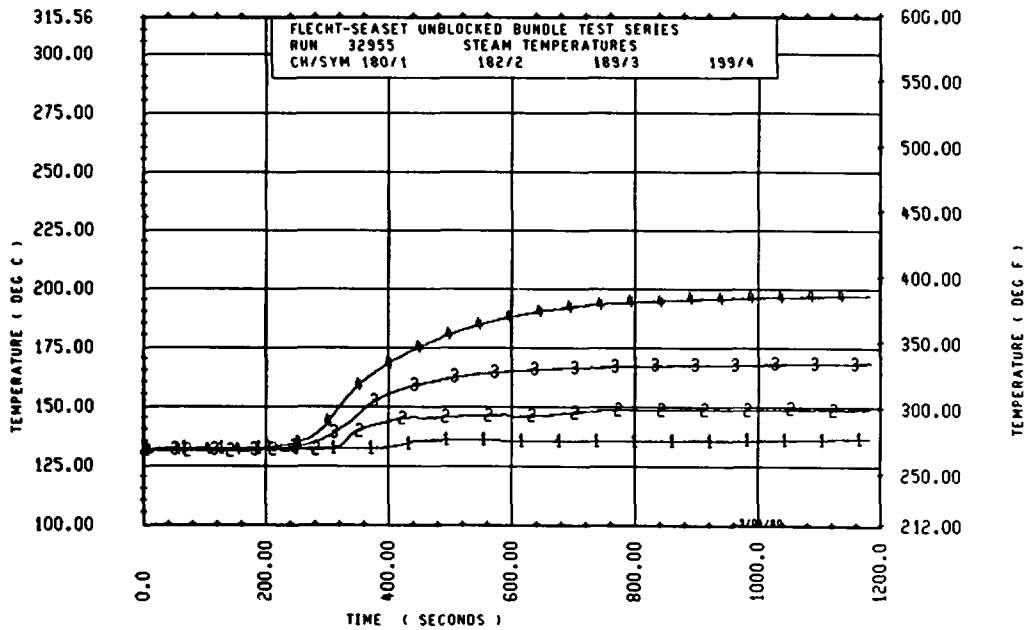

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32955 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0

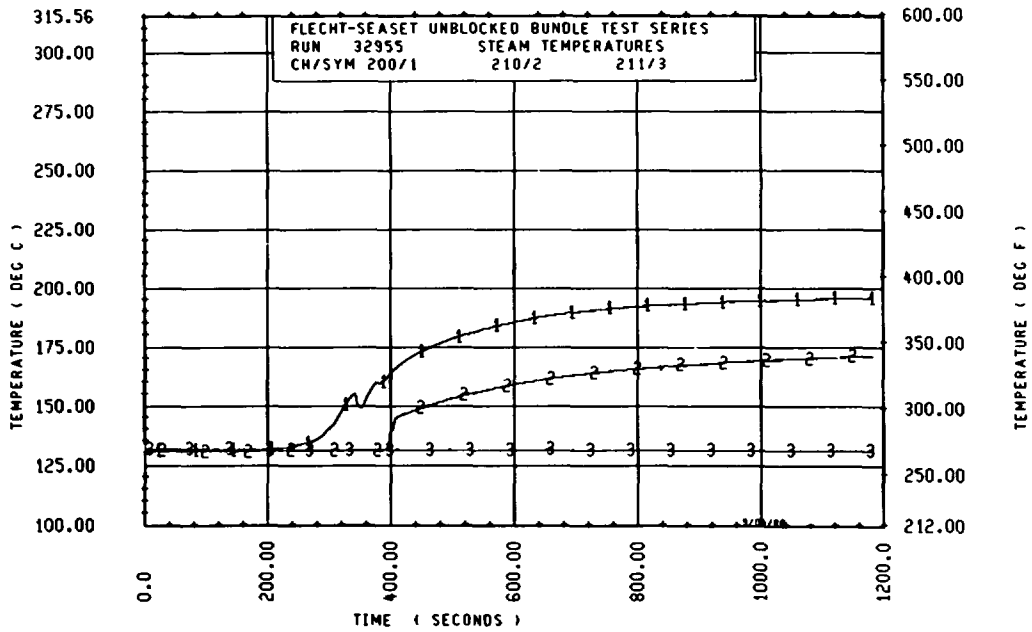

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32955 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.7321
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0

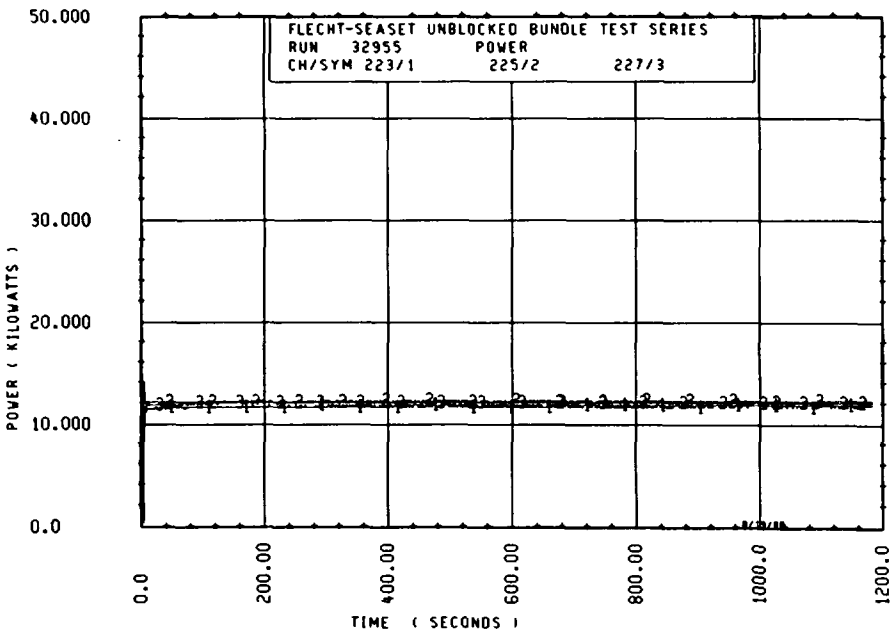

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32955 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32955 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.7321
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32955 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32955 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32955 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 32955 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
TIME (SECONDS)
50.000
40.000
30.000
20.000
10.000
0.0
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 33056

Date: 5/16/79

Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	158°C (316°F)
Rod peak power	1.3 kw/m (0.40 kw/ft)
Flow rate	0.36 kg/sec (0.80 lb/sec)
Coolant temperature	132°C (269°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G
Inlet Reynolds number	16720

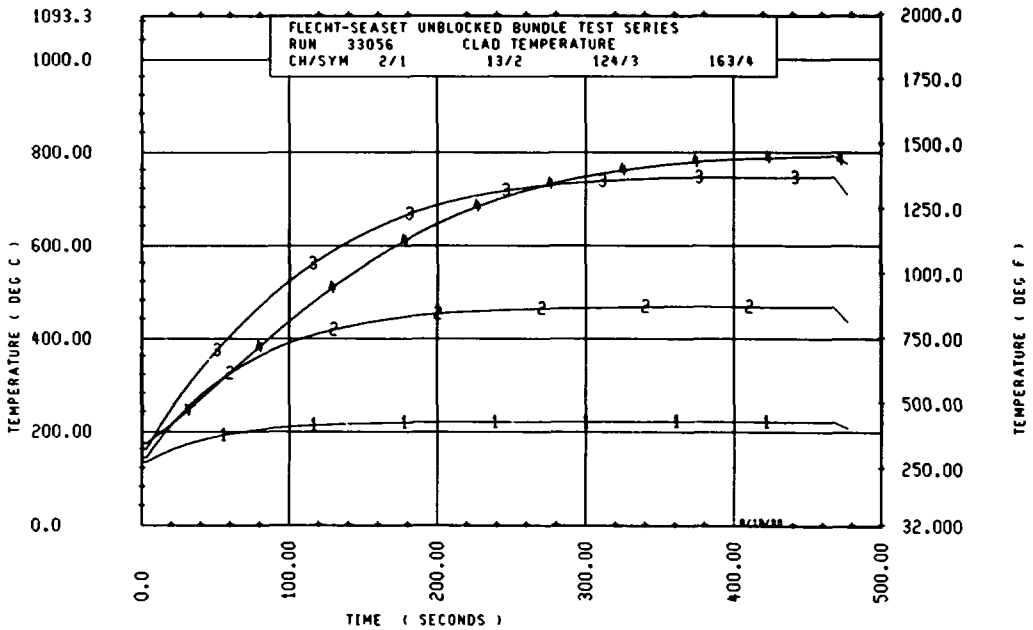
B. Housing Temperatures

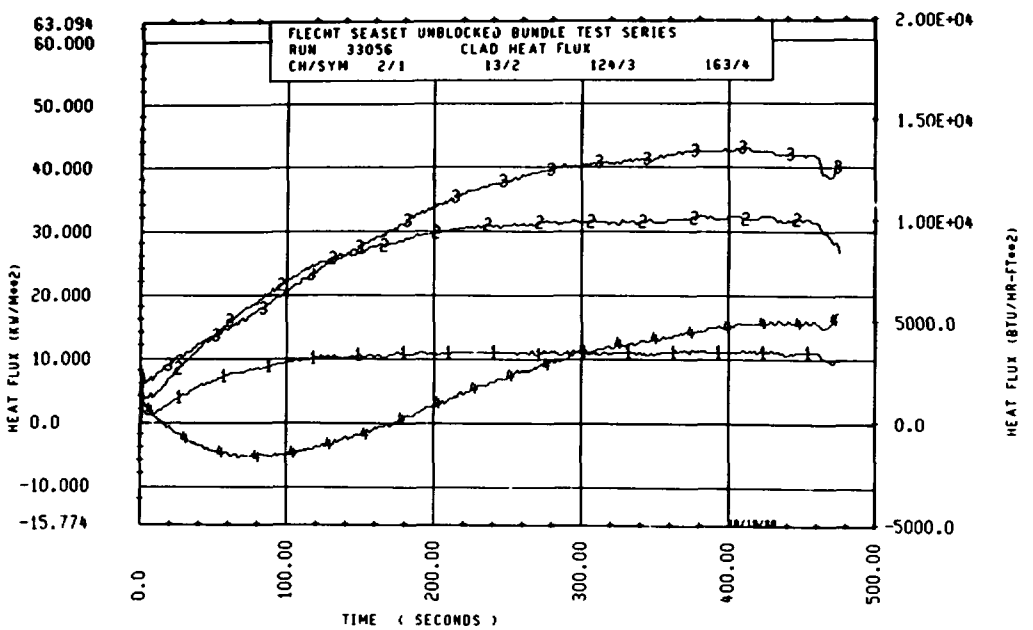
Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	132°C (271°F)	161°C (322°F)
1.22 m (48 in.)	134°C (274°F)	201°C-250°C (394°F-483°F)
1.83 m (72 in.)	133°C-145°C (272°F-293°F)	321°C-437°C (610°F-819°F)
2.44 m (96 in.)	146°C (295°F)	463°C-551°C (866°F-1023°F)
2.74 m (108 in.)	144°C (291°F)	515°C (960°F)
3.05 m (120 in.)	146°C (294°F)	542°C (1008°F)
3.35 m (132 in.)	--	--

*At 472 seconds after test initiation

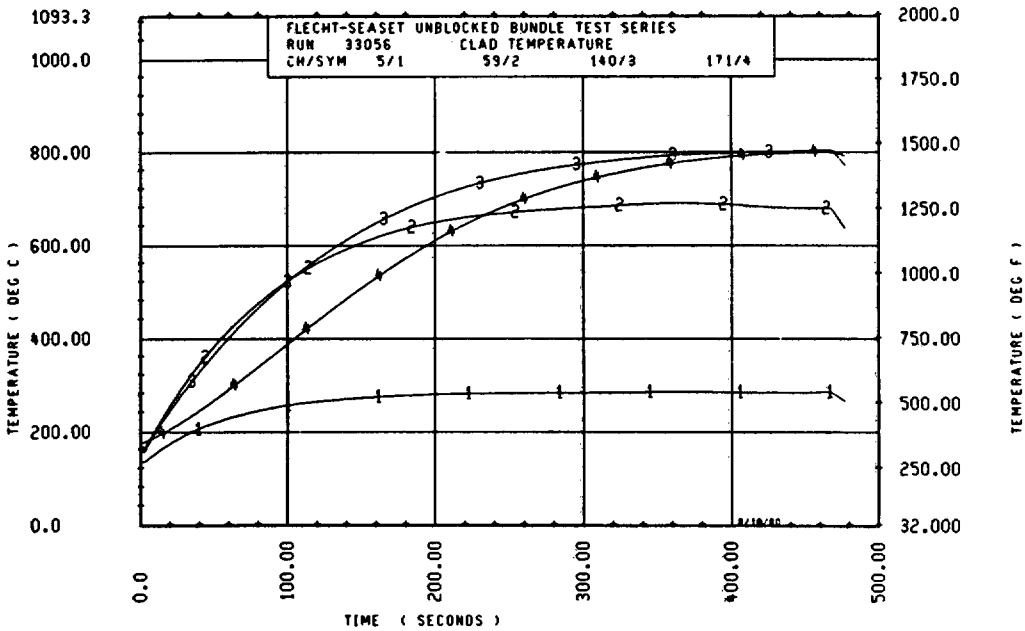
C. Comments

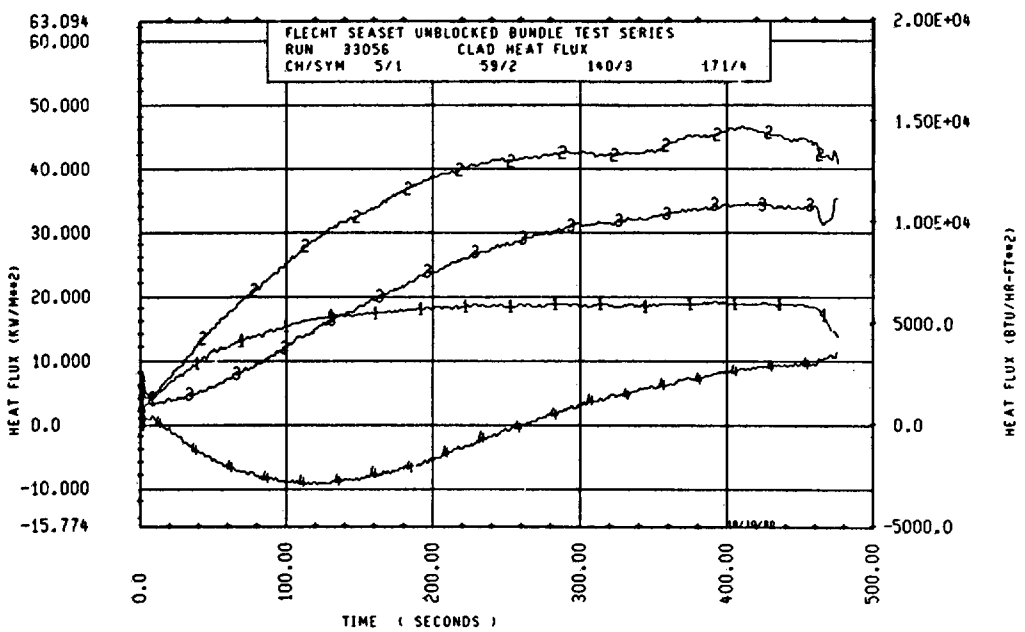
None

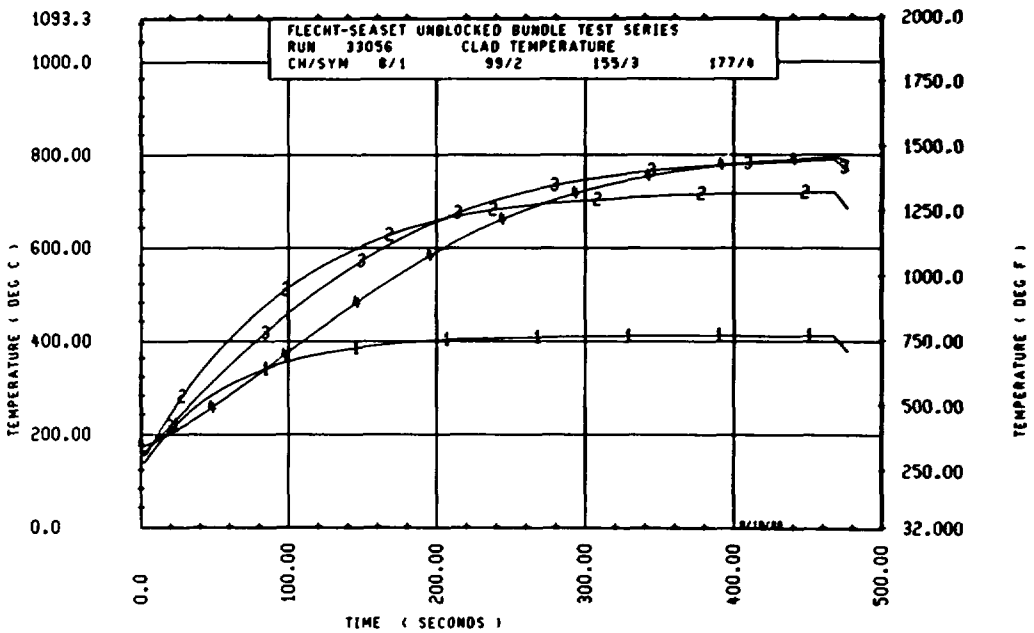

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33056 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1093.3
1000.0
800.00
600.00
400.00
200.00
0.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00

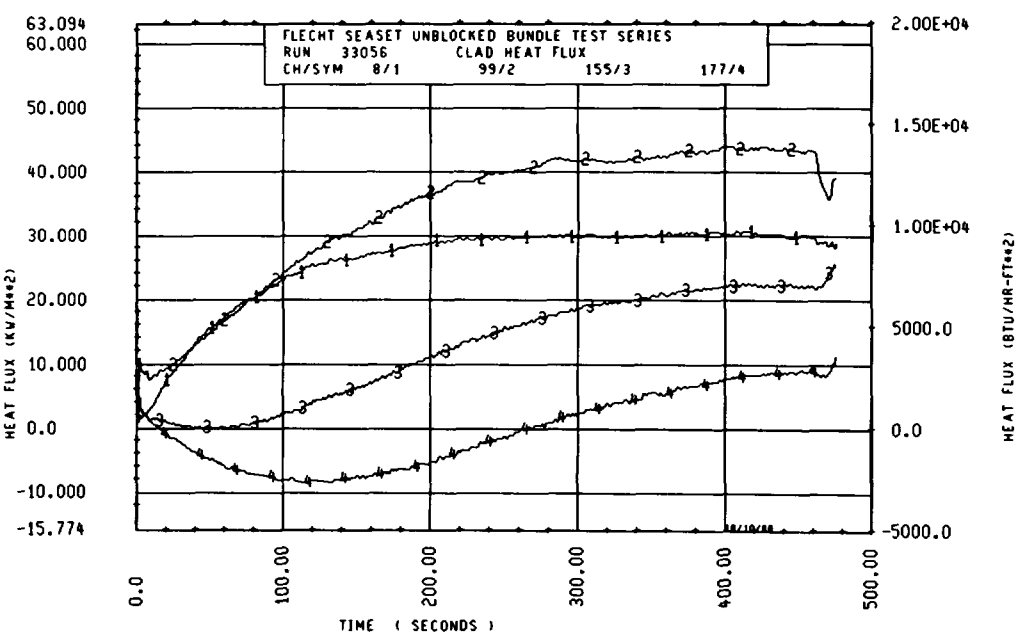

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33056 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
63.094
60.000
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
-15.774
2.00E+04
1.50E+04
1.00E+04
5000.0
0.0
-5000.0
0.0
100.00
200.00
300.00
400.00
500.00

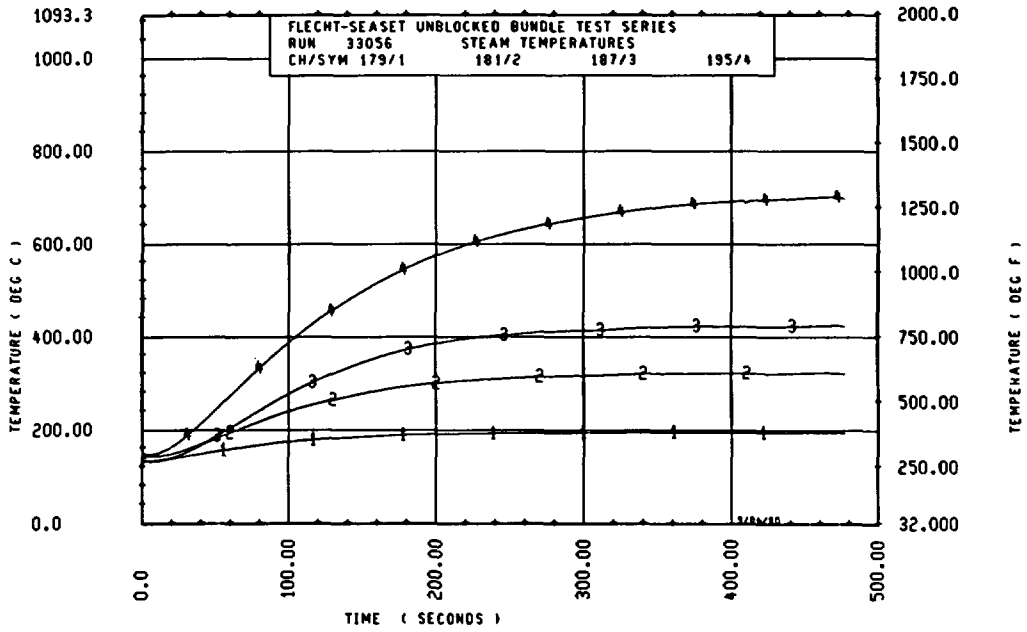
33056-2

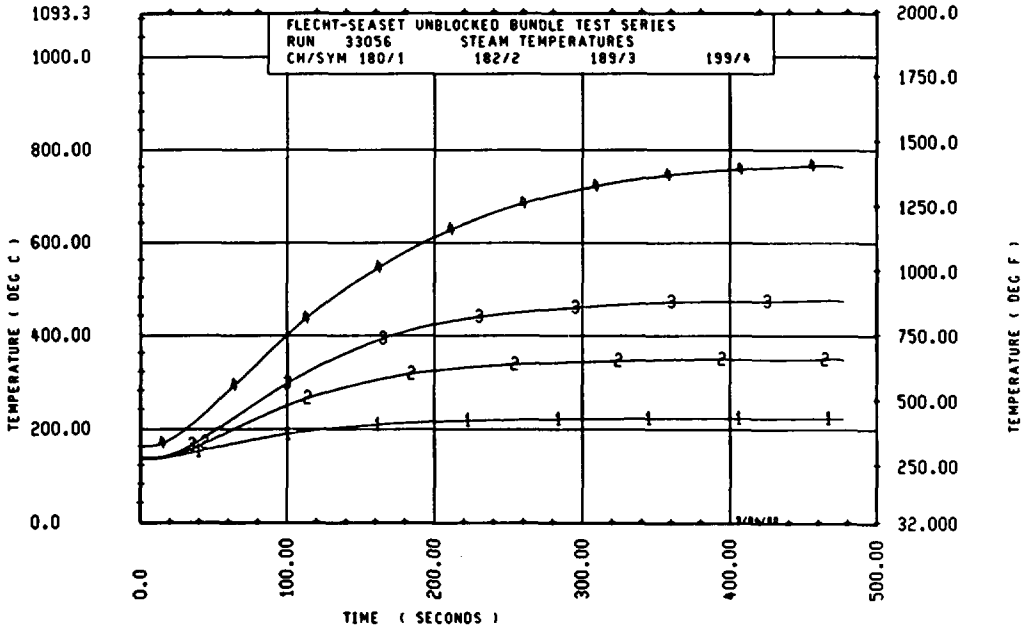

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33056 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1093.3
1000.0
800.00
600.00
400.00
200.00
0.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00

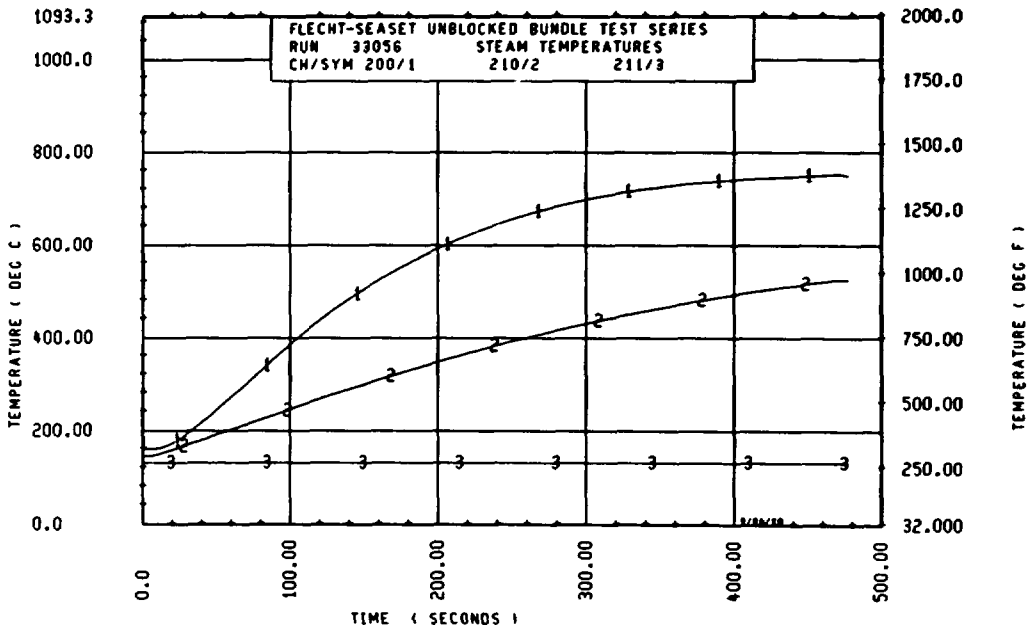

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33056 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
63.094
60.000
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
-15.774
2.00E+04
1.50E+04
1.00E+04
5000.0
0.0
-5000.0
0.0
100.00
200.00
300.00
400.00
500.00

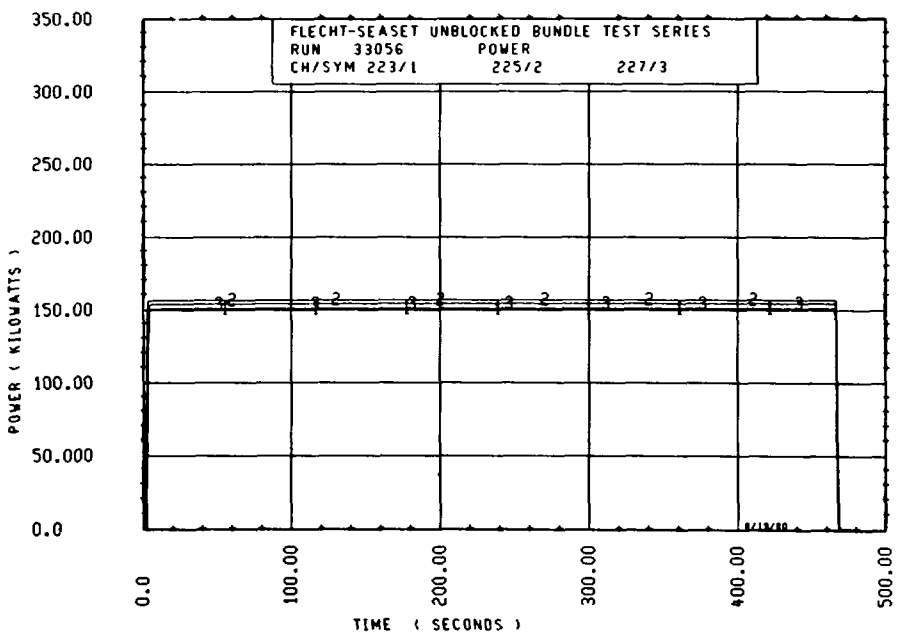

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33056 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1093.3
1000.0
800.00
600.00
400.00
200.00
0.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33056 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
63.094
60.000
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
-15.774
2.00E+04
1.50E+04
1.00E+04
5000.0
0.0
-5000.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33056 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1093.3
1000.0
800.00
600.00
400.00
200.00
0.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33056 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1093.3
1000.0
800.00
600.00
400.00
200.00
0.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33056 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1093.3
1000.0
800.00
600.00
400.00
200.00
0.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33056 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
TIME (SECONDS)
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 33338

Date: 7/9/79

Gravity Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at	871°C (1600°F) hot channel
1.83 m (72 in.) elevation	591°C (1096°F) cold channel
Rod peak power	2.3 kw/m (0.70 kw/ft) hot channel
	1.3 kw/m (0.40 kw/ft) cold channel
Flow rate	5.9 kg/sec (13 lb/sec) (15 sec)
	0.807 kg/sec (1.78 lb/sec) (onward)
Coolant temperature	52°C (125°F)
Bundle radial power profile	Hot/cold channels
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Hot Rod Quench Time Temperature*
0.61 m (24 in.)	121°C (250°F)	58°C (137°F)
1.22 m (48 in.)	131°C (267°F)	82°C (179°F)
1.83 m (72 in.)	132°C (269°F)	119°C-123°C (247°F-253°F)
2.44 m (96 in.)	128°C (262°F)	120°C (248°F)
2.74 m (108 in.)	128°C (262°F)	122°C (251°F)
3.05 m (120 in.)	126°C (258°F)	121°C (249°F)
3.35 m (132 in.)	126°C (258°F)	121°C (249°F)

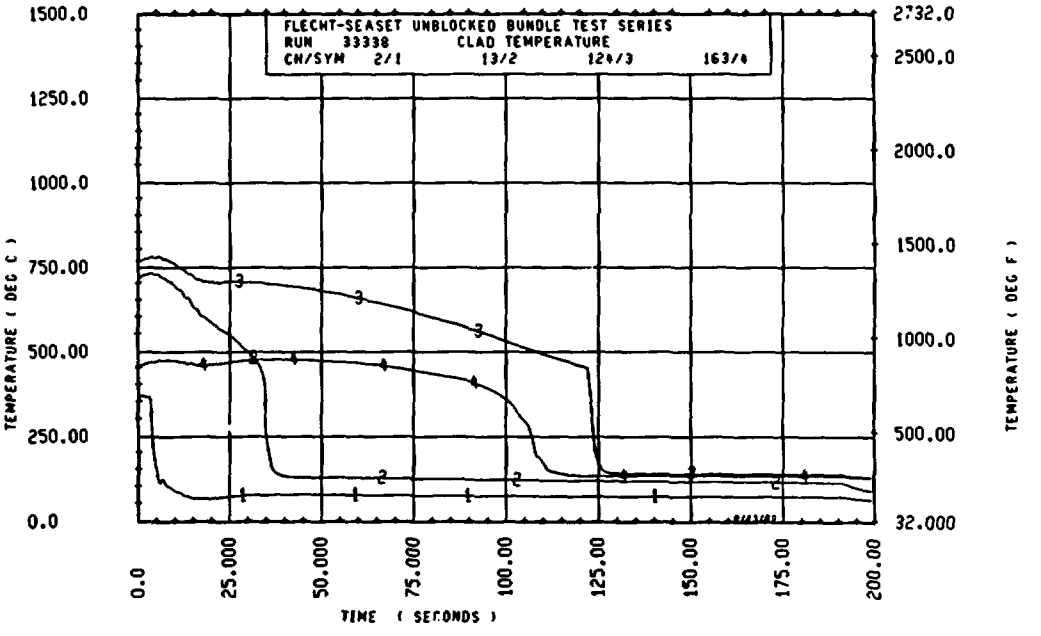
*At 76 seconds after flood

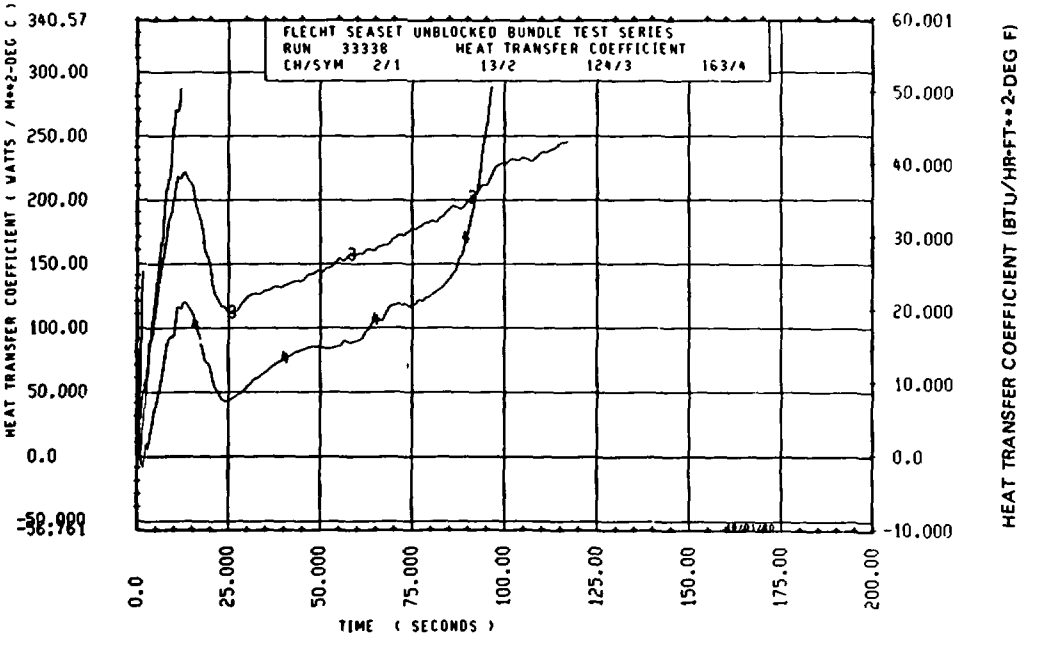
C. Comments

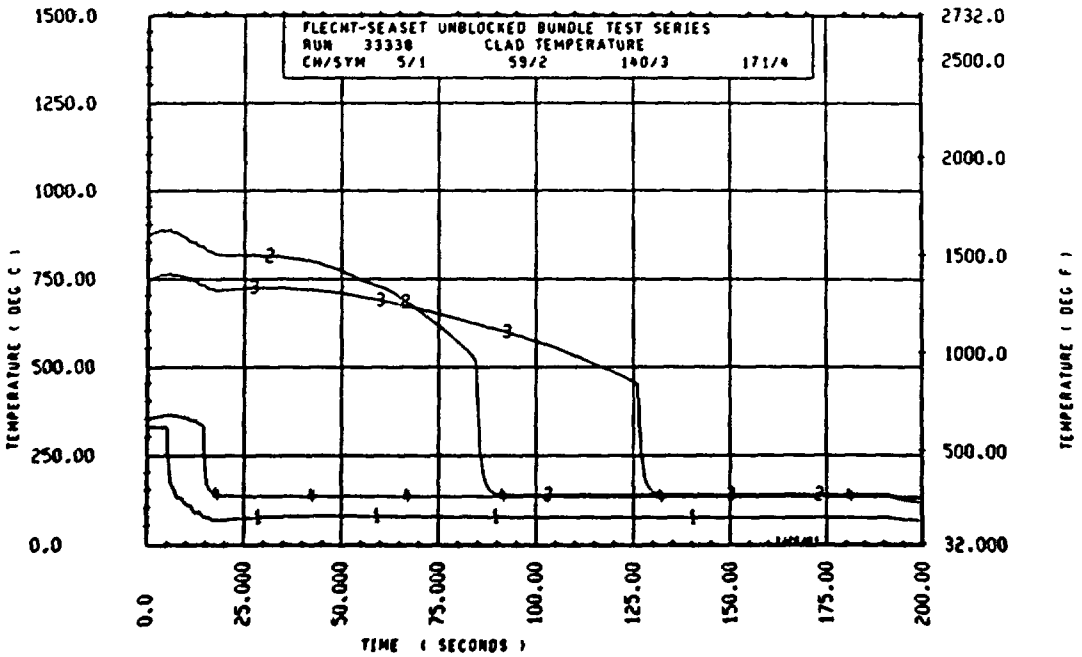
First flow step linearly decreased to approximately 84 percent of nominal value.

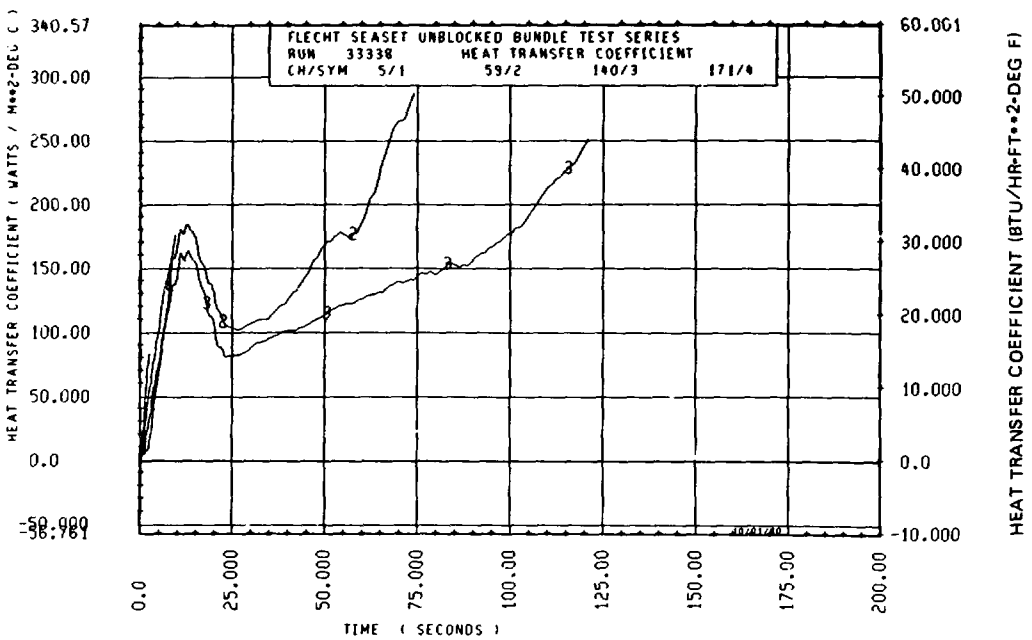
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 33338

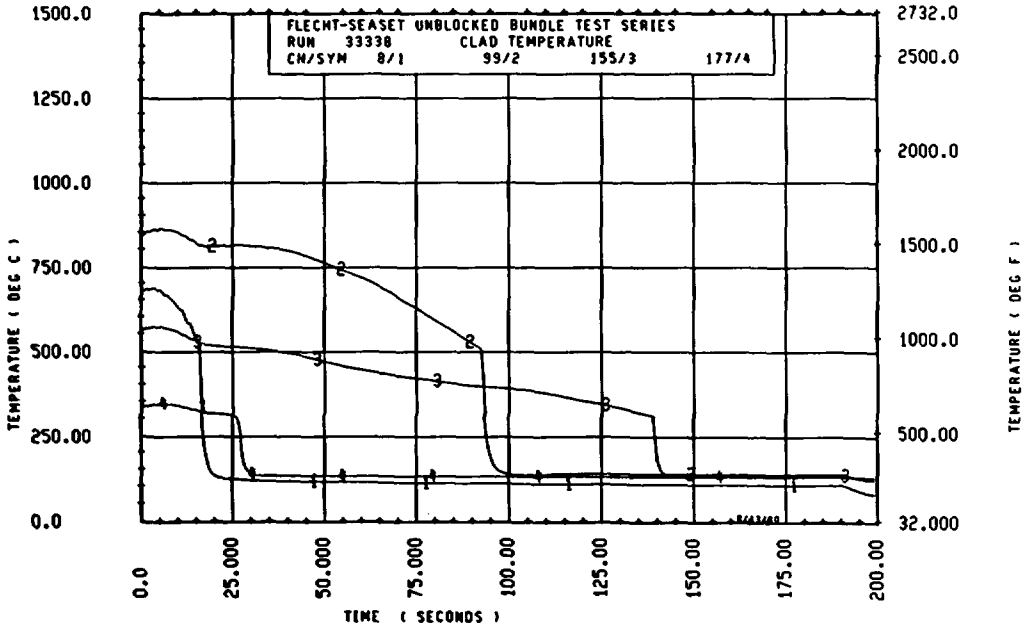
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	901.	916.	16.	3.5	736.	22.0
2H 6- 0	50	1087.	1111.	24.	5.5	781.	59.5
3C 5- 0	17	948.	965.	17.	5.5	738.	46.0
3C 5- 7	28	1002.	1019.	18.	5.5	709.	60.5
4L 8- 0	129	942.	968.	26.	5.5	687.	99.5
4L 8- 6	147	941.	966.	25.	5.5	687.	100.0
5E11- 0	168	643.	658.	16.	5.5	593.	15.0
5J 4- 0	12	1223.	1245.	22.	3.5	795.	35.8
5J 8- 6	146	1109.	1133.	24.	3.5	824.	100.0
5J11- 6	175	614.	630.	16.	5.5	523.	30.0
7B 6- 0	57	1056.	1081.	25.	5.5	859.	37.0
7B 8- 6	142	810.	830.	21.	5.5	759.	14.9
7B10- 0	162	618.	639.	21.	5.5	566.	59.9
7B11- 6	176	504.	515.	11.	5.5	477.	16.0
7D 6- 4	84	[illegible]92.	1628.	36.	5.5	1029.	77.0
7D 7- 6	119	[illegible]4.	1451.	27.	3.5	904.	99.6
7D 9- 3	151	[illegible]09.	1036.	27.	5.5	678.	123.0
7G 5- 0	23	1540.	1565.	25.	3.5	853.	57.3
7J 6- 0	59	1600.	1632.	32.	5.5	962.	84.5
7M 7- 6	120	1052.	1077.	25.	5.5	731.	90.5
7M 8- 0	132	953.	983.	30.	5.5	701.	99.8
7M 9- 3	152	750.	773.	23.	5.5	691.	19.0
8H 4- 0	13	1325.	1351.	26.	3.5	816.	33.9
8H10- 0	163	854.	892.	38.	38.0	524.	106.6
8H11- 6	177	638.	656.	18.	5.5	559.	26.9
8K 4- 0	14	1287.	1311.	24.	3.5	752.	34.5
8K 6- 6	99	1547.	1590.	42.	5.5	943.	92.7
8K 8- 0	140	1374.	1411.	37.	5.5	847.	126.0
8K10- 0	164	854.	889.	35.	39.0	450.	119.8
8N 2- 0	5	625.	631.	6.	1.5	627.	4.6
8N 4- 0	15	912.	928.	16.	3.5	735.	22.8
8N 6- 0	61	1088.	1108.	20.	3.5	1041.	10.2
8N10- 0	165	616.	642.	25.	7.5	608.	34.0
9C 7- 0	109	1076.	1107.	31.	5.5	806.	71.3
9C 9- 3	153	789.	812.	23.	5.5	711.	32.4
9G 1- 0	2	695.	699.	4.	1.0	695.	3.4
9G 3- 3	8	1254.	1271.	18.	3.5	969.	16.0
9G11- 0	171	672.	690.	18.	5.5	637.	14.5
9I 5- 0	24	1558.	1585.	27.	3.5	889.	57.0
9E 6- 2	46	1568.	1603.	35.	5.5	823.	92.5
10D 6- 6	93	1230.	1269.	40.	5.5	793.	76.2
11E 7- 6	124	1409.	1439.	30.	5.5	844.	122.2
11E 9- 3	155	1046.	1067.	21.	5.5	590.	139.0
11E11- 0	172	670.	685.	15.	5.5	627.	14.0
12D 4- 0	16	926.	944.	18.	3.5	738.	24.2
12D 6- 0	66	1138.	1162.	24.	3.5	839.	67.4
12F 6- 6	102	1229.	1269.	41.	5.5	908.	73.9

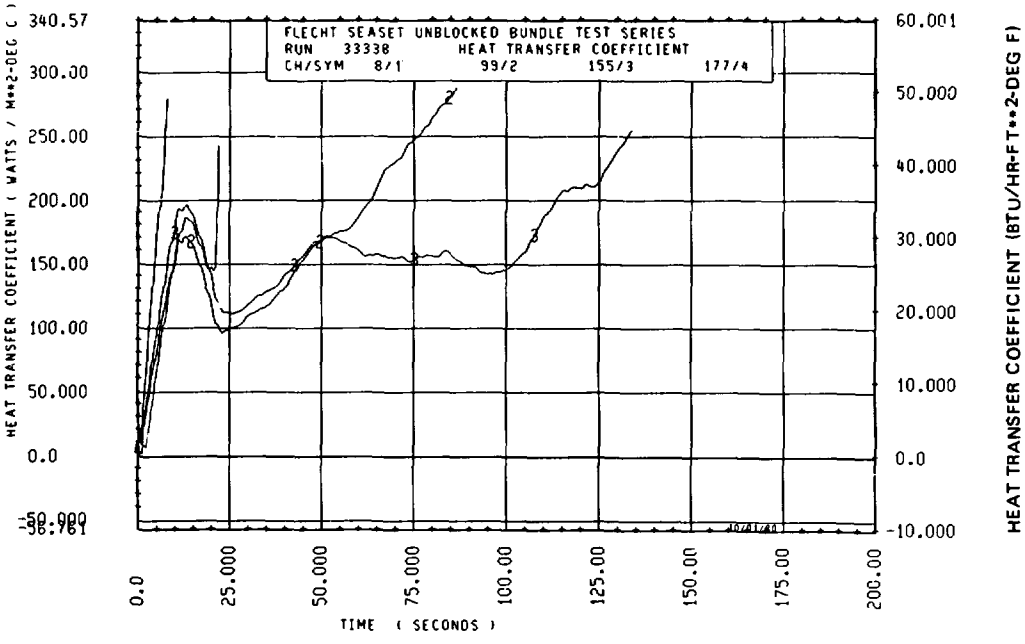

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

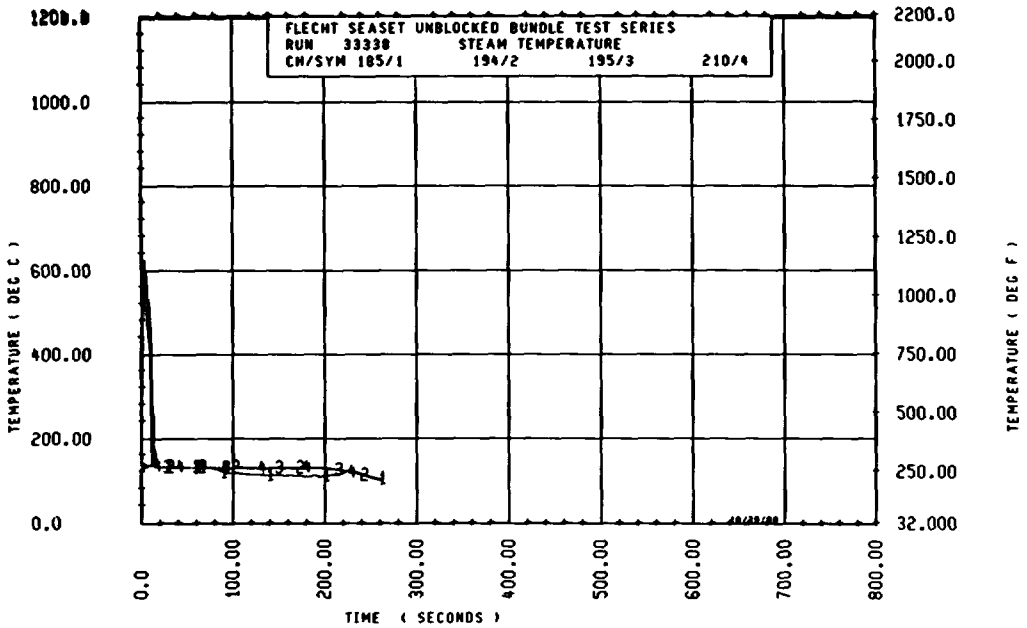

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

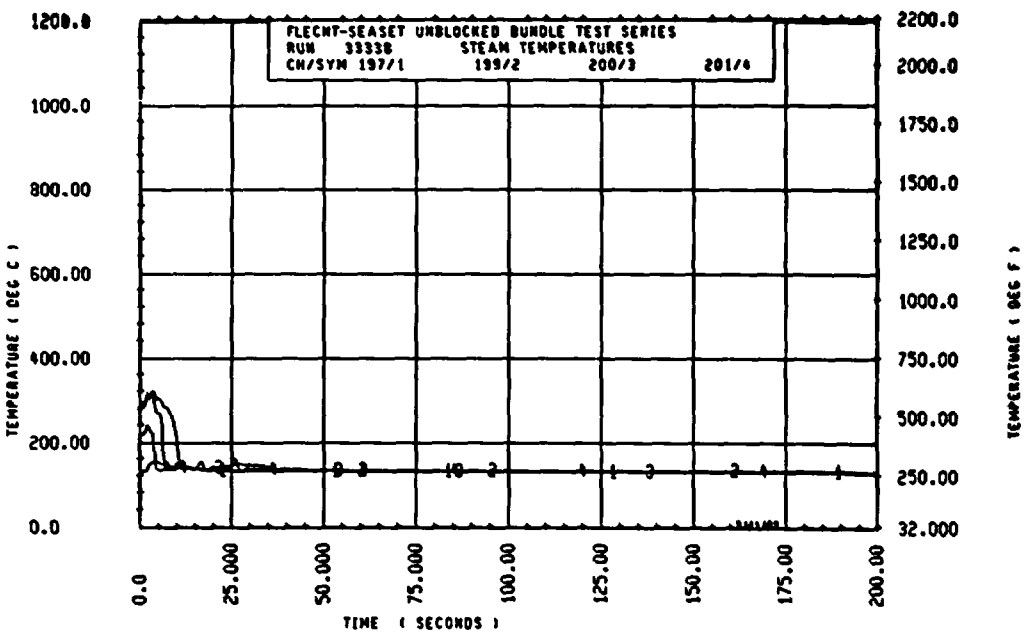

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

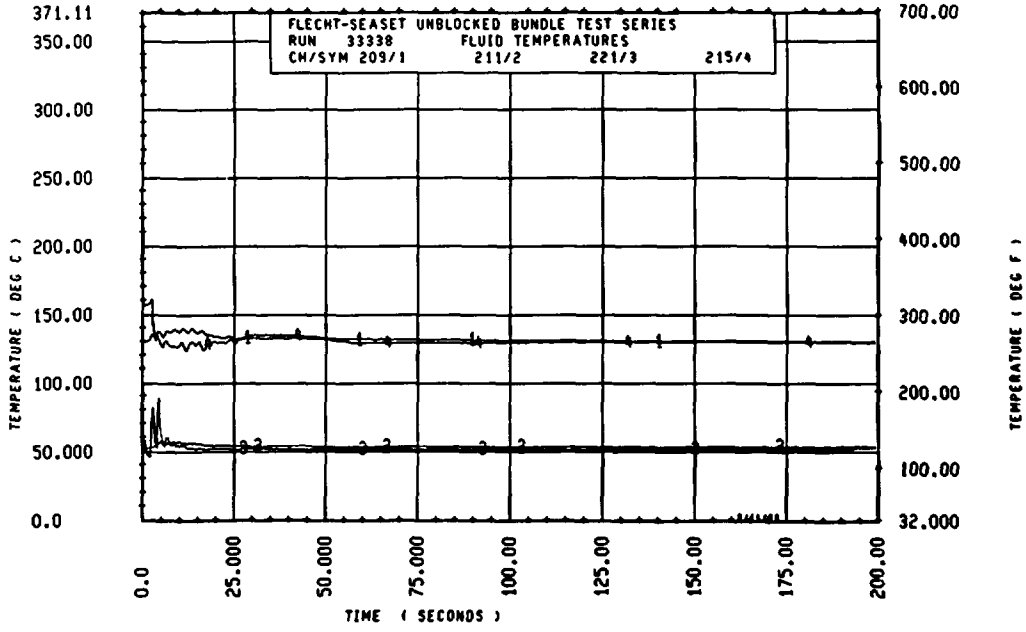

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

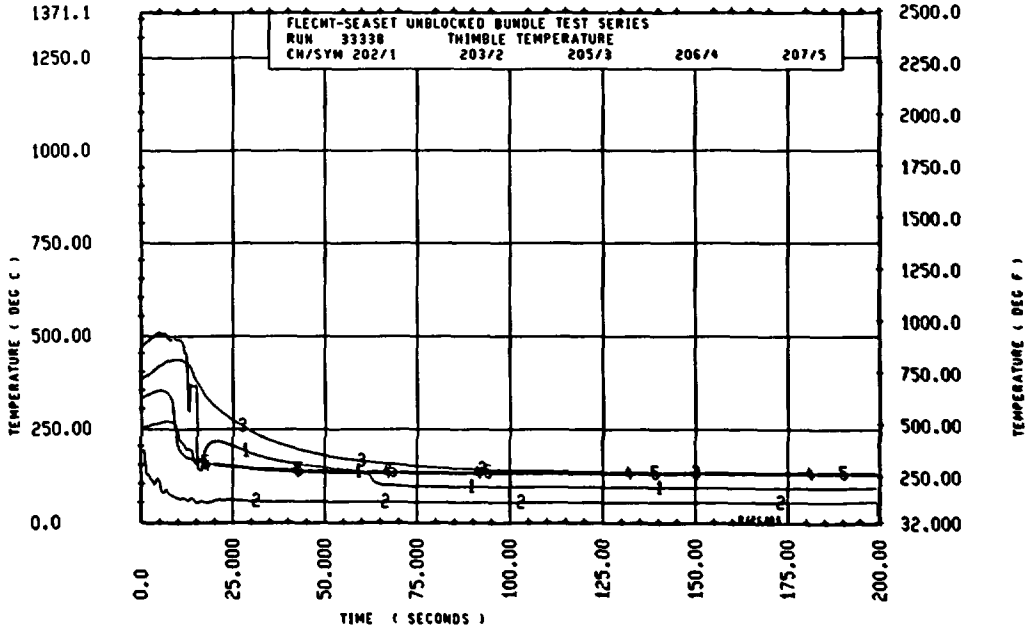

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

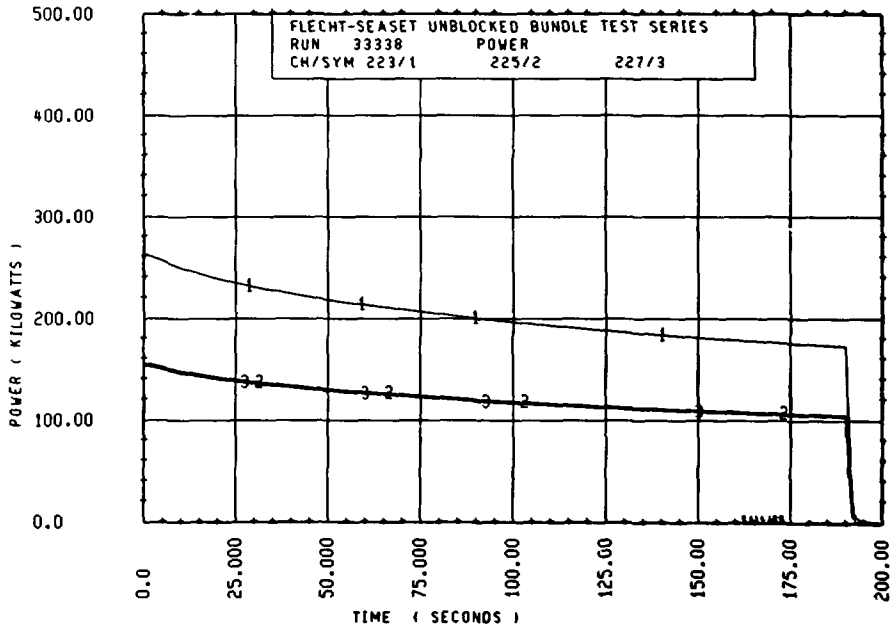

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

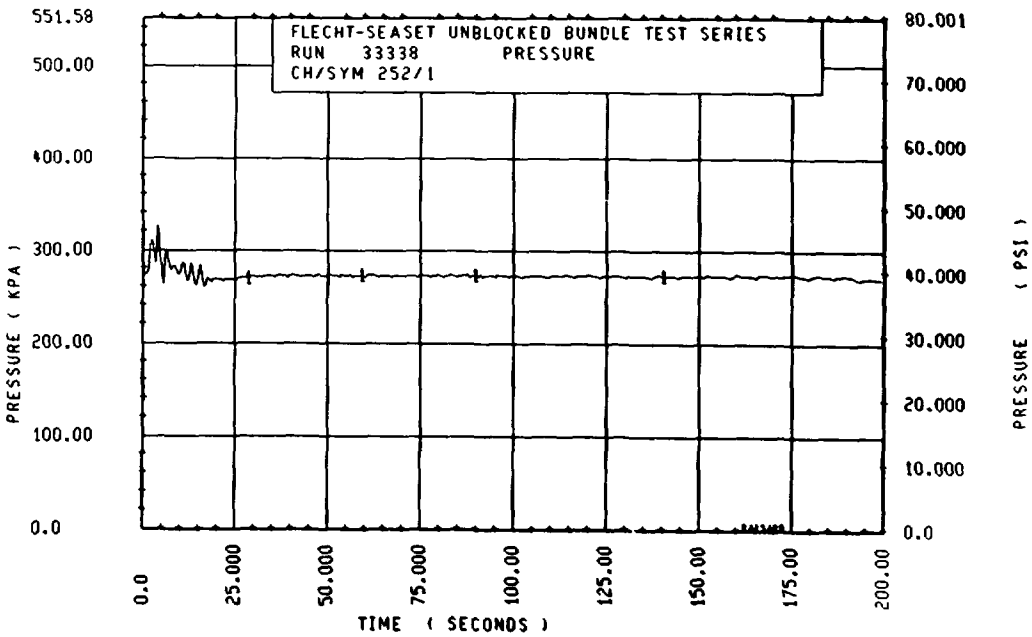

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

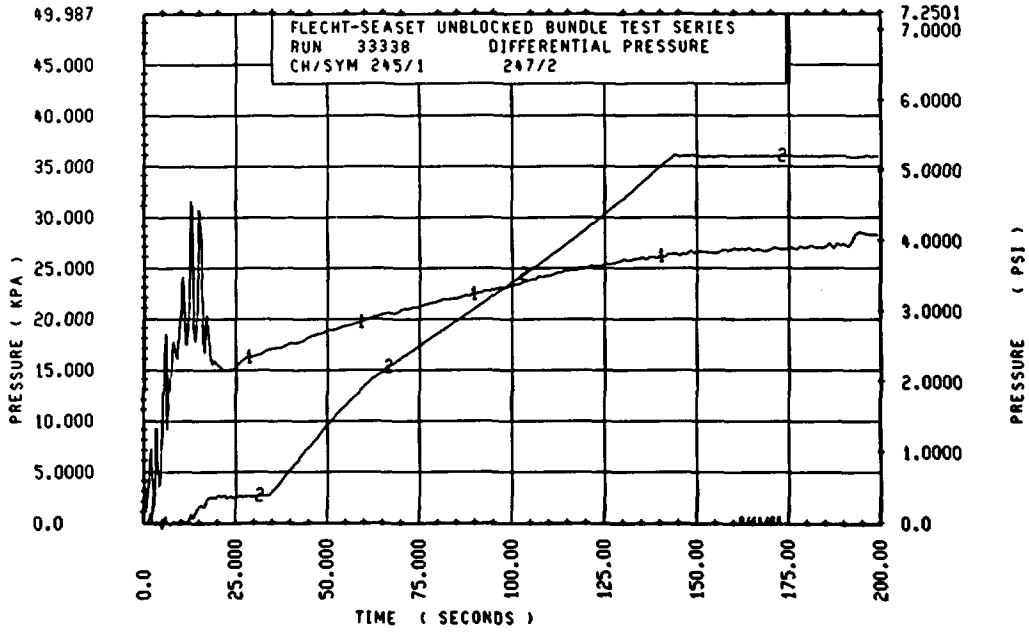


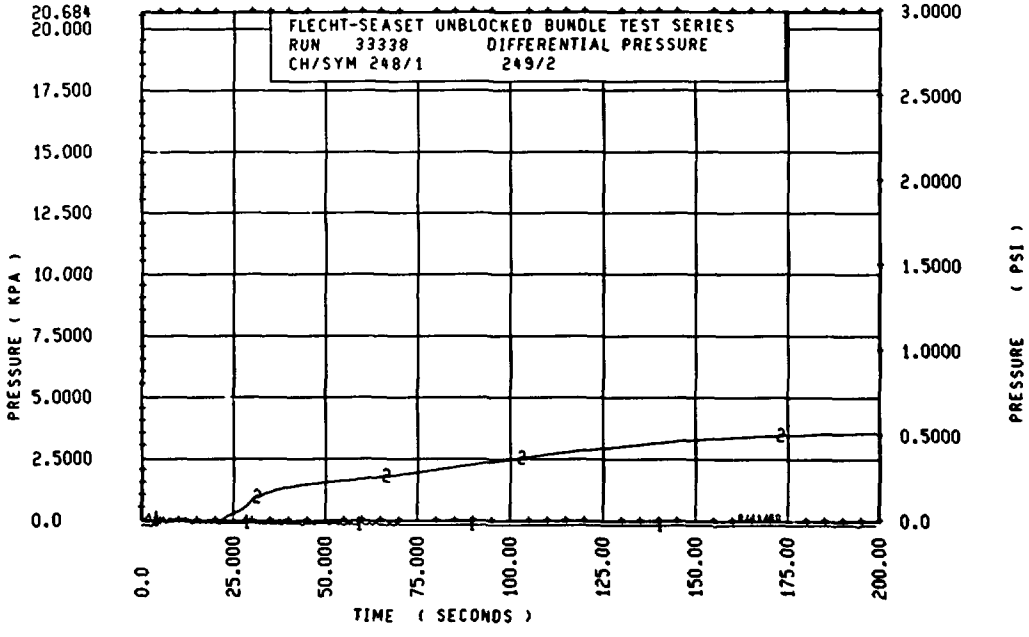


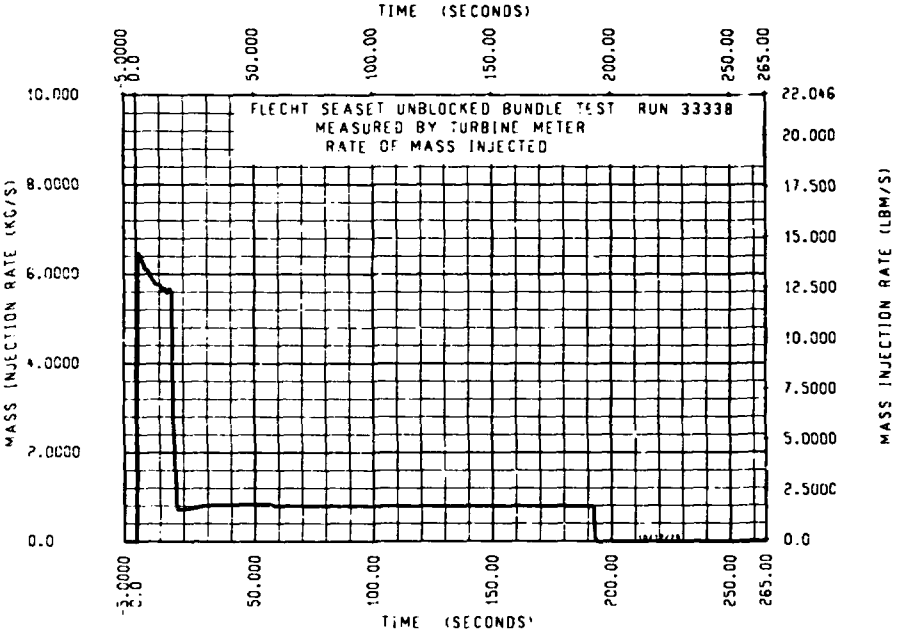
CH 202-4I, 1.52 m (60 in.); CH 203-7L, 0.30 m (12 in.); CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

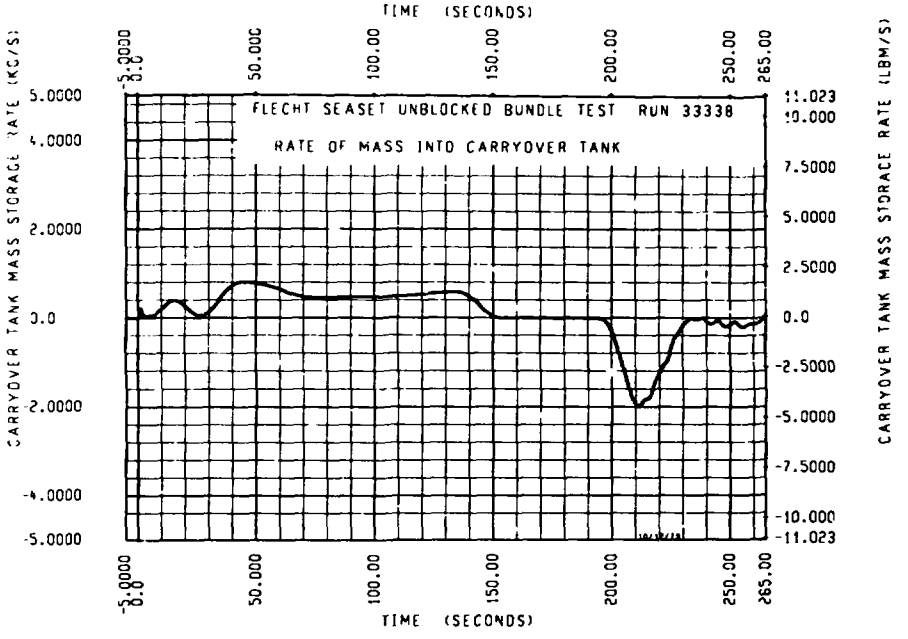

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

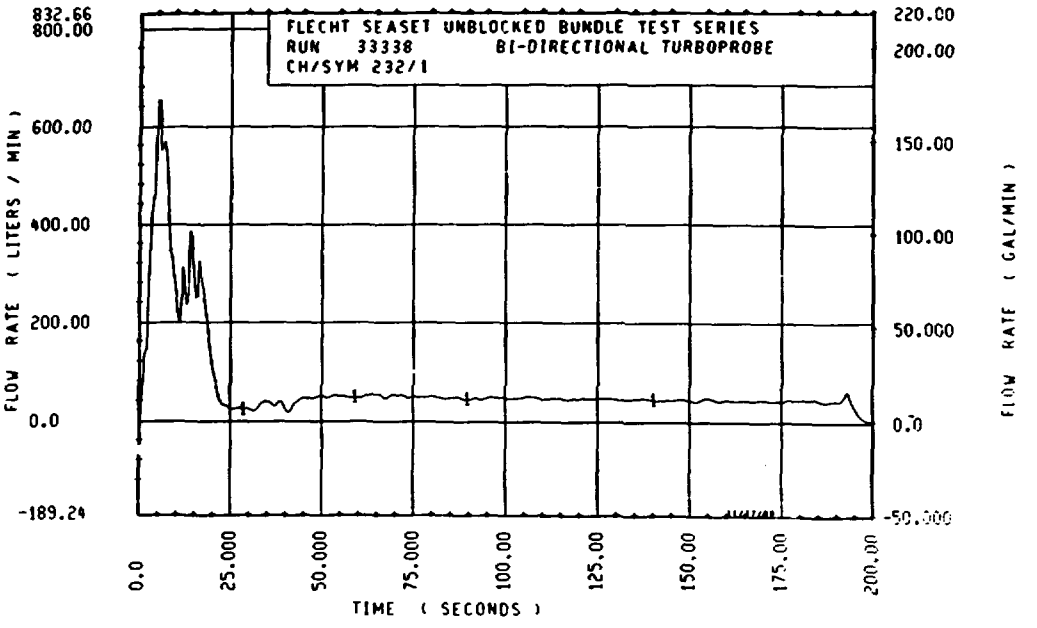

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

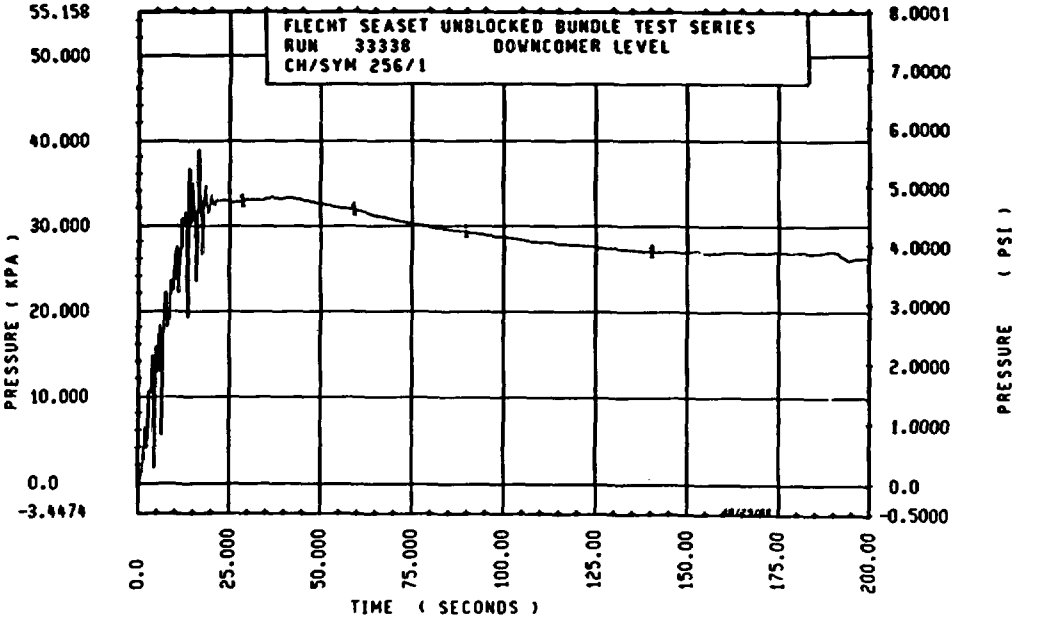

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

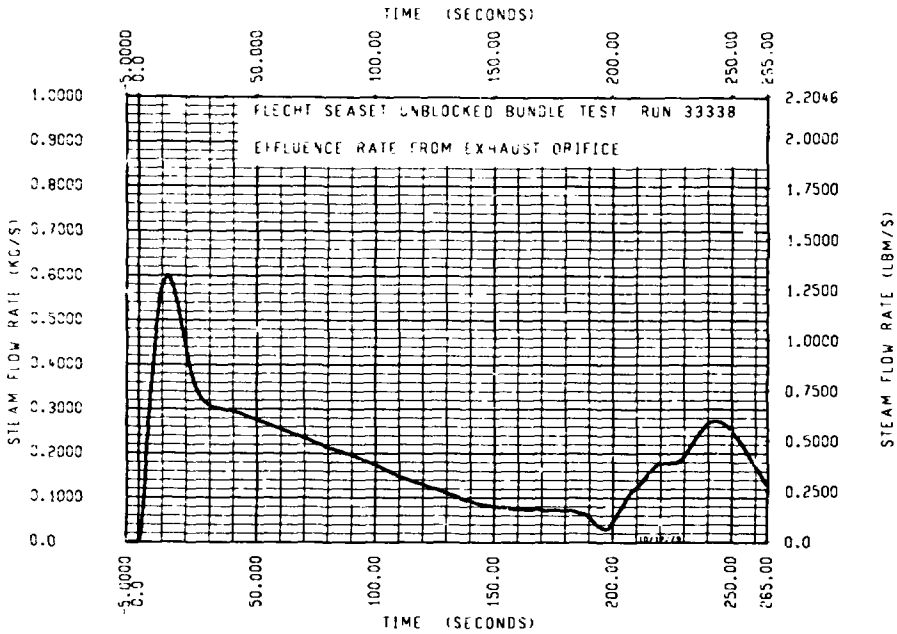

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

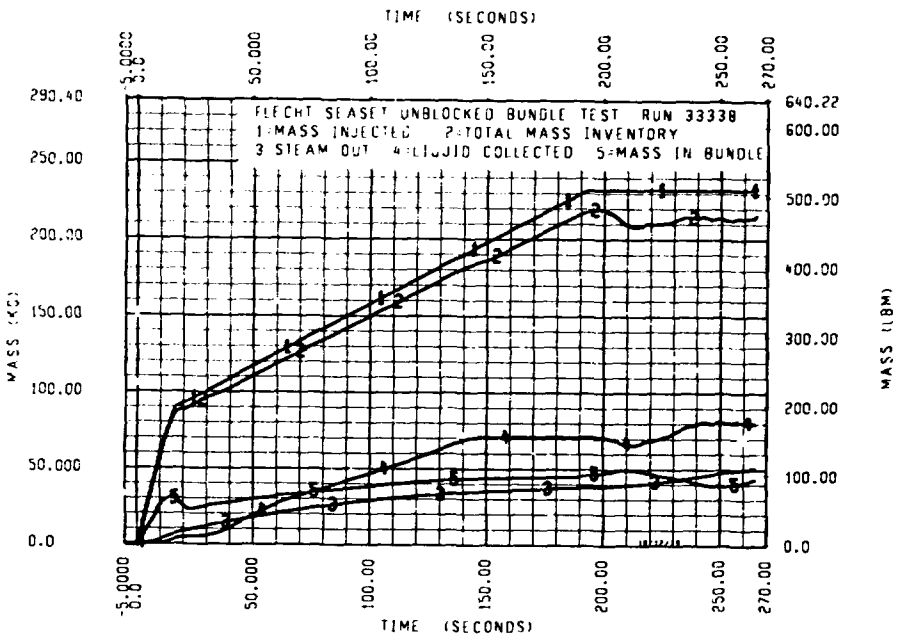

TIME (SECONDS)
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
265.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33338
MEASURED BY TURBINE METER
RATE OF MASS INJECTED
MASS INJECTION RATE (KG/S)
10.000
8.0000
6.0000
4.0000
2.0000
0.0
MASS INJECTION RATE (LBM/S)
22.046
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0

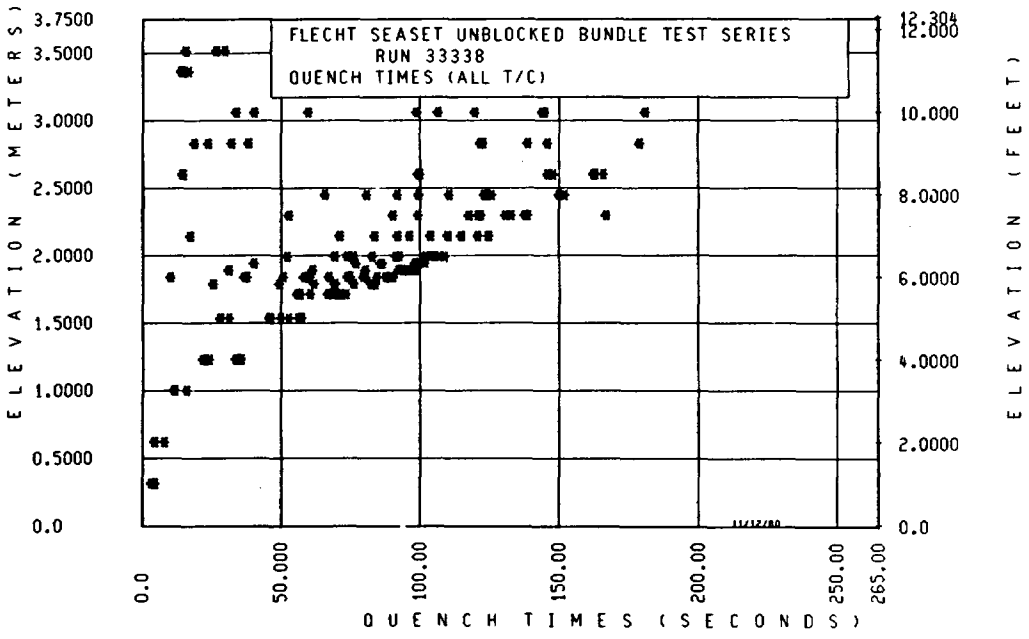

TIME (SECONDS)
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
265.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33338
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
5.0000
4.0000
2.0000
0.0
-2.0000
-4.0000
-5.0000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
11.023
10.000
7.5000
5.0000
2.5000
0.0
-2.5000
-5.0000
-7.5000
-10.000
-11.023

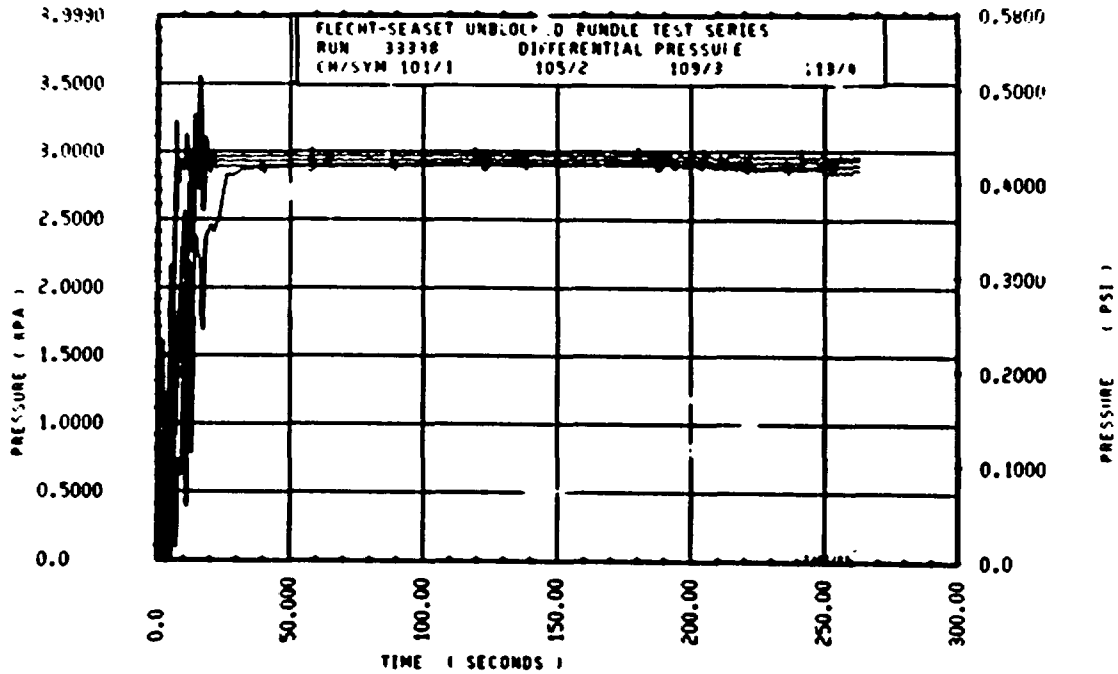

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 BI-DIRECTIONAL TURBOPROBE
CH/SYM 232/1
832.66
800.00
600.00
400.00
200.00
0.0
-189.24
FLOW RATE (LITERS / MIN)
220.00
200.00
150.00
100.00
50.000
0.0
-50.000
FLOW RATE (GAL/MIN)
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

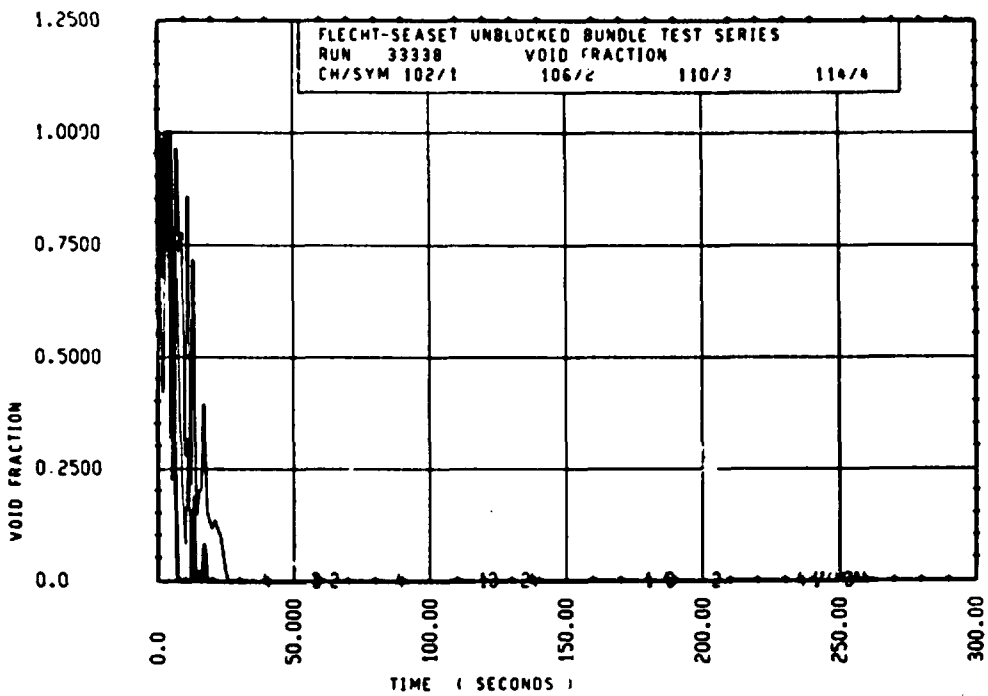

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 DOWNCOMER LEVEL
CH/SYM 256/1
55.158
50.000
40.000
30.000
20.000
10.000
0.0
-3.4474
PRESSURE (KPA)
8.0001
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-0.5000
PRESSURE (PSI)
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

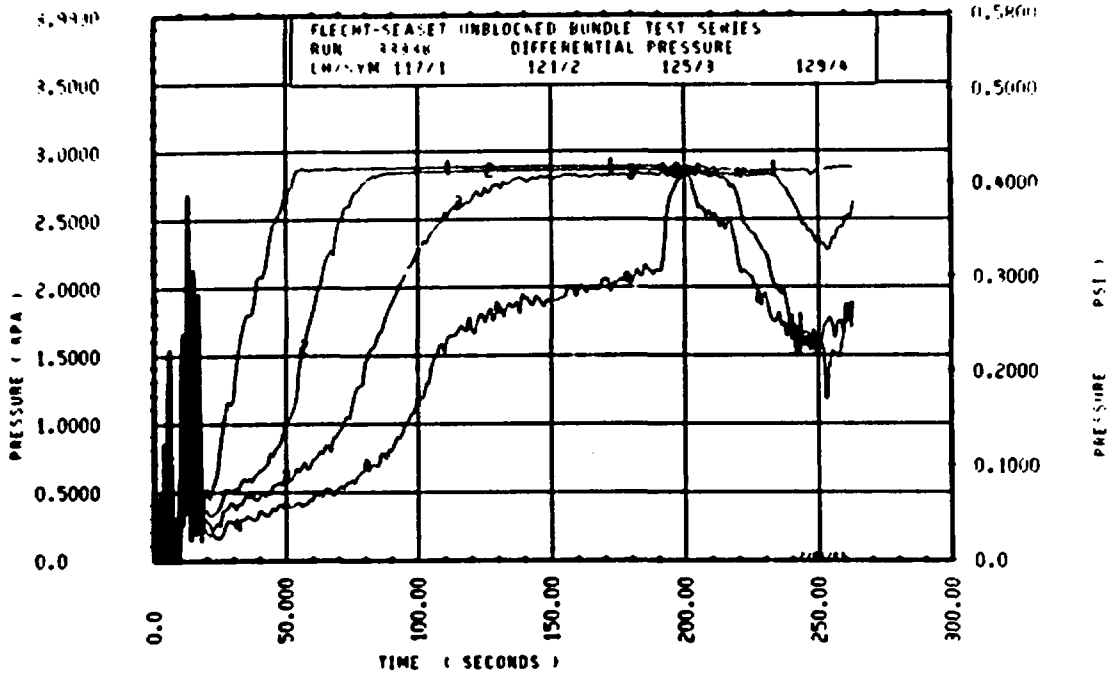

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33338
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
265.00
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
2.2046
2.0000
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0

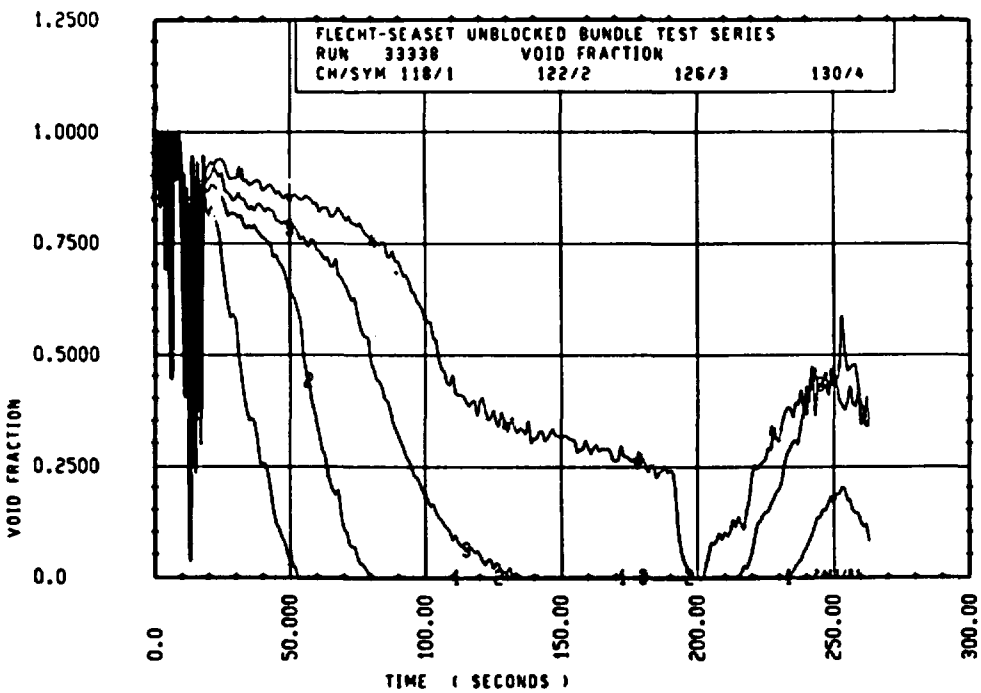

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33338
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3 STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
270.00
290.40
250.00
200.00
150.00
100.00
50.000
0.0
640.22
600.00
500.00
400.00
300.00
200.00
100.00
0.0

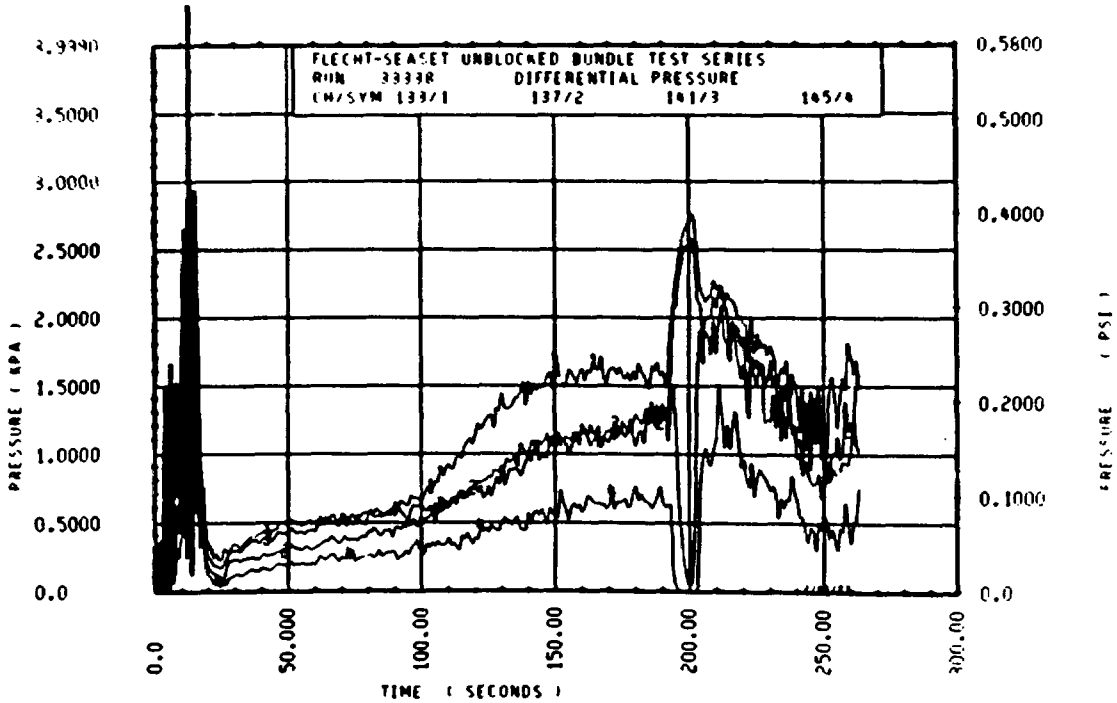

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
265.00
QUENCH TIMES (SECONDS)

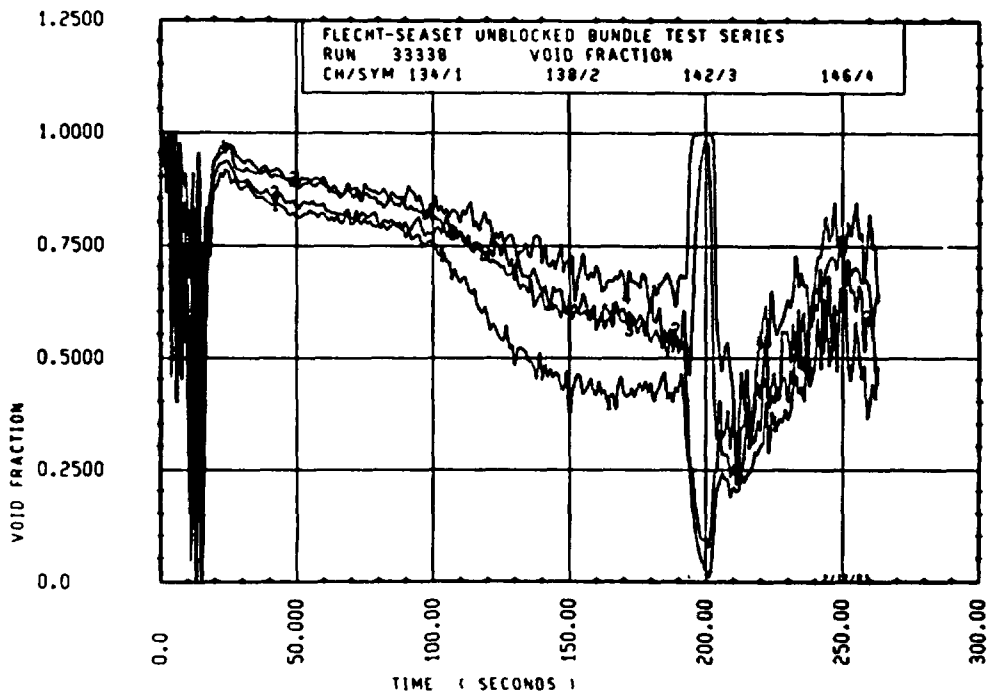

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
0.5000
1.0000
1.5000
2.0000
2.5000
3.0000
3.5000
0.1000
0.2000
0.3000
0.4000
0.5000
0.5800
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
0.0
0.2500
0.5000
0.7500
1.0000
1.2500
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
0.5000
1.0000
1.5000
2.0000
2.5000
3.0000
3.5000
0.1000
0.2000
0.3000
0.4000
0.5000
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
0.0
0.2500
0.5000
0.7500
1.0000
1.2500
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
0.5000
1.0000
1.5000
2.0000
2.5000
3.0000
3.5000
0.1000
0.2000
0.3000
0.4000
0.5000
0.5800
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33338 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
0.0
0.2500
0.5000
0.7500
1.0000
1.2500
50.000
100.00
150.00
200.00
250.00
300.00

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 33436
Date: 7/10/79
Gravity Reflood Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	878°C (1611°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	5.80 kg/sec (12.8 lb/sec) (15 sec)
	0.785 kg/sec (1.73 lb/sec) (onward)
Coolant temperature	52°C (125°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Hot Rod Quench Time Temperature*
0.61 m (24 in.)	133°C (272°F)	65°C (149°F)
1.22 m (48 in.)	146°C (295°F)	93°C (200°F)
1.83 m (72 in.)	164°C-294°C (328°F-562°F)	129°C (265°F)
2.44 m (96 in.)	274°C-279°C (525°F-534°F)	128°C (262°F)
2.74 m (108 in.)	141°C-157°C (285°F-314°F)	128°C (262°F)
3.05 m (120 in.)	136°C (277°F)	127°C (261°F)
3.35 m (132 in.)	136°C (277°F)	127°C (260°F)

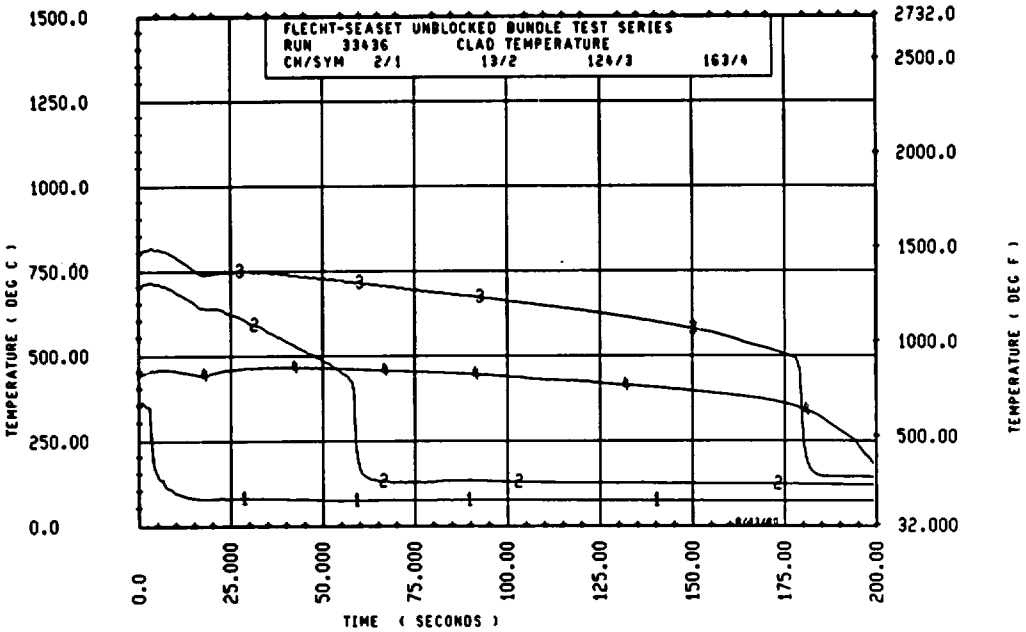
*At 121 seconds after flood

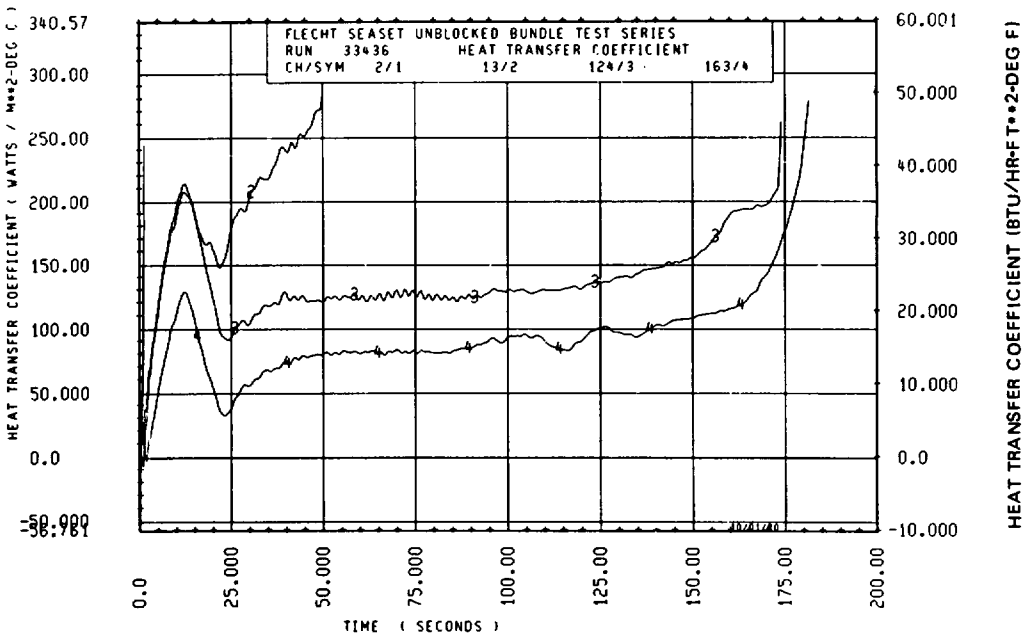
C. Comments

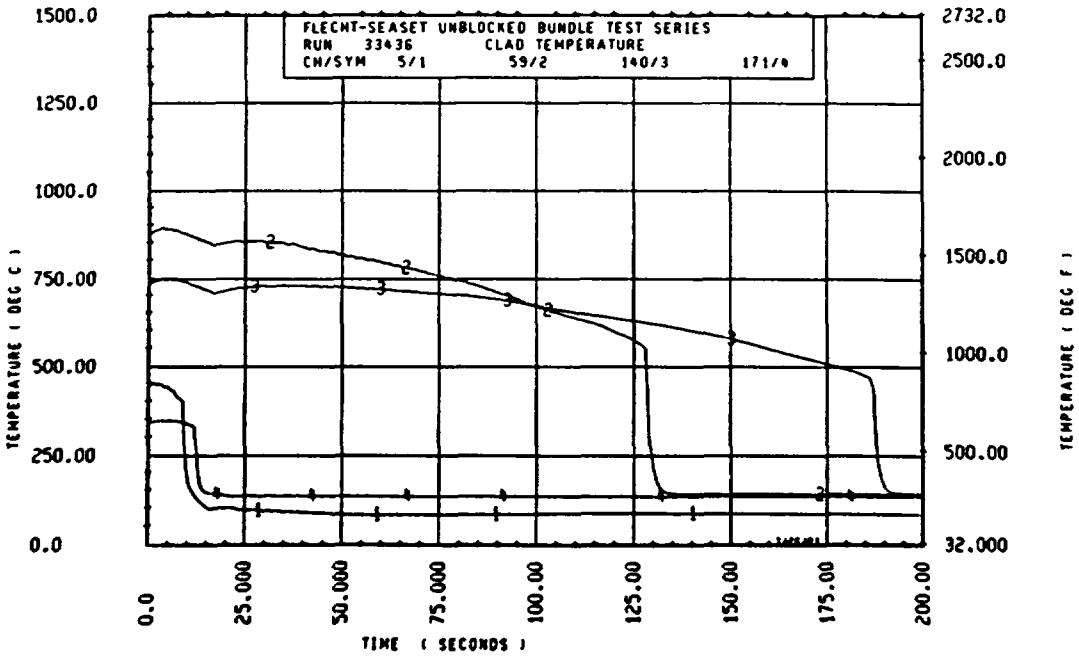
First flow step linearly decreased to approximately 80 percent of nominal value.

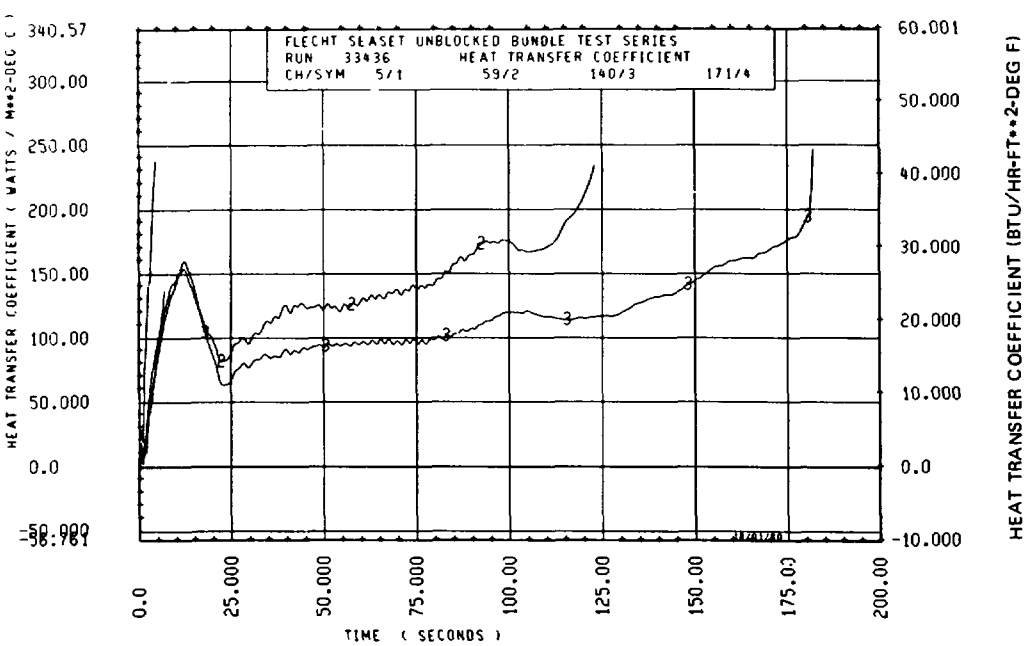
FLECHT SEASET UNPLOCKED BUNDLE TEST SERIES
RUN NUMBER 33436

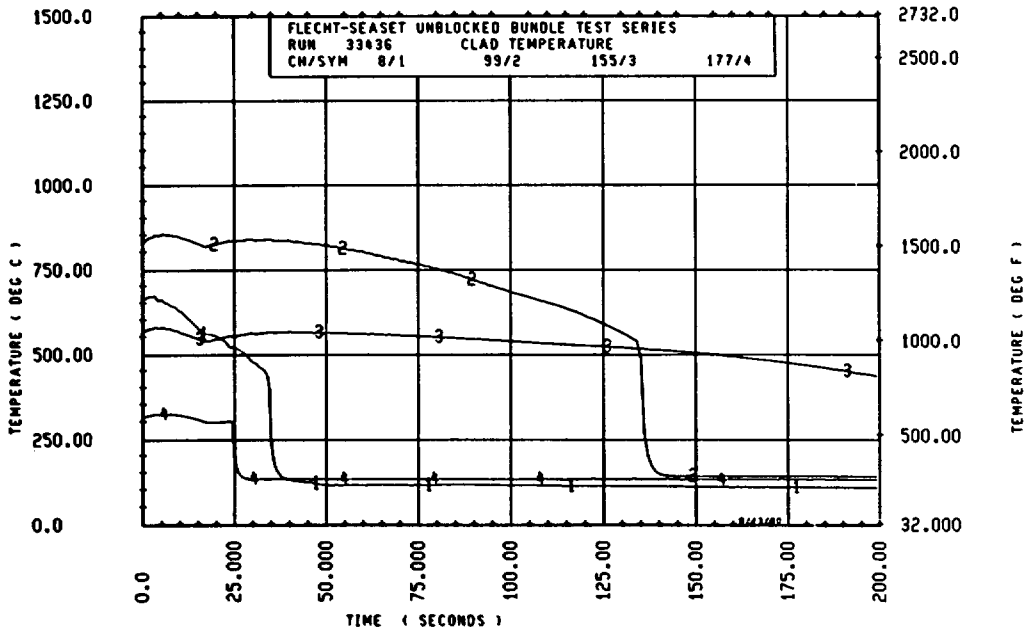
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1262.	1284.	22.	3.5	746.	58.0
2H 6- 0	50	1542.	1571.	29.	3.5	967.	123.0
3C 5- 0	17	1341.	1365.	23.	3.5	827.	99.0
3C 5- 7	28	1425.	1448.	24.	3.5	811.	119.0
4L 8- 0	129	1318.	1351.	33.	3.5	802.	188.0
4L 8- 6	147	1319.	1352.	32.	3.5	802.	188.0
5E11- 0	168	645.	659.	14.	3.5	591.	15.4
5J 4- 0	12	1252.	1277.	24.	3.5	753.	58.4
5J 8- 6	146	1122.	1151.	28.	3.5	815.	143.9
5J11- 6	175	610.	625.	14.	5.5	572.	29.0
7B 6- 0	57	1482.	1512.	30.	3.5	798.	111.0
7B 8- 6	142	1112.	1141.	29.	3.5	714.	213.1
7B10- 0	162	828.	858.	31.	7.0	579.	245.0
7B11- 6	174	642.	657.	15.	5.5	286.	244.0
7D 6- 4	84	1609.	1646.	37.	3.5	1060.	11[illegible].8
7D 7- 6	119	1455.	1484.	29.	3.5	855.	161.0
7D 9- 3	151	1016.	1042.	26.	3.5	640.	198.0
7G 5- 0	23	1506.	1533.	27.	3.5	881.	91.3
7J 6- 0	59	1608.	1645.	37.	3.5	1029.	128.0
7M 7- 6	120	1465.	1494.	29.	3.5	906.	168.0
7M 8- 0	132	1330.	1364.	34.	5.5	887.	184.0
7M 9- 3	152	1021.	1046.	25.	3.5	678.	193.0
8H 4- 0	13	1298.	1323.	24.	3.5	788.	58.4
8H10- 0	163	831.	872.	41.	40.0	280.	204.0
8H11- 6	177	603.	619.	17.	5.5	575.	24.5
8K 4- 0	14	1274.	1299.	24.	3.5	781.	56.7
8K 6- 6	99	1528.	1572.	44.	5.5	994.	134.8
8K 8- 0	140	1354.	1386.	31.	3.5	868.	186.9
8K10- 0	164	834.	860.	46.	42.0	683.	138.8
8N 2- 0	5	839.	848.	9.	1.5	759.	9.0
8N 4- 0	15	1276.	1301.	25.	3.5	778.	57.4
8N 6- 0	61	1542.	1574.	32.	3.5	828.	121.2
8N10- 0	165	830.	919.	89.	76.0	592.	235.0
9C 7- 0	109	1457.	1489.	32.	3.5	992.	117.8
9C 9- 3	153	1035.	1061.	26.	3.5	820.	172.7
9G 1- 0	2	681.	686.	5.	1.0	662.	3.0
9G 3- 3	8	1227.	1243.	16.	3.0	799.	34.4
9G11- 0	171	650.	664.	13.	3.5	627.	12.0
9I 5- 0	24	1528.	1557.	29.	3.5	922.	91.1
9E 6- 2	46	1567.	1603.	35.	3.5	833.	141.0
10D 6- 6	93	1515.	1544.	29.	3.5	772.	144.0
11E 7- 6	124	1475.	1505.	30.	3.5	910.	178.9
11E 9- 3	153	1054.	1080.	26.	3.5	656.	231.6
11E11- 0	172	664.	678.	14.	5.5	635.	13.4
12D 4- 0	16	1287.	1311.	24.	3.5	791.	57.5
12D 6- 0	66	1568.	1600.	32.	3.5	957.	127.0
12F 6- 6	102	1552.	1588.	37.	3.5	970.	134.5

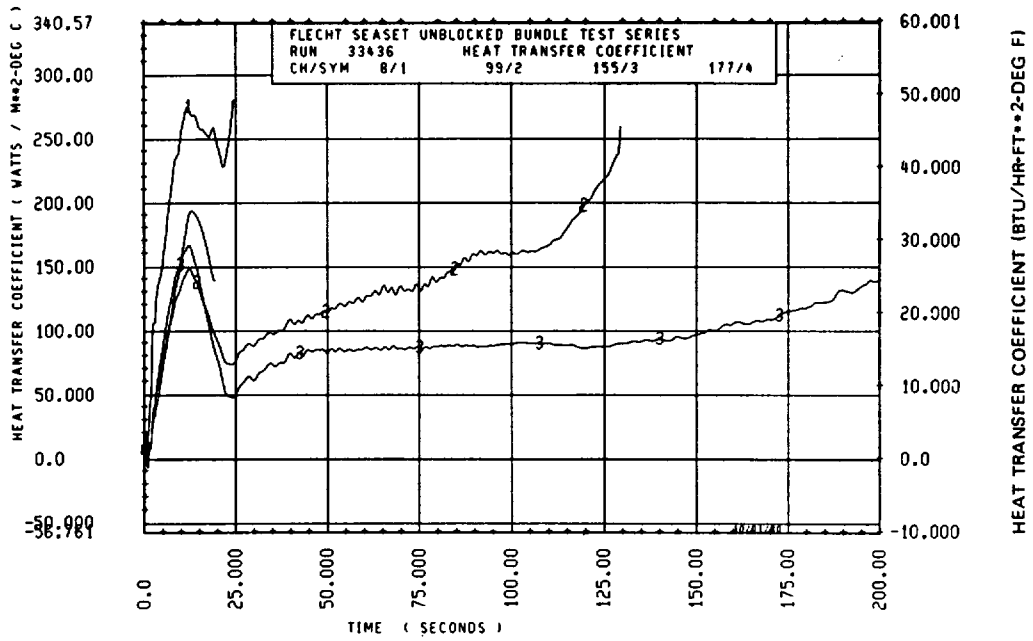

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

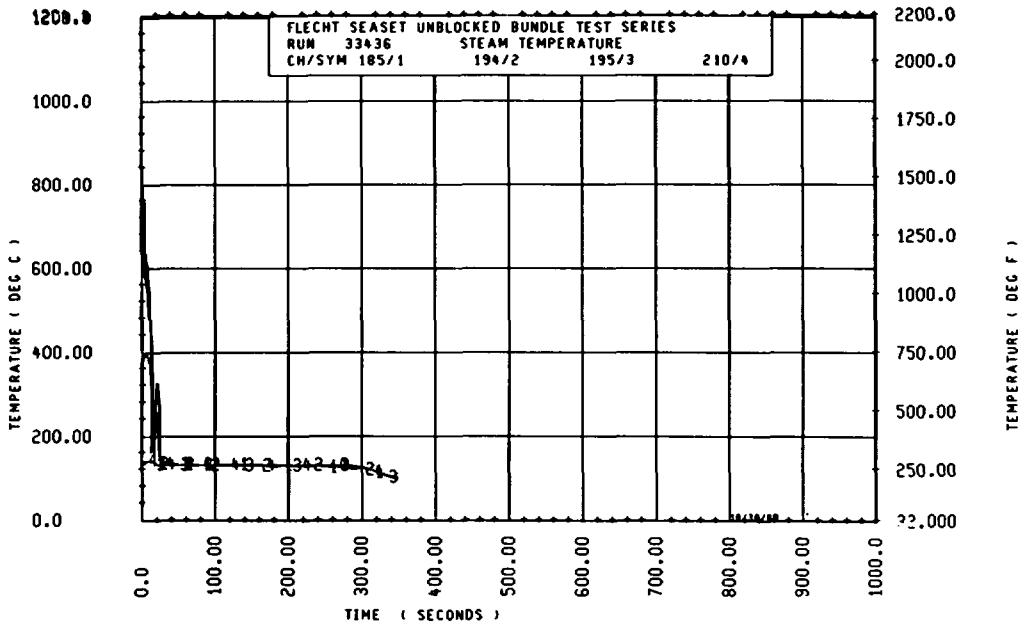

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

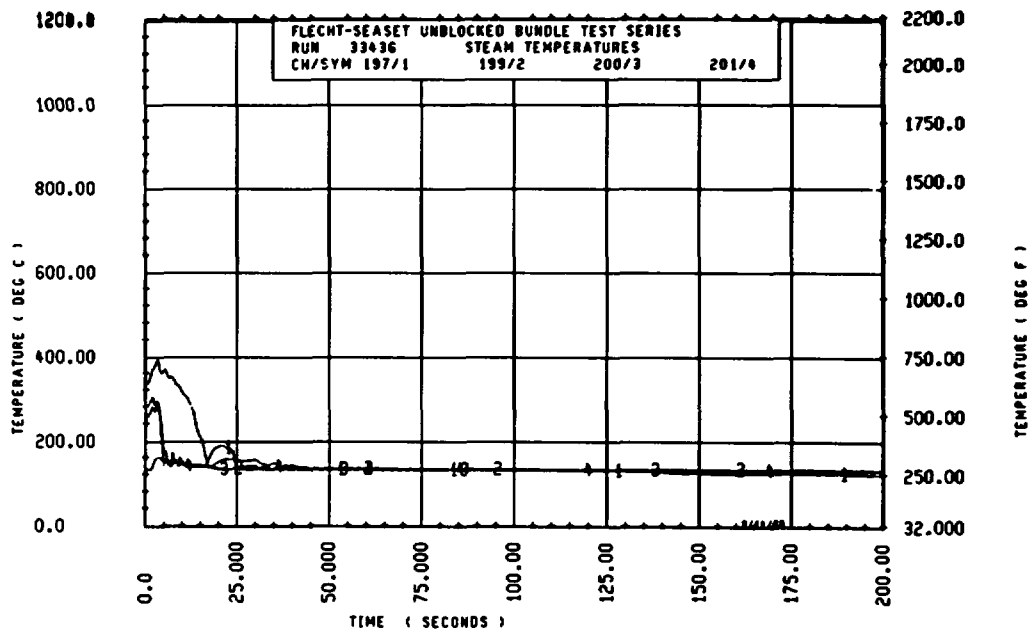

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

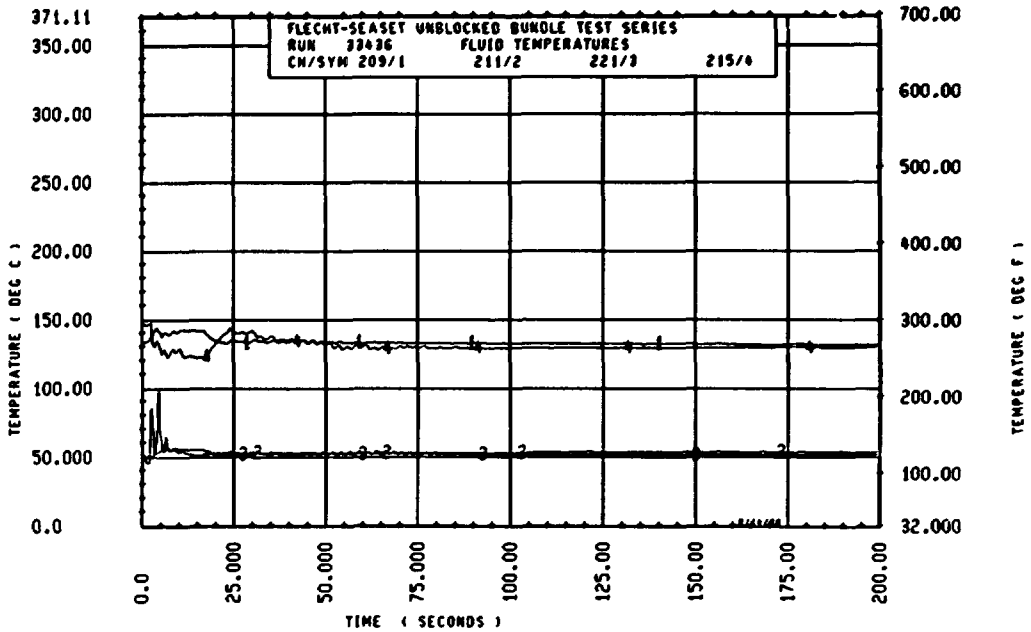

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

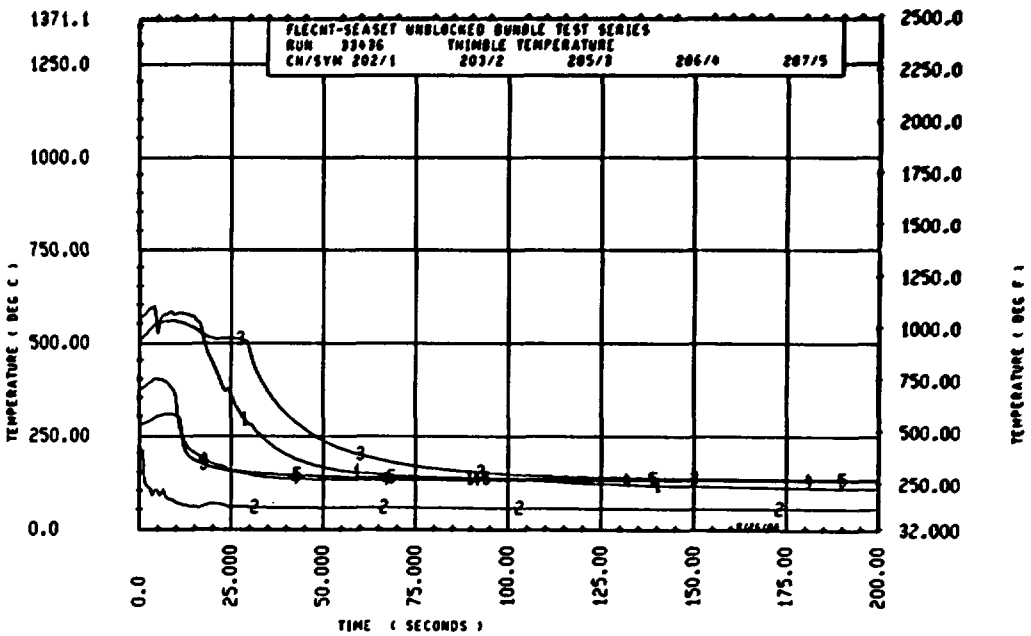

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

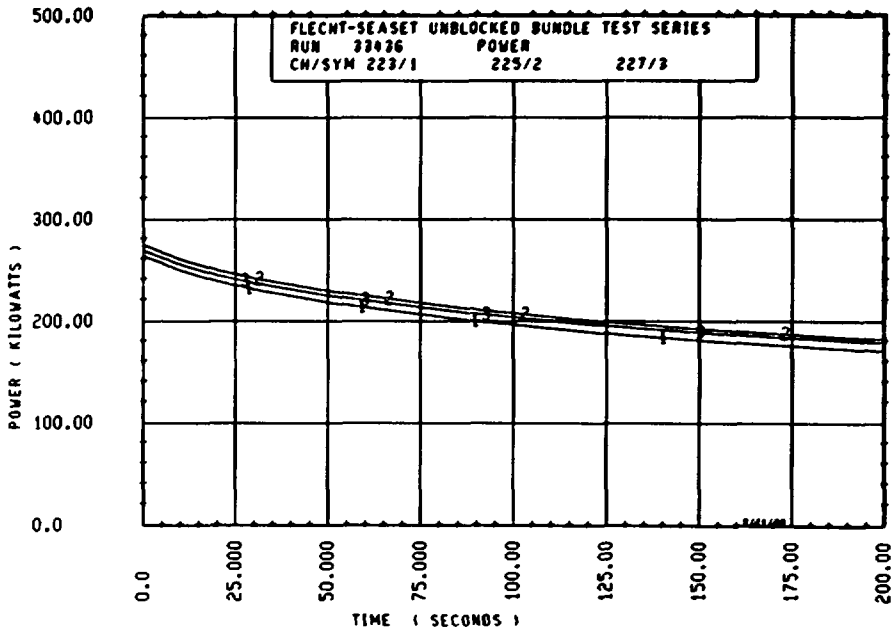

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

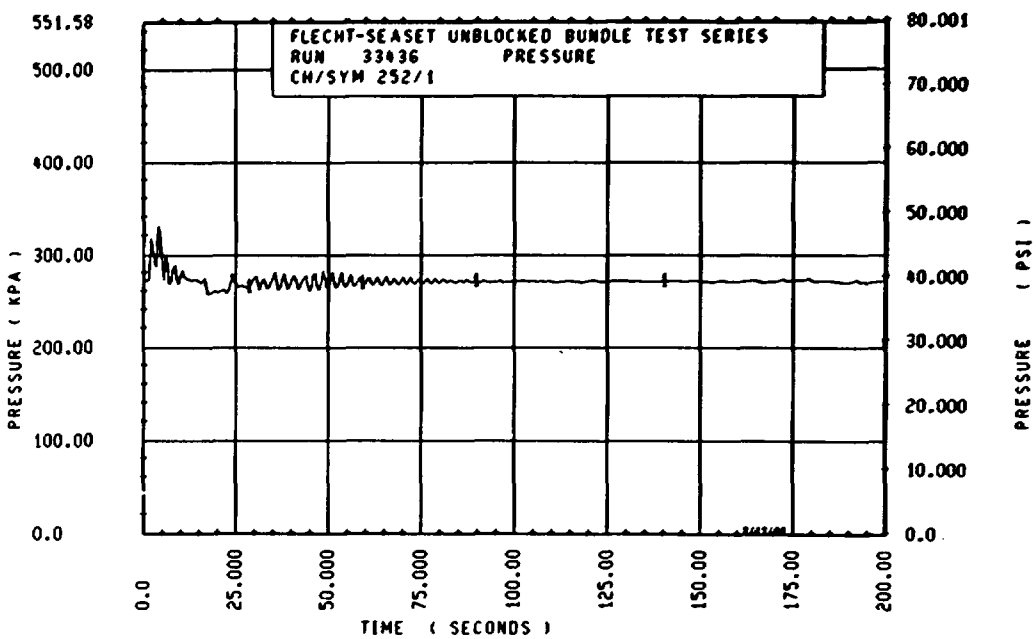

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

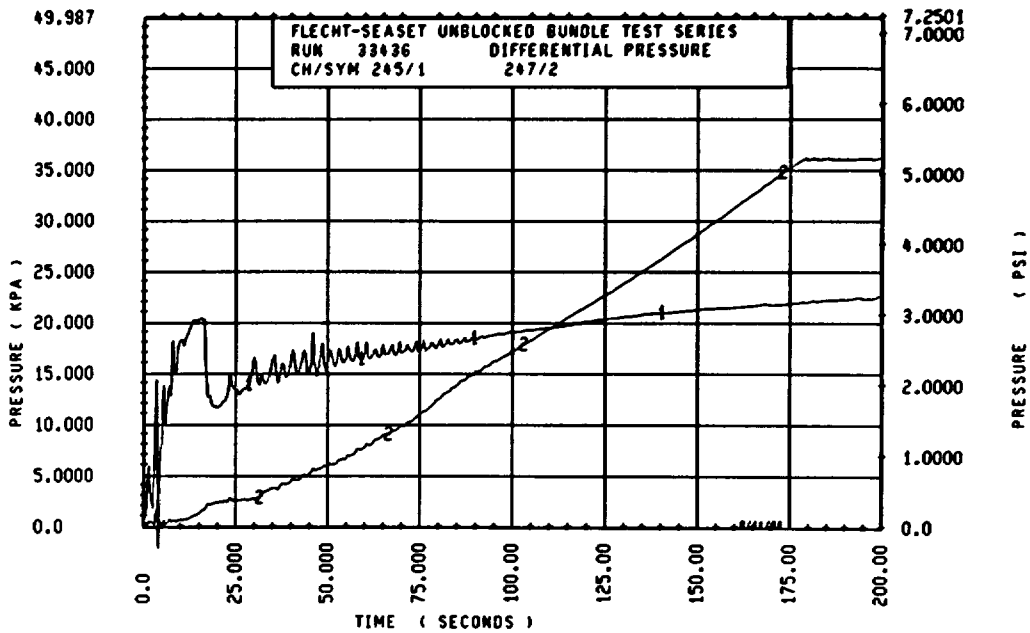


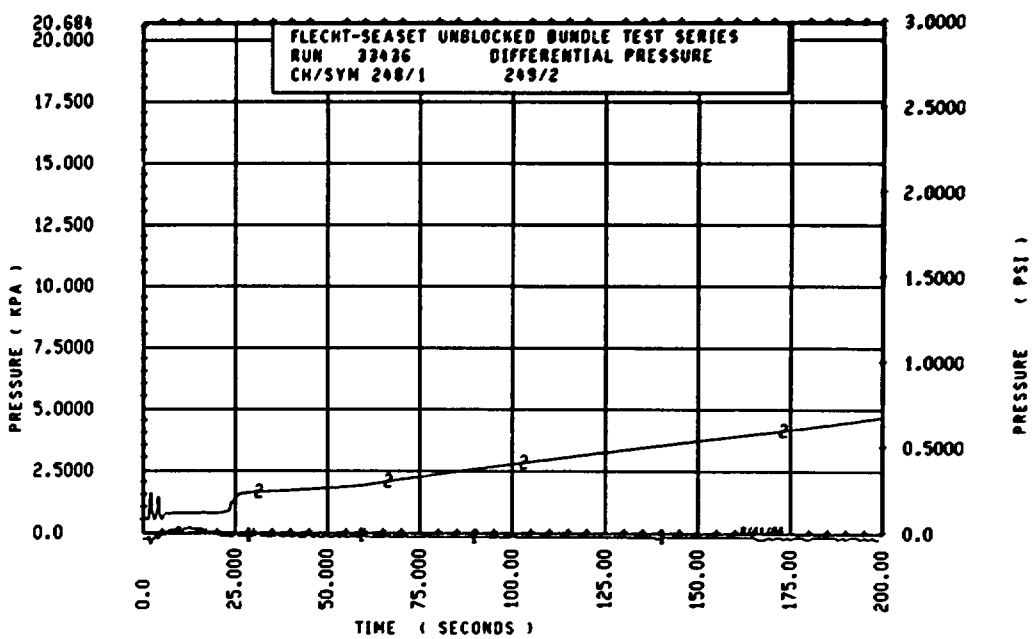


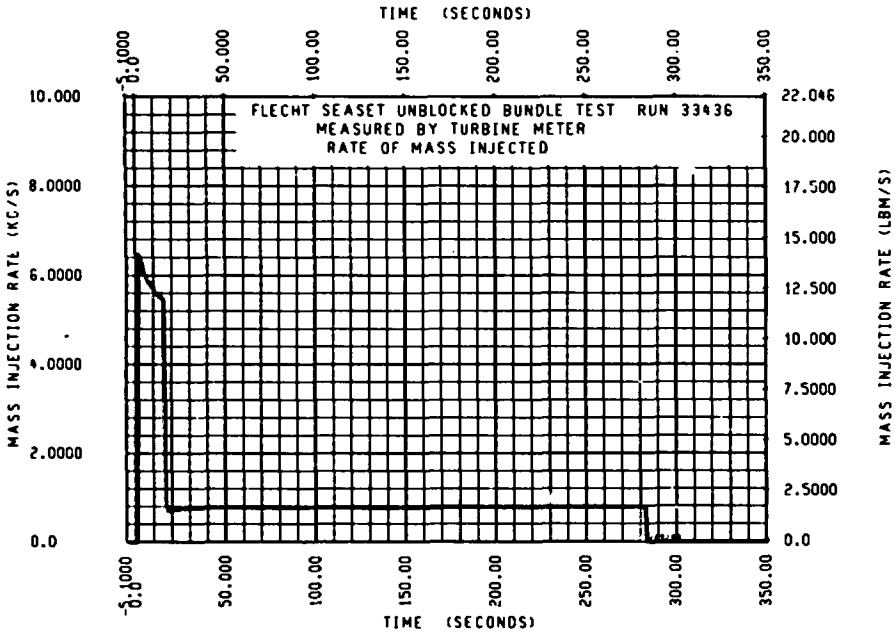
CH 202-4I, 1.52 m (60 in.); CH 203-7L, 0.30 m (12 in.); CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

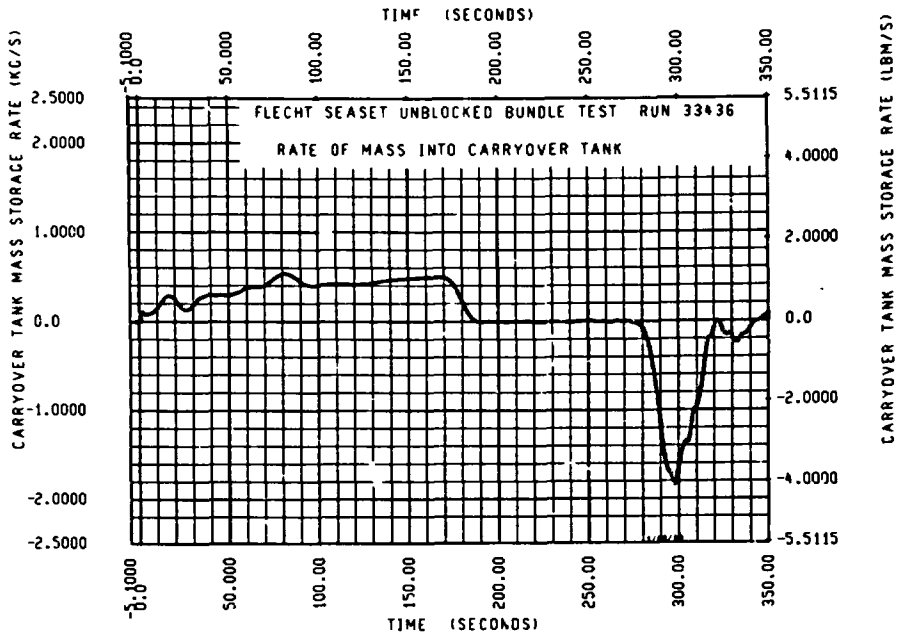

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

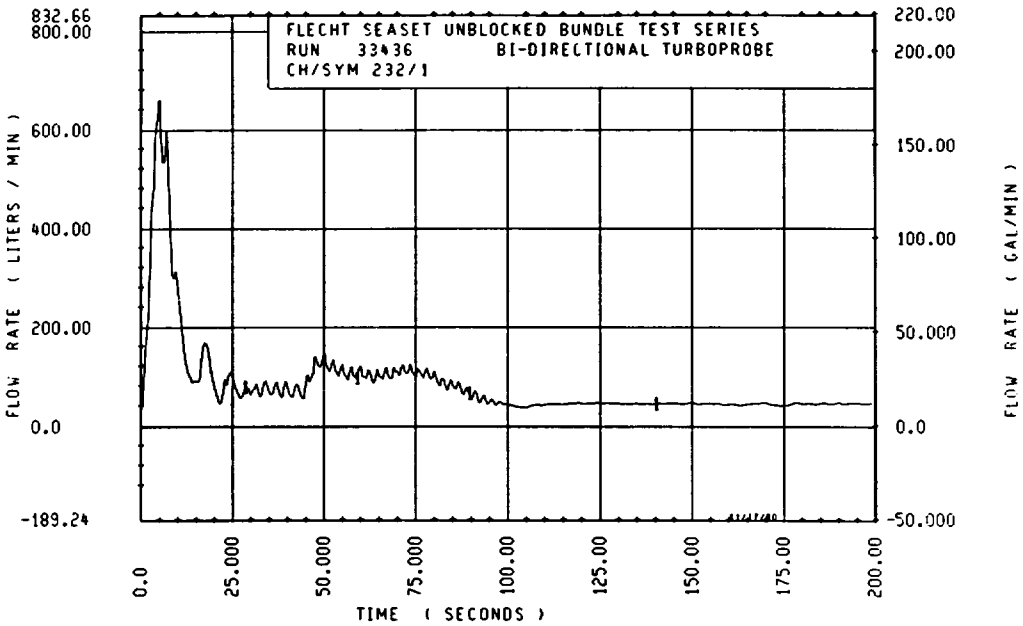

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

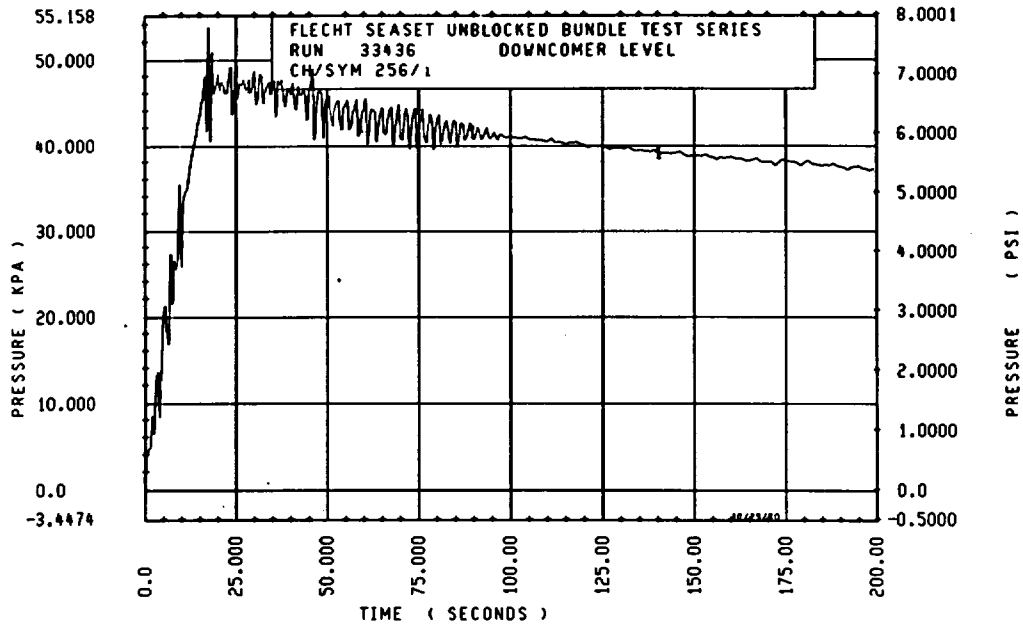

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

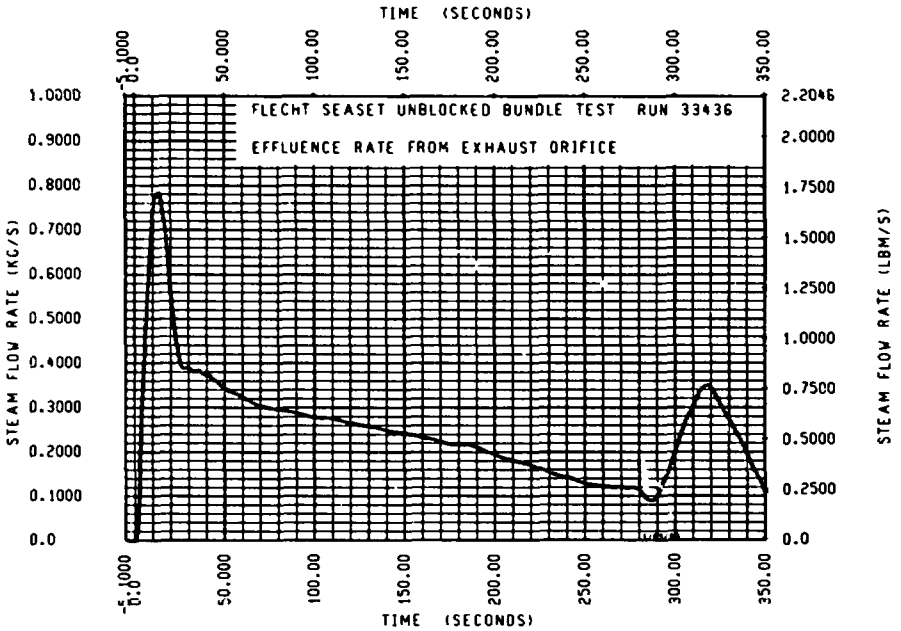

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

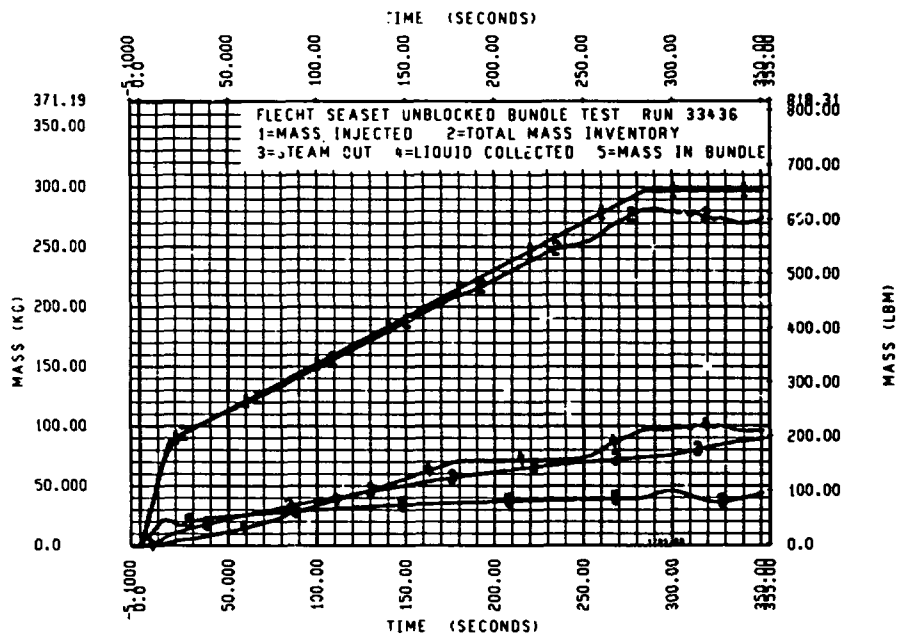

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33436
MEASURED BY TURBINE METER
RATE OF MASS INJECTED
TIME (SECONDS)
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
MASS INJECTION RATE (KG/S)
10.000
8.0000
6.0000
4.0000
2.0000
0.0
MASS INJECTION RATE (LBM/S)
22.046
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0

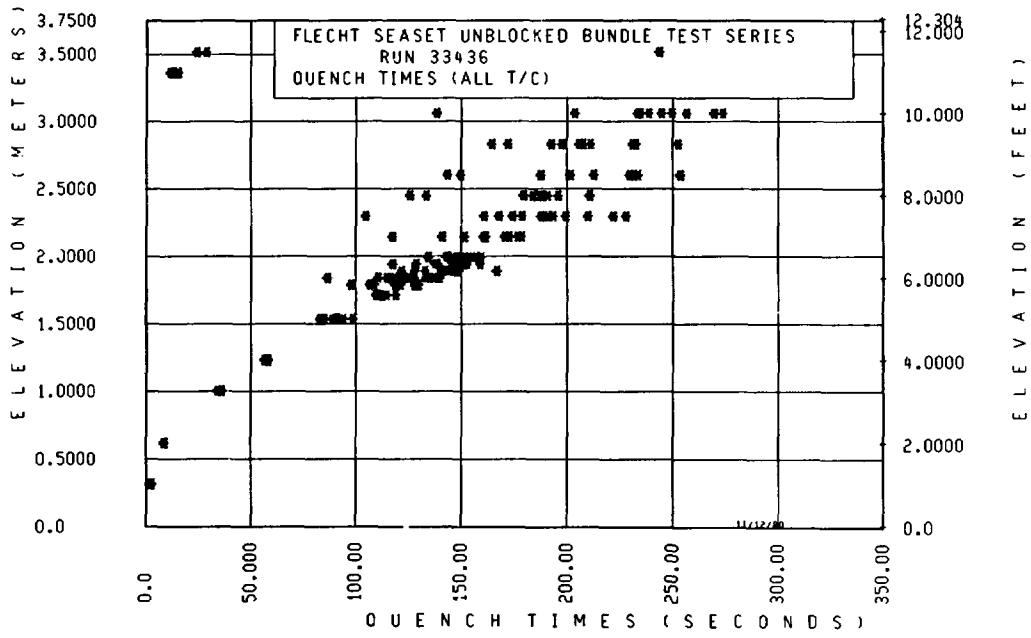

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33436
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
CARRYOVER TANK MASS STORAGE RATE (KG/S)
2.5000
2.0000
1.0000
0.0
-1.0000
-2.0000
-2.5000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
5.5115
4.0000
2.0000
0.0
-2.0000
-4.0000
-5.5115

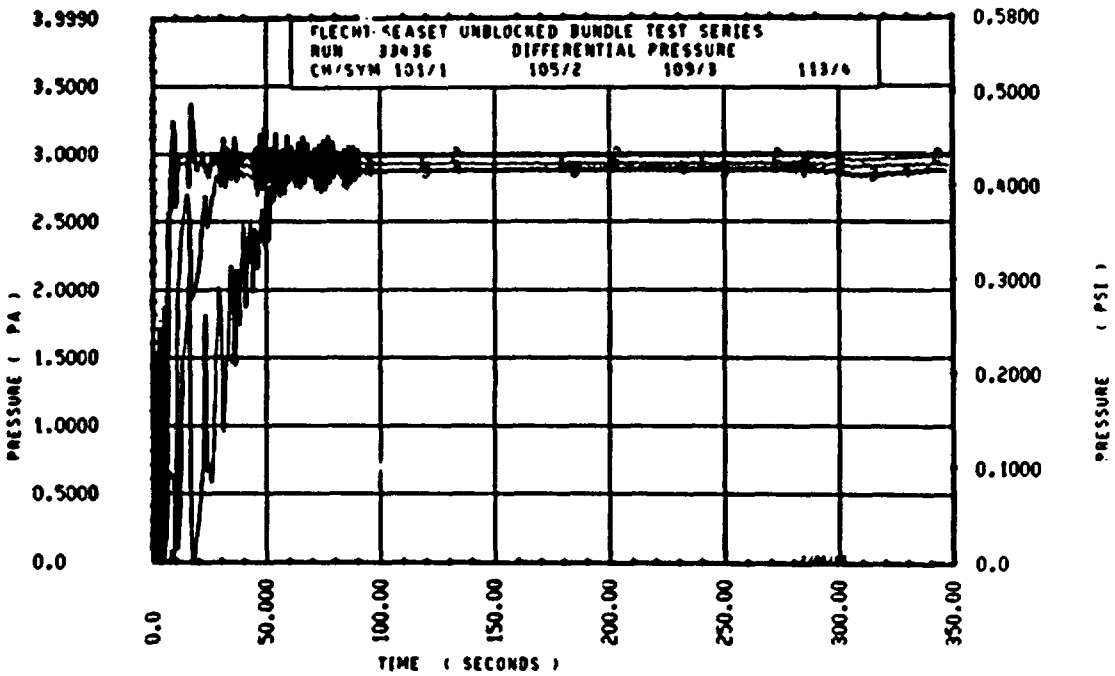

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 BI-DIRECTIONAL TURBOPROBE
CH/SYM 232/1
832.66
800.00
600.00
400.00
200.00
0.0
-189.24
FLOW RATE (LITERS / MIN)
220.00
200.00
150.00
100.00
50.000
0.0
-50.000
FLOW RATE (GAL/MIN)
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

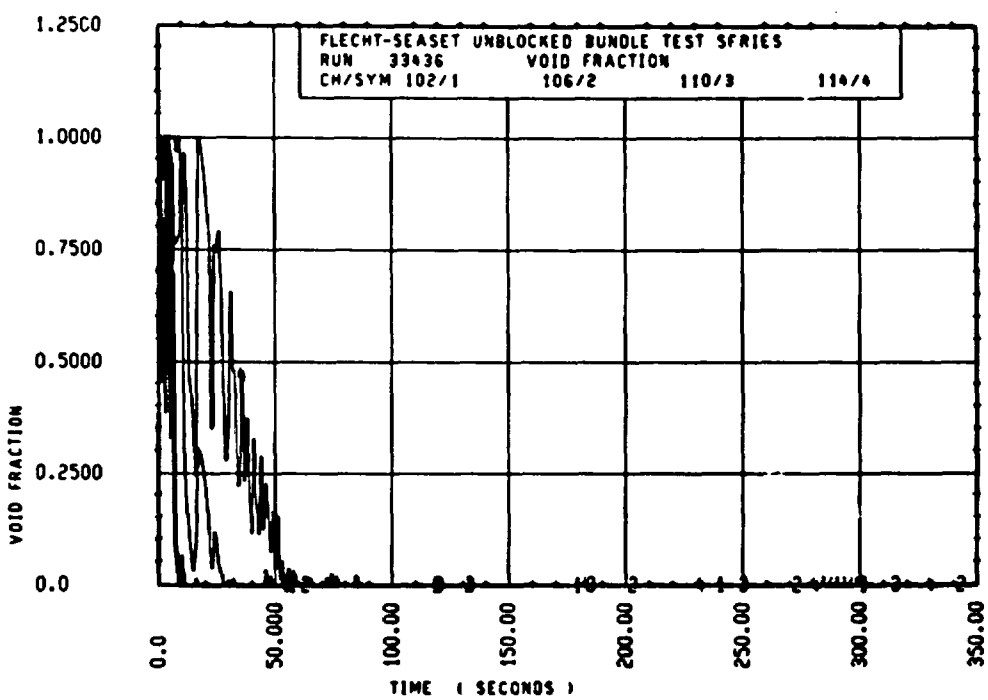

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 DOWNCOMER LEVEL
CH/SYM 256/1
55.158
50.000
40.000
30.000
20.000
10.000
0.0
-3.4474
PRESSURE (KPA)
8.0001
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-0.5000
PRESSURE (PSI)
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00
TIME (SECONDS)

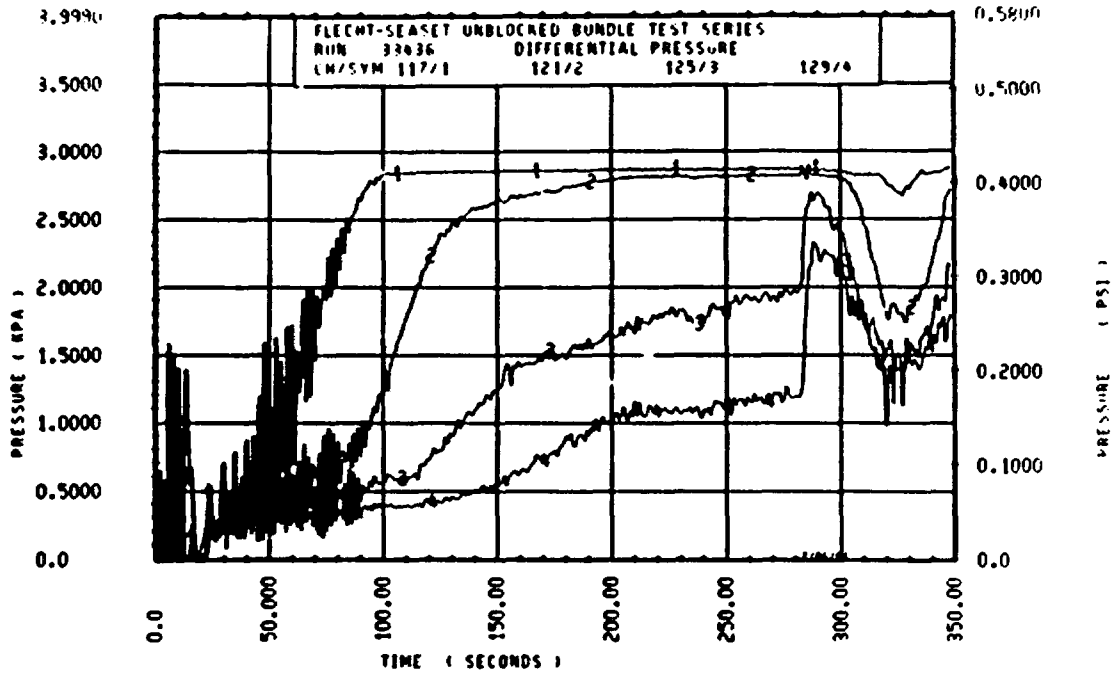

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33436
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
2.2046
2.0000
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00

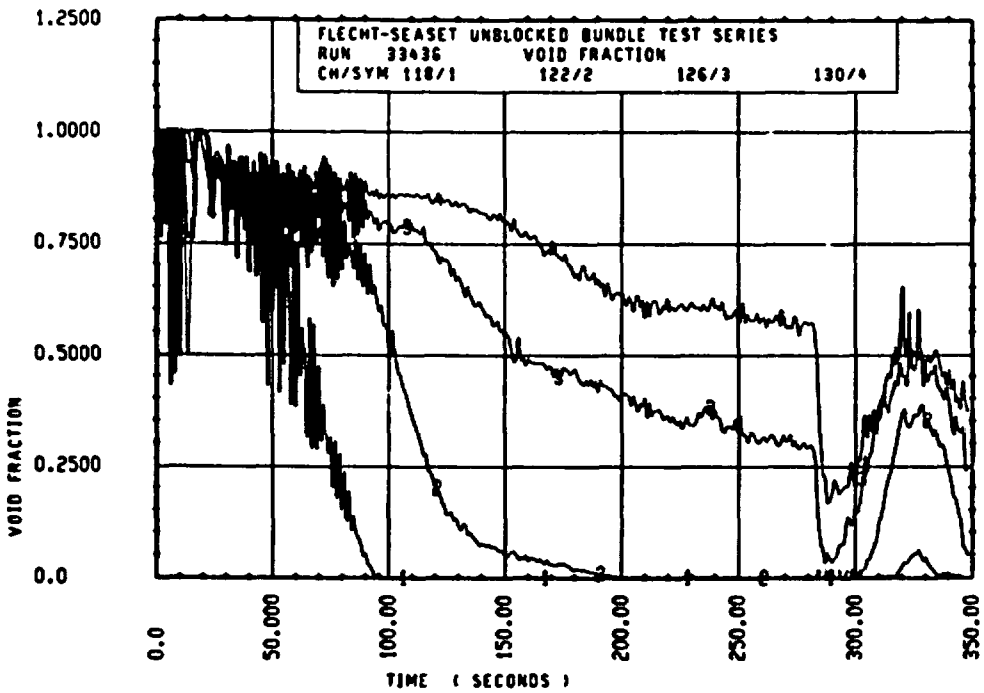

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33436
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
371.19
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
818.31
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00

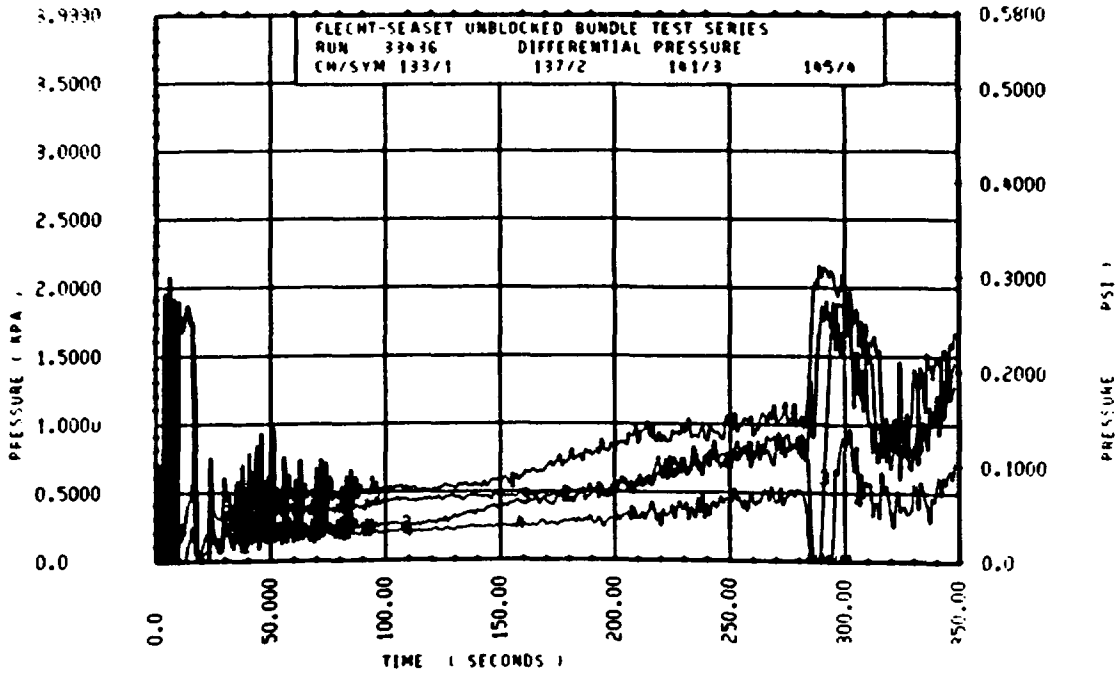

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
QUENCH TIMES (SECONDS)

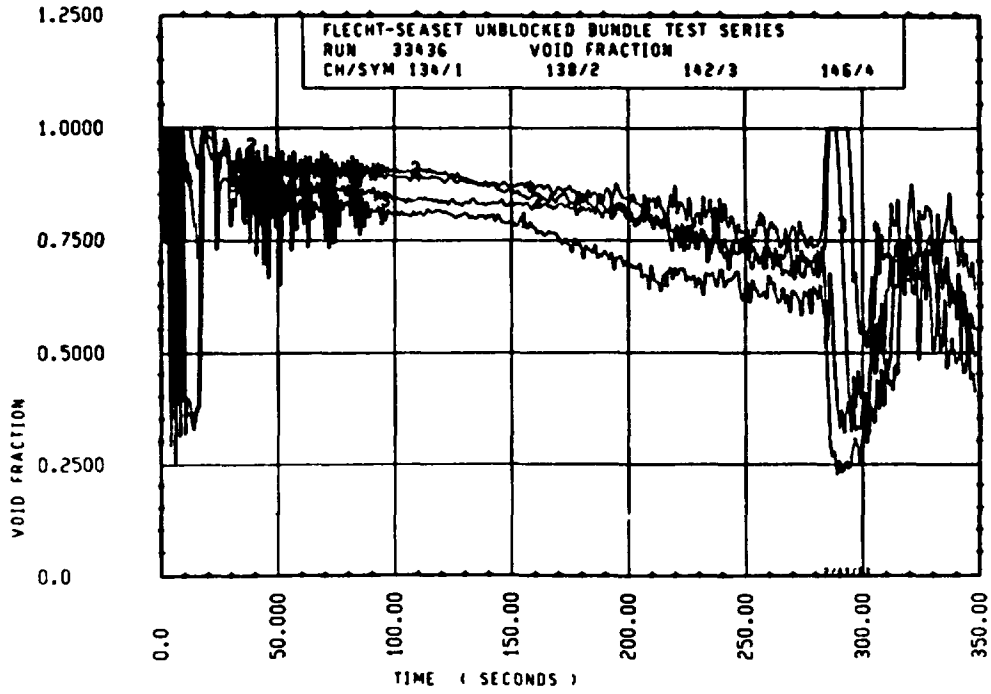

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (PA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33436 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 33544

Date: 7/11/79

Gravity Reflood Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at	196°C at 0 to 0.91 m (385°F at 0 to 36 in.)
1.83 m (72 in.) elevation	874°C (1605°F)
Rod peak power	2.3 kw/m (0.69 kw/ft)
Flow rate	5.85 kg/sec (12.9 lb/sec) (15 sec)
	0.780 kg/sec (1.72 lb/sec) (onward)
Coolant temperature	52°C (125°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Hot Rod Quench Time Temperature*
0.61 m (24 in.)	257°C (494°F)	66°C (150°F)
1.22 m (48 in.)	261°C (502°F)	86°C (187°F)
1.83 m (72 in.)	194°C-367°C (381°F-692°F)	122°C-128°C (252°F-262°F)
2.44 m (96 in.)	158°C-188°C (317°F-371°F)	130°C (266°F)
2.74 m (108 in.)	156°C (312°F)	131°C (267°F)
3.05 m (120 in.)	137°C (279°F)	130°C (265°F)
3.35 m (132 in.)	134°C (274°F)	129°C (264°F)

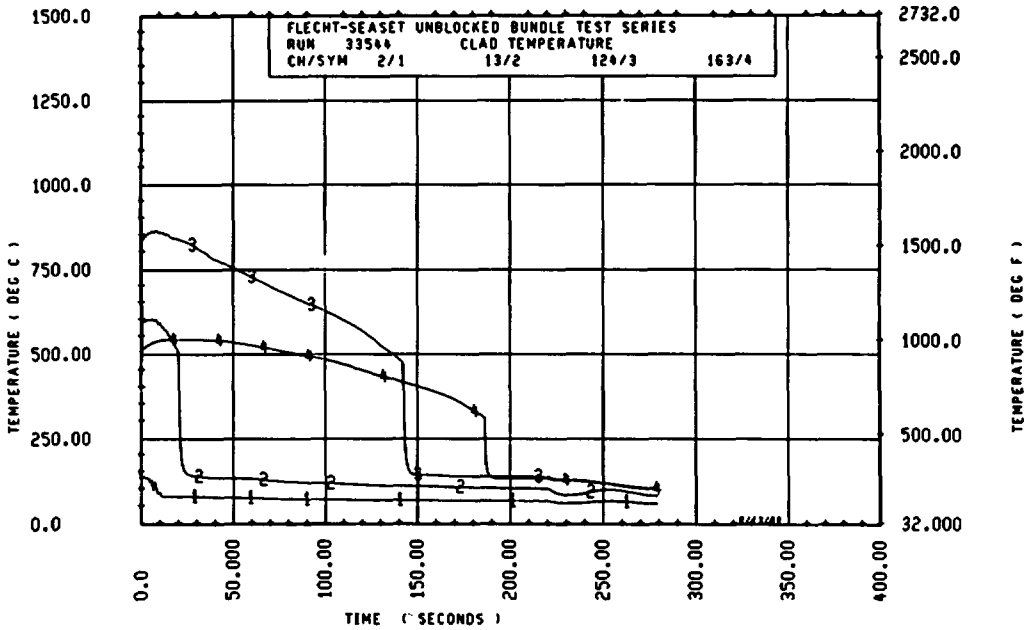
*At 121 seconds after flood

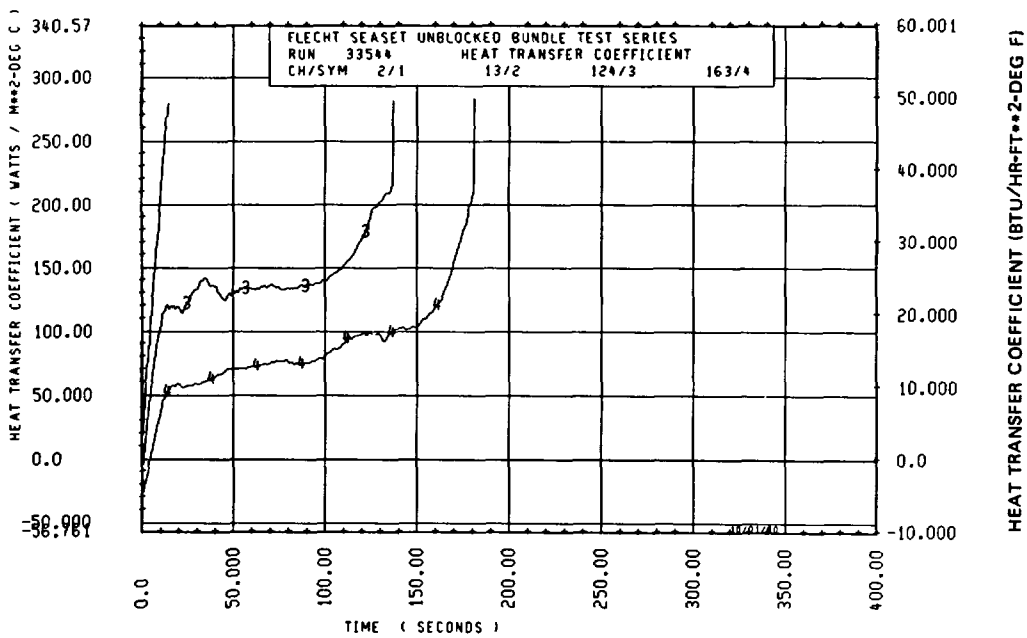
C. Comments

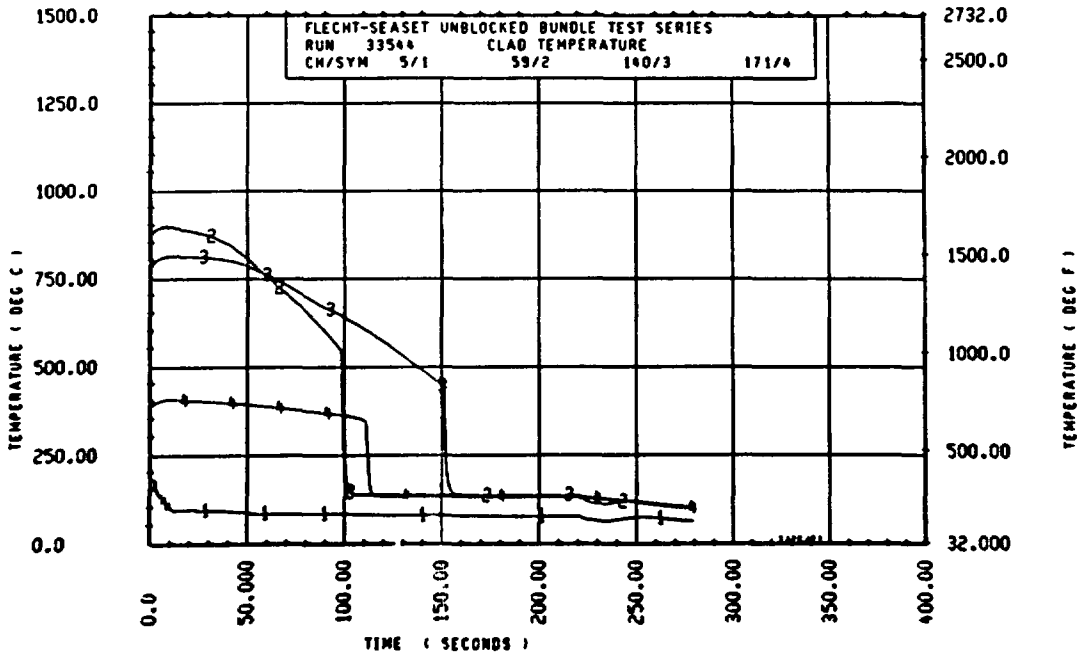
Power decay of all three power zones was approximately 25 percent lower than nominal.

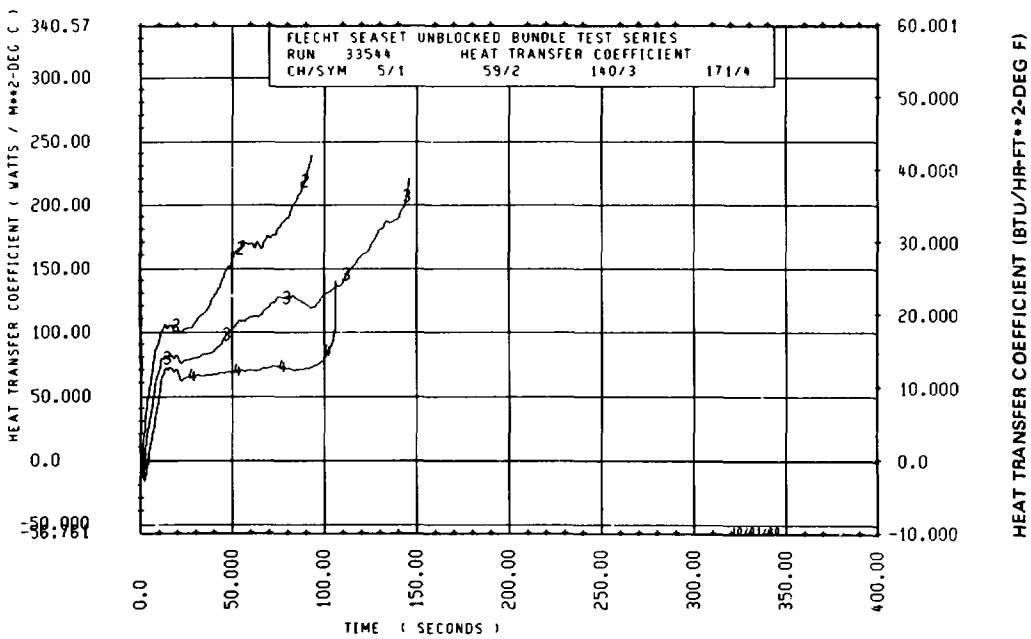
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 33544

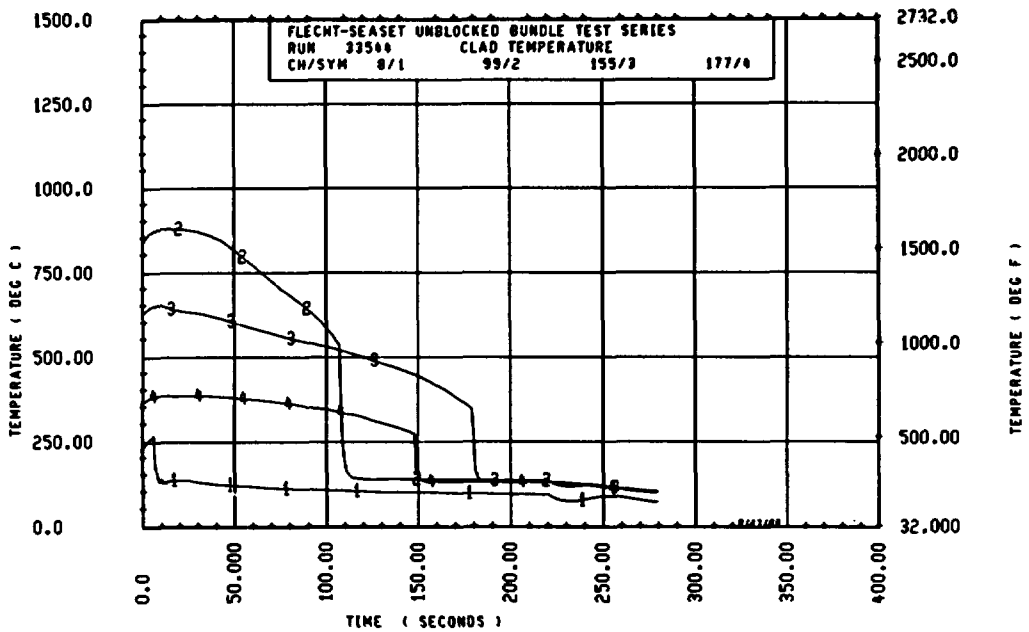
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	942.	958.	16.	7.5	901.	14.0
2H 6- 0	50	1547.	1603.	55.	8.0	944.	96.4
3C 5- 0	17	1277.	1307.	30.	6.0	844.	68.4
3C 5- 7	28	1372.	1406.	34.	6.0	805.	89.1
4L 8- 0	129	1389.	1448.	60.	8.0	778.	150.3
4L 8- 6	147	1391.	1446.	55.	6.0	773.	150.6
5E11- 0	168	724.	751.	28.	8.0	519.	136.0
5J 4- 0	12	1071.	1091.	20.	4.0	925.	19.9
5J 8- 6	146	1264.	1312.	48.	6.0	796.	127.0
5J11- 6	175	682.	718.	36.	13.5	498.	148.0
7B 6- 0	57	1438.	1485.	47.	6.0	807.	83.5
7B 8- 6	142	1211.	1262.	50.	6.0	725.	166.0
7B10- 0	162	920.	982.	62.	21.0	566.	191.0
7B11- 6	176	702.	738.	36.	13.5	515.	170.1
7D 6- 4	84	1612.	1666.	53.	6.0	1036.	91.0
7D 7- 6	119	1526.	1580.	54.	8.0	904.	118.9
7D 9- 3	151	1107.	1166.	59.	10.0	645.	160.0
7G 5- 0	23	1386.	1413.	27.	6.0	885.	62.0
7J 6- 0	59	1601.	1655.	53.	8.0	1013.	98.5
7M 7- 6	120	1521.	1575.	55.	6.0	847.	136.9
7M 8- 0	132	1421.	1483.	61.	8.5	836.	153.0
7M 9- 3	152	1127.	1181.	53.	10.0	668.	156.0
8H 4- 0	13	1094.	1117.	24.	6.0	934.	20.4
8H10- 0	163	952.	1011.	59.	23.0	590.	186.0
8H11- 6	177	692.	729.	36.	10.5	522.	148.0
8K 4- 0	14	988.	1000.	11.	2.5	897.	15.2
8K 6- 6	99	1544.	1619.	75.	13.5	993.	107.0
8K 8- 0	140	1438.	1501.	63.	10.0	824.	151.0
8K10- 0	164	944.	1010.	66.	21.5	618.	177.0
8N 2- 0	5	352.	362.	11.	1.5	358.	2.4
8N 4- 0	15	1040.	1055.	15.	2.5	947.	16.4
8N 6- 0	61	1553.	1603.	49.	8.0	765.	91.0
8N10- 0	165	939.	1006.	67.	37.5	618.	187.5
9C 7- 0	109	1502.	1550.	48.	6.0	721.	127.0
9C 9- 3	153	1123.	1176.	54.	10.0	708.	162.4
9G 1- 0	2	280.	283.	3.	.5	283.	.5
9G 3- 3	8	447.	513.	66.	6.0	266.	10.5
9G11- 0	171	736.	770.	34.	8.5	654.	111.1
9I 5- 0	24	1434.	1461.	27.	6.0	918.	61.5
9E 6- 2	46	1533.	1592.	59.	8.0	837.	108.0
10D 6- 6	93	1525.	1581.	56.	10.0	775.	114.0
11E 7- 6	124	1531.	1588.	57.	8.0	884.	142.0
11E 9- 3	155	1181.	1210.	48.	8.0	651.	179.3
11E11- 0	172	739.	776.	37.	8.5	549.	152.0
12D 4- 0	16	1068.	1087.	19.	4.0	967.	17.4
12D 6- 0	66	1532.	1586.	55.	8.0	928.	98.5
12F 6- 6	102	1538.	1605.	67.	10.0	933.	107.0

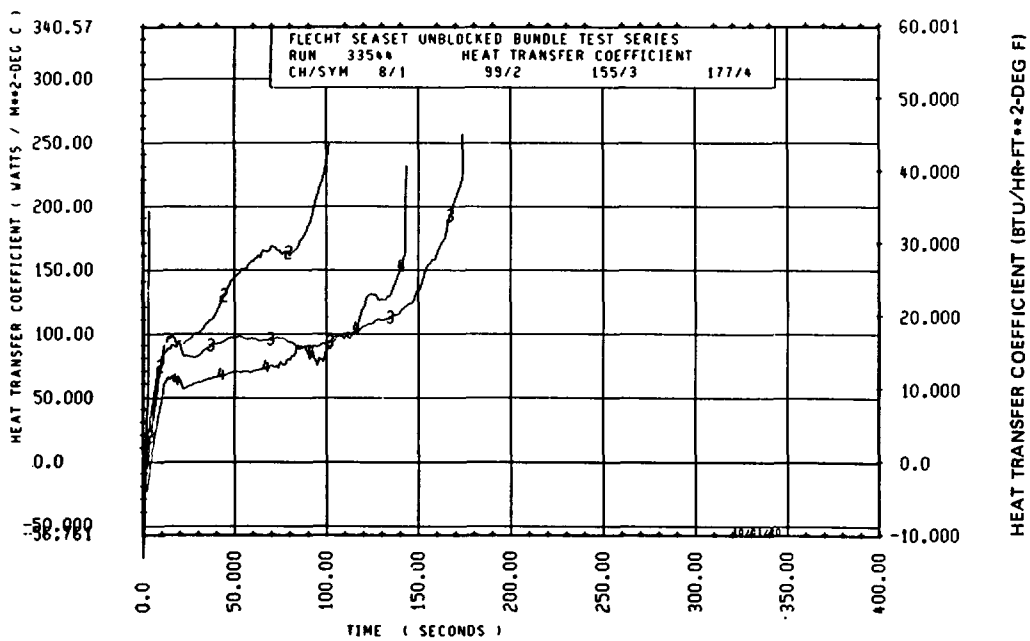

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

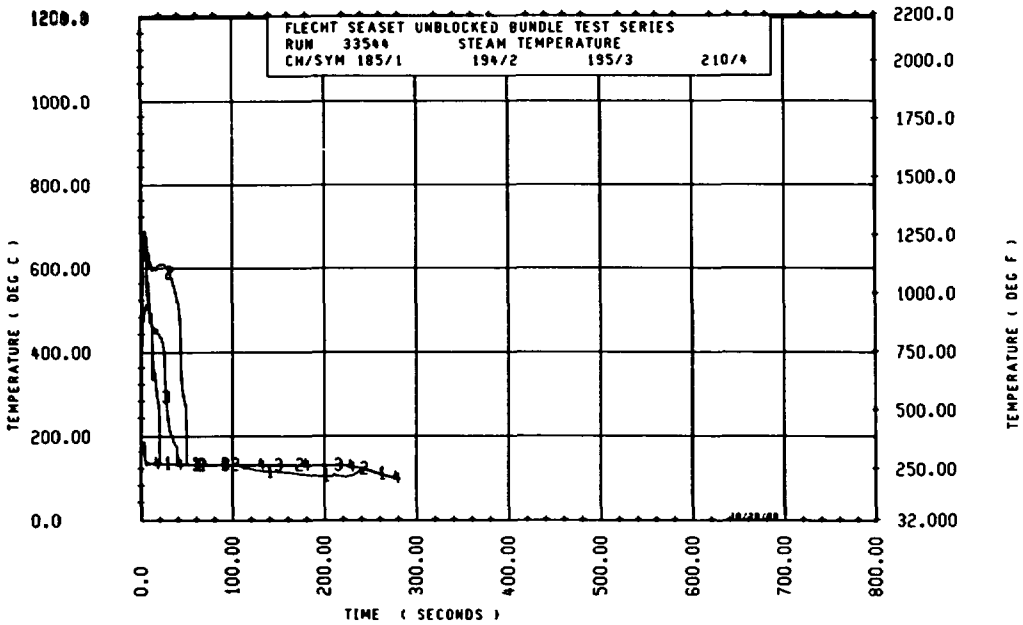

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

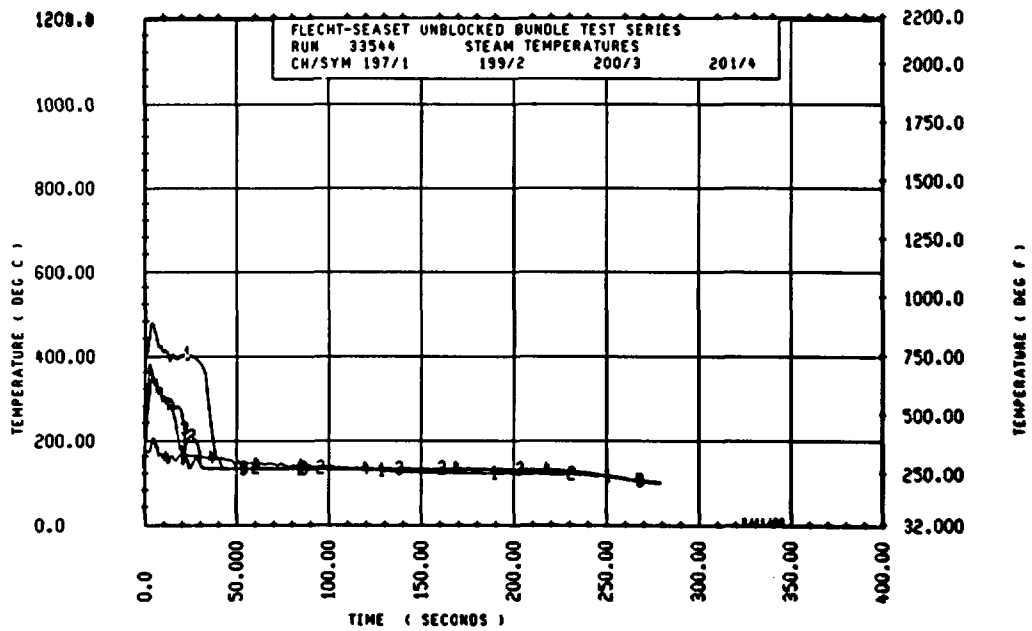

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

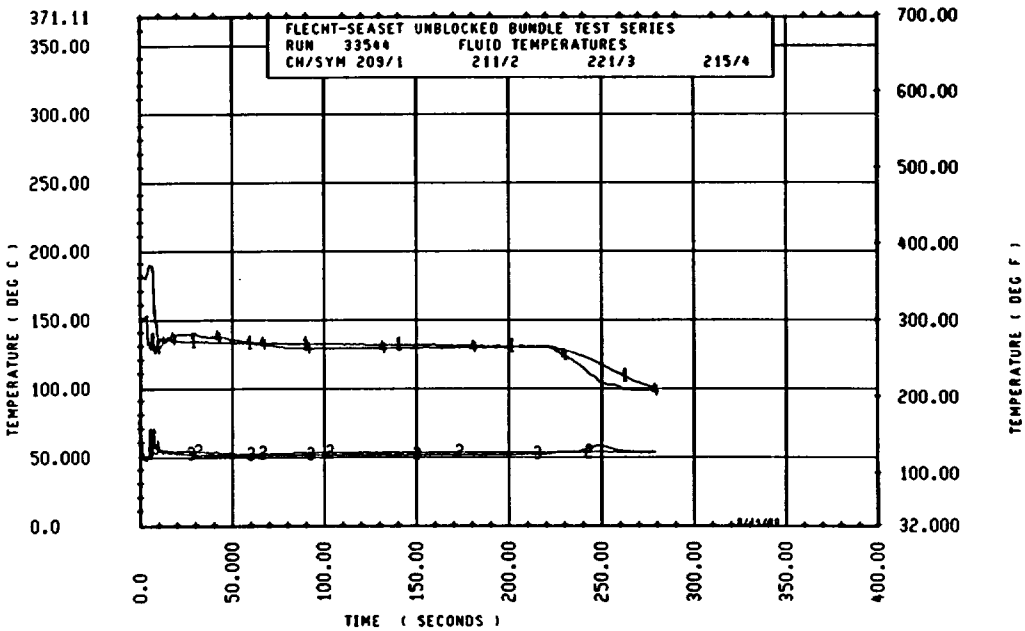

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)

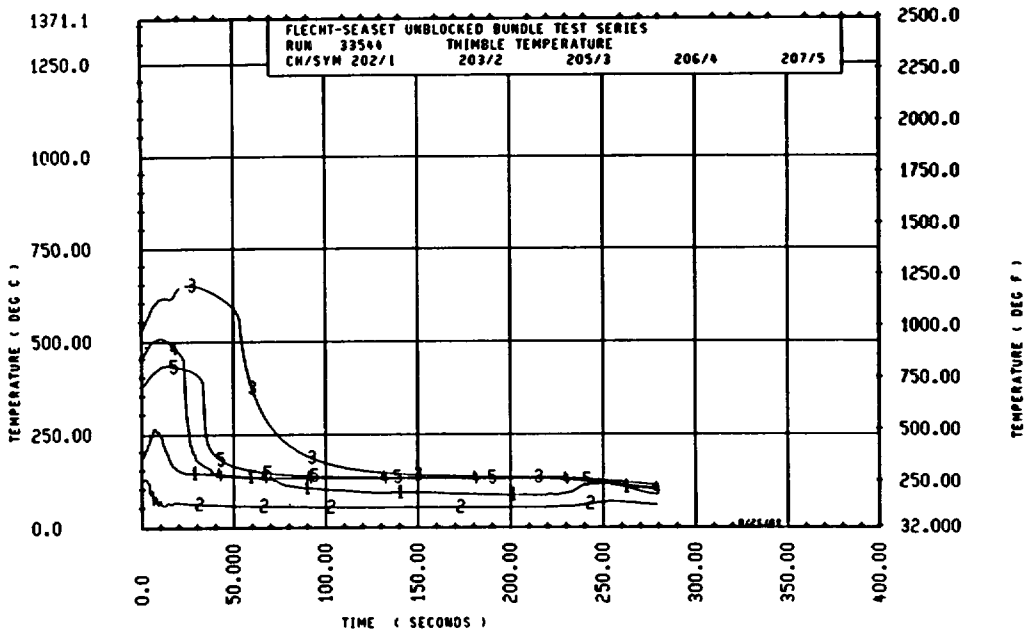

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-36.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

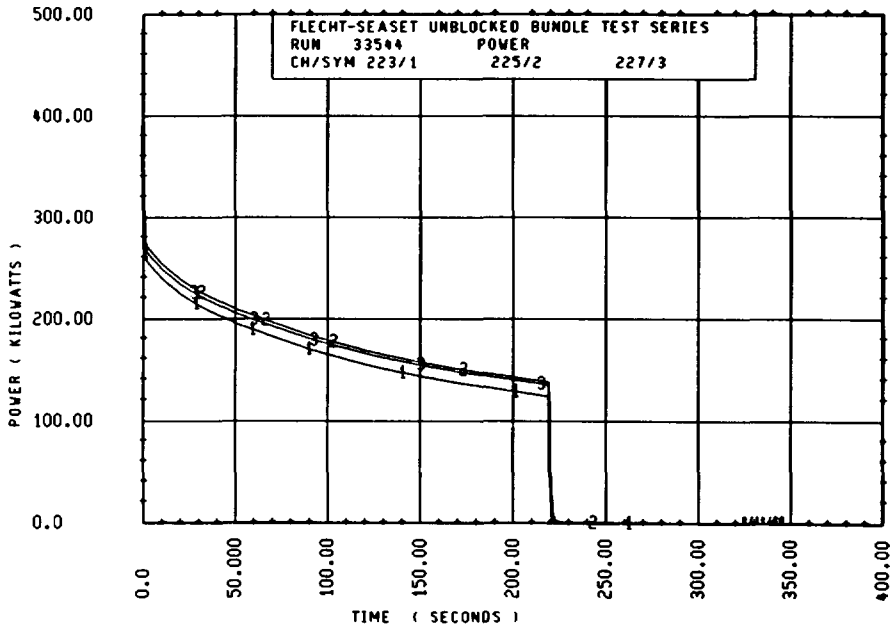

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

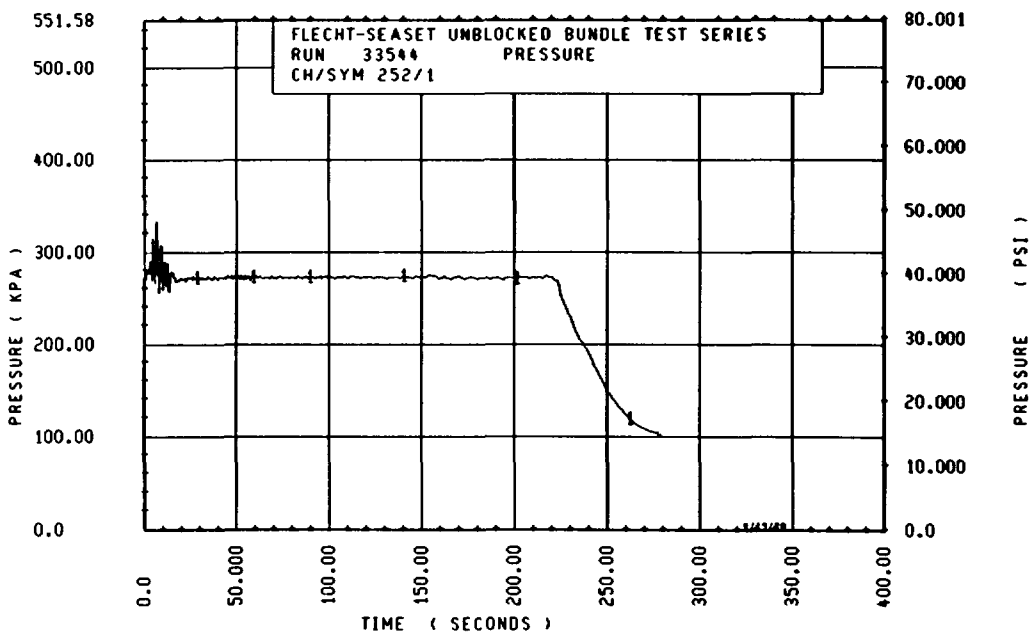

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

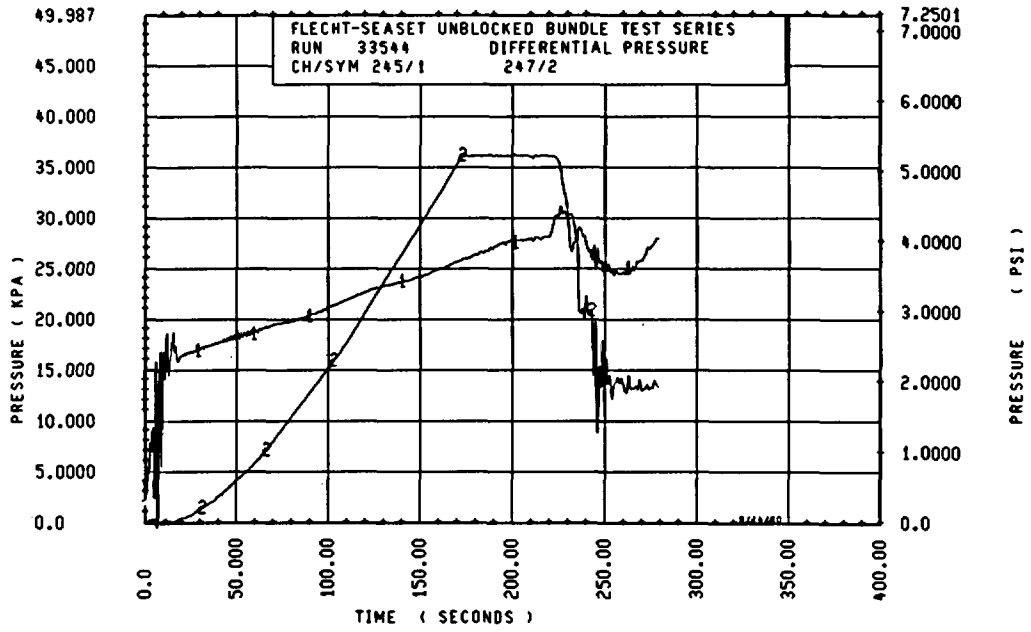


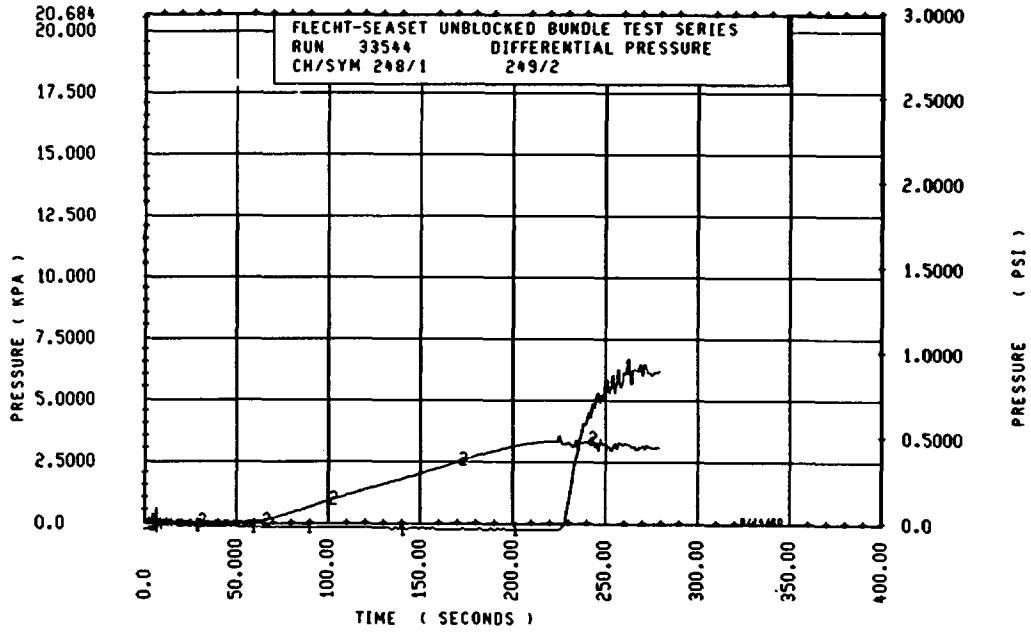


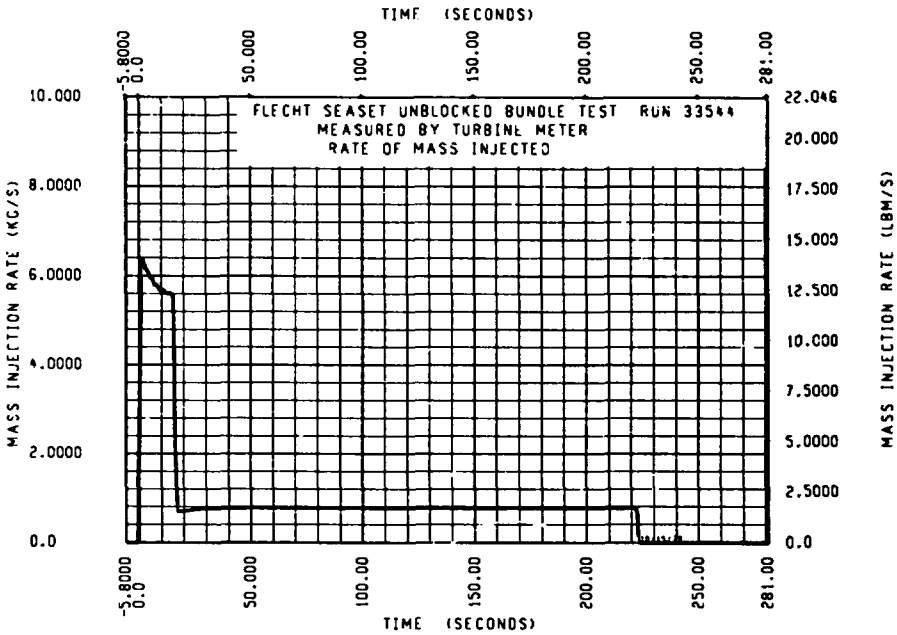
CH 202-4I, 1.52 m (60 in.); CH 203-7L, 0.30 m (12 in.); CH 205-7L, 2.44 m (96 in.); CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

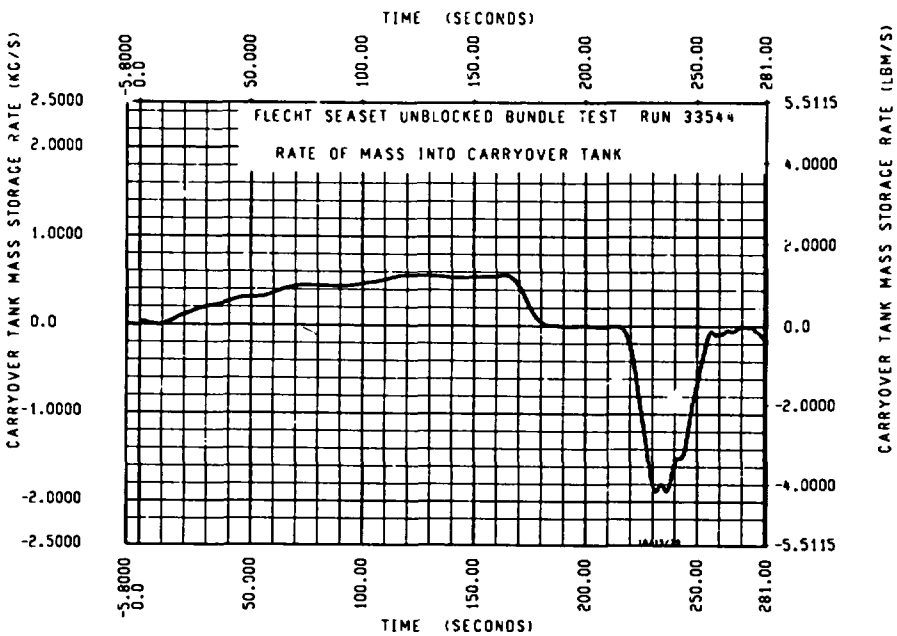

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

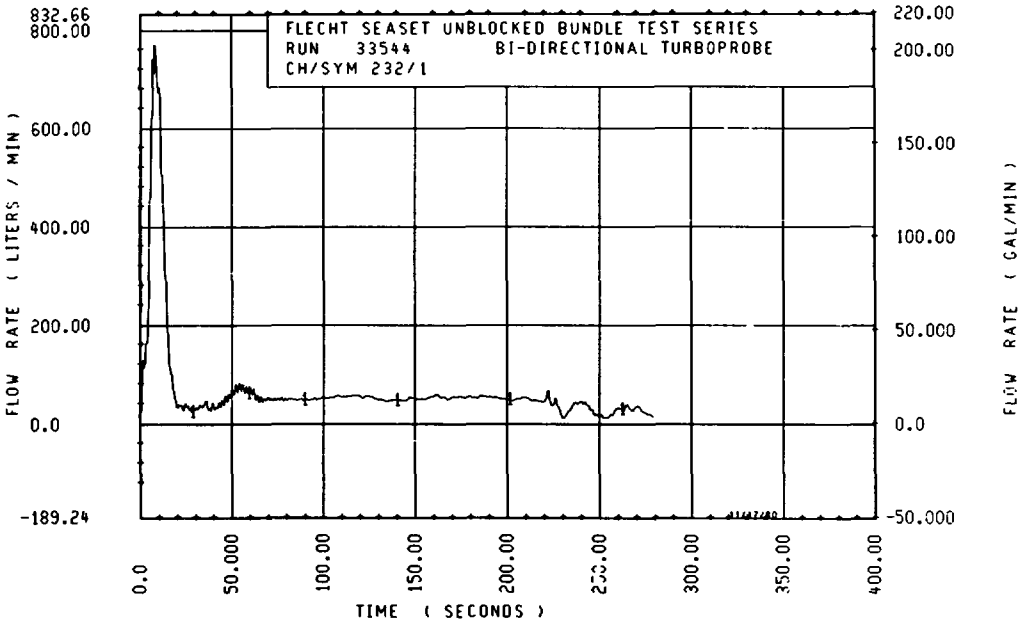

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

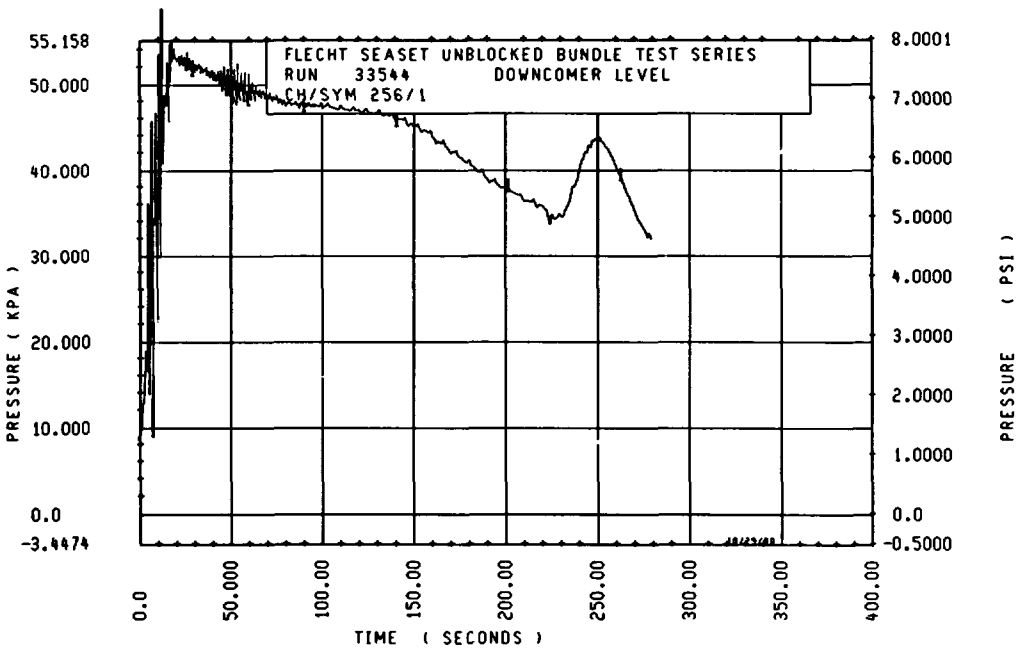

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

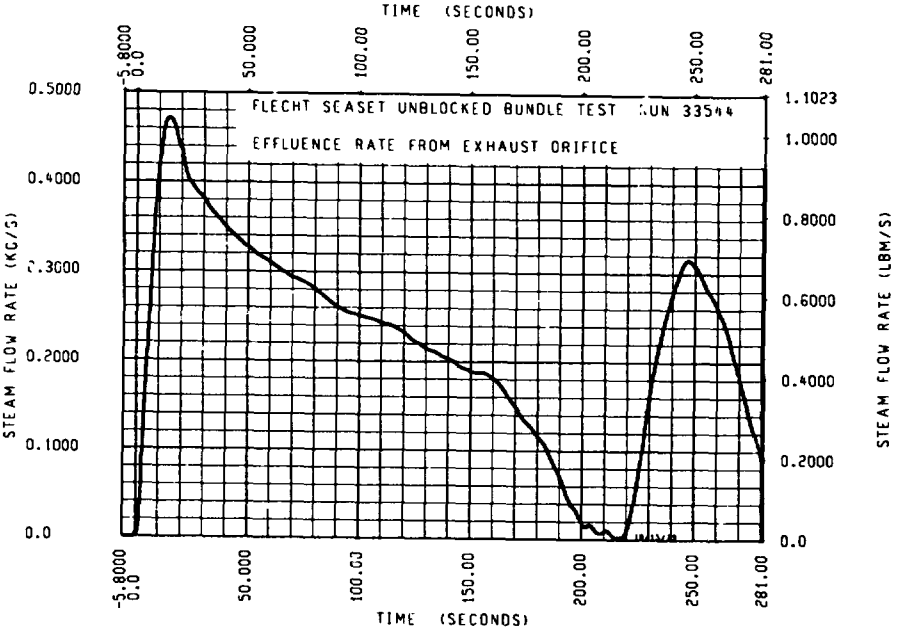

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

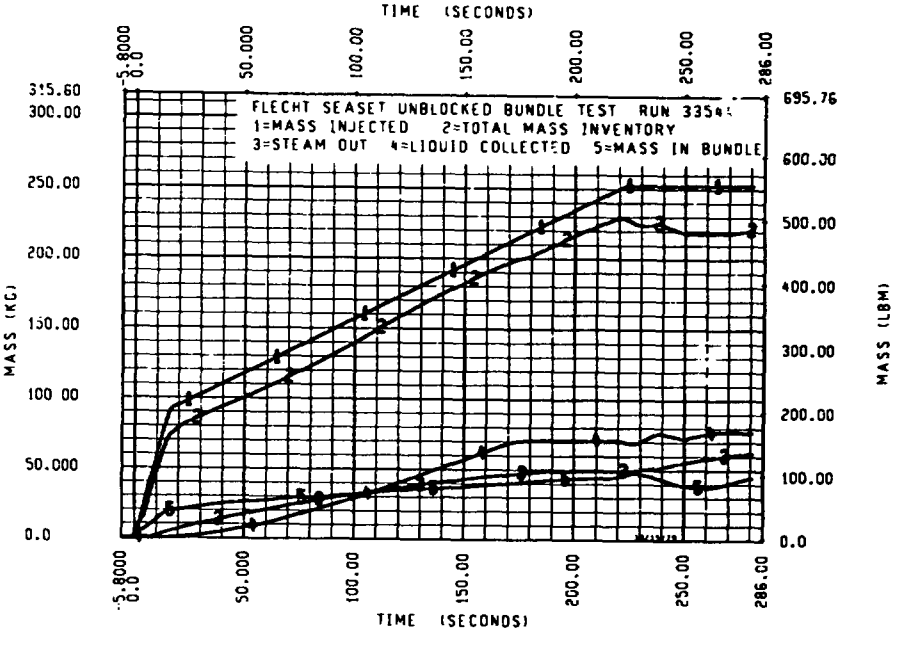

TIME (SECONDS)
-5.8000
0.0
50.000
100.00
150.00
200.00
250.00
281.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33544
MEASURED BY TURBINE METER
RATE OF MASS INJECTED
MASS INJECTION RATE (KG/S)
10.000
8.0000
6.0000
4.0000
2.0000
0.0
MASS INJECTION RATE (LBM/S)
22.046
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0

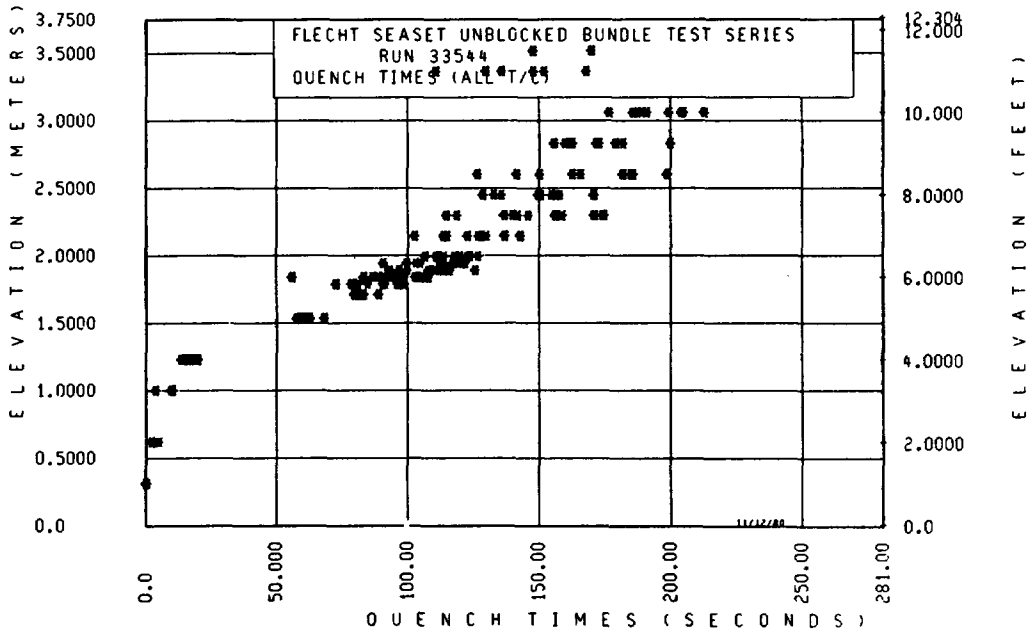

TIME (SECONDS)
-5.8000
0.0
50.000
100.00
150.00
200.00
250.00
281.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33544
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
2.5000
2.0000
1.0000
0.0
-1.0000
-2.0000
-2.5000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
5.5115
4.0000
2.0000
0.0
-2.0000
-4.0000
-5.5115

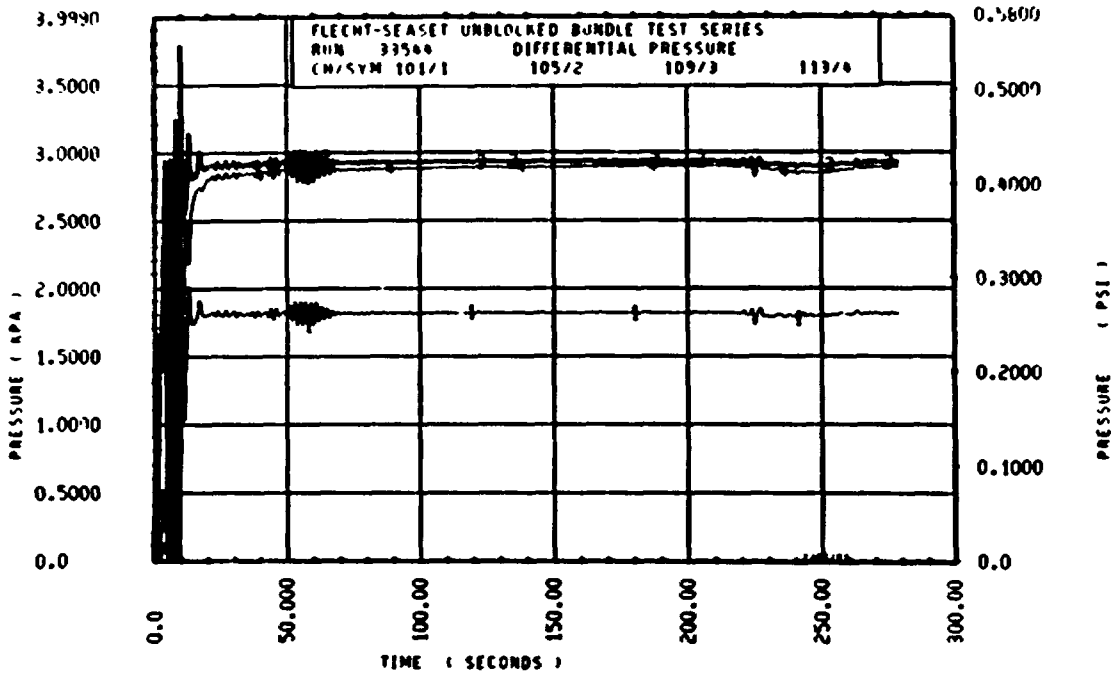

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 BI-DIRECTIONAL TURBOPROBE
CH/SYM 232/1
FLOW RATE (LITERS / MIN)
FLOW RATE (GAL/MIN)
832.66
800.00
600.00
400.00
200.00
0.0
-189.24
220.00
200.00
150.00
100.00
50.000
0.0
-50.000
0.0
50.000
100.00
150.00
200.00
300.00
350.00
400.00
TIME (SECONDS)

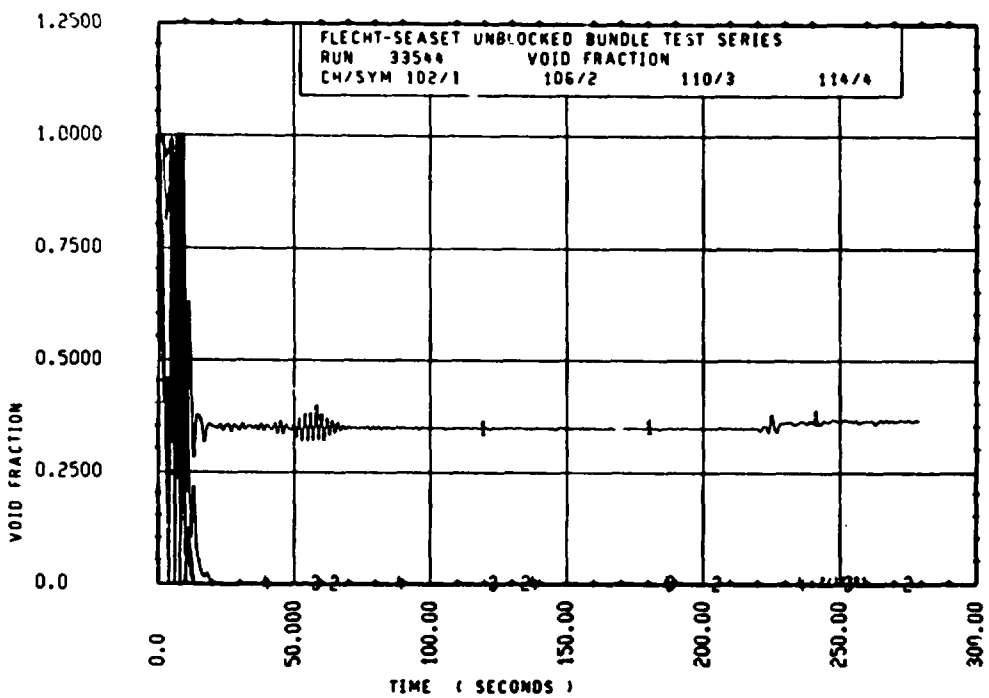

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 DOWNCOMER LEVEL
CH/SYM 256/1
PRESSURE (KPA)
PRESSURE (PSI)
55.158
50.000
40.000
30.000
20.000
10.000
0.0
-3.4474
8.0001
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-0.5000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

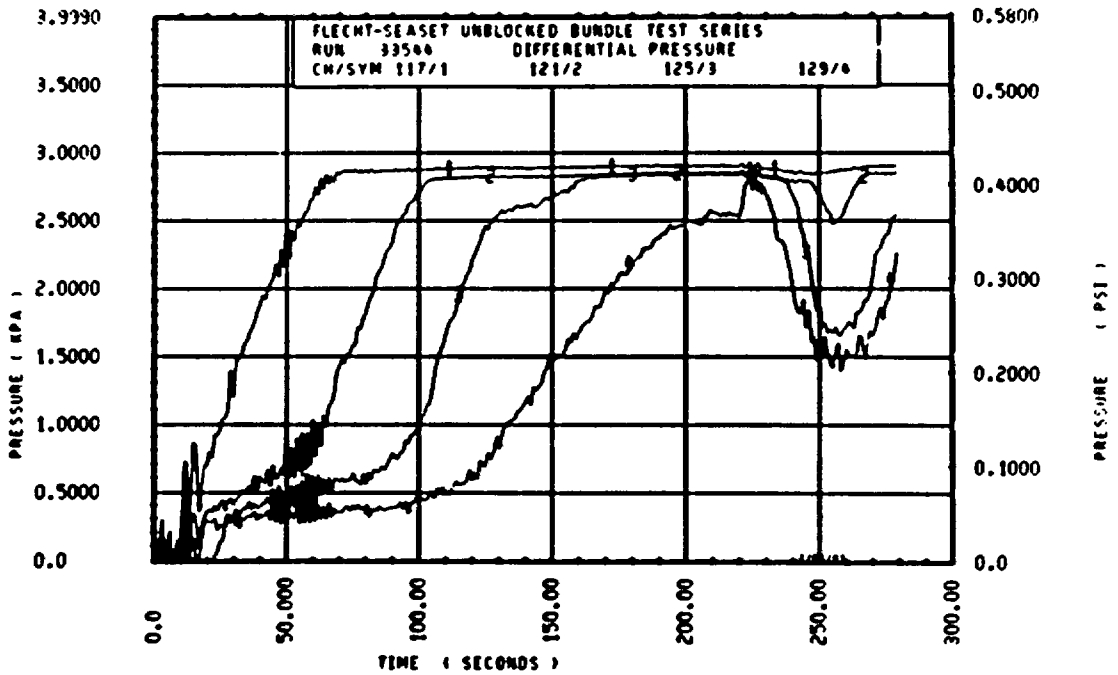

TIME (SECONDS)
-5.8000
0.0
50.000
100.00
150.00
200.00
250.00
281.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33544
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
STEAM FLOW RATE (LBM/S)
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0

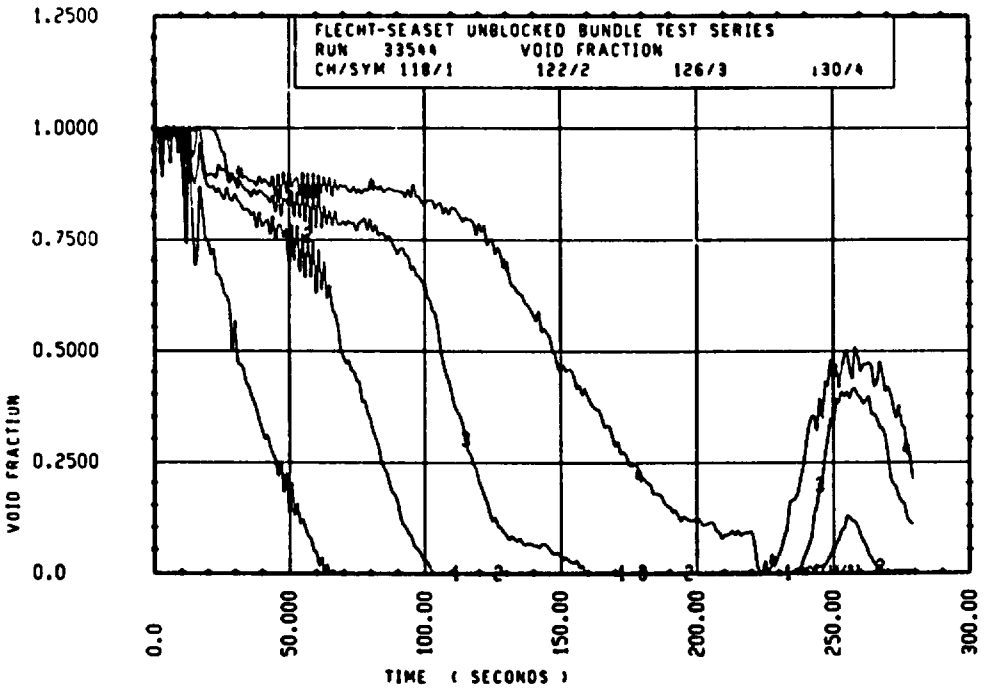

TIME (SECONDS)
-5.8000
0.0
50.000
100.00
150.00
200.00
250.00
286.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33544
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
315.60
300.00
250.00
200.00
150.00
100.00
50.000
0.0
MASS (LBM)
695.76
600.00
500.00
400.00
300.00
200.00
100.00
0.0

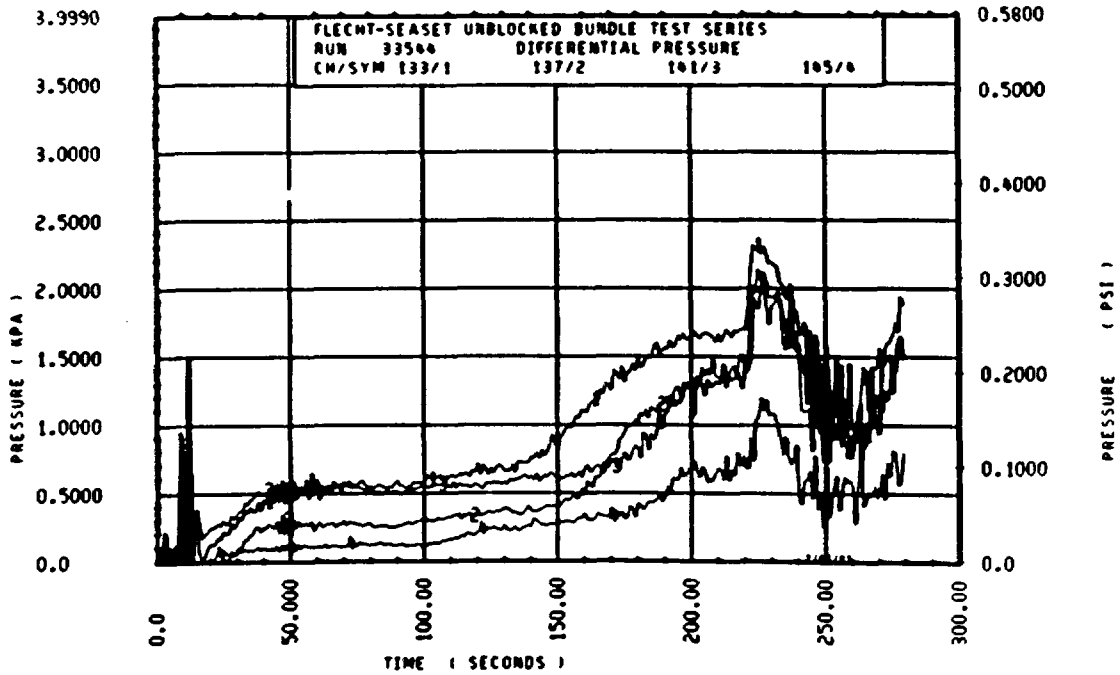

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544
QUENCH TIMES (ALL T/C)
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
281.00
QUENCH TIMES (SECONDS)

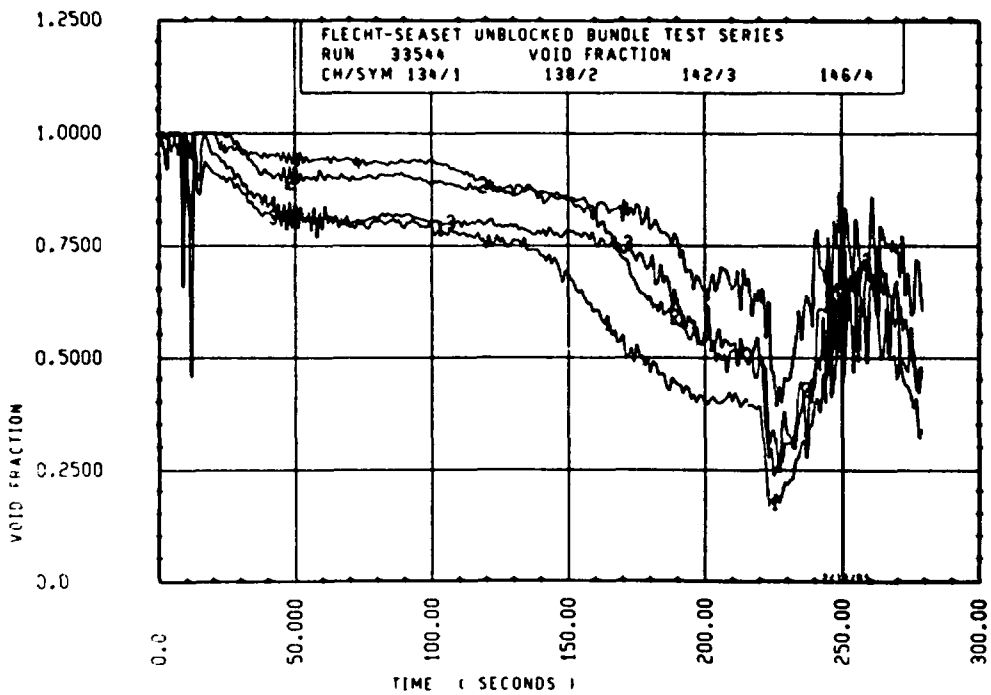

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33544 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 33644
Date: 7/12/79
Gravity Reflood Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at	182°C at 0 to 0.91 m (359°F at 0 to 36 in.)
1.83 m (72 in.) elevation	877°C (1610°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	5.80 kg/sec (12.8 lb/sec) (15 sec)
	0.789 kg/sec (1.76 lb/sec) (onward)
Coolant temperature	52°C (125°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Hot Rod Quench Time Temperature*
0.61 m (24 in.)	125°C (257°F)	64°C (148°F)
1.22 m (48 in.)	132°C (270°F)	92°C (197°F)
1.83 m (72 in.)	174°C-198°C (345°F-389°F)	132°C (269°F)
2.44 m (96 in.)	172°C-188°C (341°F-370°F)	130°C (266°F)
2.74 m (108 in.)	142°C (288°F)	130°C (266°F)
3.05 m (120 in.)	137°C (279°F)	129°C (264°F)
3.35 m (132 in.)	134°C (274°F)	128°C (263°F)

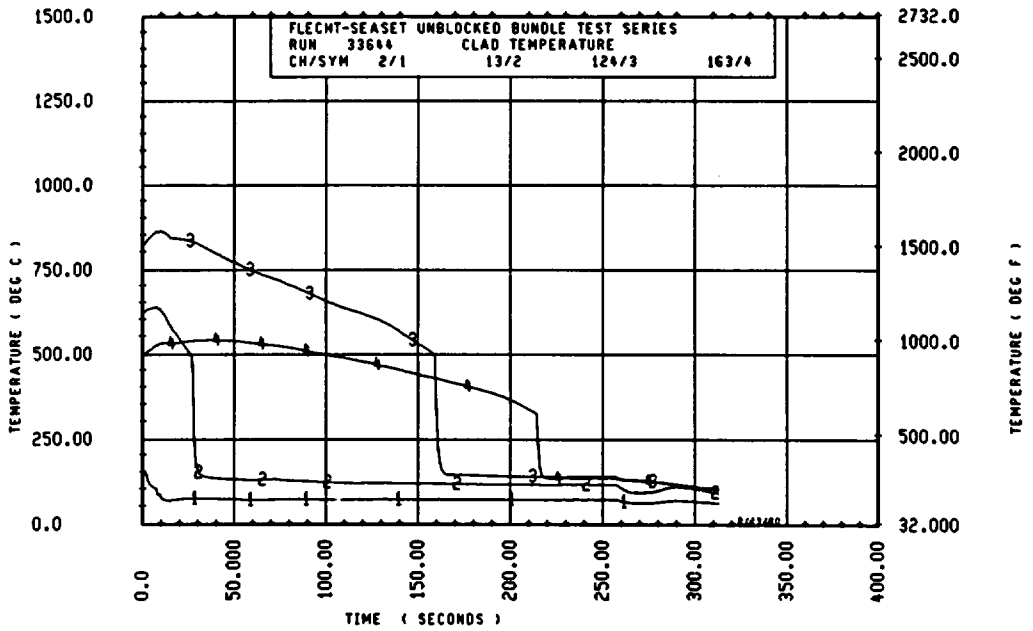
*At 104 seconds after flood

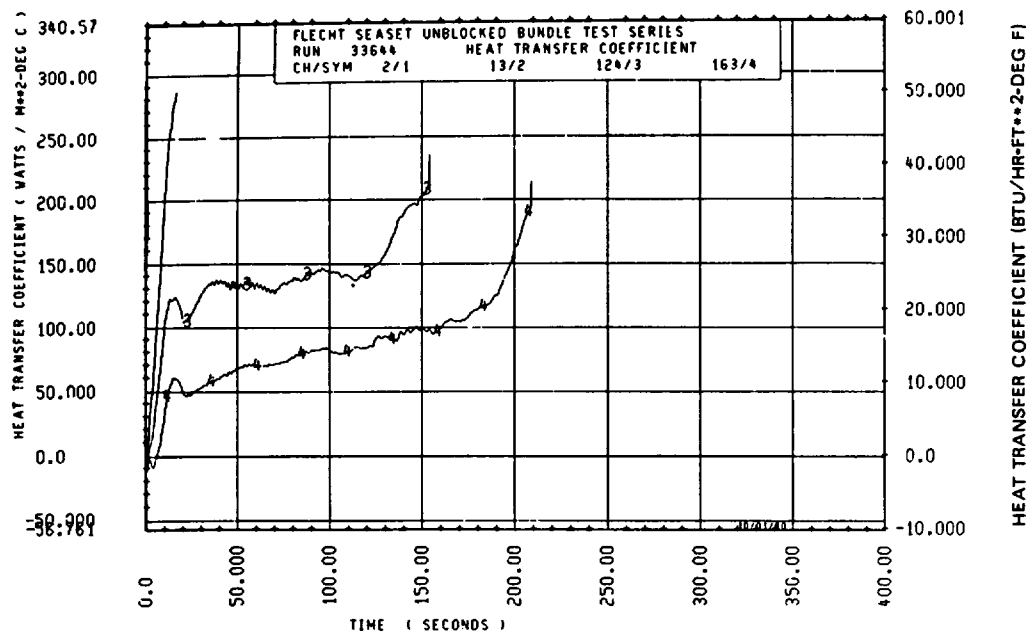
C. Comments

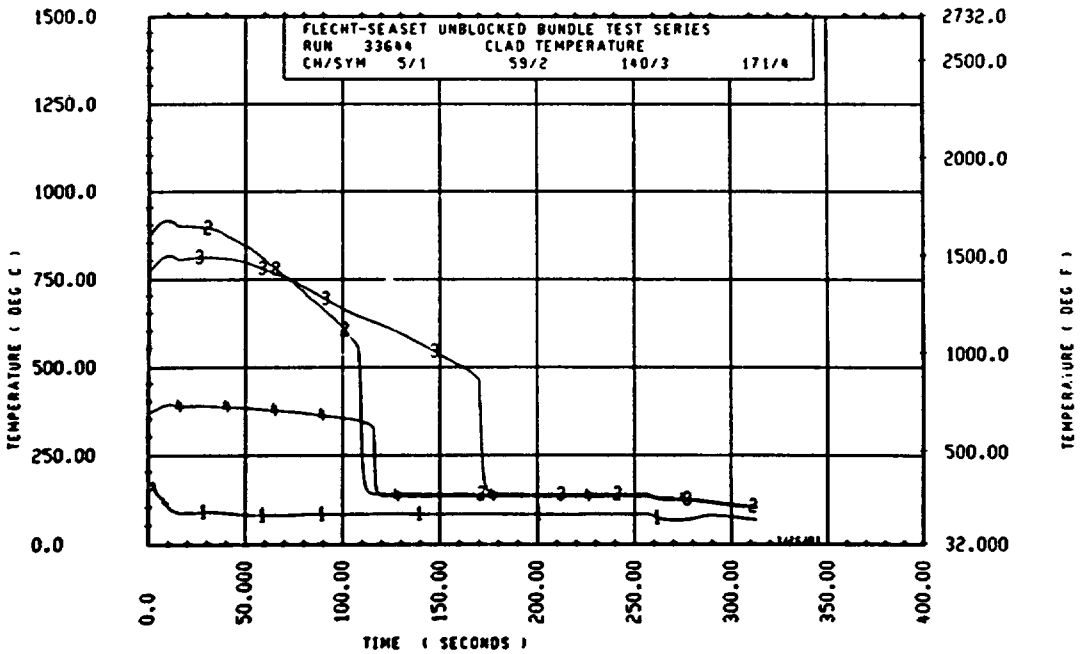
First flow step linearly decreased to approximately 83 percent of nominal value.

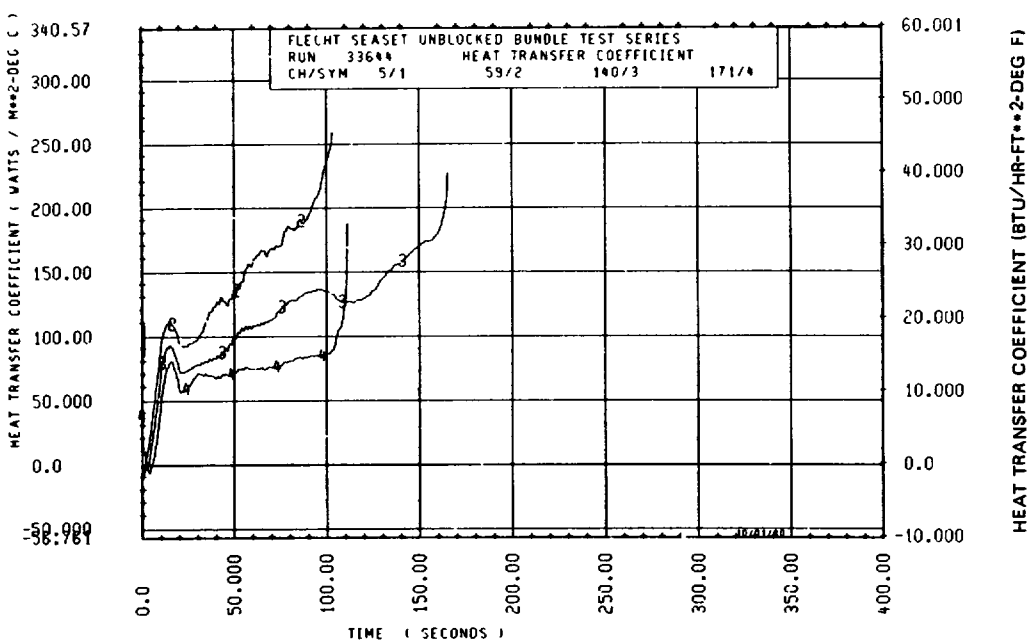
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 33644

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)
2H 4- 0	10	1114.	1159.	45.	7.5	926.	23.4
2H 6- 0	50	1536.	1619.	83.	9.5	974.	104.0
3C 5- 0	17	1288.	1340.	52.	7.5	853.	75.8
3C 5- 7	28	1382.	1439.	57.	9.5	829.	98.3
4L 8- 0	129	1381.	1464.	84.	9.5	804.	172.0
4L 8- 6	147	1383.	1466.	83.	9.5	801.	172.4
5E11- 0	168	707.	744.	37.	9.5	525.	154.2
5J 4- 0	12	1115.	1155.	39.	7.5	907.	27.0
5J 8- 6	146	1245.	1311.	66.	8.0	803.	148.0
5J11- 6	175	684.	725.	42.	11.0	281.	176.0
7B 6- 0	57	1465.	1539.	74.	9.5	849.	91.5
7B 8- 6	142	1196.	1264.	68.	9.5	758.	190.9
7B10- 0	162	909.	982.	73.	26.0	612.	224.0
7B11- 6	176	694.	735.	41.	27.0	498.	203.9
7D 6- 4	84	1623.	1705.	82.	9.5	1016.	104.4
7D 7- 6	119	1521.	1603.	81.	9.5	910.	137.0
7D 9- 3	151	1089.	1164.	75.	11.0	675.	182.8
7G 5- 0	23	1441.	1489.	49.	9.5	917.	69.0
7J 6- 0	59	1600.	1688.	88.	9.5	1023.	108.8
7M 7- 6	120	1507.	1586.	80.	8.0	884.	153.2
7M 8- 0	132	1402.	1487.	85.	9.5	863.	169.9
7M 9- 3	152	1103.	1170.	67.	9.5	705.	178.0
8N 4- 0	13	1145.	1185.	40.	[illegible]	907.	27.3
8N10- 0	163	928.	1008.	80.	35.5	618.	214.0
8N11- 6	177	689.	731.	41.	11.0	483.	167.0
8K 4- 0	14	1109.	1153.	44.	6.0	917.	23.5
8K 6- 6	99	1537.	1641.	103.	11.0	982.	121.0
8K 8- 0	140	1420.	1506.	87.	11.0	869.	170.0
8K10- 0	164	920.	1002.	82.	40.5	630.	206.0
8N 2- 0	5	328.	349.	21.	2.5	282.	5.0
8N 4- 0	15	1131.	1176.	46.	7.5	936.	24.5
8N 6- 0	61	1552.	1633.	81.	9.5	782.	101.0
8N10- 0	165	926.	1016.	90.	37.5	645.	216.0
9C 7- 0	109	1506.	1586.	81.	9.5	780.	145.0
9C 9- 3	153	1106.	1179.	72.	11.0	745.	188.0
9G 1- 0	2	292.	301.	8.	1.5	276.	2.5
9G 3- 3	8	359.	441.	82.	6.0	278.	11.0
9G11- 0	171	702.	745.	43.	11.0	629.	116.0
9I 5- 0	24	1459.	1514.	54.	9.5	953.	68.0
9E 6- 2	46	1534.	1623.	89.	9.5	858.	118.9
10D 6- 6	93	1518.	1599.	81.	9.5	775.	127.8
11E 7- 6	124	1504.	1588.	85.	9.5	926.	159.0
11E 9- 3	155	1136.	1205.	69.	11.0	667.	210.0
11E11- 0	172	700.	756.	55.	35.5	544.	175.8
12D 4- 0	16	1143.	1190.	47.	7.5	948.	24.4
12D 6- 0	66	1543.	1624.	81.	9.5	945.	108.9
12F 6- 6	102	1539.	1637.	98.	9.5	934.	121.0

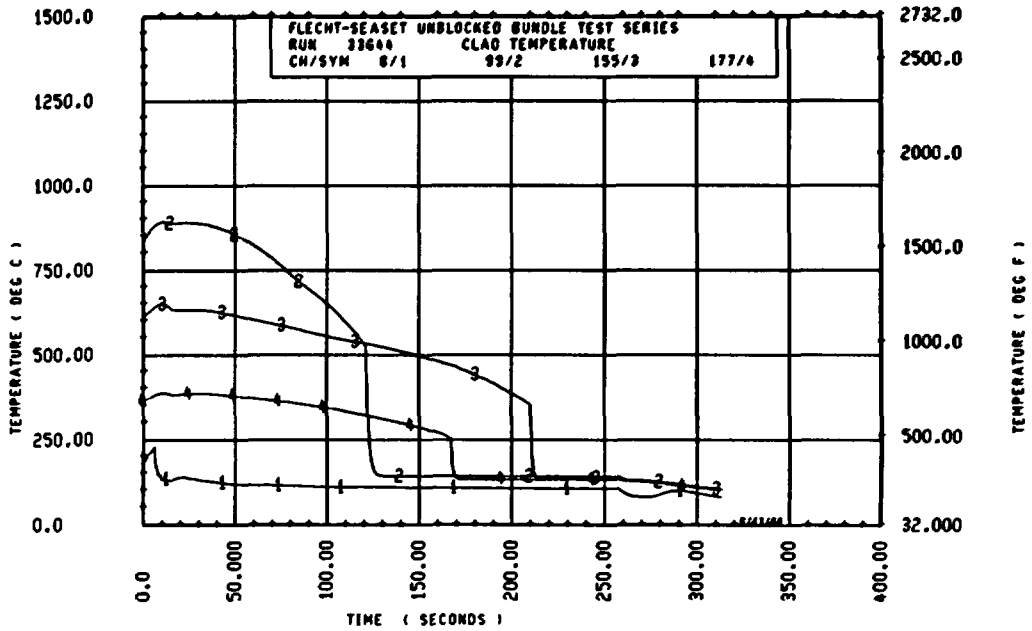

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

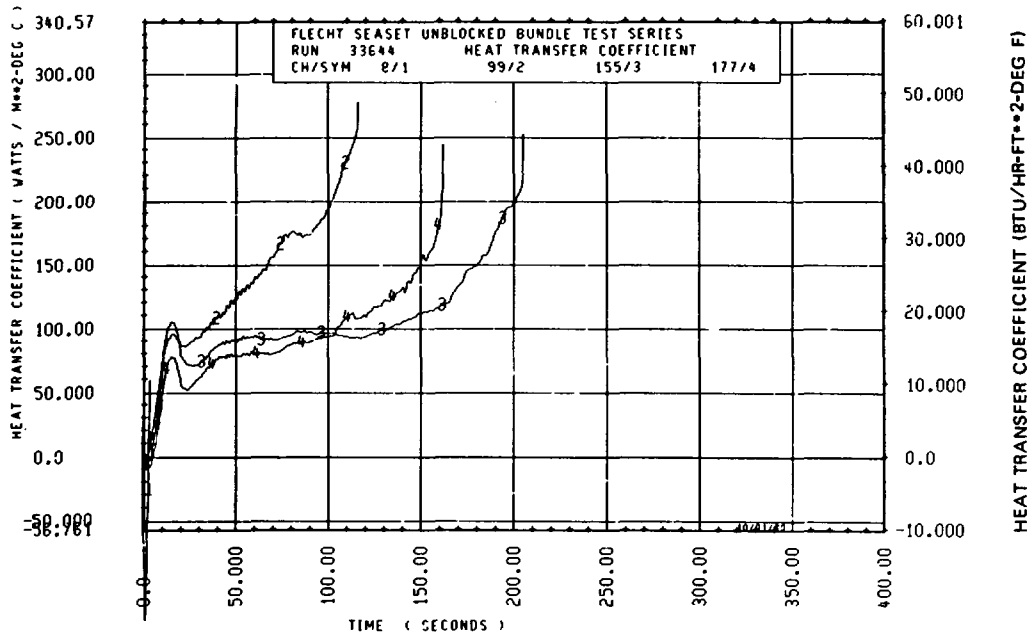

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-58.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

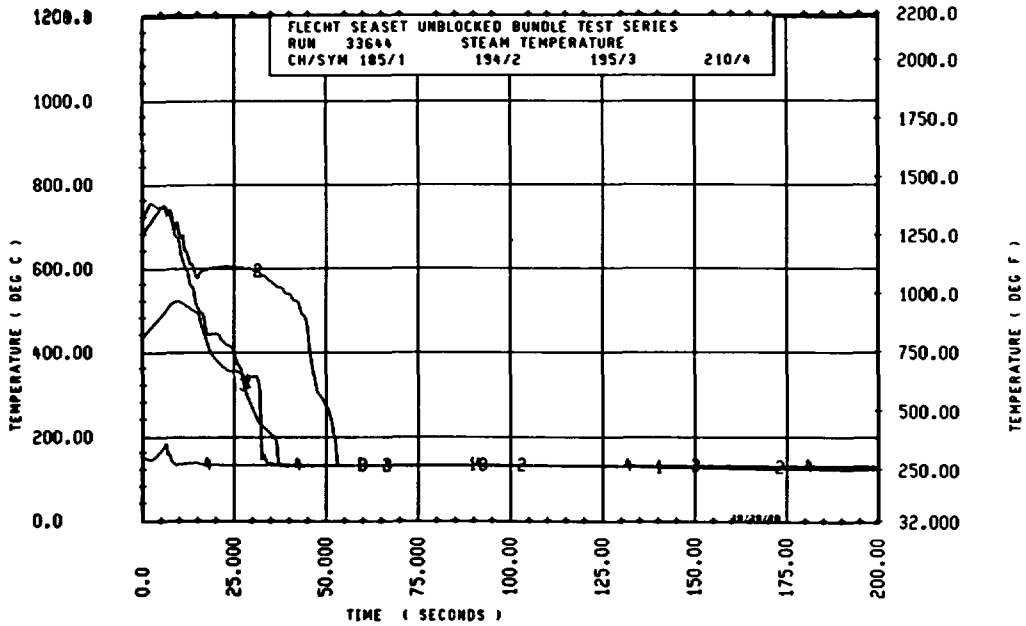

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

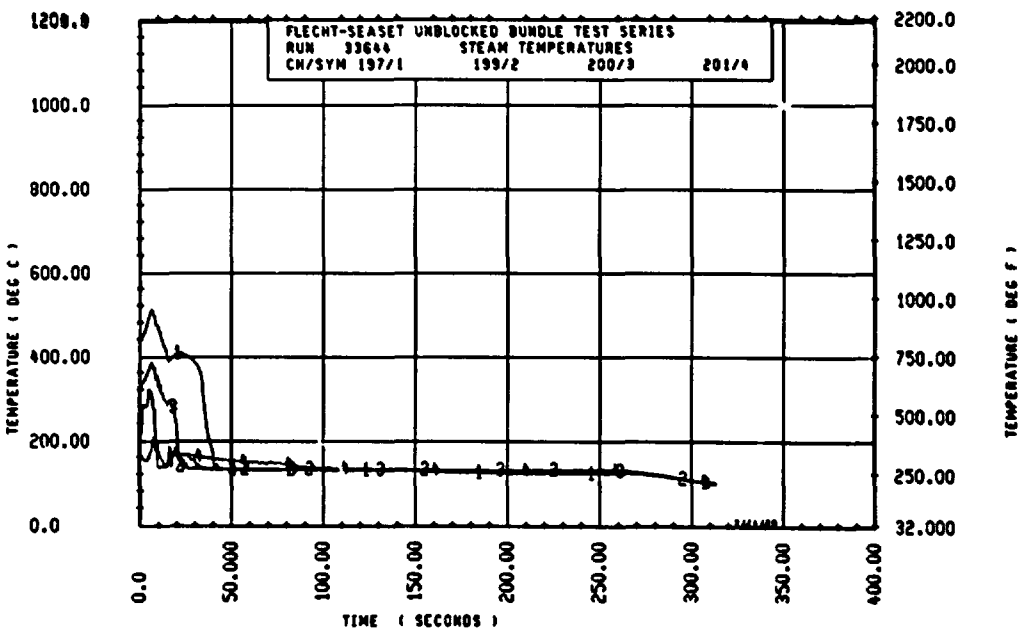

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

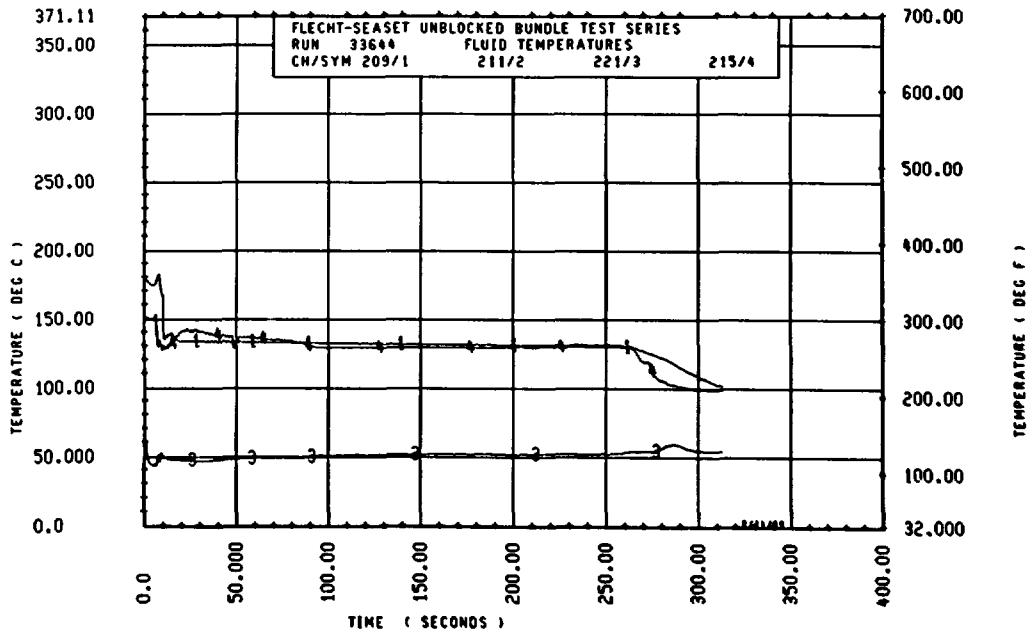
33644-4

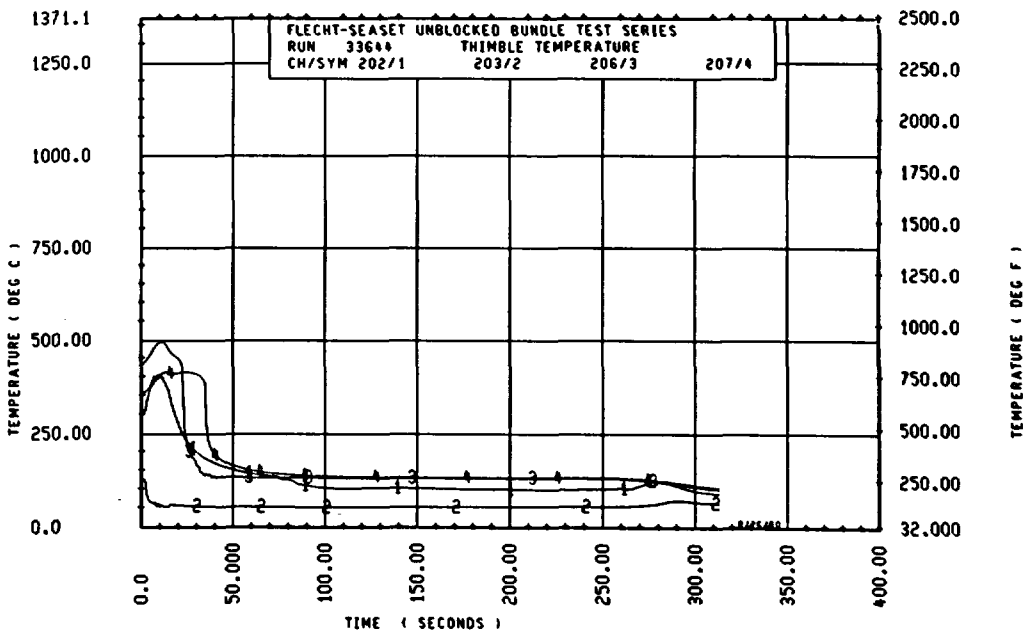

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

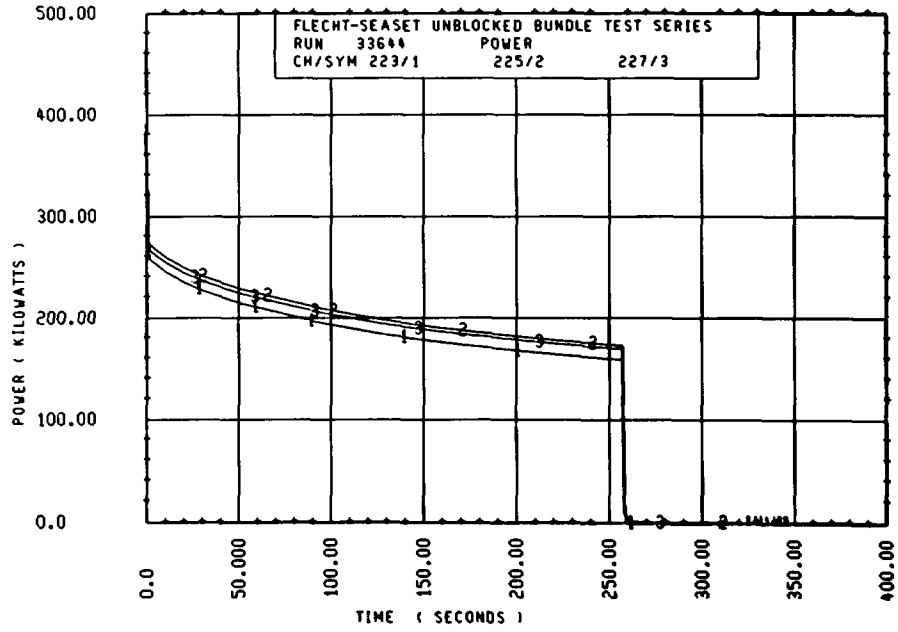

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

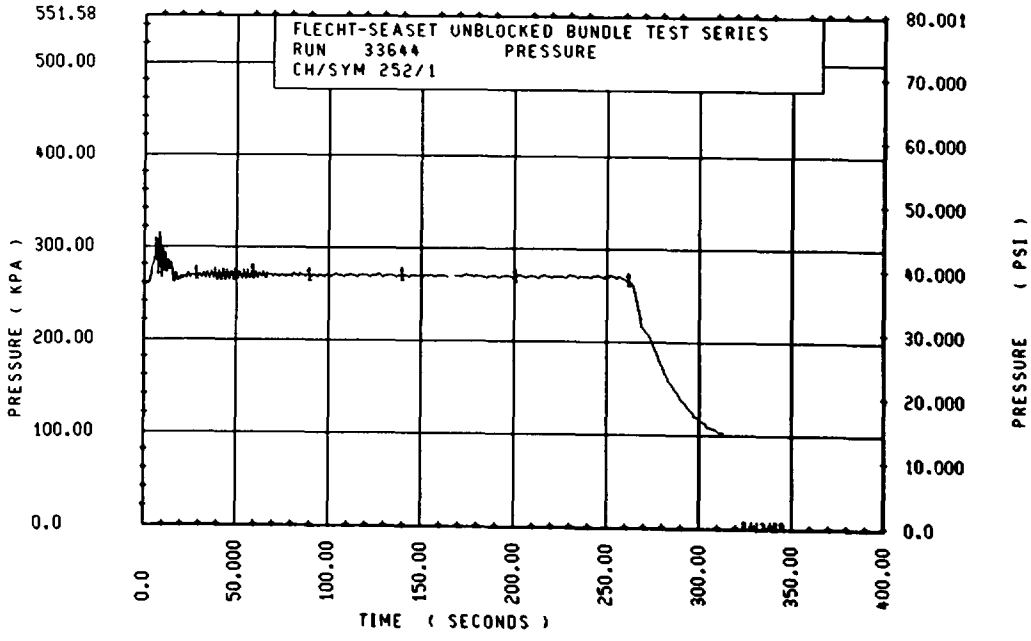

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

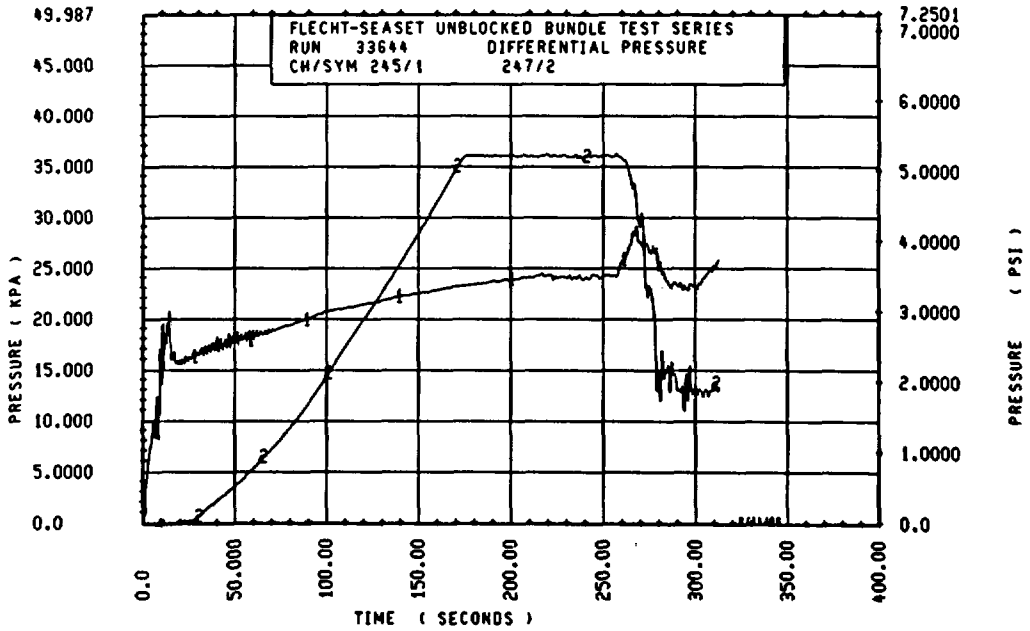


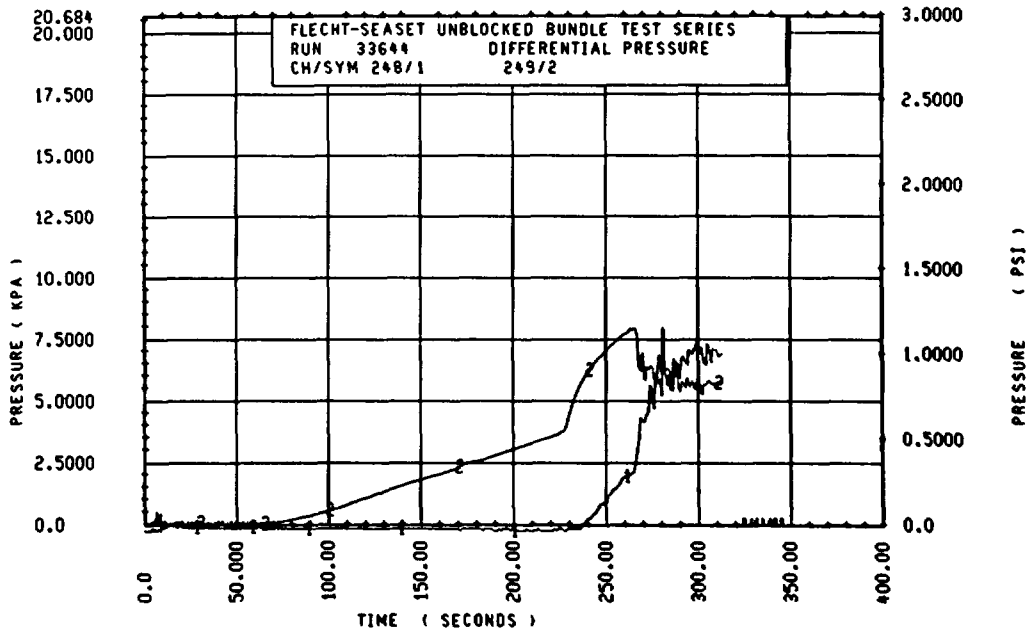


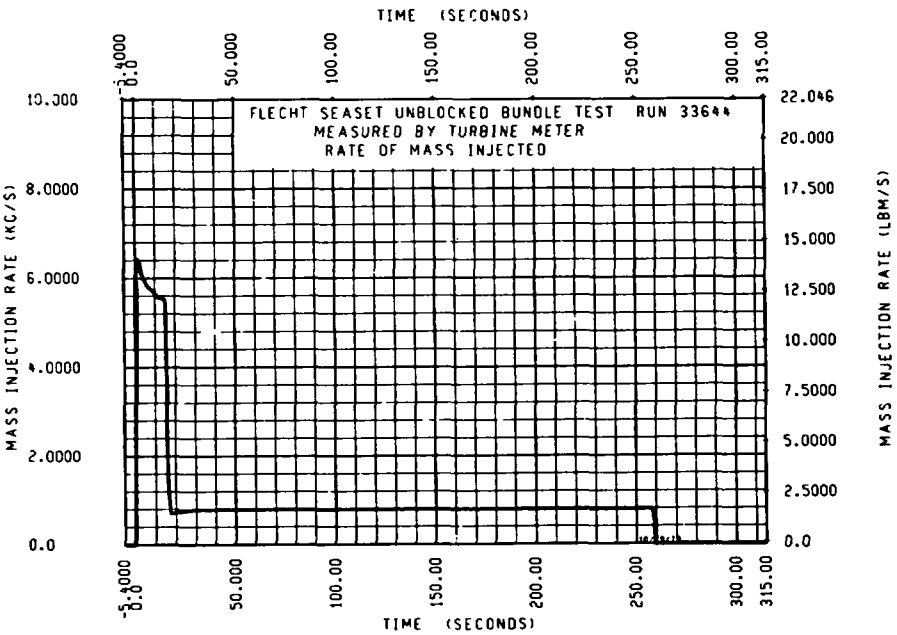
CH 202-4I, 1.52 m (60 in.); CH 203-7L, 0.30 m (12 in.);
CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

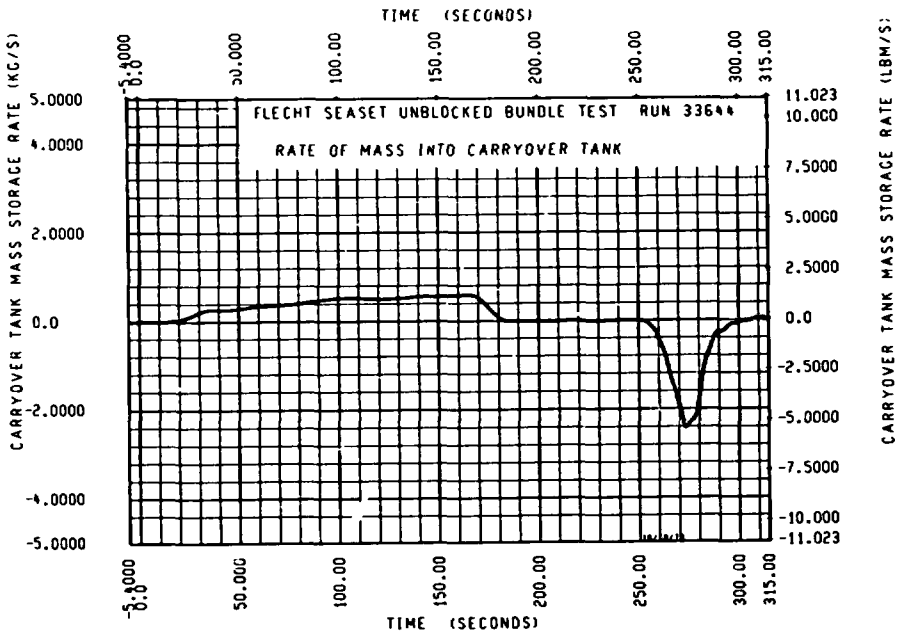

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

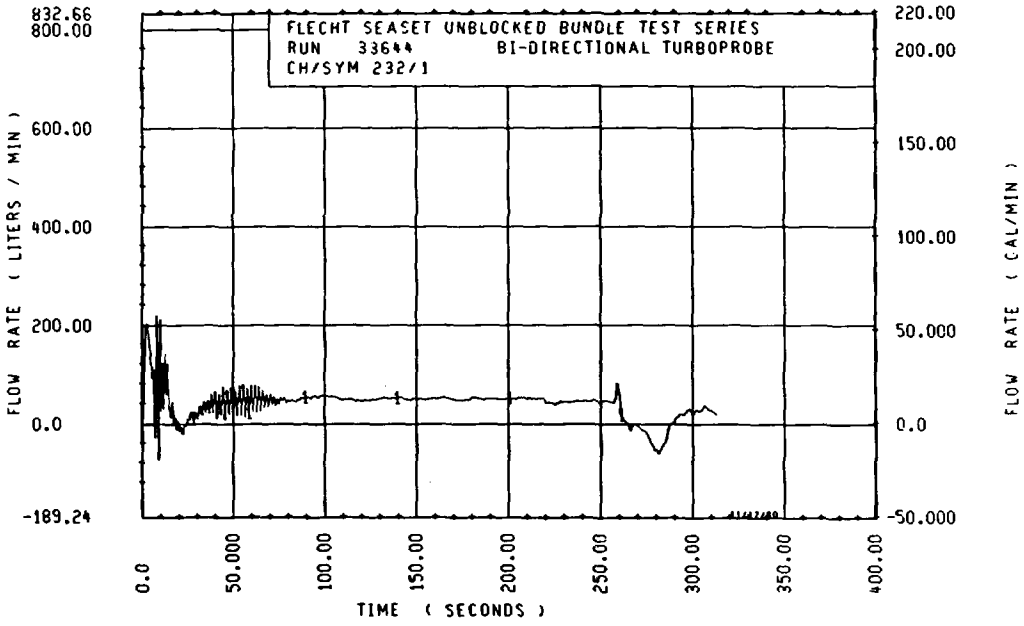

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

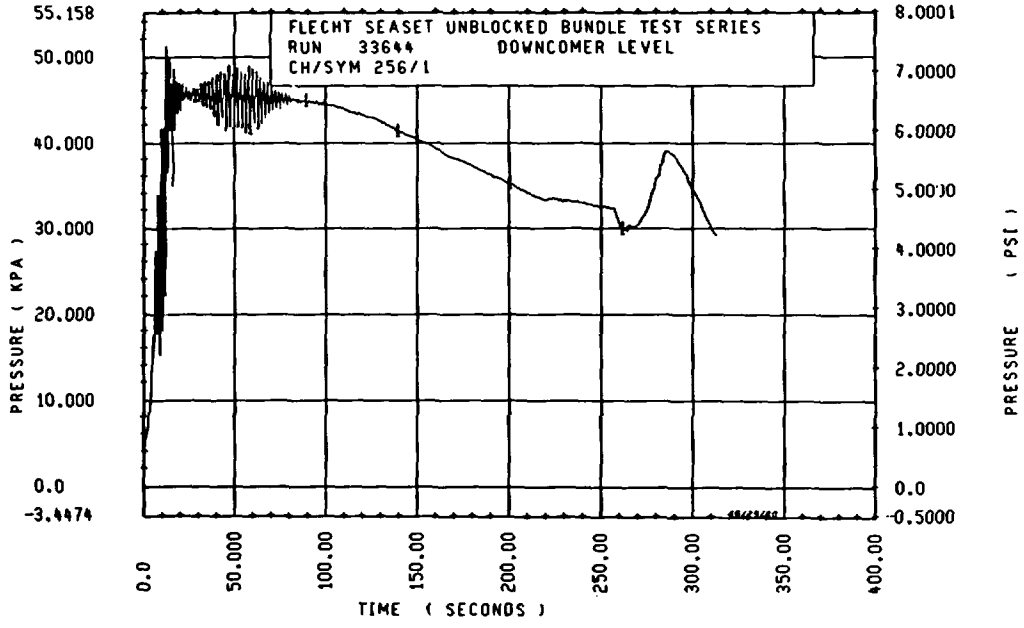

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

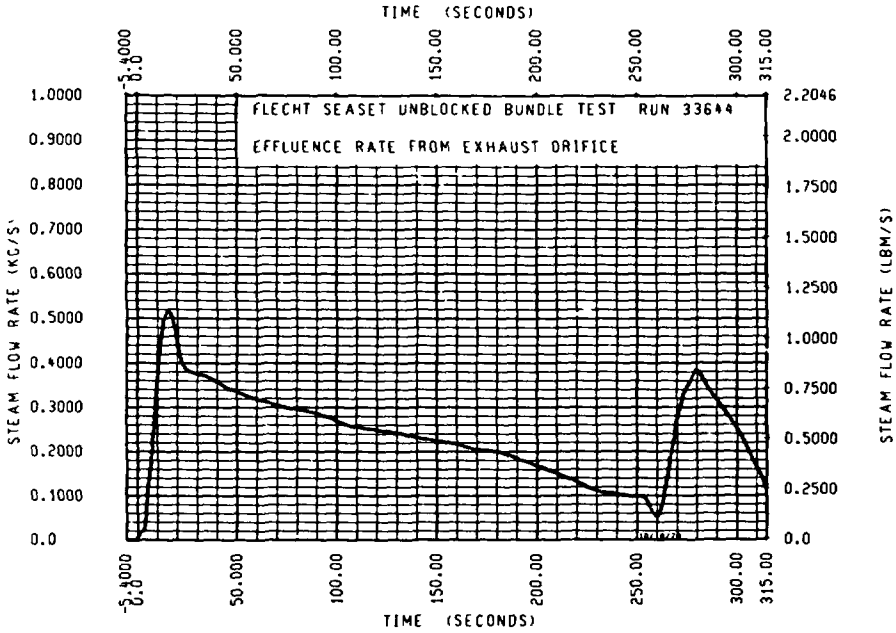

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

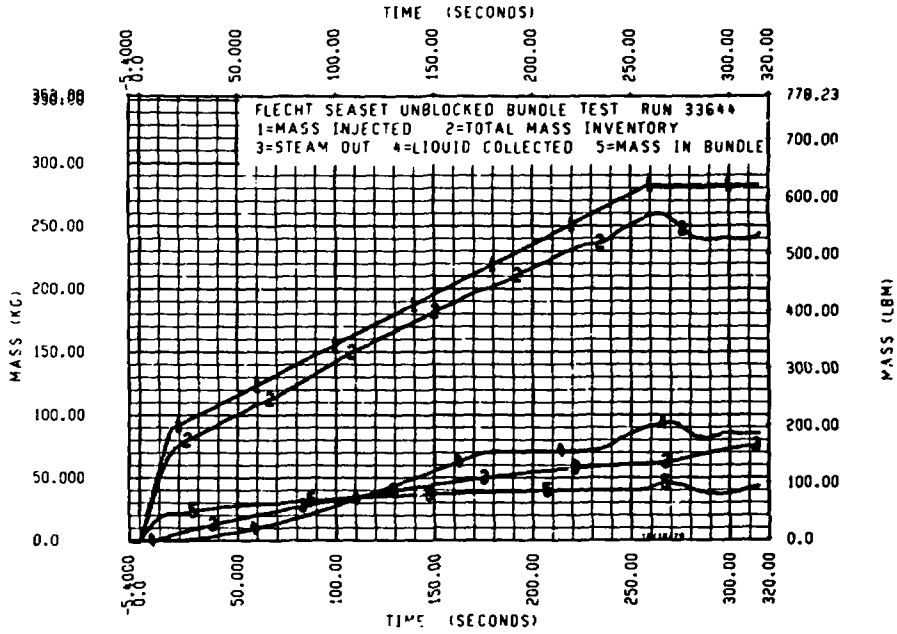

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33644
MEASURED BY TURBINE METER
RATE OF MASS INJECTED
TIME (SECONDS)
MASS INJECTION RATE (KG/S)
MASS INJECTION RATE (LBM/S)
-5.4000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
315.00
10.000
8.0000
6.0000
4.0000
2.0000
0.0
22.046
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0

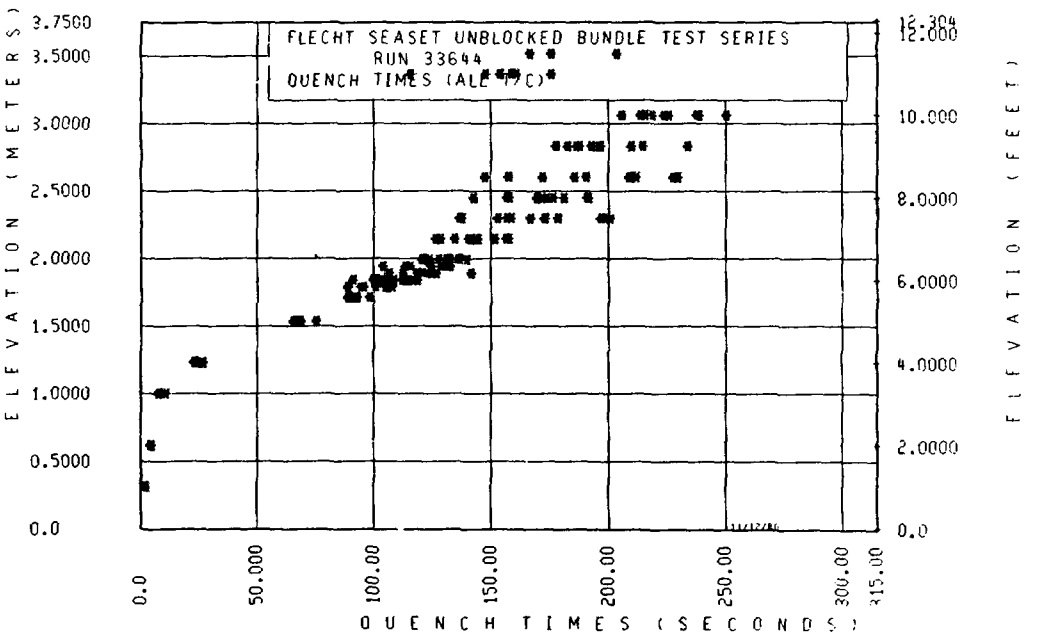

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33644
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
-5.4000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
315.00
5.0000
4.0000
2.0000
0.0
-2.0000
-4.0000
-5.0000
11.023
10.000
7.5000
5.0000
2.5000
0.0
-2.5000
-5.0000
-7.5000
-10.000
-11.023

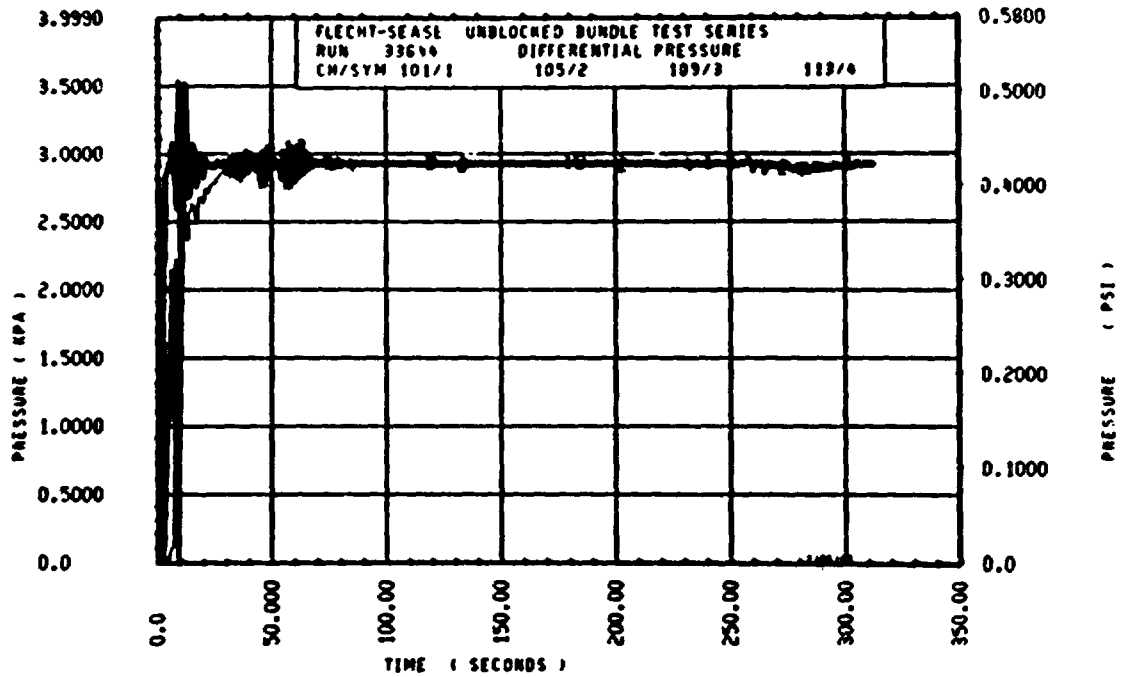

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 BI-DIRECTIONAL TURBOPROBE
CH/SYM 232/1
832.66
800.00
600.00
400.00
200.00
0.0
-189.24
FLOW RATE (LITERS / MIN)
220.00
200.00
150.00
100.00
50.000
0.0
-50.000
FLOW RATE (CAL/MIN)
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

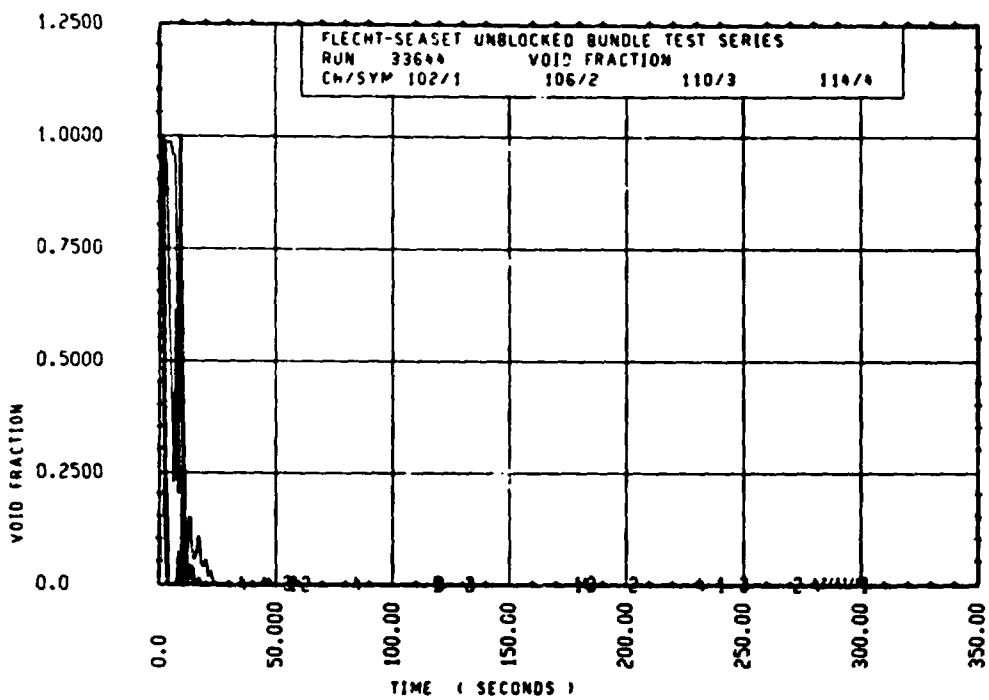

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 DOWNCOMER LEVEL
CH/SYM 256/1
55.158
50.000
40.000
30.000
20.000
10.000
0.0
-3.4474
PRESSURE (KPA)
8.0001
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-0.5000
PRESSURE (PSI)
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

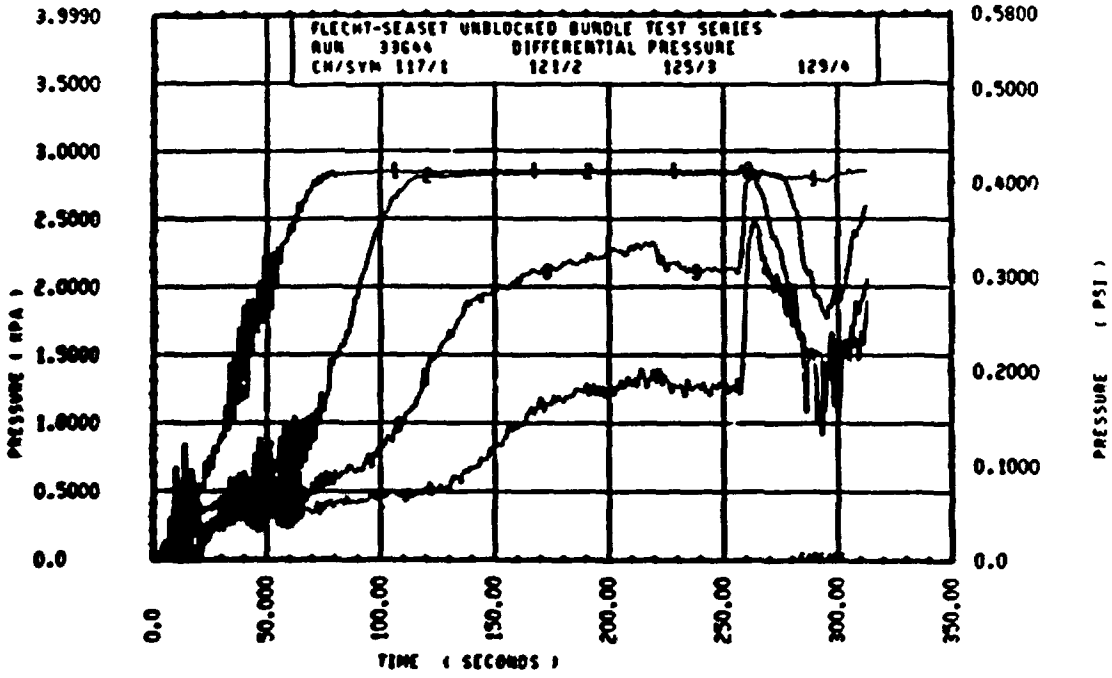

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33644
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
2.2046
2.0000
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.4000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
315.00

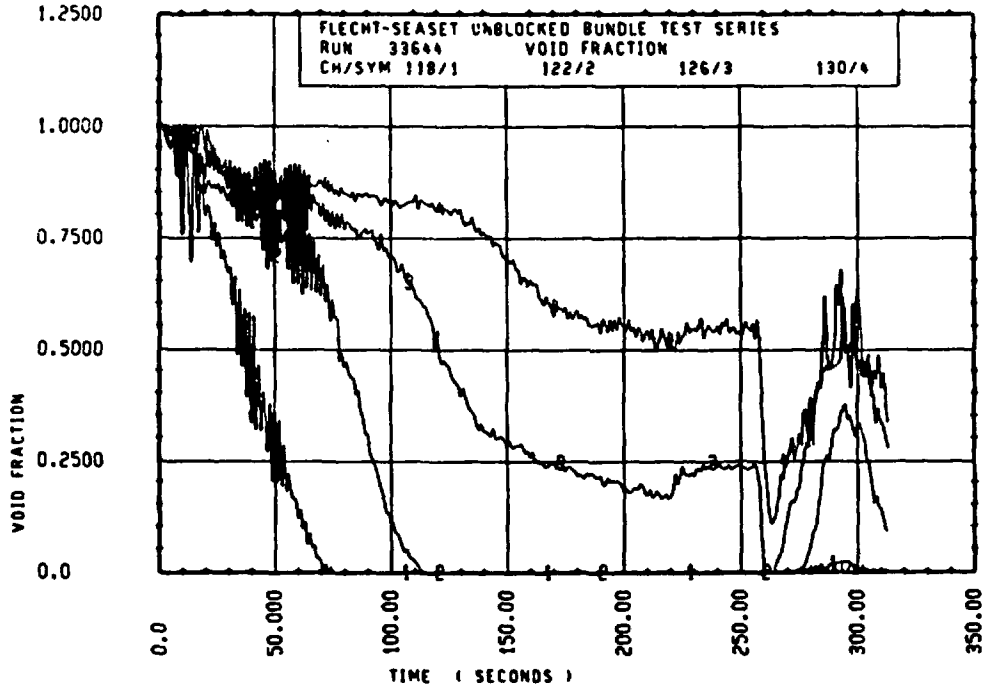

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33644
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
300.00
250.00
200.00
150.00
100.00
50.000
0.0
770.23
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-5.4000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
320.00

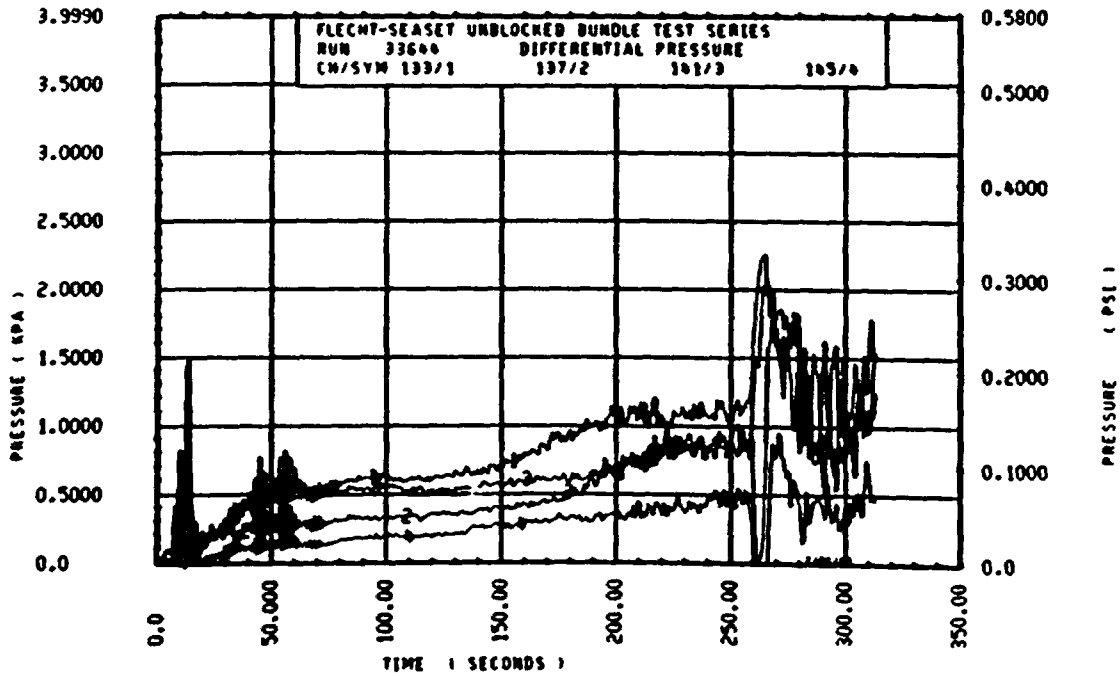

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644
QUENCH TIMES (ALE 17C)
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
ELEVATION (FEET)
0.0
50.000
100.00
150.00
200.00
250.00
300.00
315.00
QUENCH TIMES (SECONDS)

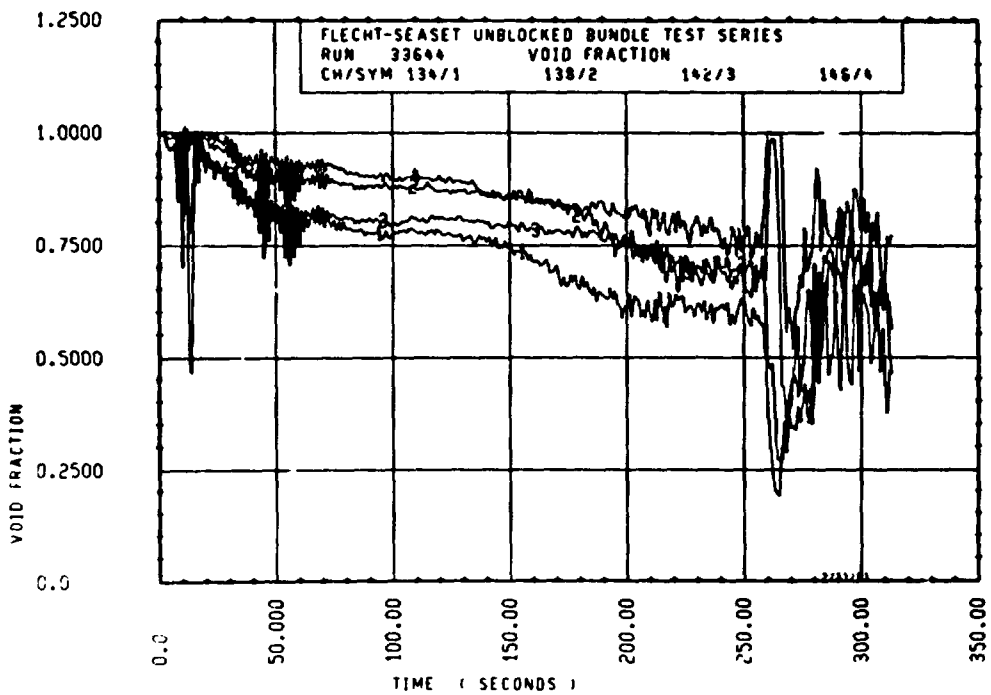

FLECHT-SEASE UNBLOCKED BUNDLE TEST SERIES
RUN 33644 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (MPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33644 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 33749

Date: 7/16/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	745°C (1374°F)
Rod peak power	1.9 kw/m (0.57 kw/ft)
Flow rate	26.9 mm/sec (1.06 in./sec)
Coolant temperature	61°C (142°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	--	--
1.22 m (48 in.)	147°C-155°C (296°F-311°F)	261°C (501°F)
1.83 m (72 in.)	163°C-169°C (325°F-337°F)	294°C-517°C (561°F-962°F)
2.44 m (96 in.)	157°C-165°C (314°F-329°F)	276°C-337°C (528°F-638°F)
2.74 m (108 in.)	147°C (296°F)	129°C (265°F)
3.05 m (120 in.)	132°C-142°C (269°F-287°F)	128°C (263°F)
3.35 m (132 in.)	129°C-133°C (265°F-271°F)	128°C (262°F)

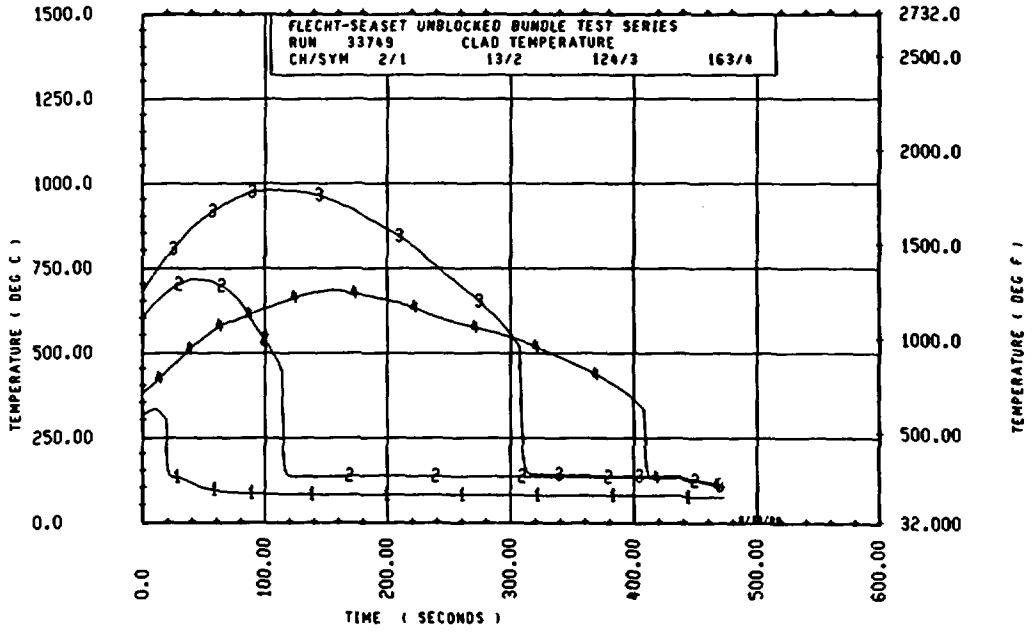
*At 82 seconds after flood

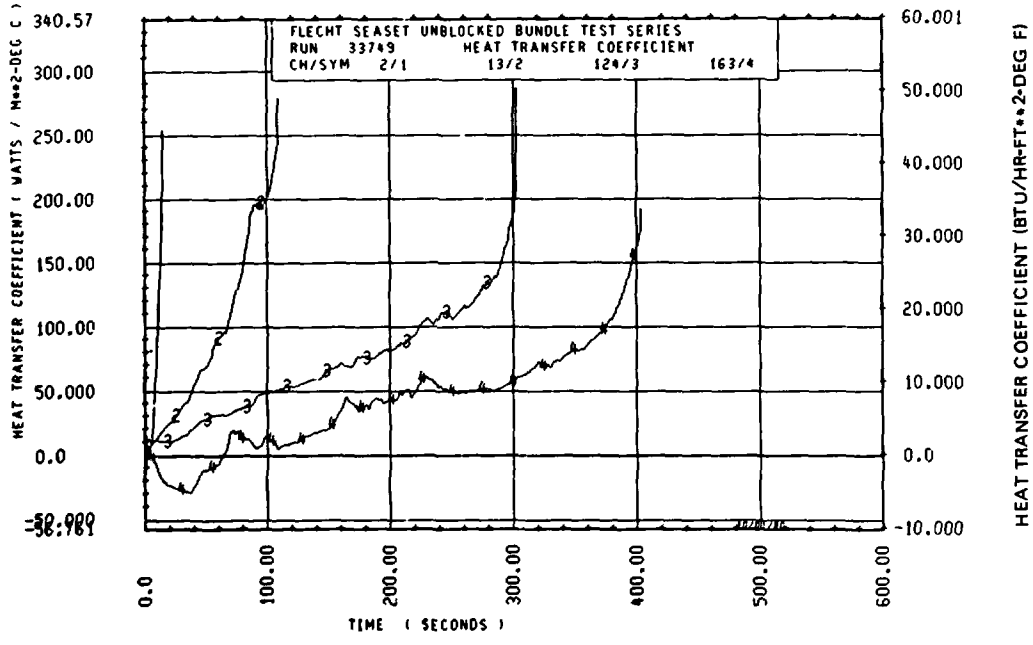
C. Comments

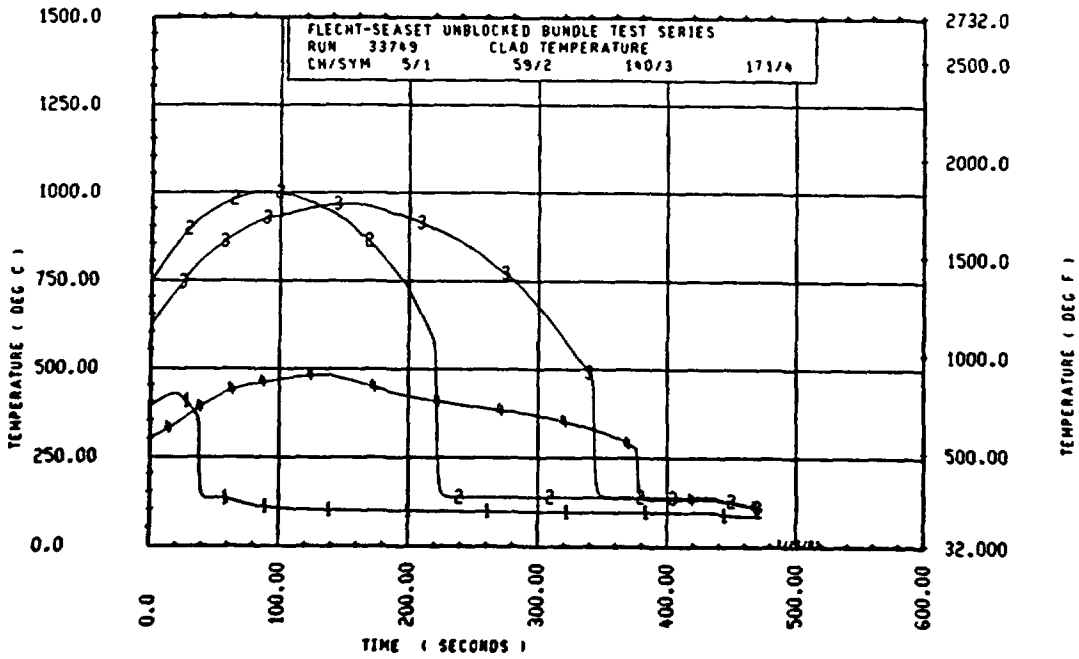
None

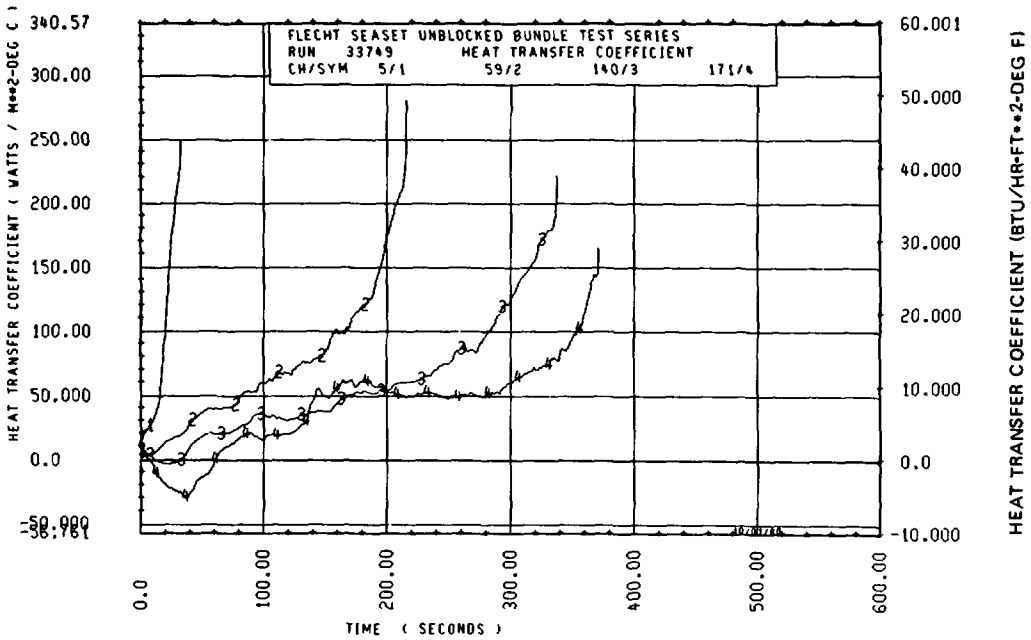
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 33749

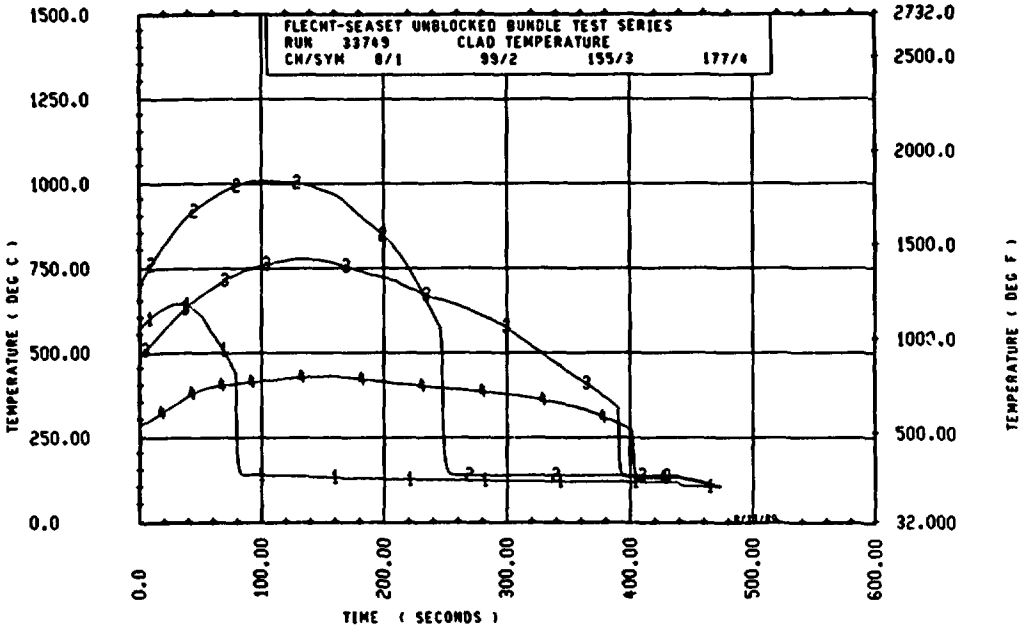
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1095.	1302.	206.	47.5	854.	110.7
2H 6- 0	50	1328.	1726.	398.	84.5	1060.	215.9
3C 5- 0	17	1156.	1367.	211.	54.5	815.	168.9
3C 5- 7	28	1224.	1467.	243.	62.5	848.	196.6
4L 8- 0	129	1138.	1634.	496.	114.0	826.	328.8
4L 8- 6	147	1139.	1625.	486.	113.0	832.	329.0
5E11- 0	168	565.	868.	303.	163.0	542.	386.0
5J 4- 0	12	1079.	1300.	221.	46.0	823.	113.0
5J 8- 6	146	973.	1540.	567.	169.0	708.	358.6
5J11- 6	175	530.	761.	231.	175.0	719.	245.8
7B 4- 0	57	1272.	1608.	336.	71.5	944.	190.9
7B 8- 6	142	970.	1413.	443.	110.0	713.	365.0
7B10- 0	162	726.	1281.	555.	192.0	642.	412.0
7B11- 6	176	551.	865.	315.	131.0	504.	430.0
7D 6- 4	84	1391.	1821.	431.	86.0	1026.	216.2
7D 7- 6	119	1256.	1750.	494.	112.0	969.	288.0
7D 9- 3	151	878.	1455.	577.	145.0	684.	367.0
7G 5- 0	23	1242.	1531.	289.	60.0	964.	160.3
7J 6- 0	59	1374.	1836.	463.	83.0	1055.	220.7
7M 7- 6	120	1261.	1748.	486.	113.0	899.	305.3
7M 8- 0	132	1141.	1715.	574.	121.0	875.	332.9
7M 9- 3	152	883.	1513.	630.	182.0	768.	370.1
8H 4- 0	13	1119.	1323.	204.	40.0	844.	114.0
8H10- 0	163	721.	1265.	544.	155.0	632.	408.0
8H11- 6	177	546.	808.	262.	156.0	518.	401.5
8K 4- 0	14	1097.	1305.	208.	39.0	864.	109.0
8K 6- 6	99	1298.	1846.	548.	103.0	1042.	246.7
8K 8- 0	140	1160.	1775.	616.	155.0	881.	342.0
8K10- 0	164	721.	1332.	611.	164.0	685.	405.0
8N 2- 0	5	740.	806.	66.	19.0	681.	37.8
8N 4- 0	15	1105.	1325.	219.	48.5	857.	110.0
8N 6- 0	61	1331.	1775.	444.	84.5	875.	212.9
8N10- 0	165	724.	1395.	671.	192.0	665.	409.3
9C 7- 0	109	1259.	1695.	436.	93.0	784.	271.0
9C 9- 3	153	897.	1443.	546.	135.0	709.	370.8
9G 1- 0	2	603.	634.	31.	10.5	575.	19.5
9G 3- 3	8	1059.	1193.	134.	34.5	826.	79.0
9G11- 0	171	579.	903.	324.	133.0	528.	376.0
9I 5- 0	24	1304.	1587.	283.	68.5	926.	165.0
9E 6- 2	46	1322.	1811.	489.	92.5	905.	232.0
10D 6- 6	93	1303.	1756.	453.	114.0	835.	250.7
11E 7- 6	124	1261.	1797.	535.	111.0	932.	307.5
11E 9- 3	155	915.	1429.	514.	128.0	634.	390.0
11E11- 0	172	581.	993.	413.	132.0	588.	369.0
12D 4- 0	16	1114.	1312.	198.	38.0	848.	110.9
12D 6- 0	66	1344.	1720.	375.	84.0	1008.	214.8
12F 6- 6	102	1316.	1803.	487.	93.0	936.	241.6

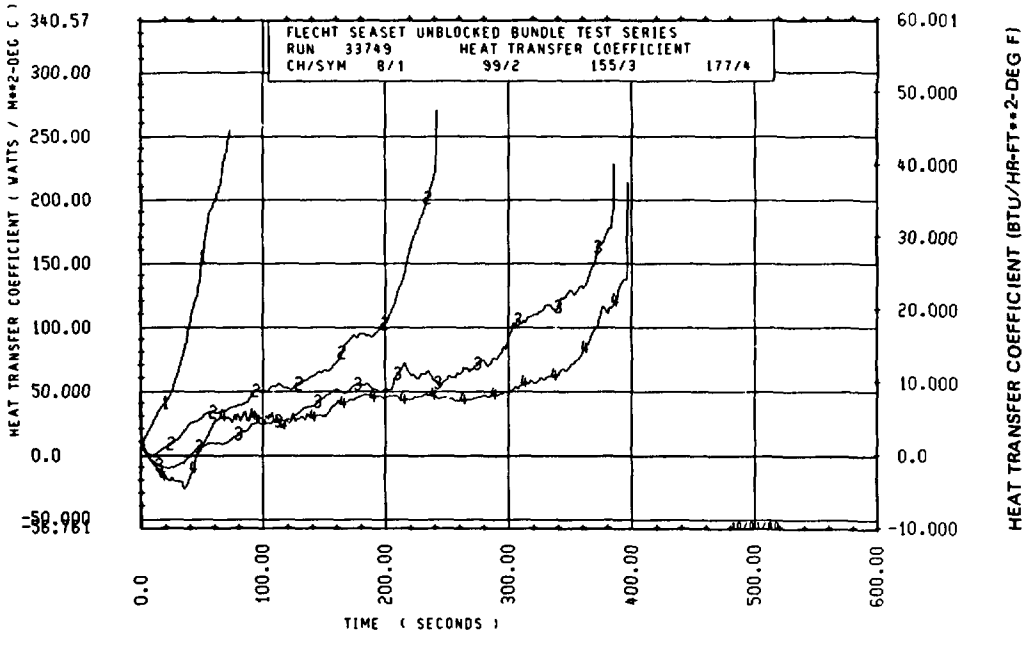

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

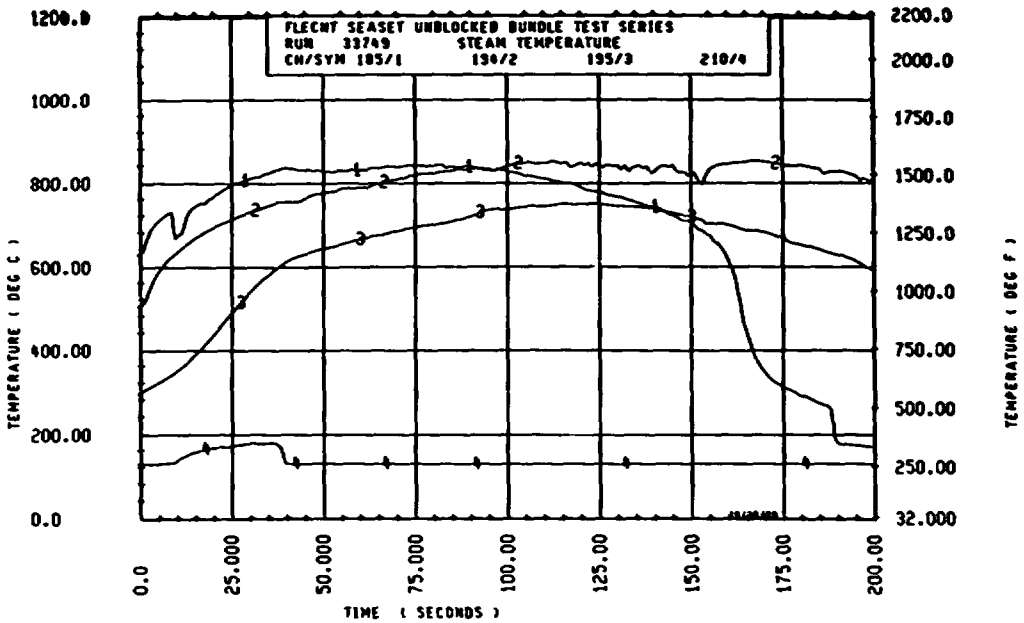

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

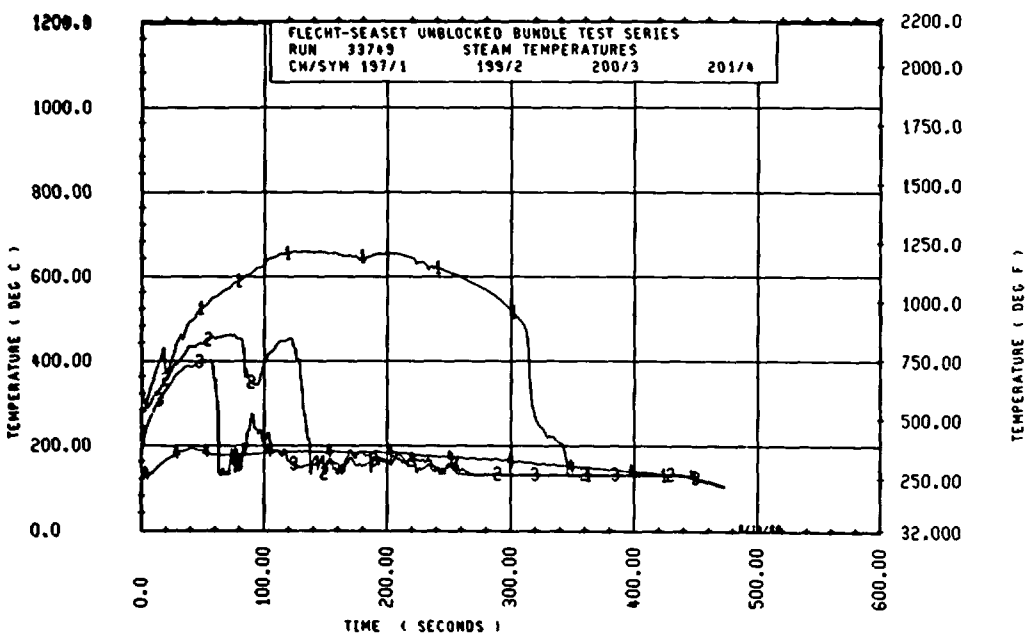

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

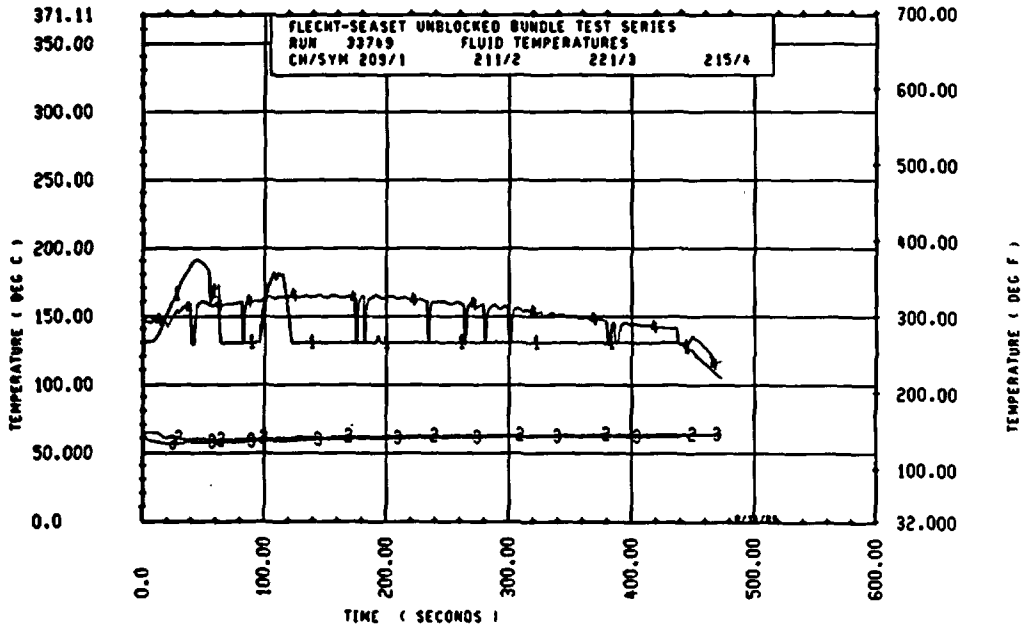

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

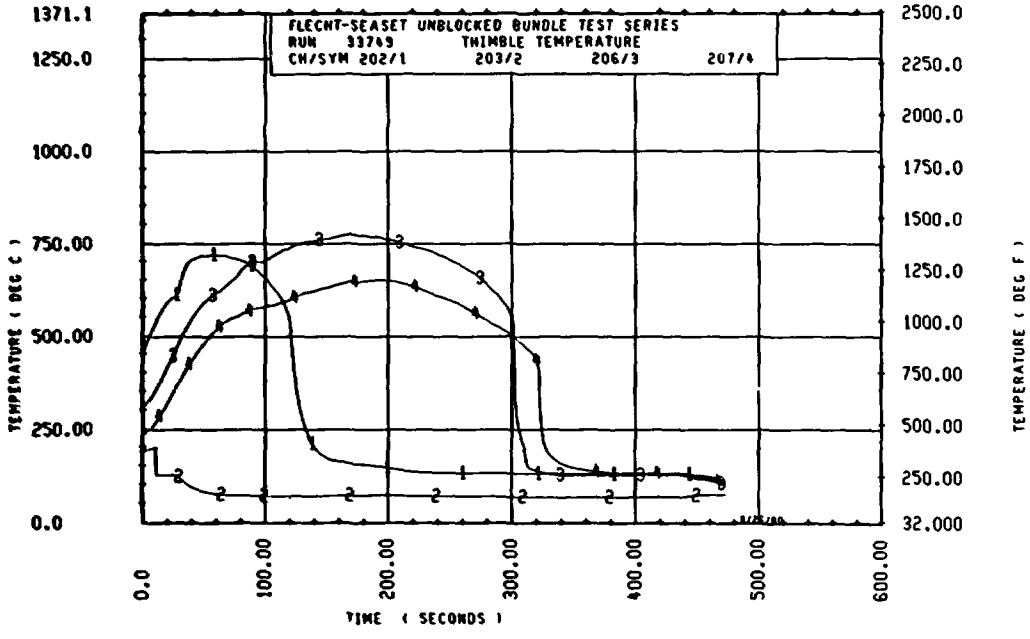

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

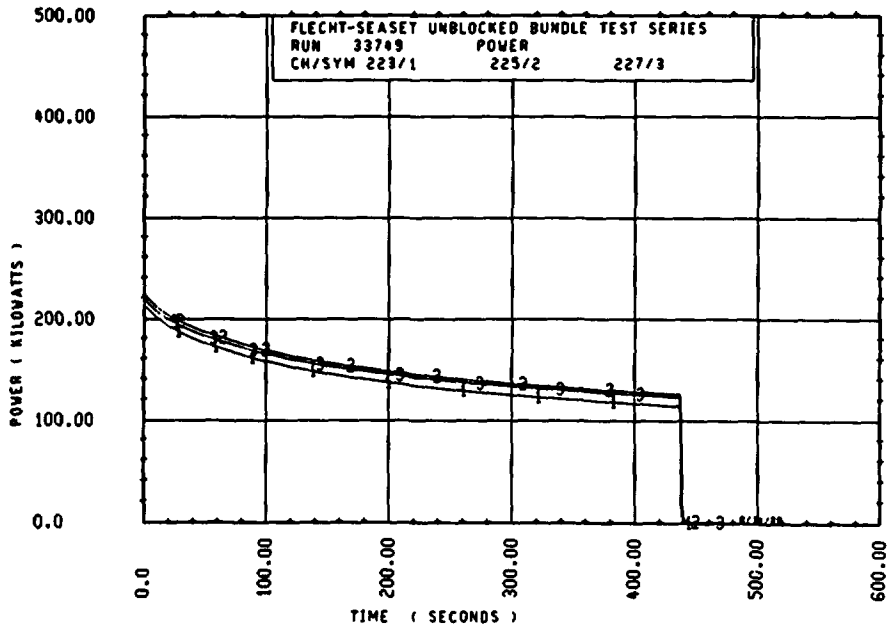

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
25.000
50.000
75.000
100.00
125.00
150.00
175.00
200.00

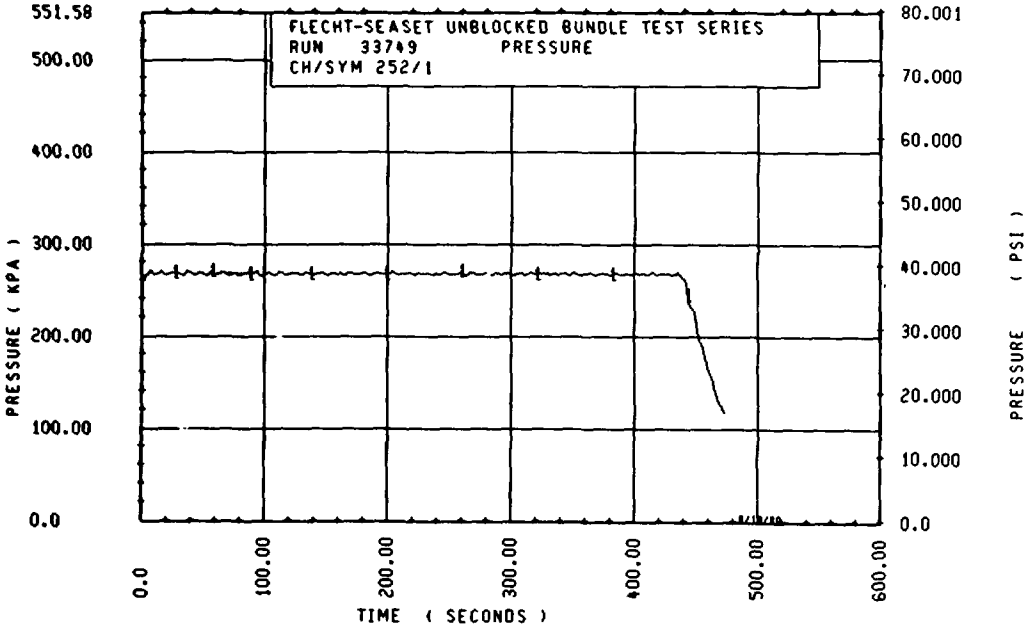

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

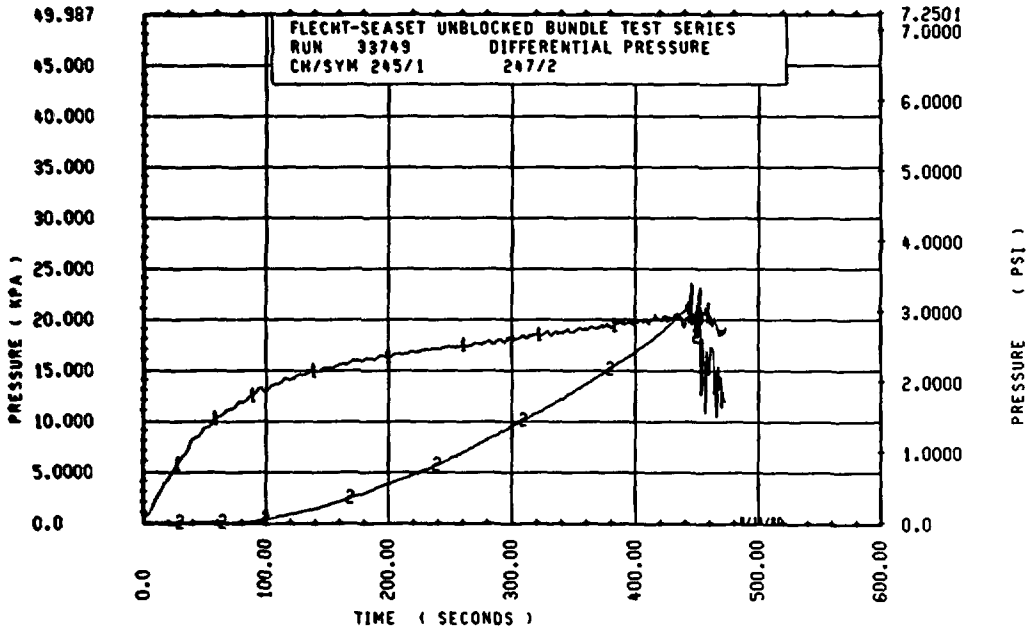


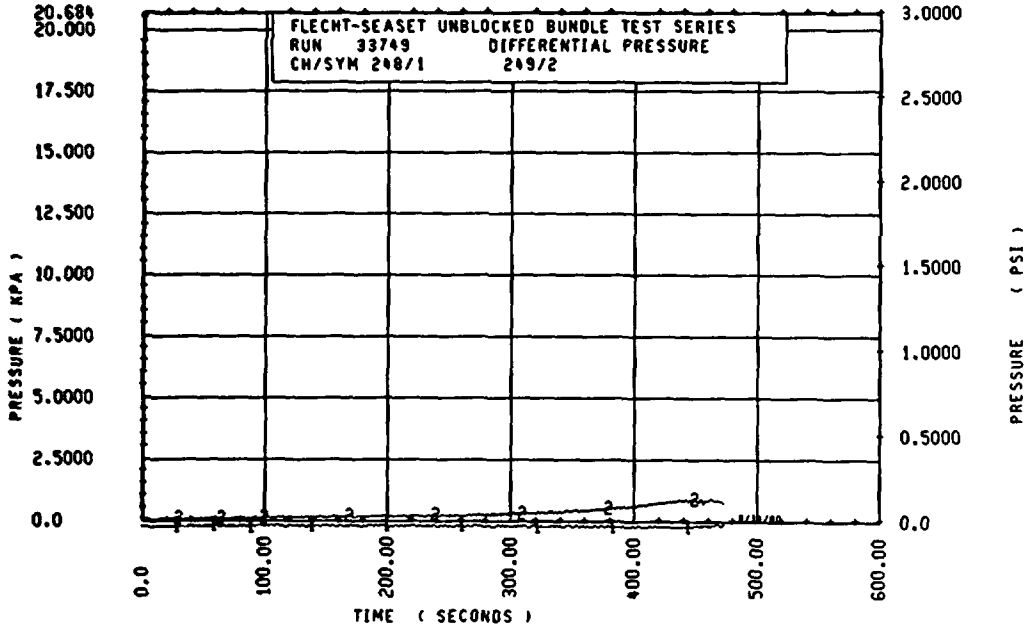


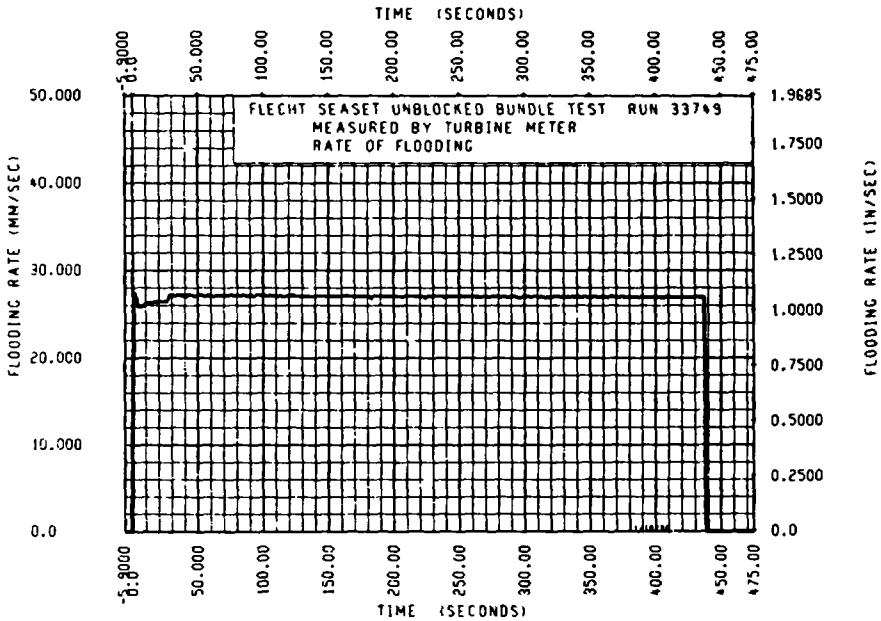
CH 202-4I, 1.52 m (60 in.); CH 203-7L, 0.30 m (12 in.);
CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

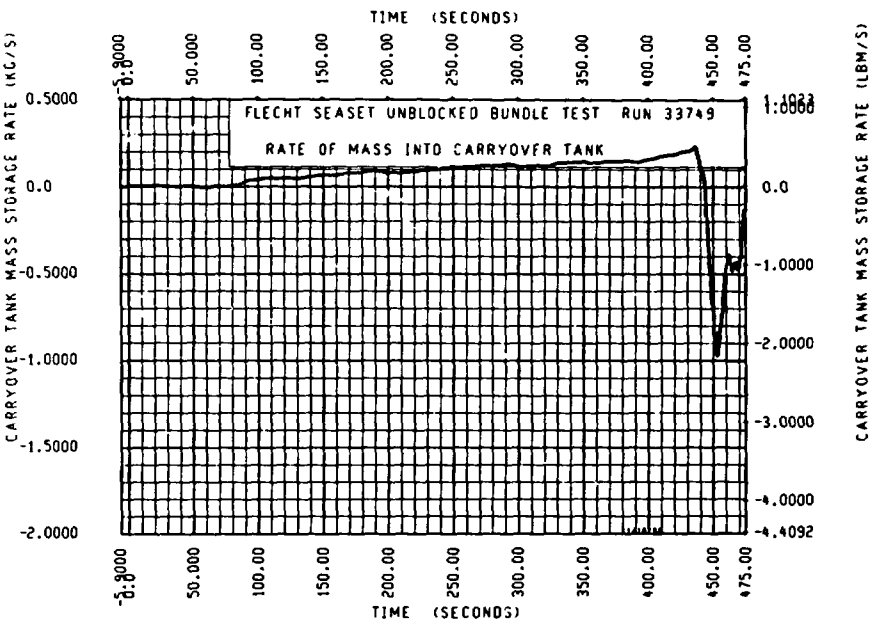

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

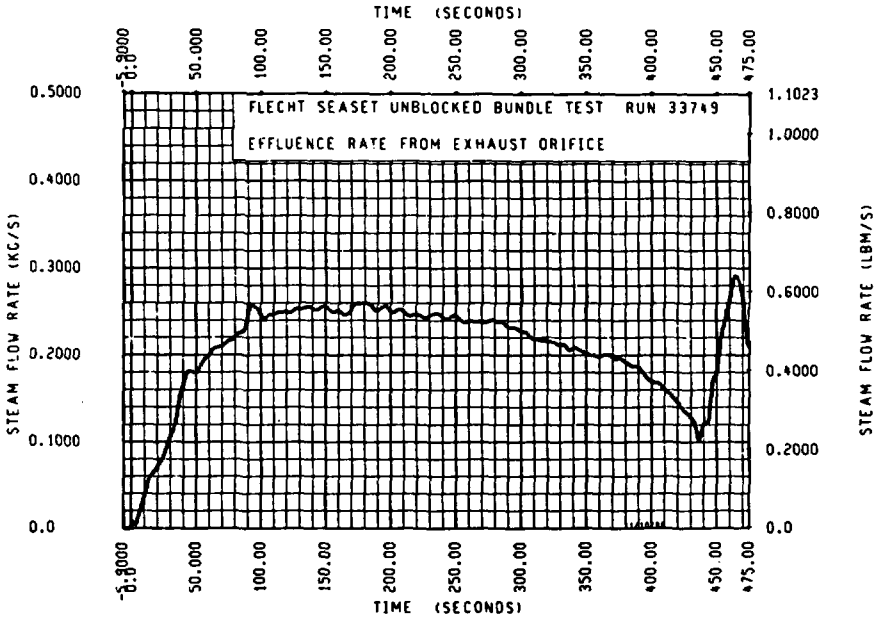

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

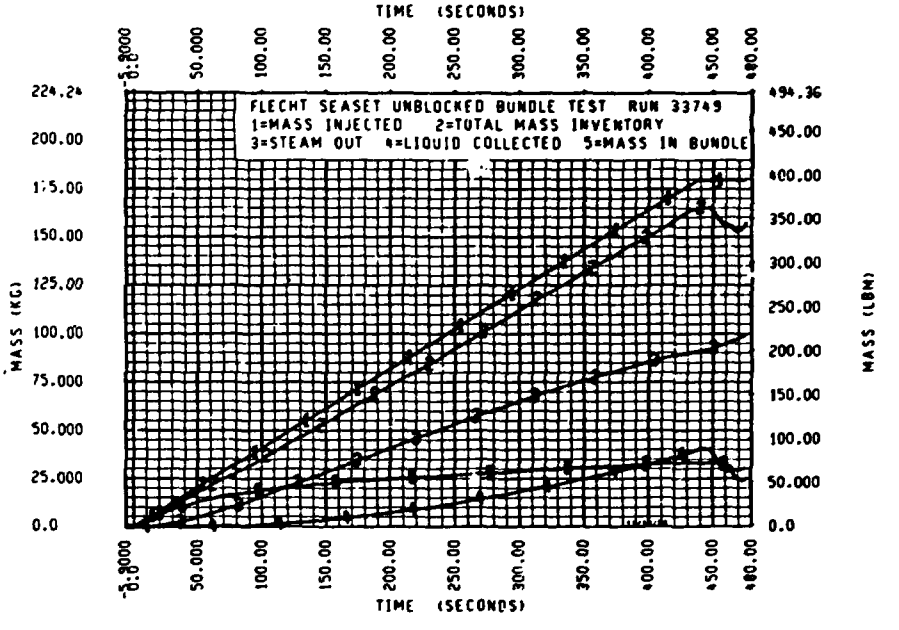

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

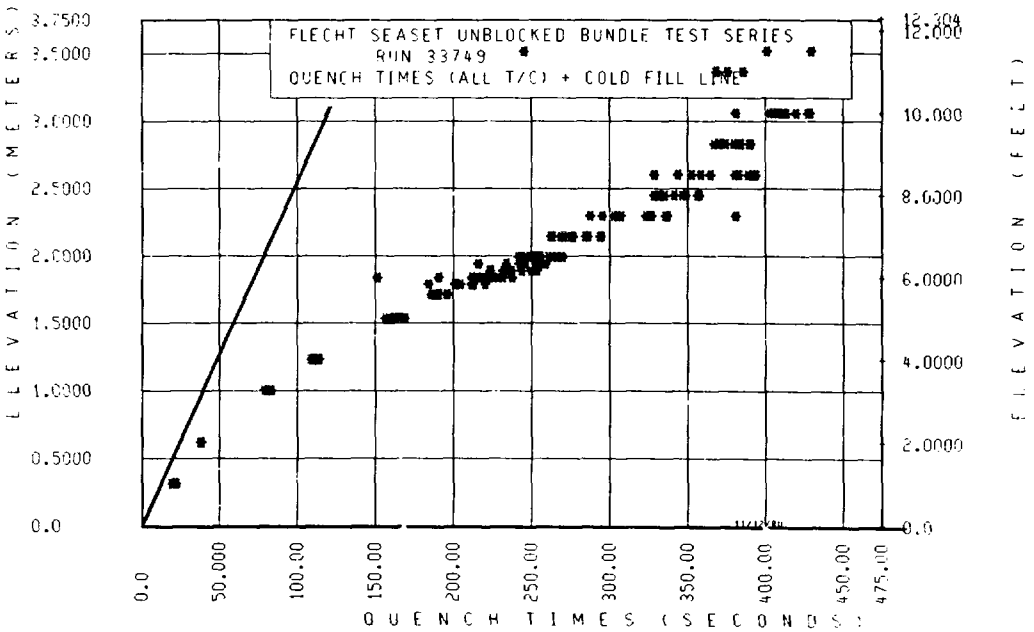

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

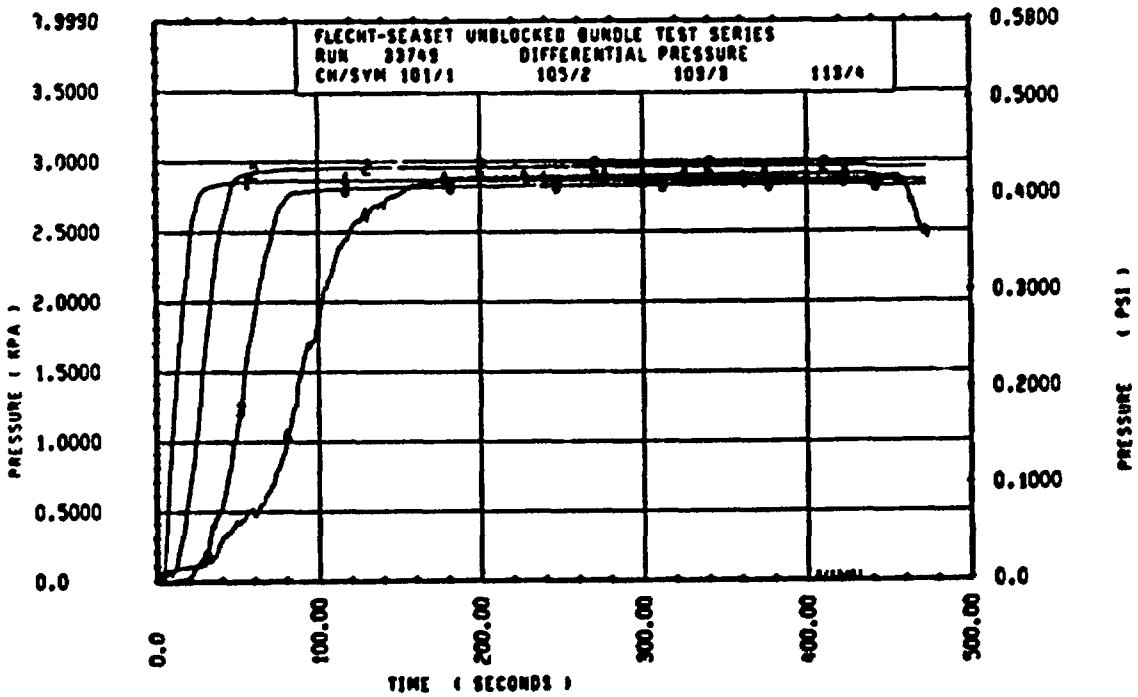

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33749
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
475.00
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0

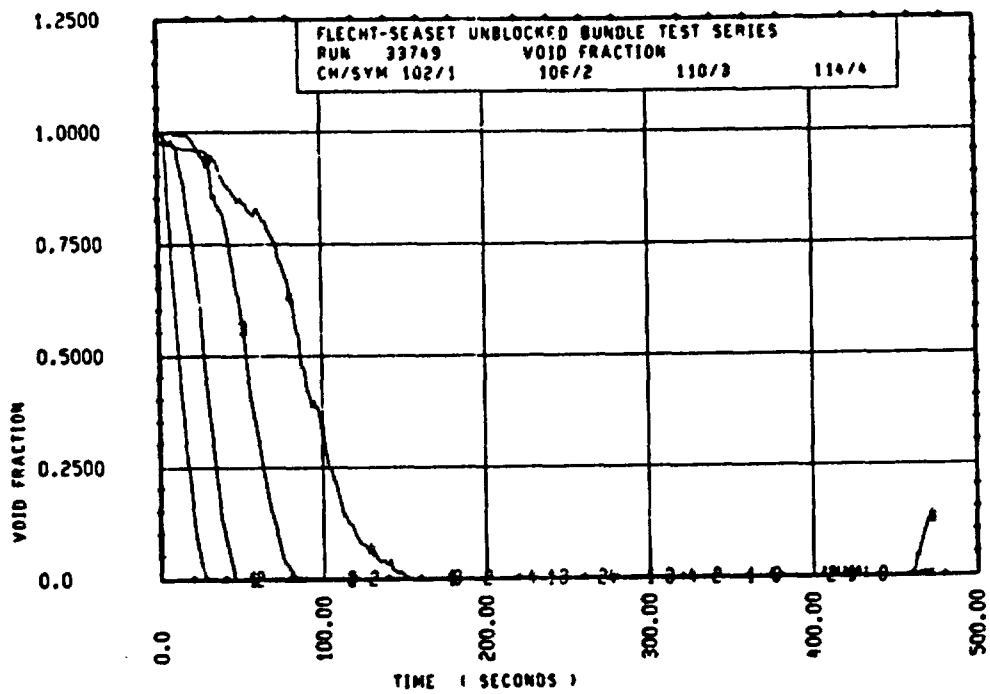

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33749
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
475.00
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
1.1023
1.0000
0.0
-1.0000
-2.0000
-3.0000
-4.0000
-4.4092

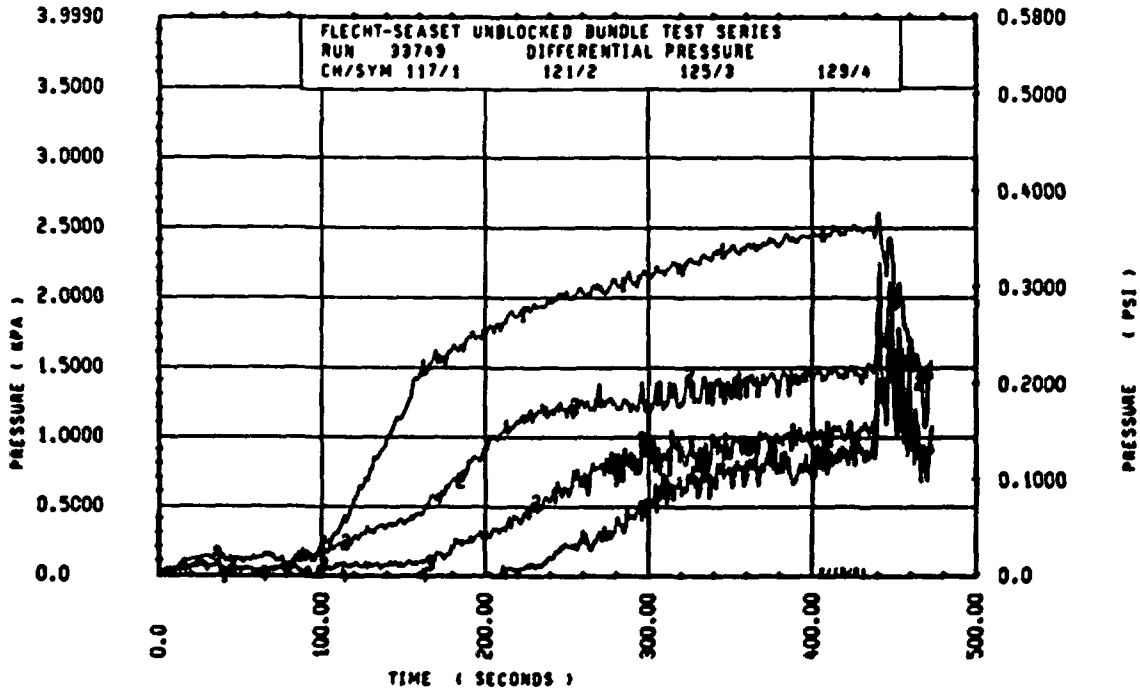

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33749
EFFLUENCE RATE FROM EXHAUST ORIFICE
TIME (SECONDS)
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
475.00

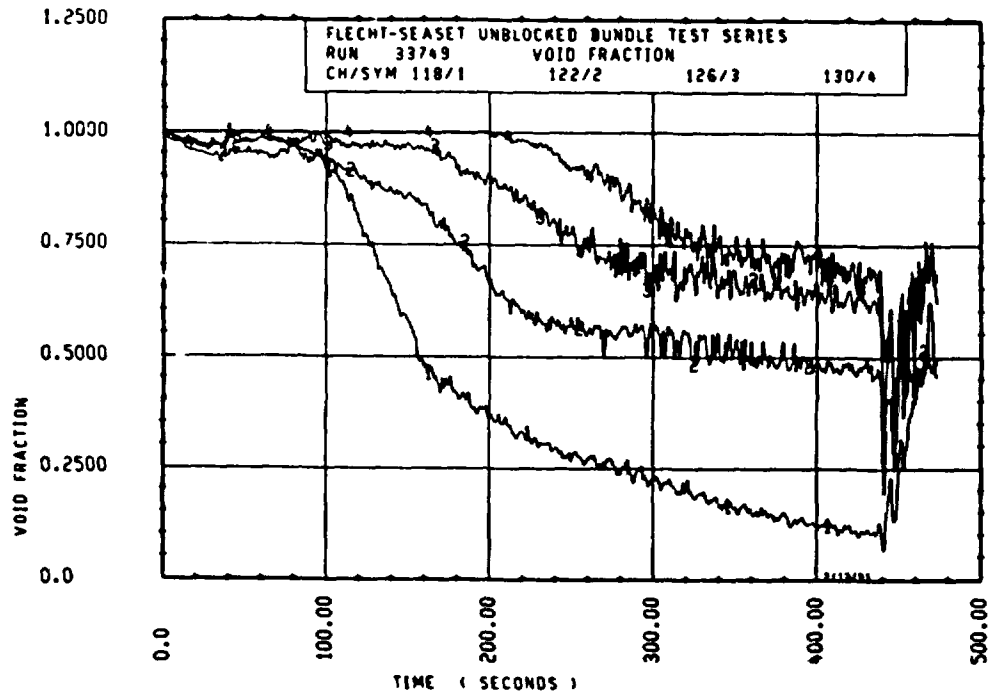

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33749
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
TIME (SECONDS)
MASS (KG)
MASS (LBM)
224.24
200.00
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
494.36
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
480.00

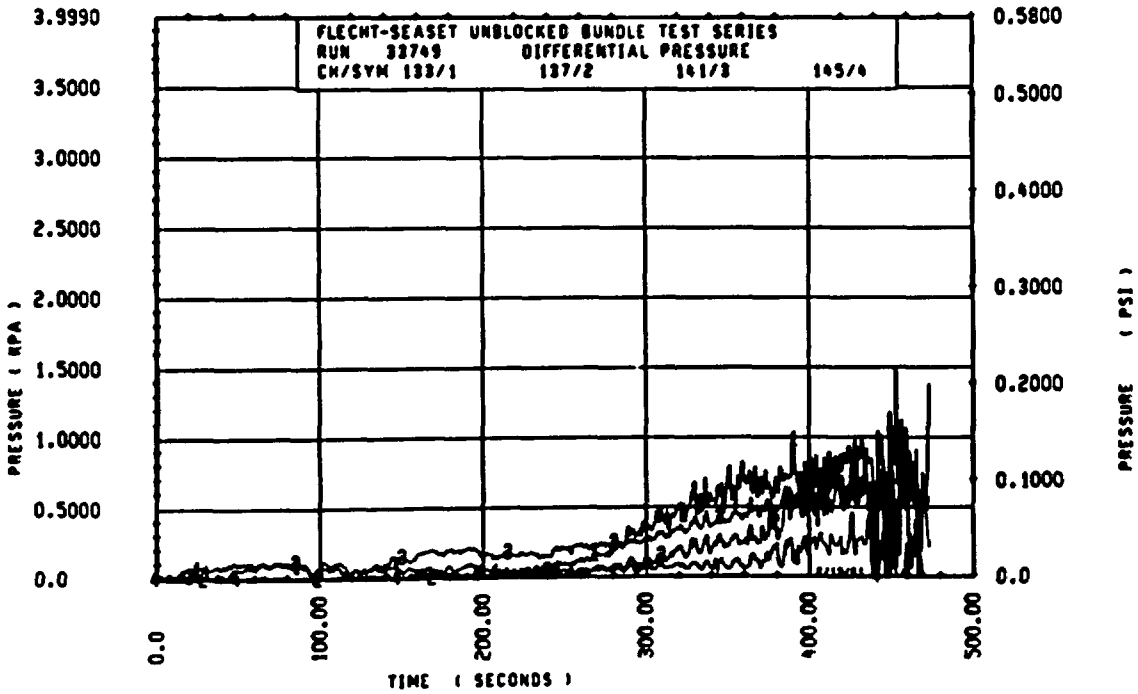

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
475.00
QUENCH TIMES (SECONDS)

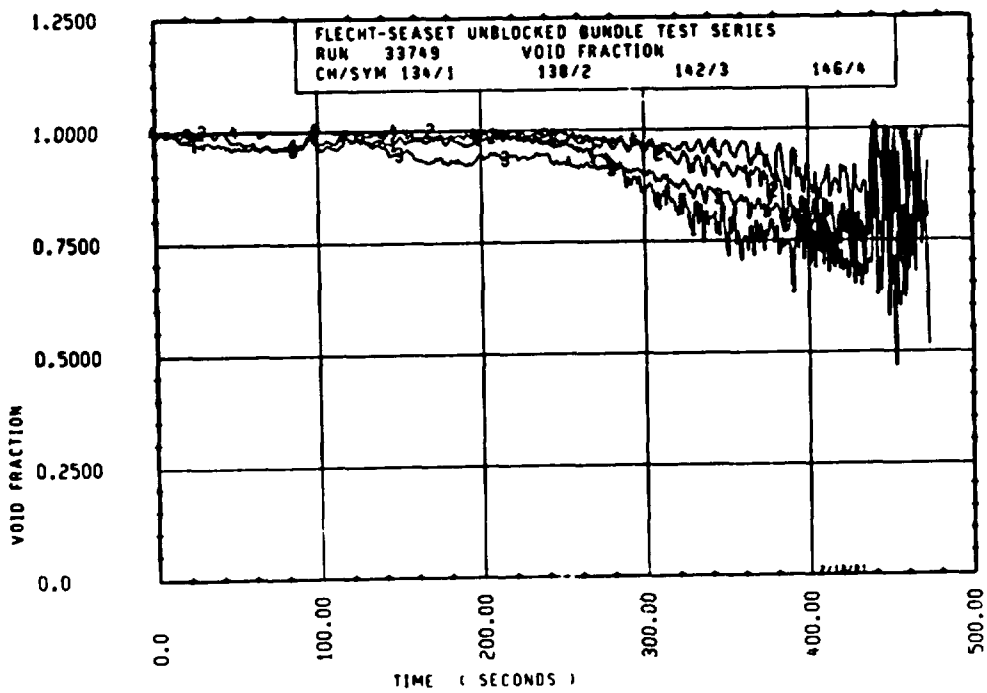

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
100.00
200.00
300.00
400.00
500.00
0.5000
1.0000
1.5000
2.0000
2.5000
3.0000
3.5000
0.1000
0.2000
0.3000
0.4000
0.5000
0.5800


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
0.0
100.00
200.00
300.00
400.00
500.00
0.2500
0.5000
0.7500
1.0000
1.2500


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (MPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33749 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 33849
Date: 7/18/79
Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	745°C (1374°F)
Rod peak power	1.9 kw/m (0.57 kw/ft)
Flow rate	25.9 mm/sec (1.02 in./sec)
Coolant temperature	58°C (138°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	92°C (197°F)	83°C (182°F)
1.22 m (48 in.)	155°C (311°F)	130°C (266°F)
1.83 m (72 in.)	193°C-210°C (379°F-410°F)	129°C-135°C (264°F-275°F)
2.44 m (96 in.)	154°C-174°C (309°F-346°F)	141°C-531°C (286°F-988°F)
2.74 m (108 in.)	173°C (342°F)	131°C (268°F)
3.05 m (120 in.)	133°C-138°C (271°F-281°F)	130°C-196°C (266°F-384°F)
3.35 m (132 in.)	139°C (273°F)	130°C (266°F)

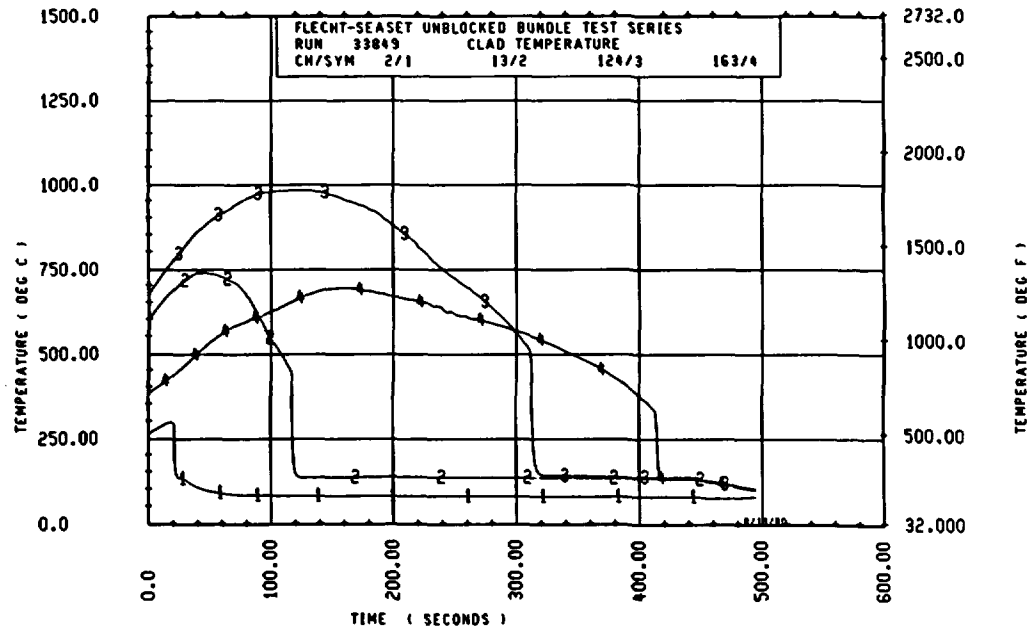
*At 224 seconds after flood

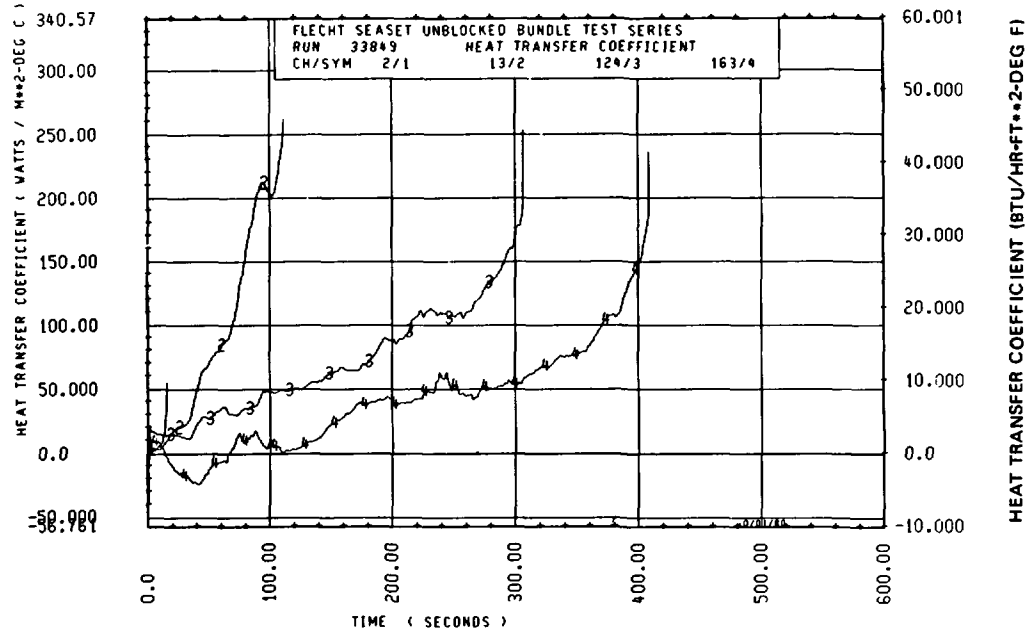
C. Comments

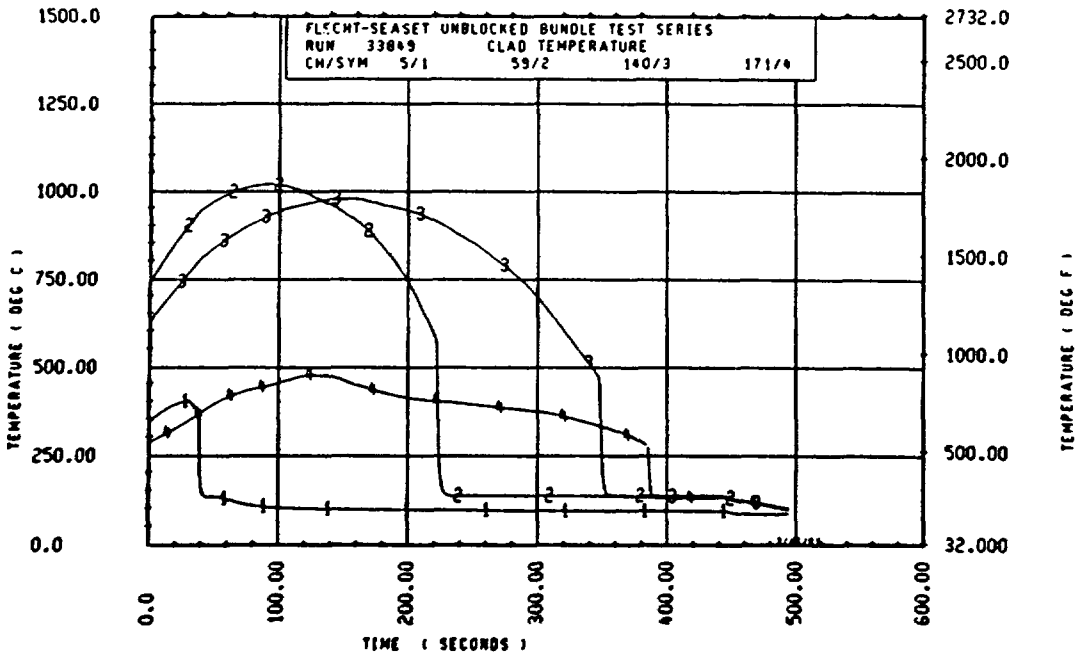
Rod 12J shorted to ground during test.

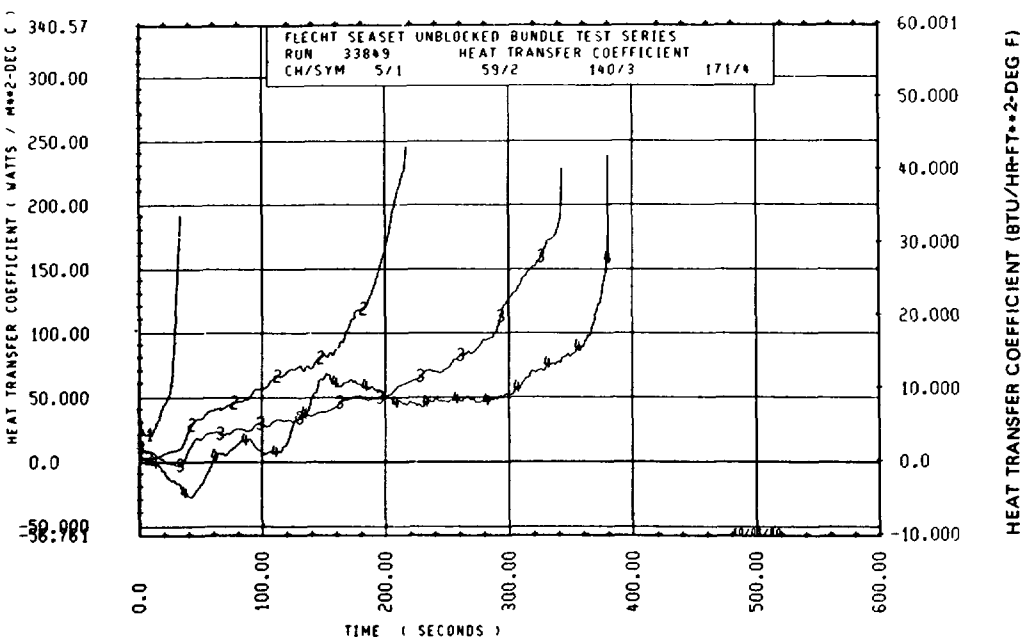
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 33849

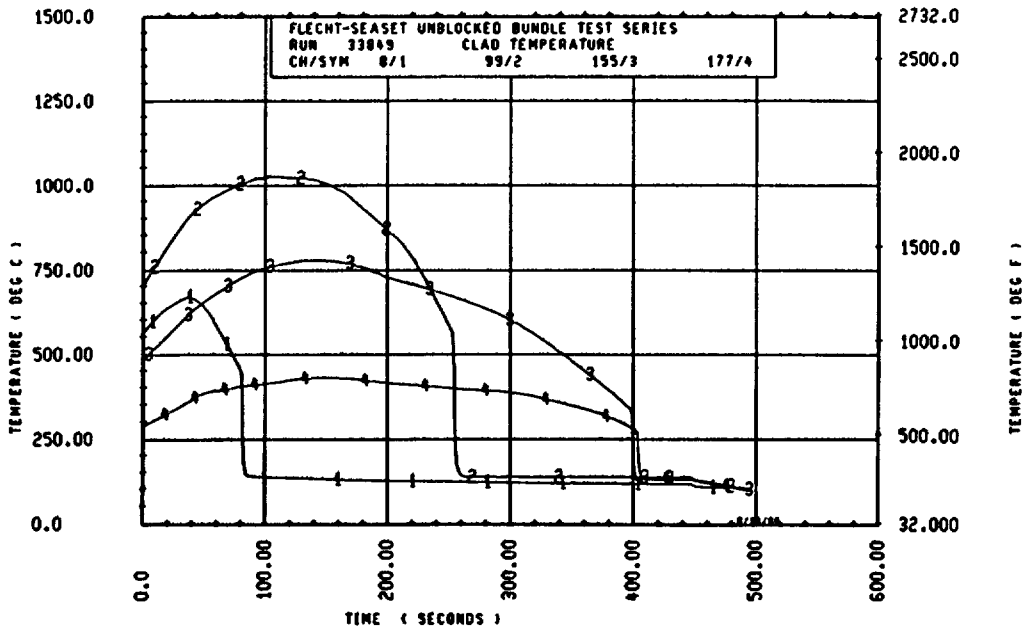
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1093.	1337.	244.	43.0	846.	113.0
2H 6- 0	50	1346.	1762.	416.	88.0	1043.	221.7
3C 5- 0	17	1159.	1406.	247.	56.5	812.	170.8
3C 5- 7	28	1244.	1512.	268.	69.0	853.	197.8
4L 8- 0	129	1138.	1651.	513.	91.0	832.	332.9
4L 8- 6	147	1140.	1646.	506.	90.5	837.	332.9
5E11- 0	168	569.	884.	315.	158.0	522.	396.9
5J 4- 0	12	1076.	1333.	257.	48.5	821.	176.0
5J 8- 6	146	974.	1543.	569.	177.0	708.	361.5
5J11- 6	**BAD THERMOCOUPLE DATA*						
7B 6- 0	57	1276.	1641.	365.	71.0	944.	193.0
7B 8- 6	142	967.	1393.	426.	103.0	689.	370.0
7B10- 0	162	730.	1265.	535.	152.0	630.	418.0
7B11- 6	176	575.	979.	404.	243.0	518.	437.0
7D 6- 4	84	1392.	1856.	465.	90.5	1032.	219.8
7D 7- 6	119	1267.	1778.	511.	106.0	943.	291.3
7D 9- 3	151	884.	1470.	586.	154.0	657.	374.0
7G 5- 0	23	1286.	1599.	313.	48.0	953.	162.0
7J 6- 0	59	1367.	1869.	502.	89.5	1067.	221.9
7M 7- 6	120	1259.	1765.	506.	91.0	896.	309.0
7M 8- 0	132	1143.	1721.	578.	114.0	871.	338.0
7M 9- 3	152	887.	1532.	646.	187.0	780.	376.0
8H 4- 0	13	1118.	1364.	245.	41.0	831.	117.0
8H10- 0	163	725.	1282.	557.	157.0	619.	413.6
8H11- 6	177	554.	809.	255.	142.0	522.	403.0
8K 4- 0	14	1095.	1350.	255.	44.0	863.	112.0
8K 6- 6	99	1302.	1878.	576.	105.0	1031.	253.6
8K 8- 0	140	1165.	1795.	631.	154.0	874.	347.9
8K10- 0	164	729.	1339.	610.	165.0	677.	413.0
8N 2- 0	5	656.	764.	108.	30.0	697.	38.6
8N 4- 0	15	1105.	1353.	248.	48.5	855.	112.9
8N 6- 0	61	1334.	1795.	461.	86.5	905.	213.0
8N10- 0	165	731.	1403.	672.	195.0	677.	415.2
9C 7- 0	109	1258.	1707.	450.	91.5	764.	275.9
9C 9- 3	153	892.	1442.	550.	141.0	705.	378.0
9G 1- 0	2	510.	570.	59.	18.5	560.	21.0
9G 3- 3	8	1049.	1239.	190.	36.5	830.	81.2
9G11- 0	171	550.	896.	345.	124.0	525.	385.1
9I 5- 0	24	1301.	1623.	322.	55.0	920.	166.7
9E 6- 2	46	1329.	1841.	512.	92.0	891.	235.7
10D 6- 6	93	1298.	1764.	466.	107.0	820.	255.0
11E 7- 6	124	1252.	1802.	551.	115.0	933.	311.8
11E 9- 3	155	905.	1433.	528.	142.0	631.	398.9
11E11- 0	172	530.	956.	426.	124.0	614.	374.2
12D 4- 0	16	1112.	1350.	238.	41.5	843.	113.9
12D 6- 0	66	1344.	1758.	414.	88.0	998.	219.2
12F 6- 6	102	1312.	1838.	526.	94.5	931.	246.4

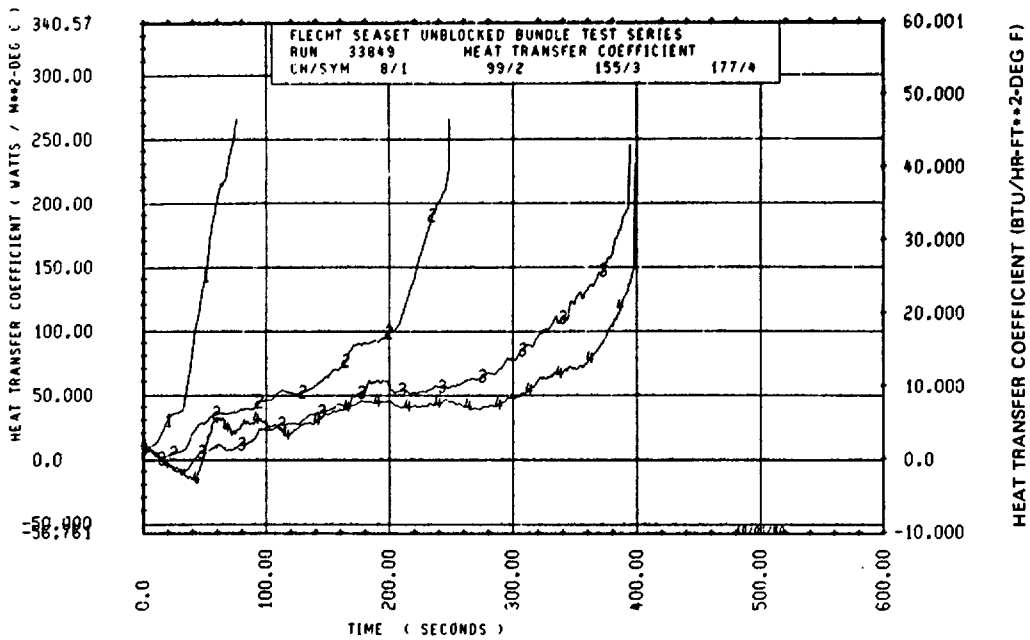

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

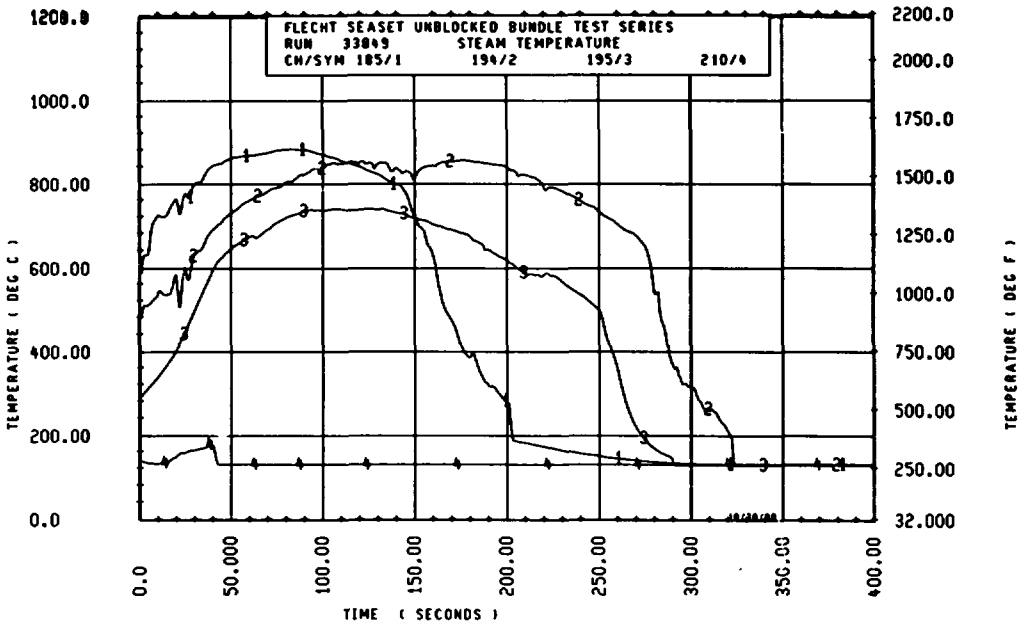

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

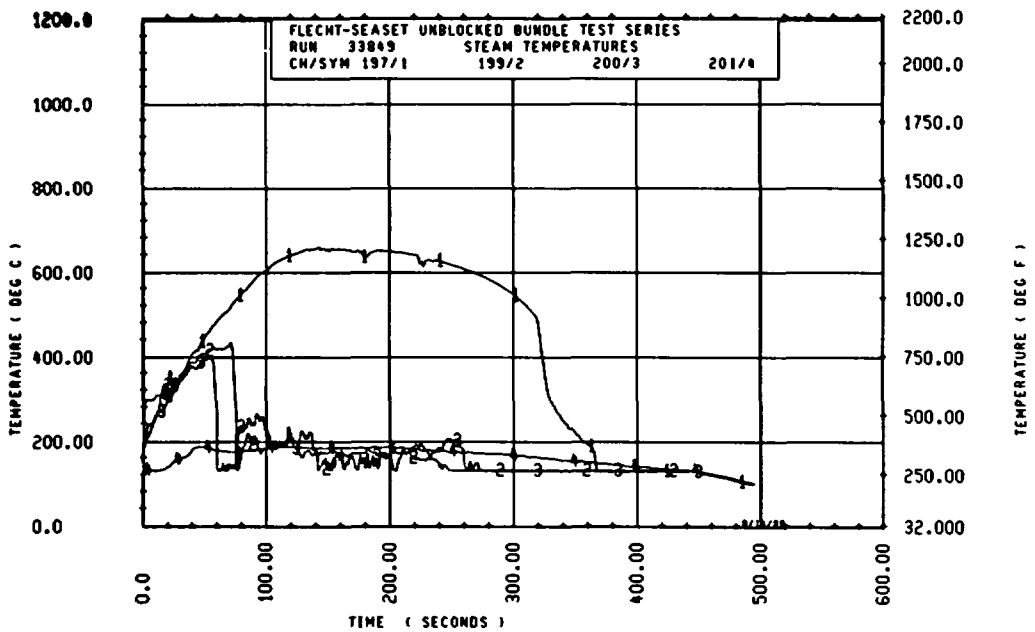

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

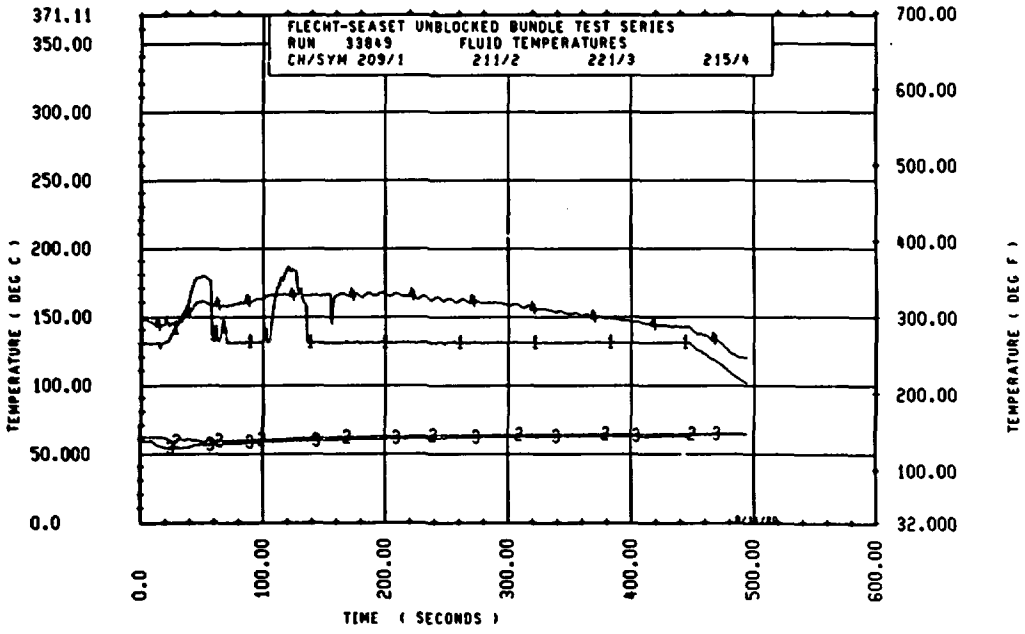

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

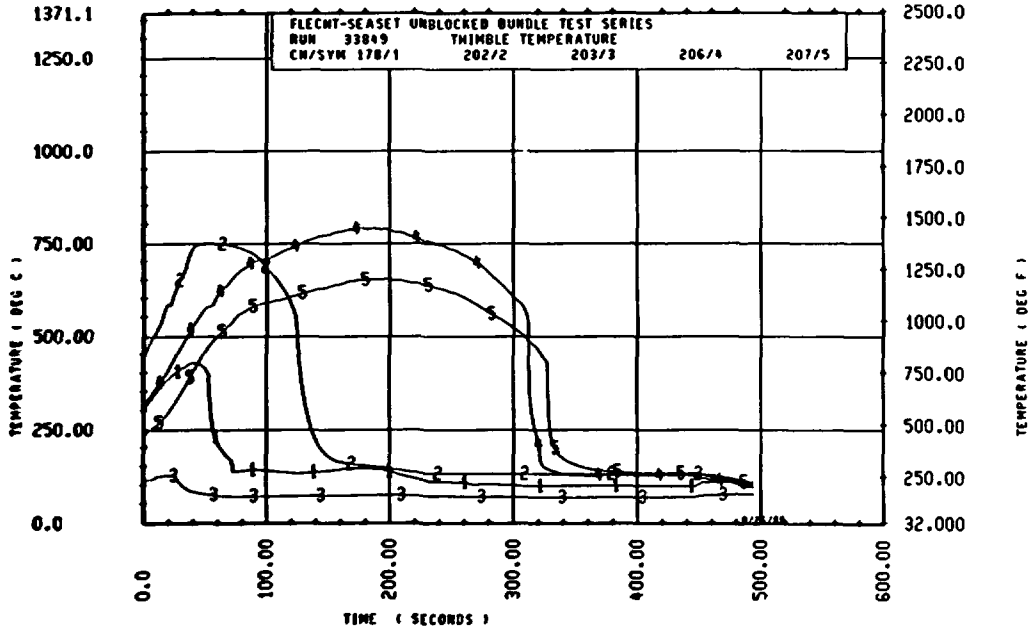

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

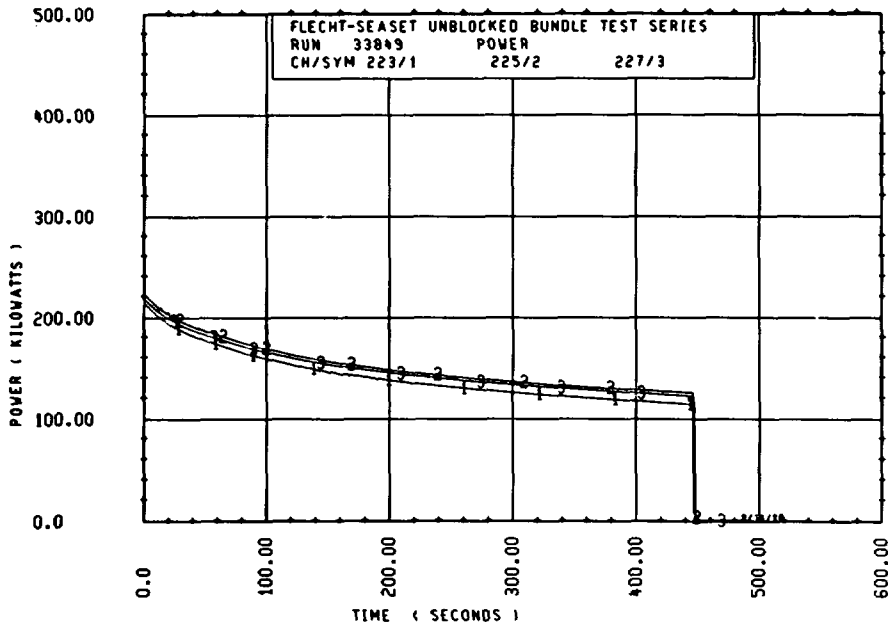

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

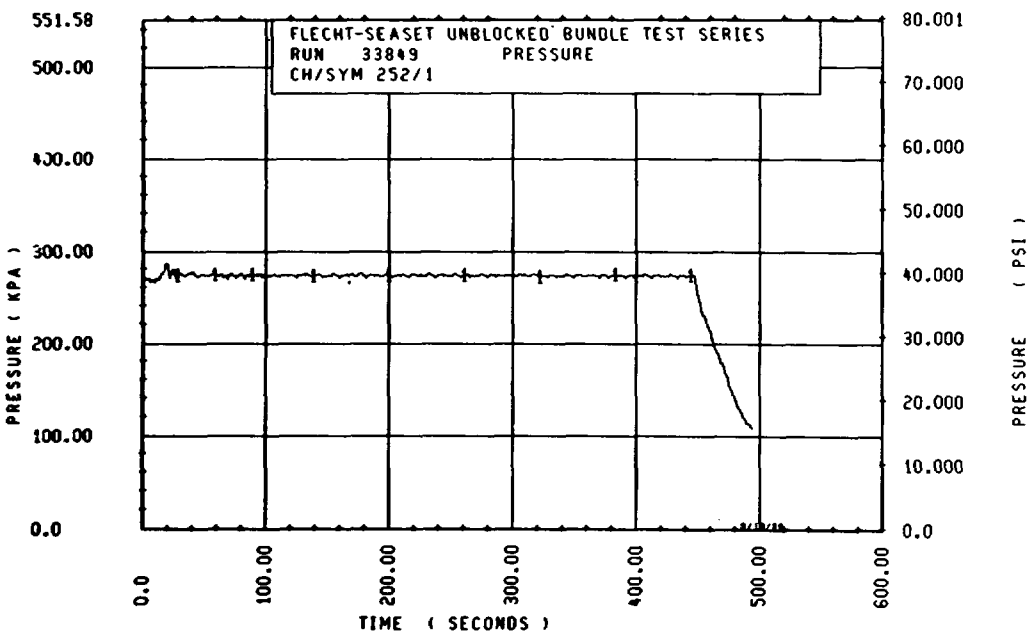

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

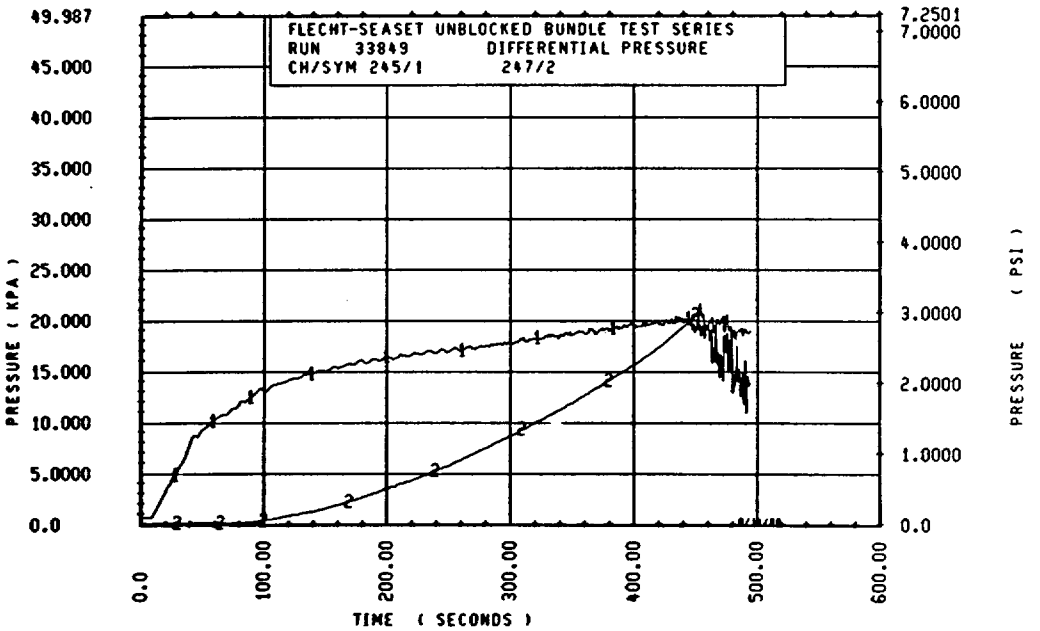


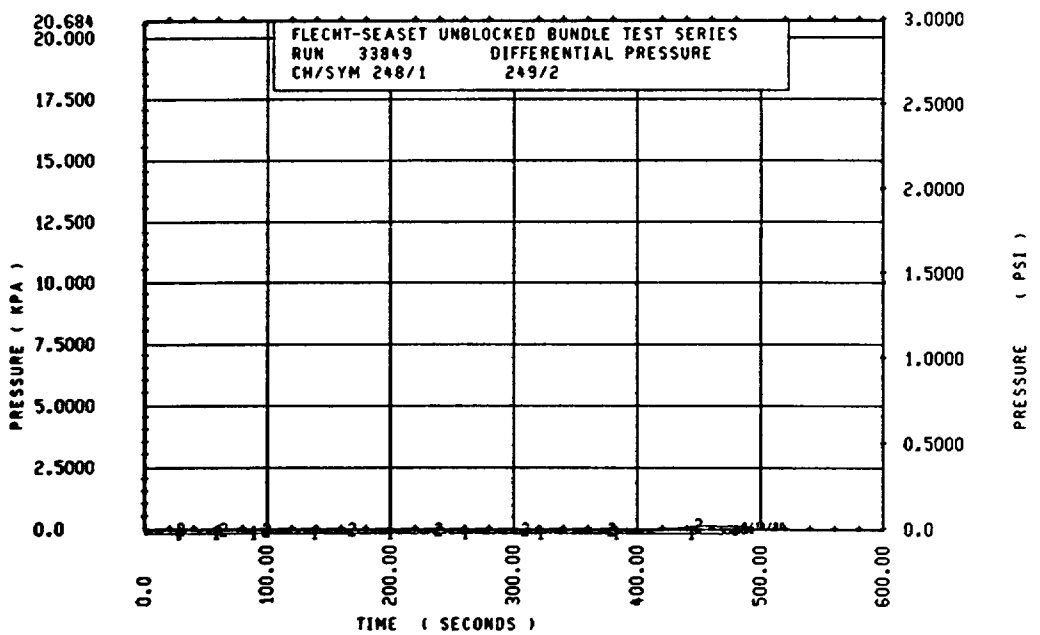


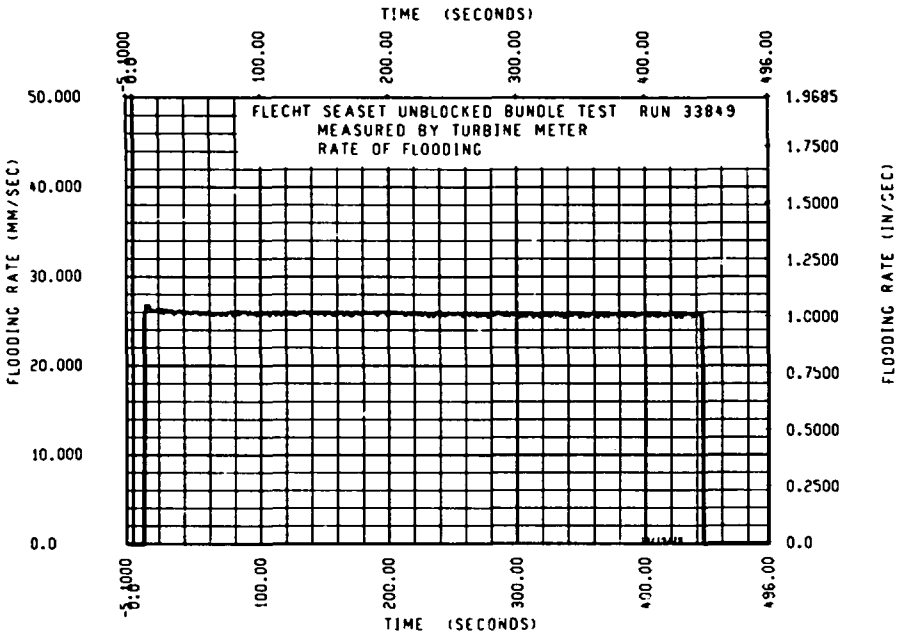
CH 178-7L, 0.99 m (39 in.); CH 202-4I, 1.52 m (60 in.); CH 203-7L, 0.30 m (12 in.); CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

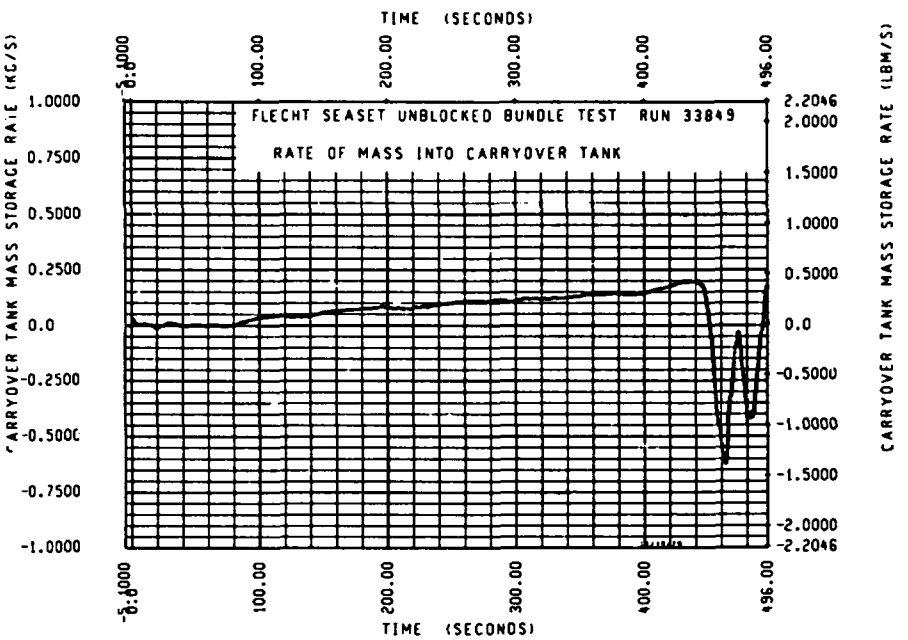

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

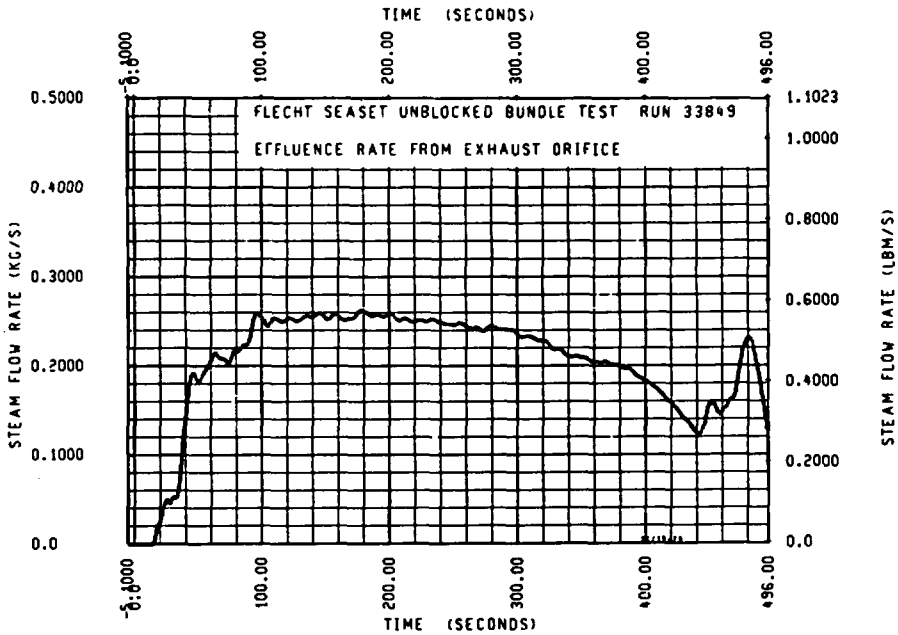

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

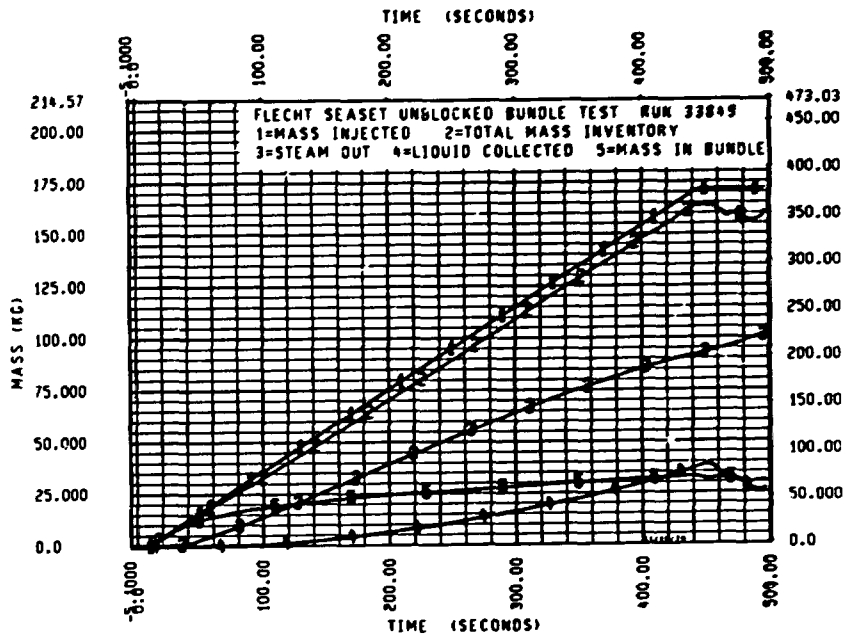

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

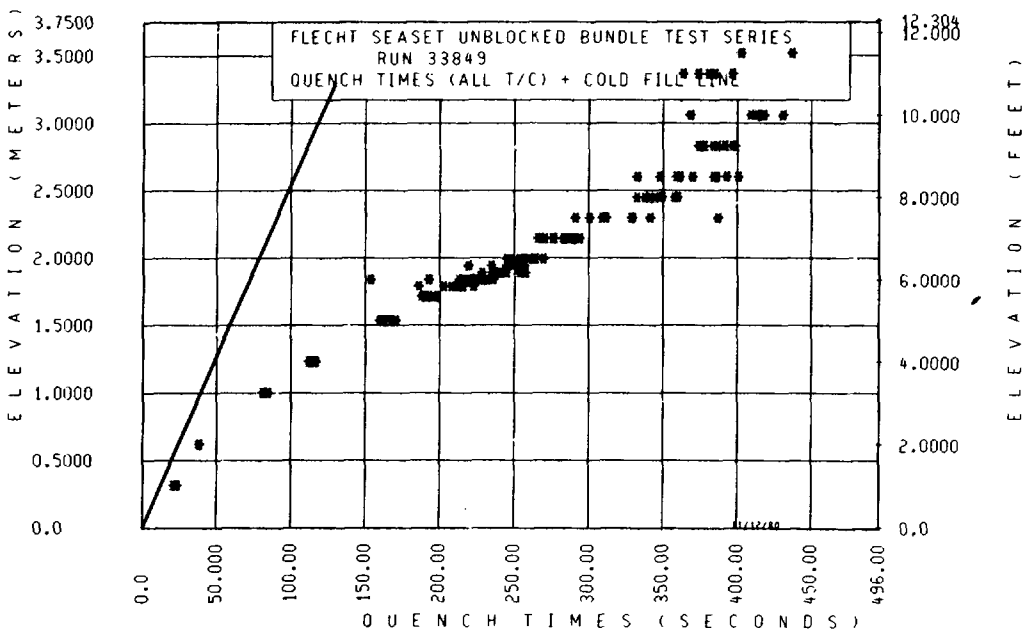

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

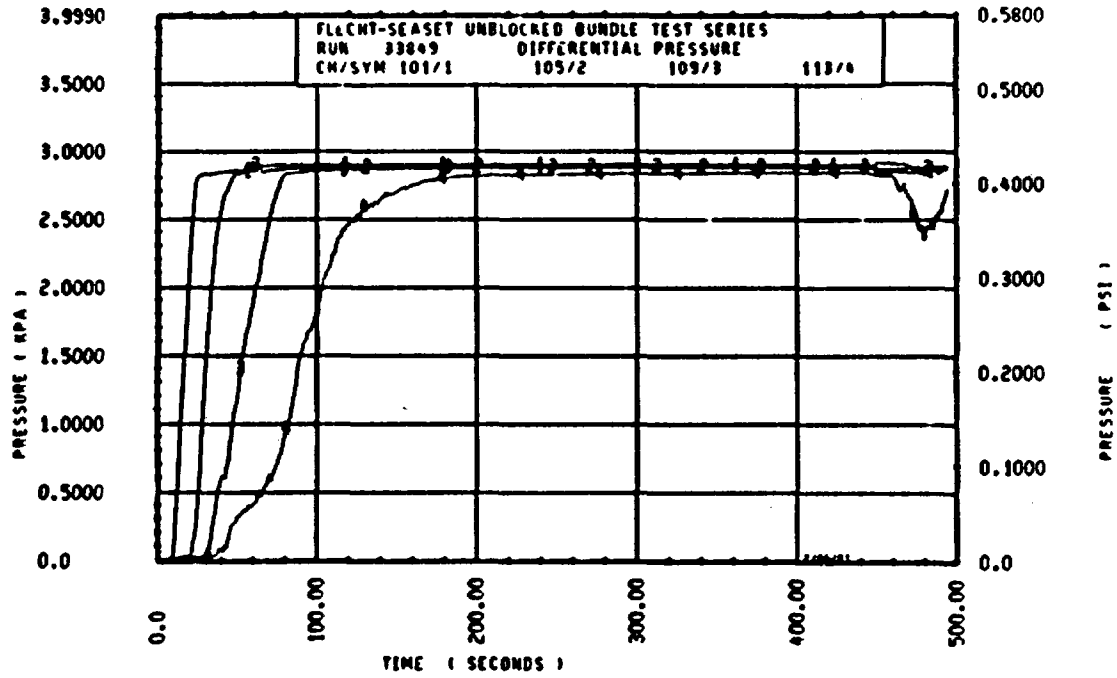

TIME (SECONDS)
-5.0000
100.00
200.00
300.00
400.00
496.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33849
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
FLOODING RATE (IN/SEC)
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0

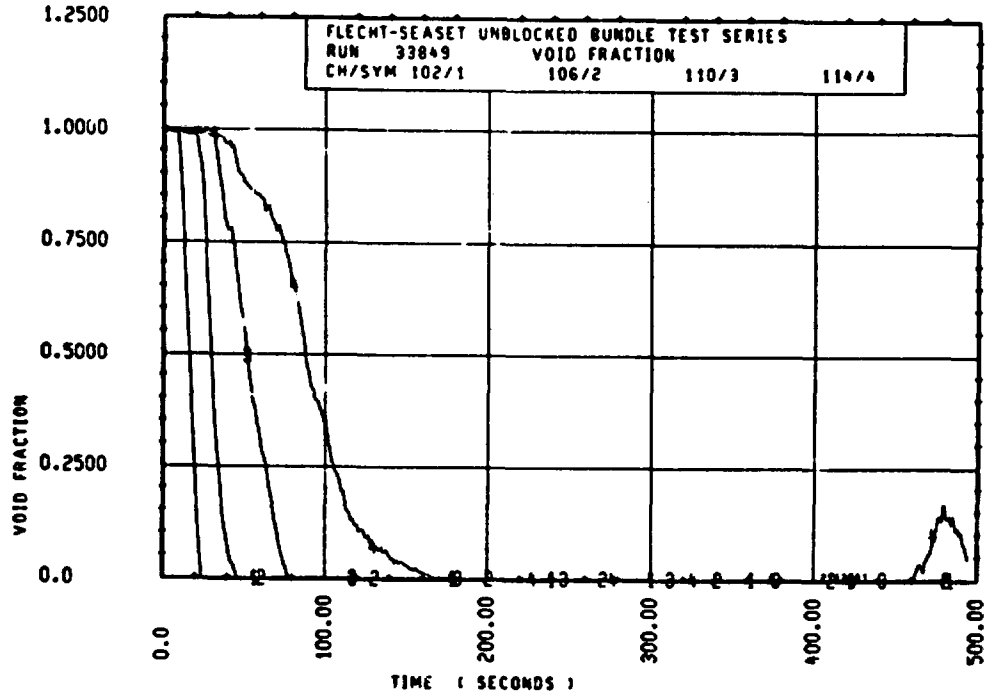

TIME (SECONDS)
-5.0000
100.00
200.00
300.00
400.00
496.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33849
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
1.0000
0.7500
0.5000
0.2500
0.0
-0.2500
-0.5000
-0.7500
-1.0000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
2.2046
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
-2.2046

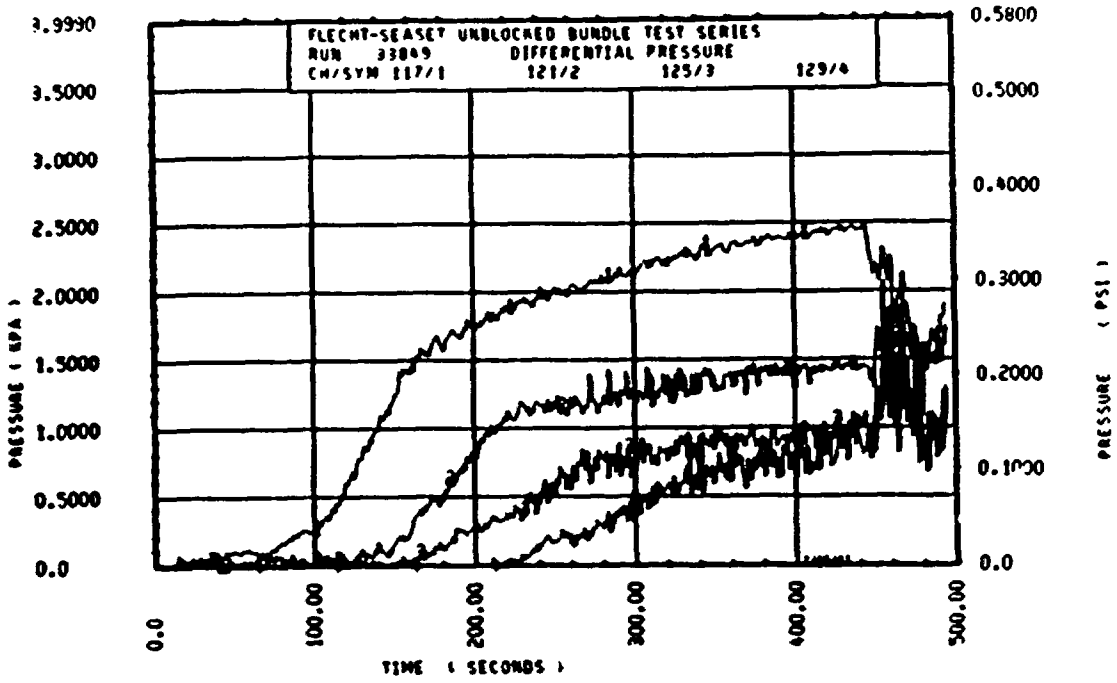

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33849
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.0000
100.00
200.00
300.00
400.00
496.00

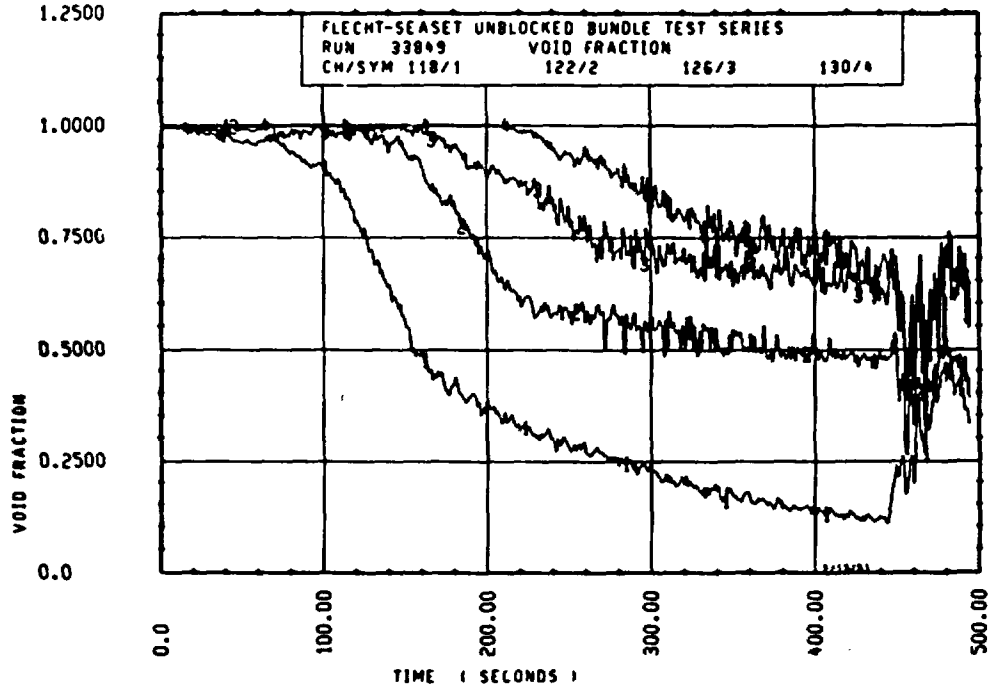

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33849
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
214.57
200.00
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
473.03
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00

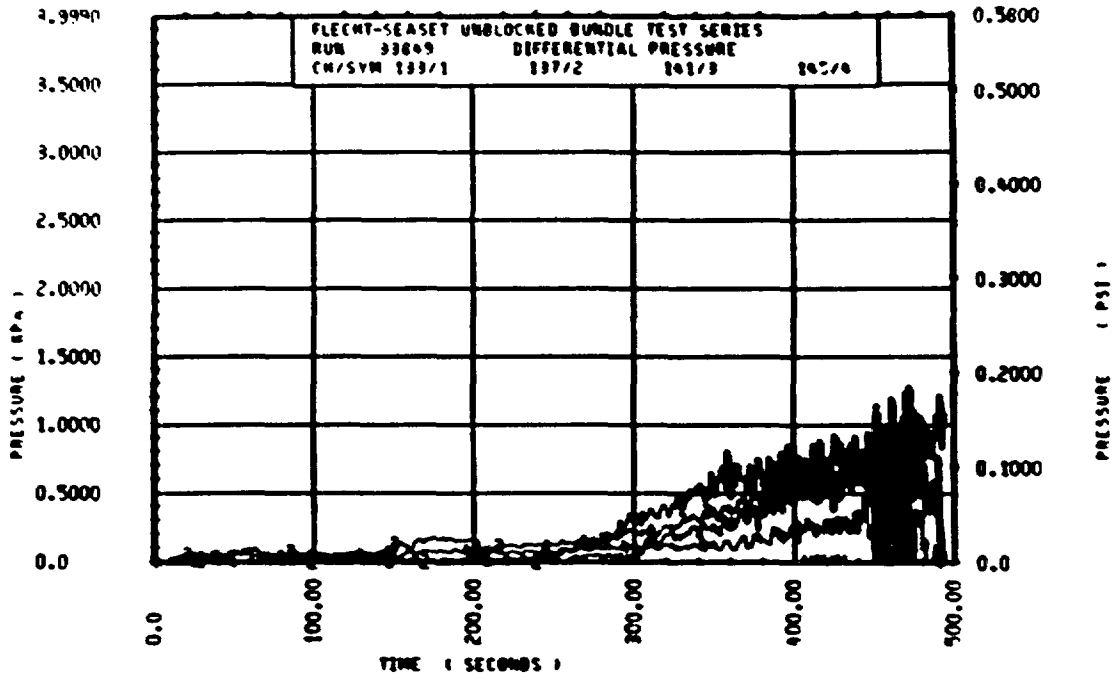

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
496.00
QUENCH TIMES (SECONDS)

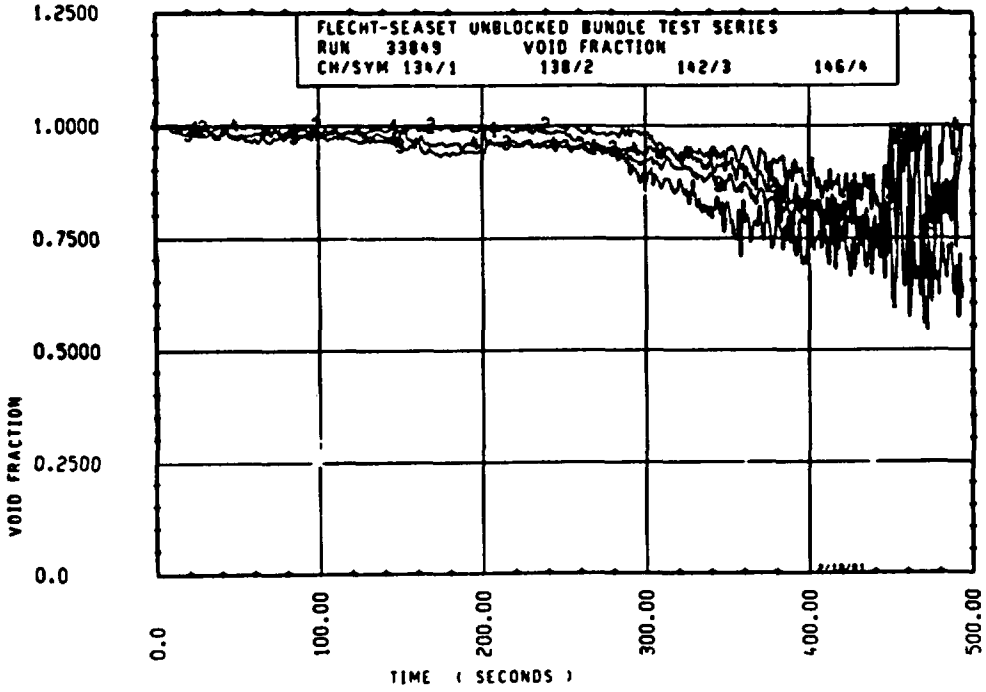

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (MPA)
PRESSURE (PSI)
TIME (SECONDS)
0.0
0.5000
1.0000
1.5000
2.0000
2.5000
3.0000
3.5000
3.9990
0.1000
0.2000
0.3000
0.4000
0.5000
0.5800
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
0.0
0.2500
0.5000
0.7500
1.0000
1.2500
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3
PRESSURE (MPa)
PRESSURE (PSI)
TIME (SECONDS)
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33849 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
100.00
200.00
300.00
400.00
500.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 33903

Date: 7/20/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	881°C (1619°F)
Rod peak power	2.3 kw/m (0.70 kw/ft)
Flow rate	40.1 mm/sec (1.58 in./sec)
Coolant temperature	52°C (125°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	139°C (283°F)	108°C (226°F)
1.22 m (48 in.)	164°C (327°F)	133°C (271°F)
1.83 m (72 in.)	180°C-198°C (356°F-388°F)	258°C-349°C (497°F-660°F)
2.44 m (96 in.)	124°C-197°C (356°F-386°F)	177°C-299°C (350°F-570°F)
2.74 m (108 in.)	191°C (375°F)	133°C (271°F)
3.05 m (120 in.)	137°C-143°C (278°F-289°F)	129°C (264°F)
3.35 m (132 in.)	132°C (271°F)	129°C (264°F)

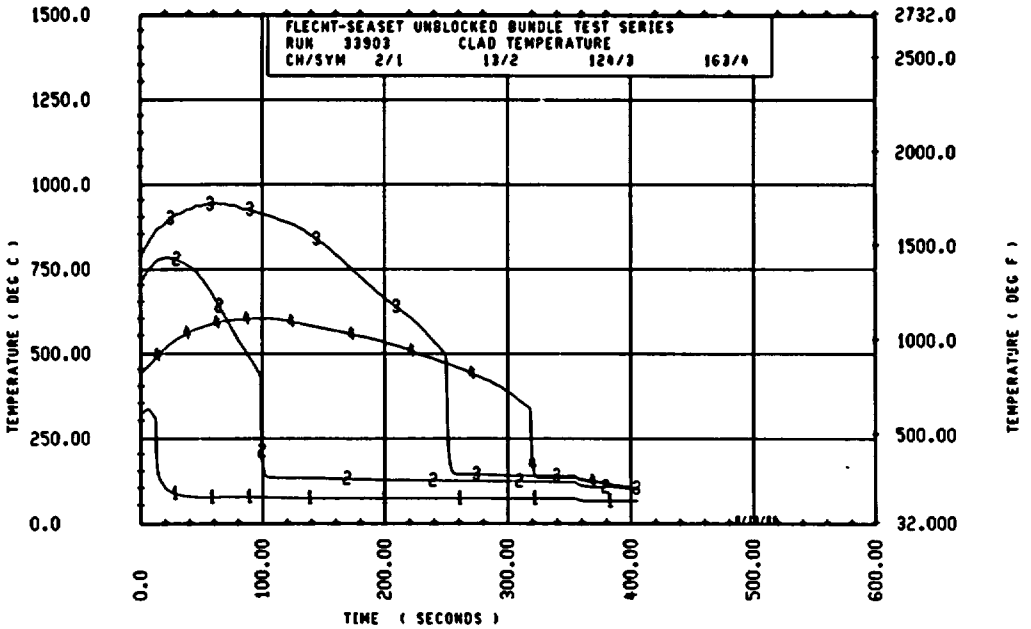
*At 40 seconds after flood

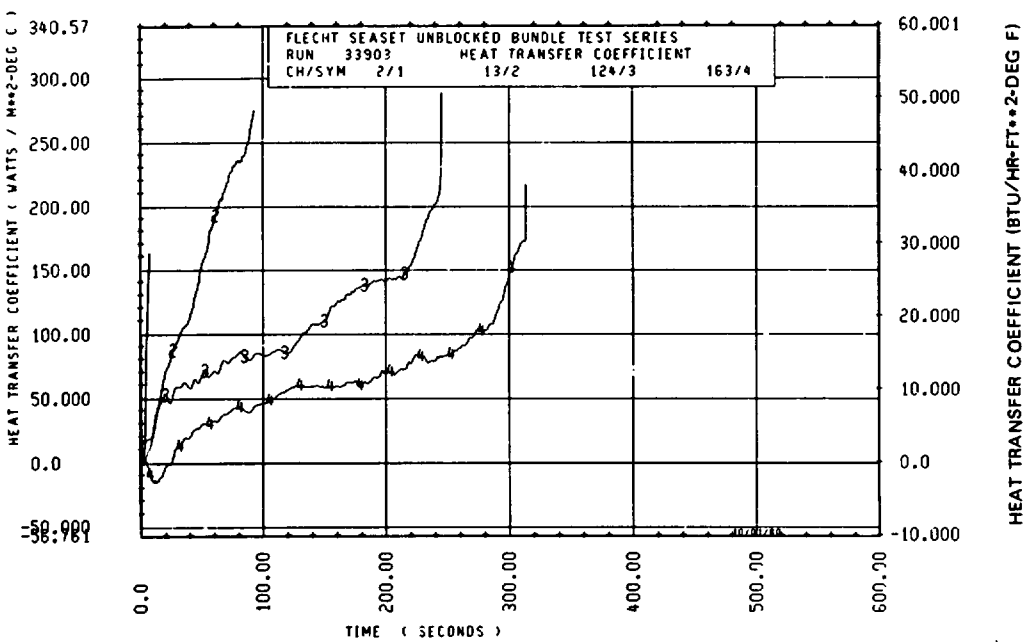
C. Comments

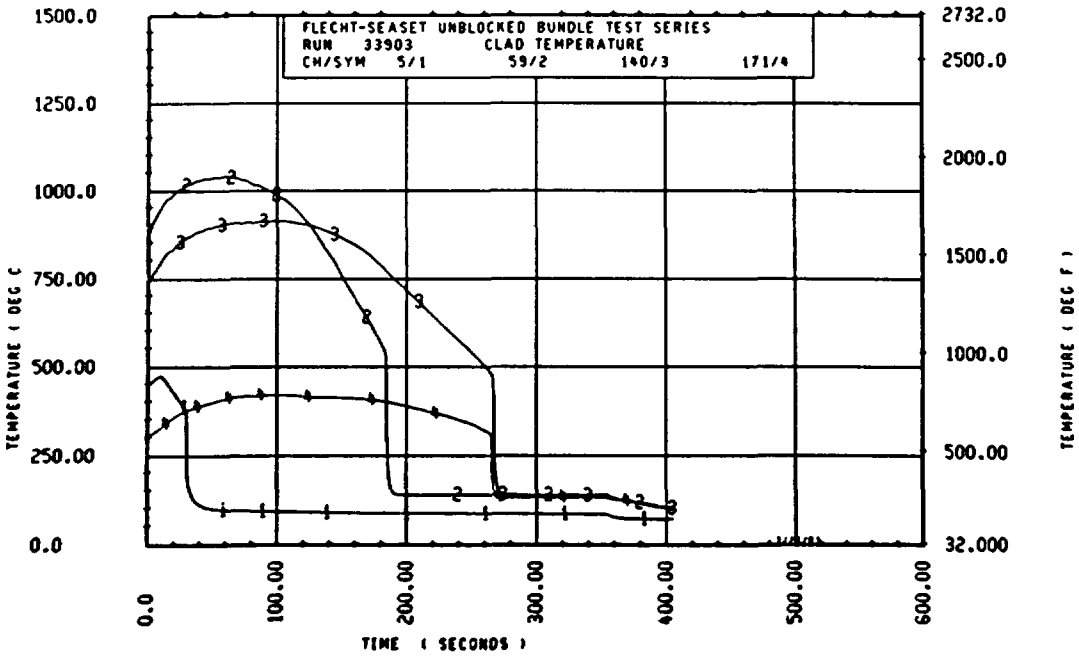
Rod 12J and the surrounding seven heater rods were disconnected for this test and all subsequent tests.

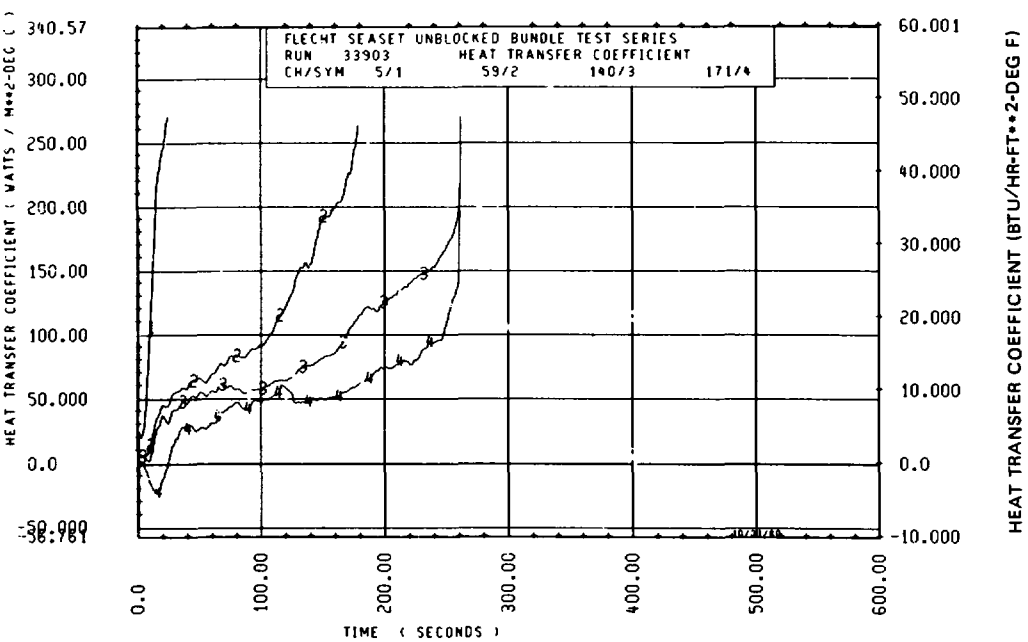
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 33903

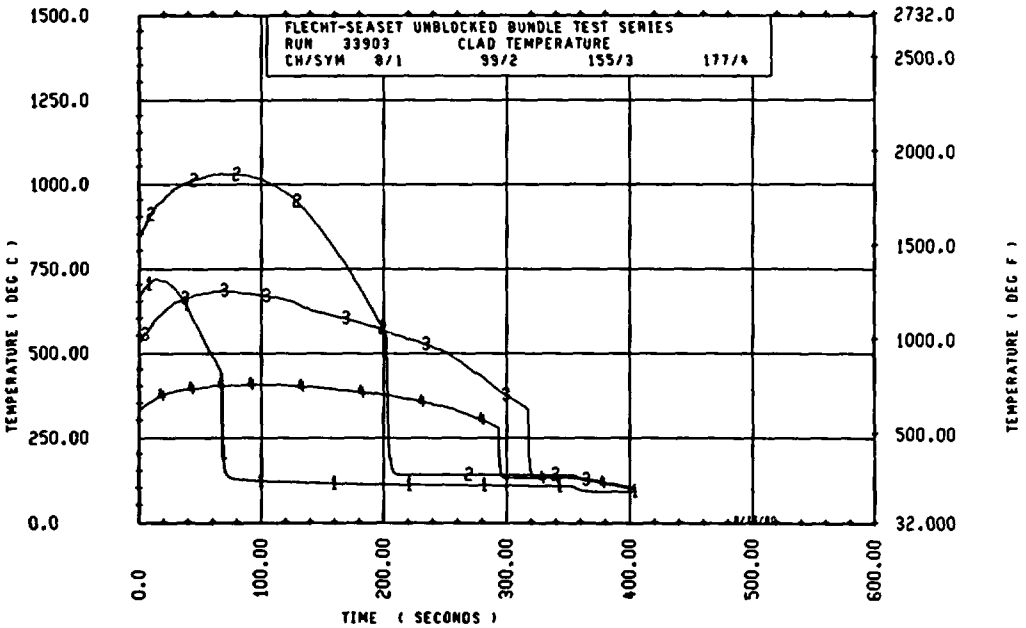
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1288.	1413.	125.	23.0	813.	97.5
2H 6- 0	50	1572.	1798.	225.	43.5	959.	178.0
3C 5- 0	17	1364.	1488.	124.	28.0	856.	142.9
3C 5- 7	28	1452.	1584.	133.	27.0	825.	167.9
4L 8- 0	129	1344.	1610.	264.	52.0	824.	263.0
4L 8- 6	147	1347.	1608.	261.	52.5	816.	263.6
5E11- 0	168	648.	791.	143.	77.0	549.	267.0
5J 4- 1	12	1269.	1406.	137.	22.5	800.	99.0
5J 8- 6	146	1132.	1381.	249.	123.0	737.	269.6
5J11- 6	175	625.	748.	124.	107.0	649.	218.0
7E 6- 0	57	1497.	1709.	212.	43.5	861.	162.0
7E 8- 6	142	1127.	1347.	219.	44.5	720.	295.0
7E10- 0	162	843.	1146.	304.	77.5	608.	335.0
7E11- 6	176	654.	827.	173.	87.5	549.	306.3
7D 6- 4	84	1638.	1885.	247.	45.5	1066.	177.3
7D 7- 6	119	1489.	1717.	228.	45.0	920.	230.8
7D 9- 3	151	1029.	1289.	260.	60.5	654.	292.0
7G 5- 0	23	1517.	1679.	161.	27.5	951.	135.0
7J 6- 0	59	1619.	1909.	290.	59.5	995.	164.0
7M 7- 6	120	1487.	1748.	261.	52.0	864.	245.0
7M 8- 0	132	1350.	1682.	332.	61.0	875.	264.0
7M 9- 3	152	1038.	1339.	301.	77.0	686.	294.0
8H 4- 0	13	1315.	1443.	128.	22.0	815.	98.5
8H10- 0	163	831.	1118.	287.	90.5	641.	318.0
8H11- 6	177	634.	766.	132.	90.5	533.	293.0
8K 4- 0	14	1289.	1418.	129.	21.5	814.	96.1
8K 6- 6	99	1549.	1888.	339.	76.5	1023.	202.0
8K 8- 0	140	1370.	1678.	308.	97.5	878.	266.7
8K10- 0	164	845.	1189.	344.	131.0	661.	319.0
3N 2- 0	5	840.	887.	47.	9.5	706.	30.1
8N 4- 0	15	1296.	1422.	125.	26.5	832.	96.0
8N 6- 0	61	1575.	1803.	229.	45.0	839.	175.1
8N10- 0	165	848.	1222.	375.	107.0	674.	320.4
9C 7- 0	109	1482.	1673.	192.	37.5	764.	228.0
9C 9- 3	153	1040.	1314.	274.	77.0	720.	295.0
9G 1- 0	2	614.	638.	24.	6.0	586.	12.5
9G 3- 3	8	1239.	1327.	88.	13.0	823.	67.5
9G11- 0	171	579.	792.	213.	90.0	590.	265.0
9I 5- 0	24	1526.	1690.	164.	36.0	941.	136.9
9E 6- 2	46	1561.	1849.	288.	60.5	833.	198.9
10D 6- 6	93	1510.	1759.	249.	68.0	755.	207.2
11E 7- 6	124	1454.	1730.	275.	61.0	919.	249.9
11E 9- 3	155	994.	1265.	271.	68.0	635.	317.0
11E11- 0	172	575.	791.	216.	88.5	594.	260.1
12D 4- 0	16	1314.	1443.	129.	22.0	824.	97.4
12D 6- 0	66	1588.	1794.	206.	45.0	936.	186.5
12F 6- 6	102	1550.	1825.	275.	55.0	935.	200.0

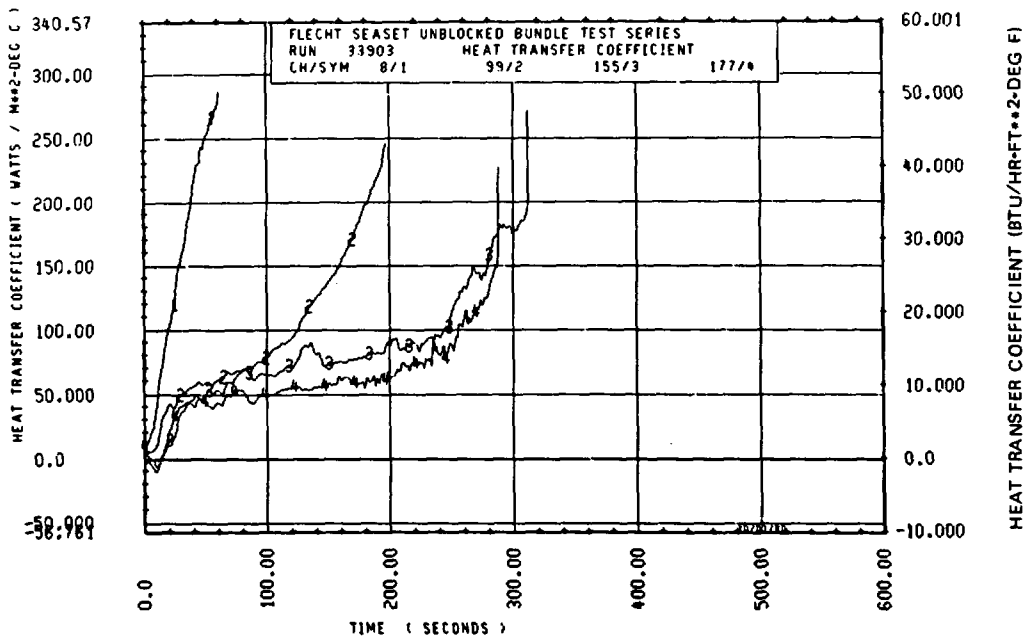

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

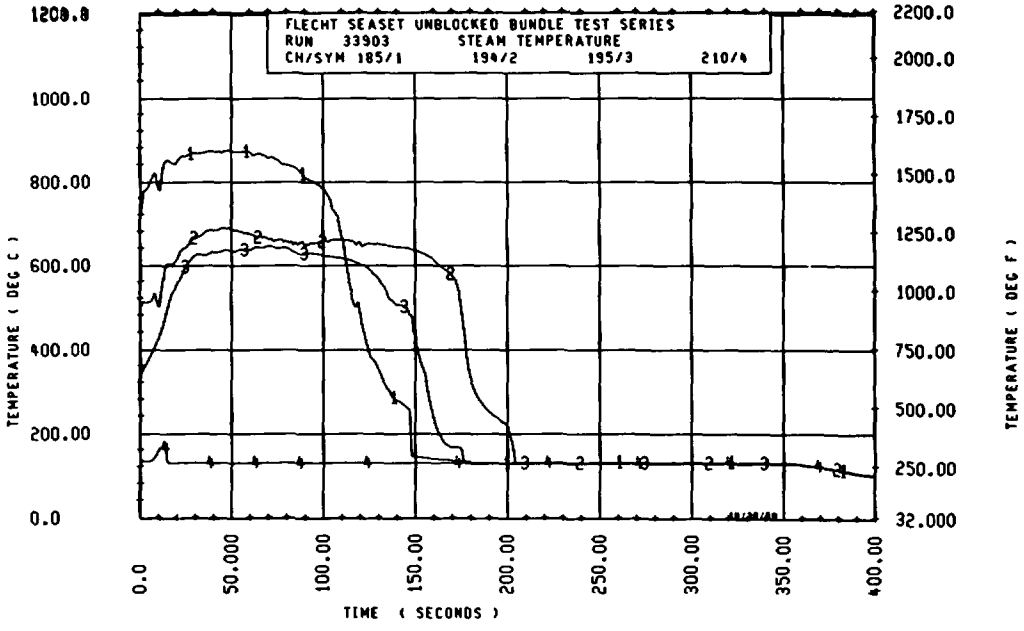

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-36.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

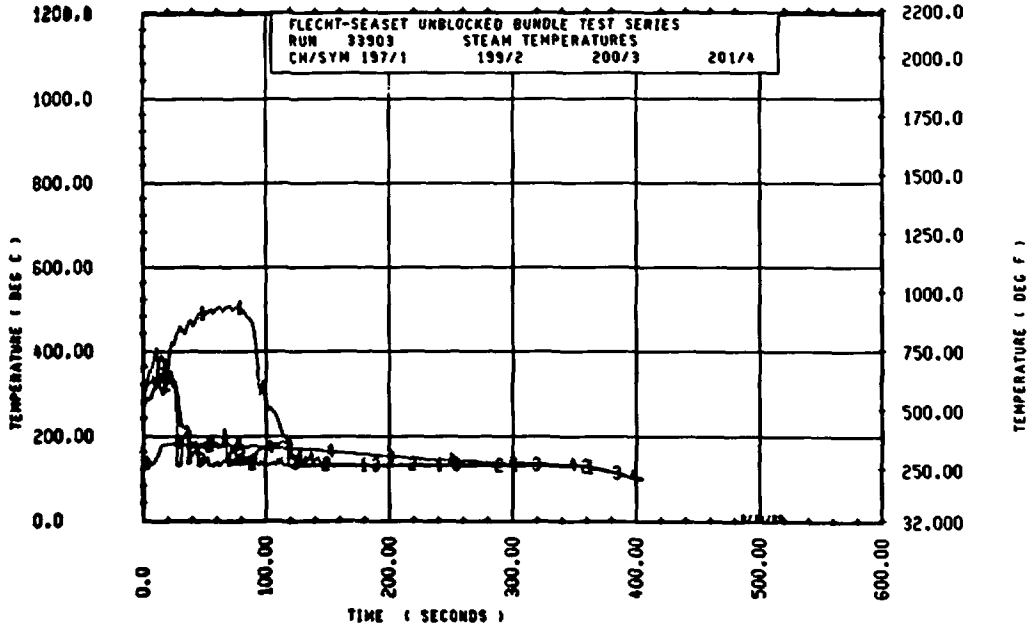

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

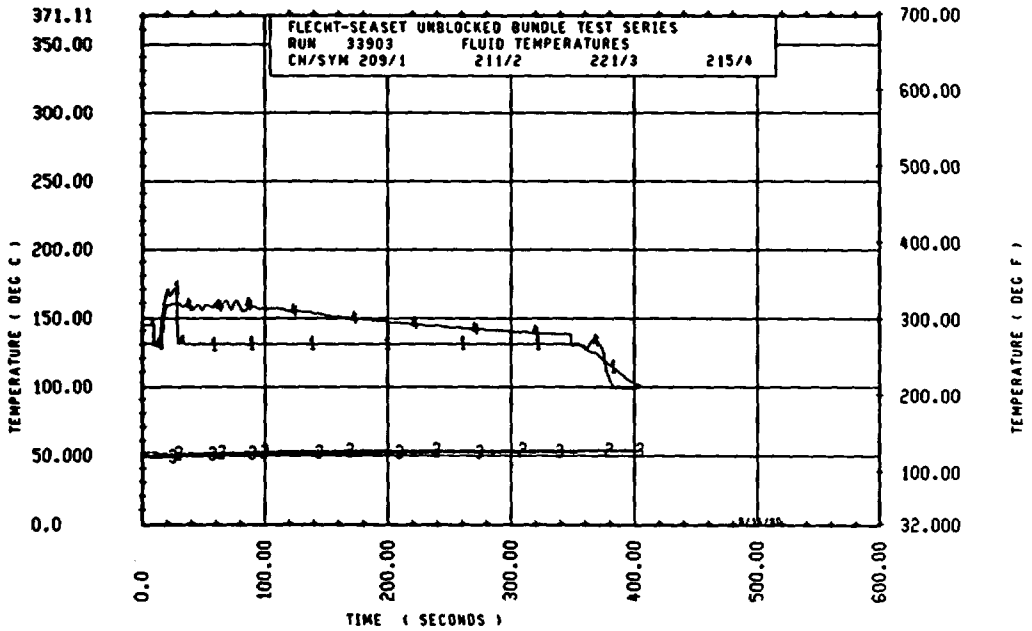

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

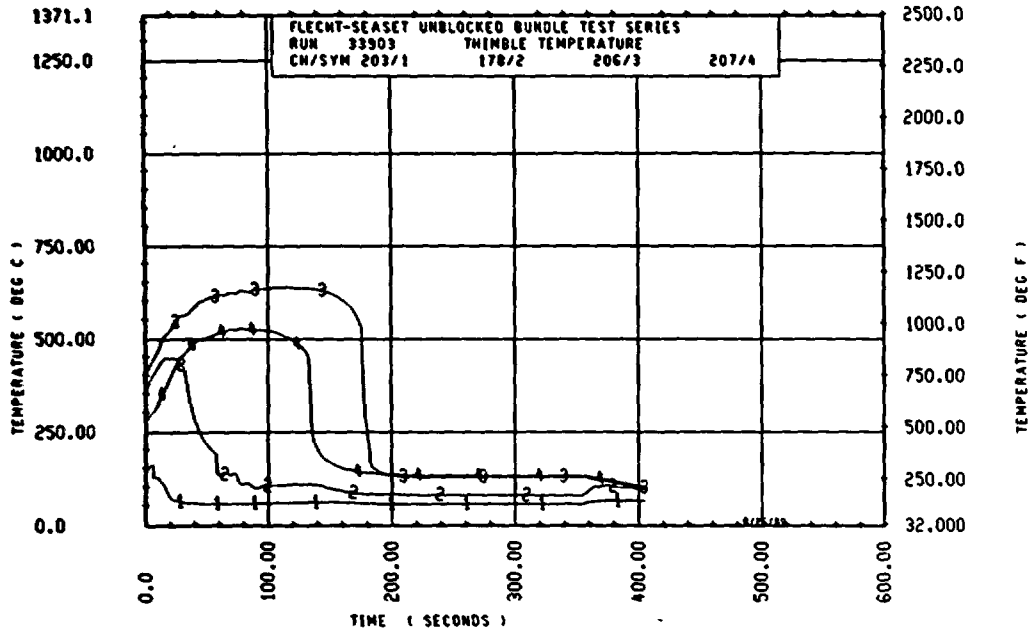

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

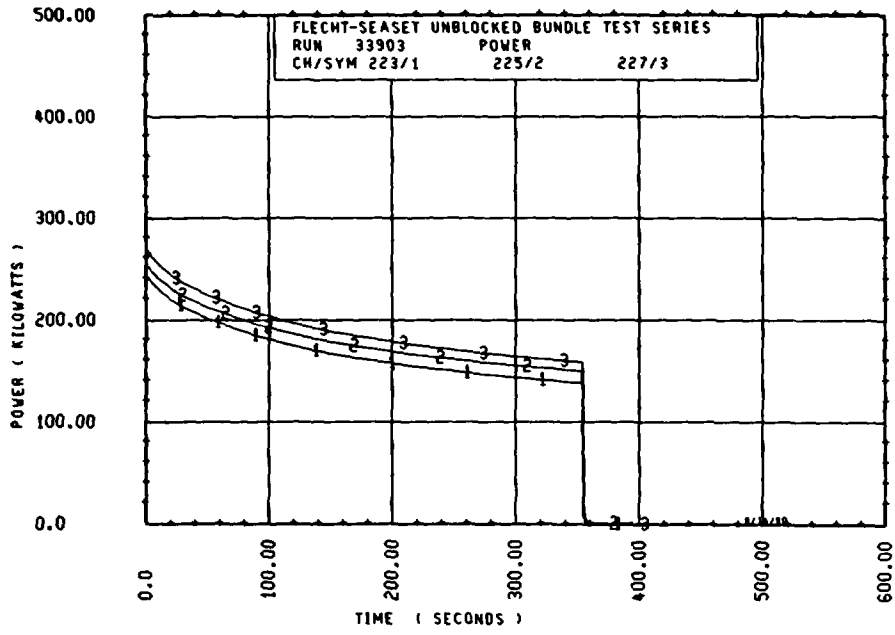

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

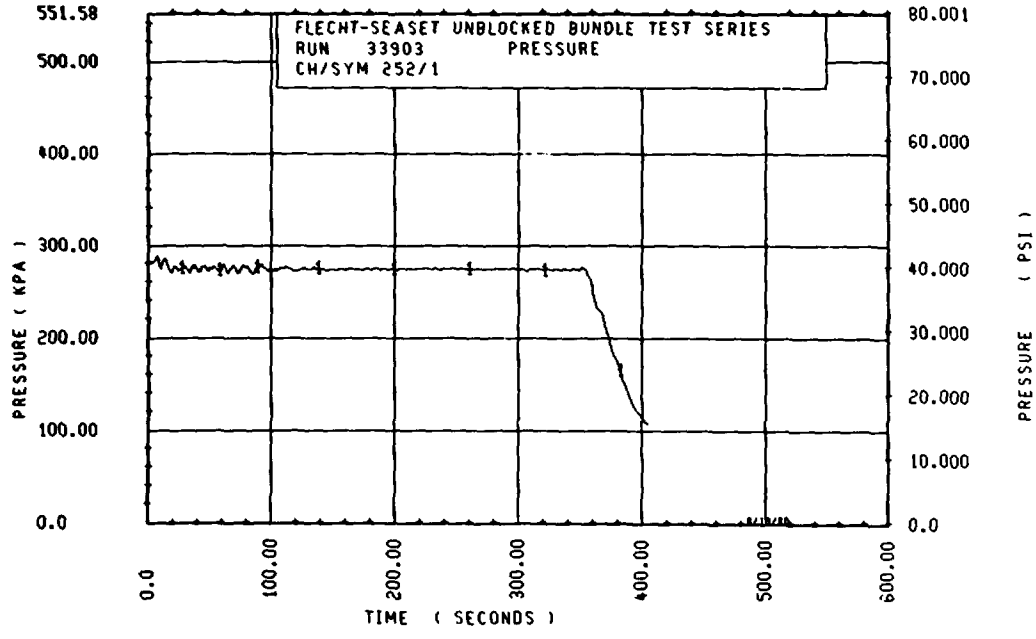

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

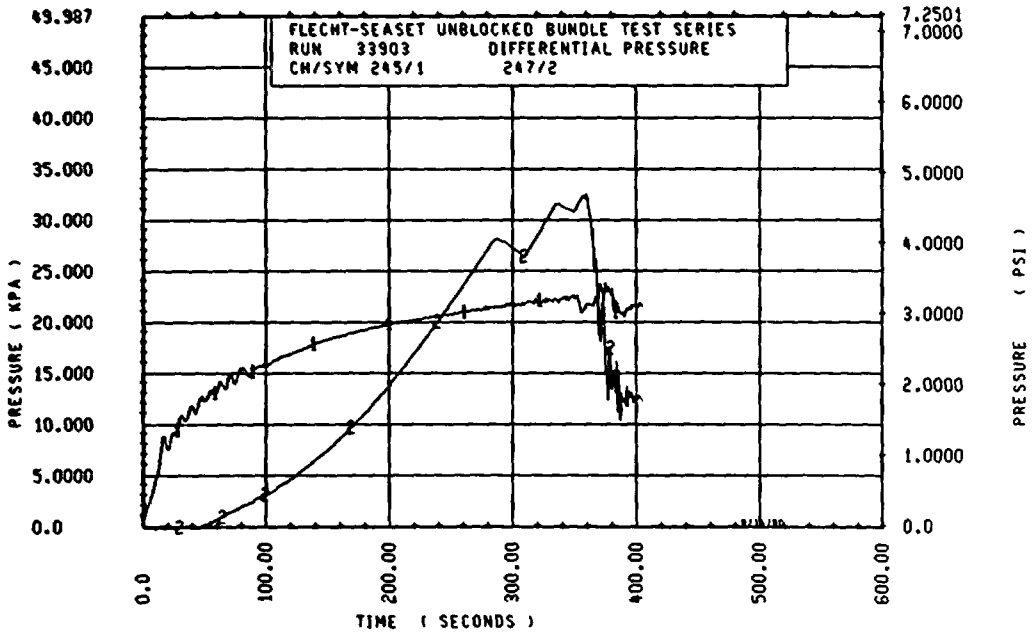


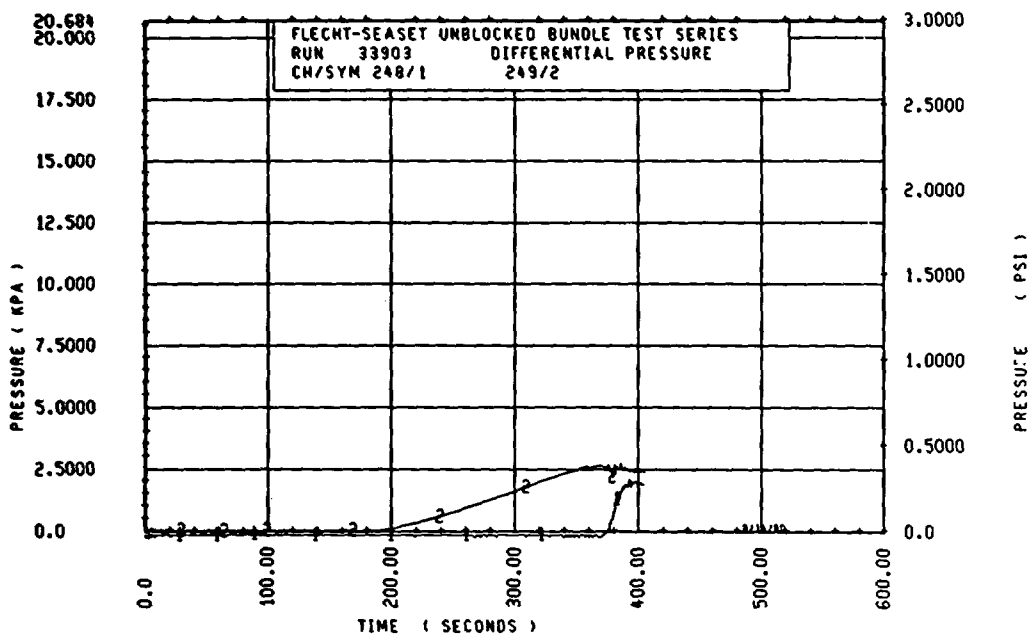


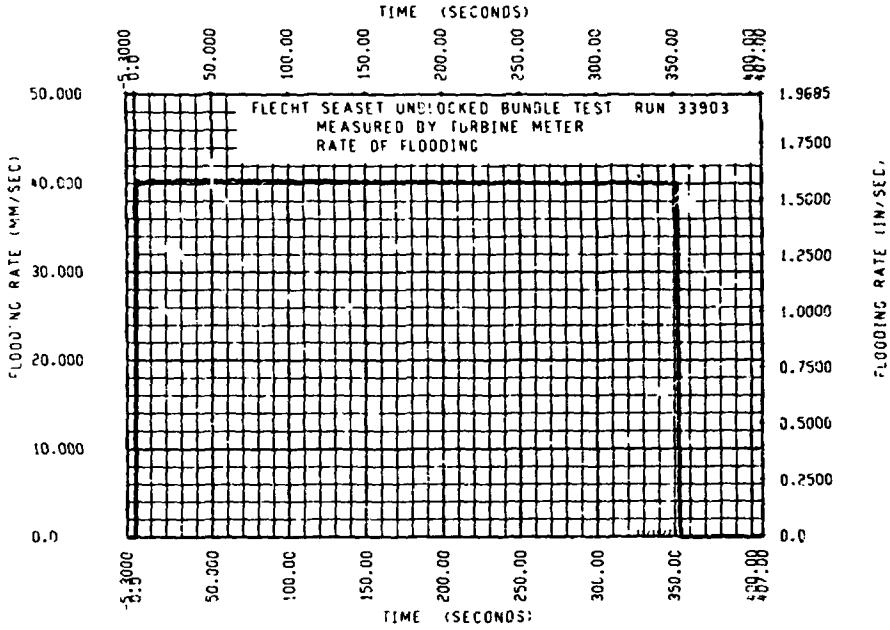
CH 203-4I,0.305 m (12 in.);CH 178-7L, 0.99 m (39 in.);
CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

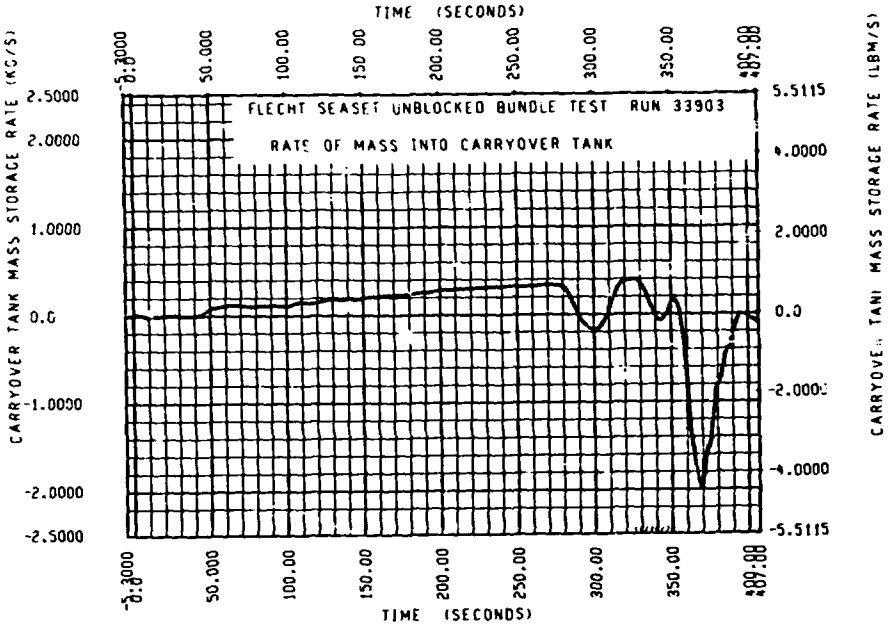

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

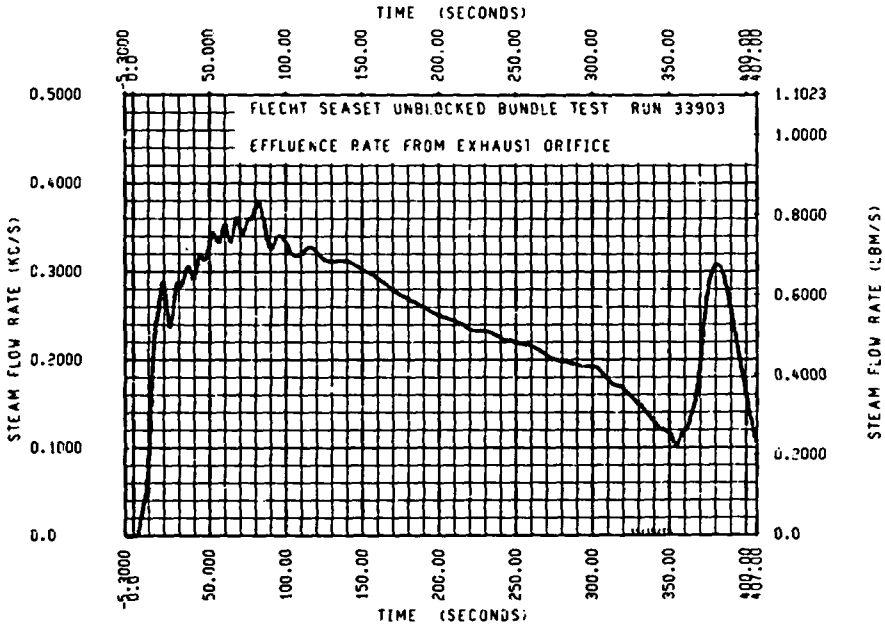

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

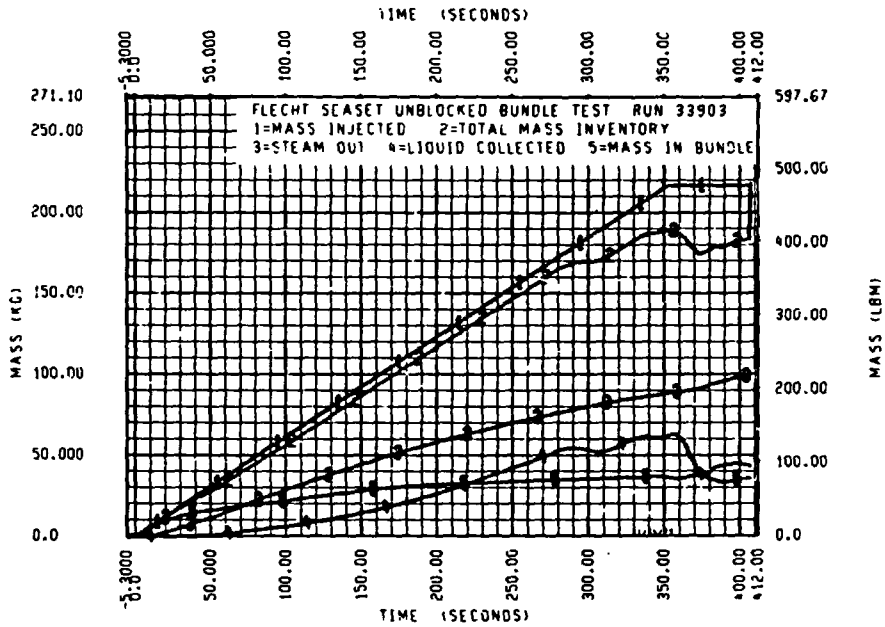

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00

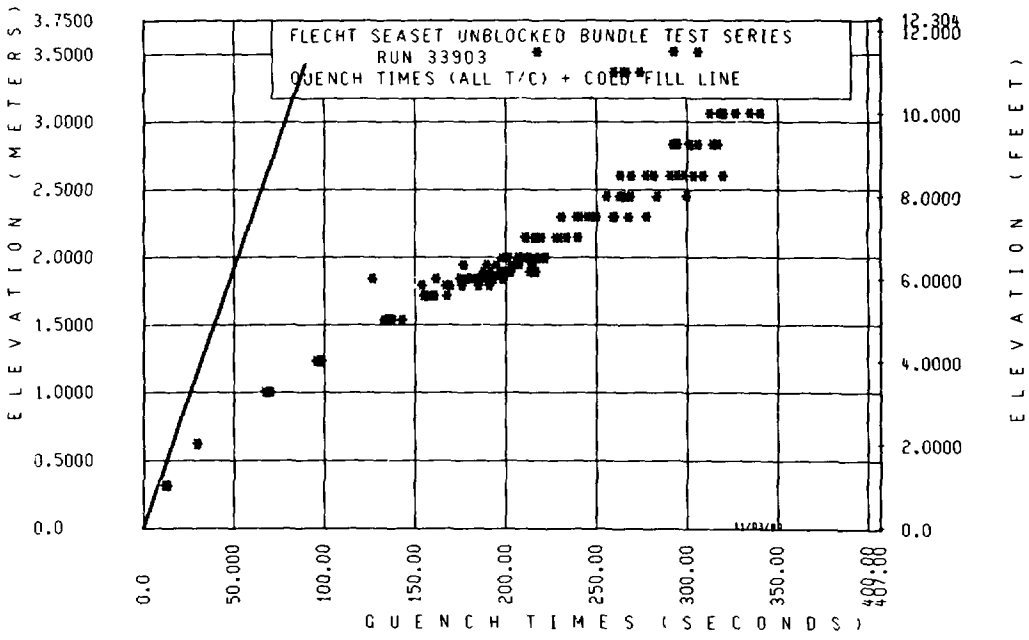

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00

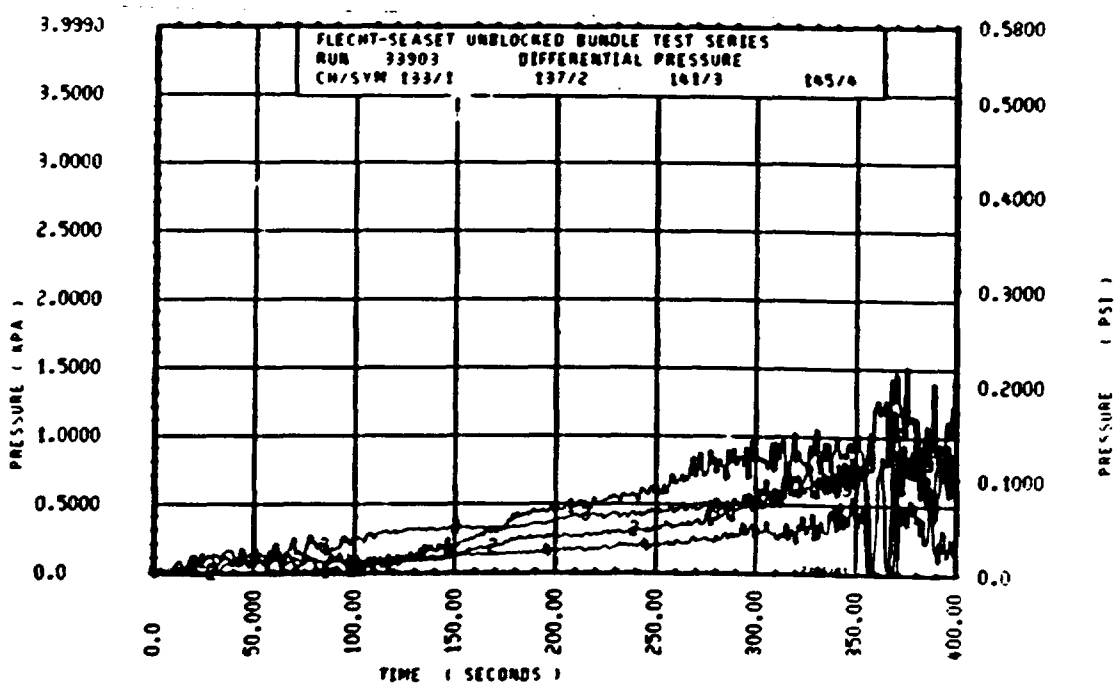

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33903
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.0000
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

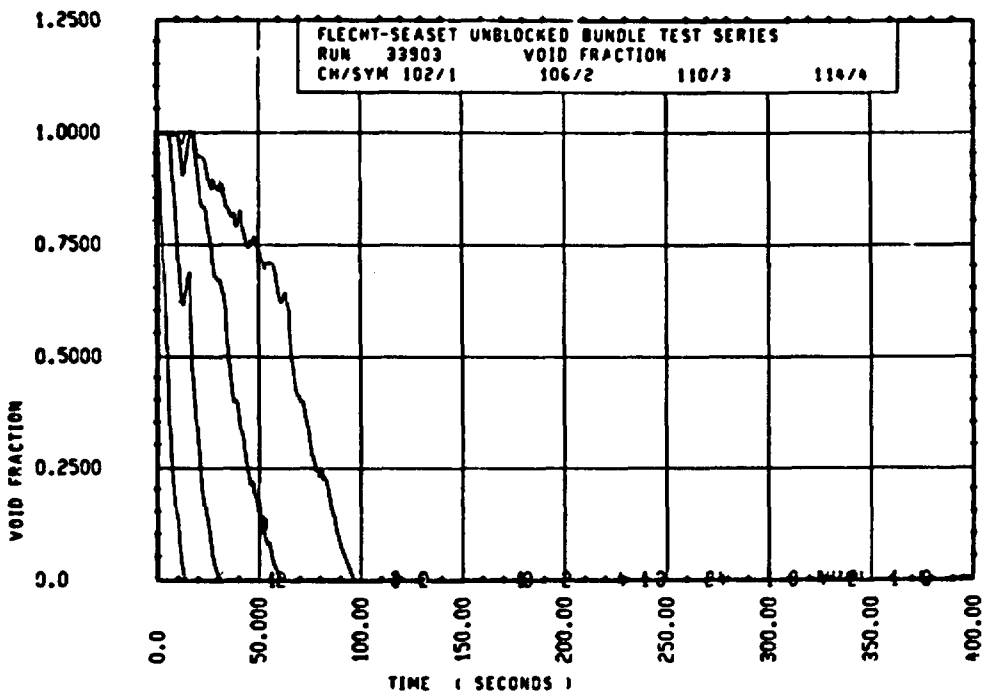

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33903
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
2.5000
2.0000
1.0000
0.0
-1.0000
-2.0000
-2.5000
5.5115
4.0000
2.0000
0.0
-2.0000
-4.0000
-5.5115
-5.0000
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

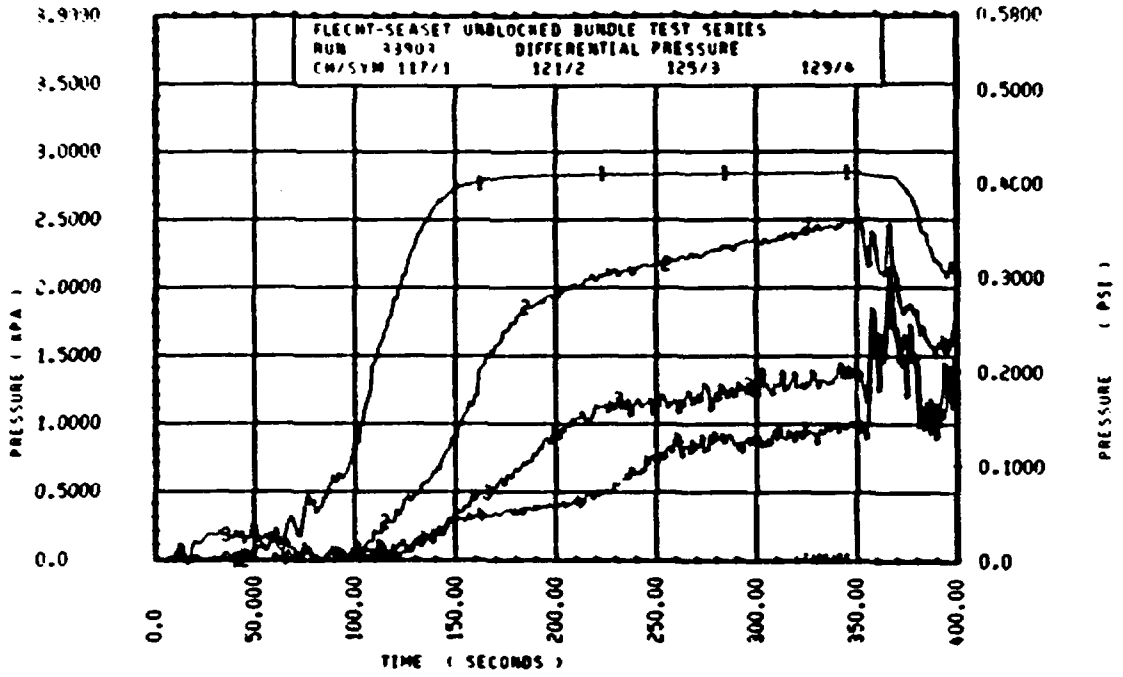

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33903
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.3000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

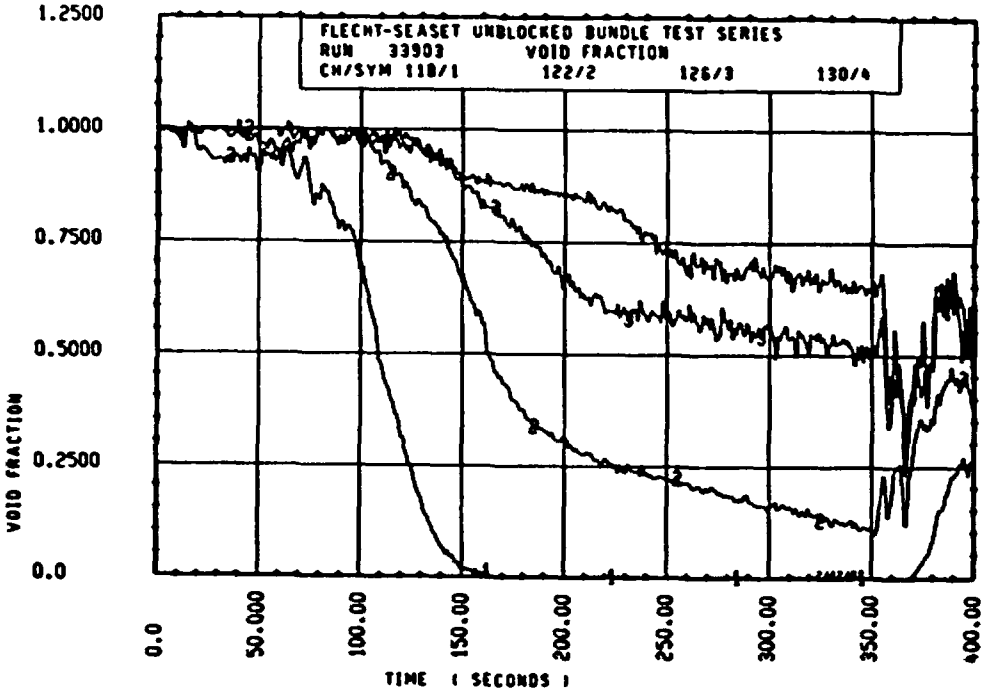

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 33903
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
271.10
250.00
200.00
150.00
100.00
50.000
0.0
597.67
500.00
400.00
300.00
200.00
100.00
0.0
-5.3000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
412.00

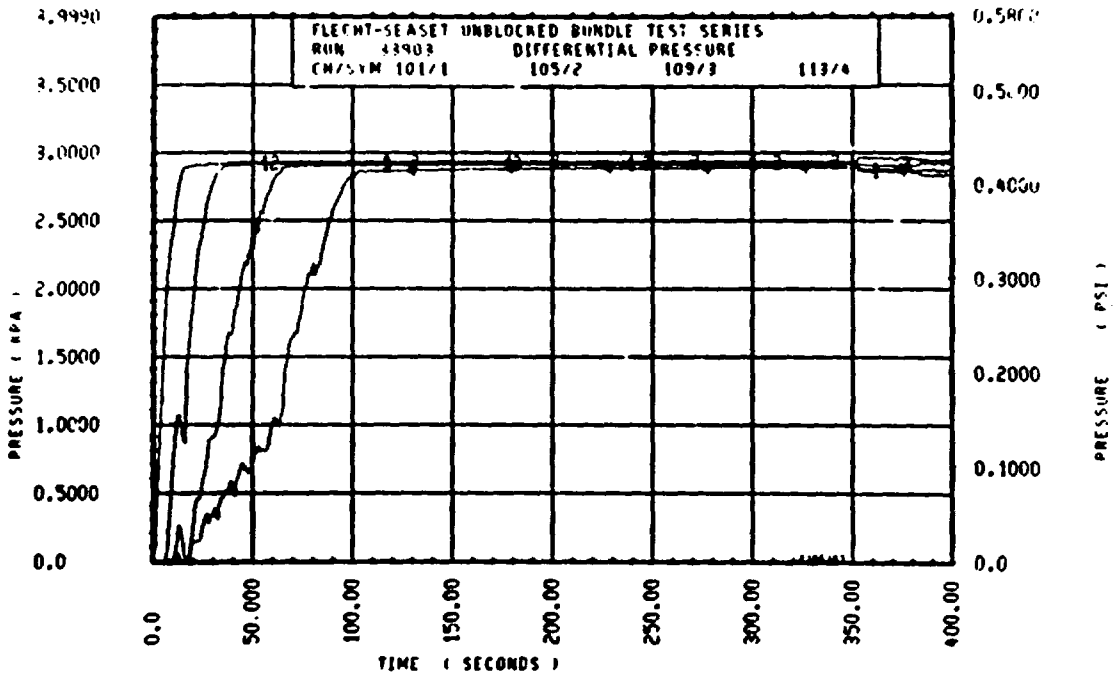

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
489.88
QUENCH TIMES (SECONDS)

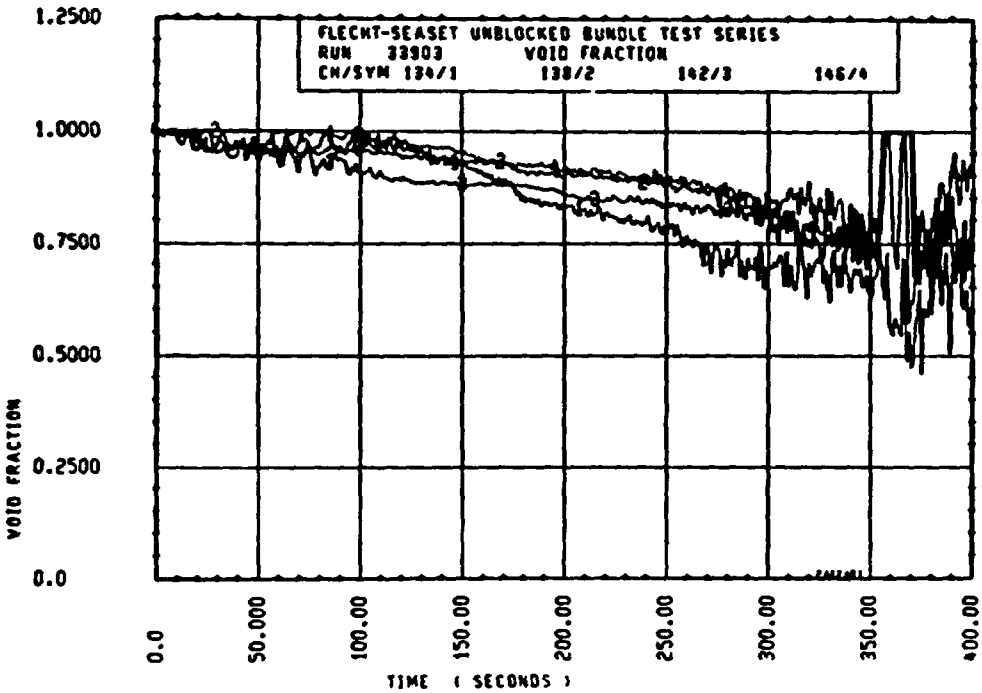

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 33903 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 34006
Date: 7/25/79
Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	882°C (1620°F)
Rod peak power	1.3 kw/m (0.40 kw/ft)
Flow rate	15 mm/sec (0.59 in./sec)
Coolant temperature	51°C (124°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	141°C (286°F)	82°C (180°F)
1.22 m (48 in.)	175°C (347°F)	129°C (264°F)
1.83 m (72 in.)	181°C-219°C (358°F-426°F)	408°C-642°C (766°F-1188°F)
2.44 m (96 in.)	191°C-202°C (376°F-396°F)	287°C-736°C (549°F-1356°F)
2.74 m (108 in.)	166°C (331°F)	156°C-343°C (313°F-649°F)
3.05 m (120 in.)	135°C-150°C (277°F-302°F)	132°C-298°C (269°F-568°F)
3.35 m (132 in.)	127°C-136°C (267°F-277°F)	126°C-139°C (259°F-283°F)

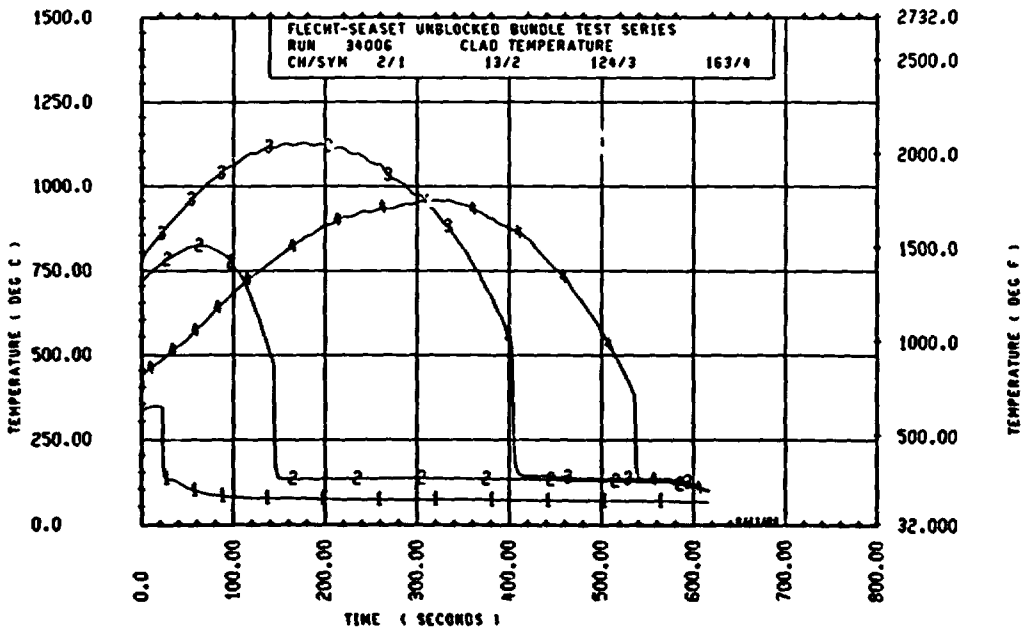
*At 205 seconds after flood

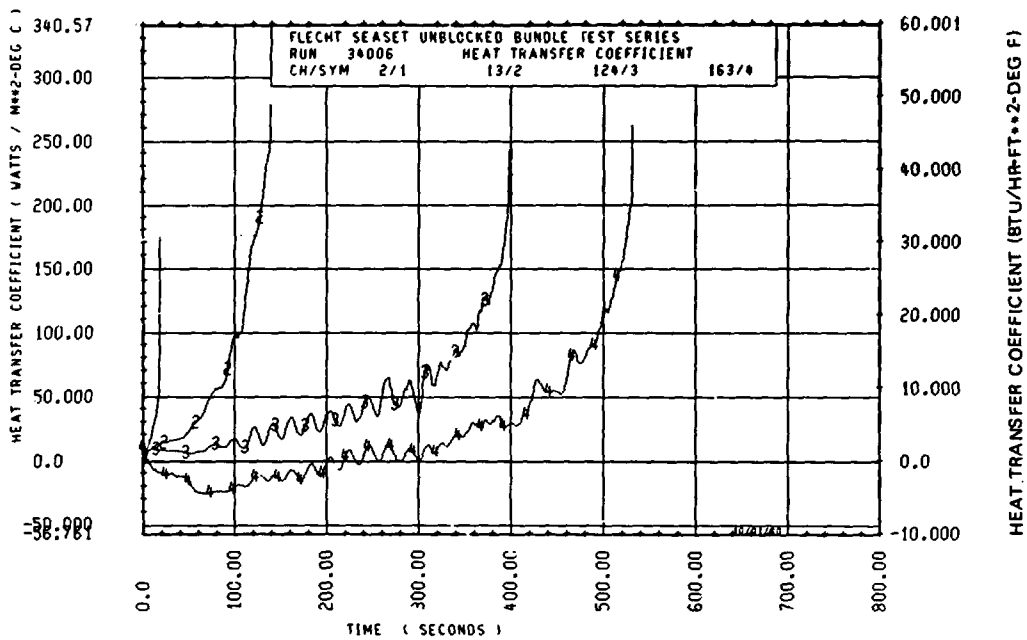
C. Comments

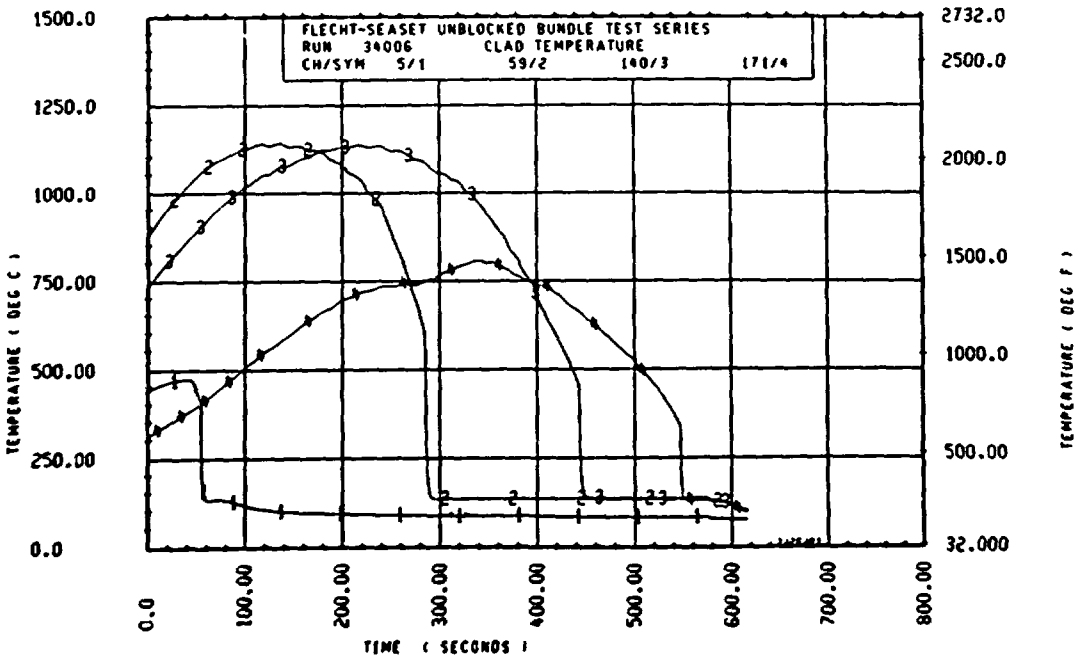
Power decay of inside power zone was lower than specified by approximately 7 percent.

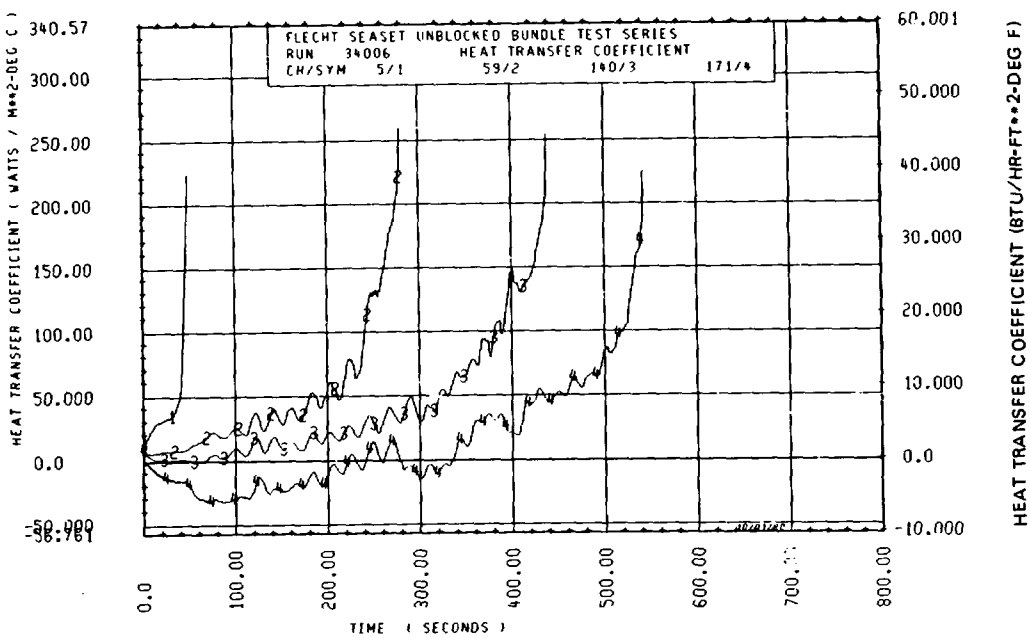
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 34006

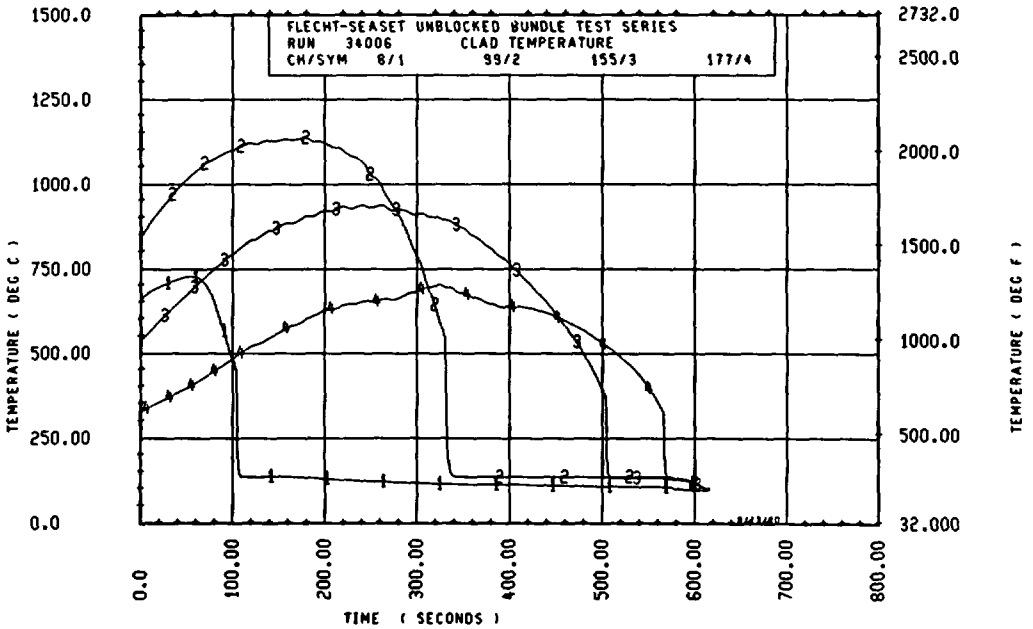
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1271.	1455.	184.	68.0	856.	141.0
2H 6- 0	50	1527.	1851.	324.	115.0	972.	283.5
3C 5- 0	17	1305.	1490.	185.	64.0	827.	207.1
3C 5- 7	28	1389.	1583.	194.	70.0	869.	264.5
4L 8- 0	129	1324.	1875.	551.	158.0	823.	429.0
4L 8- 6	147	1322.	1858.	536.	157.0	827.	429.6
5E11- 0	168	642.	1314.	672.	334.0	598.	543.0
5J 4- 0	12	1274.	1493.	220.	67.5	835.	144.0
5J 8- 6	146	1135.	1925.	789.	199.0	720.	464.8
5J11- 6	175	600.	1361.	762.	319.0	607.	558.0
7B 6- 0	57	1464.	1756.	290.	92.5	961.	242.4
7B 8- 6	142	1112.	1616.	504.	199.0	631.	473.0
7B10- 0	162	828.	1449.	622.	240.0	652.	528.0
7B11- 6	176	642.	1099.	457.	206.0	606.	552.0
7D 6- 4	84	1610.	2012.	402.	116.0	998.	288.3
7D 7- 6	119	1471.	1979.	508.	156.0	876.	393.5
7D 9- 3	151	1030.	1761.	731.	239.0	746.	493.5
7G 5- 0	23	1504.	1782.	278.	68.5	991.	204.9
7J 6- 0	59	1620.	2087.	467.	116.0	1100.	284.9
7M 7- 6	120	1451.	1966.	515.	177.0	871.	407.8
7M 8- 0	132	1327.	1950.	623.	215.0	812.	442.5
7M 9- 3	152	1021.	1812.	791.	241.0	757.	497.0
8H 4- 0	13	1323.	1514.	191.	63.5	880.	144.0
8H10- 0	163	826.	1756.	931.	320.0	710.	535.9
8H11- 6	177	625.	1296.	672.	325.0	618.	566.0
8K 4- 0	14	1301.	1517.	216.	68.5	891.	140.9
8K 6- 6	99	1553.	2075.	523.	176.0	1003.	330.6
8K 8- 0	140	1362.	2078.	716.	217.0	846.	442.9
8K10- 0	164	845.	1753.	908.	306.0	700.	536.0
8M 2- 0	5	828.	888.	60.	37.5	767.	54.8
8M 4- 0	15	1283.	1476.	193.	65.5	884.	140.9
8M 6- 0	61	1528.	1897.	369.	116.0	1102.	276.7
8M10- 0	165	841.	1529.	688.	261.0	733.	524.0
9C 7- 0	109	1445.	1911.	466.	156.0	796.	357.9
9C 9- 3	153	1026.	1695.	669.	239.0	791.	489.9
9G 1- 0	2	636.	660.	24.	14.5	645.	22.9
9G 3- 3	8	1222.	1343.	121.	53.5	838.	104.0
9G11- 0	171	601.	1485.	883.	340.0	641.	547.0
9J 5- 0	26	1497.	1755.	259.	70.0	1001.	204.9
9E 6- 2	46	1557.	2025.	468.	117.0	935.	291.7
10D 6- 6	93	1497.	1855.	359.	154.0	830.	323.0
11E 7- 6	124	1444.	2062.	618.	176.0	938.	403.3
11E 9- 3	155	1004.	1719.	715.	240.0	698.	503.8
11E11- 0	172	600.	1427.	827.	350.0	610.	546.9
12D 4- 0	16	1284.	1468.	184.	66.0	886.	141.5
12D 6- 0	66	1547.	1876.	329.	113.0	953.	277.6
12F 6- 6	102	1523.	1945.	422.	117.0	942.	318.9

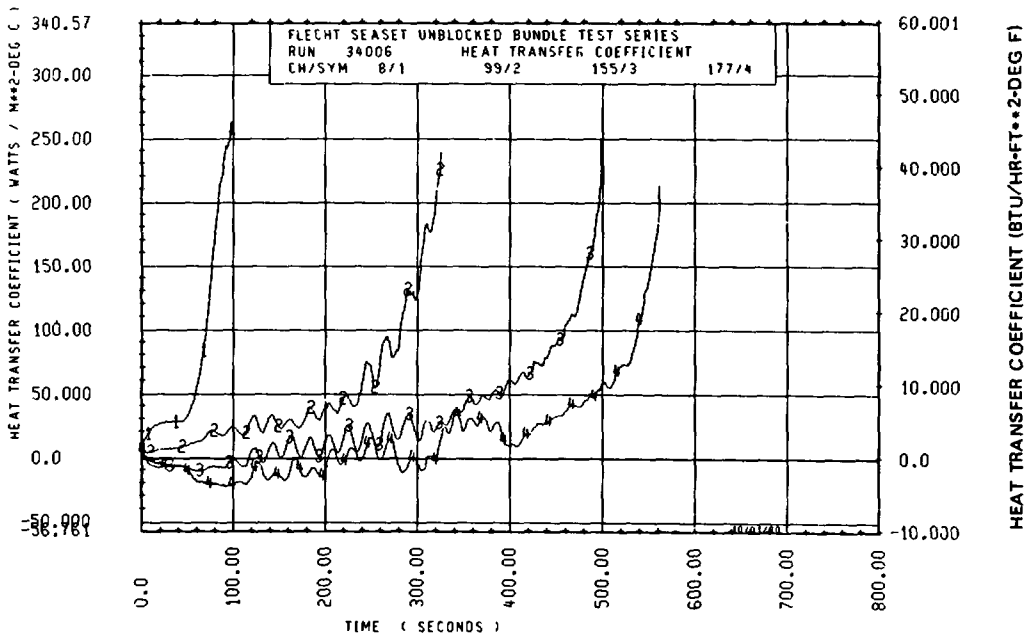

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

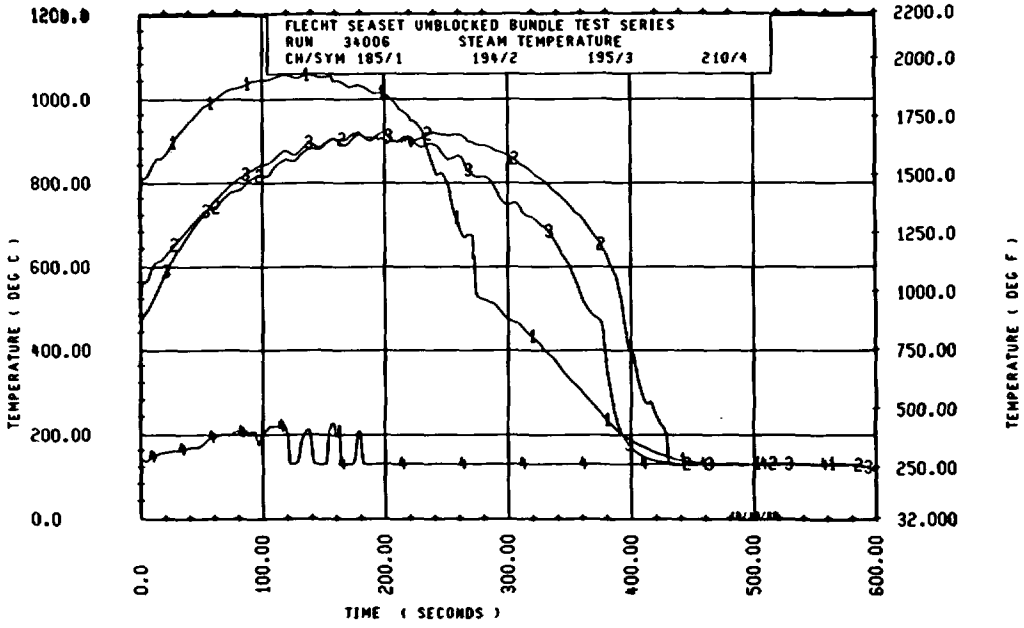

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

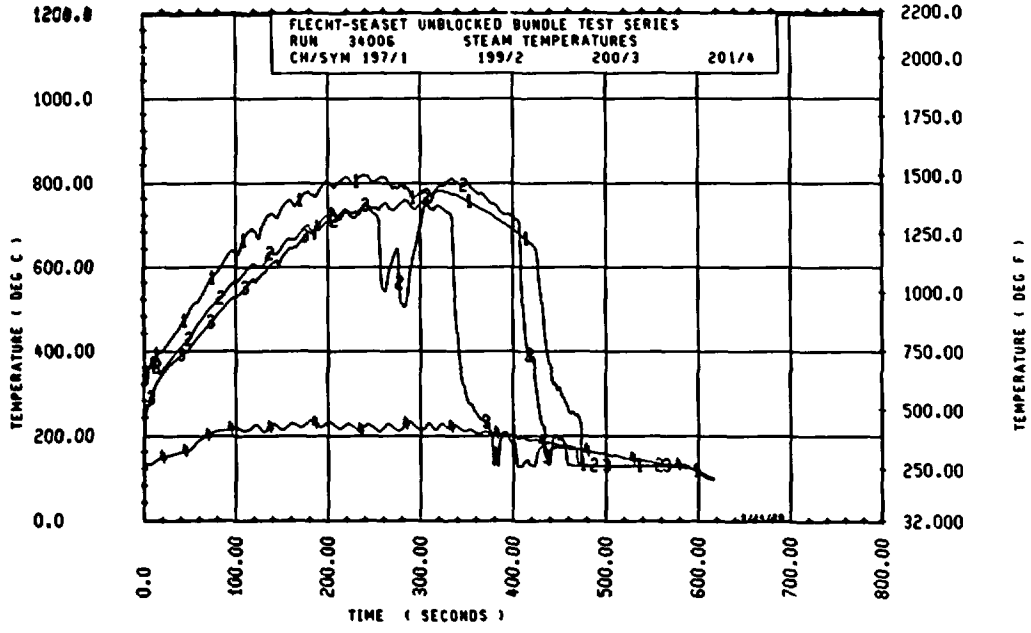

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

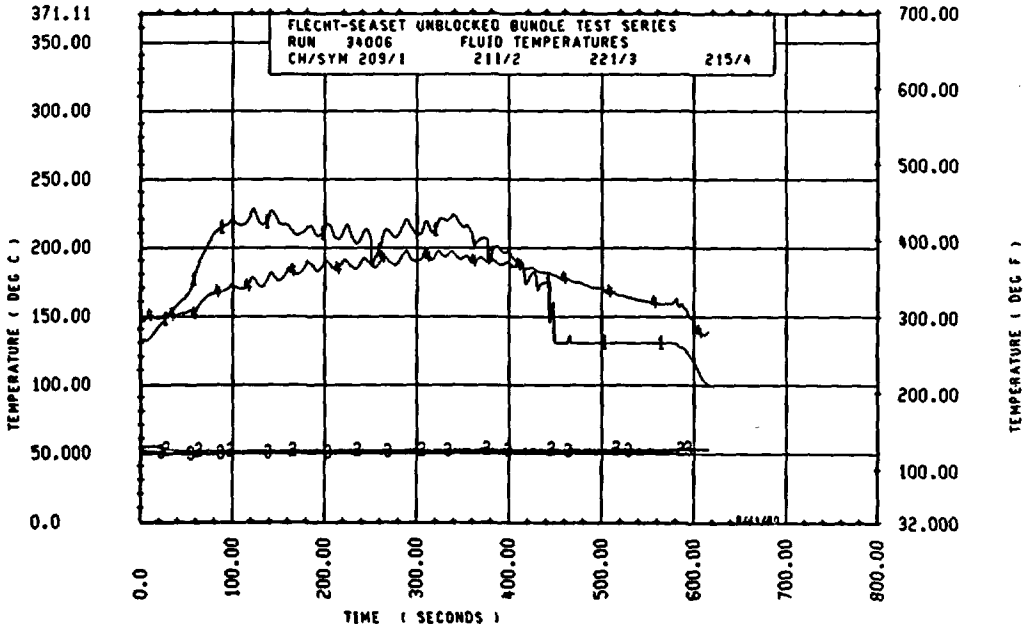

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
800.00

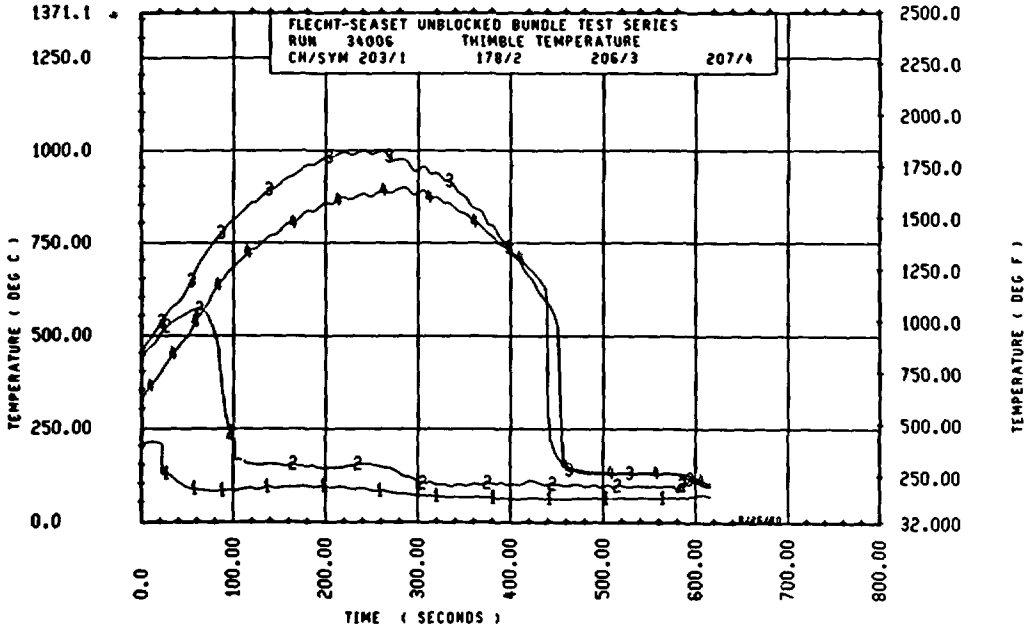

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)

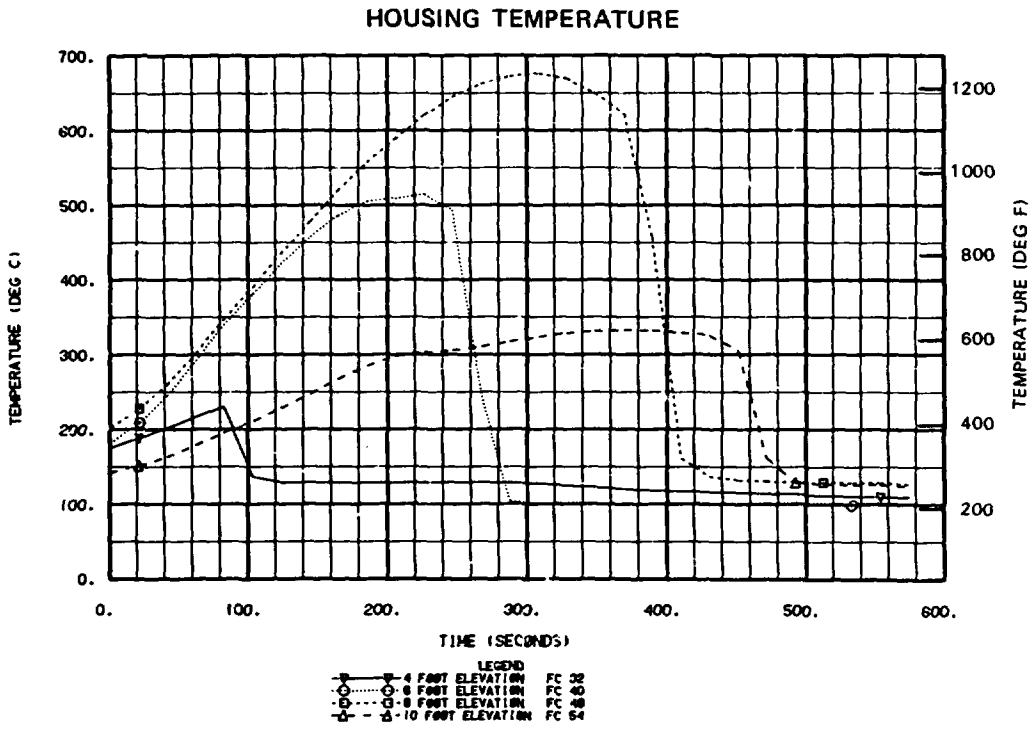

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

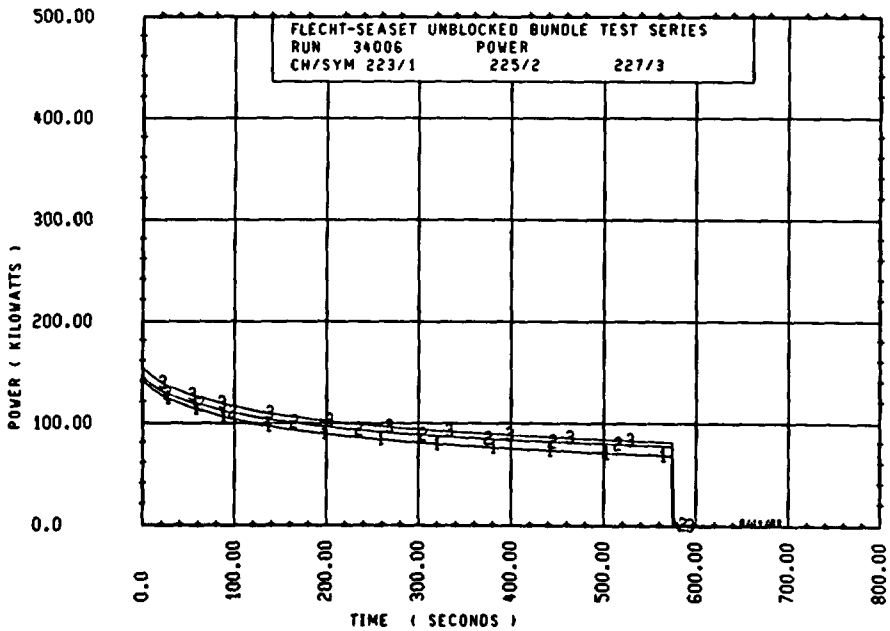

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

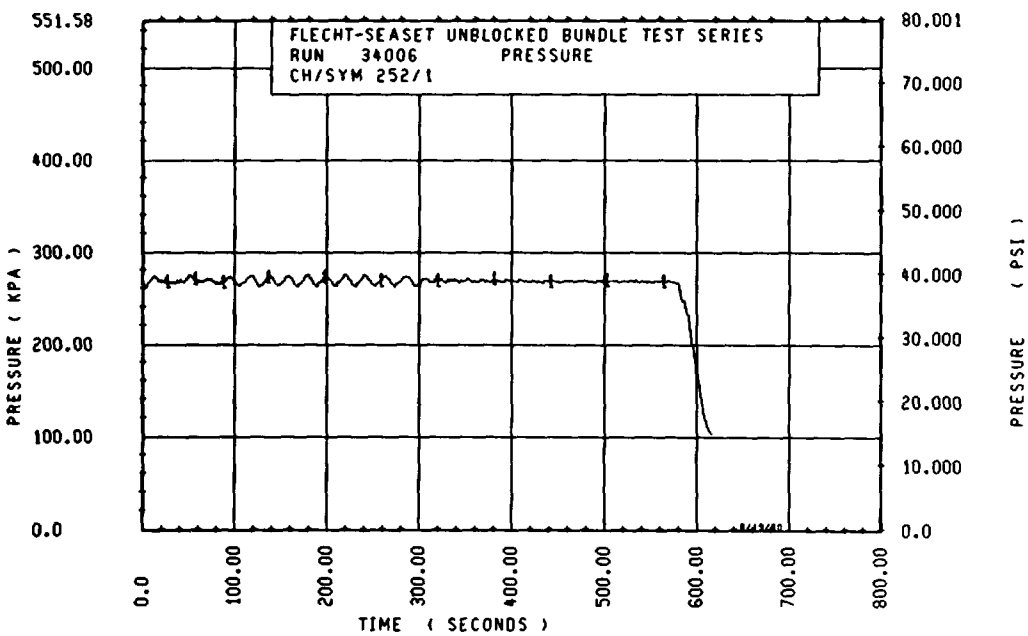


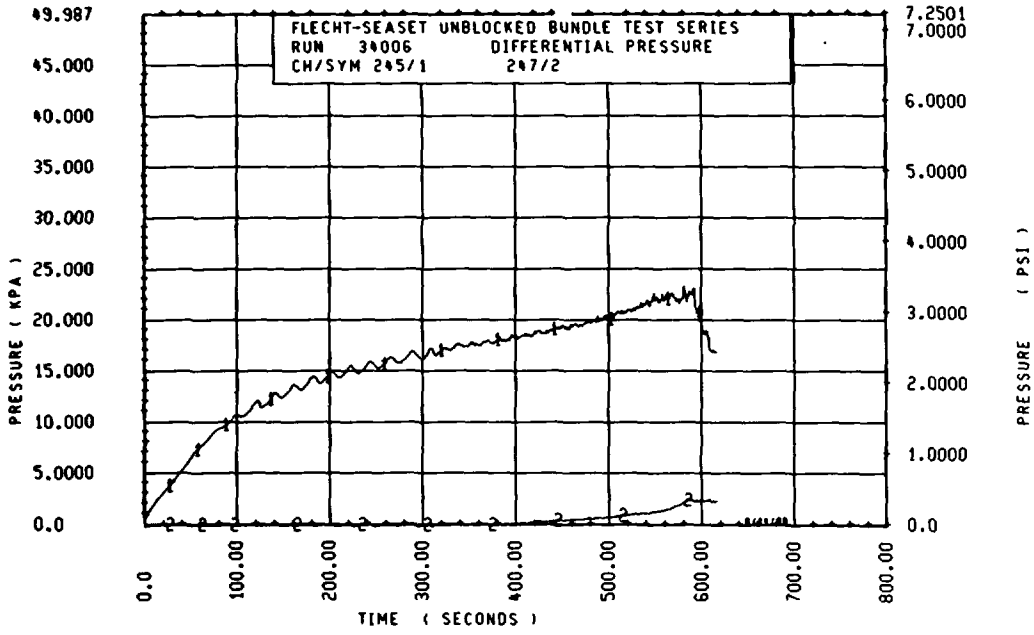


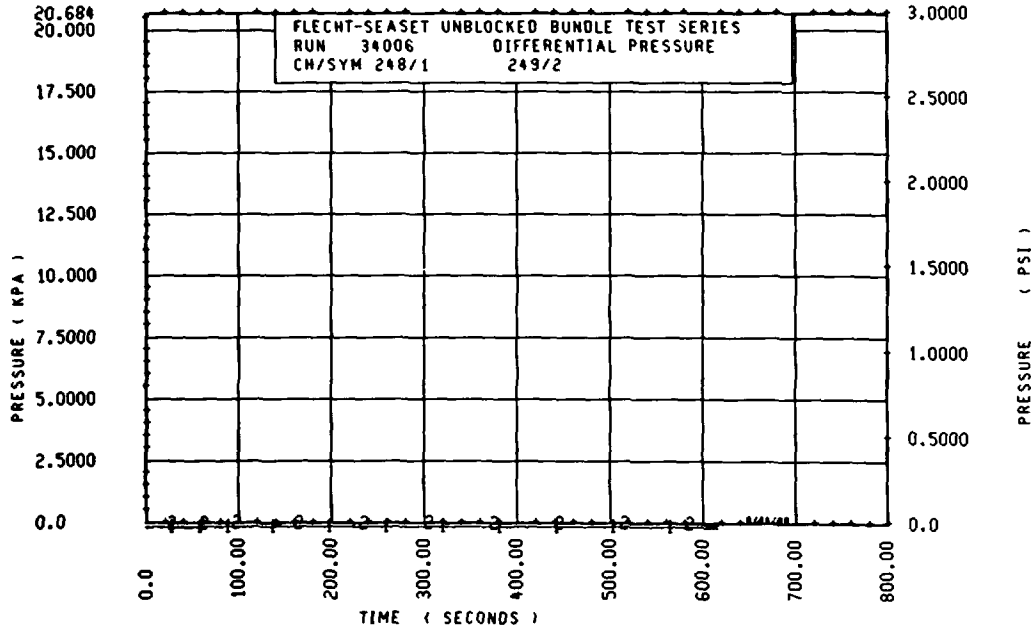
CH 203-4I, 0.305 m (12 in.); CH 178-7L, 0.99 m (39 in.);
CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

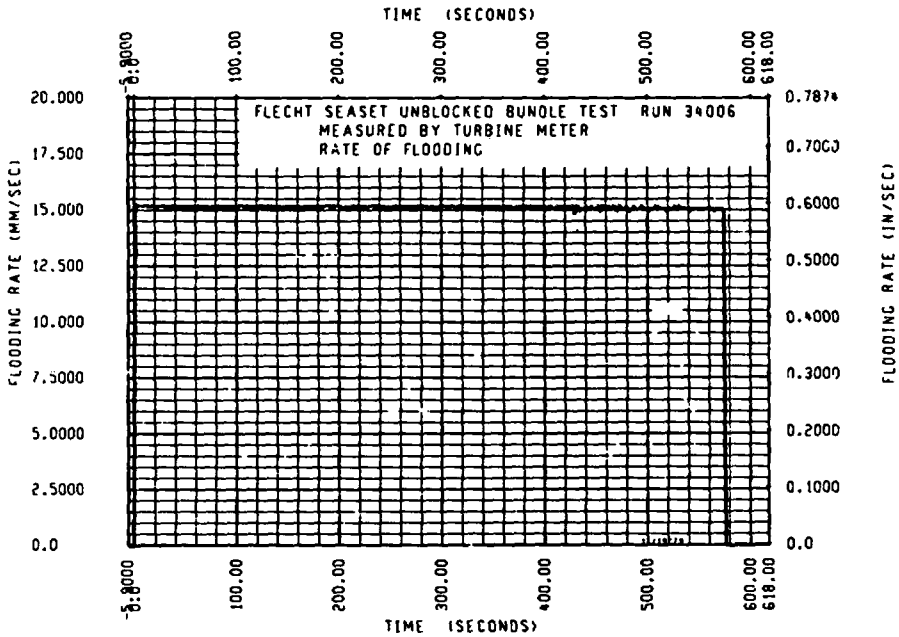

HOUSING TEMPERATURE
TEMPERATURE (DEG C)
700.
600.
500.
400.
300.
200.
100.
0.
TEMPERATURE (DEG F)
1200
1000
800
600
400
200
0.
100.
200.
300.
400.
500.
600.
TIME (SECONDS)
LEGEND
4 FOOT ELEVATION FC 32
6 FOOT ELEVATION FC 40
8 FOOT ELEVATION FC 48
10 FOOT ELEVATION FC 54

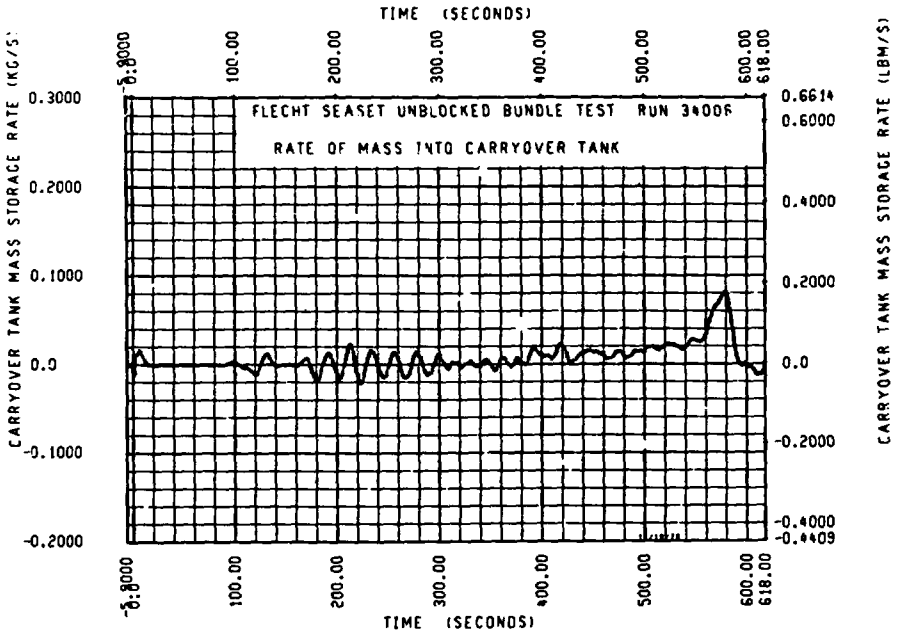

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

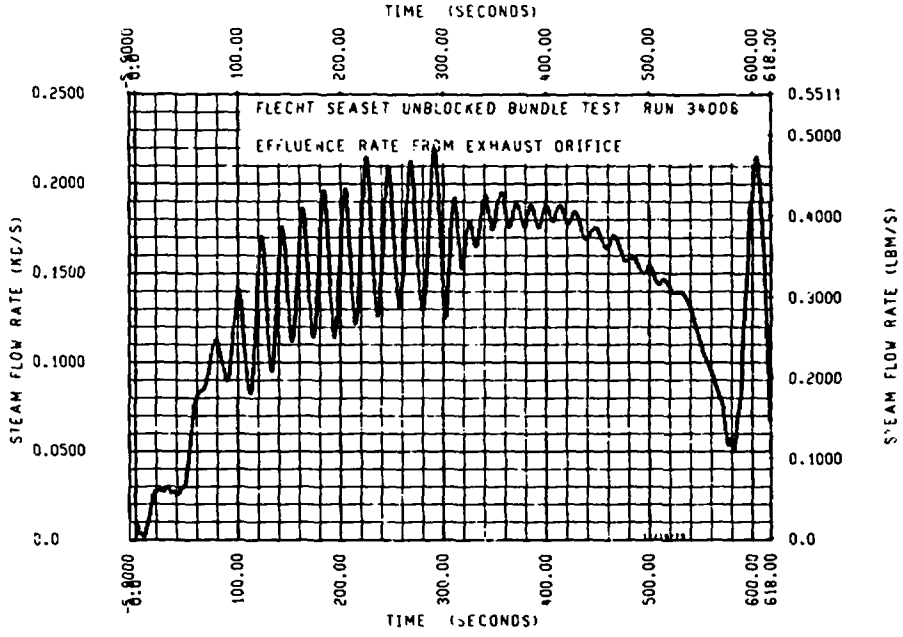

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

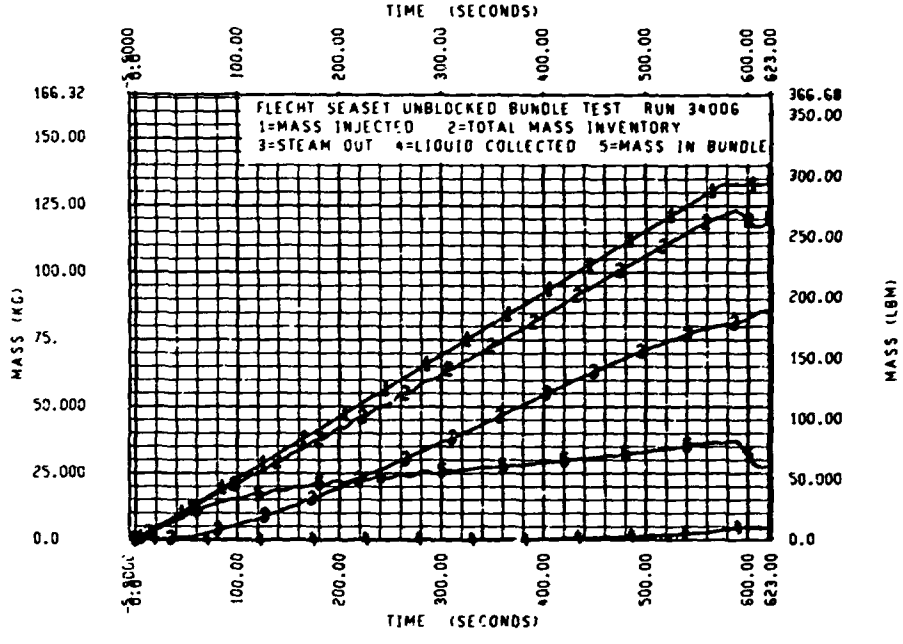

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

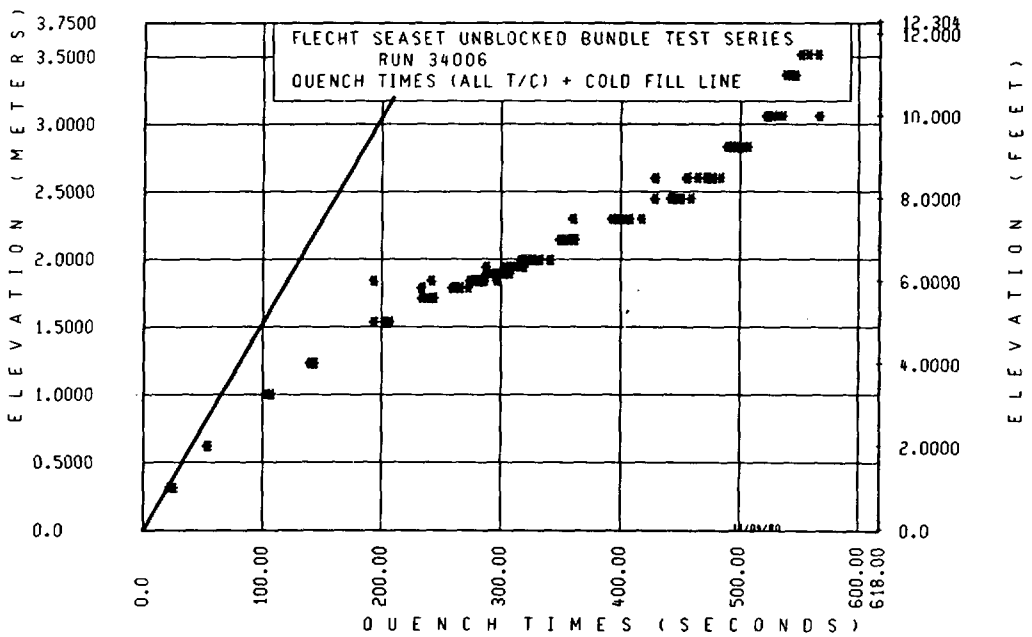

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

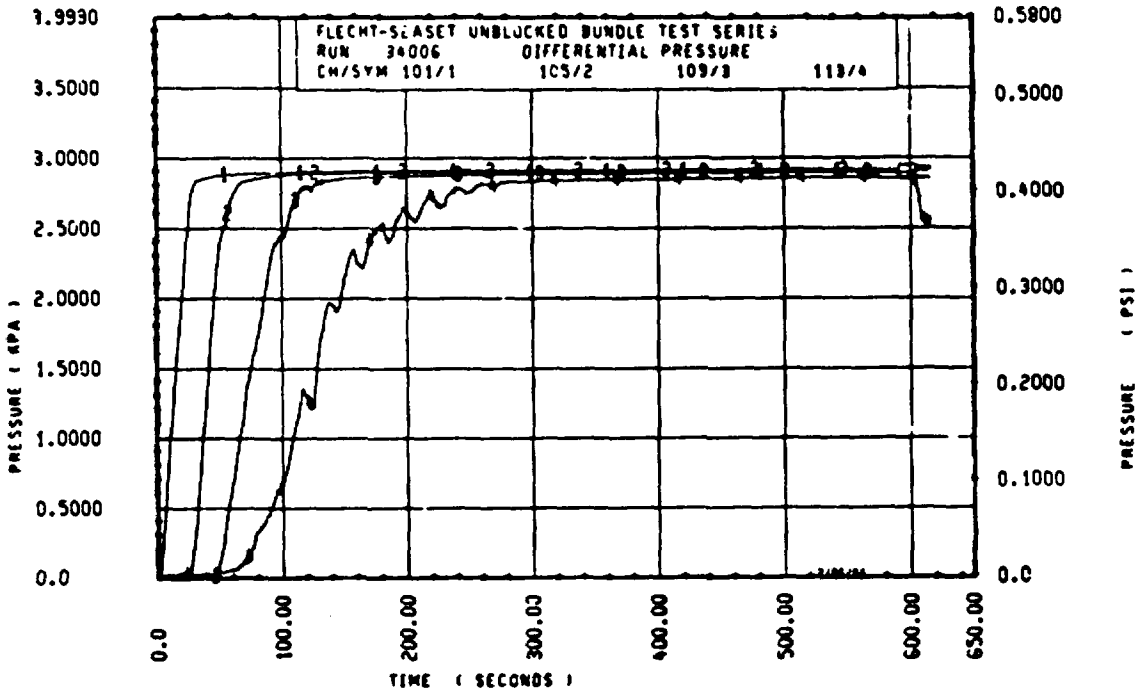

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34006
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.7874
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
-5.8000
100.00
200.00
300.00
400.00
500.00
600.00
618.00

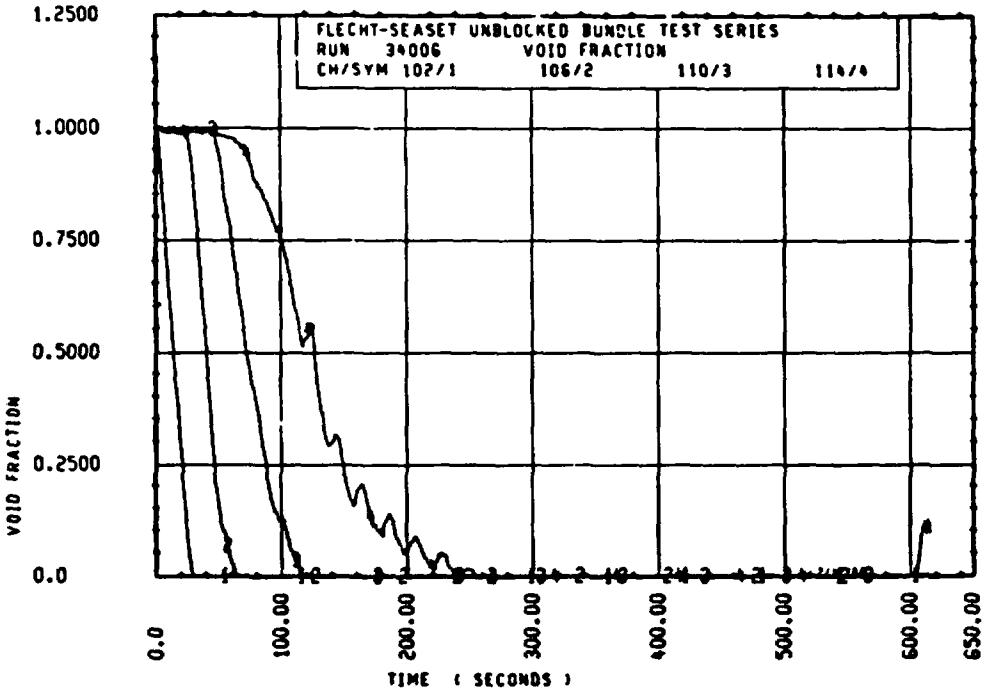

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34006
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.3000
0.2000
0.1000
0.0
-0.1000
-0.2000
0.6614
0.6000
0.4000
0.2000
0.0
-0.2000
-0.4000
-0.4409
-5.8000
100.00
200.00
300.00
400.00
500.00
600.00
618.00

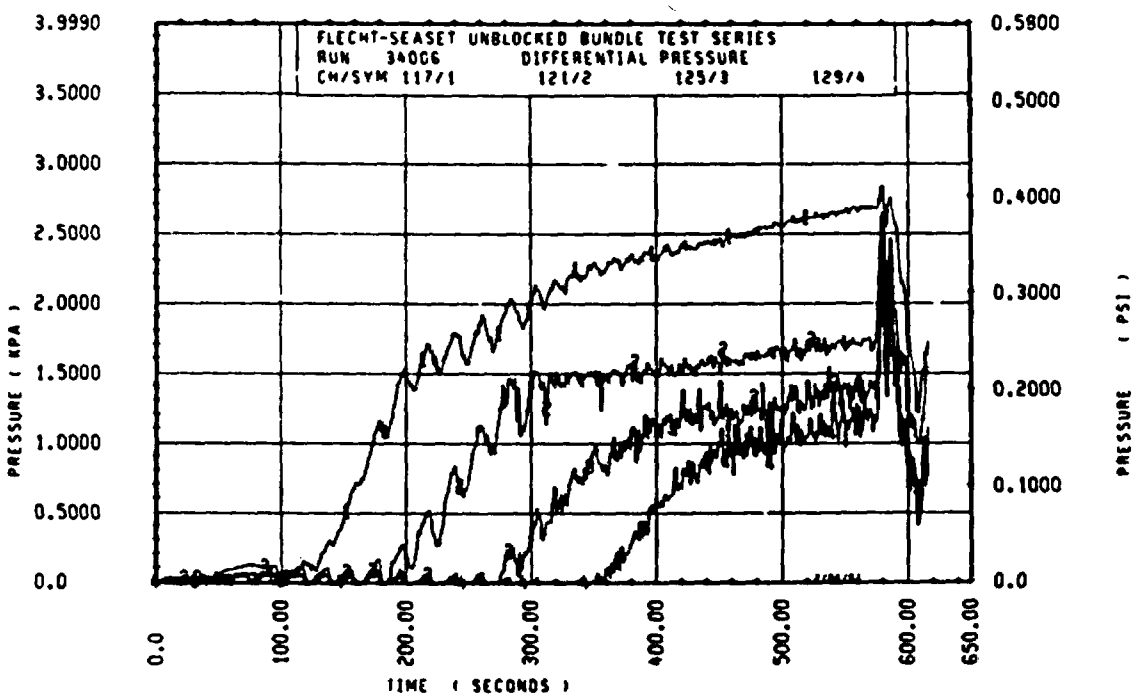

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34006
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.2500
0.2000
0.1500
0.1000
0.0500
0.0
0.5511
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
-5.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
618.00

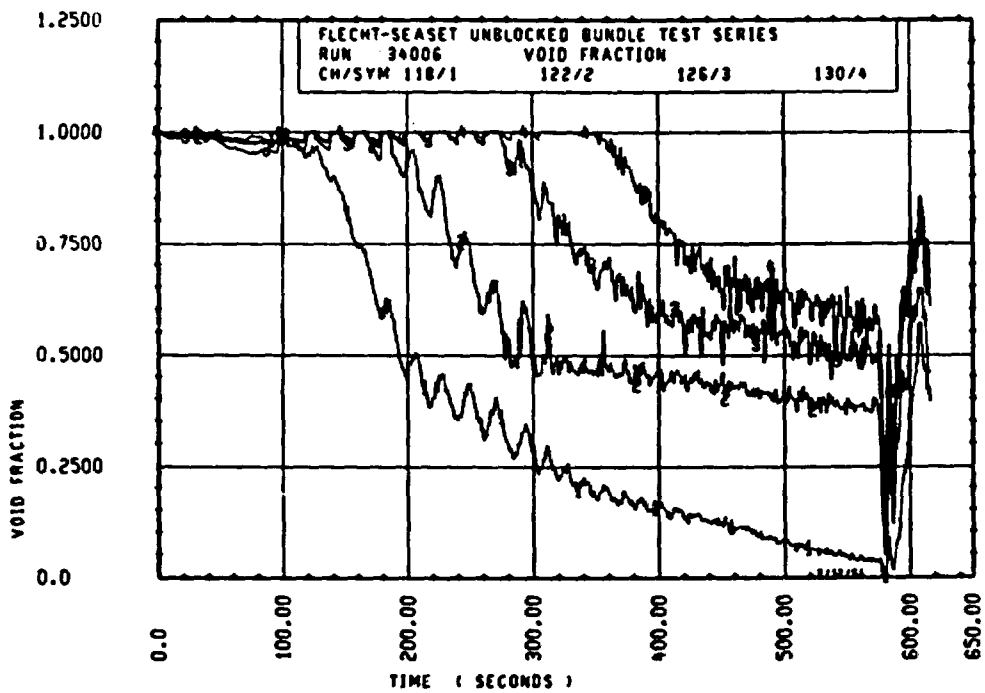

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34006
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
166.32
150.00
125.00
100.00
75.
50.000
25.000
0.0
366.68
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-5.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
623.00

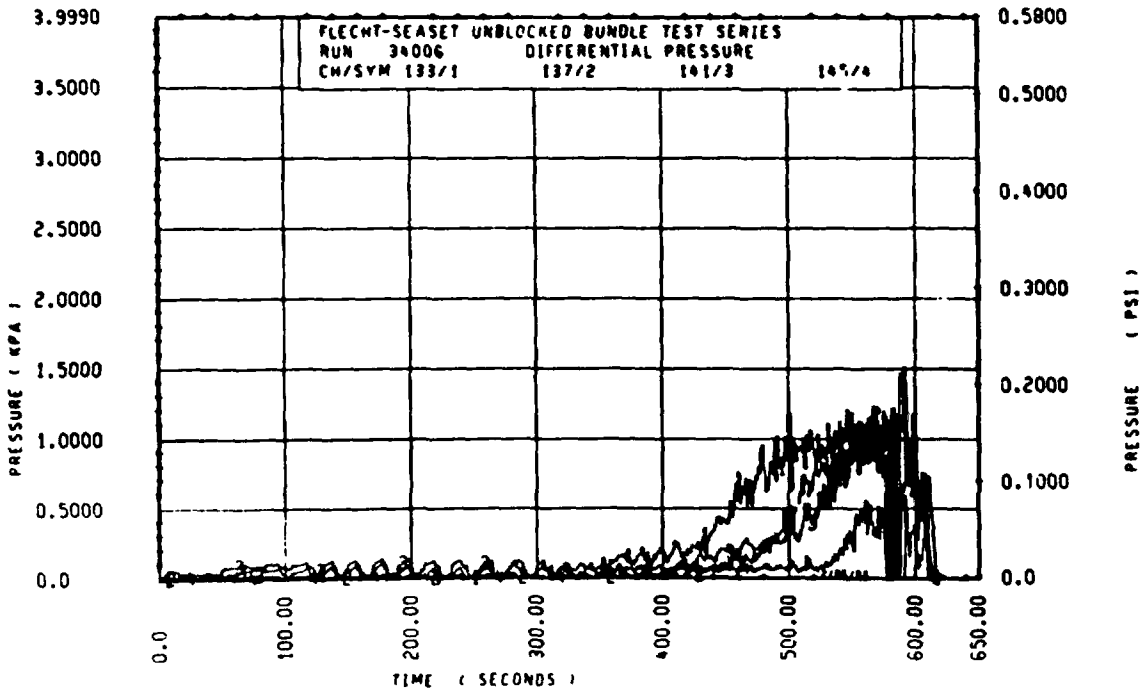

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
618.00
QUENCH TIMES (SECONDS)

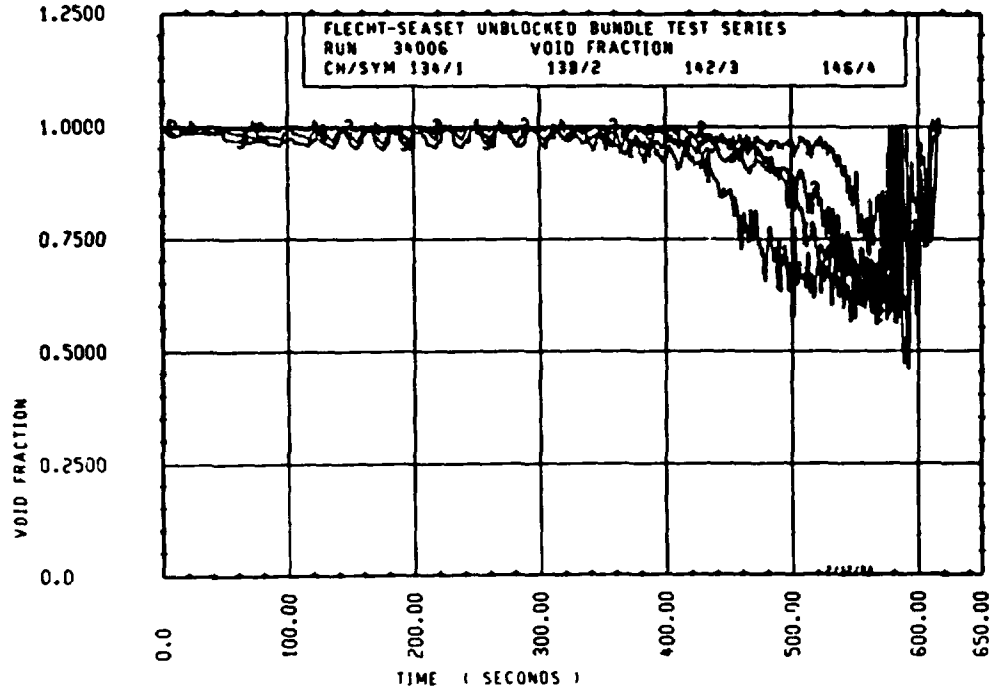

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34006 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 34103
Date: 7/31/79
Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	885°C (1626°F)
Rod peak power	2.4 kw/m (0.74 kw/ft)
Flow rate	38.1 mm/sec (1.5 in./sec)
Coolant temperature	51°C (123°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	140°C (284°F)	73°C (163°F)
1.22 m (48 in.)	186°C-196°C (366°F-385°F)	115°C (239°F)
1.83 m (72 in.)	197°C-243°C (387°F-469°F)	93°C-133°C (200°F-272°F)
2.44 m (96 in.)	211°C-232°C (412°F-451°F)	131°C-512°C (267°F-953°F)
2.74 m (108 in.)	185°C (365°F)	129°C (264°F)
3.05 m (120 in.)	137°C-163°C (279°F-325°F)	128°C (264°F)
3.35 m (132 in.)	129°C-141°C (264°F-286°F)	172°C (261°F)

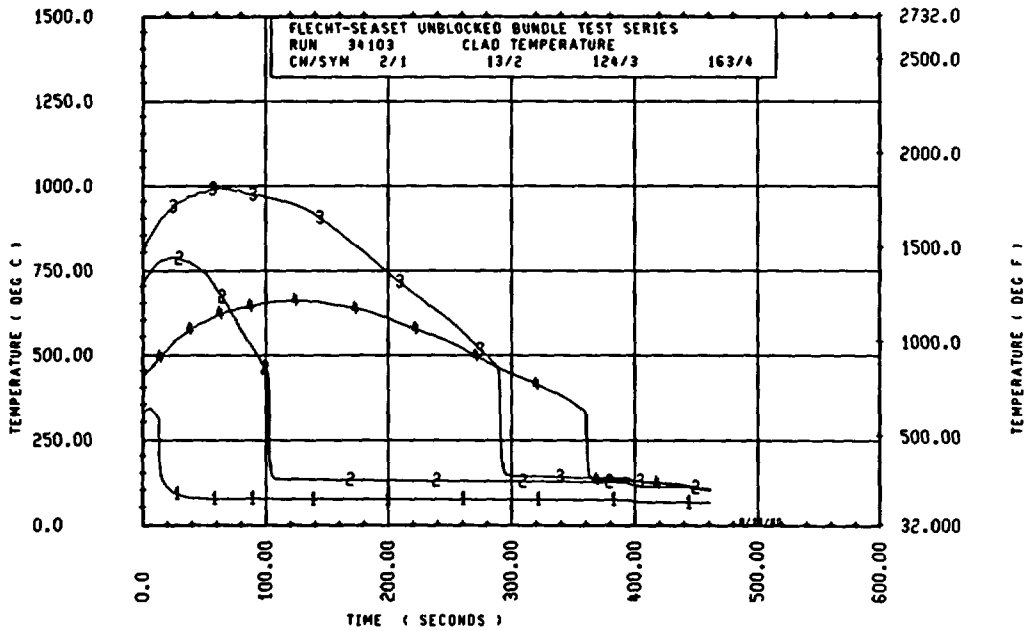
*At 144 seconds after flood

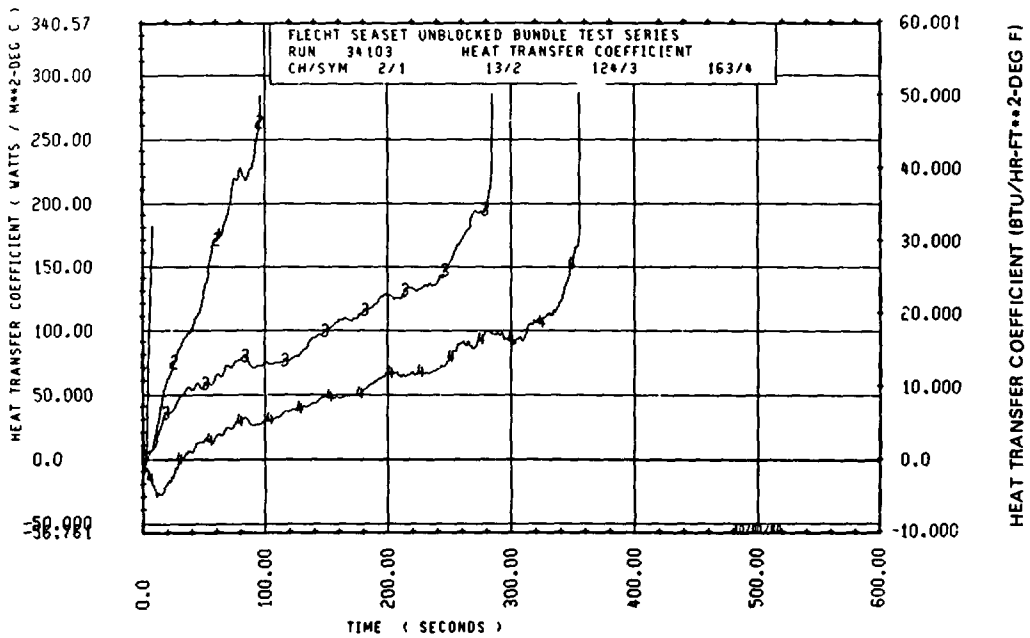
C. Comments

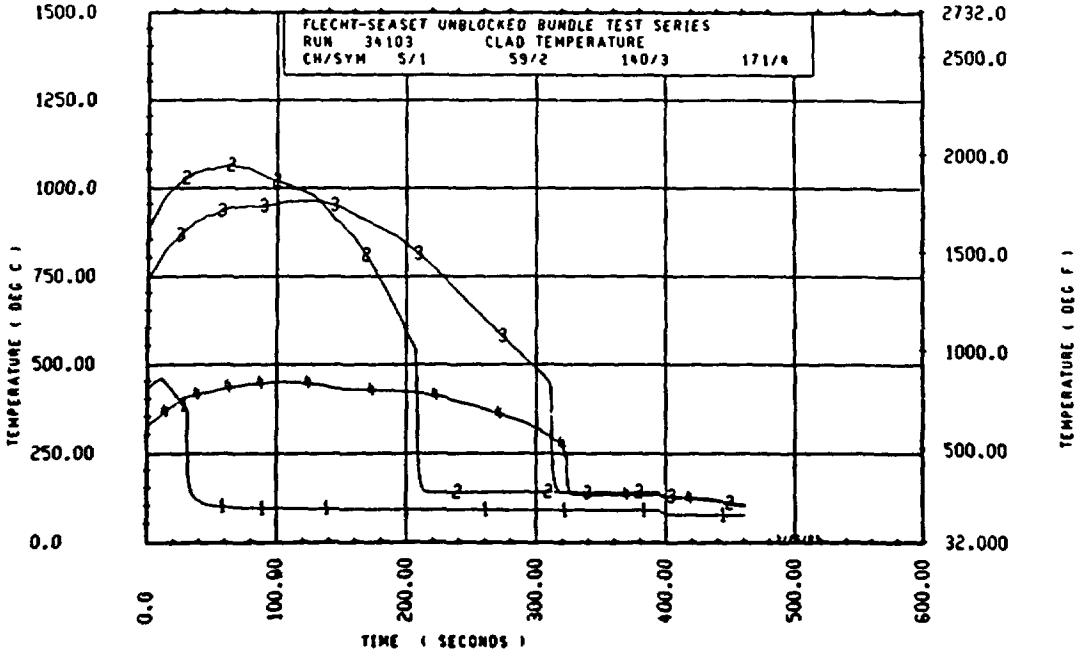
The power was increased by 5.7 percent for this test and all subsequent tests to compensate for the eight additional disconnected rods.

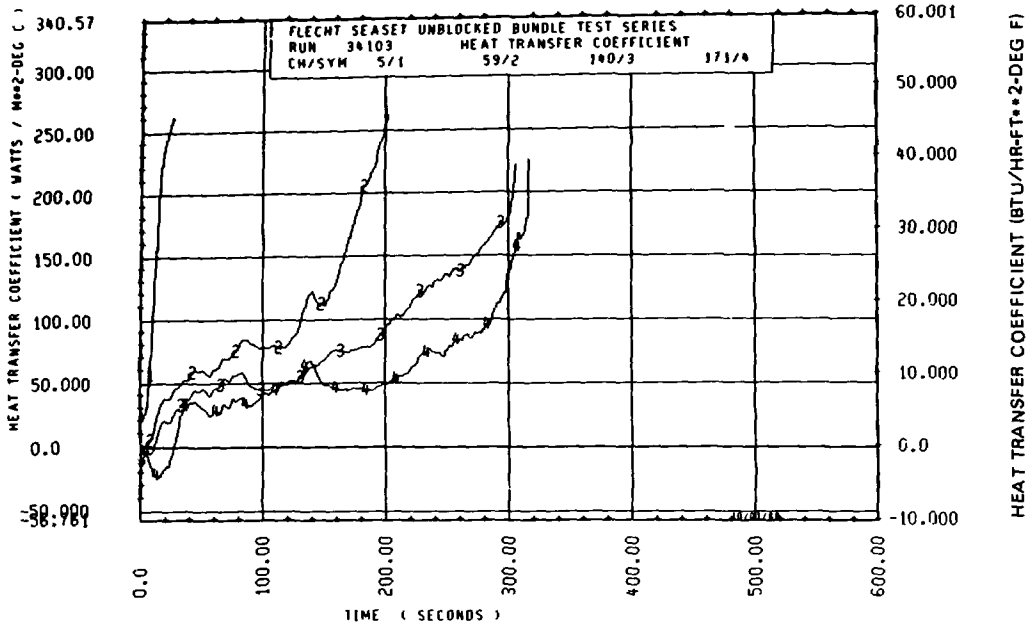
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 34103

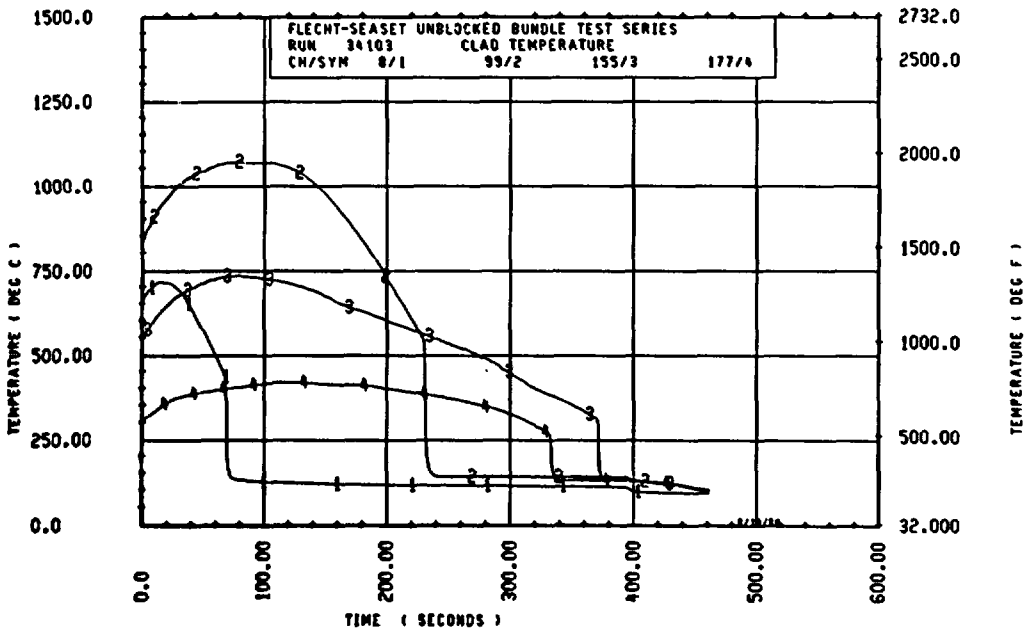
ROW/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1272.	1416.	144.	27.0	832.	101.0
2H 6- 0	50	1535.	1843.	307.	55.0	960.	195.4
3C 5- 0	17	1340.	1511.	171.	34.5	859.	151.0
3C 3- 7	28	1412.	1618.	205.	46.5	840.	179.0
4L 8- 0	129	1343.	1679.	336.	54.0	816.	296.9
4L 8- 6	147	1346.	1676.	330.	54.0	823.	297.0
5E11- 0	168	633.	823.	190.	102.0	521.	321.0
5J 4- 0	12	1285.	1436.	151.	24.5	823.	103.0
5J 8- 6	146	1161.	1466.	305.	140.0	751.	306.9
5J11- 6	175	578.	778.	200.	143.0	536.	332.0
7B 6- 0	57	1470.	1733.	263.	45.5	900.	173.8
7B 8- 6	142	1121.	1339.	218.	45.5	676.	332.3
7B10- 0	162	840.	1159.	319.	94.0	598.	371.0
7B11- 6	176	640.	849.	209.	108.0	563.	331.7
7D 6- 4	84	1641.	1945.	305.	55.0	1056.	199.7
7D 7- 6	119	1497.	1771.	274.	46.0	894.	268.0
7D 9- 3	151	1032.	1361.	329.	77.0	587.	339.8
7G 5- 0	23	1535.	1717.	182.	38.0	1009.	139.7
7J 6- 0	59	1626.	1949.	322.	62.0	994.	207.6
7M 7- 6	120	1469.	1825.	356.	62.5	808.	287.0
7M 8- 0	132	1350.	1763.	413.	69.0	802.	311.0
7M 9- 3	152	1047.	1403.	356.	77.5	667.	339.0
8H 6- 0	13	1314.	1449.	135.	24.5	835.	101.9
8H10- 0	163	820.	1221.	401.	118.0	629.	360.0
8H11- 6	177	587.	790.	203.	116.0	514.	332.5
8K 4- 0	14	1292.	1441.	149.	26.0	835.	99.4
8K 6- 6	99	1542.	1961.	419.	78.5	1006.	230.0
8K 8- 0	140	1367.	1768.	401.	118.0	831.	311.0
8K10- 0	164	854.	1275.	420.	133.0	593.	371.0
8N 2- 0	5	808.	861.	53.	10.5	701.	31.0
8N 4- 0	15	1283.	1425.	142.	27.5	843.	98.7
8N 6- 0	61	1537.	1852.	315.	55.0	988.	193.0
8N10- 0	165	836.	1239.	403.	95.0	674.	357.9
9C 7- 0	109	1484.	1733.	249.	46.0	773.	255.0
9C 9- 3	153	1036.	1359.	324.	95.0	681.	341.9
9G 1- 0	2	625.	649.	24.	6.0	592.	13.0
9G 3- 3	8	1230.	1324.	94.	14.5	815.	68.6
9G11- 0	171	628.	845.	217.	110.0	375.	323.7
9I 5- 0	24	1530.	1727.	198.	37.5	972.	144.0
9E 6- 2	46	1587.	1924.	337.	62.0	841.	217.0
10D 6- 6	93	1527.	1802.	275.	79.0	831.	233.6
11E 7- 6	124	1490.	1818.	328.	62.5	851.	289.8
11E 9- 3	155	1028.	1358.	330.	78.0	590.	[illegible]
11E11- 0	172	635.	845.	210.	101.0	596.	292.0
12D 4- 0	16	1294.	1439.	144.	25.0	844.	100.0
12D 6- 0	66	1569.	1844.	275.	55.0	932.	203.8
12F 6- 6	102	1549.	1897.	348.	68.5	916.	223.0

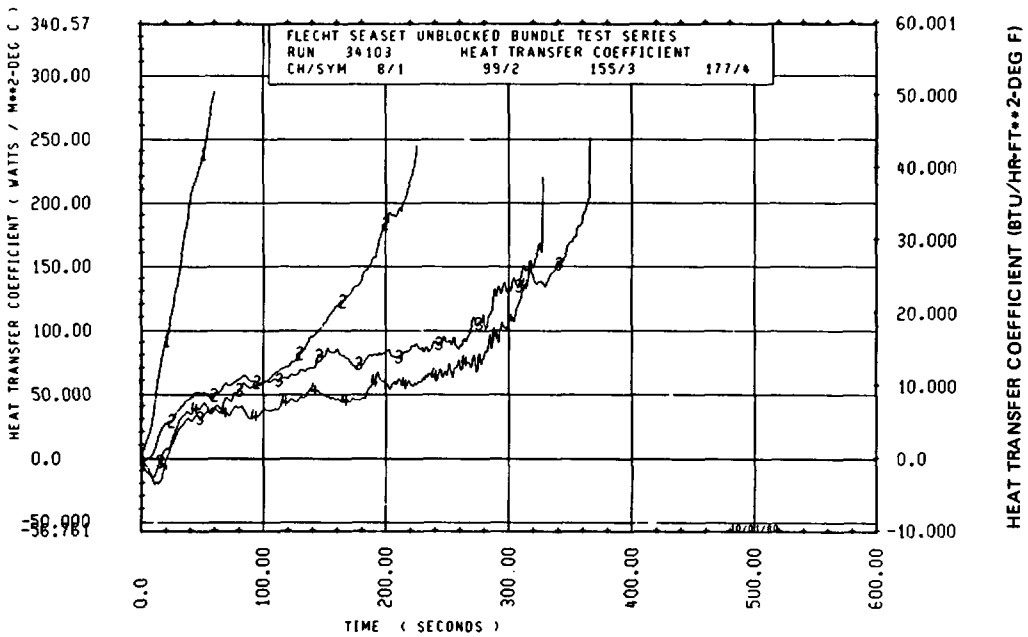

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

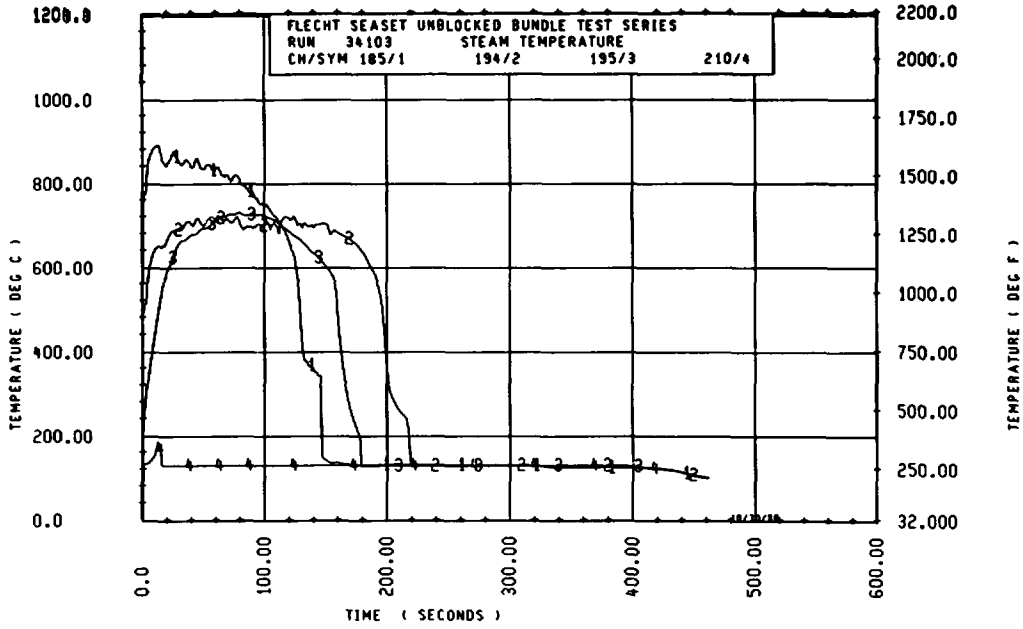

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

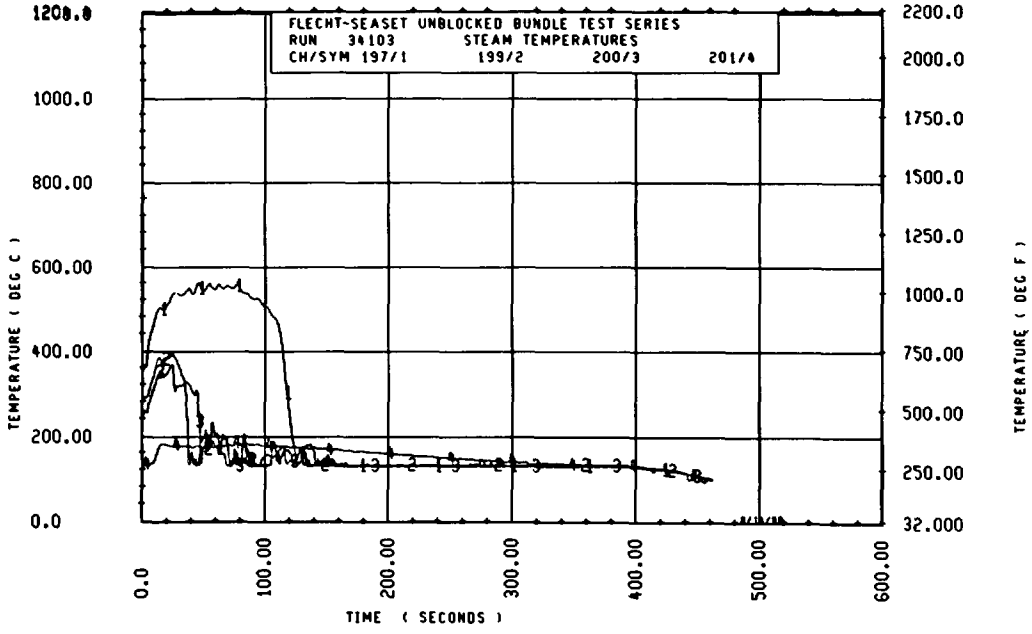

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

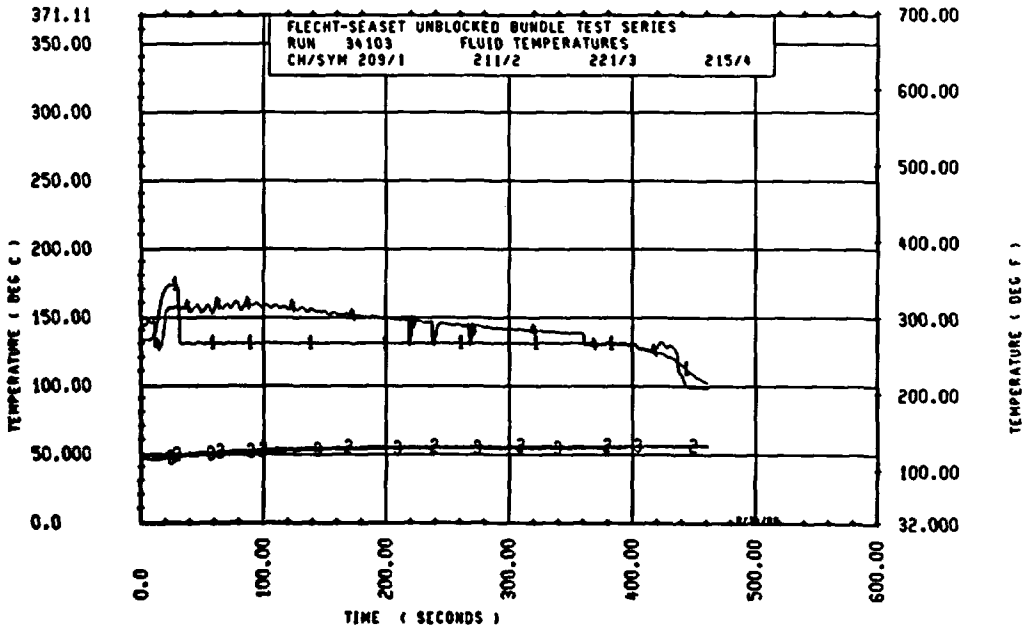

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-58.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

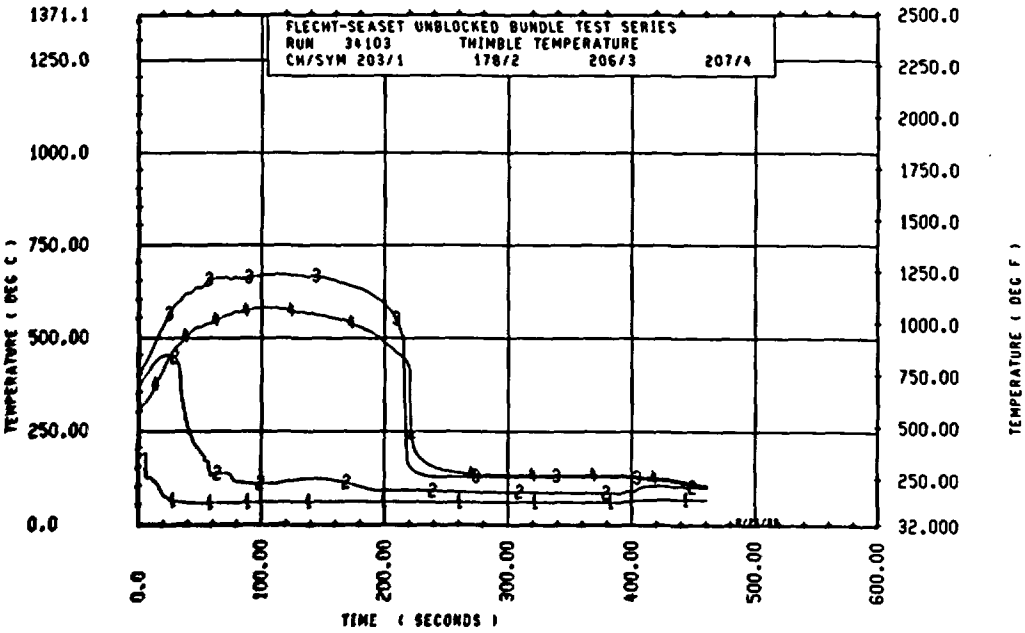

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

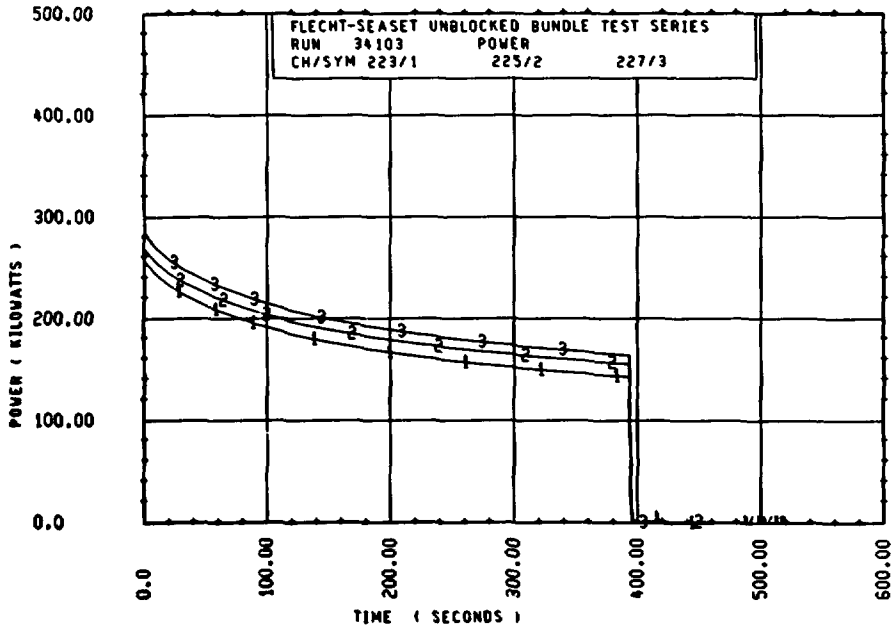

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

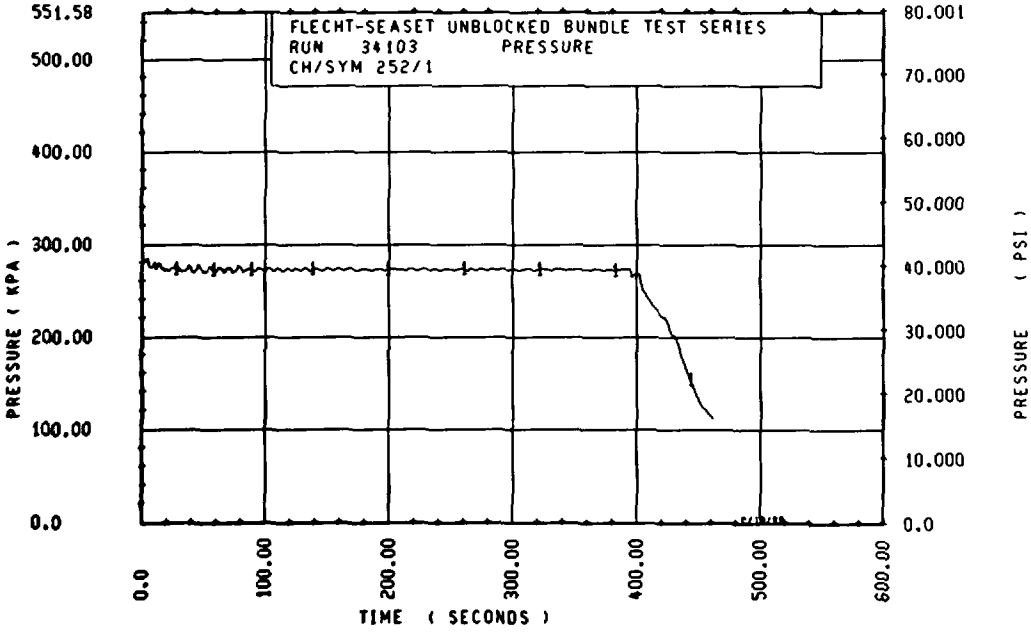

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

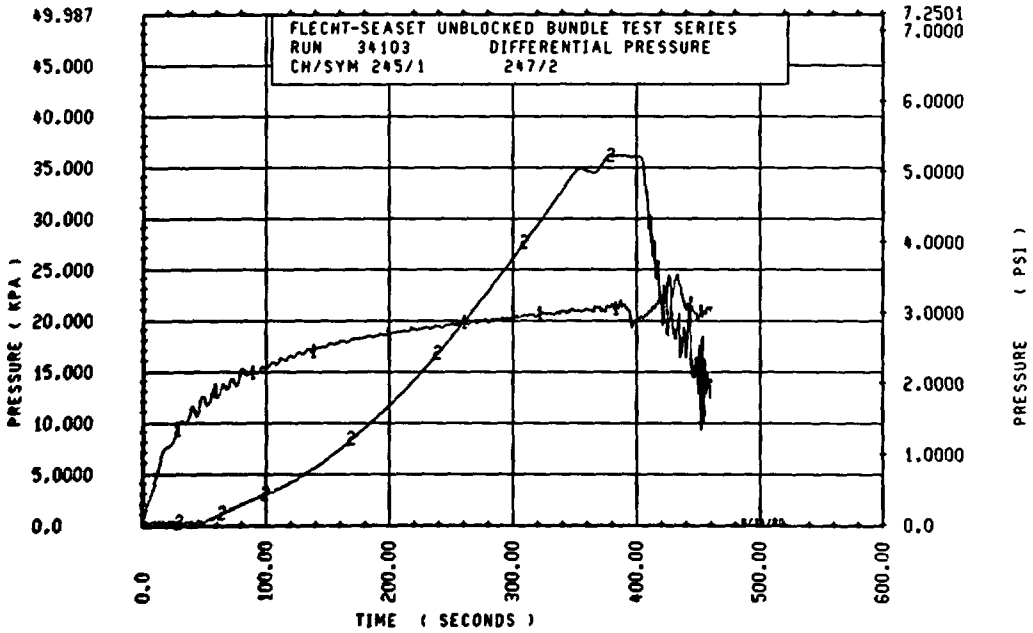


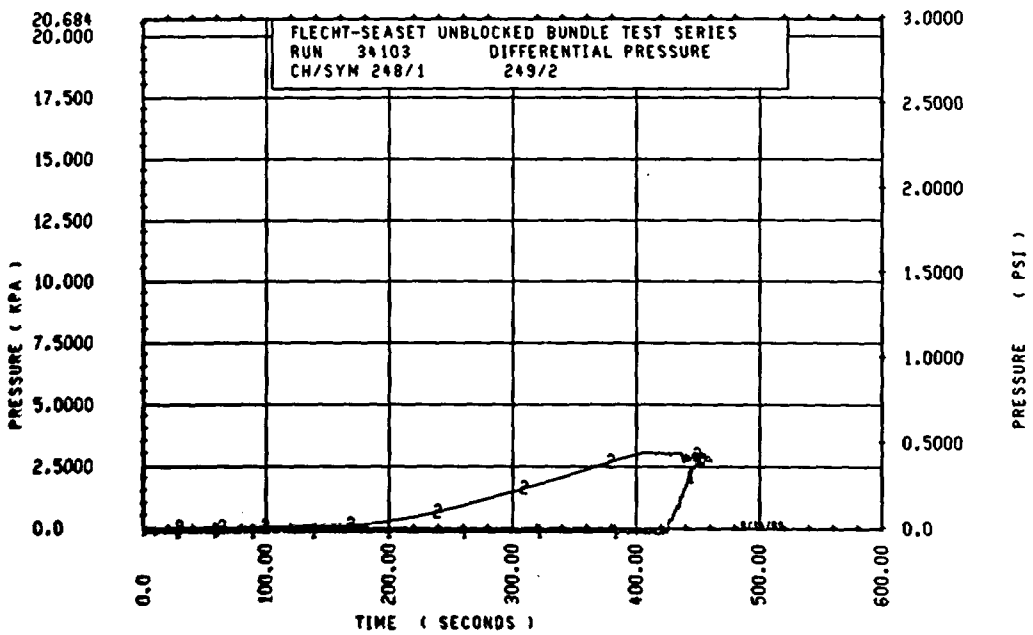


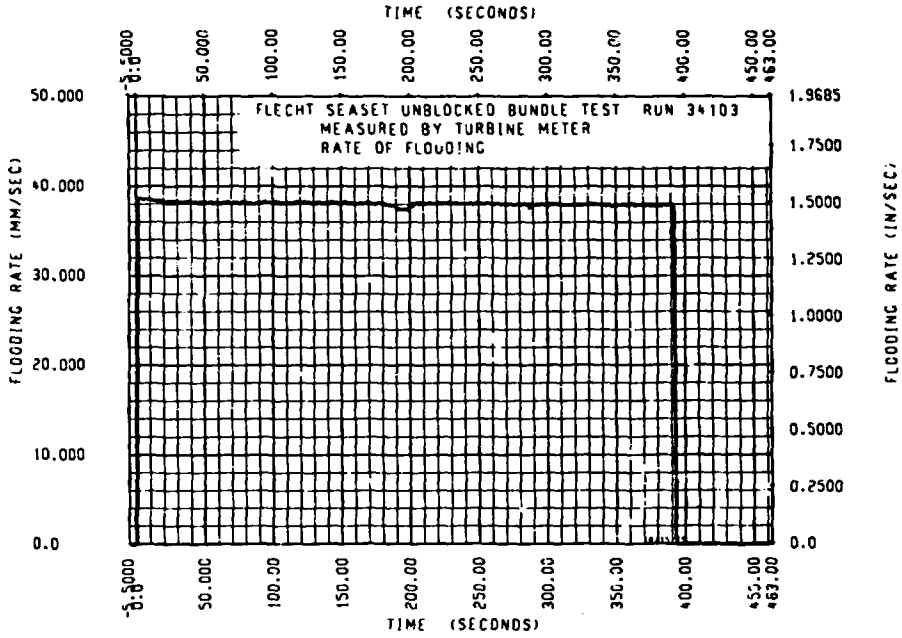
CH 203-4I,0.305 m (12 in.);CH 178-7L, 0.99 m (39 in.);
CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

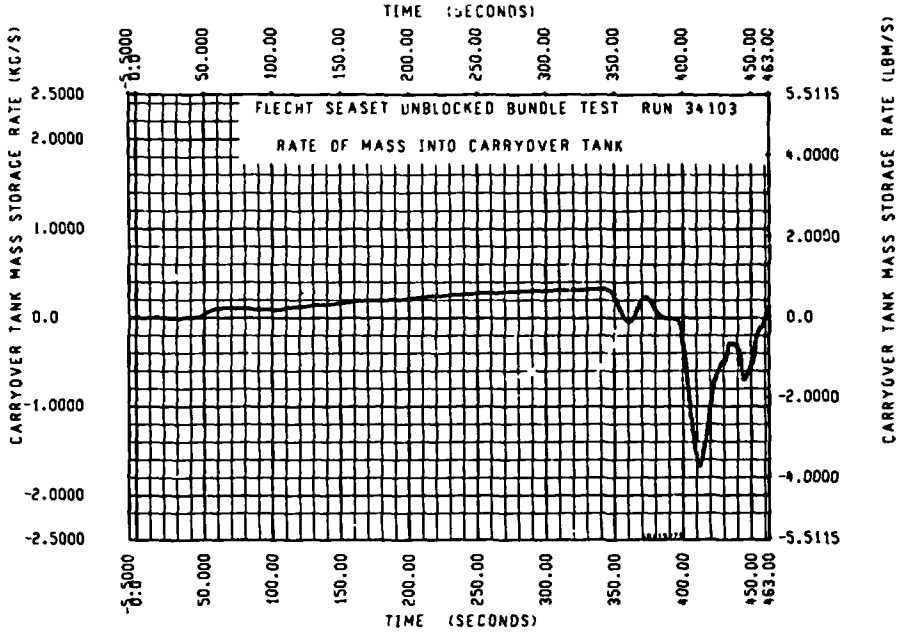

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

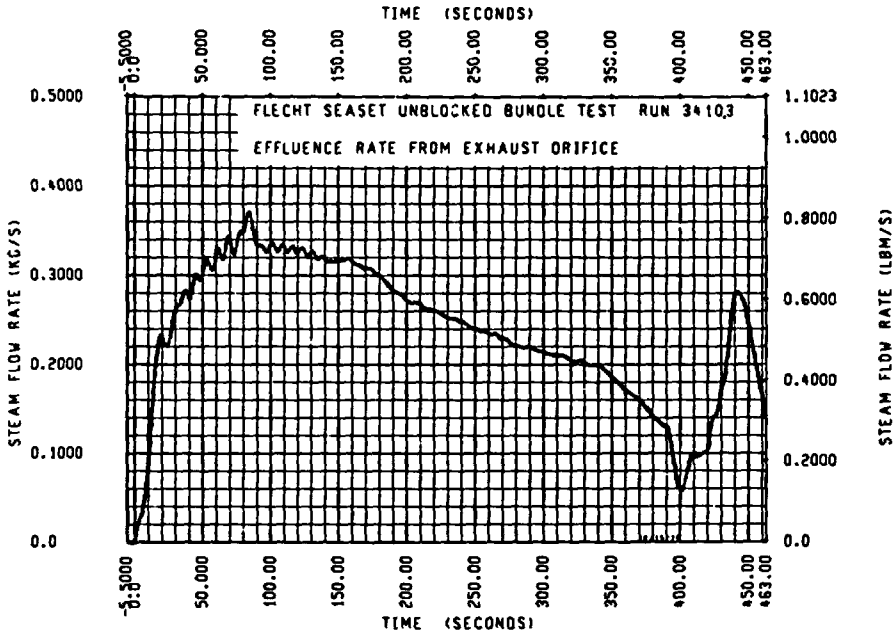

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

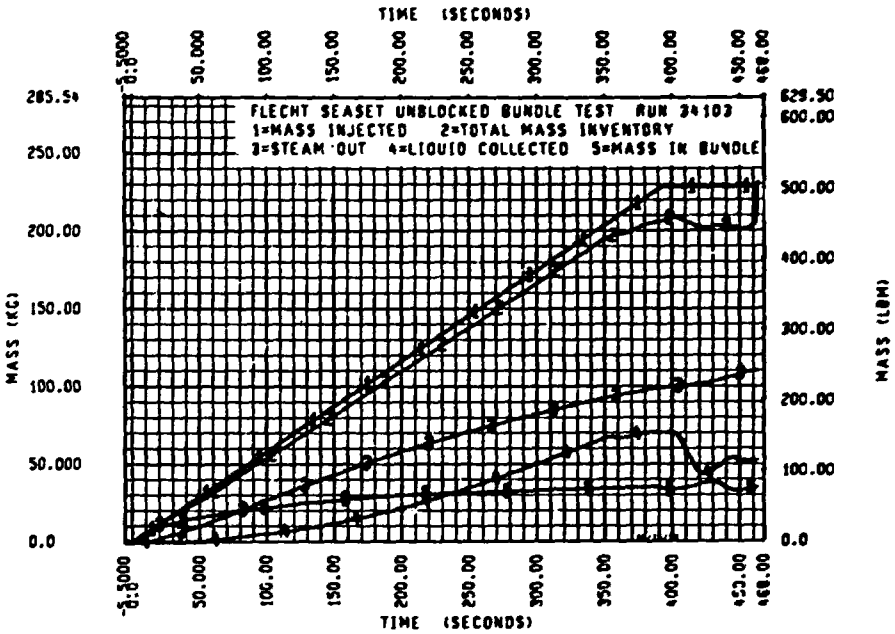

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

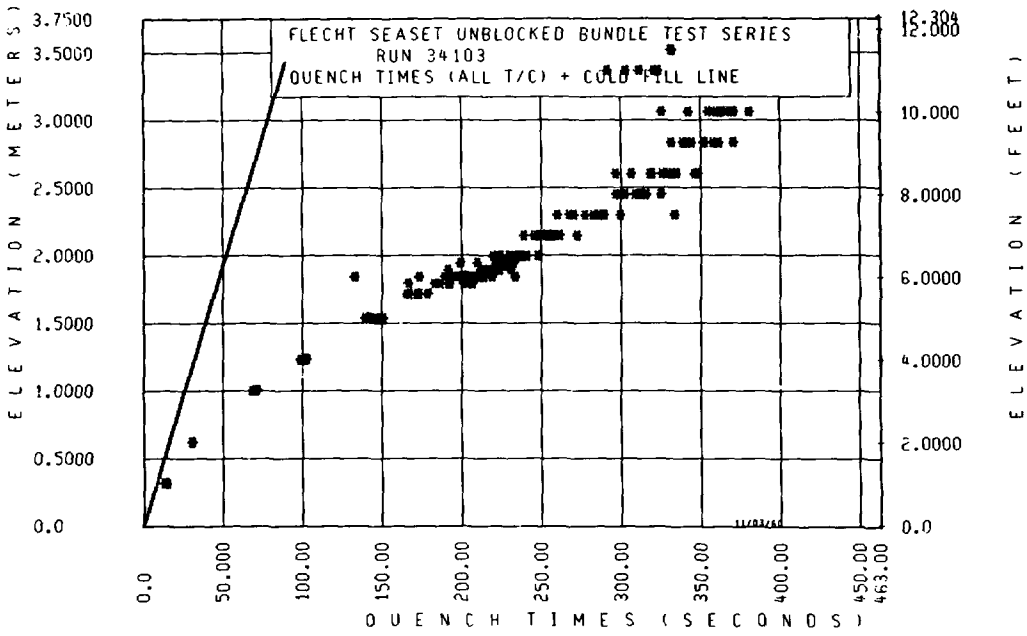

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

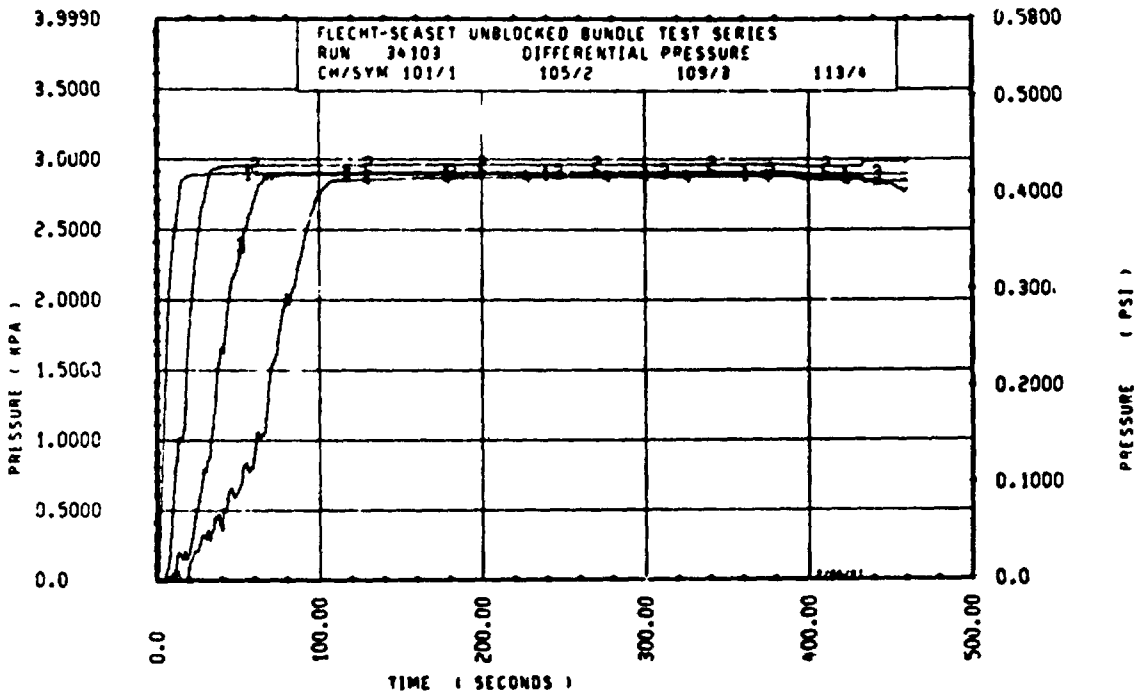

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34103
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-0.5000
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
463.00

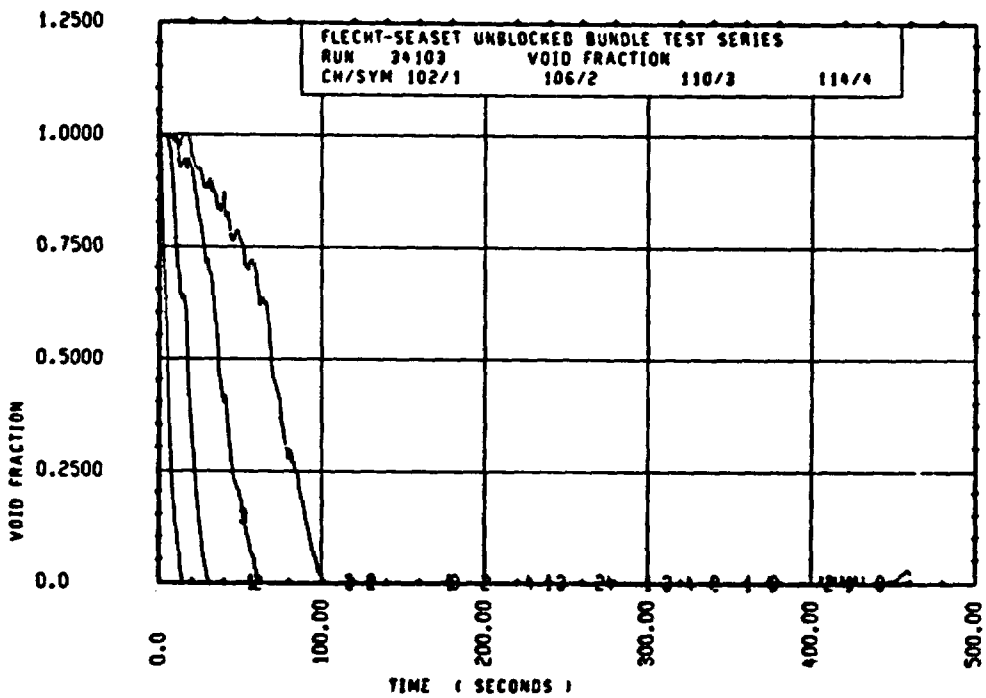

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34103
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
2.5000
2.0000
1.0000
0.0
-1.0000
-2.0000
-2.5000
5.5115
4.0000
2.0000
0.0
-2.0000
-4.0000
-5.5115
-0.5000
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
463.00

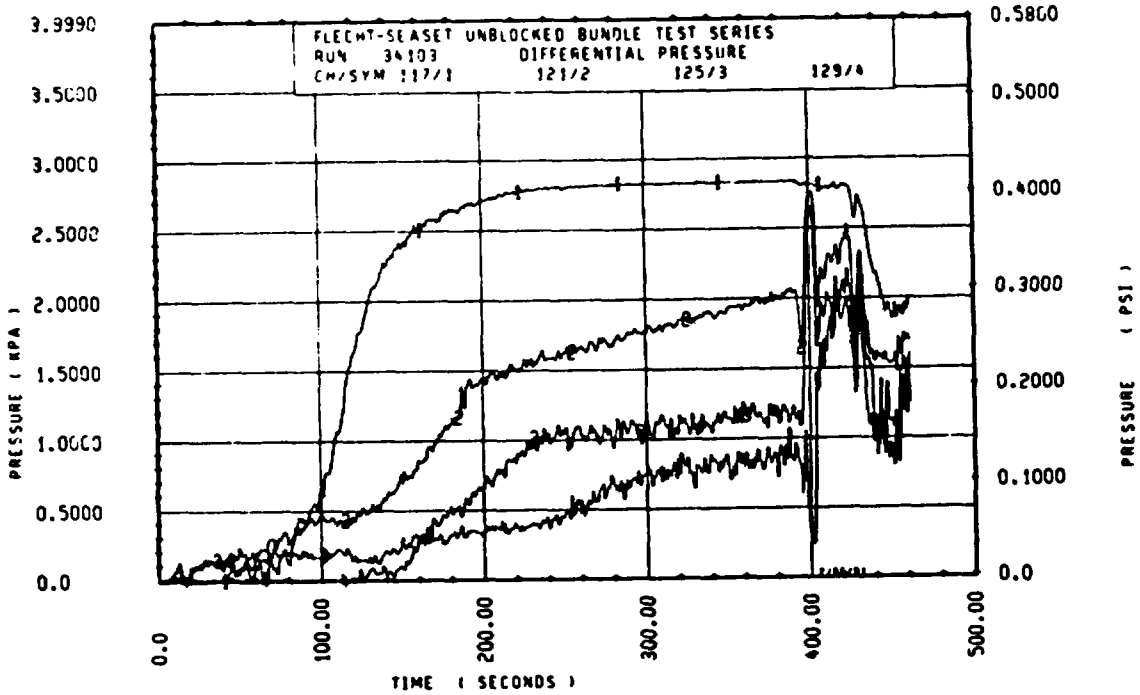

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34103
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.5000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
463.00

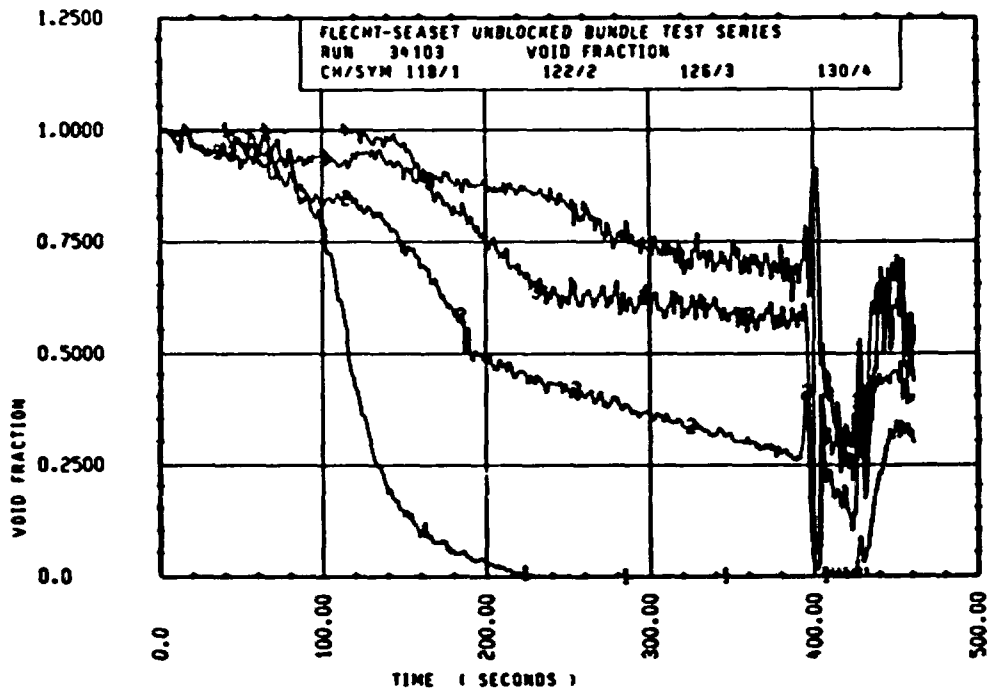

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34103
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
285.54
250.00
200.00
150.00
100.00
50.000
0.0
629.50
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-5.5000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
468.00

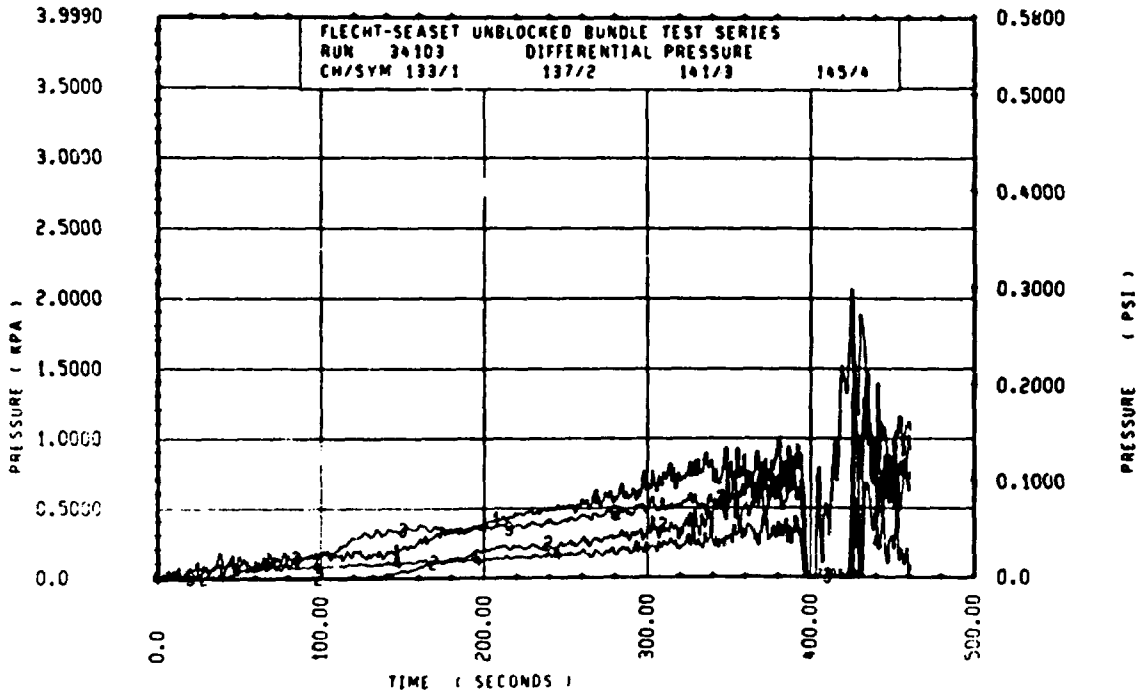

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
13.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
463.00
QUENCH TIMES (SECONDS)

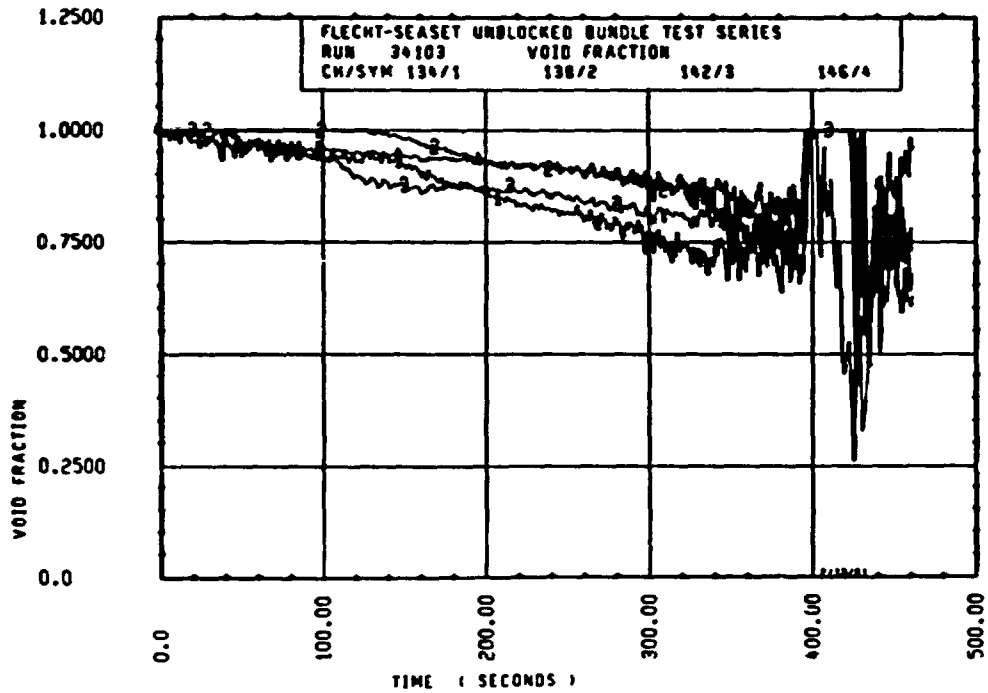

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.300
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.3990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34103 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 34209

Date: 8/1/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.14 MPa (20 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	889°C (1636°F)
Rod peak power	2.4 kw/m (0.72 kw/ft)
Flow rate	27.2 mm/sec (1.07 in./sec)
Coolant temperature	32°C (90°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	119°C (247°F)	60°C (140°F)
1.22 m (48 in.)	147°C (296°F)	110°C-114°C (230°F-238°F)
1.83 m (72 in.)	157°C-198°C (315-°F-388°F)	229°C-645°C (445°F-1193°F)
2.44 m (96 in.)	148°C-186°C (299°F-367°F)	109°C-569°C (228°F-1056°F)
2.74 m (108 in.)	143°C (290°F)	108°C (227°F)
3.05 m (120 in.)	111°C-127°C (232°F-261°F)	107°C (224°F)
3.35 m (132 in.)	109°C-114°C (228°F-237°F)	106°C (223°F)

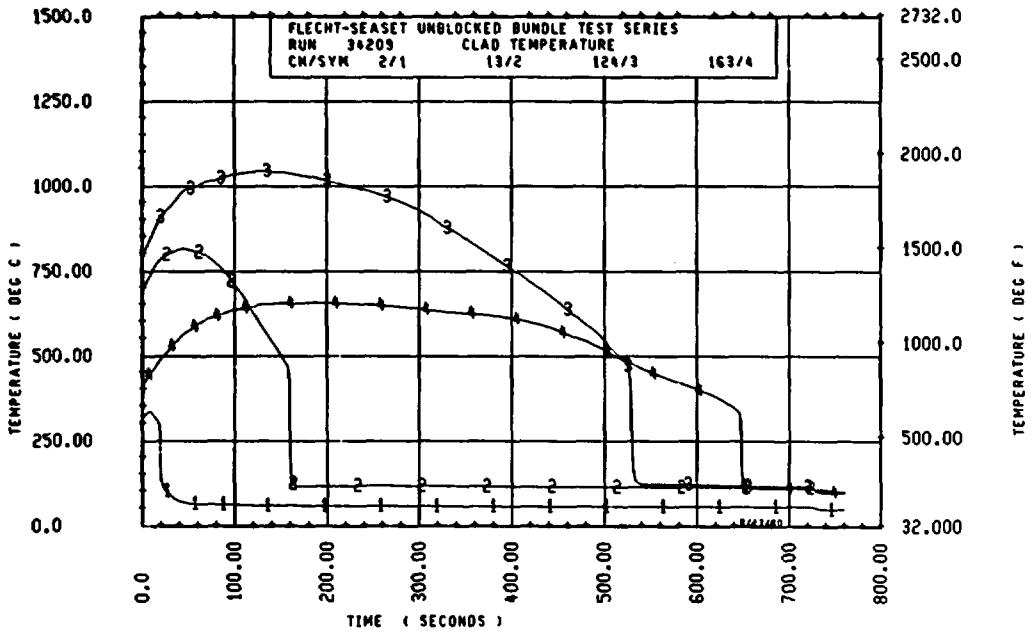
*At 165 seconds after flood

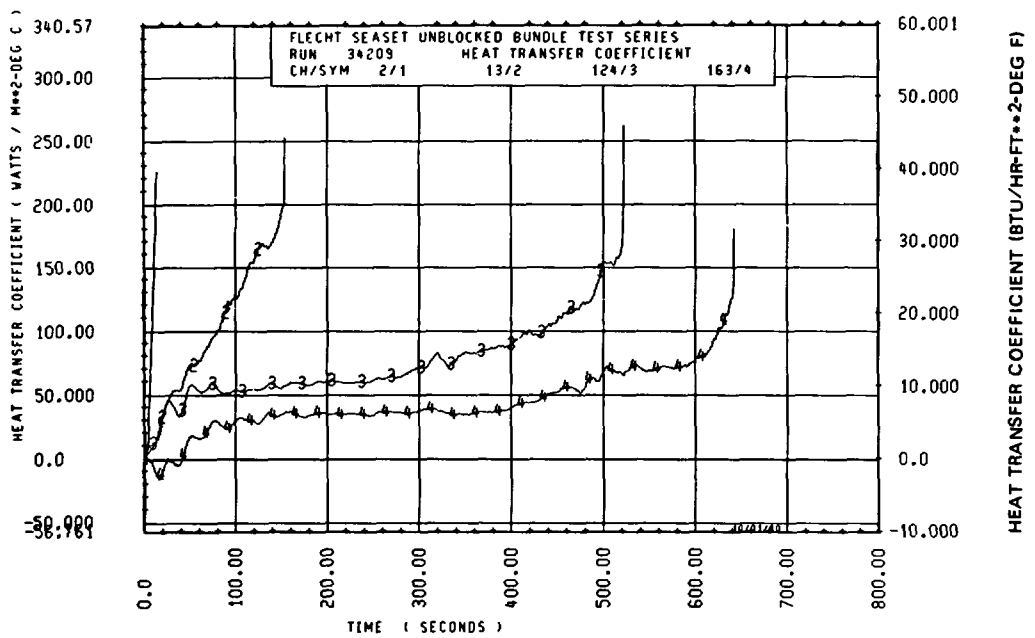
C. Comments

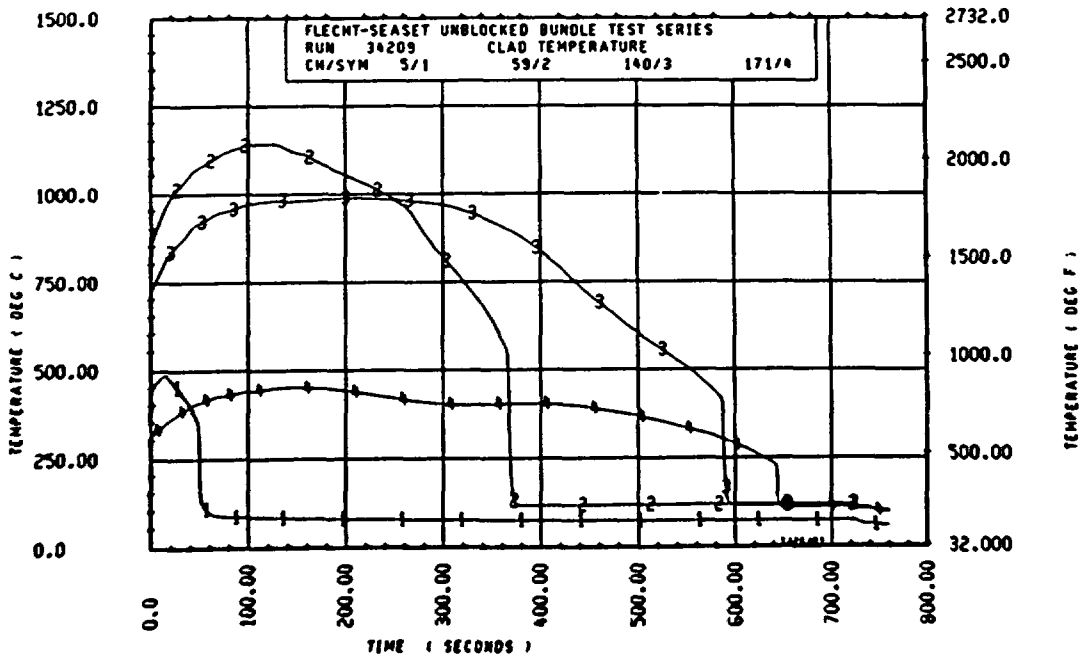
Inside power zone was approximately 5 percent lower than specified.

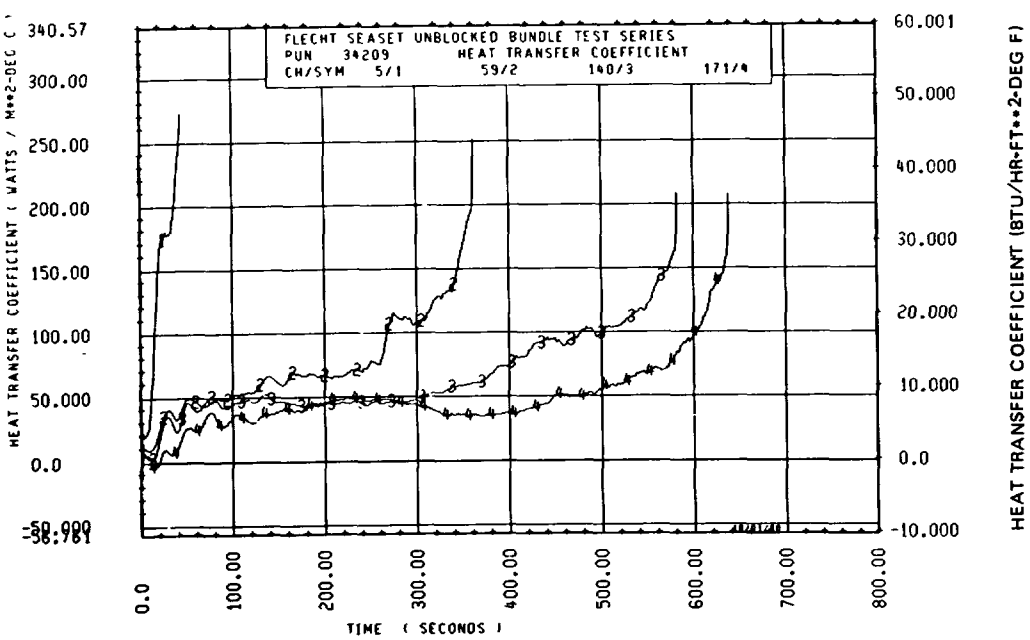
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 34209

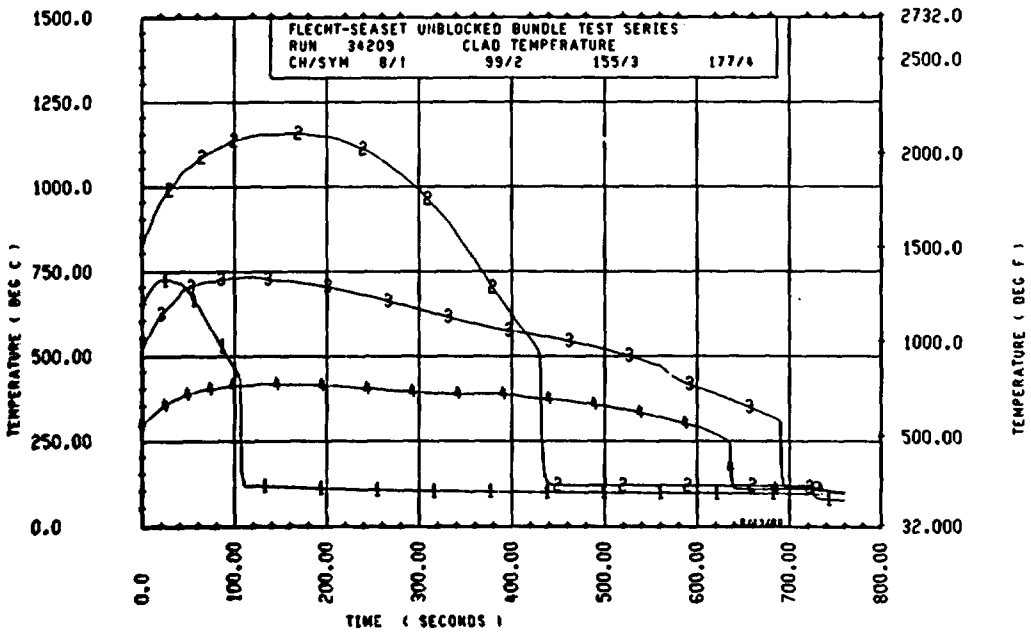
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2N 4- 0	10	1294.	1498.	203.	43.5	785.	169.7
2N 6- 0	50	1583.	1991.	408.	93.5	898.	357.7
3C 5- 0	17	1376.	1625.	249.	65.0	793.	262.8
3C 5- 7	28	1465.	1724.	259.	69.0	801.	315.7
4L 8- 0	129	1357.	1734.	377.	80.0	800.	557.8
4L 8- 6	147	1359.	1730.	370.	73.0	776.	558.4
5E11- 0	168	611.	805.	194.	89.0	457.	650.0
5J 4- 0	12	1235.	1475.	241.	44.5	780.	166.1
5J 8- 6	146	1110.	1408.	298.	47.5	676.	582.0
5J11- 6	175	575.	755.	179.	105.0	543.	624.0
7B 4- 0	57	1503.	1856.	353.	74.5	955.	293.8
7B 8- 6	142	1122.	1402.	280.	70.5	655.	618.1
7B10- 0	162	835.	1280.	445.	157.0	559.	701.3
7B11- 6	176	634.	930.	295.	161.0	467.	659.9
7D 6- 4	84	1618.	2071.	453.	125.0	956.	364.5
7D 7- 6	119	1479.	1825.	346.	74.5	850.	499.7
7D 9- 3	151	996.	1408.	411.	128.0	636.	631.0
7G 5- 0	23	1494.	1794.	300.	69.5	990.	231.8
7J 6- 0	59	1583.	2088.	505.	111.0	988.	366.6
7M 7- 6	120	1501.	1910.	409.	97.0	783.	551.2
7M 8- 0	132	1365.	1858.	493.	105.0	768.	592.9
7M 9- 3	152	1032.	1432.	400.	108.0	615.	646.0
8H 4- 0	13	1283.	1501.	218.	43.5	861.	158.9
8H10- 0	163	782.	1214.	432.	182.0	621.	646.9
8H11- 6	177	569.	785.	216.	131.0	480.	635.0
8K 4- 0	14	1259.	1492.	233.	42.5	816.	160.0
8K 6- 6	99	1517.	2114.	597.	163.0	922.	430.4
8K 8- 0	140	1336.	1812.	476.	197.0	770.	586.8
8K10- 0	164	814.	1248.	434.	297.0	555.	686.8
8N 2- 0	5	839.	909.	70.	13.5	657.	49.6
8N 4- 0	15	1304.	1545.	241.	44.5	863.	161.0
8N 6- 0	61	1581.	2005.	424.	97.0	1169.	326.7
8N10- 0	165	827.	1299.	472.	159.0	702.	647.0
9C 7- 0	109	1509.	1800.	290.	46.0	759.	470.2
9C 9- 3	153	1035.	1395.	360.	121.0	680.	640.0
9G 1- 0	2	607.	638.	31.	8.0	564.	19.0
9G 3- 3	8	1210.	1339.	130.	28.5	805.	106.5
9G11- 0	171	600.	847.	247.	142.0	438.	642.9
9I 5- 0	24	1495.	1807.	311.	71.0	921.	241.4
9E 6- 2	46	1542.	2038.	496.	117.0	908.	364.8
10D 6- 6	93	1524.	1956.	432.	153.0	875.	418.8
11E 7- 6	124	1453.	1912.	459.	128.0	797.	527.7
11E 9- 3	155	979.	1354.	375.	113.0	585.	690.0
11E11- 0	172	603.	846.	243.	154.0	574.	588.9
12D 4- 0	16	1315.	1530.	215.	42.5	816.	163.6
12D 6- 0	66	1600.	2005.	405.	111.0	956.	355.7
12F 6- 6	102	1552.	2092.	540.	126.0	881.	416.2

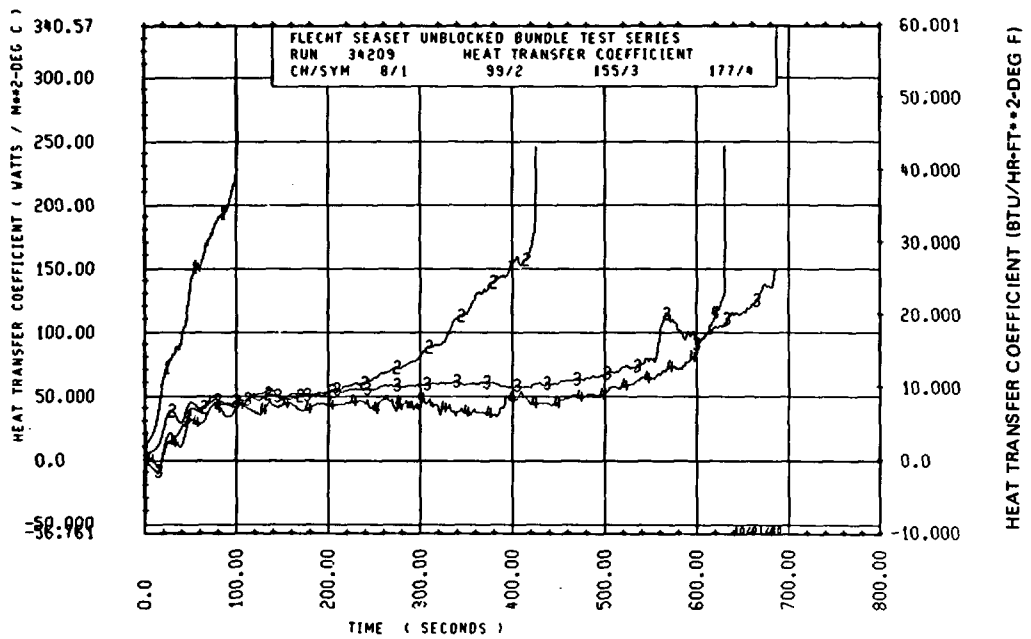

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

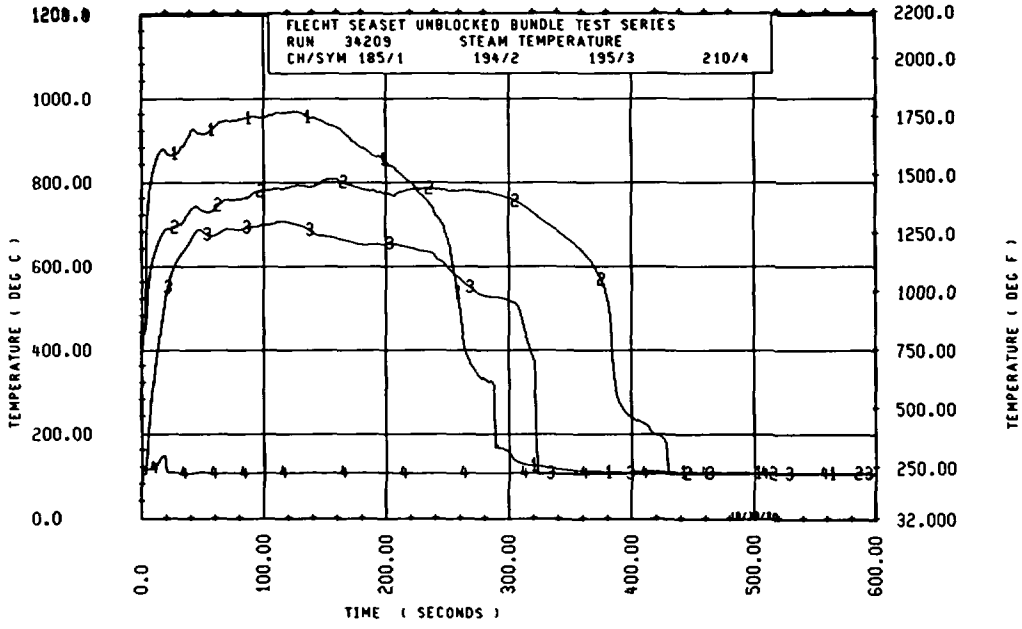

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

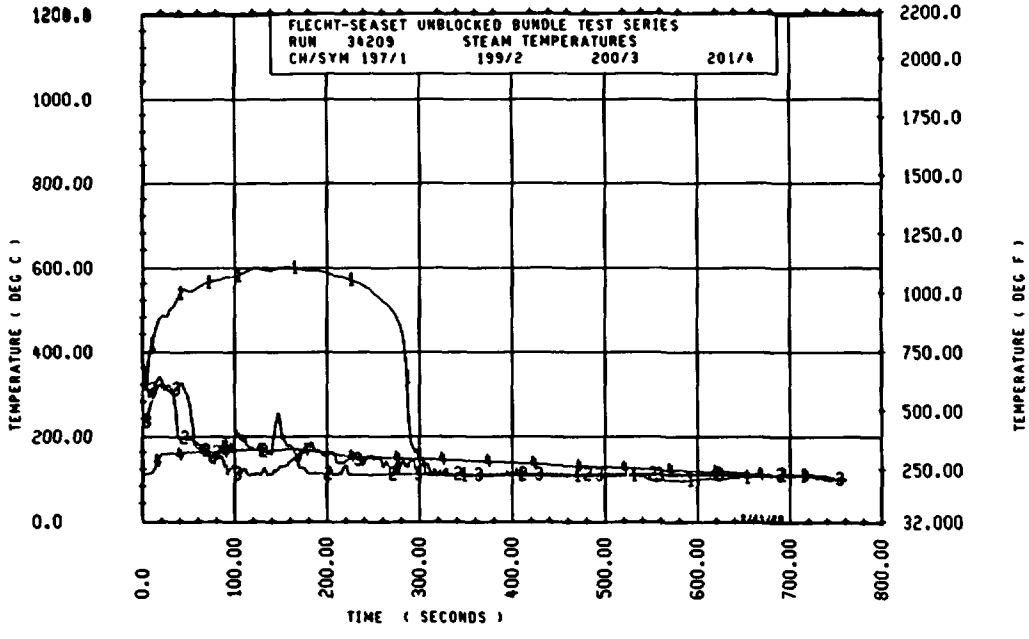

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

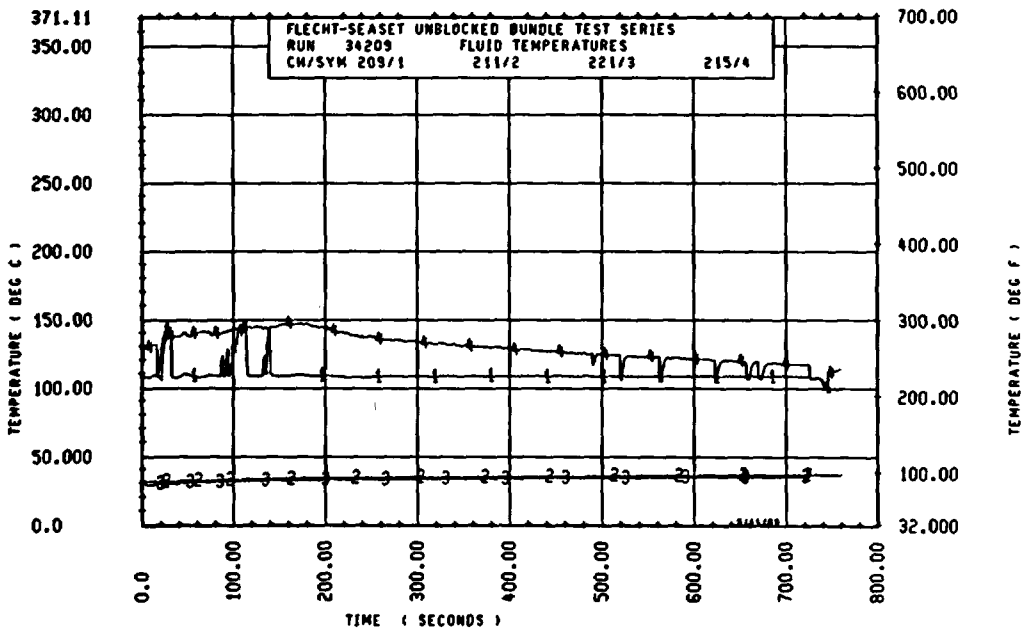

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

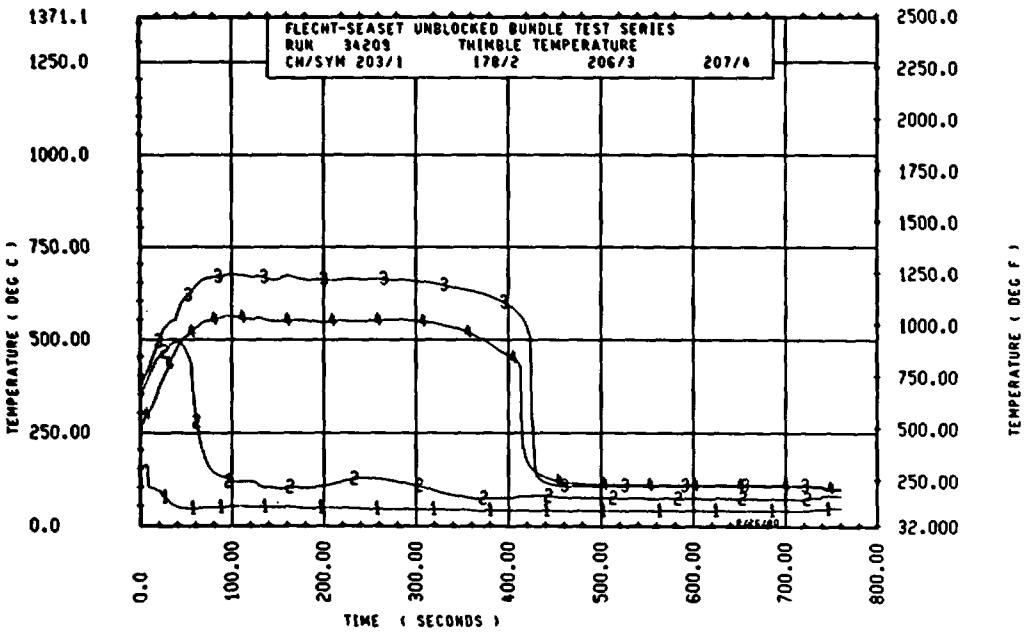

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

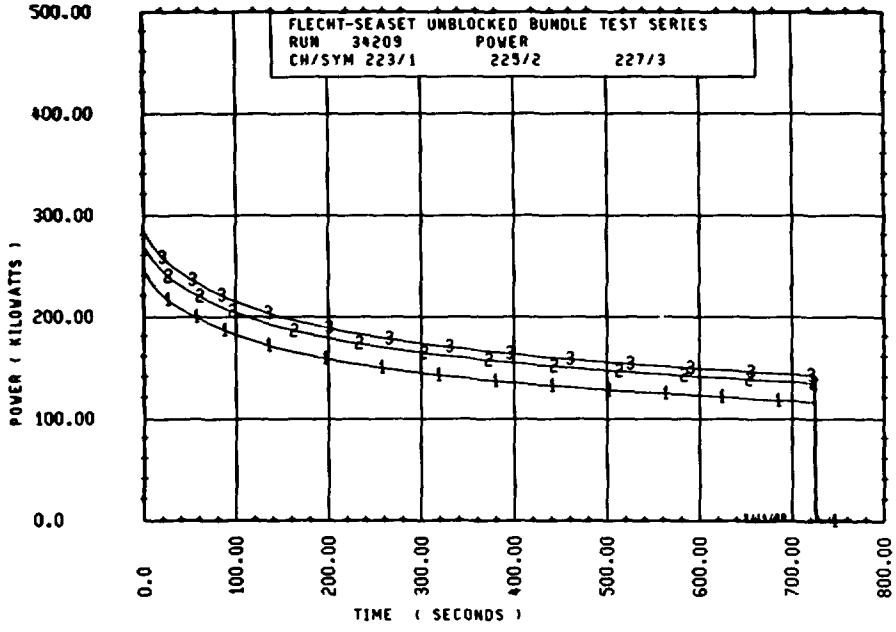

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

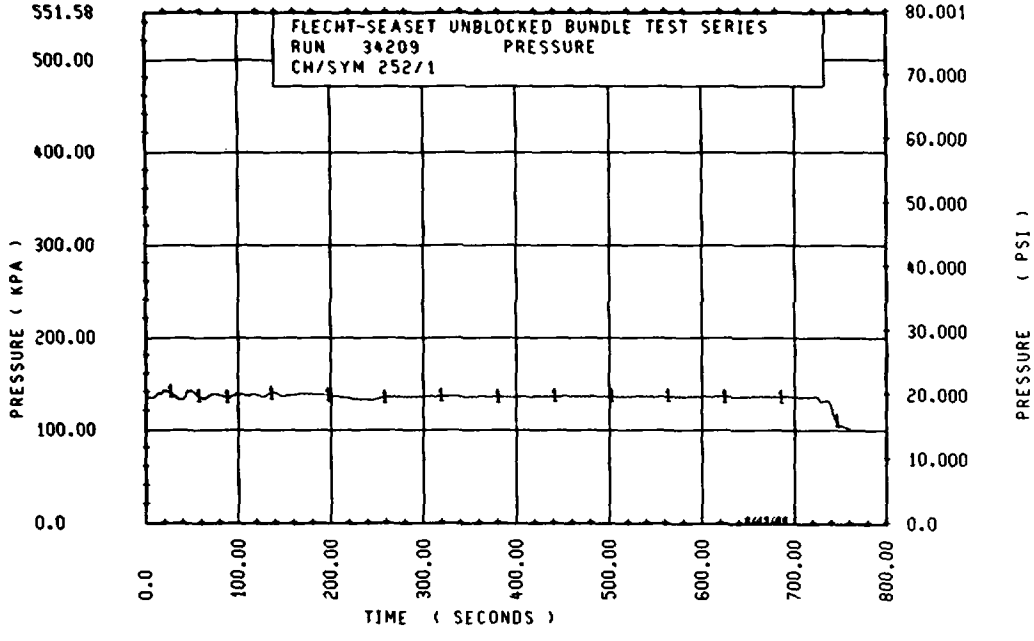

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

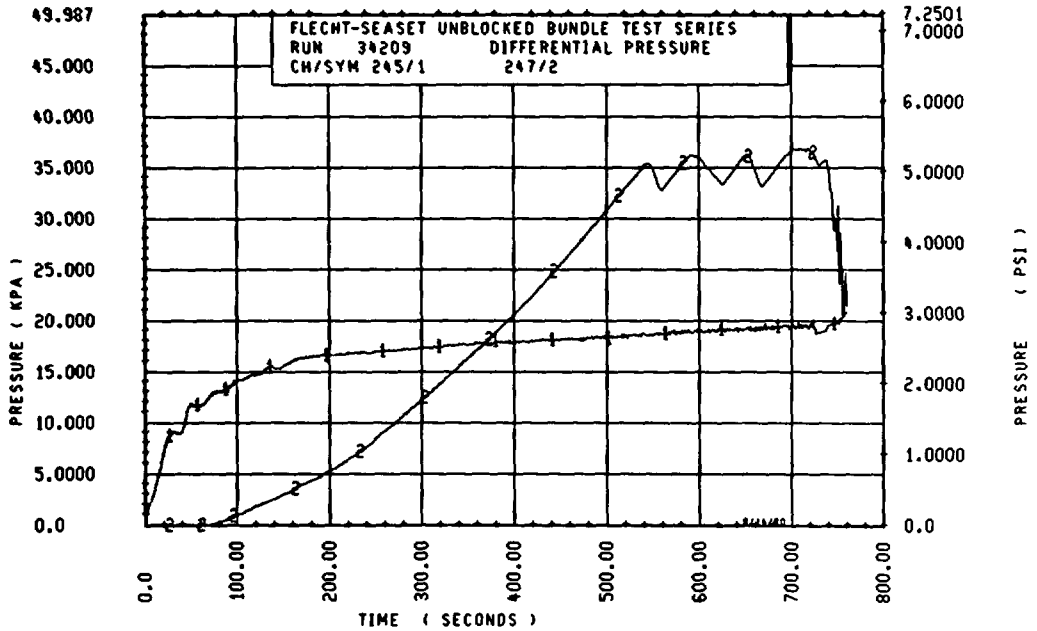


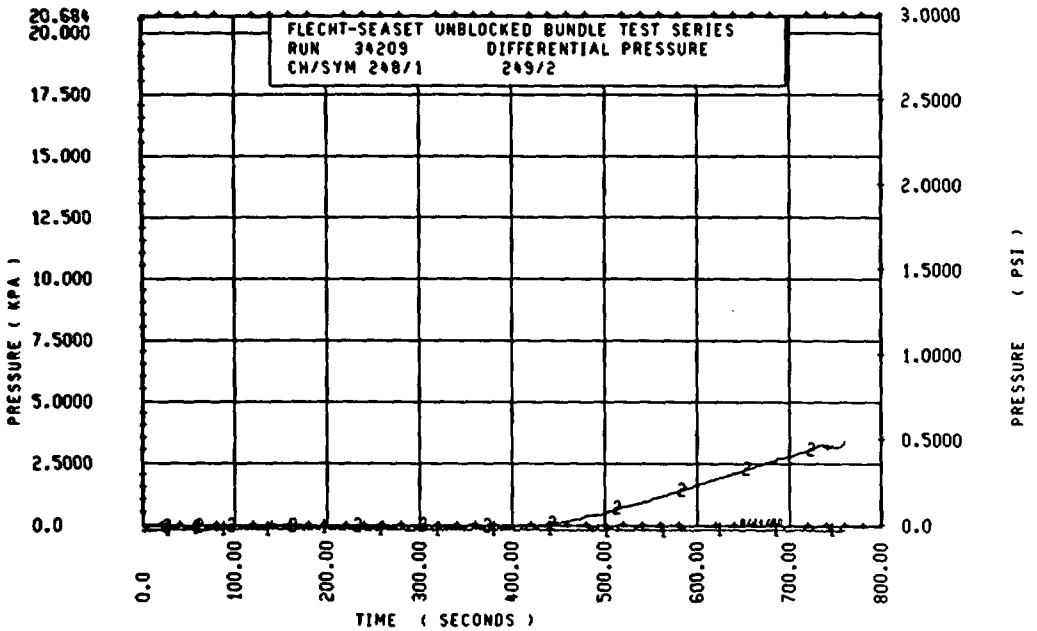


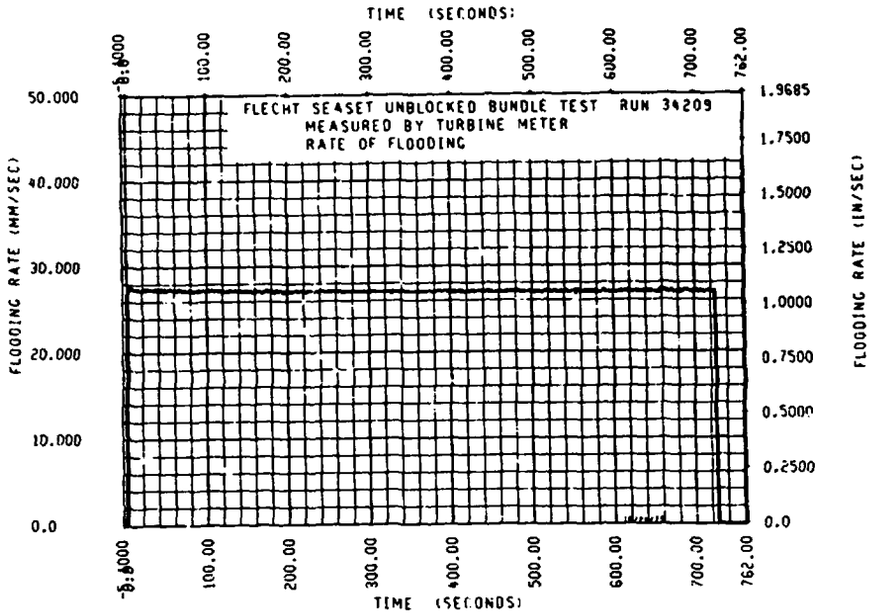
CH 203-4I,0.305 m (12 in.);CH 178-7L, 0.99 m (39 in.);
CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

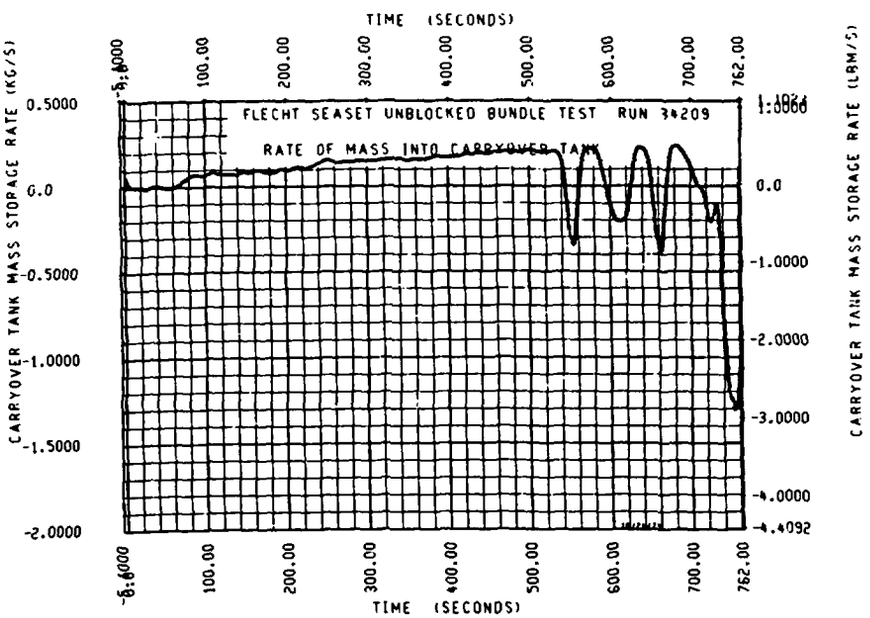

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

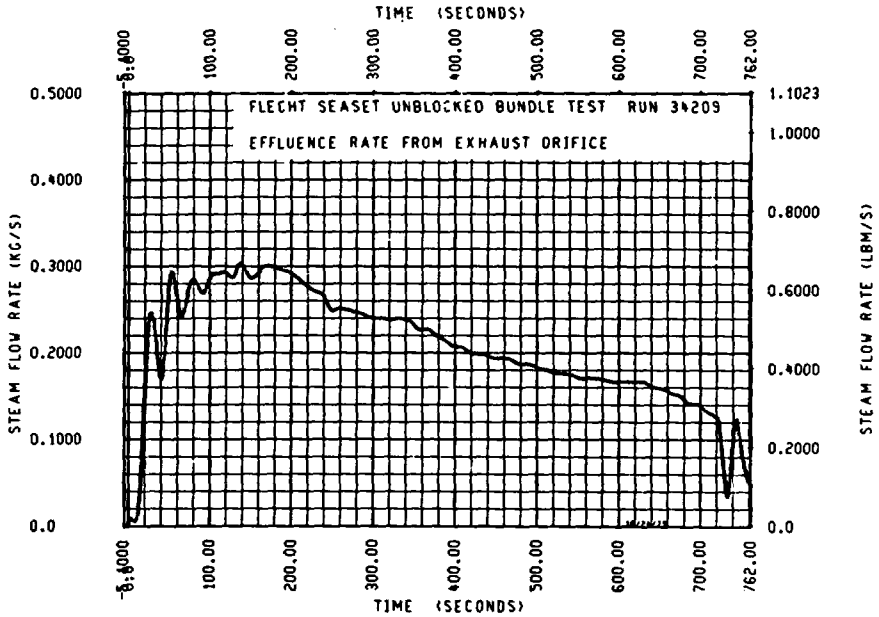

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

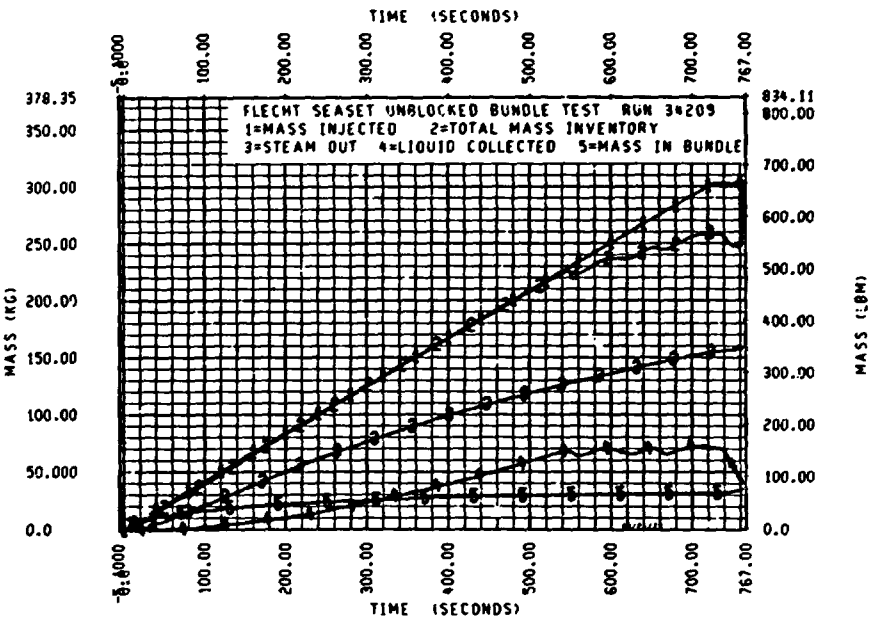

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

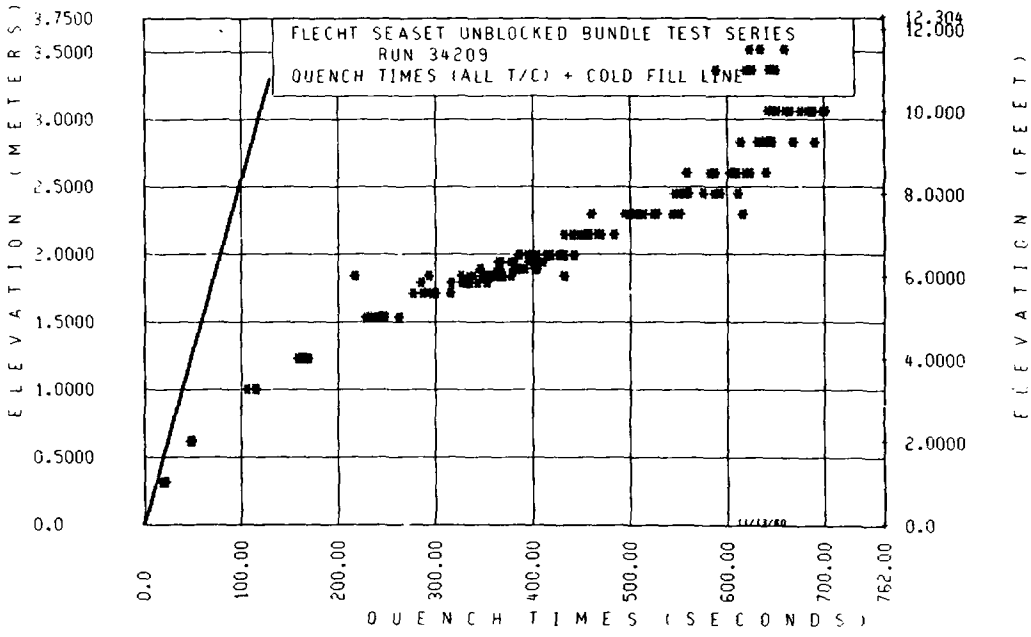

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

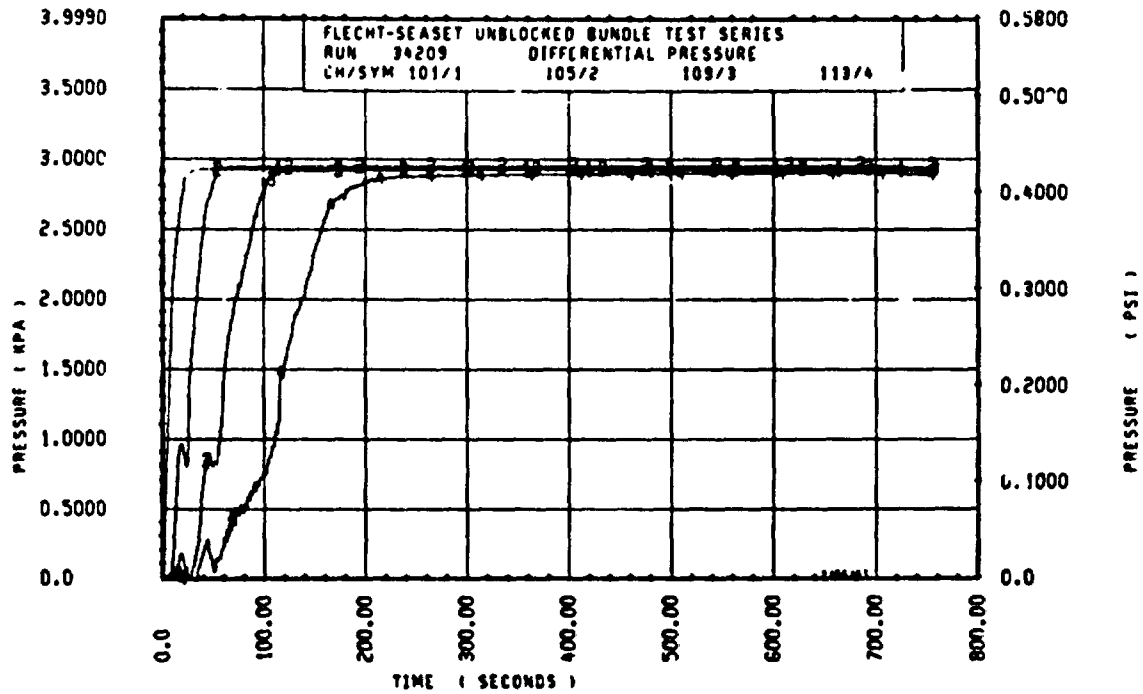

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34209
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
762.00

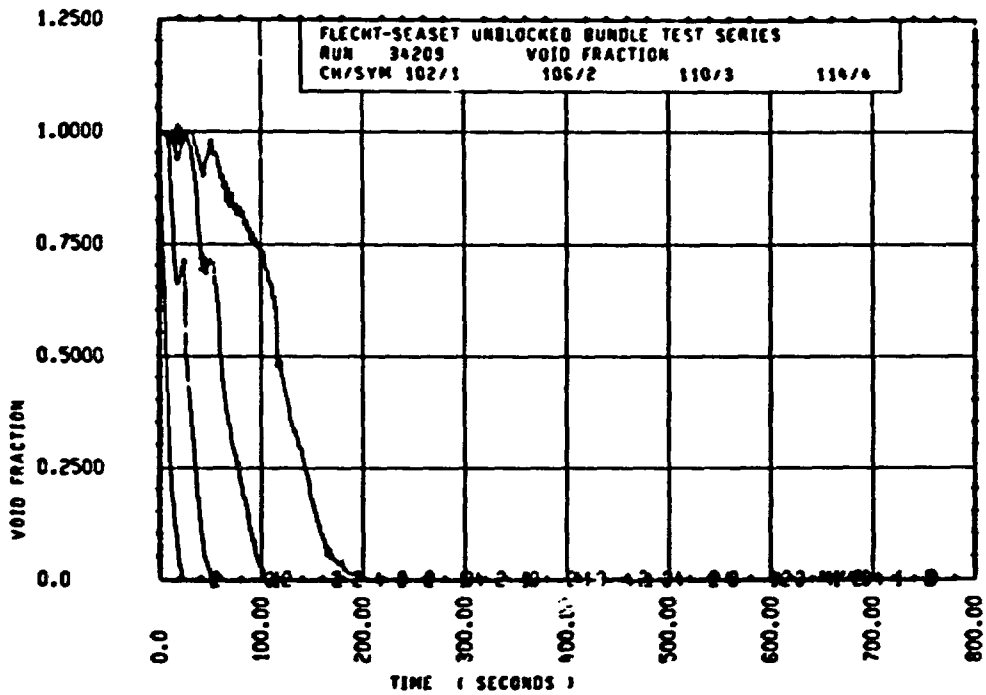

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34209
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
1.0000
0.0
-1.0000
-2.0000
-3.0000
-4.0000
-4.4092
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
762.00

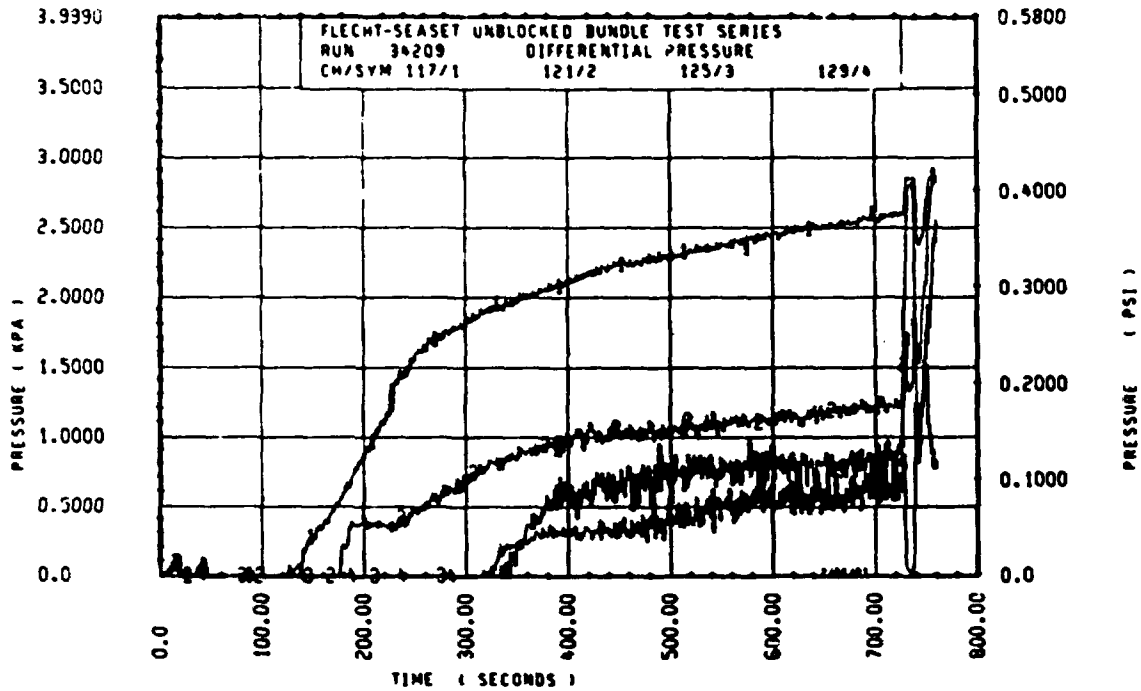

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34209
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-8.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
762.00

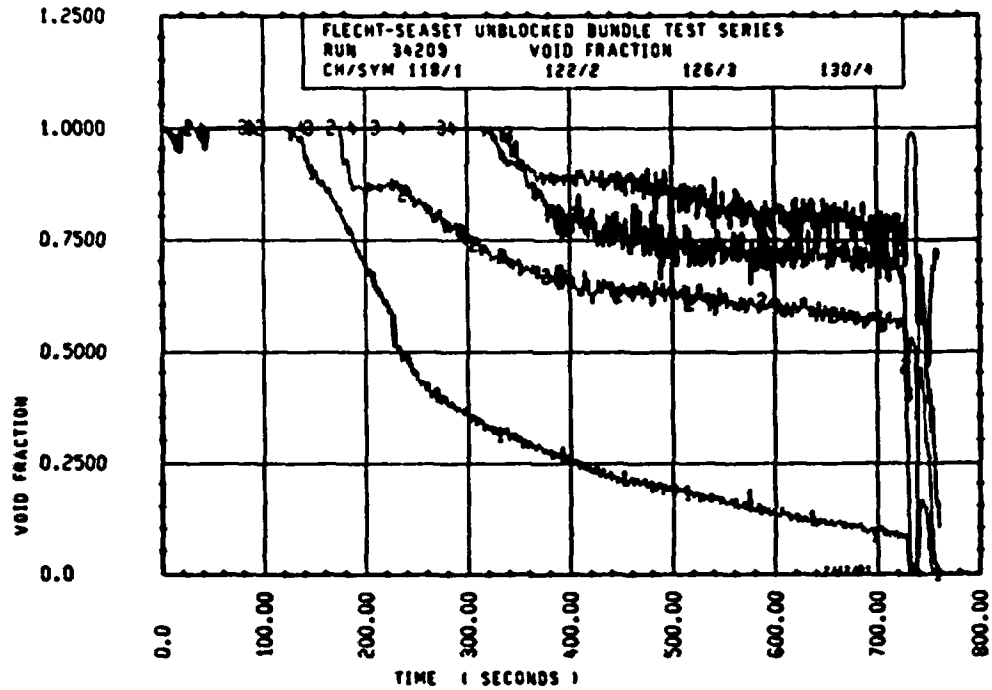

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34209
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
378.35
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
834.11
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-8.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
767.00

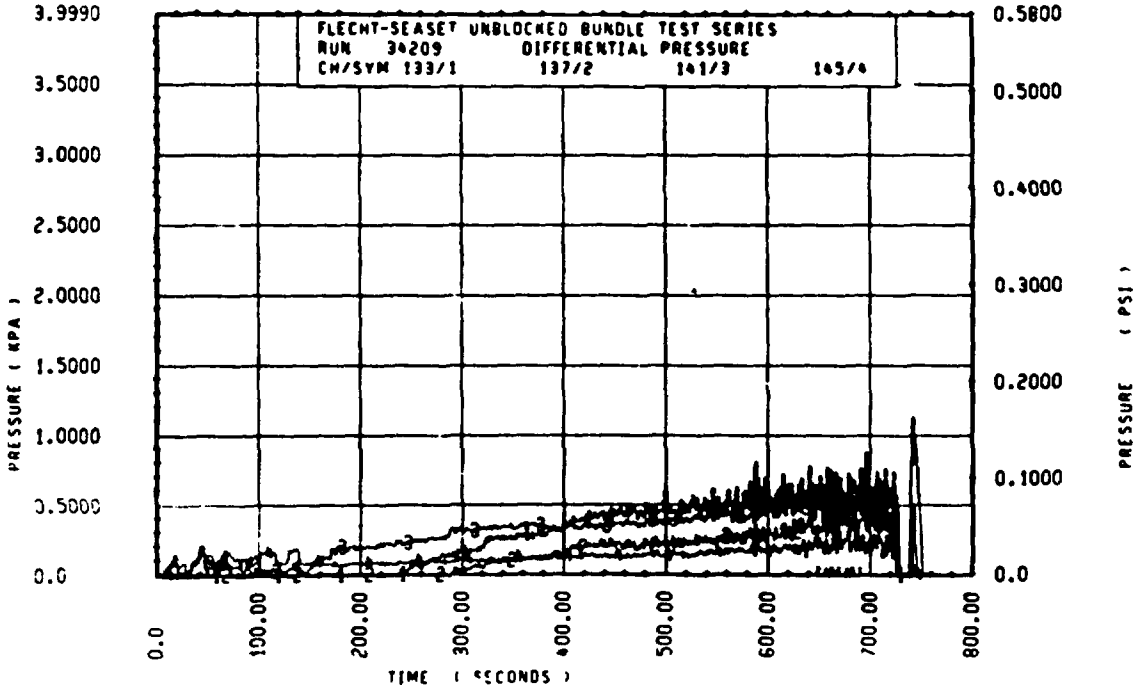

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
762.00
QUENCH TIMES (SECONDS)

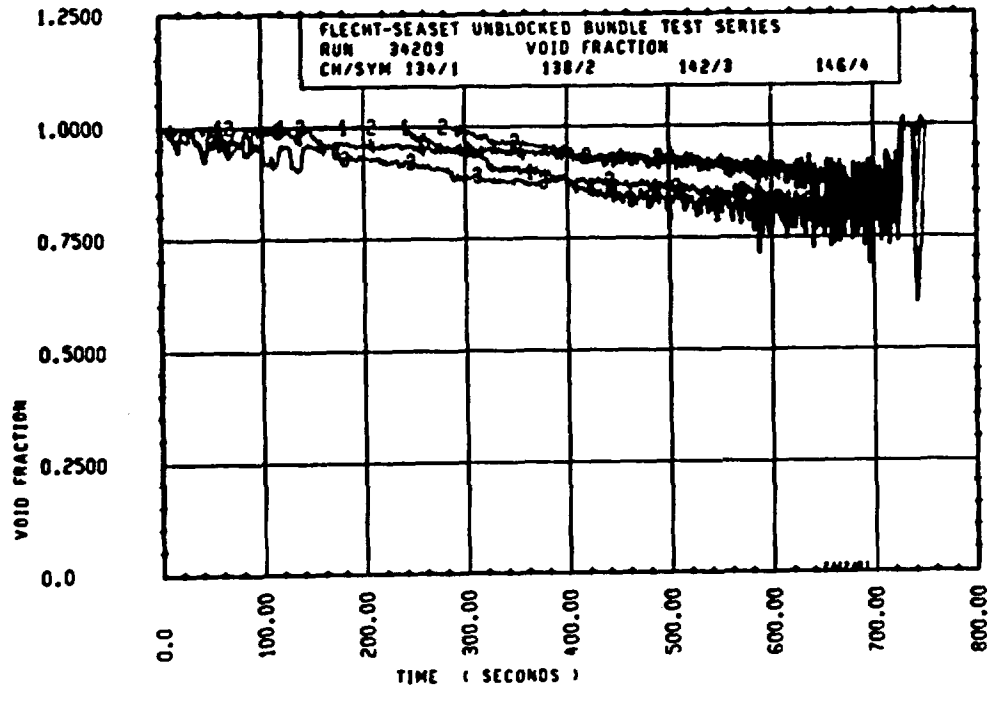

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.4000
0.3000
0.2000
0.1000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
100.00
200.00
300.00
500.00
600.00
700.00
800.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34209 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 34316

Date: 7/2/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	889°C (1631°F)
Rod peak power	2.4 kw/m (0.74 kw/ft)
Flow rate	25 mm/sec (0.97 in./sec)
Coolant temperature	51°C→119°C (124°F→246°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	133°C (272°F)	234°C (453°F)
1.22 m (48 in.)	160°C-168°C (320°F-335°F)	262°C-492°C (503°F-918°F)
1.83 m (72 in.)	172°C-209°C (342°F-409°F)	542°C-777°C (1008°F-1431°F)
2.44 m (96 in.)	178°C-193°C (353°F-380°F)	439°C-553°C (827°F-1028°F)
2.74 m (108 in.)	161°C (322°F)	131°C (267°F)
3.05 m (120 in.)	133°C-145°C (271°F-293°F)	129°C-167°C (264°F-333°F)
3.35 m (132 in.)	129°C-135°C (265°F-275°F)	129°C-135°C (264°F-275°F)

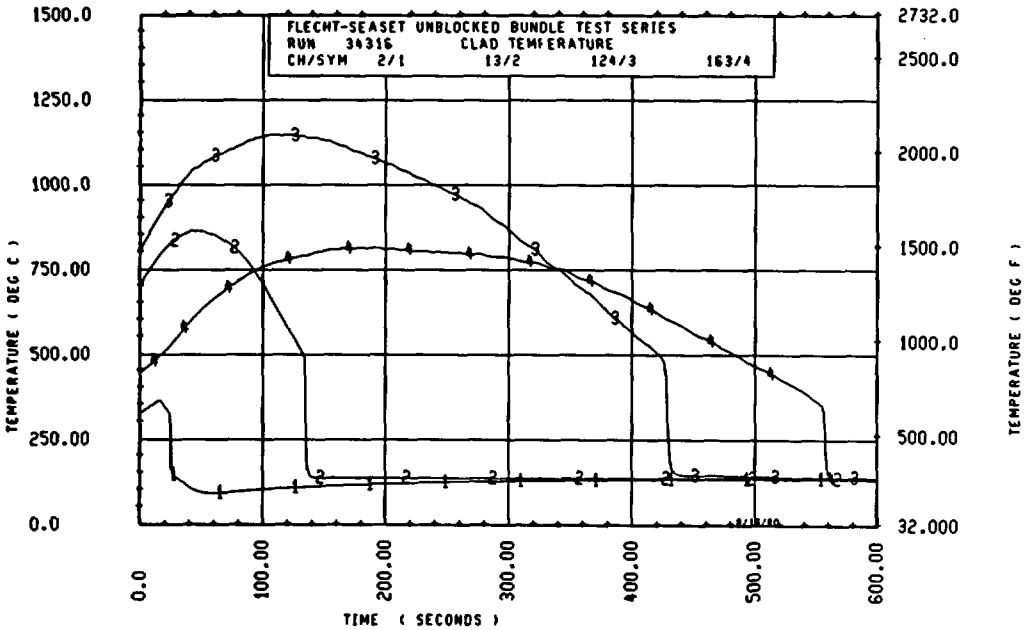
*At 122 seconds after flood

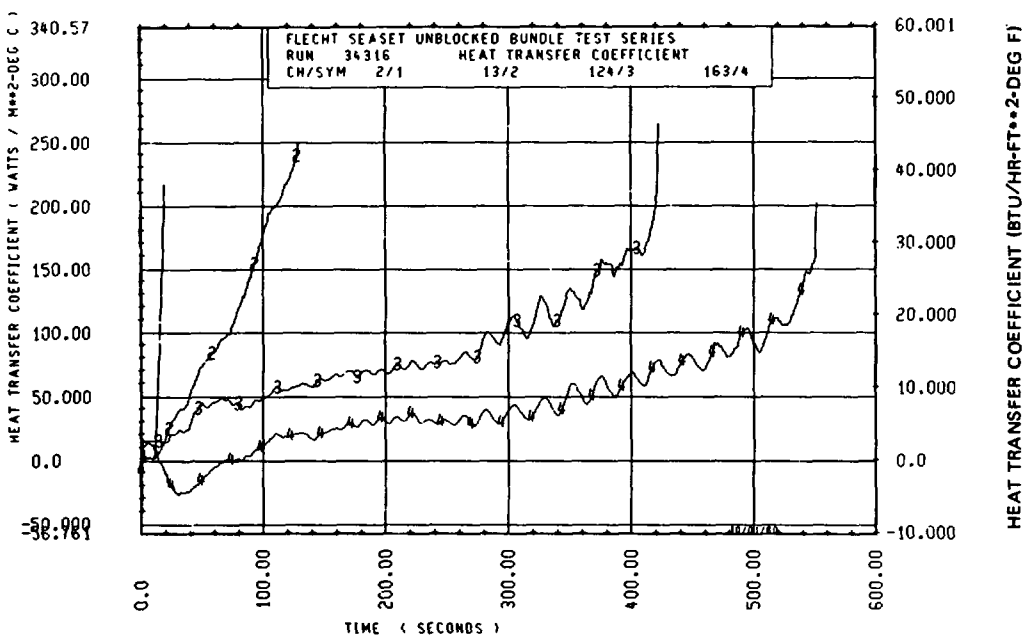
C. Comments

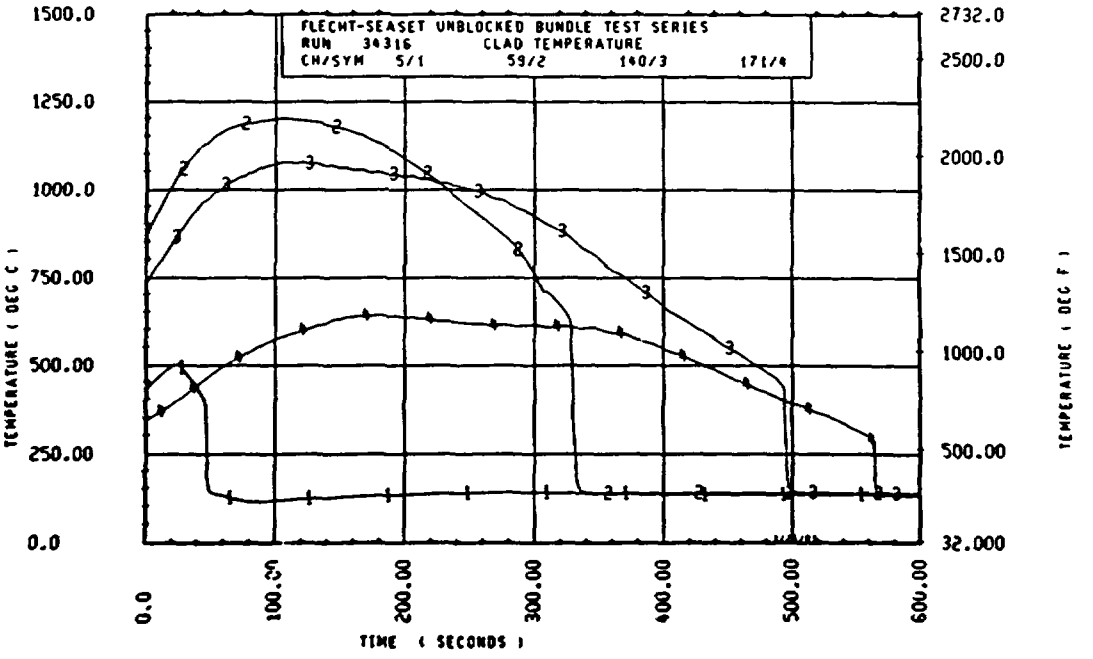
Subcooling change with respect to time was exponential instead of linear as specified.

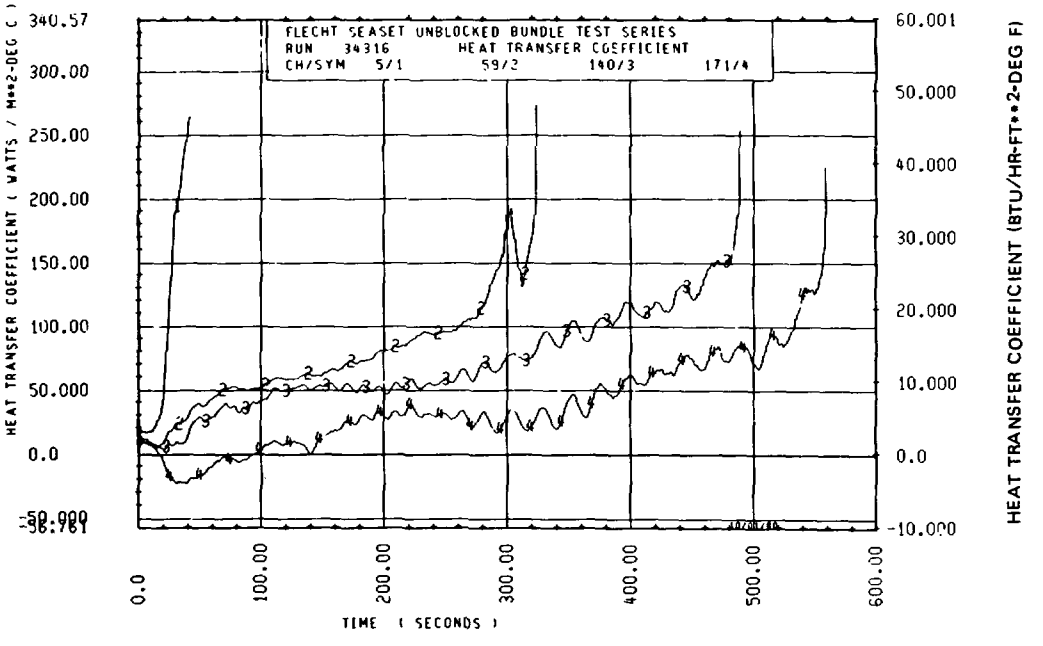
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 34316

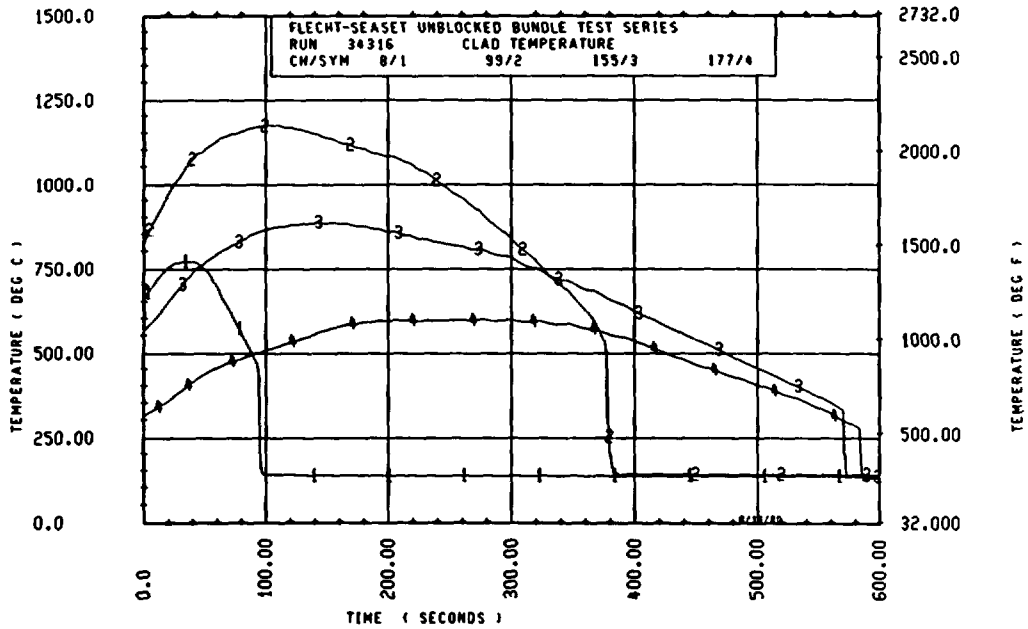
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1266.	1560.	294.	68.0	904.	132.0
2H 6- 0	50	1542.	2006.	464.	93.0	876.	316.7
3C 5- 0	17	1345.	1640.	295.	58.0	855.	211.7
3C 5- 7	28	1424.	1752.	328.	71.0	890.	259.9
4L 8- 0	129	1326.	1893.	567.	104.0	795.	467.0
4L 8- 6	147	1327.	1887.	560.	95.0	787.	467.7
5E11- 0	168	632.	1083.	451.	276.0	535.	562.0
5J 4- 0	12	1255.	1569.	314.	51.0	869.	135.0
5J 8- 6	146	1130.	1649.	520.	94.0	652.	507.0
5J11- 6	175	594.	1108.	514.	276.0	535.	576.0
7B 6- 0	57	1458.	1872.	414.	72.0	917.	259.7
7E 8- 6	142	1113.	1519.	406.	102.0	641.	518.0
7B10- 0	162	831.	1340.	509.	144.0	589.	573.8
7B11- 6	176	634.	1094.	460.	191.0	496.	592.1
7D 6- 4	84	1633.	2178.	545.	106.0	1111.	312.9
7D 7- 6	119	1490.	2025.	535.	94.0	880.	413.9
7D 9- 3	151	1015.	1634.	619.	143.0	647.	532.0
7G 5- 0	23	1521.	1886.	365.	52.0	972.	204.3
7J 6- 0	59	1601.	2195.	594.	102.0	1101.	328.5
7M 7- 6	120	1470.	2044.	574.	100.0	826.	449.1
7M 8- 0	132	1337.	1995.	657.	102.0	784.	485.9
7M 9- 3	152	1022.	1630.	607.	108.0	707.	516.0
8H 4- 0	13	1299.	1590.	291.	42.5	919.	134.0
8H10- 0	163	832.	1498.	665.	179.0	651.	555.8
8H11- 6	177	600.	1112.	512.	273.0	533.	583.0
8K 4- 0	14	1271.	1584.	313.	44.5	925.	130.9
8K 6- 6	99	1529.	2146.	617.	103.0	949.	376.9
8K 8- 0	140	1354.	1973.	619.	108.0	812.	493.6
8K10- 0	164	840.	1486.	646.	258.0	631.	584.0
8N 2- 0	5	815.	938.	123.	24.5	737.	46.9
8N 4- 0	15	1277.	1577.	300.	44.0	937.	130.1
8N 6- 0	61	1541.	2081.	540.	96.0	1081.	297.8
8N10- 0	165	829.	1427.	598.	109.0	672.	548.0
9C 7- 0	109	1477.	1929.	452.	87.0	745.	392.9
9C 9- 3	153	1041.	1605.	564.	143.0	668.	542.5
9G 1- 0	2	618.	687.	69.	16.0	613.	24.7
9G 3- 3	8	1228.	1423.	195.	32.0	859.	93.9
9G11- 0	171	651.	1189.	538.	178.0	546.	563.5
9I 5- 0	24	1525.	1880.	356.	71.0	966.	205.3
9E 6- 2	46	1579.	2152.	573.	95.0	905.	320.6
10D 6- 6	93	1525.	1960.	436.	117.0	856.	351.4
11E 7- 6	124	1485.	2096.	611.	111.0	820.	427.5
11E 9- 3	155	1054.	1628.	573.	142.0	628.	570.0
11E11- 0	172	665.	1191.	526.	165.0	602.	545.0
12D 4- 0	16	1290.	1577.	286.	63.0	902.	132.0
12D 6- 0	66	1573.	2051.	477.	88.0	974.	304.8
12F 6- 6	102	1554.	2126.	572.	102.0	890.	350.5

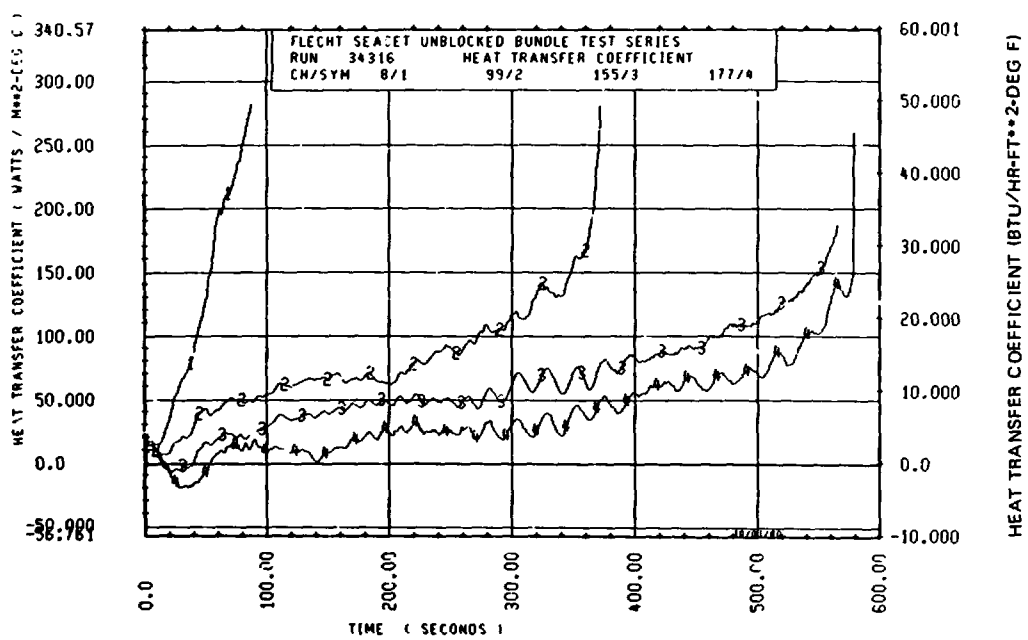

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

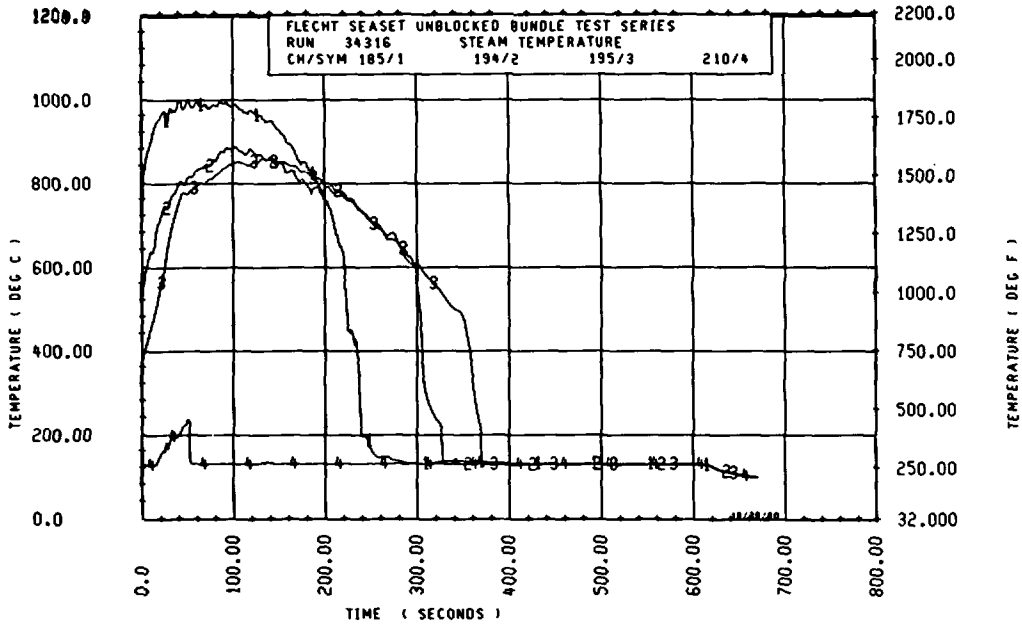

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

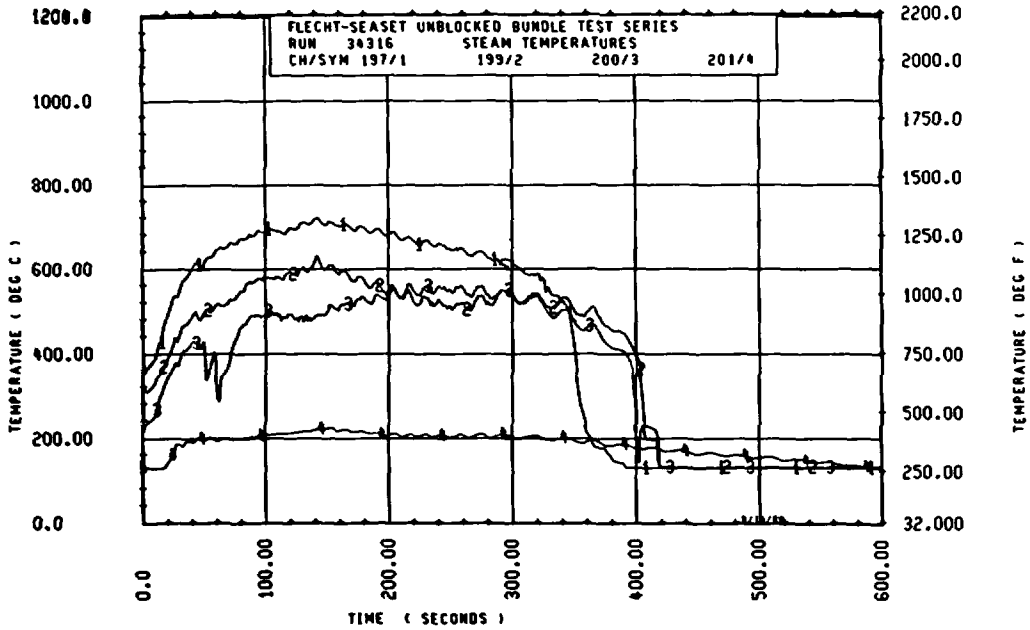

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

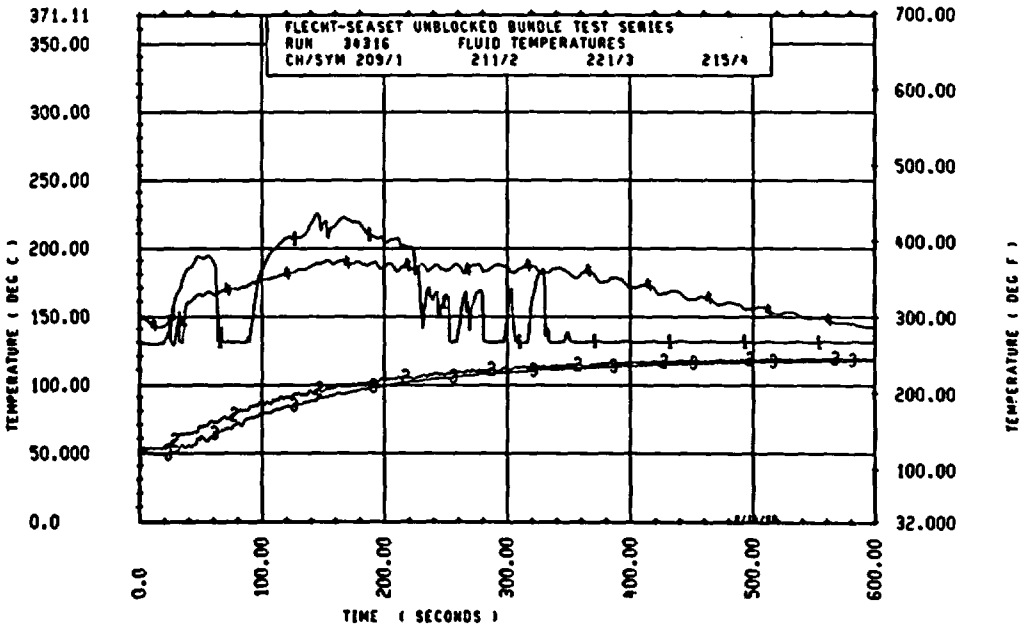

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

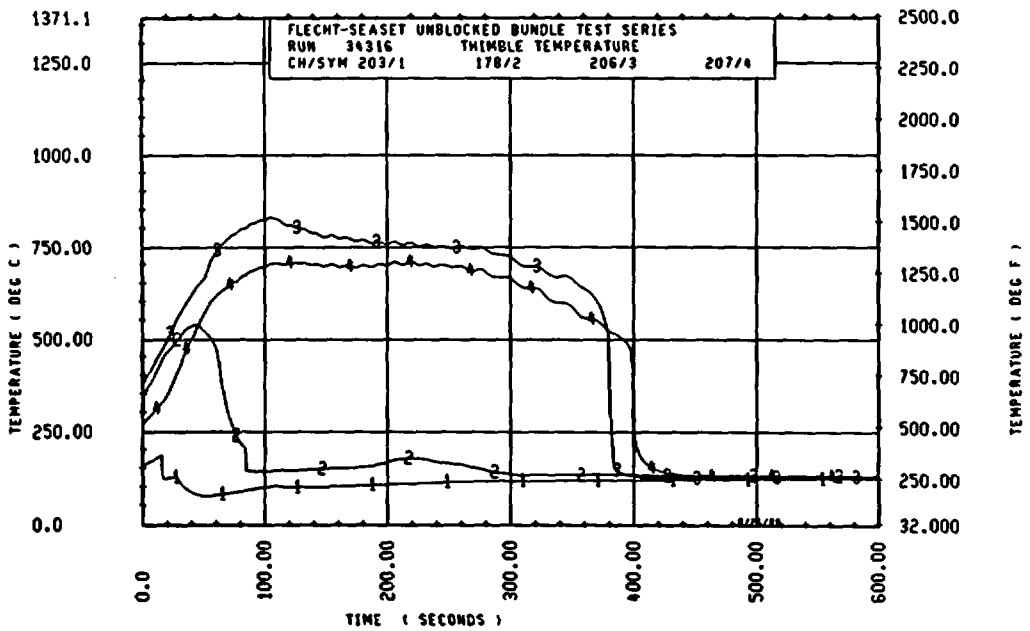

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

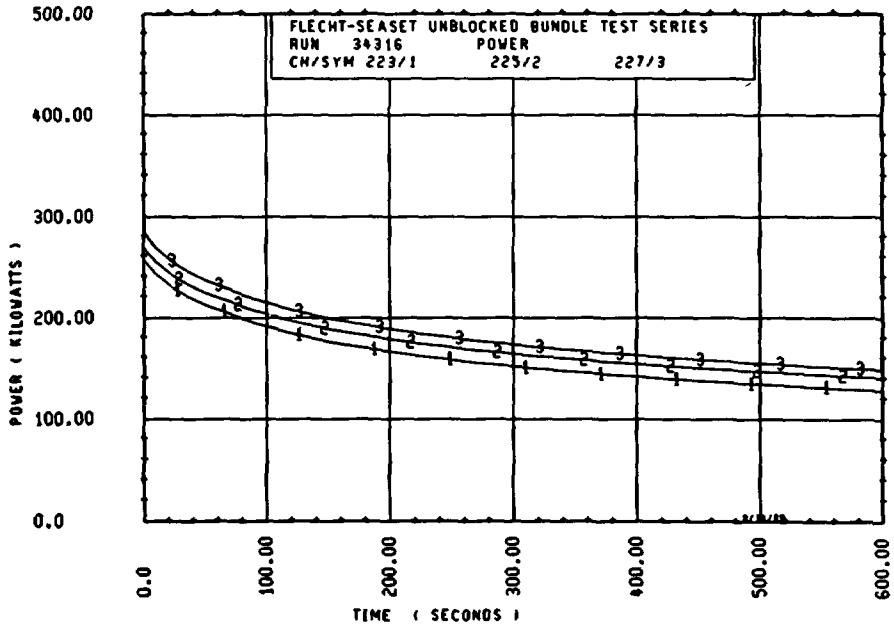

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

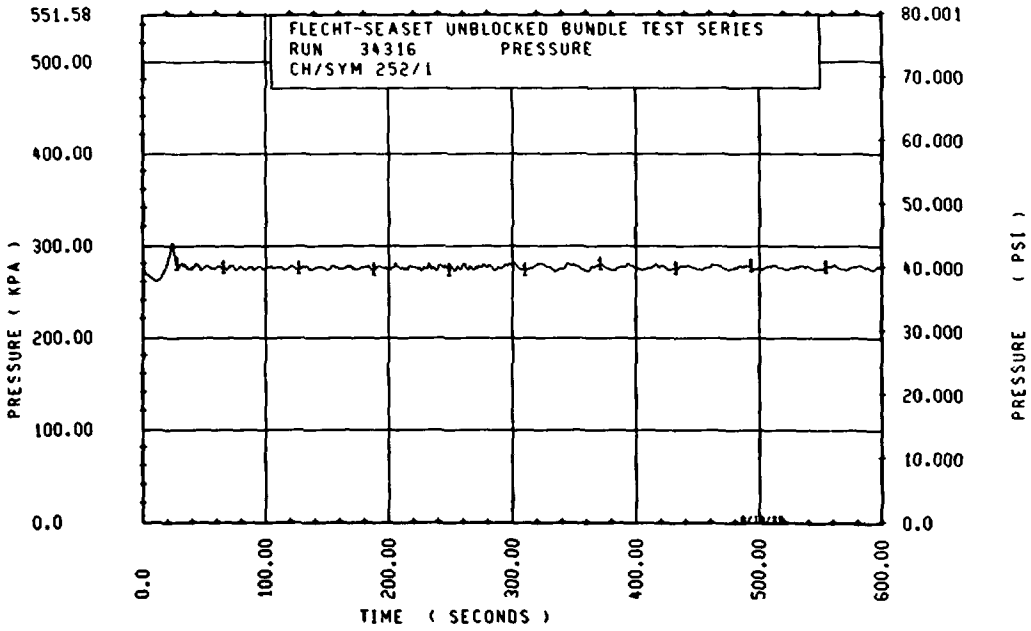

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

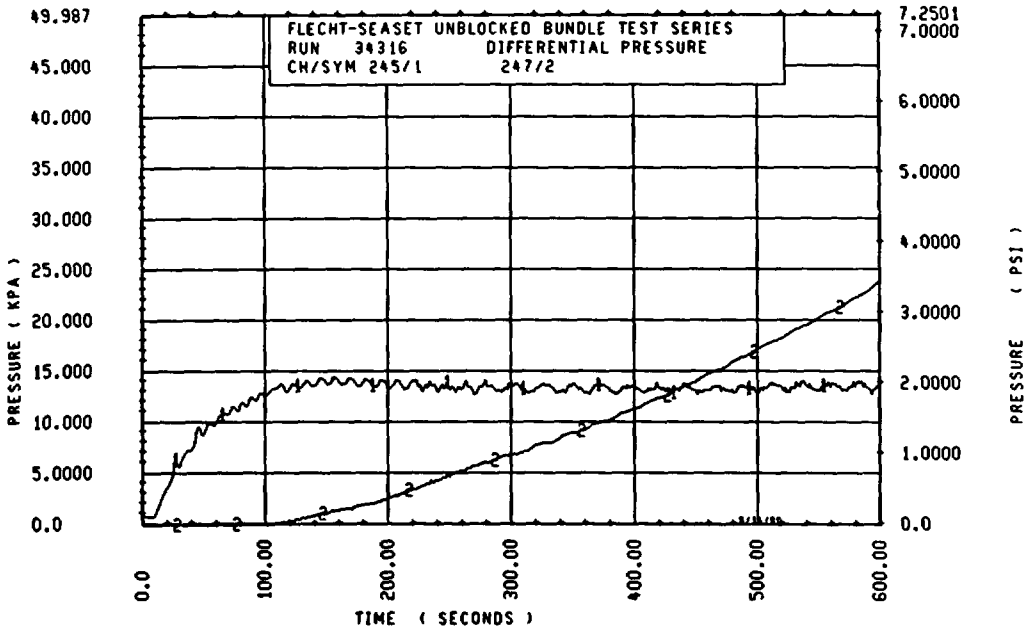


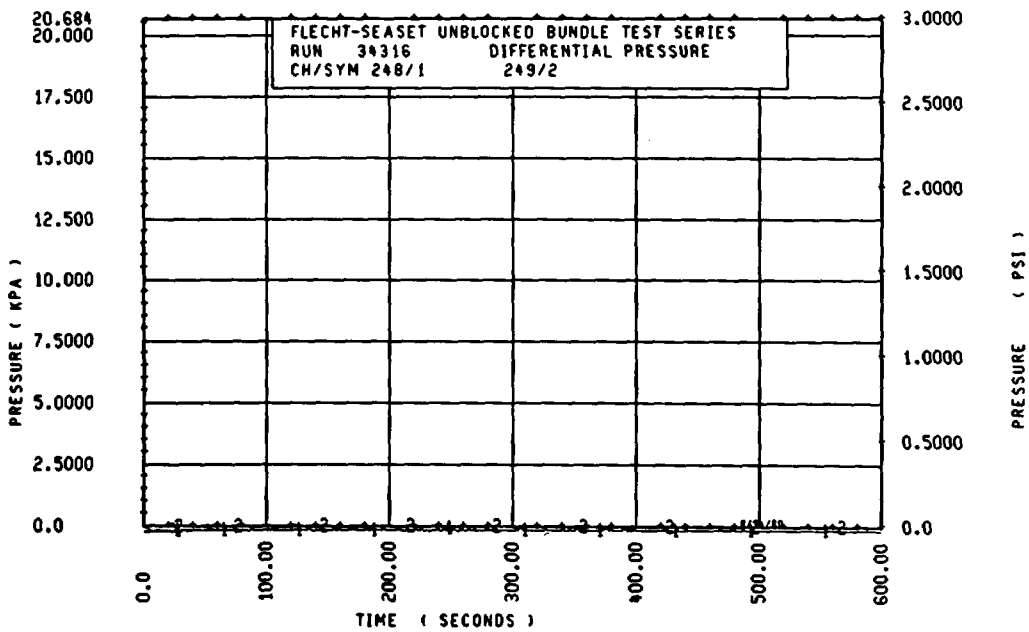


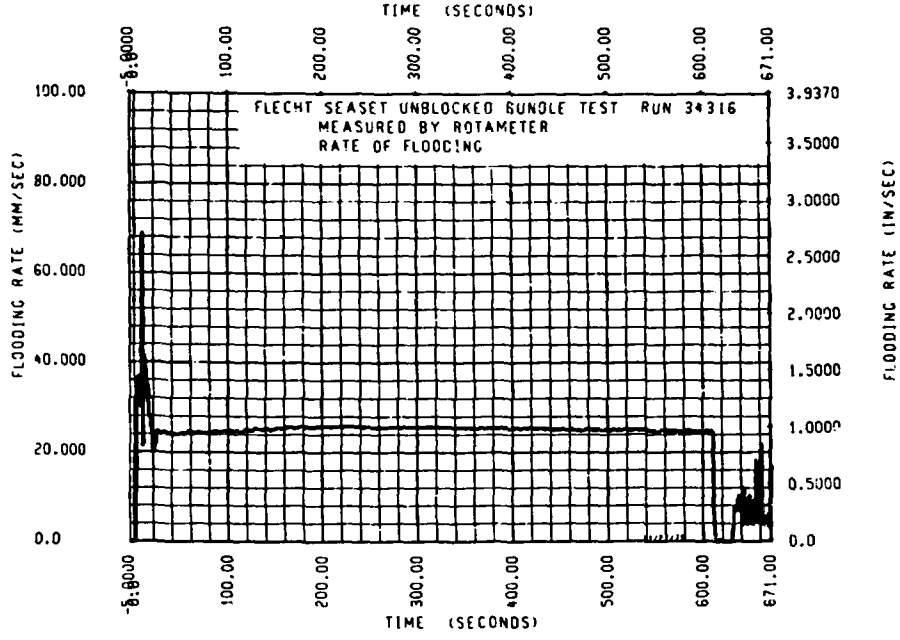
CH 203-7L, 0.30 m (12 in.); CH 178-7L, 0.99 m (39 in.);
CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

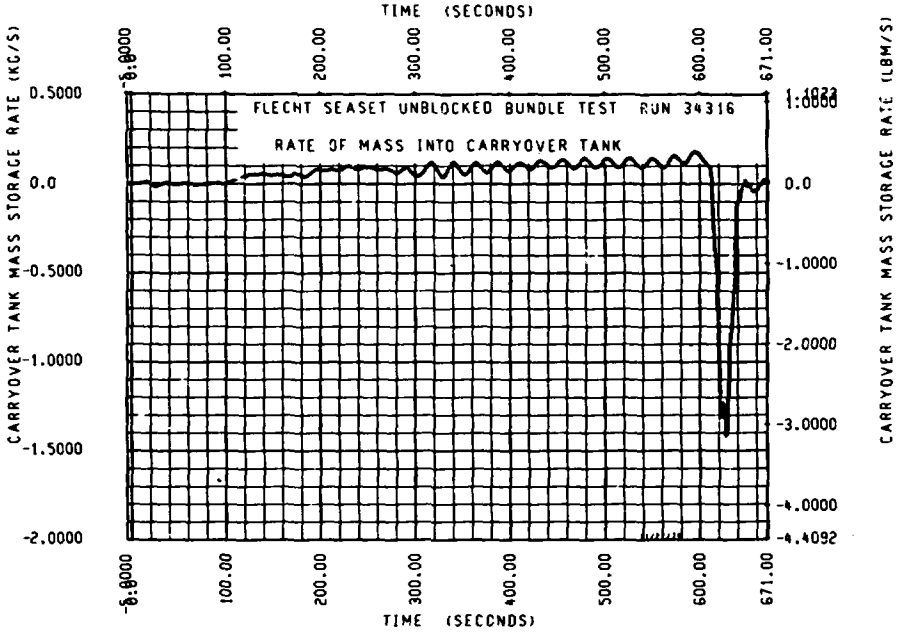

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

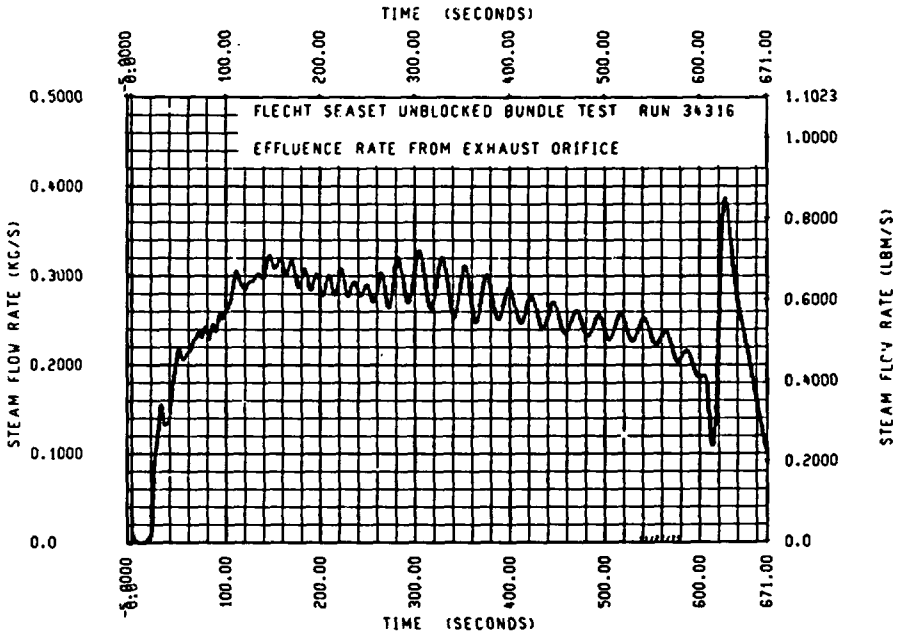

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

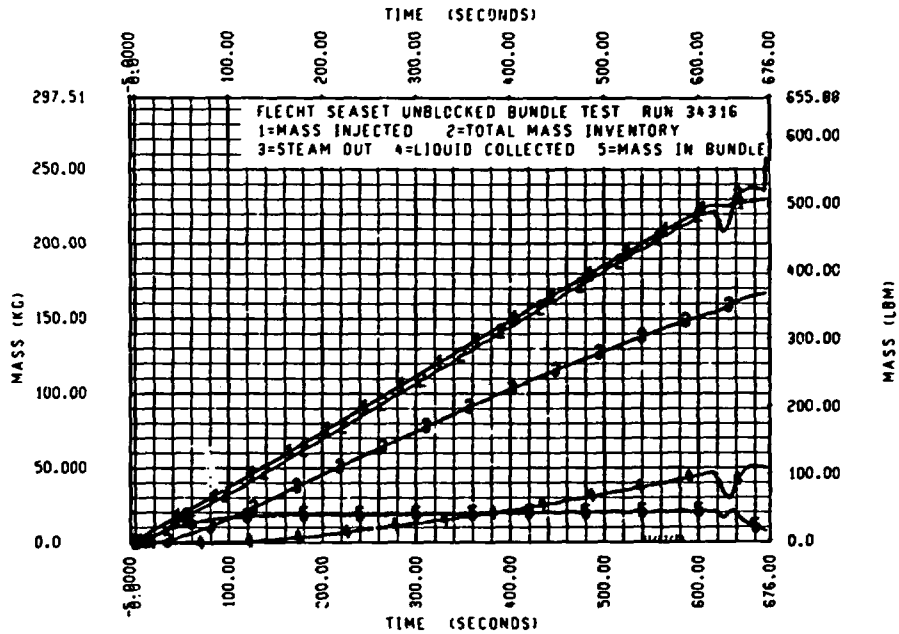

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00

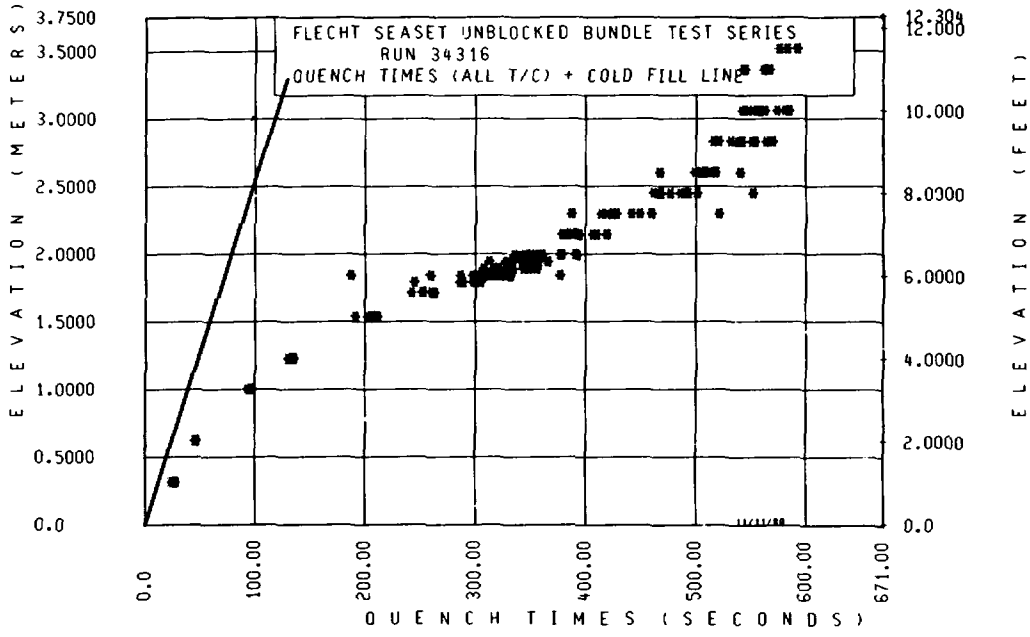

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00

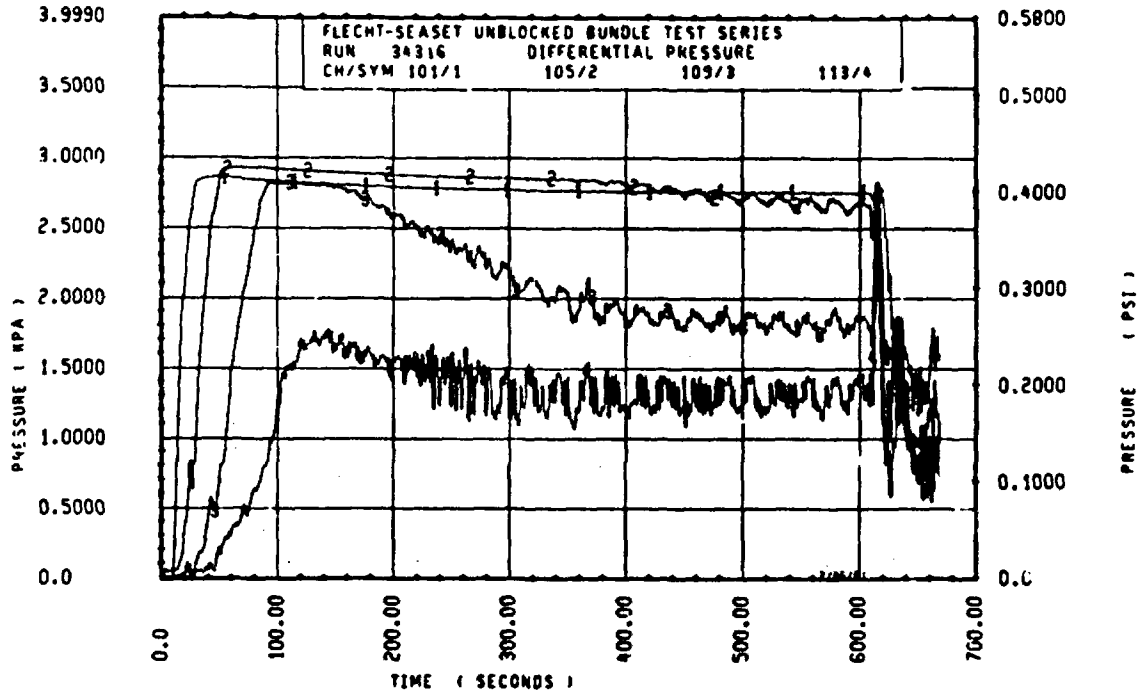

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34316
MEASURED BY ROTAMETER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
100.00
80.000
60.000
40.000
20.000
0.0
3.9370
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
671.00

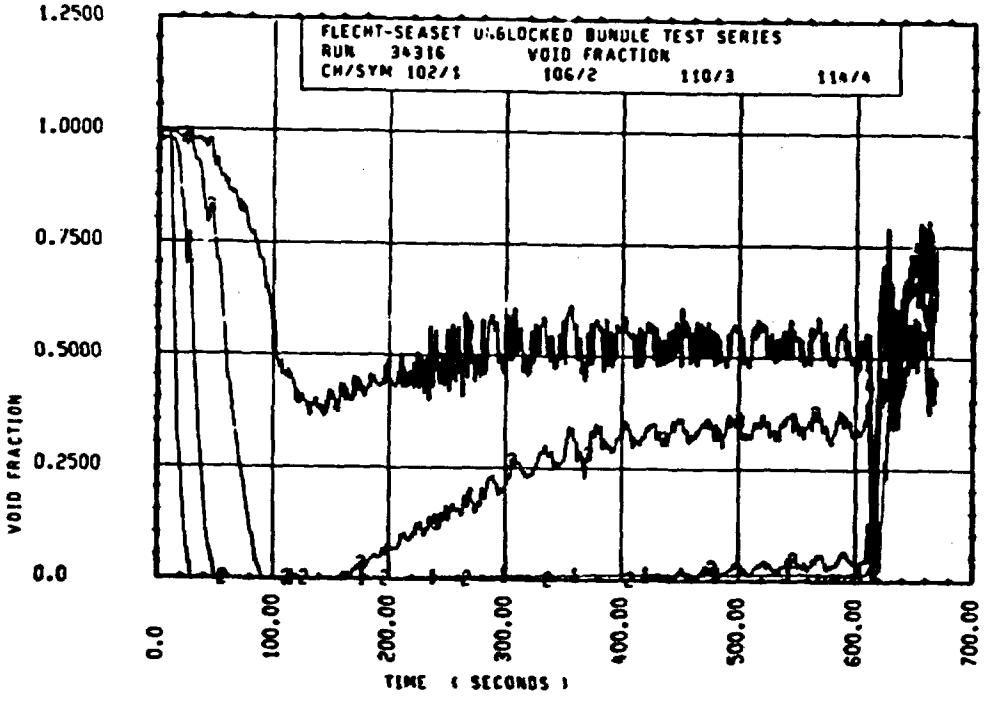

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34316
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
1.1023
1.0000
0.0
-1.0000
-2.0000
-3.0000
-4.0000
-4.4092
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
671.00

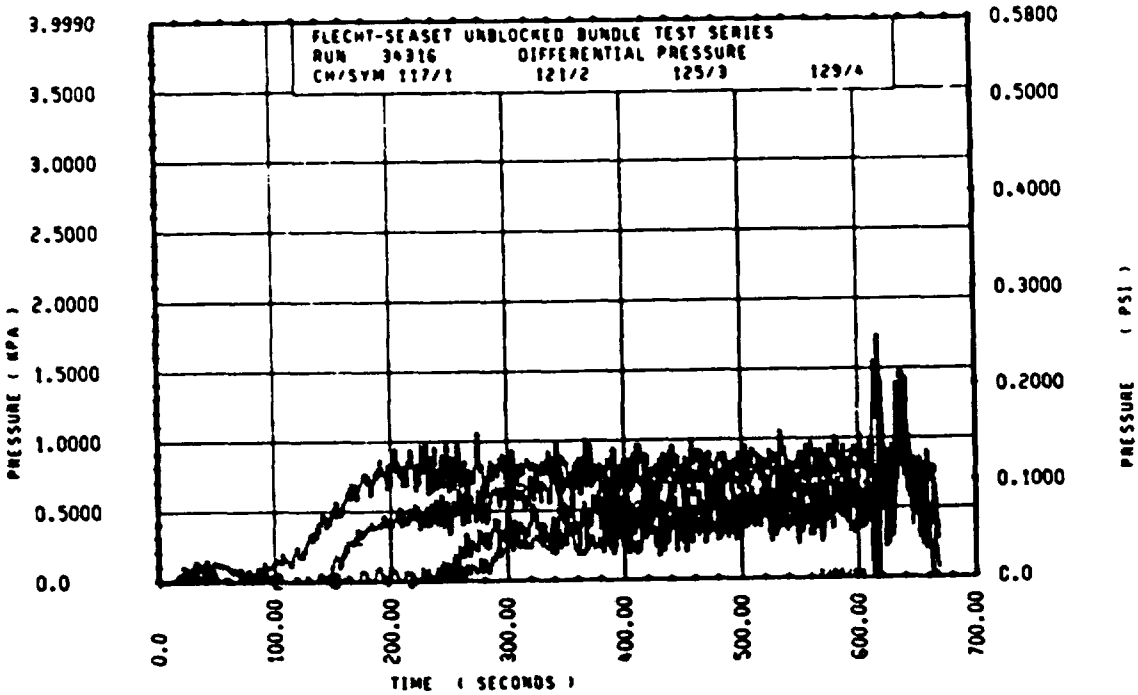

TIME (SECONDS)
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
671.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34316
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
STEAM FLOW RATE (LBM/S)
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0

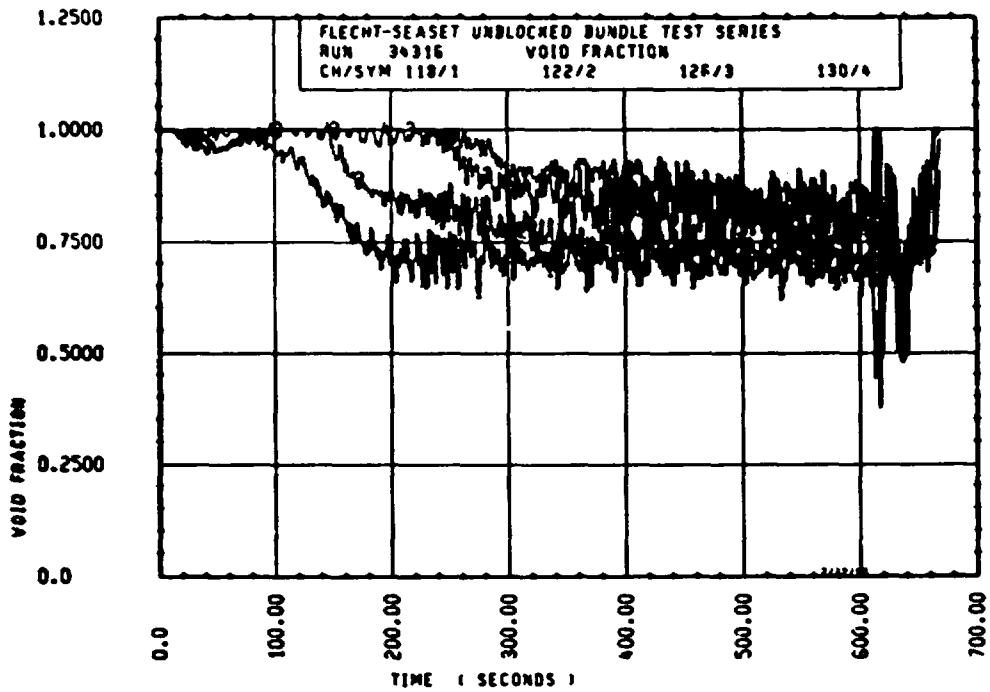

TIME (SECONDS)
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
676.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34316
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
297.51
250.00
200.00
150.00
100.00
50.000
0.0
MASS (LBM)
655.88
600.00
500.00
400.00
300.00
200.00
100.00
0.0

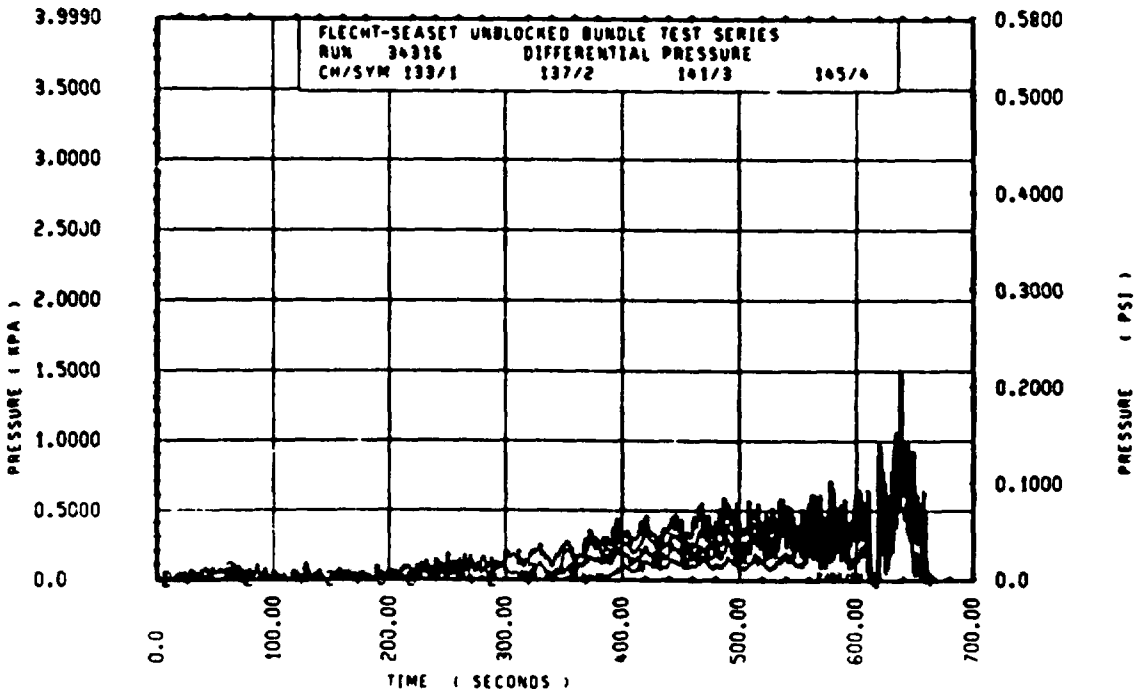

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
671.00
QUENCH TIMES (SECONDS)

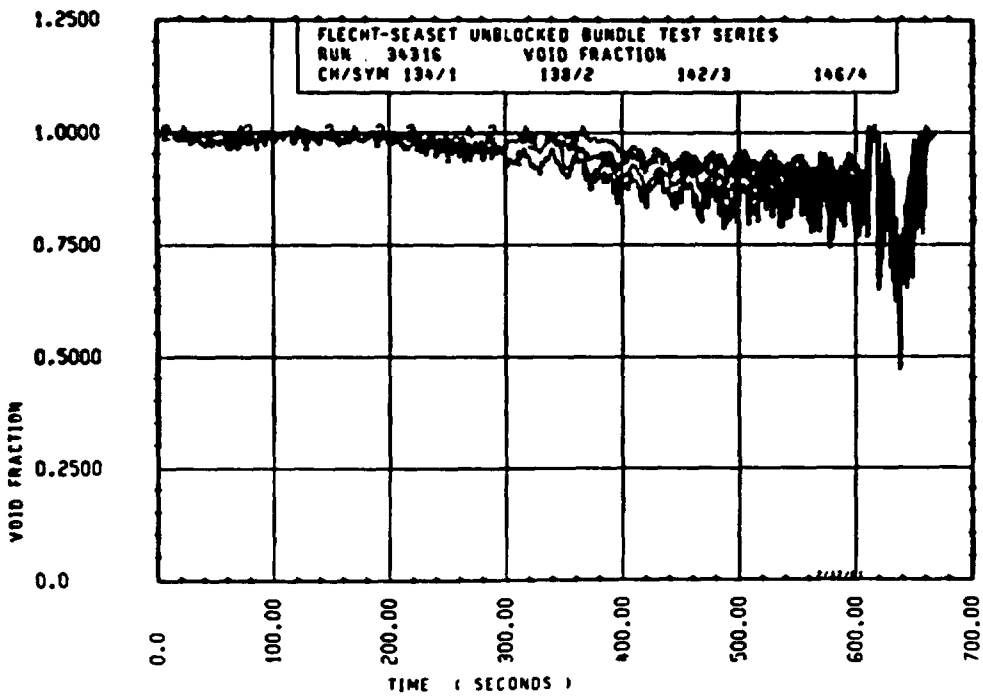

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (MPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34316 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 34420

Date: 8/6/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	1119°C (2045°F)
Rod peak power	2.4 kw/m (0.74 kw/ft)
Flow rate	38.9 mm/sec (1.53 in./sec)
Coolant temperature	51°C (124°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	129°C (265°F)	73°C (163°F)
1.22 m (48 in.)	197°C (387°F)	125°C (257°F)
1.83 m (72 in.)	219°C-300°C (426°F-572°F)	143°C-583°C (290°F-1082°F)
2.13 m (84 in.)	223°C-284°C (434°F-544°F)	261°C-662°C (502°F-1224°F)
2.44 m (96 in.)	236°C-268°C (457°F-514°F)	264°C-623°C (508°F-1154°F)
2.74 m (108 in.)	195°C (383°F)	130°C-158°C (266°F-317°F)
3.05 m (120 in.)	137°C-158°C (278°F-317°F)	129°C (264°F)
3.35 m (132 in.)	132°C-141°C (270°F-286°F)	129°C (264°F)

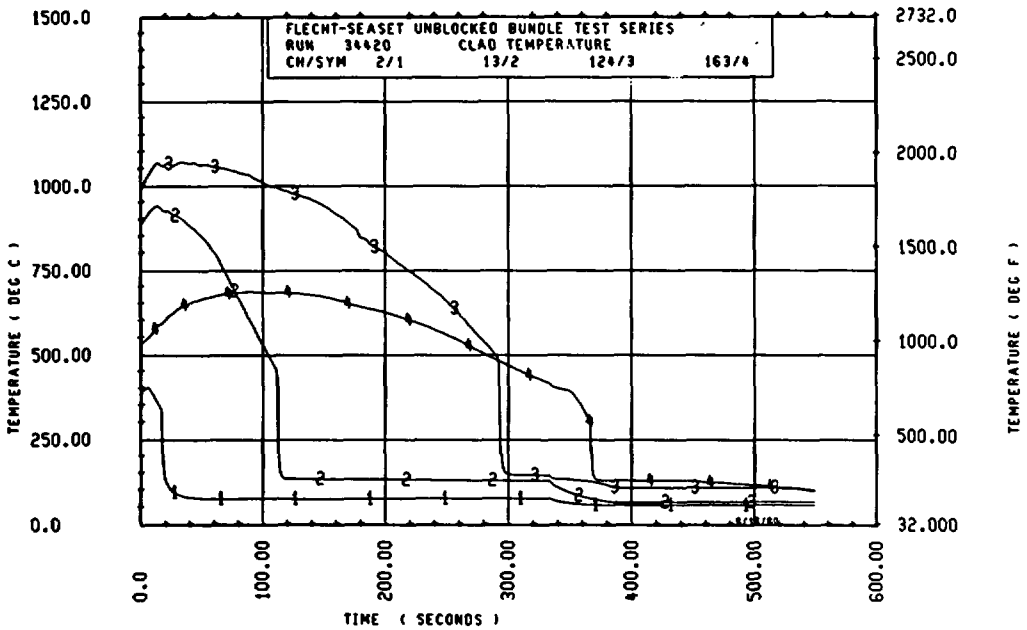
*At 123 seconds after flood

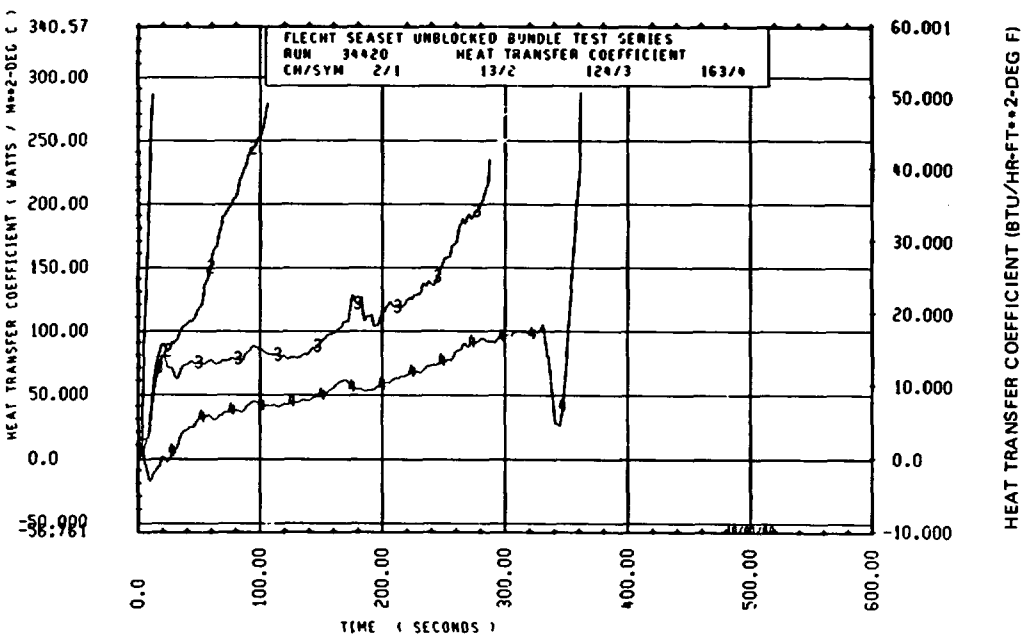
C. Comments

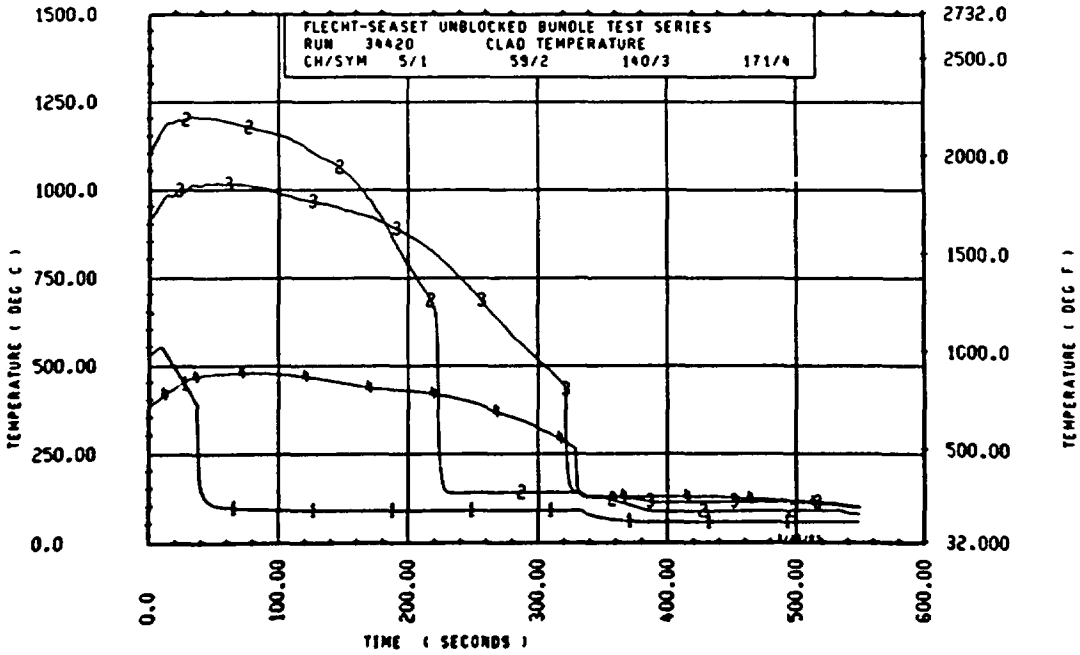
None

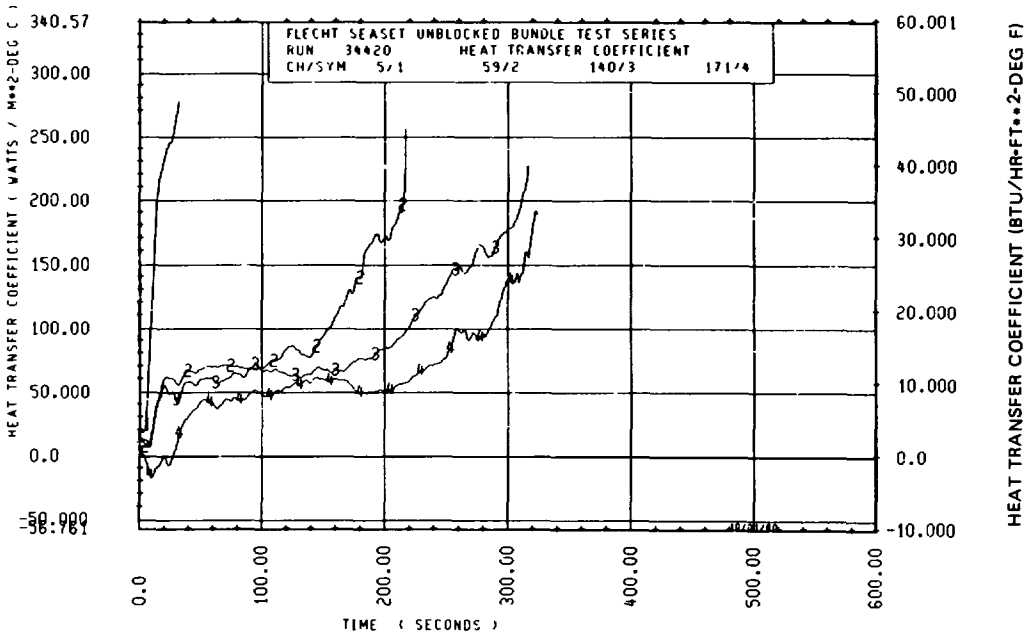
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 34420

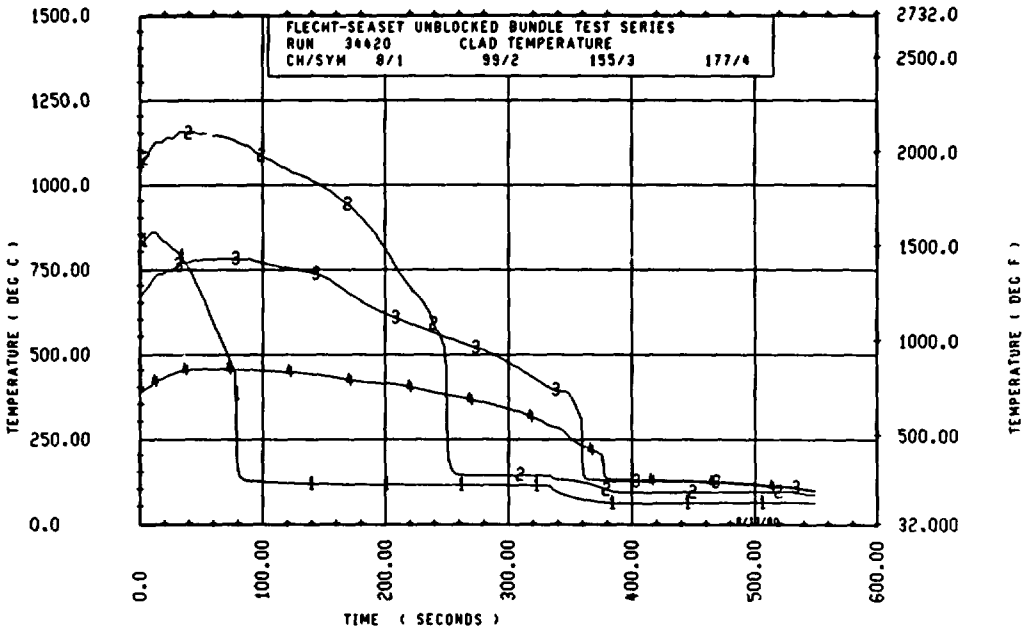
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1579.	1669.	90.	15.0	830.	111.5
2H 6- 0	50	1905.	2023.	118.	21.5	969.	210.0
3C 5- 0	17	1650.	1741.	91.	15.0	876.	162.8
3C 5- 7	28	1758.	1850.	91.	13.0	849.	191.0
4L 8- 0	129	1654.	1827.	173.	34.0	784.	315.0
4L 8- 6	147	1653.	1826.	172.	34.5	788.	315.0
5E11- 0	168	759.	891.	132.	53.0	560.	312.0
5J 4- 0	12	1576.	1685.	109.	21.0	834.	113.0
5J 8- 6	146	1386.	1521.	135.	34.5	550.	346.0
5J11- 6	175	711.	838.	126.	52.0	574.	319.0
7E 6- 0	57	1813.	1937.	124.	13.5	897.	186.9
7E 8- 6	142	1357.	1506.	149.	34.0	666.	351.0
7E10- 0	162	1015.	1287.	272.	88.0	558.	370.9
7E11- 6	176	775.	980.	205.	100.0	561.	359.0
7D 6- 4	84	2018.	2170.	152.	53.0	1137.	218.9
7D 7- 6	119	1836.	1972.	136.	14.0	878.	281.9
7D 9- 3	151	1249.	1487.	238.	65.0	641.	370.9
7G 5- 0	23	1889.	2004.	115.	13.0	995.	153.8
7J 6- 0	59	2016.	2205.	189.	33.5	1190.	221.8
7M 7- 6	120	1819.	1967.	148.	33.5	926.	285.9
7M 8- 0	132	1663.	1877.	214.	52.0	866.	310.0
7M 9- 3	152	1265.	1483.	217.	53.0	635.	351.0
8M 4- 0	13	1626.	1726.	100.	13.0	841.	111.9
8M10- 0	163	989.	1269.	280.	89.0	579.	366.0
8M11- 6	177	732.	855.	123.	51.0	395.	376.0
8K 4- 0	14	1596.	1698.	103.	21.0	849.	110.0
8K 6- 6	99	1919.	2114.	195.	33.5	951.	248.8
8K 8- 0	140	1676.	1864.	188.	44.0	820.	321.0
8K10- 0	164	1017.	1297.	280.	89.0	586.	366.9
8N 2- 0	5	984.	1028.	44.	9.0	726.	37.5
8N 4- 0	15	1594.	1689.	95.	13.5	866.	110.0
8N 6- 0	61	1892.	2049.	157.	44.0	1055.	209.1
8N10- 0	165	1018.	1300.	281.	69.0	579.	363.6
9C 7- 0	109	1816.	1946.	131.	13.0	773.	272.0
9C 9- 3	153	1277.	1461.	184.	52.0	655.	355.0
9G 1- 0	2	738.	761.	23.	5.5	635.	17.1
9G 3- 3	8	1514.	1581.	67.	12.0	831.	77.7
9G11- 0	171	728.	898.	169.	79.0	510.	329.0
9J 5- 0	24	1874.	1981.	107.	13.0	969.	157.0
9E 6- 2	46	1956.	2156.	199.	34.0	881.	225.9
10D 6- 6	93	1790.	1895.	105.	43.0	861.	244.9
11E 7- 6	124	1819.	1960.	141.	33.0	909.	291.9
11E 9- 3	155	1241.	1440.	198.	70.0	582.	359.0
11E11- 0	172	731.	915.	184.	88.0	599.	301.0
12D 6- 0	16	1607.	1698.	92.	13.0	857.	110.0
12D 6- 0	66	1959.	2086.	127.	12.5	995.	217.0
12F 6- 6	102	1934.	2107.	173.	32.5	950.	233.7

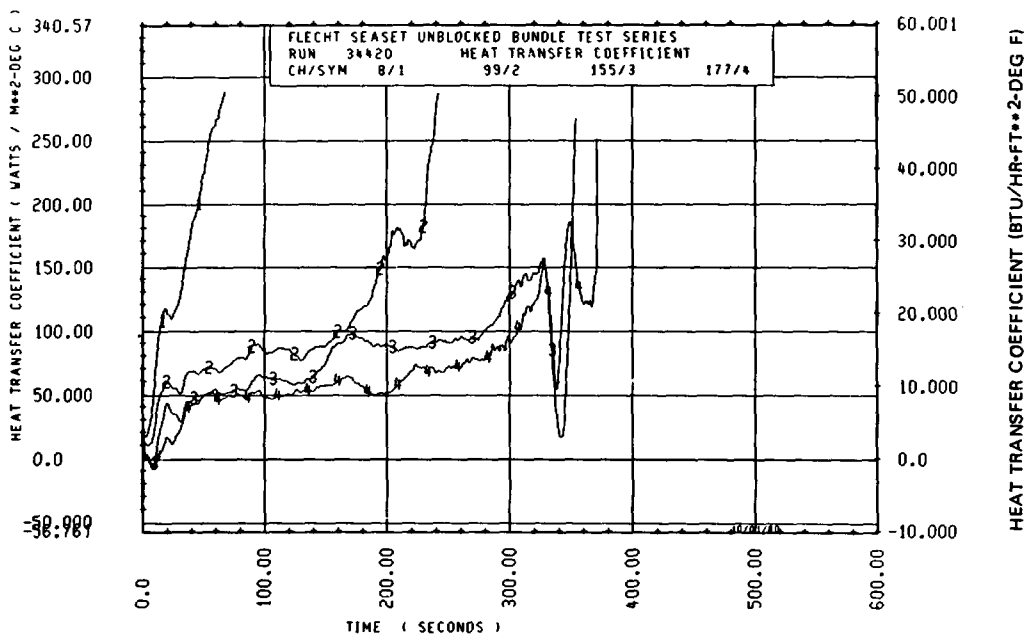

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

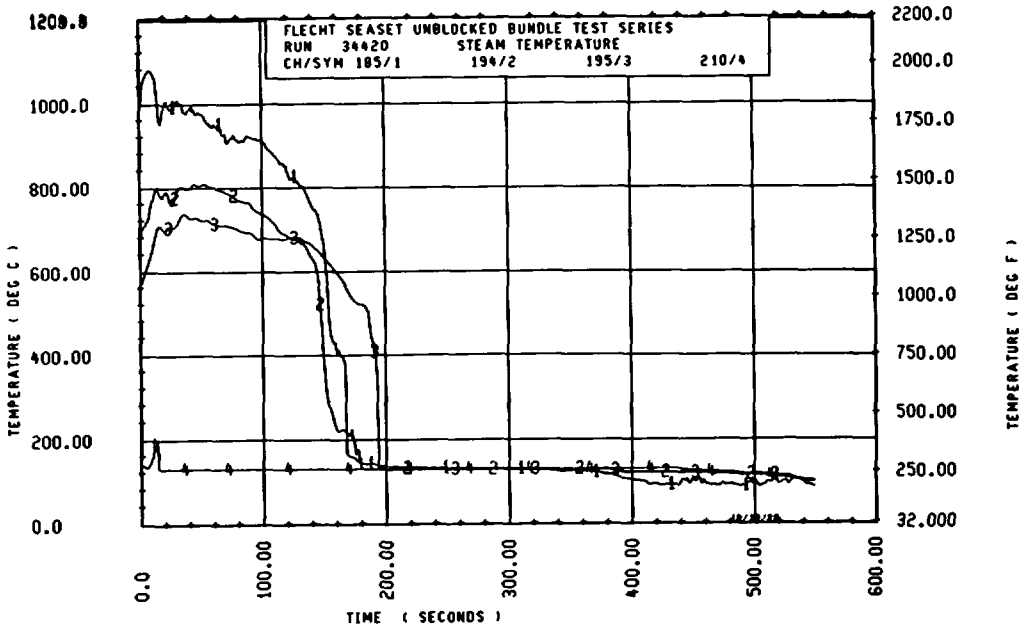

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

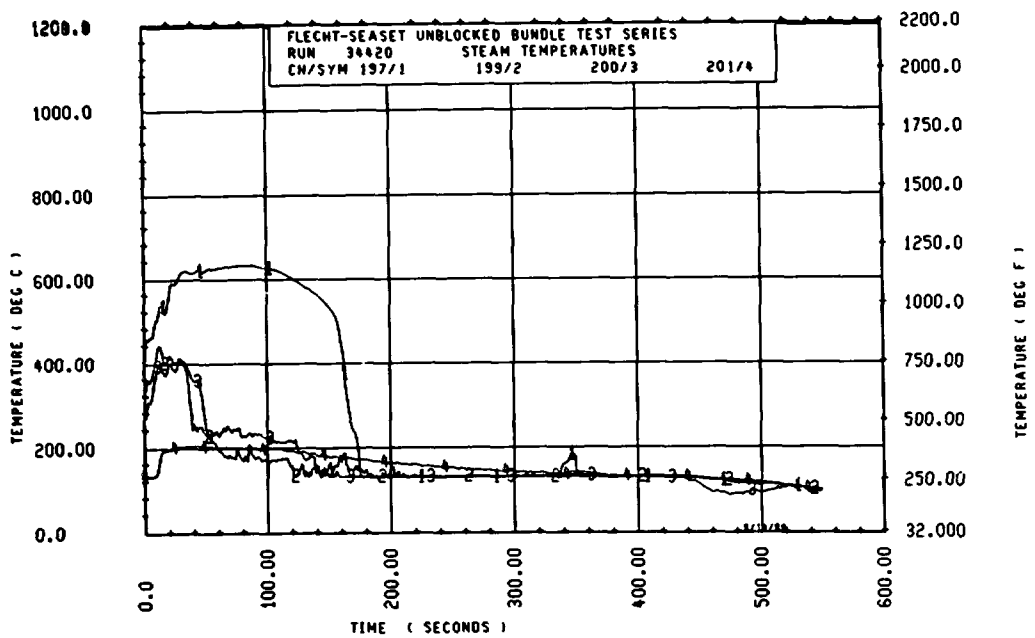

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

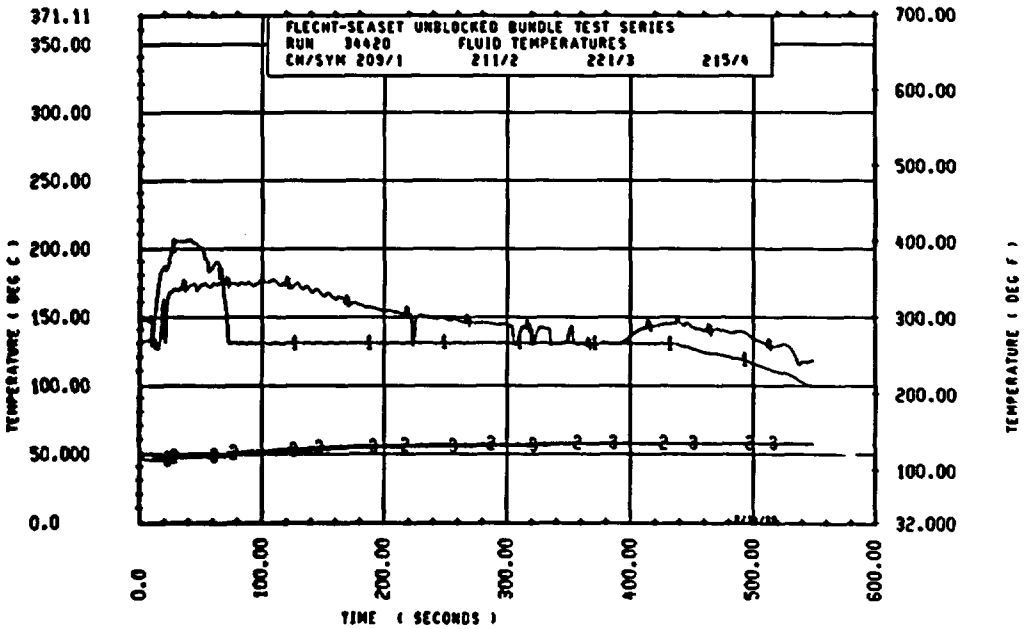

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

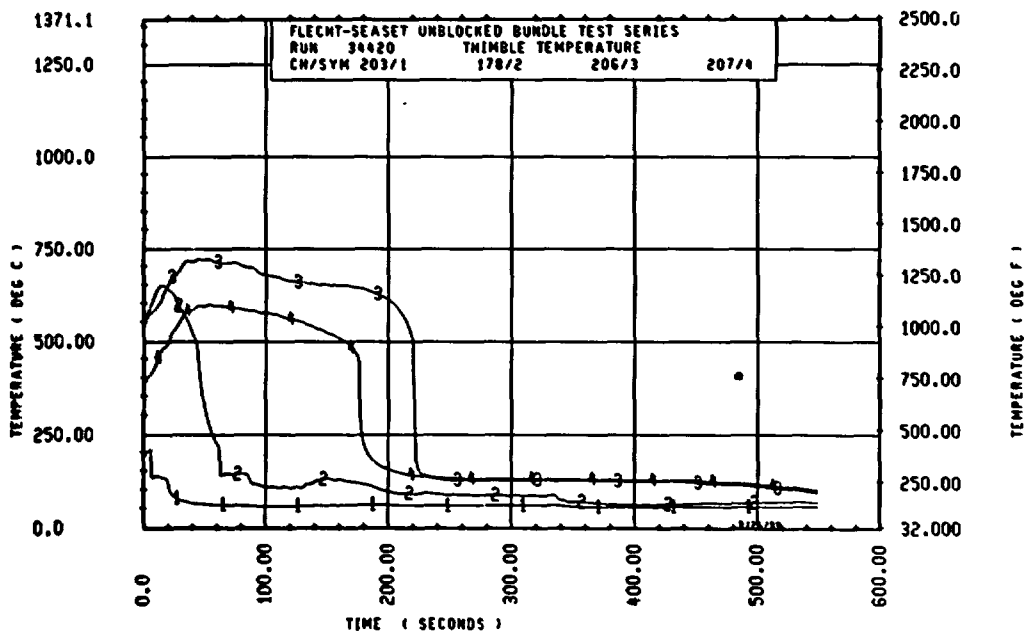

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

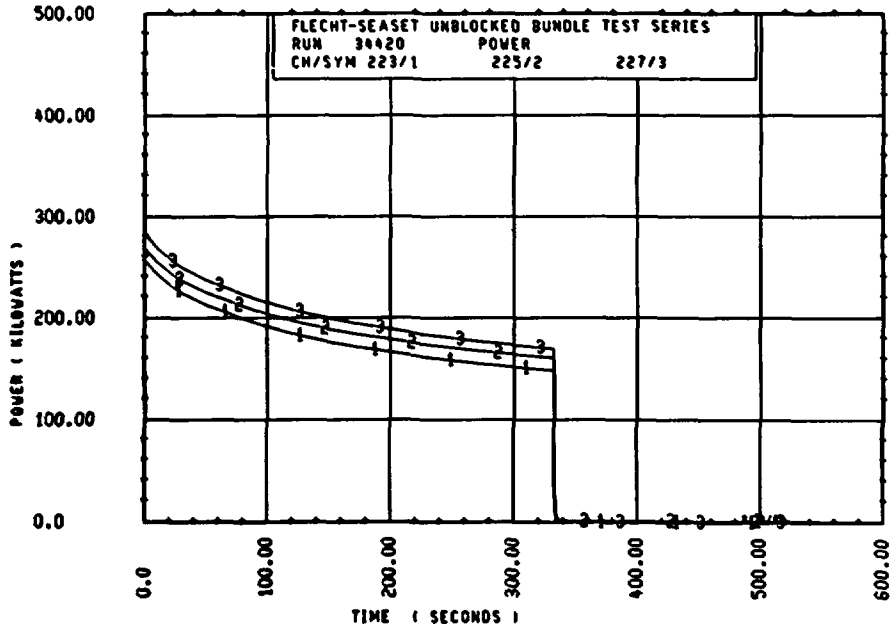

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

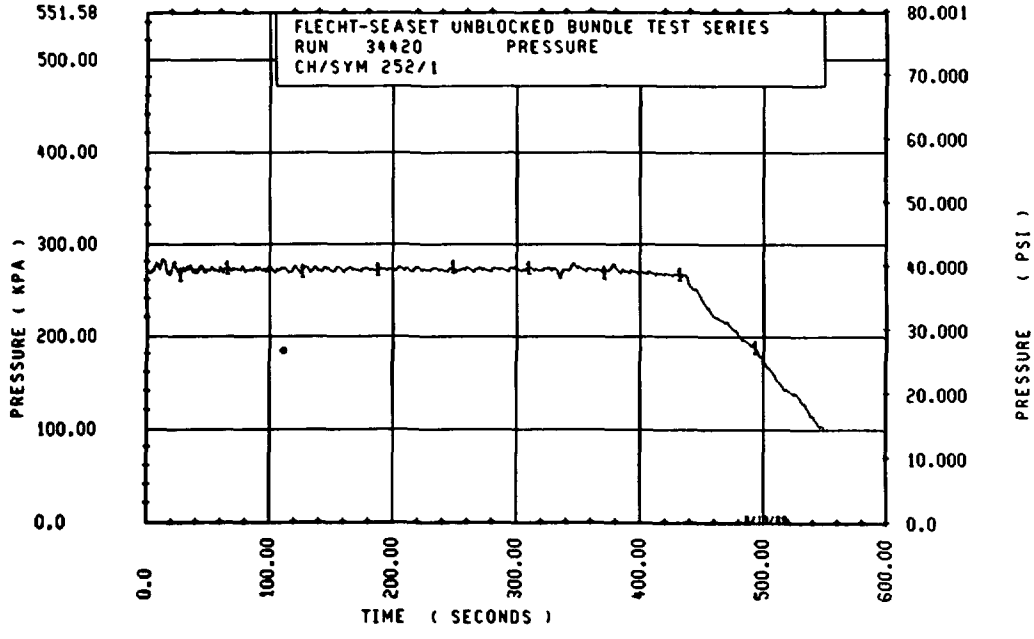

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

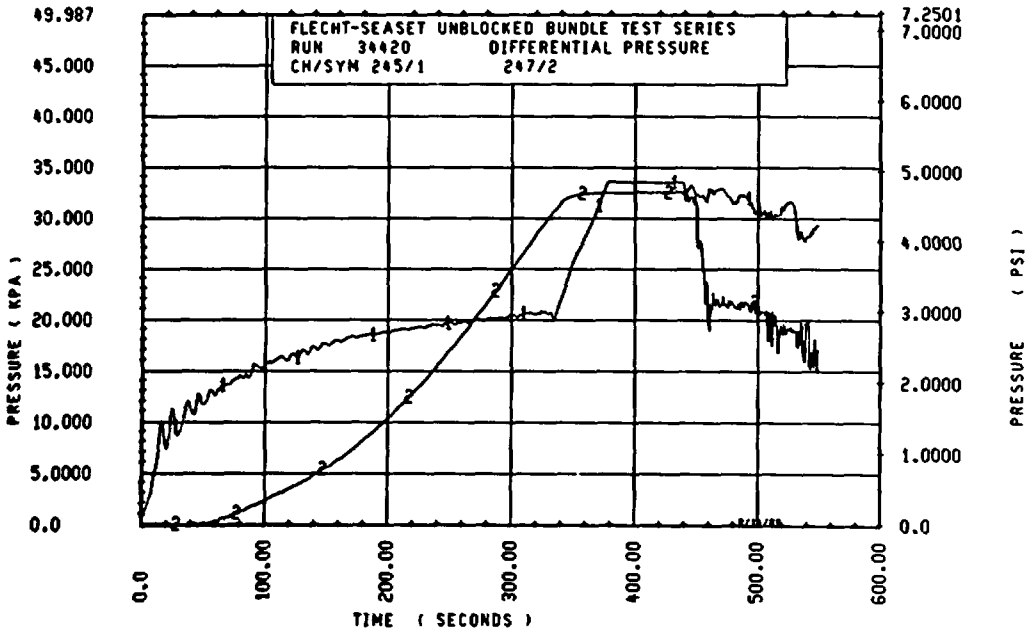


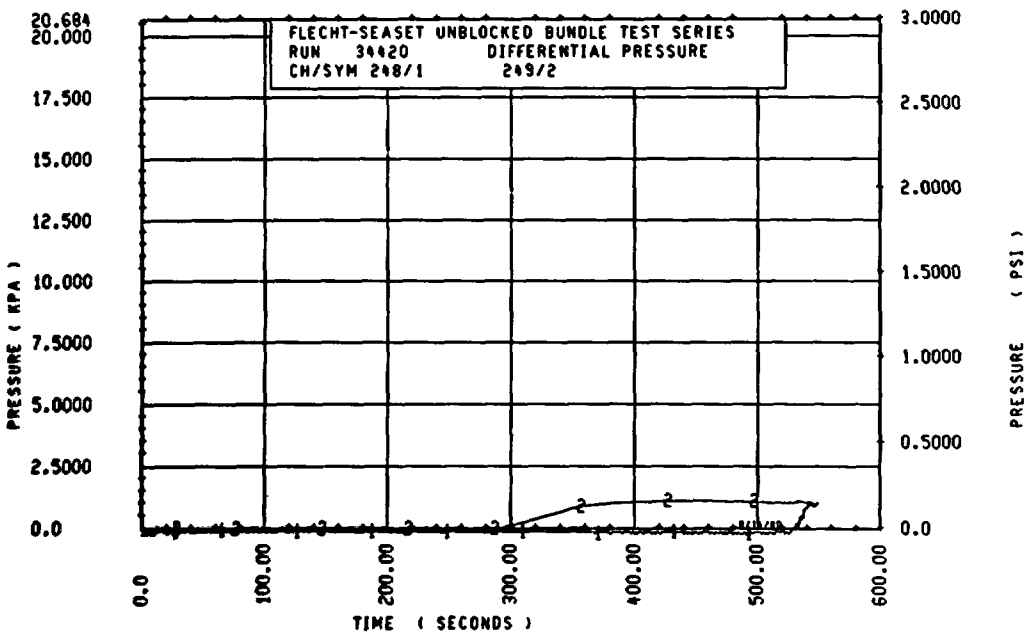


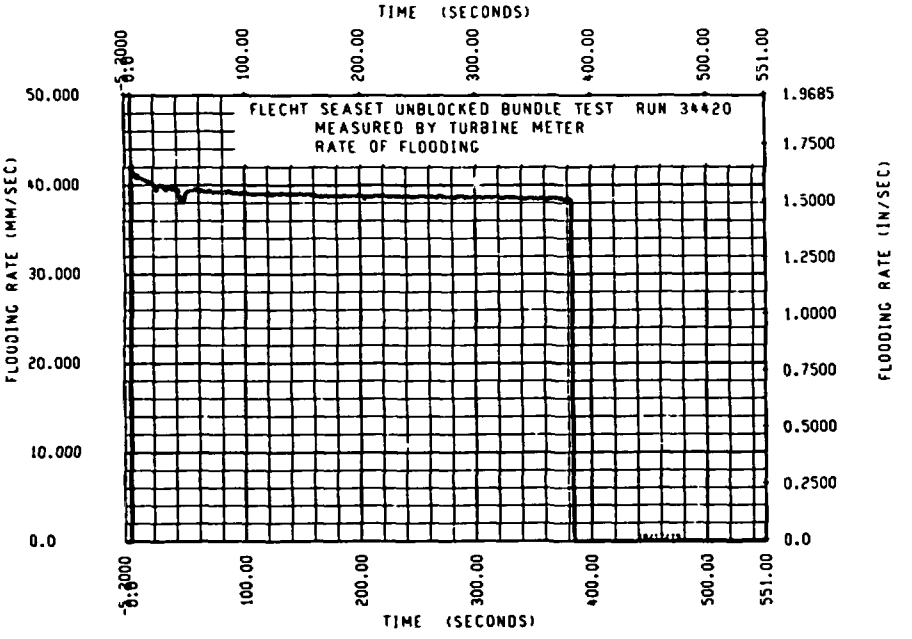
CH 203-7L, 0.30 m (12 in.); CH 178-7L, 0.99 m (39 in.);
CH 206-7L, 2.82 m (111 in.); CH 207-4I, 3.05 m (120 in.)

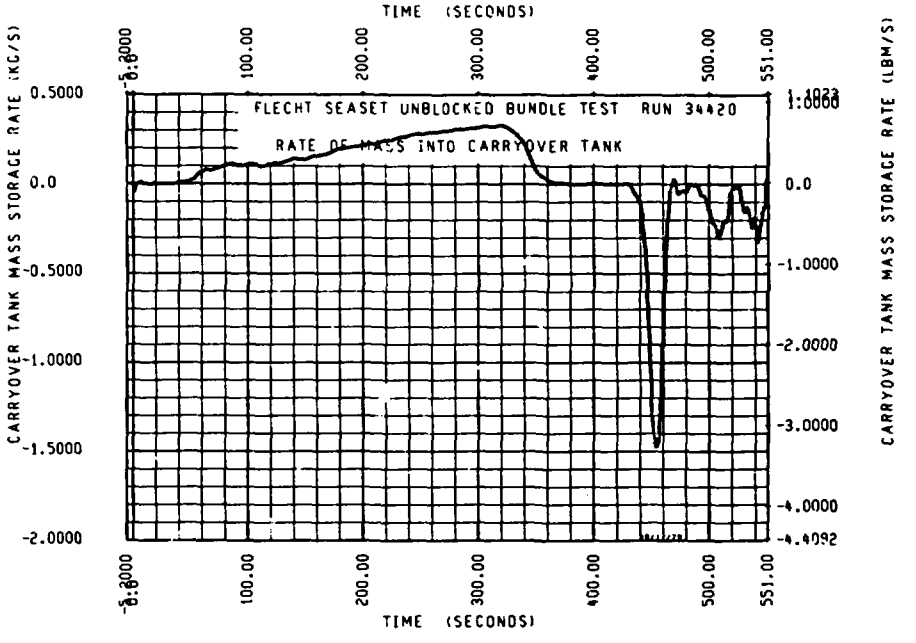

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

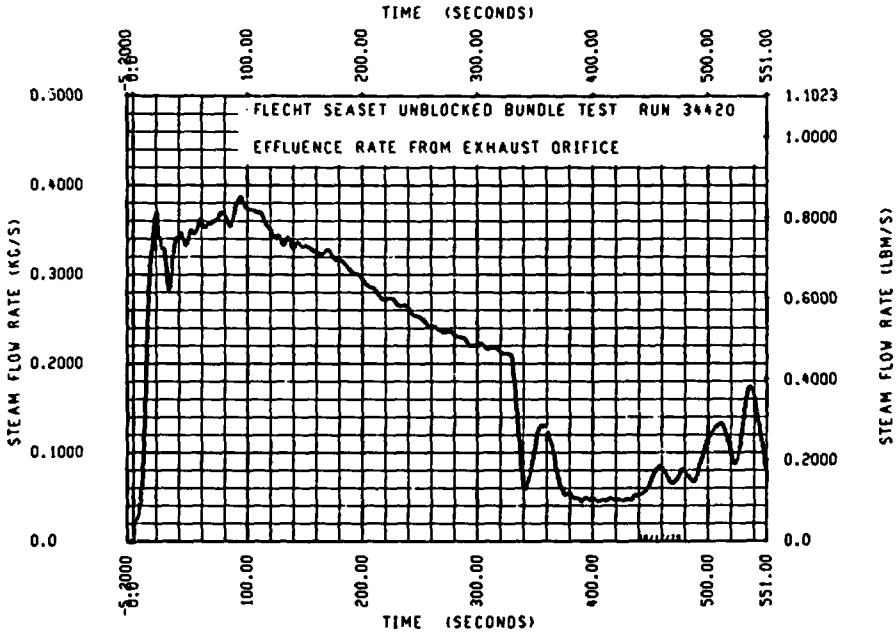

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

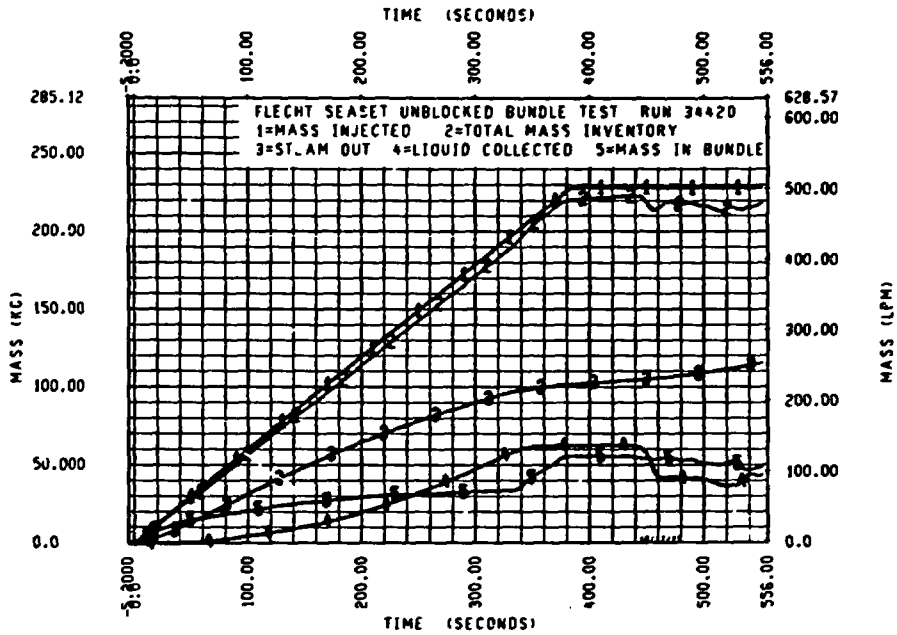

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

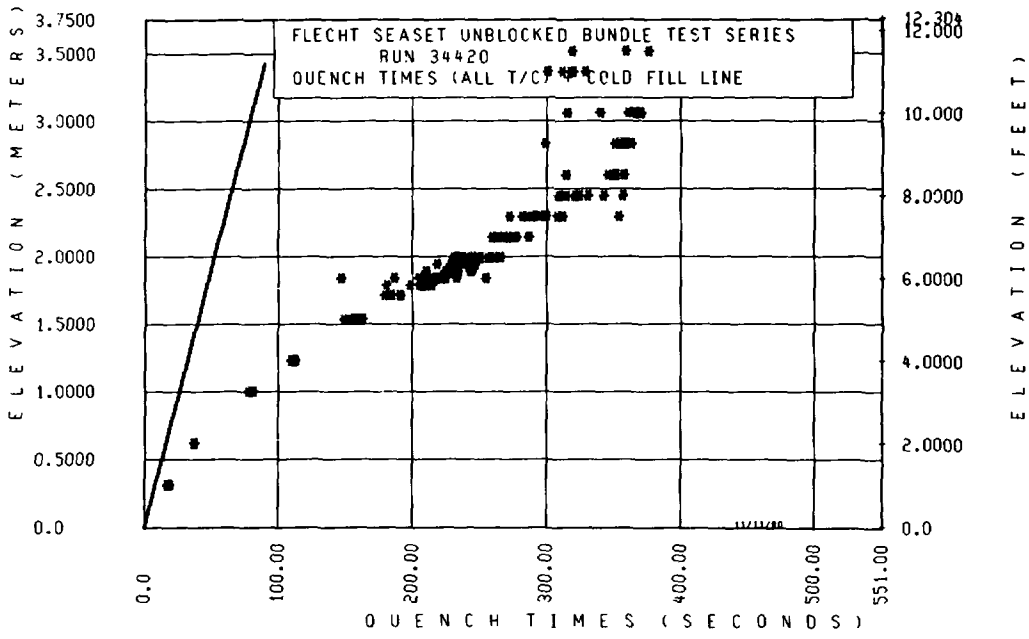

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

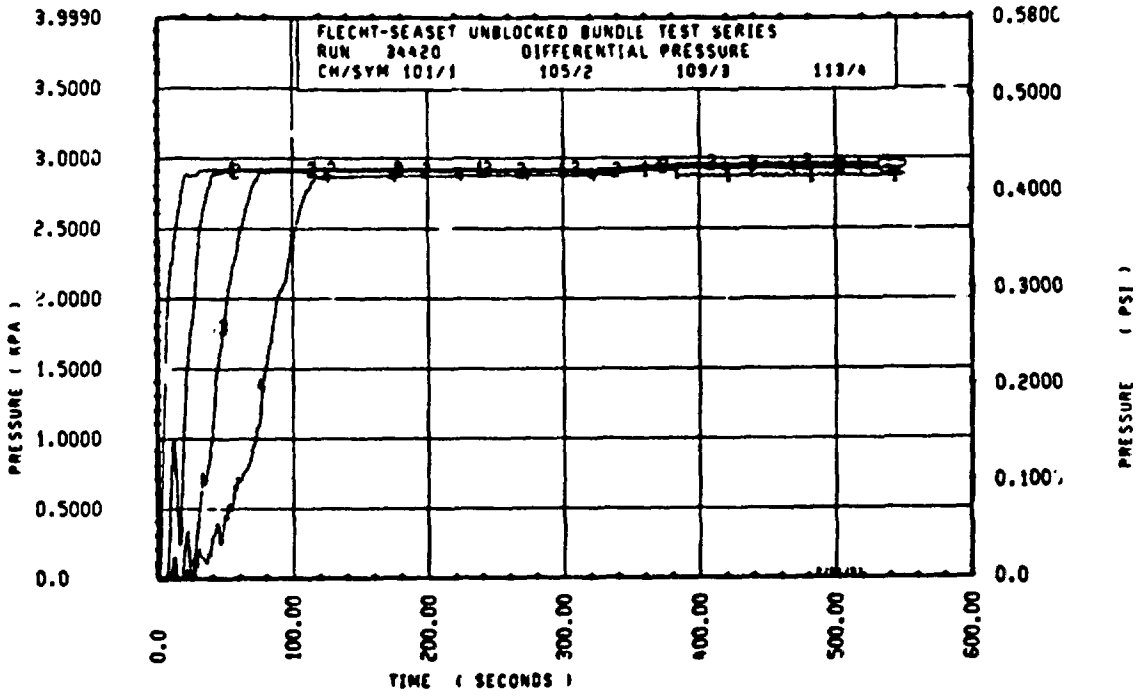

TIME (SECONDS)
-5.2000
0.0
100.00
200.00
300.00
400.00
500.00
551.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34420
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
FLOODING RATE (IN/SEC)
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0

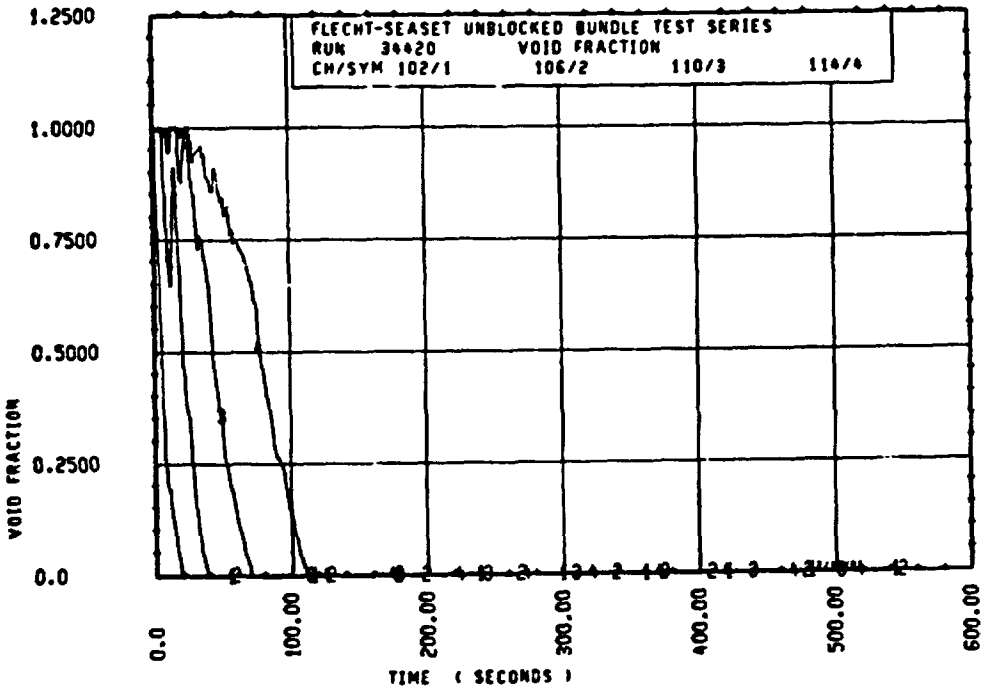

TIME (SECONDS)
-5.2000
0.0
100.00
200.00
300.00
400.00
500.00
551.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34420
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
1.1023
1.0000
0.0
-1.0000
-2.0000
-3.0000
-4.0000
-4.4092

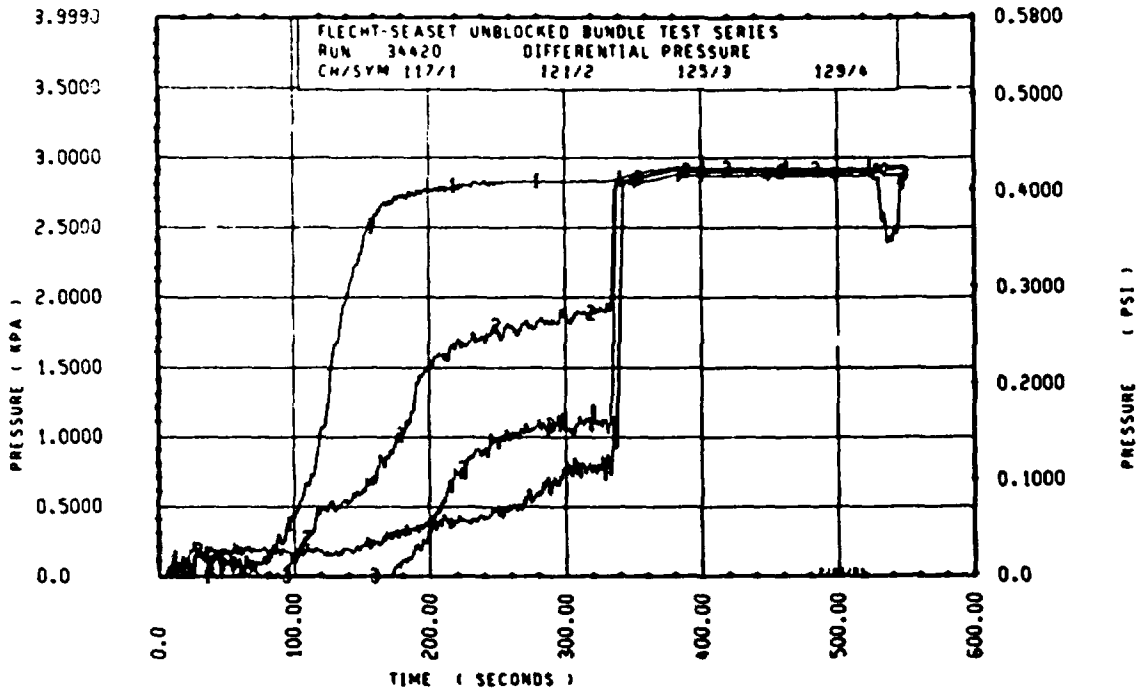

TIME (SECONDS)
-5.0000
100.00
200.00
300.00
400.00
500.00
551.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34420
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
STEAM FLOW RATE (LBM/S)
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0

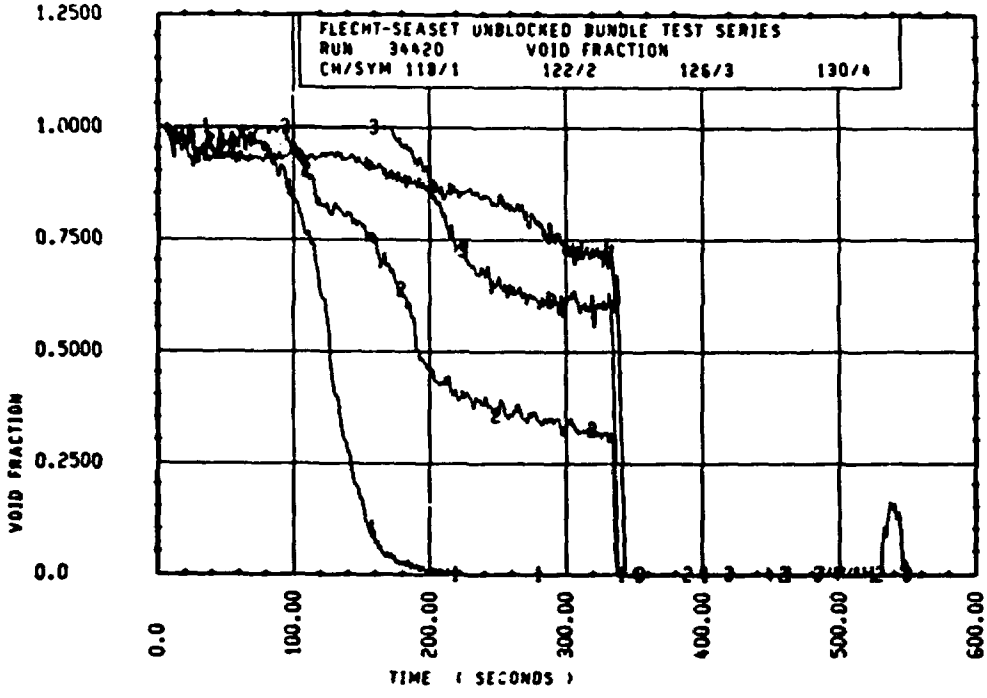

TIME (SECONDS)
-5.0000
100.00
200.00
300.00
400.00
500.00
556.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34420
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
285.12
250.00
200.00
150.00
100.00
50.000
0.0
MASS (LBM)
628.57
600.00
500.00
400.00
300.00
200.00
100.00
0.0

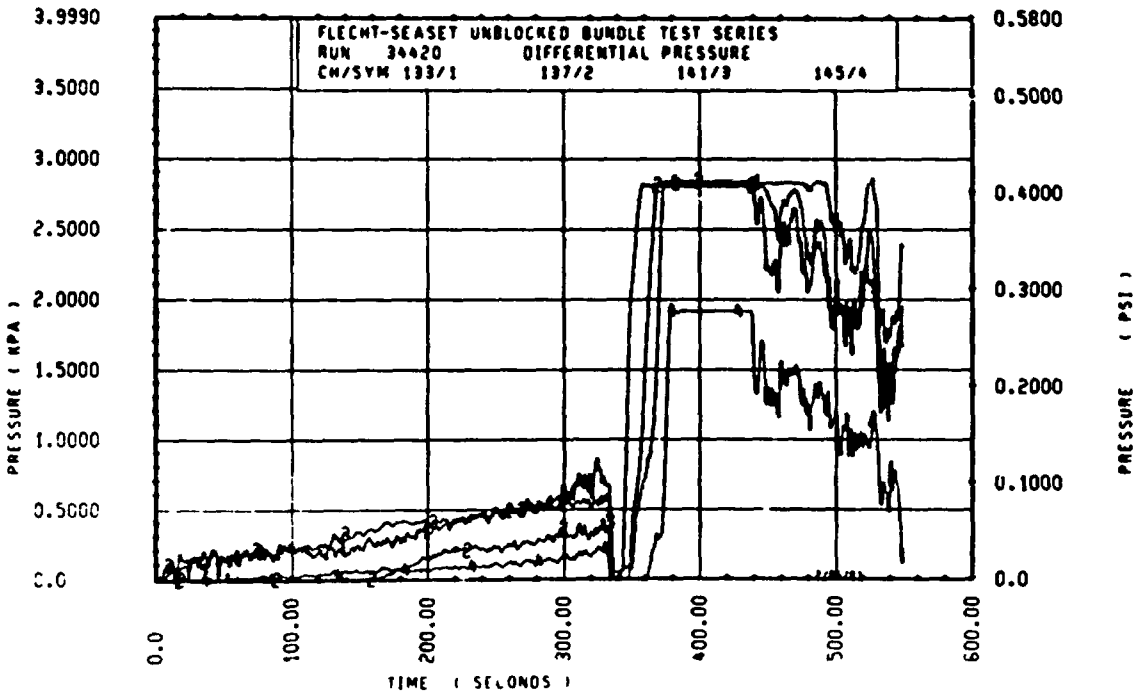

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420
QUENCH TIMES (ALL T/C'S) COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
551.00
QUENCH TIMES (SECONDS)

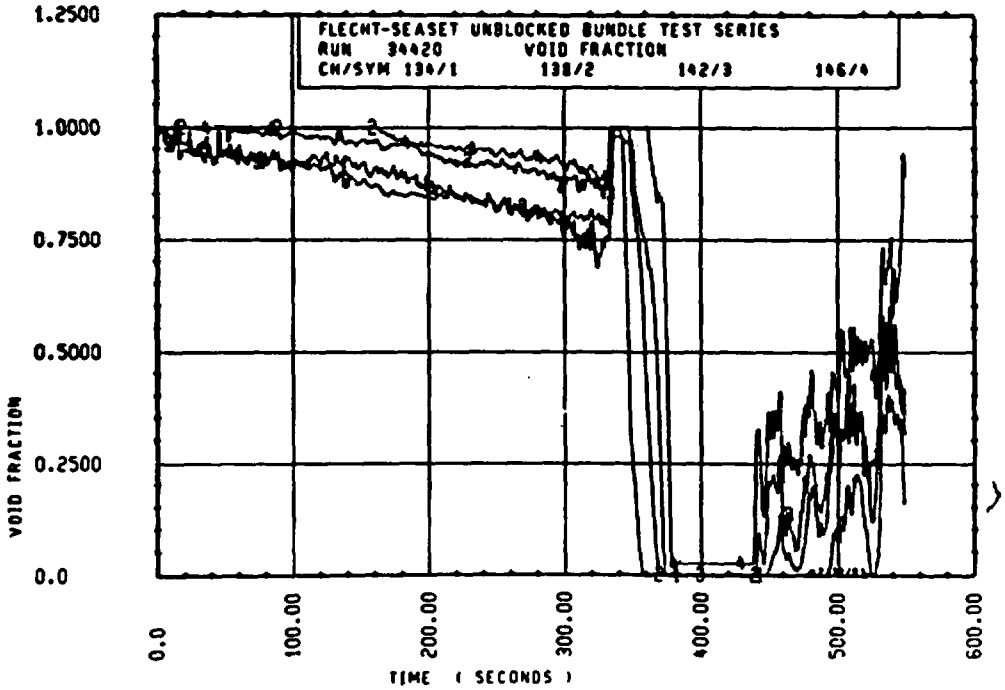

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5000
0.4000
0.3000
0.2000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34420 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 34524
Date: 8/7/79
Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	878°C (1612°F)
Rod peak power	3.0 kw/m (1.0 kw/ft)
Flow rate	39.9 mm/sec (1.57 in./sec)
Coolant temperature	52°C (125°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	138°C (281°F)	97°C (207°F)
1.22 m (48 in.)	160°C (320°F)	133°C (271°F)
1.83 m (72 in.)	222°C-250°C (431°F-482°F)	279°C-486°C (535°F-907°F)
2.44 m (96 in.)	176°C-200°C (349°F-392°F)	134°C-373°C (273°F-703°F)
2.74 m (108 in.)	182°C (359°F)	131°C (268°F)
3.05 m (120 in.)	133°C-140°C (272°F-284°F)	131°C (267°F)
3.35 m (132 in.)	131°C-132°C (267°F-270°F)	129°C-149°C (264°F-300°F)

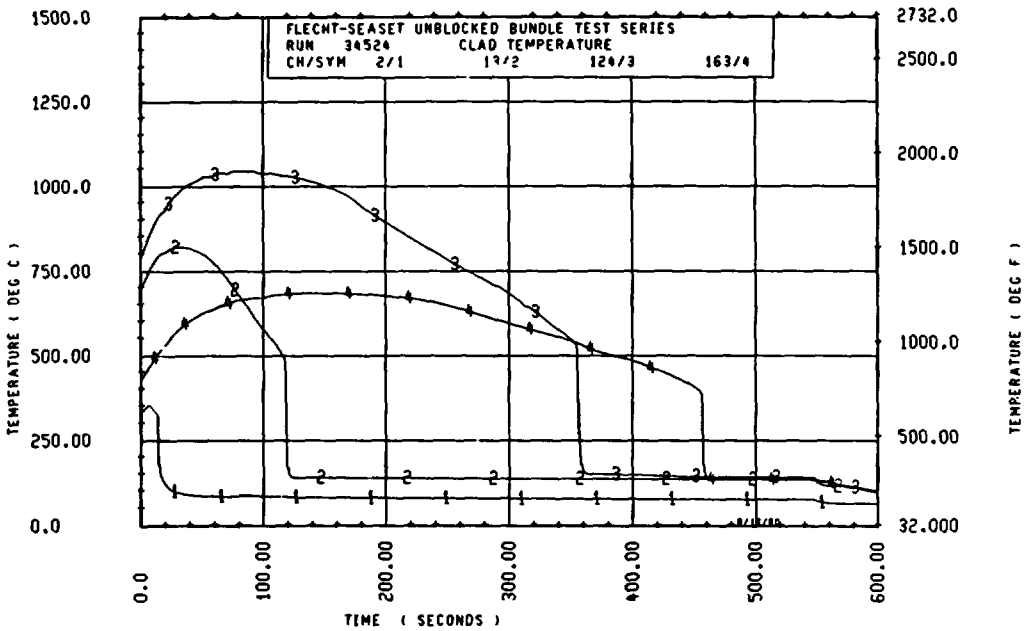
*At 62 seconds after flood

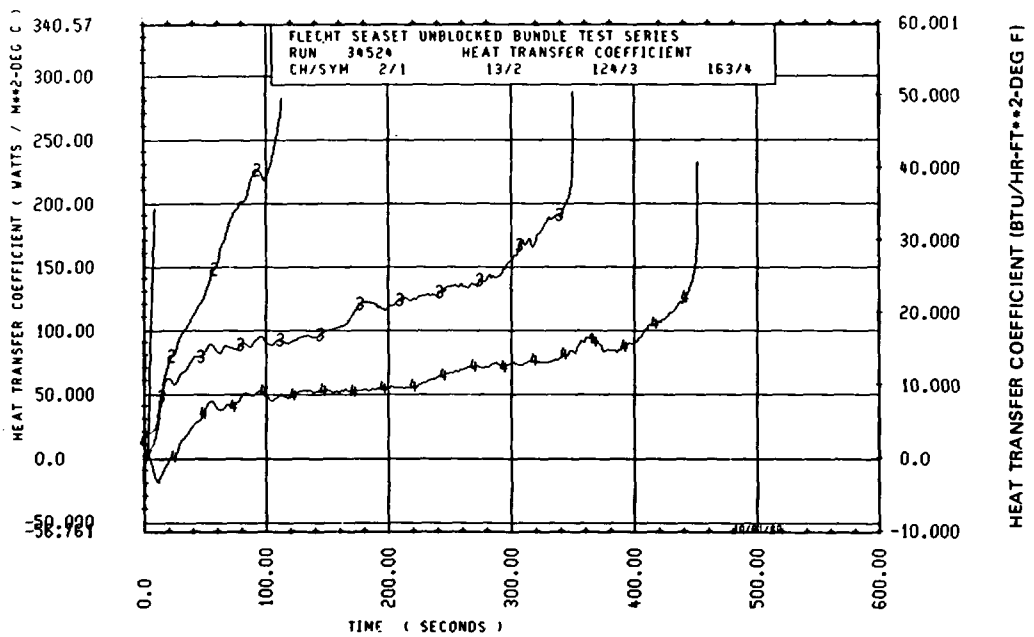
C. Comments

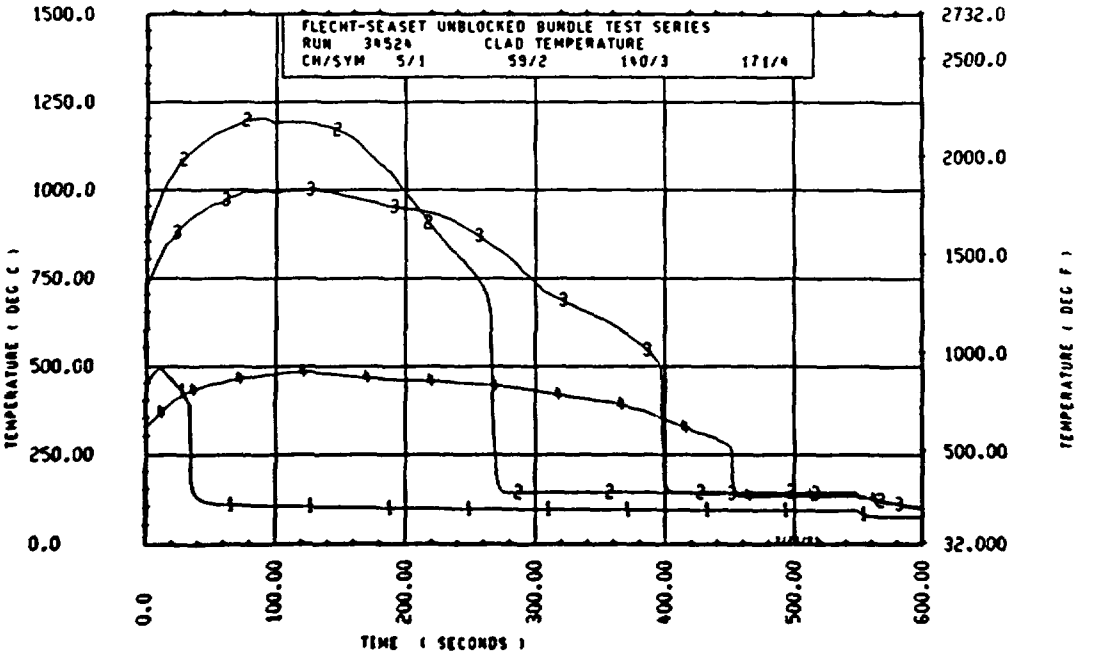
None

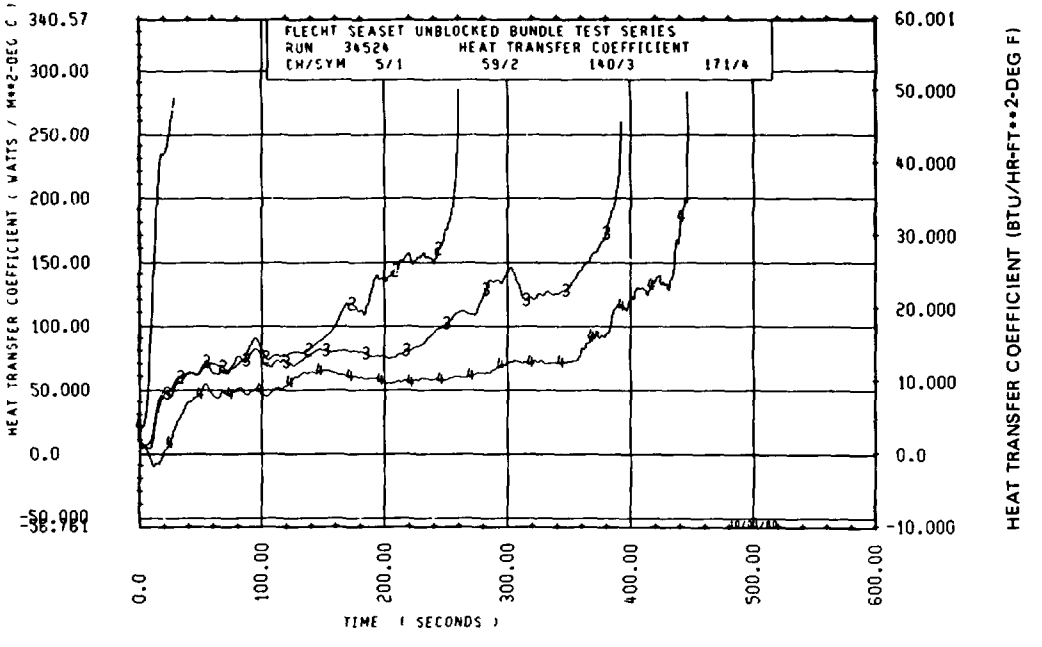
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 34524

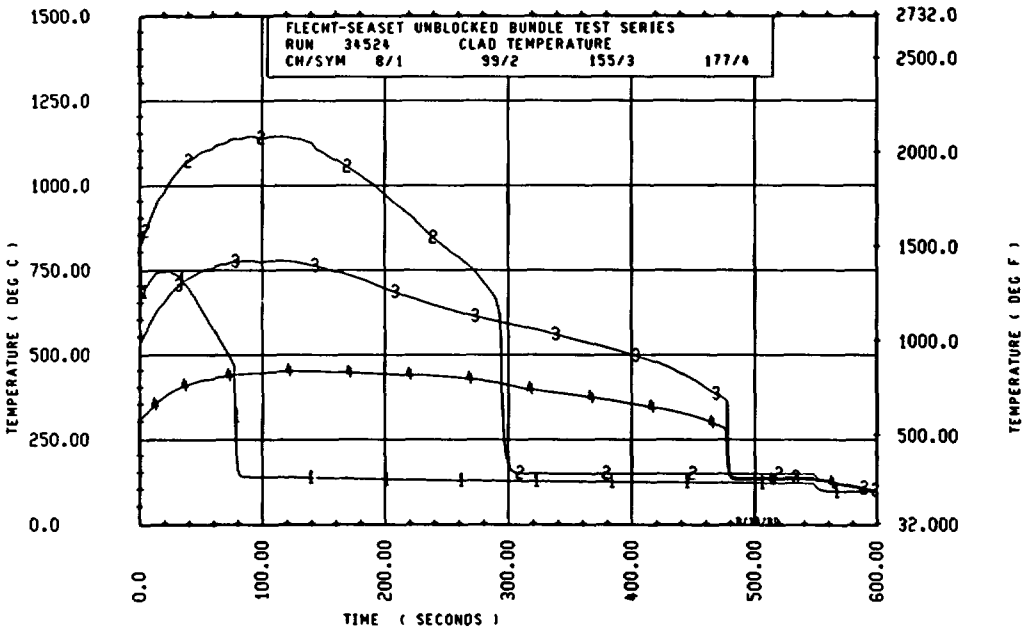
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1283.	1500.	216.	29.5	897.	119.0
2H 8- 0	50	1587.	1961.	374.	64.0	1038.	256.8
3C 5- 0	17	1351.	1573.	222.	35.0	932.	185.9
3C 5- 7	28	1447.	1689.	241.	33.5	900.	226.7
4L 8- 0	129	1312.	1721.	409.	64.0	862.	393.9
4L 8- 6	147	1316.	1721.	404.	64.0	853.	394.5
5E11- 0	168	630.	869.	238.	90.0	495.	462.0
5J 4- 0	12	1244.	1481.	236.	31.5	869.	120.0
5J 8- 6	146	1111.	1425.	313.	76.0	742.	425.9
5J11- 6	175	594.	804.	211.	107.0	541.	454.0
7B 6- 0	57	1432.	1783.	351.	52.0	927.	221.9
7B 8- 6	142	1108.	1423.	315.	77.0	716.	445.0
7B10- 0	162	833.	1224.	391.	93.0	638.	500.9
7B11- 6	176	647.	948.	301.	107.0	515.	520.0.
7D 6- 4	84	1629.	2063.	435.	76.0	1173.	257.4
7D 7- 6	119	1478.	1850.	372.	52.0	923.	356.9
7D 9- 3	151	999.	1444.	446.	105.0	709.	460.0
7G 5- 0	23	1527.	1818.	291.	47.5	1078.	168.7
7J 6- 0	59	1604.	2199.	595.	89.0	1196.	265.6
7M 7- 6	120	1463.	1955.	492.	76.0	938.	370.0
7M 8- 0	132	1329.	1844.	515.	75.0	898.	399.9
7M 9- 3	152	1018.	1447.	429.	91.0	714.	443.0
8H 4- 0	13	1284.	1508.	224.	29.5	910.	118.0
8H10- 0	163	810.	1264.	454.	143.0	728.	456.0
8H11- 6	177	591.	845.	253.	120.0	535.	476.4
8K 4- 0	14	1258.	1491.	233.	34.5	901.	115.0
8K 6- 6	99	1505.	2092.	586.	91.0	1133.	293.5
8K 8- 0	140	1341.	1833.	492.	130.0	924.	396.8
8K10- 0	164	830.	1284.	454.	126.0	679.	476.3
8N 2- 0	5	848.	924.	76.	10.5	742.	34.0
8N 4- 0	15	1285.	1510.	225.	34.5	918.	115.9
8N 6- 0	61	1554.	2021.	468.	91.0	1207.	246.7
8N10- 0	165	836.	1321.	485.	92.0	704.	473.0
9C 7- 0	109	1470.	1777.	306.	49.5	873.	319.9
9C 9- 3	153	1020.	1453.	433.	119.0	755.	443.0
9G 1- 0	2	632.	669.	37.	6.0	613.	14.0
9G 3- 3	8	1228.	1378.	150.	23.5	874.	77.0
9G11- 0	171	624.	905.	281.	120.0	519.	450.9
9I 5- 0	24	1531.	1846.	315.	51.0	1054.	174.9
9E 6- 2	46	1531.	2046.	515.	76.0	965.	269.0
10D 6- 6	93	1490.	1919.	429.	116.0	869.	294.3
11E 7- 6	124	1453.	1912.	459.	91.0	982.	354.9
11E 9- 3	155	1000.	1430.	430.	90.0	682.	477.0
11E11- 0	172	615.	934.	319.	122.0	597.	431.0
12D 4- 0	16	1283.	1504.	221.	27.0	908.	117.0
12D 6- 0	66	1564.	1989.	424.	75.0	1074.	253.7
12F 6- 6	102	1523.	2082.	559.	83.0	1036.	282.7

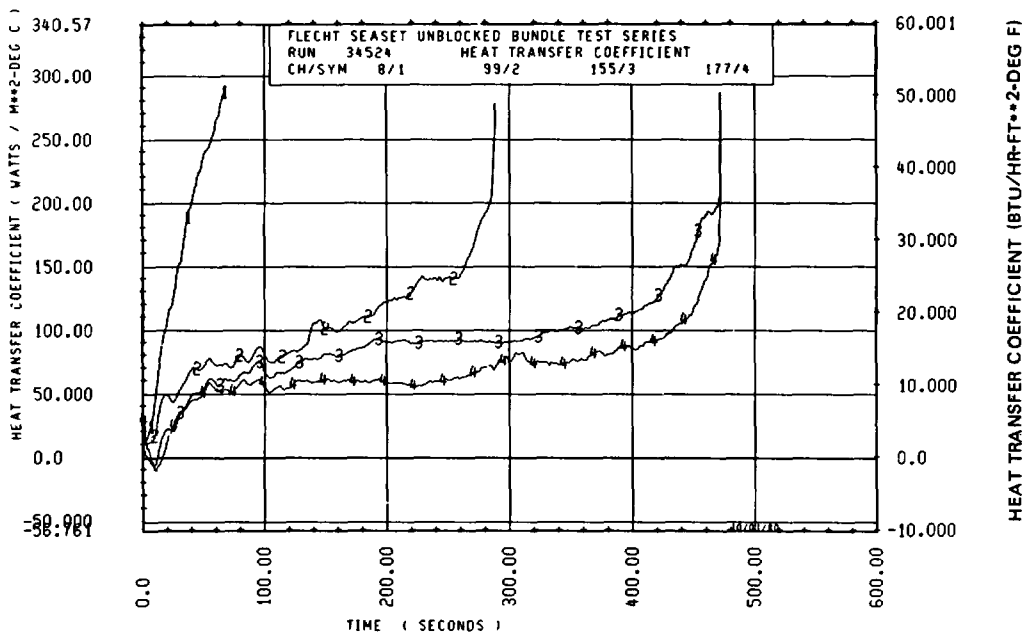

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

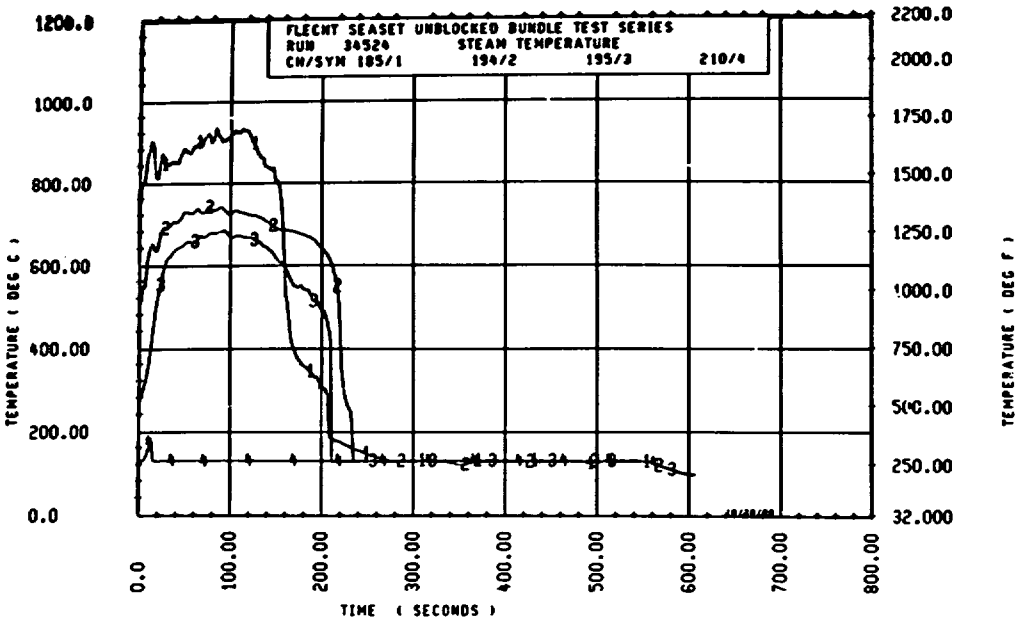

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

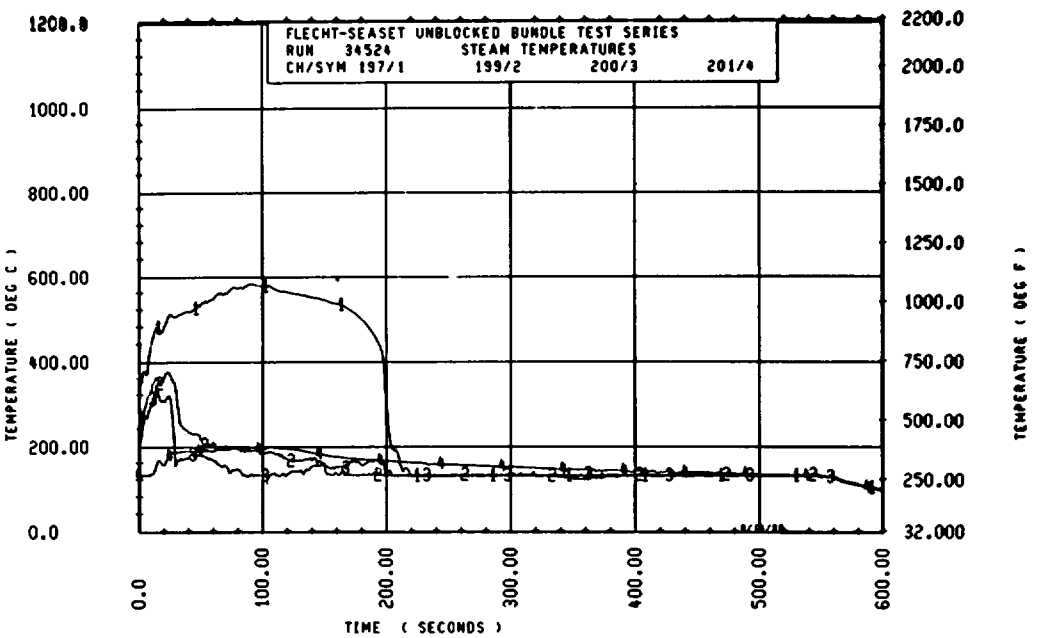

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

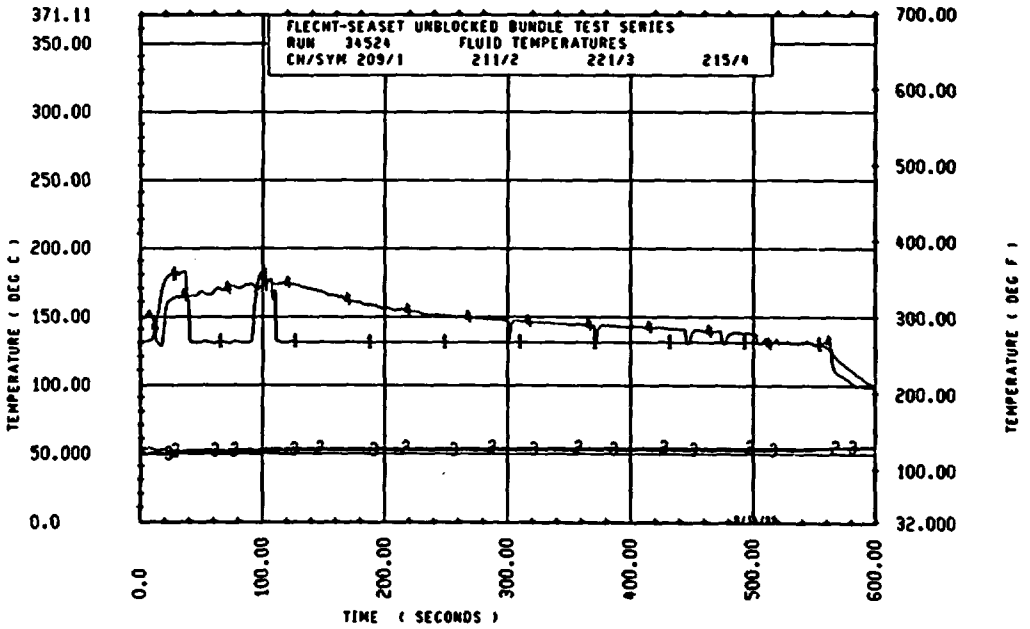

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

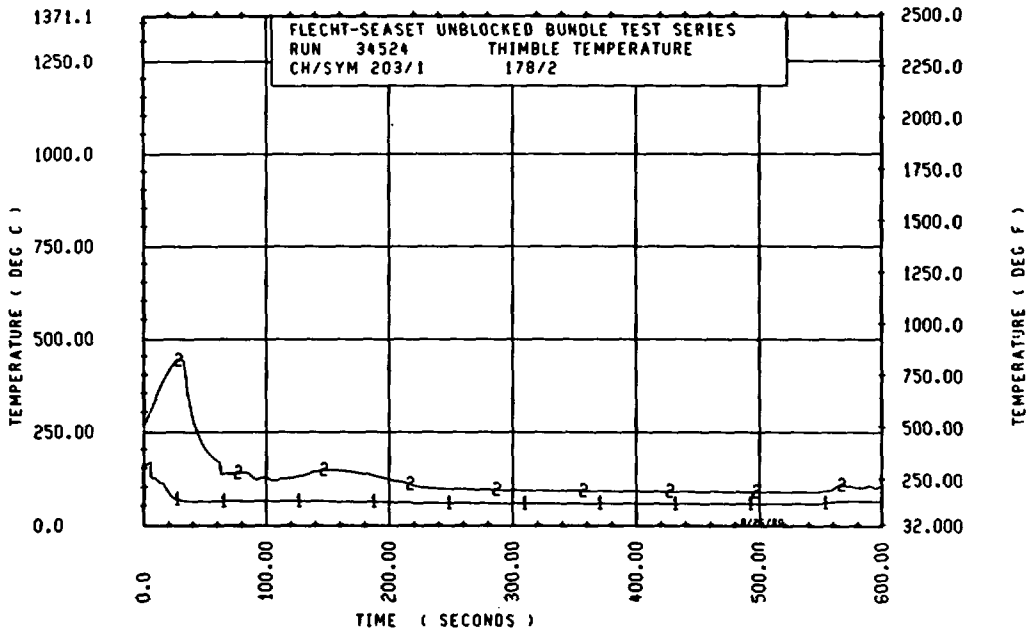

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-58.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

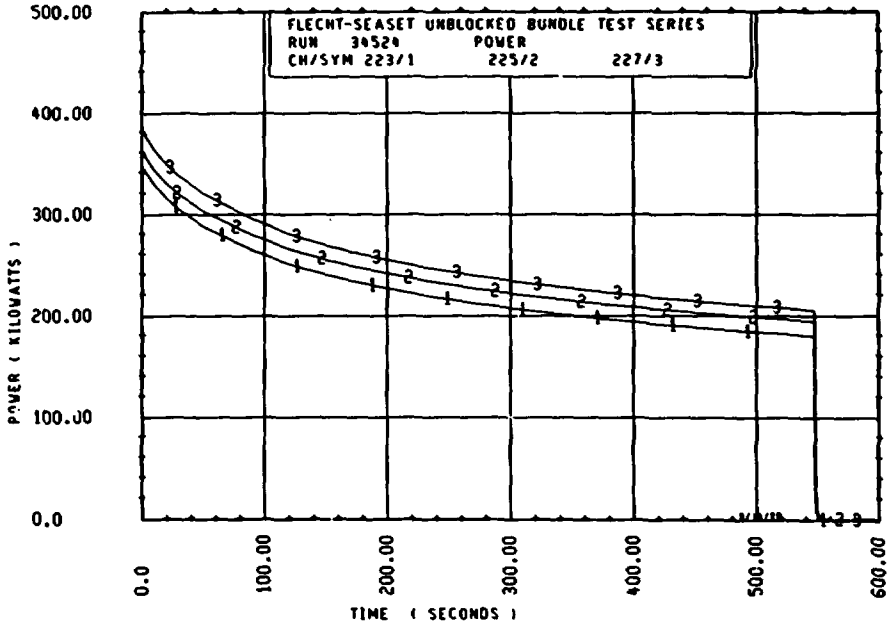

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

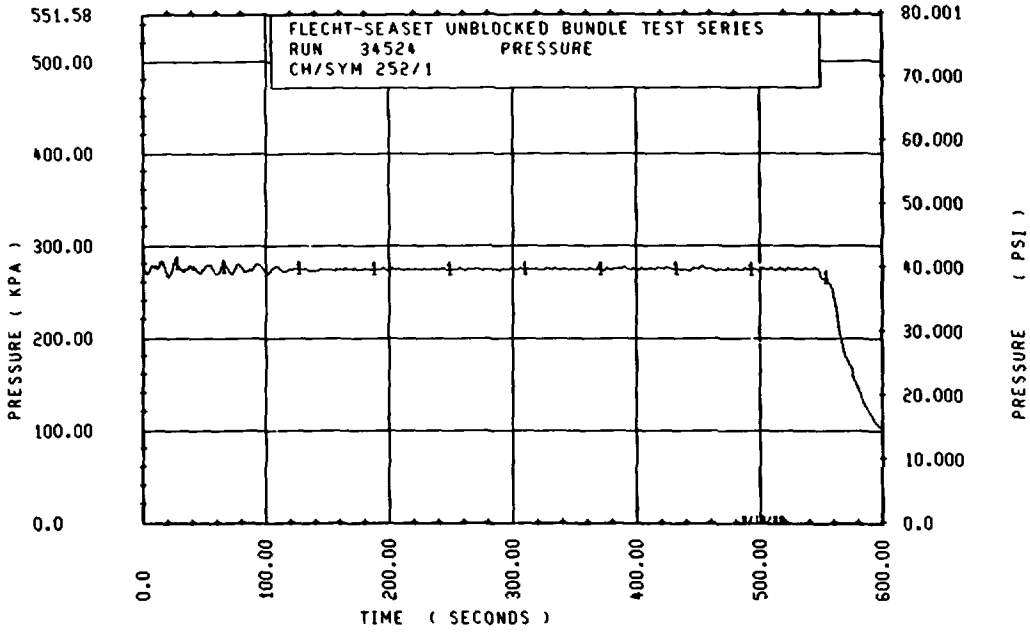

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

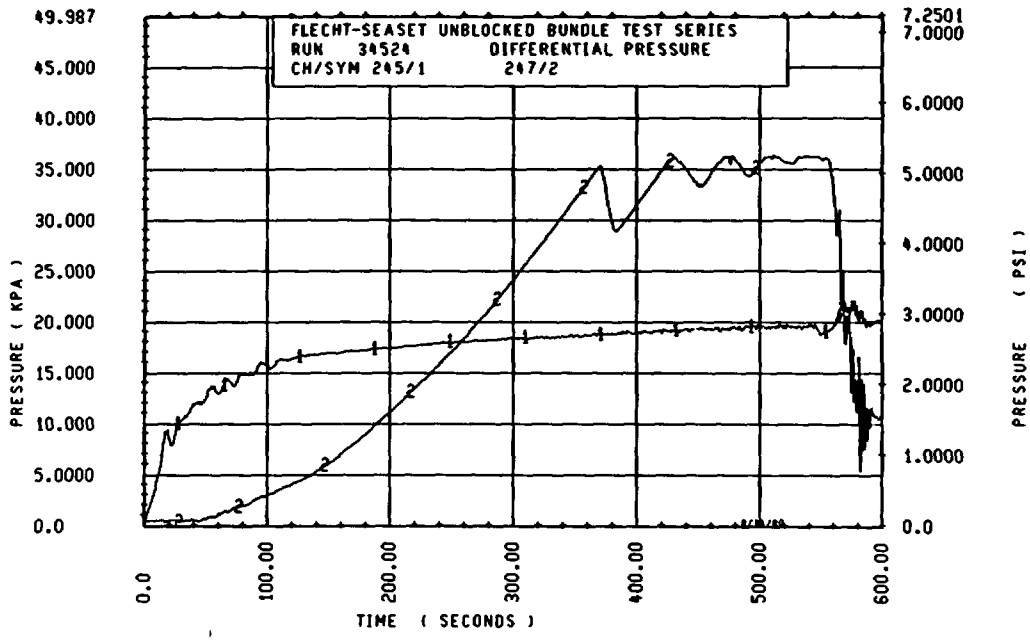


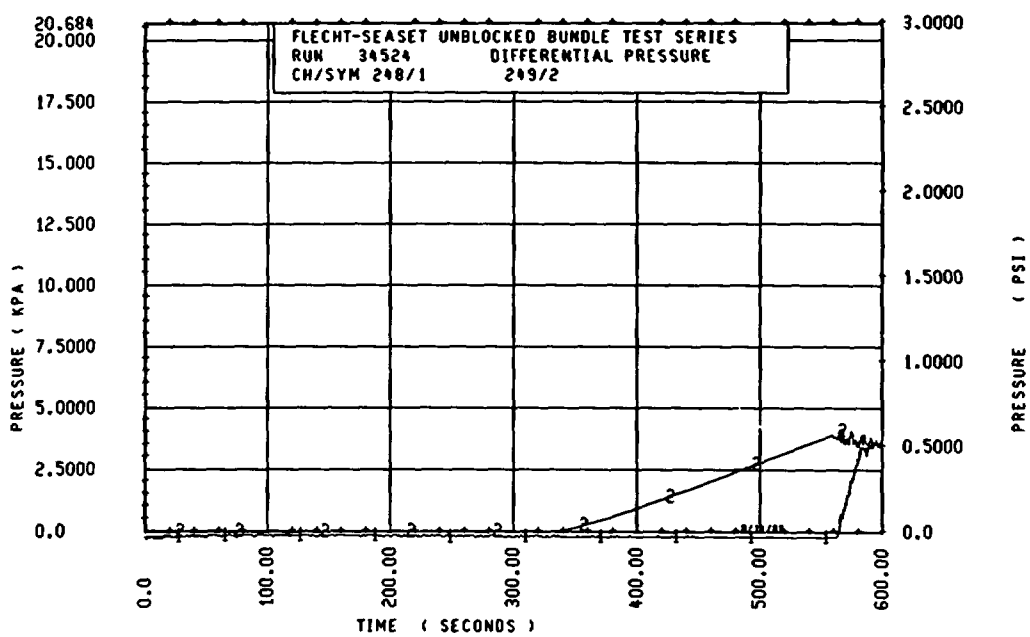


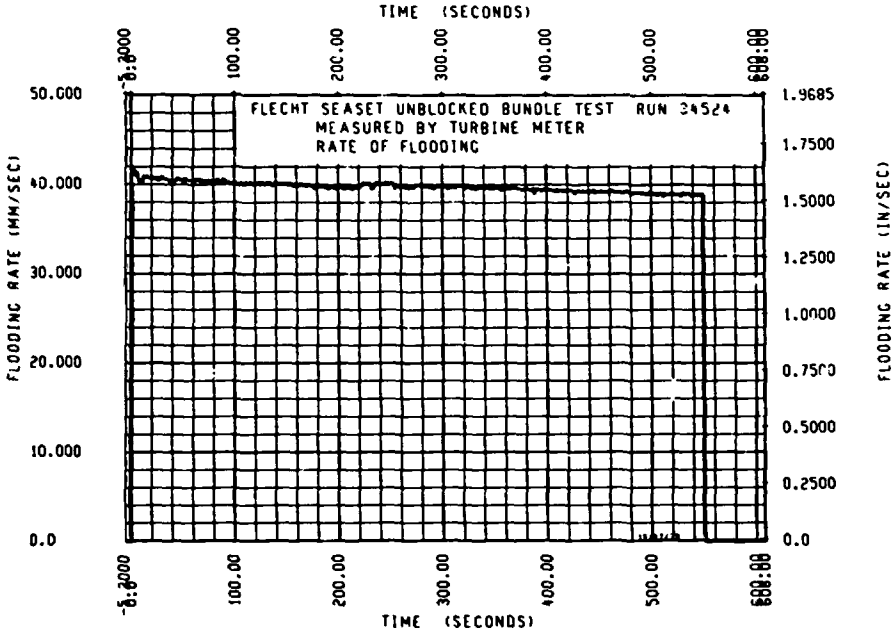
CH 203-7L, 0.30 m (12 in.); CH 178-7L, 0.99 m (39 in.)

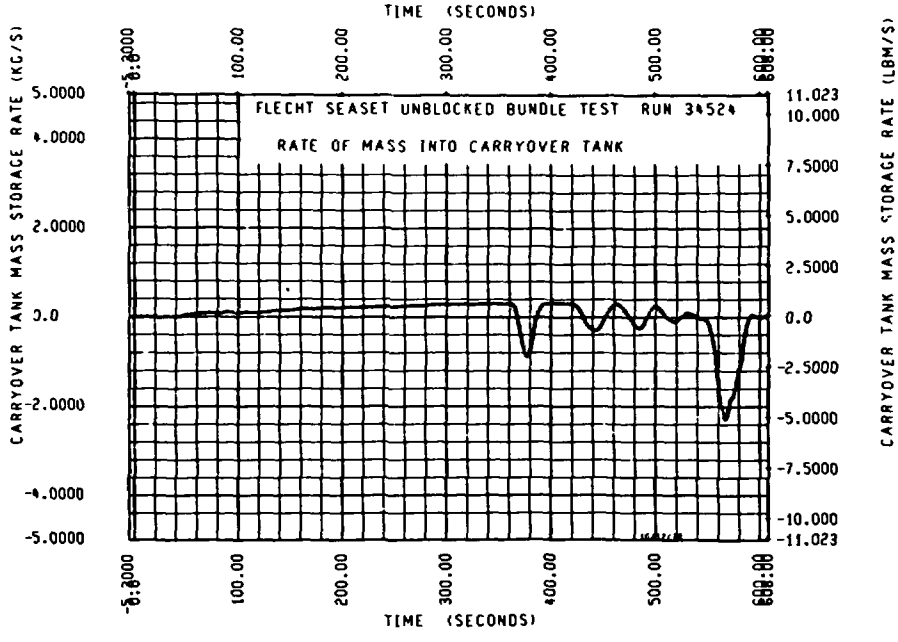

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

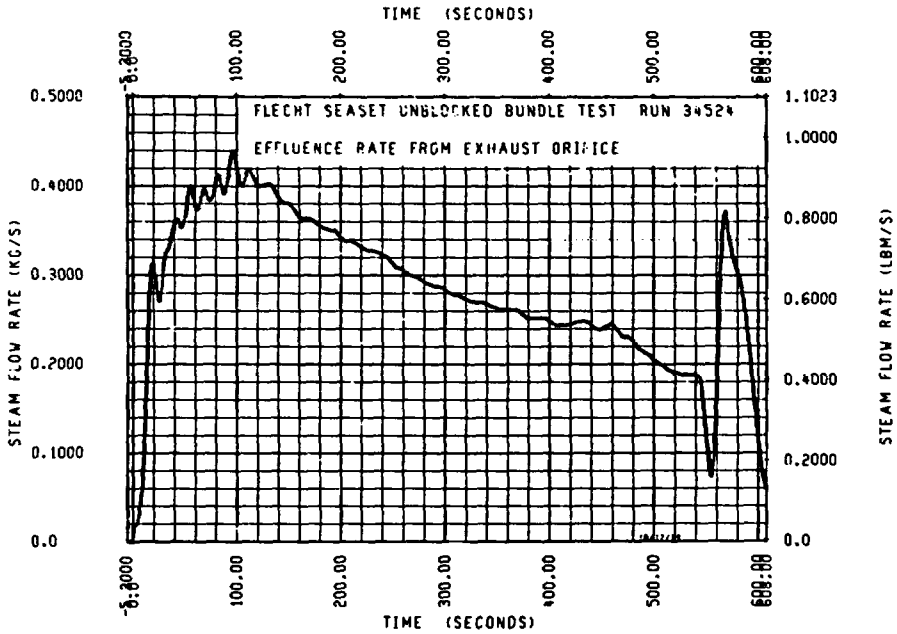

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

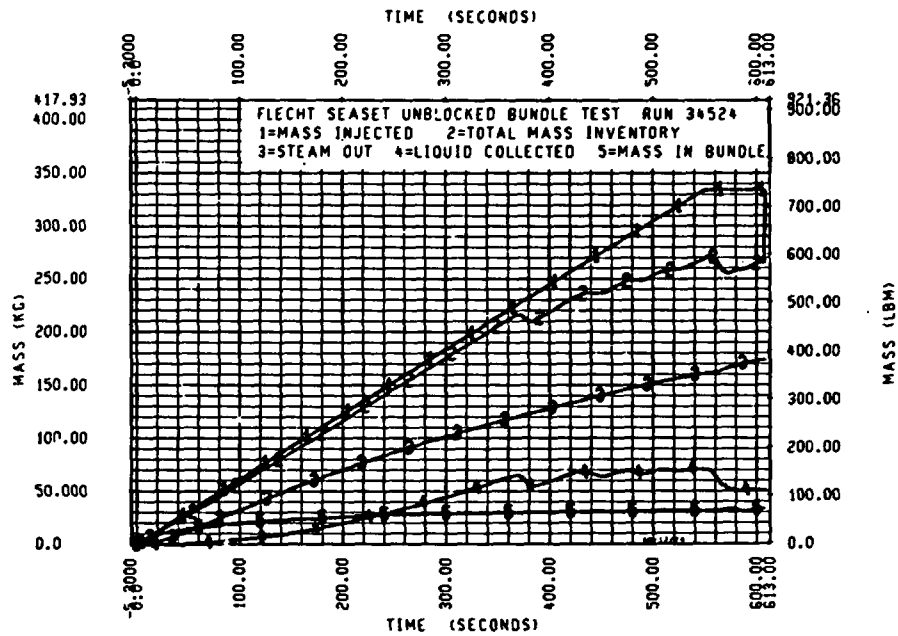

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

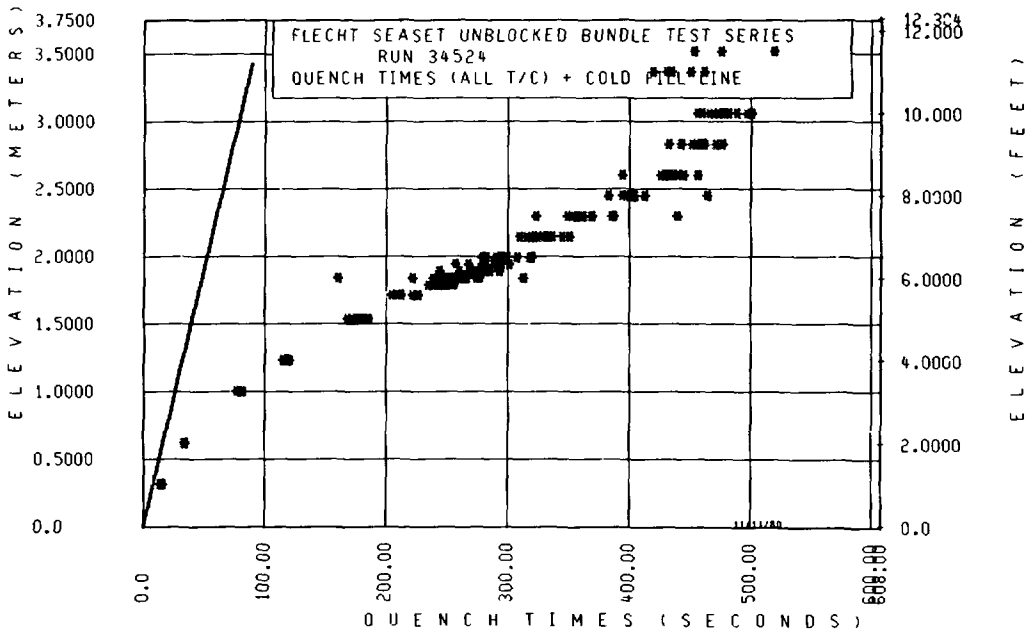

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

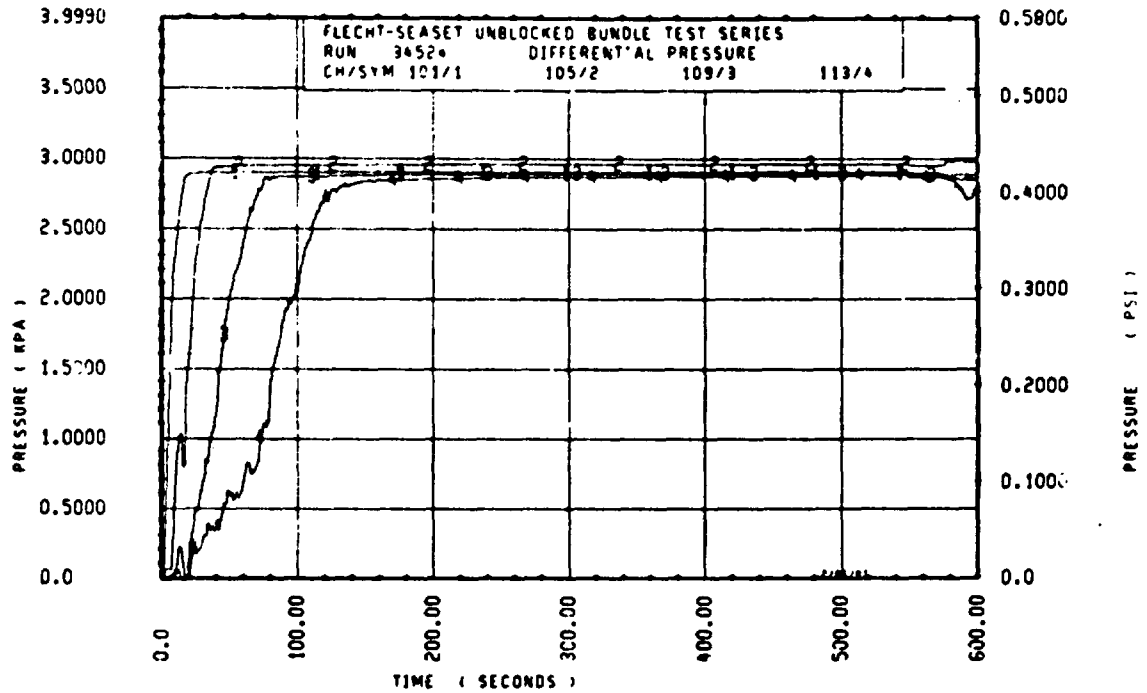

TIME (SECONDS)
-5.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34524
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
FLOODING RATE (IN/SEC)
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0

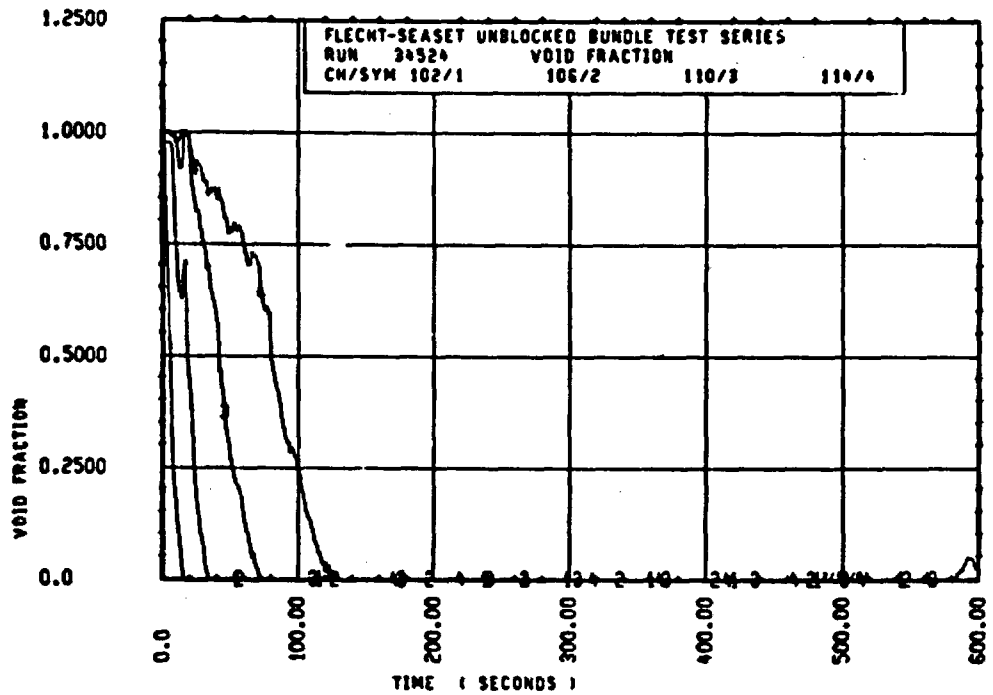

TIME (SECONDS)
-5.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34524
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
5.0000
4.0000
2.0000
0.0
-2.0000
-4.0000
-5.0000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
11.023
10.000
7.5000
5.0000
2.5000
0.0
-2.5000
-5.0000
-7.5000
-10.000
-11.023

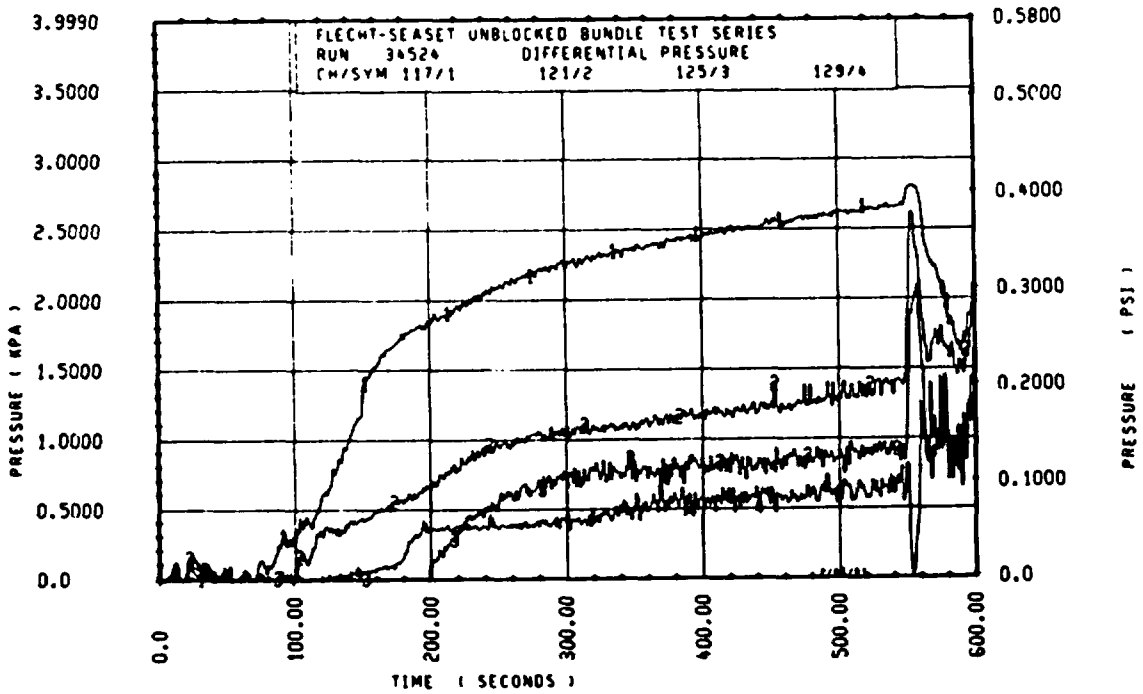

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34524
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-8.2000
100.00
200.00
300.00
400.00
500.00
600.00

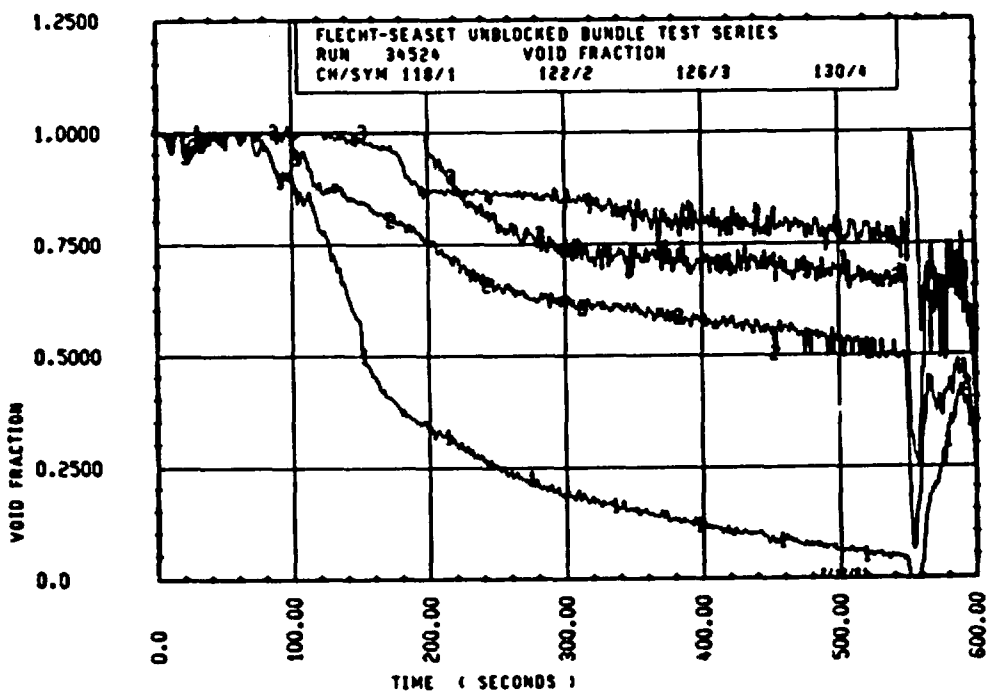

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34524
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
417.93
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
921.36
900.00
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-8.2000
100.00
200.00
300.00
400.00
500.00
600.00
613.00

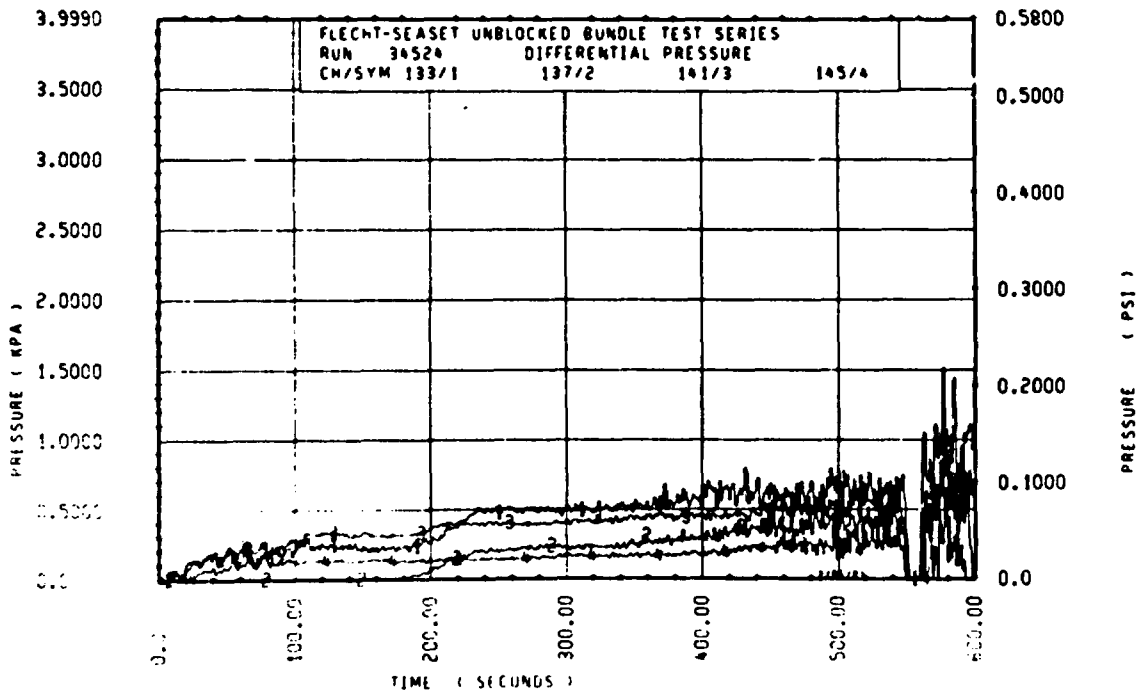

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.324
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
QUENCH TIMES (SECONDS)

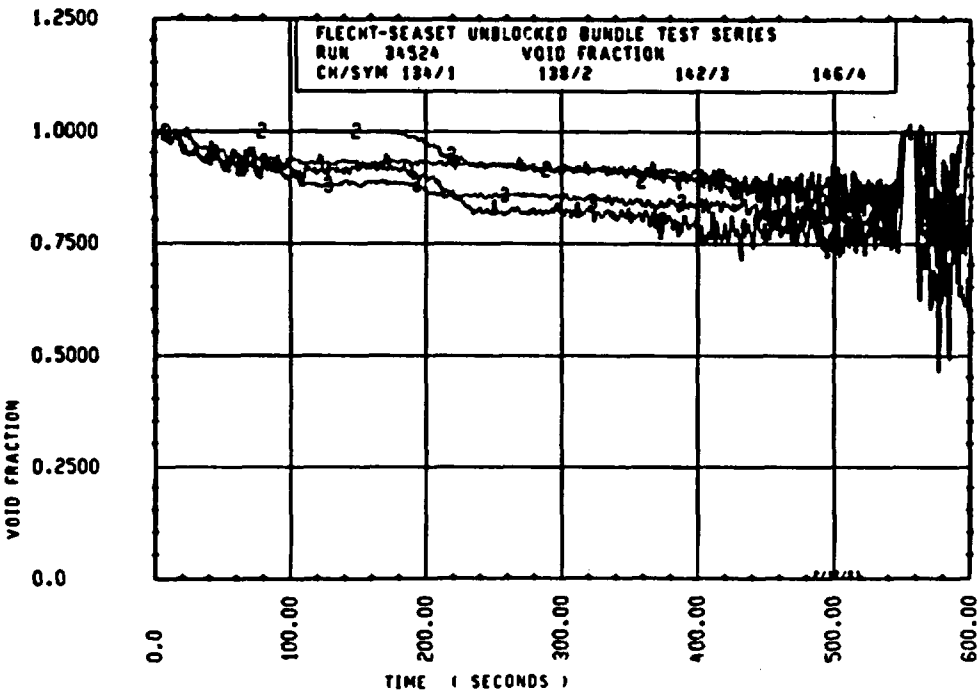

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
PRESSURE (KPA)
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
PRESSURE (PSI)
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34524 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
VOID FRACTION
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 34610

Date: 8/8/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.14 MPa (20 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	892°C (1637°F)
Rod peak power	1.4 kw/m (0.42 kw/ft)
Flow rate	21 mm/sec (0.82 in./sec)
Coolant temperature	32°C (90°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	109°C (228°F)	54°C (129°F)
1.22 m (48 in.)	143°C-154°C (293°F-309°F)	96°C (204°F)
1.83 m (72 in.)	170°C-213°C (338°F-415°F)	112°C-397°C (234°F-746°F)
2.44 m (96 in.)	160°C-193°C (320°F-379°F)	109°C-556°C (228°F-1032°F)
2.74 m (108 in.)	149°C (300°F)	107°C (225°F)
3.05 m (120 in.)	117°C-131°C (242°F-267°F)	106°C-158°C (223°F-317°F)
3.35 m (132 in.)	113°C-117°C (235°F-243°F)	106°C (222°F)

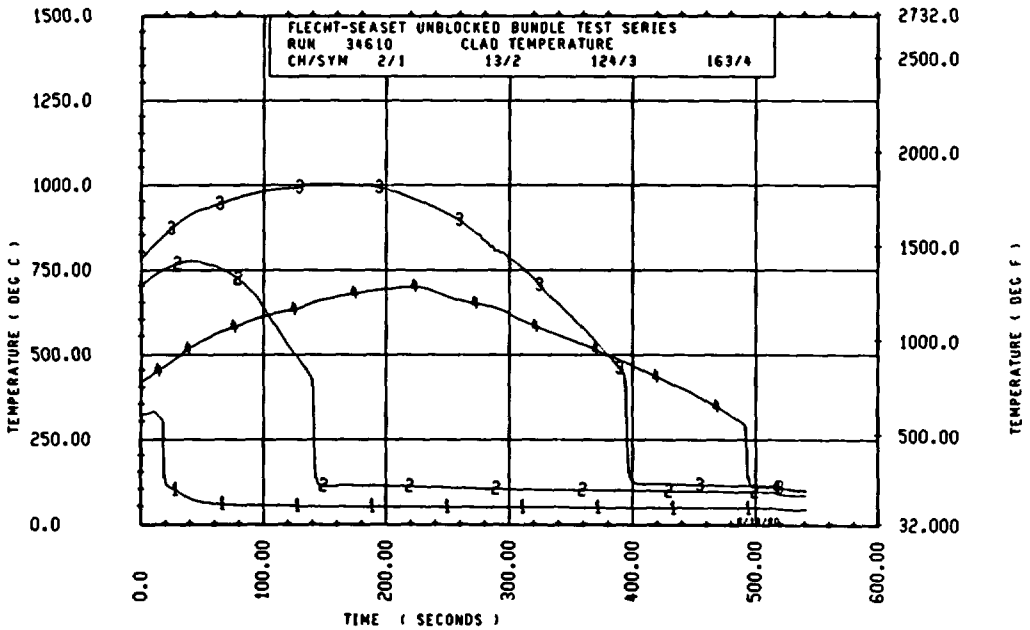
*At 228 seconds after flood

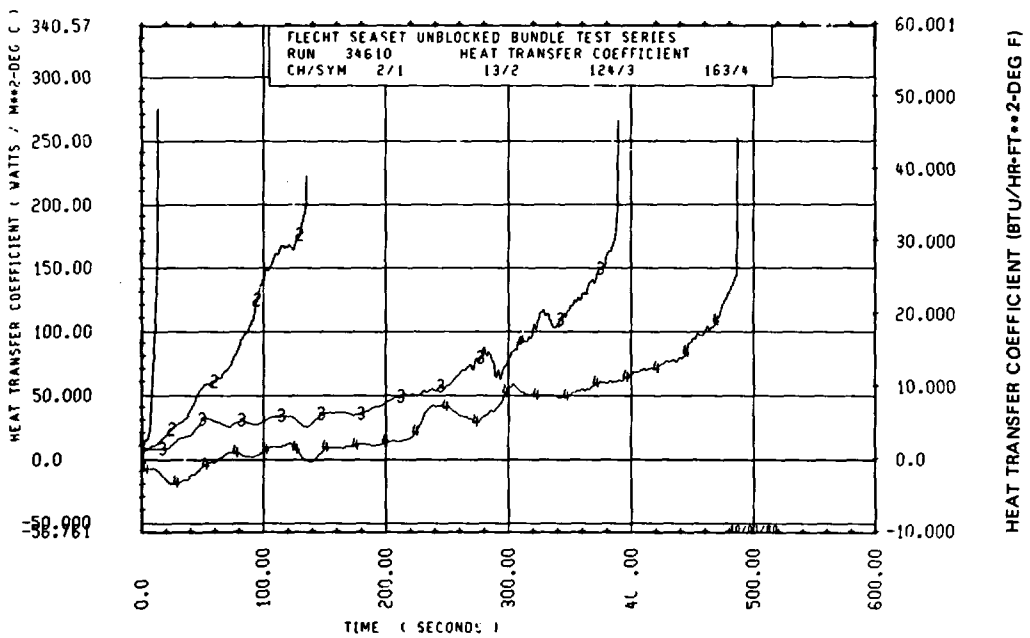
C. Comments

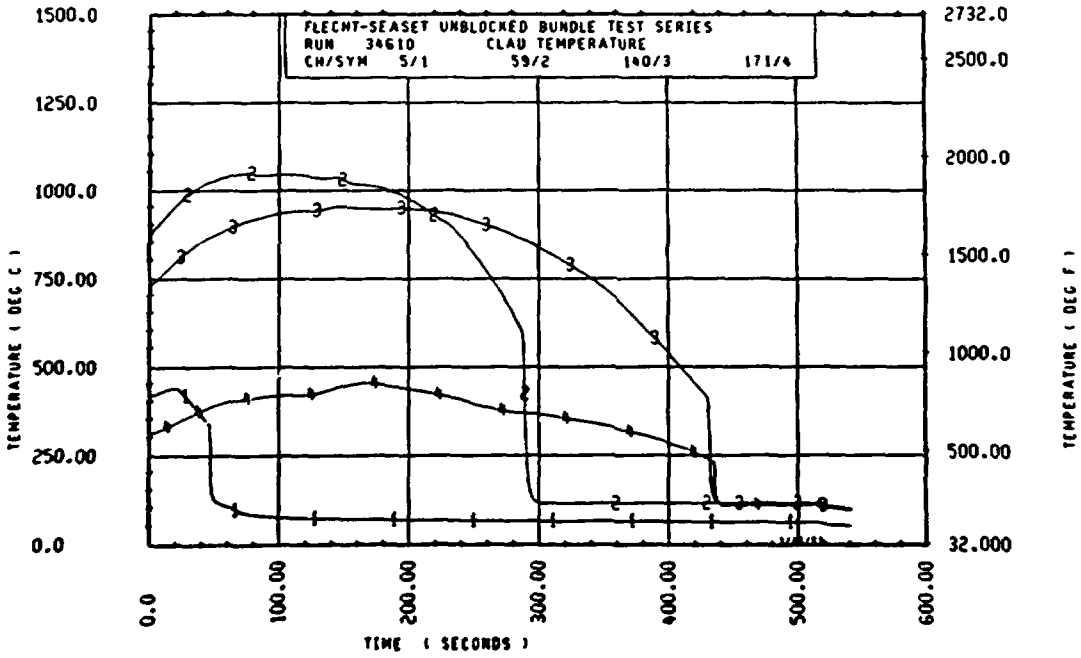
Power decay of inside power zone was lower than specified by approximately 8 percent.

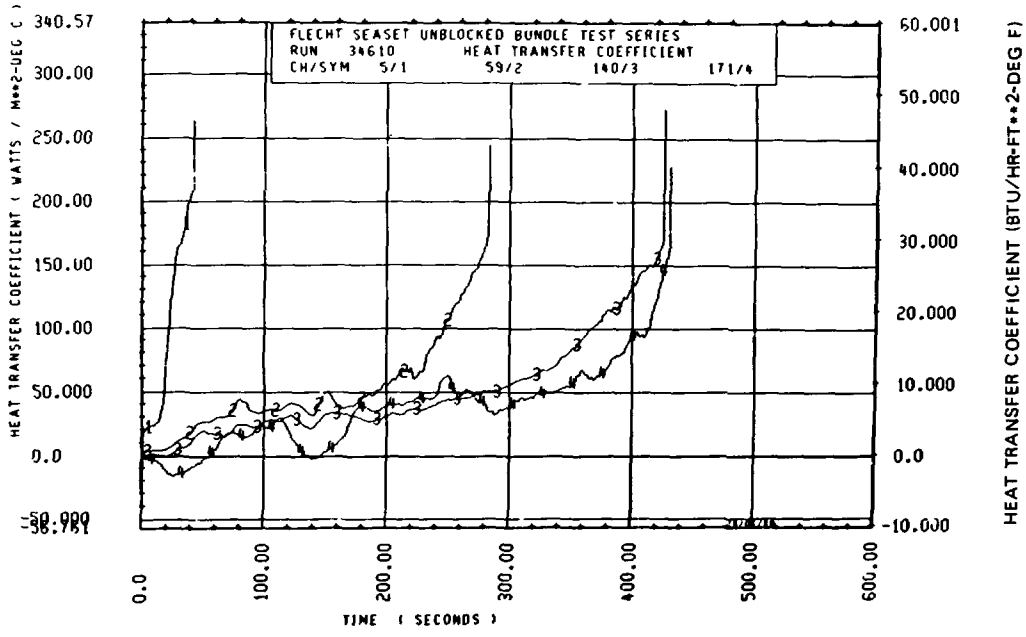
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 34610

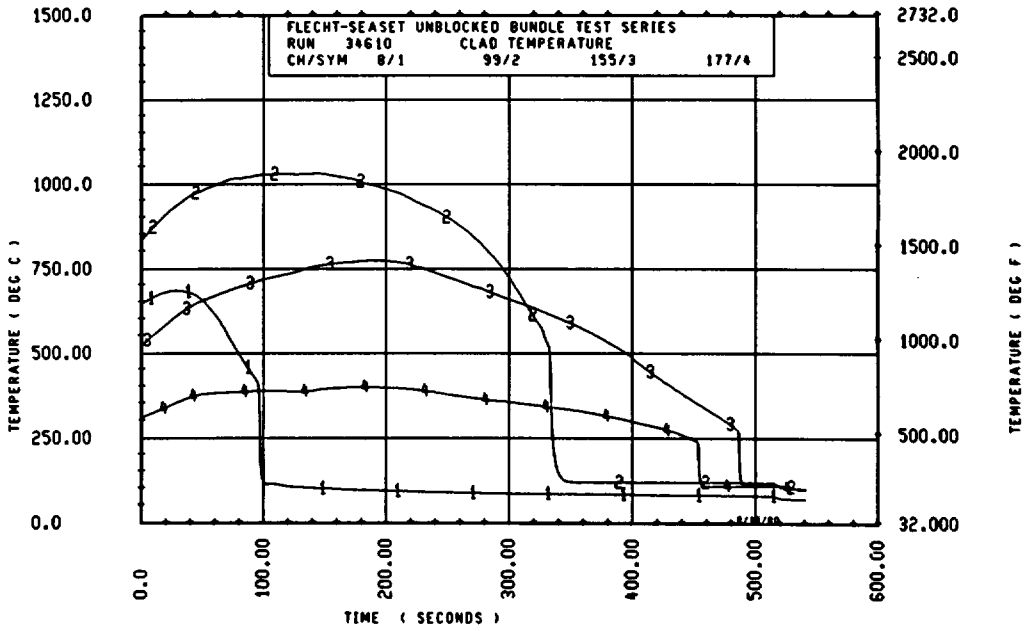
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1265.	1394.	129.	45.0	728.	146.0
2H 6- 0	50	1521.	1717.	196.	97.0	938.	274.2
3C 5- 0	17	1299.	1634.	135.	47.0	709.	215.1
3C 5- 7	28	1389.	1532.	143.	48.5	716.	254.8
4L 8- 0	129	1317.	1632.	315.	97.0	742.	412.6
4L 8- 6	147	1316.	1625.	309.	97.0	760.	412.7
5E11- 0	168	615.	797.	183.	207.0	476.	455.0
5J 4- 0	12	1242.	1397.	155.	44.5	721.	146.0
5J 8- 6	146	1107.	1509.	393.	234.0	669.	445.7
5J11- 6	175	569.	714.	145.	85.0	515.	441.0
7E 6- 0	57	1454.	1668.	214.	76.0	873.	233.9
7E 8- 6	142	1107.	1355.	248.	138.0	593.	456.0
7E10- 0	162	817.	1179.	362.	155.0	542.	506.8
7E11- 6	176	622.	905.	282.	185.0	426.	493.1
7D 6- 4	84	1615.	1917.	301.	98.0	960.	287.2
7D 7- 6	119	1471.	1783.	312.	138.0	811.	380.0
7D 9- 3	151	1010.	1452.	441.	184.0	489.	461.7
7G 5- 0	23	1488.	1652.	164.	42.0	908.	197.1
7J 6- 0	59	1607.	1921.	314.	75.0	1092.	287.9
7M 7- 6	120	1447.	1779.	332.	102.0	850.	387.0
7M 8- 0	132	1321.	1719.	398.	116.0	789.	419.6
7M 9- 3	152	1006.	1393.	387.	117.0	729.	441.0
8H 4- 0	13	1300.	1429.	129.	41.0	791.	140.6
8H10- 0	163	787.	1292.	505.	220.0	556.	491.4
8H11- 6	177	592.	751.	160.	174.0	462.	453.0
8K 4- 0	14	1276.	1422.	145.	45.5	763.	139.0
8K 6- 6	99	1534.	1888.	354.	141.0	953.	332.9
8K 8- 0	140	1341.	1749.	407.	144.0	769.	430.5
8K10- 0	164	822.	1302.	480.	229.0	559.	498.0
8N 2- 0	5	783.	827.	44.	19.0	632.	47.1
8N 4- 0	15	1277.	1413.	136.	43.0	788.	141.0
8N 6- 0	61	1515.	1802.	287.	96.0	1034.	269.6
8N10- 0	165	820.	1201.	381.	135.0	592.	493.0
9C 7- 0	109	1447.	1761.	314.	135.0	719.	351.0
9C 9- 3	153	1016.	1421.	405.	180.0	633.	460.0
9G 1- 0	2	610.	628.	18.	10.0	571.	18.0
9G 3- 3	8	1196.	1265.	69.	25.0	759.	96.5
9G11- 0	171	591.	854.	263.	168.0	442.	435.0
9I 5- 0	24	1478.	1644.	166.	60.0	921.	199.4
9E 6- 2	46	1544.	1898.	355.	111.0	870.	291.0
10D 6- 6	93	1498.	1795.	295.	142.0	790.	323.9
11E 7- 6	124	1441.	1838.	397.	142.0	815.	393.8
11E 9- 3	155	975.	1425.	449.	188.0	519.	486.0
11E11- 0	172	588.	894.	306.	169.0	532.	432.4
12D 6- 0	16	1277.	1399.	122.	40.0	772.	139.9
12D 6- 0	66	1555.	1801.	246.	100.0	959.	274.2
12F 6- 6	102	1518.	1875.	356.	115.0	856.	319.9

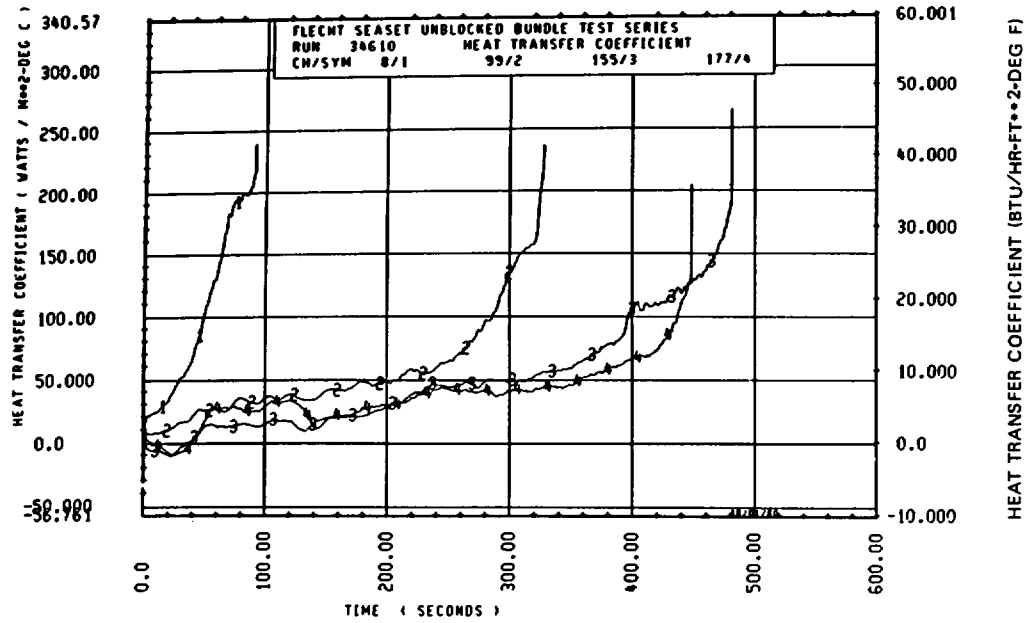

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

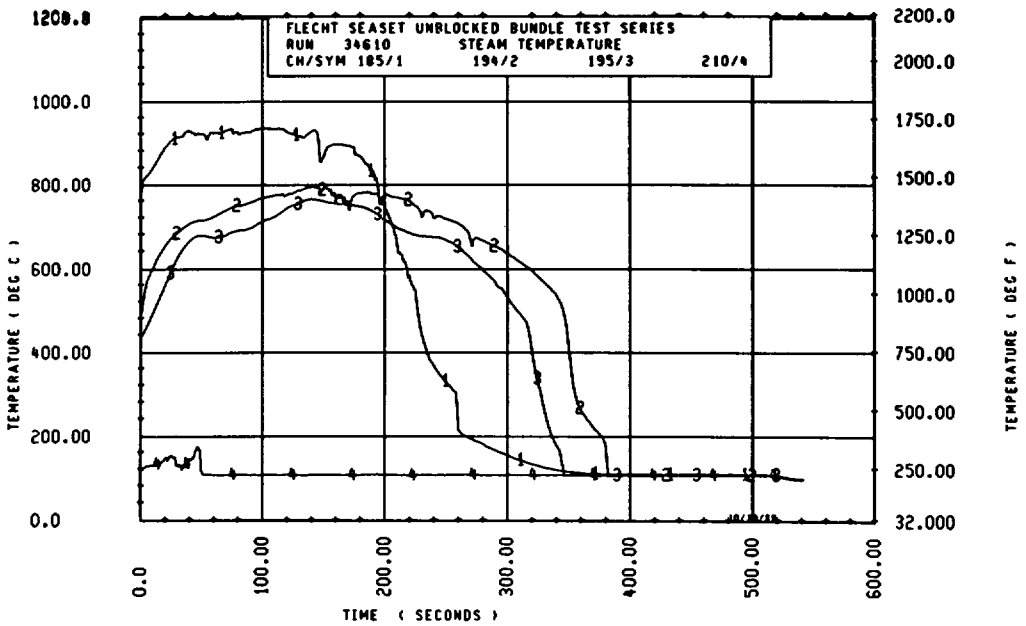

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
500.00
600.00

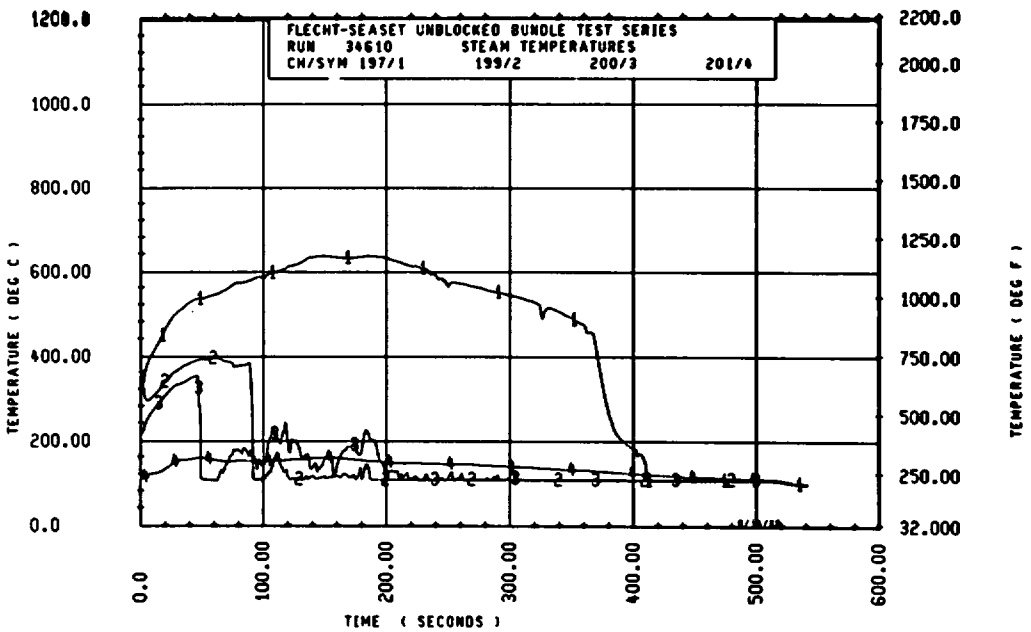

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

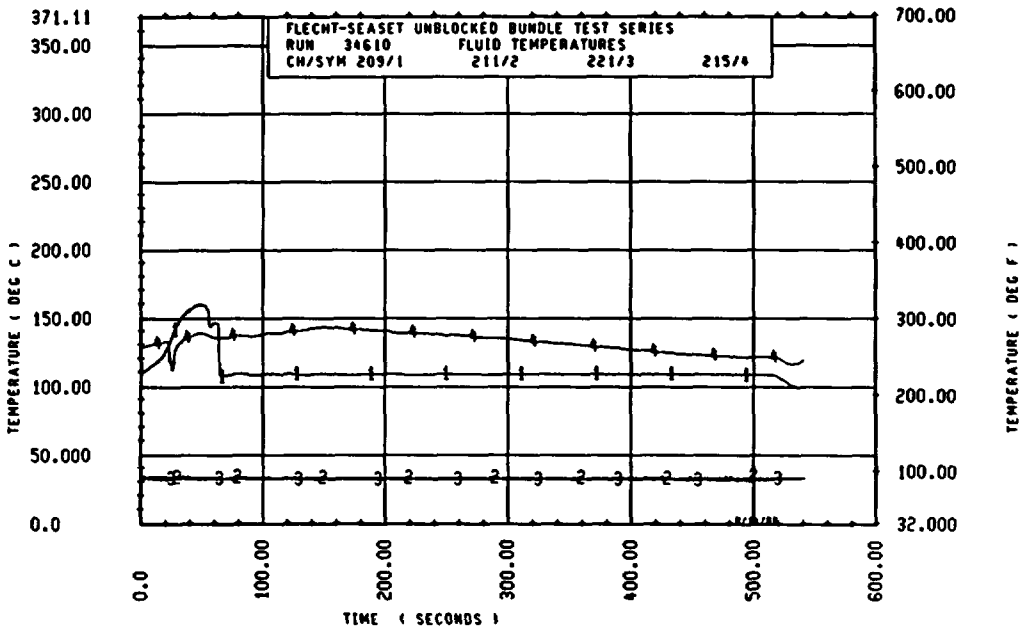

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

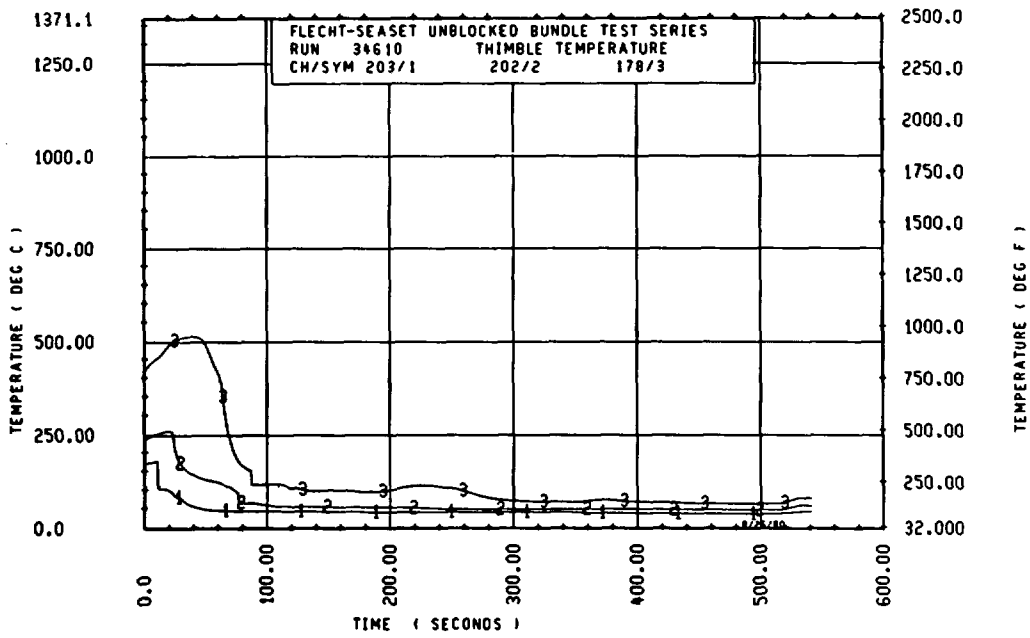

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

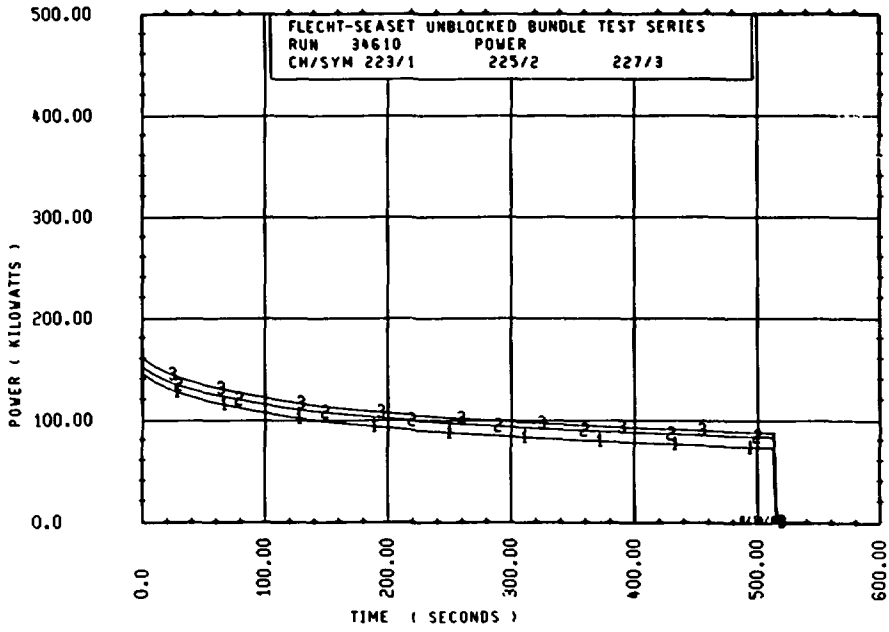

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

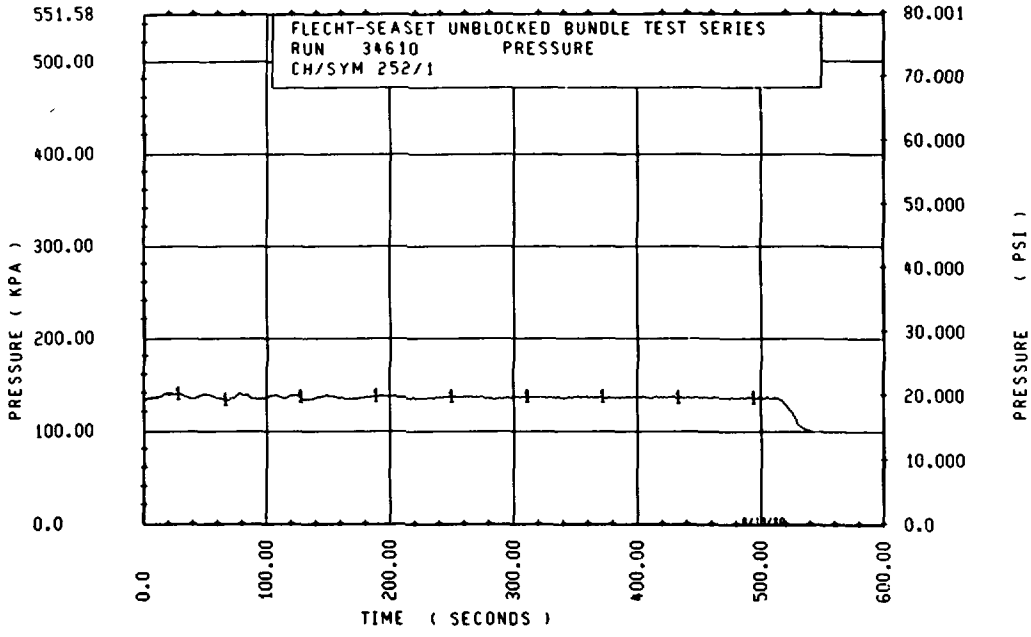

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

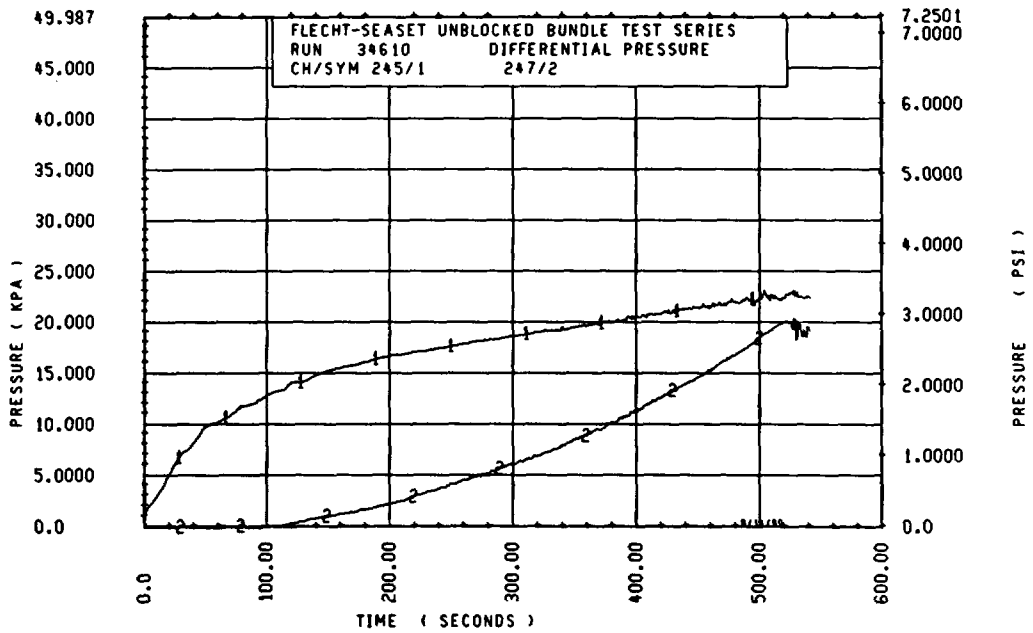


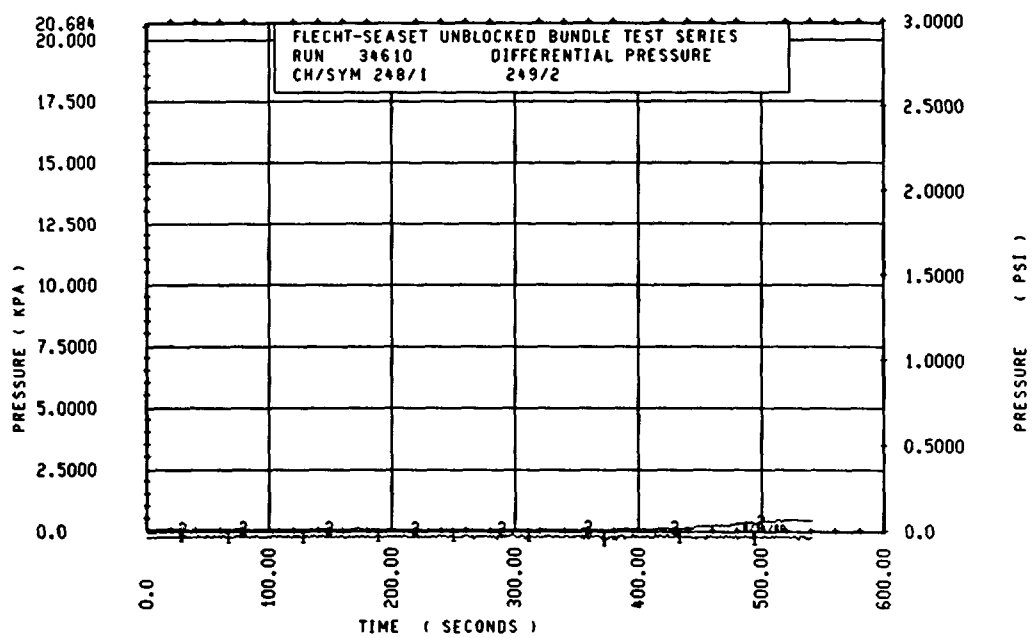


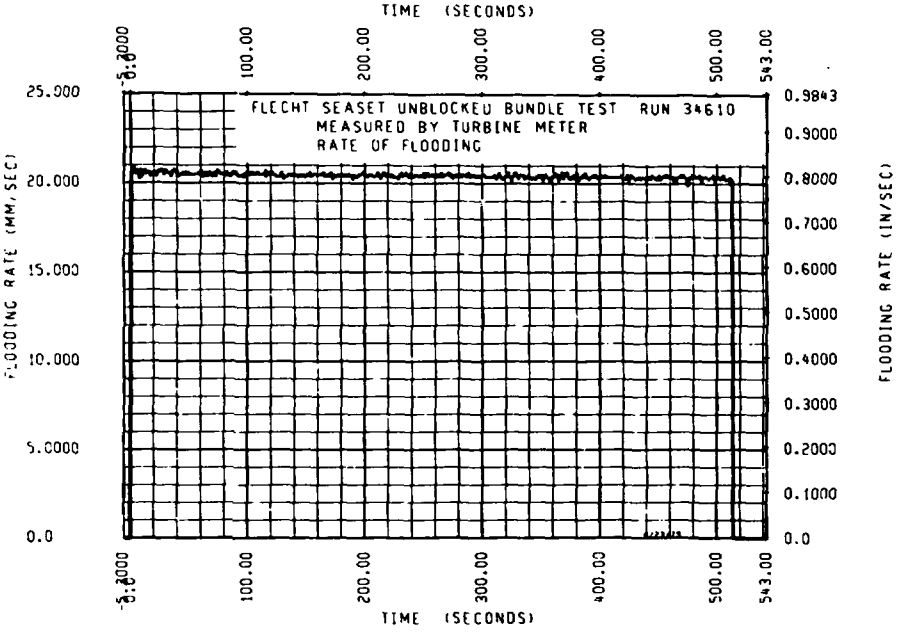
CH 203-7L, 0.30 m (12 in.); CH 202-4I, 0.61 m (24 in.); CH 178-7L, 0.99 m (39 in.)

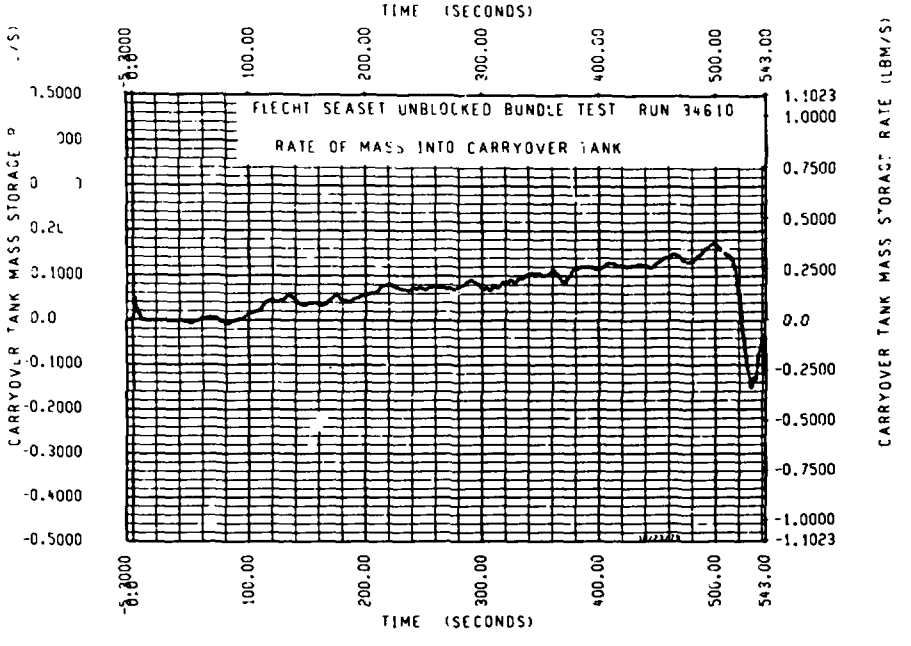

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

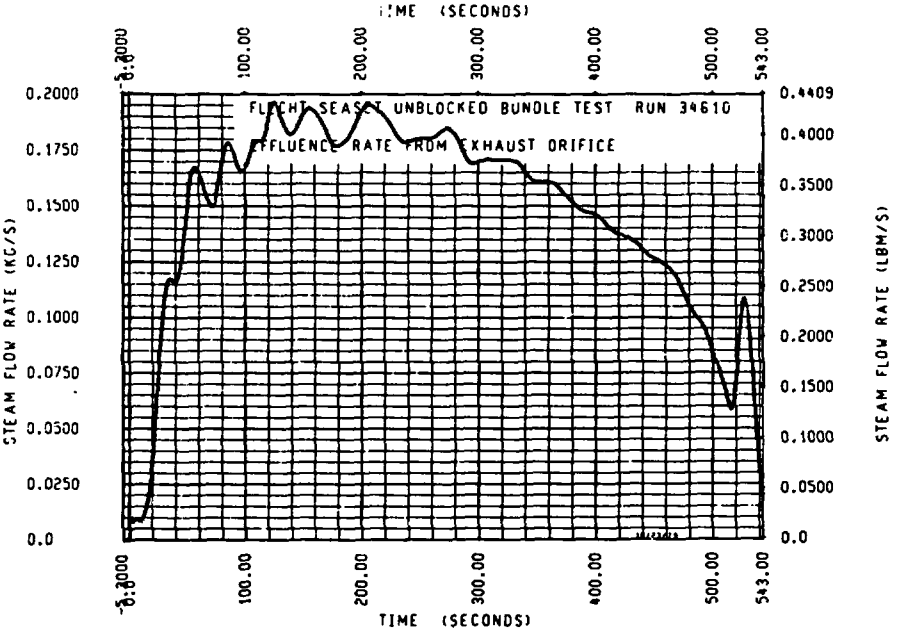

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

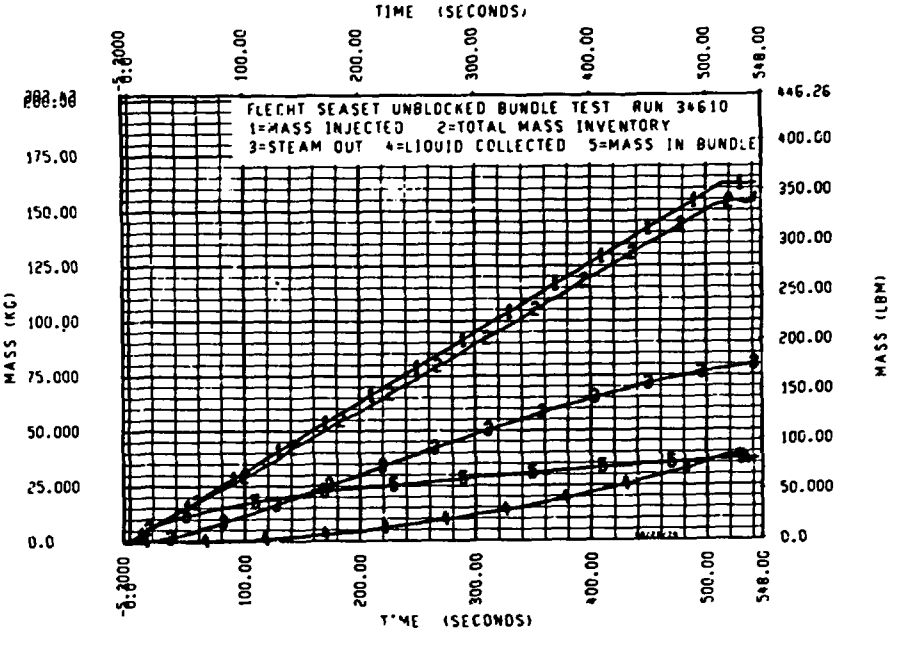

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

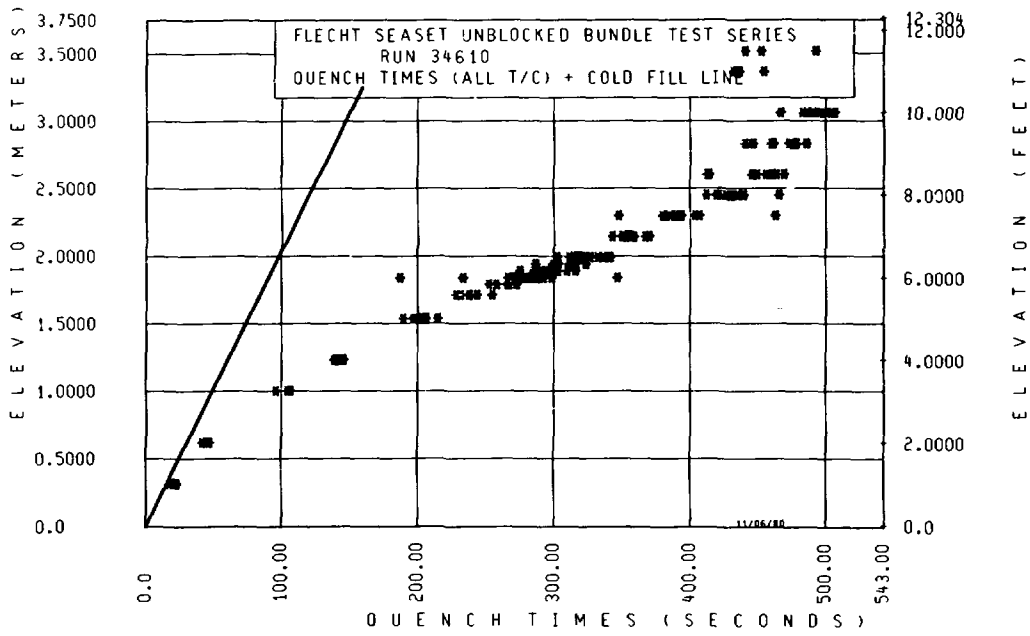

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

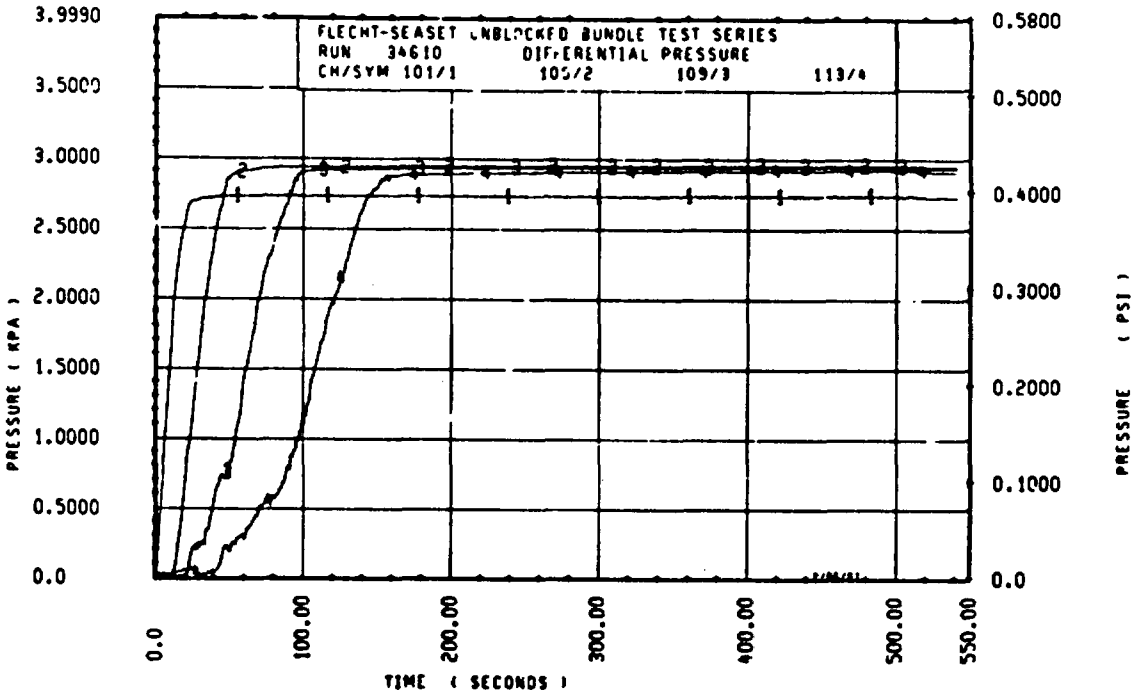

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34610
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
25.000
20.000
15.000
10.000
5.0000
0.0
0.9843
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
-5.0000
0.0
100.00
200.00
300.00
400.00
500.00
543.00

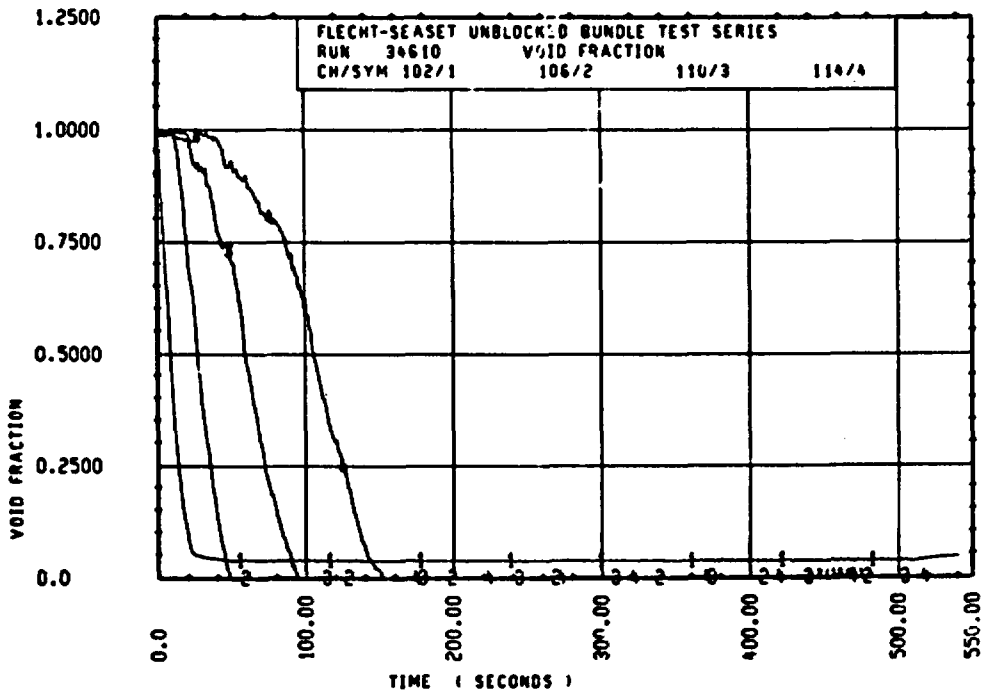

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34610
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.5000
0.1000
0.0
-0.1000
-0.2000
-0.3000
-0.4000
-0.5000
1.1023
1.0000
0.7500
0.5000
0.2500
0.0
-0.2500
-0.5000
-0.7500
-1.0000
-1.1023
-5.0000
0.0
100.00
200.00
300.00
400.00
500.00
543.00

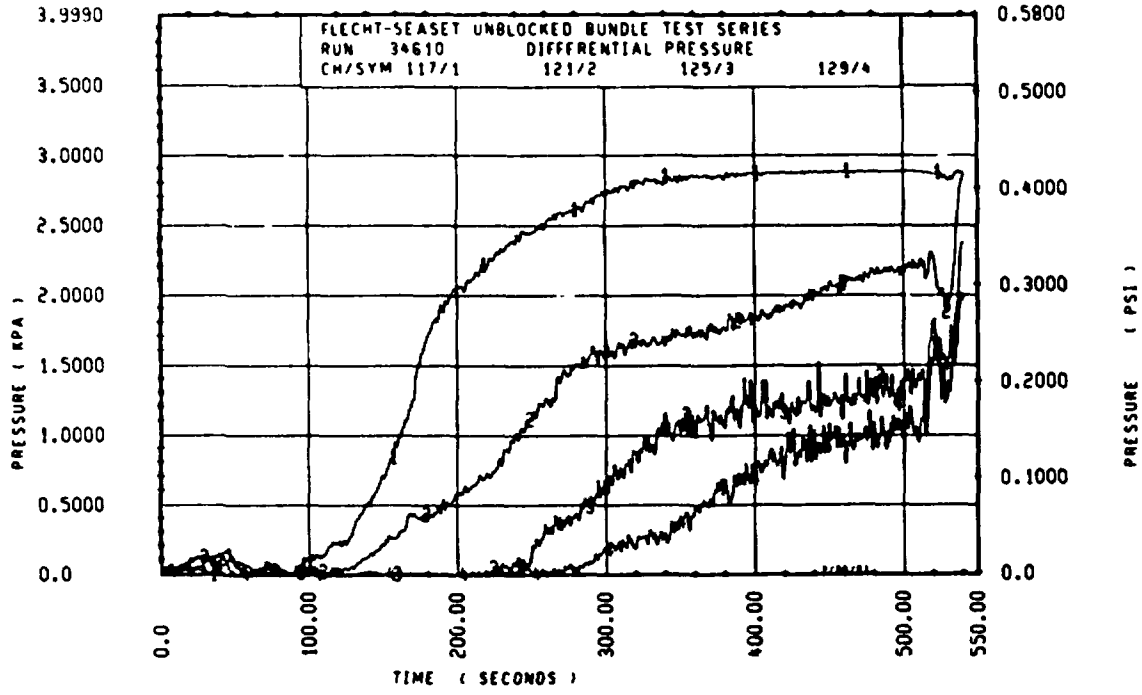

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34610
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0
0.4409
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
543.00

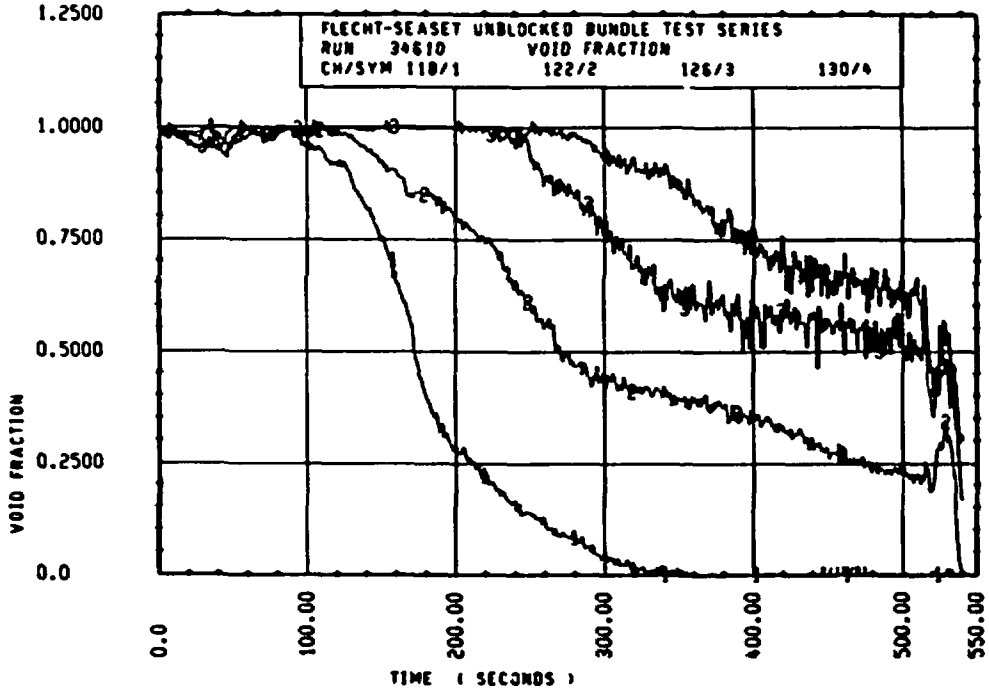

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34610
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
446.26
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
548.00

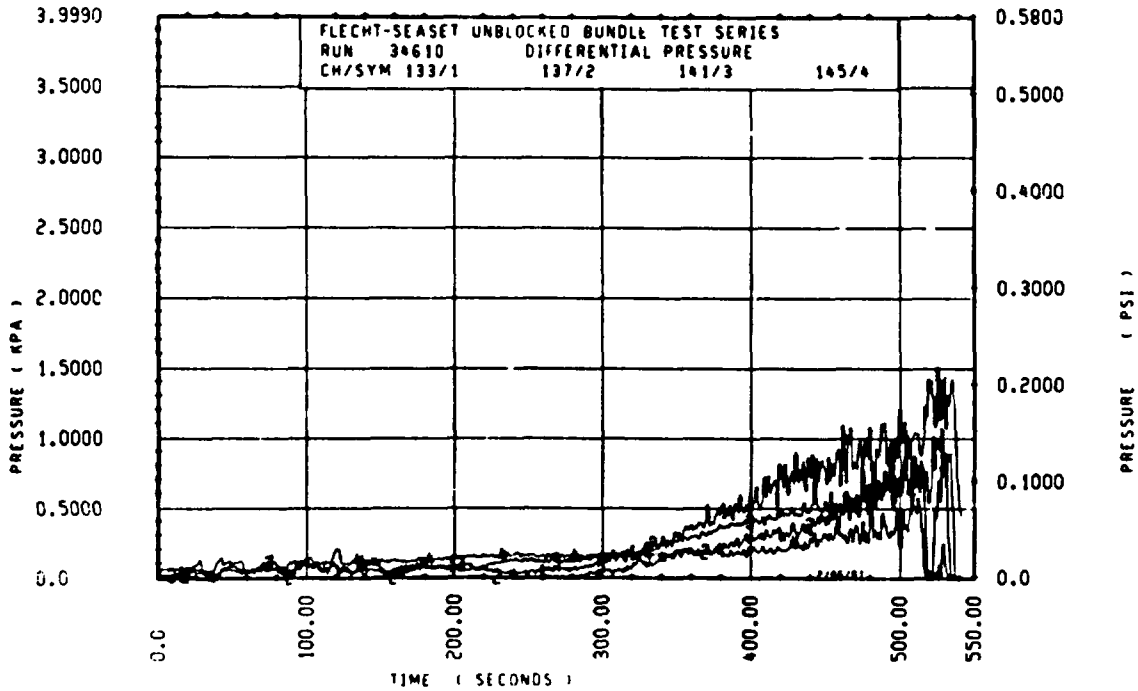

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
543.00
QUENCH TIMES (SECONDS)

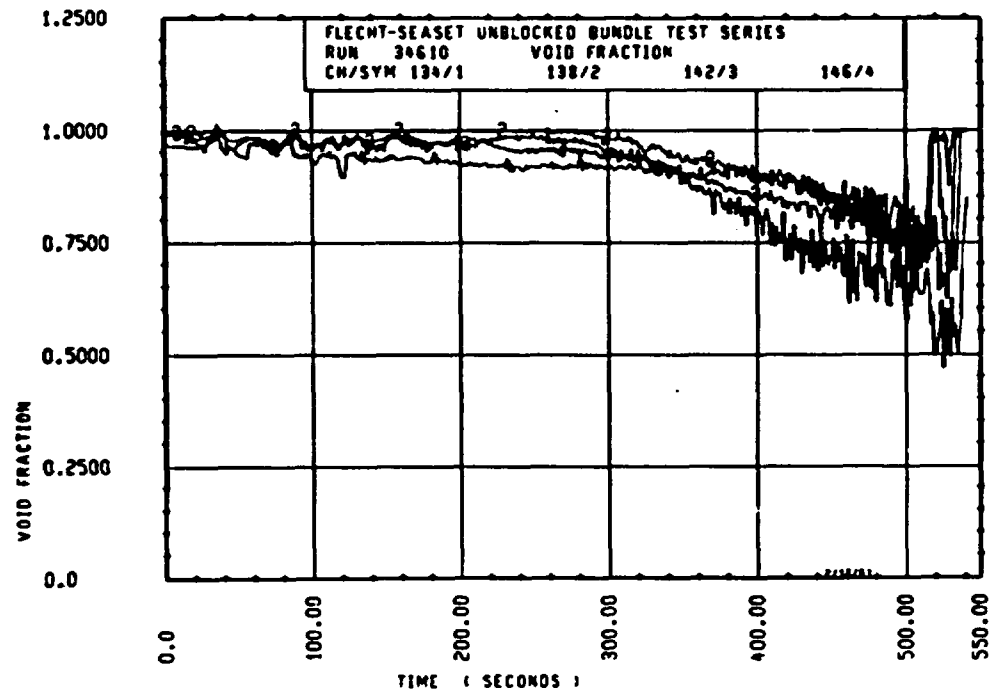

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
550.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
550.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
550.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
550.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
550.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34610 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
550.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 34711

Date: 8/9/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.13 MPa (19 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	888°C (1630°F)
Rod peak power	1.4 kw/m (0.42 kw/ft)
Flow rate	17 mm/sec (0.67 in./sec)
Coolant temperature	33°C (91°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	119°C (246°F)	56°C (132°F)
1.22 m (48 in.)	167°C-173°C (333°F-344°F)	103°C (217°F)
1.83 m (72 in.)	185°C-233°C (365°F-451°F)	101°C-114°C (215°F-238°F)
2.44 m (96 in.)	189°C-211°C (372°F-411°F)	109°C-687°C (228°F-1269°F)
2.74 m (108 in.)	162°C (324°F)	108°C (227°F)
3.05 m (120 in.)	124°C-144°C (255°F-291°F)	107°C-224°C (225°F-435°F)
3.35 m (132 in.)	112°C-123°C (233°F-254°F)	107°C (225°F)

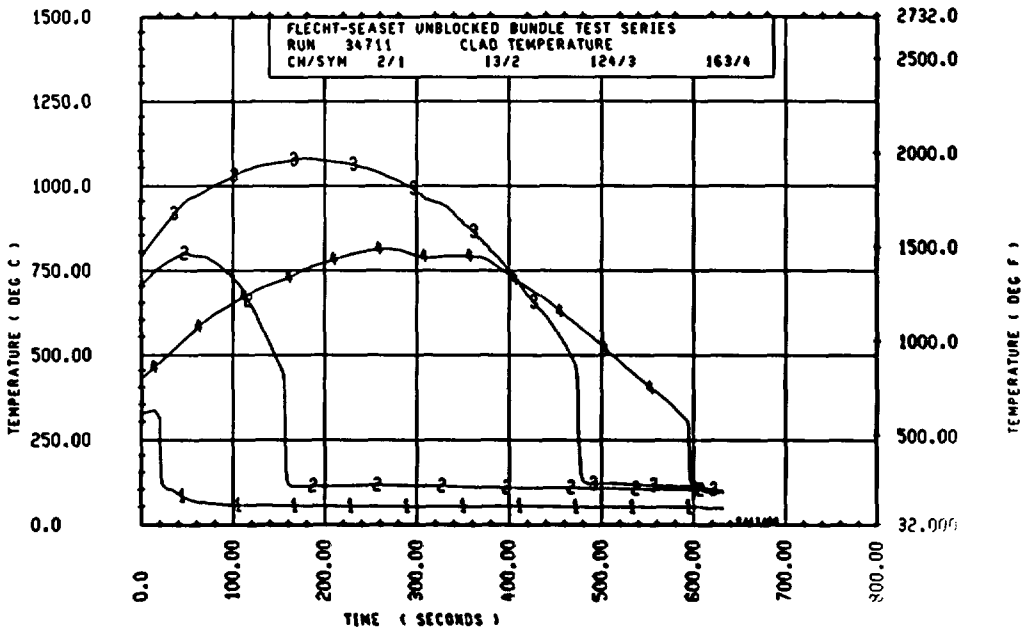
*At 310 seconds after flood

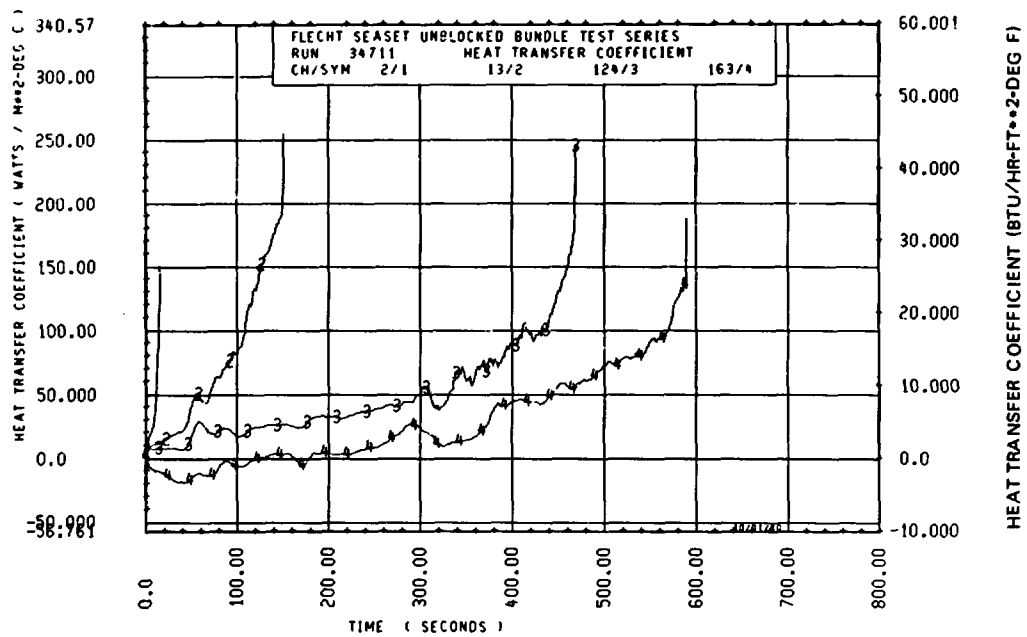
C. Comments

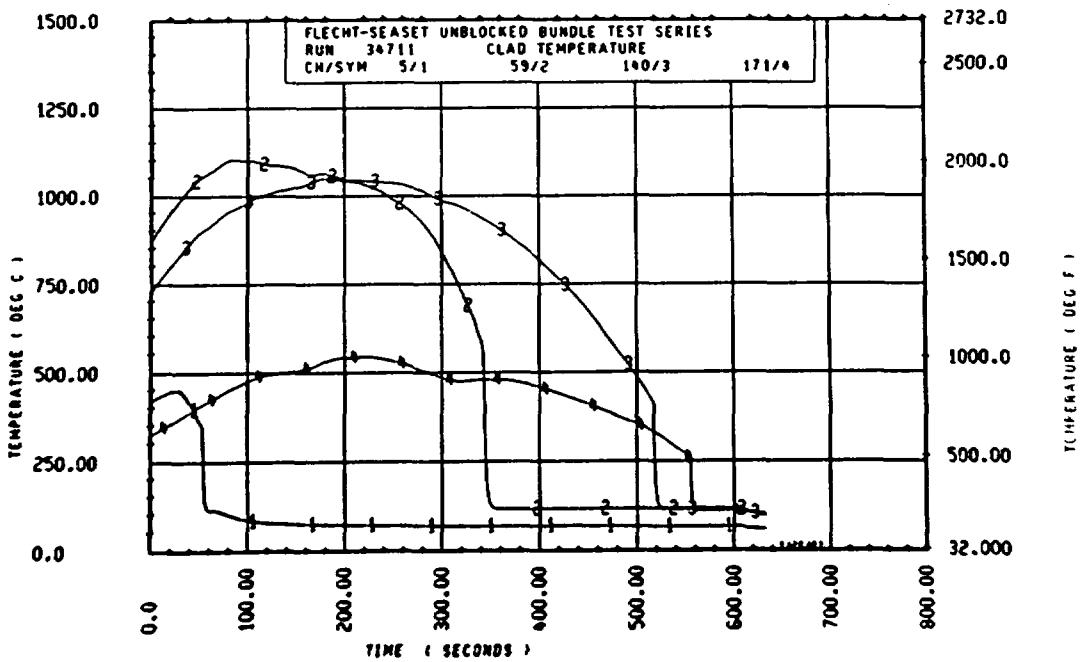
Significant bundle distortion occurred in the center of the bundle between the 1.52m (60 in.) and 2.27m (90 in.) elevations. Power decay of inside power zone was lower than specified by approximately 8 percent.

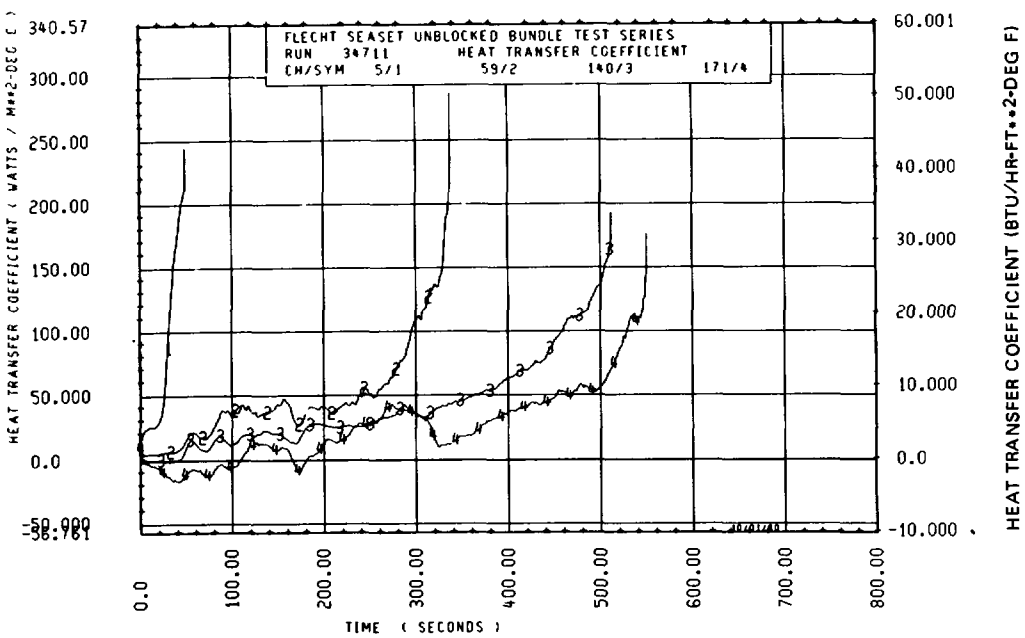
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 34711

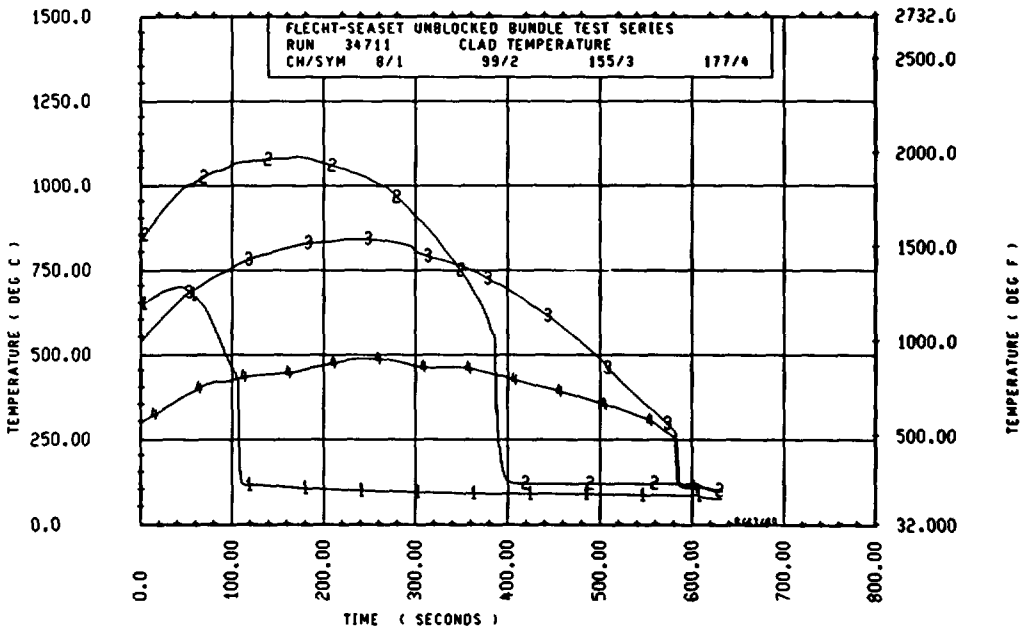
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1263.	1425.	161.	51.0	745.	161.0
2H 6- 0	50	1494.	1798.	304.	115.0	993.	322.7
3C 5- 0	17	1292.	1462.	171.	53.0	714.	243.0
3C 5- 7	28	1371.	1571.	200.	79.0	754.	290.8
4L 8- 0	122	1316.	1749.	432.	129.0	741.	492.6
4L 8- 6	147	1315.	1739.	423.	129.0	755.	492.6
5E11- 0	168	611.	925.	315.	266.0	463.	578.0
5J 4- 0	12	1253.	1444.	191.	50.0	741.	160.9
5J 8- 6	146	1134.	1651.	516.	253.0	645.	535.8
5J11- 6	175	546.	938.	392.	328.0	237.	573.0
7B 6- 0	57	1445.	1721.	276.	109.0	930.	273.5
7B 8- 6	142	1115.	1446.	332.	112.0	577.	543.0
7B10- 0	162	816.	1254.	438.	181.0	564.	596.9
7B11- 6	176	621.	870.	248.	155.0	481.	600.0
7D 6- 4	84	1610.	2012.	402.	118.0	928.	345.8
7D 7- 6	119	1473.	1880.	407.	132.0	804.	459.2
7D 9- 3	151	1020.	1534.	514.	227.0	674.	522.0
7G 5- 0	23	1473.	1703.	230.	75.0	939.	228.7
7J 6- 0	59	1603.	2019.	416.	84.0	1012.	342.5
7M 7- 6	120	1446.	1896.	450.	153.0	764.	467.9
7M 8- 0	132	1325.	1843.	518.	169.0	765.	507.7
7M 9- 3	152	1020.	1556.	536.	175.0	688.	543.8
8H 4- 0	13	1305.	1470.	165.	47.0	825.	155.9
8H10- 0	163	808.	1494.	687.	264.0	573.	593.9
8H11- 6	177	574.	911.	337.	247.0	486.	583.0
8K 4- 0	14	1285.	1463.	178.	48.0	805.	154.9
8K 6- 6	99	1538.	1984.	446.	170.0	1004.	386.2
8K 8- 0	140	1347.	1921.	574.	177.0	774.	517.0
8K10- 0	164	833.	1516.	683.	279.0	583.	597.6
8N 2- 0	5	791.	847.	56.	28.0	660.	54.0
8N 4- 0	15	1278.	1449.	172.	52.0	809.	156.7
8N 6- 0	61	1489.	1838.	350.	124.0	1126.	317.8
8N10- 0	165	834.	1314.	481.	175.0	616.	587.9
9C 7- 0	109	1455.	1847.	393.	134.0	712.	424.3
9C 9- 3	153	1016.	1502.	486.	218.0	664.	550.0
9G 1- 0	2	619.	637.	18.	12.0	592.	20.0
9G 3- 3	8	1191.	1292.	101.	45.0	789.	107.0
9G11- 0	171	619.	1012.	393.	218.0	488.	555.0
9I 5- 0	24	1477.	1698.	221.	79.0	984.	226.8
9E 6- 2	46	1569.	2035.	466.	135.0	867.	344.6
10D 6- 6	93	1502.	1880.	378.	170.0	801.	384.9
11E 7- 6	124	1453.	1977.	524.	176.0	826.	473.7
11E 9- 3	155	1005.	1545.	641.	229.0	519.	582.0
11E11- 0	172	620.	1037.	416.	199.0	546.	553.3
12D 4- 0	16	1275.	1432.	158.	51.0	807.	154.9
12D 6- 0	66	1542.	1889.	347.	124.0	997.	325.8
12F 6- 6	102	1519.	1963.	444.	168.0	838.	375.6

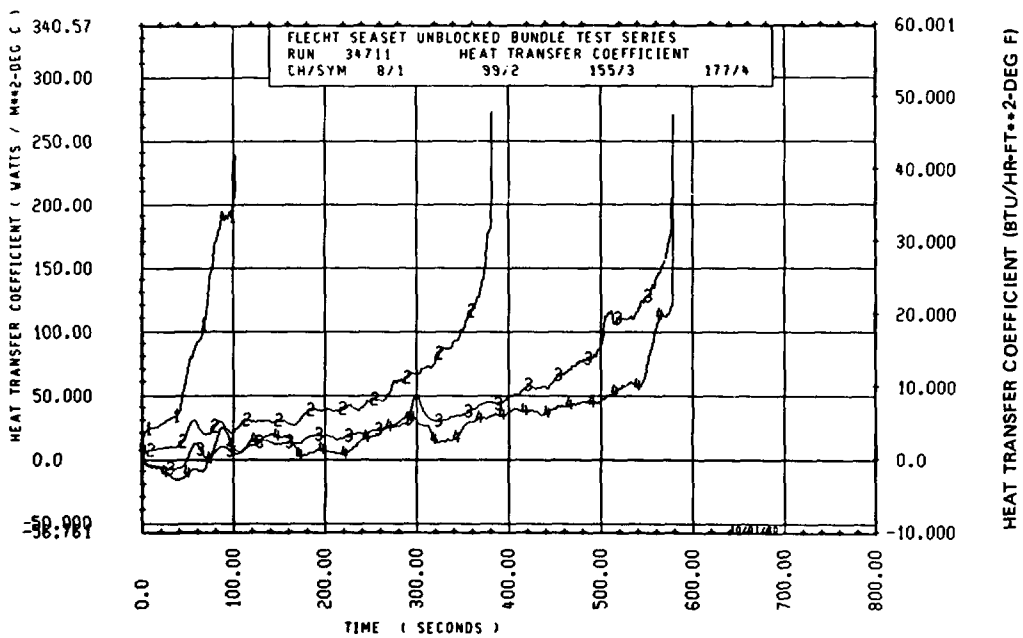

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

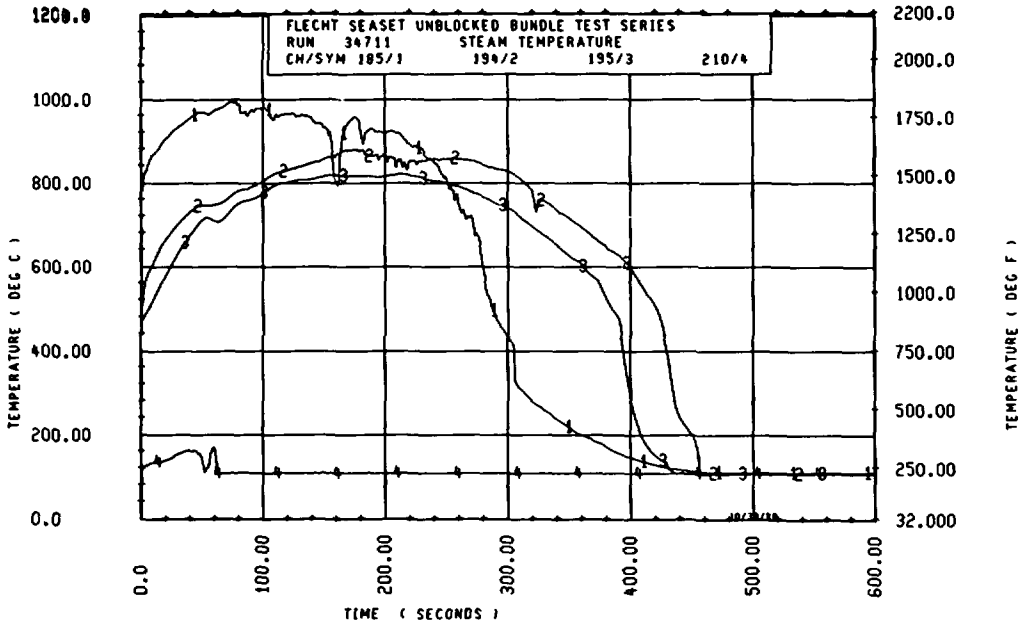

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

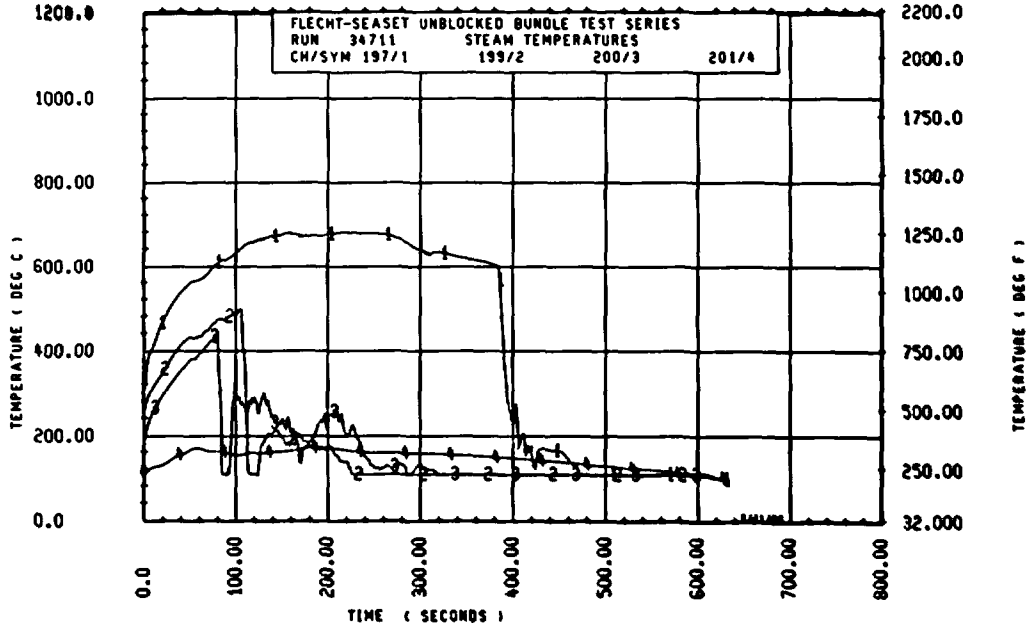

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

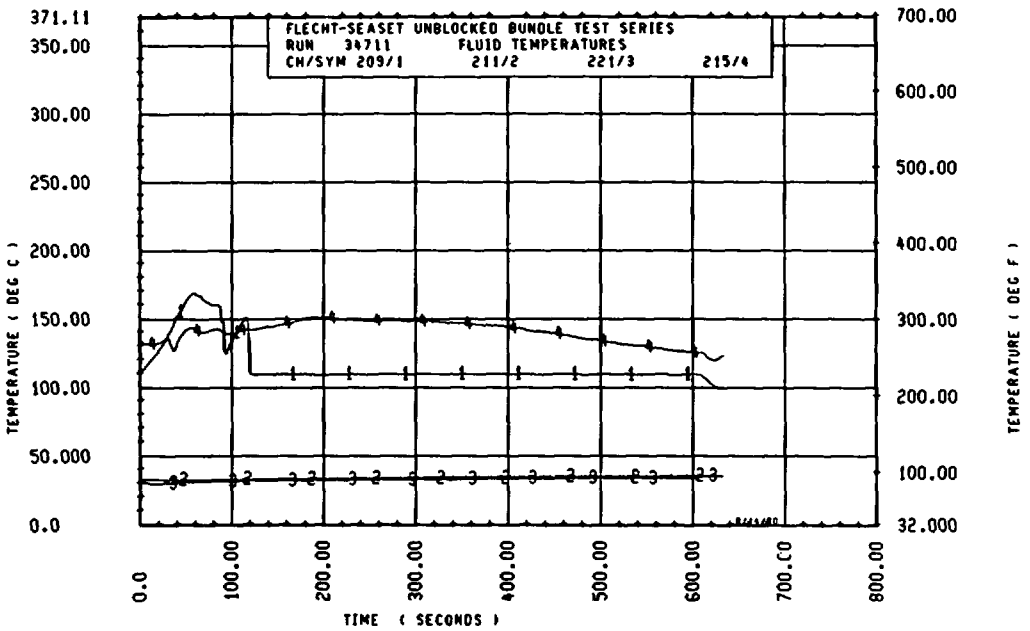

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

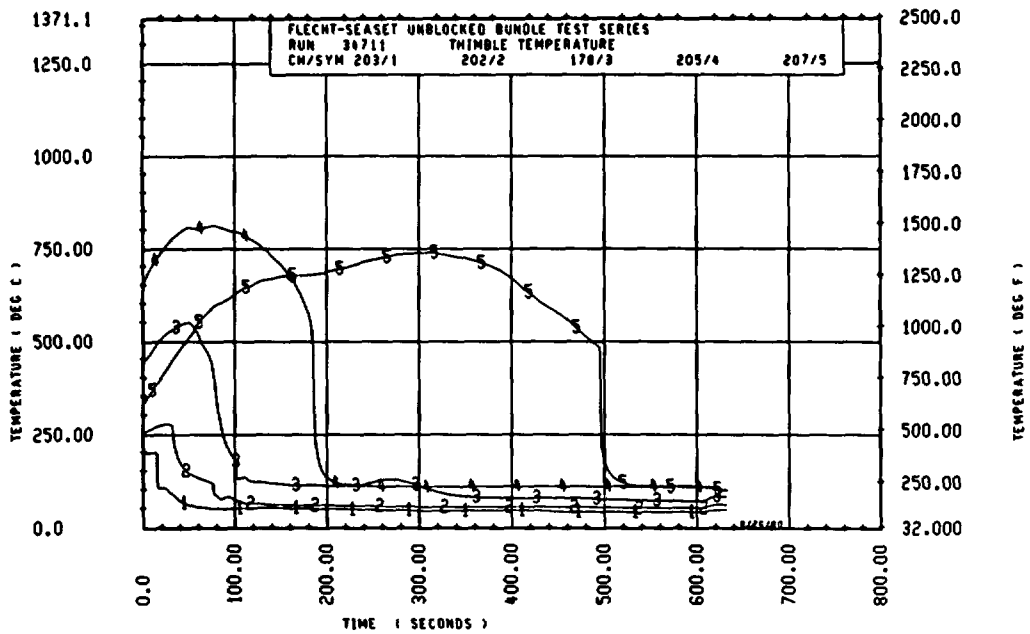

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-58.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

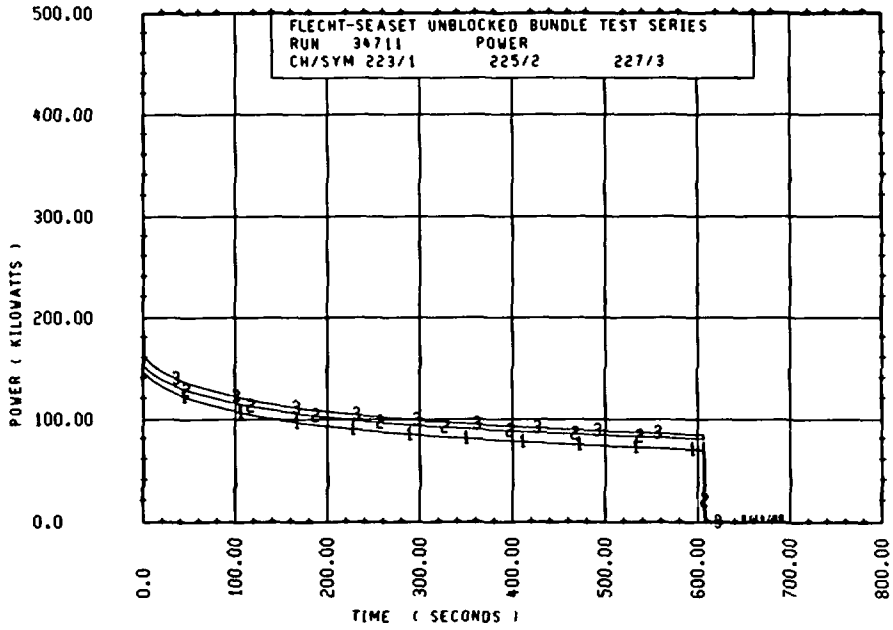

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
100.00
200.00
300.00
400.00
500.00
600.00

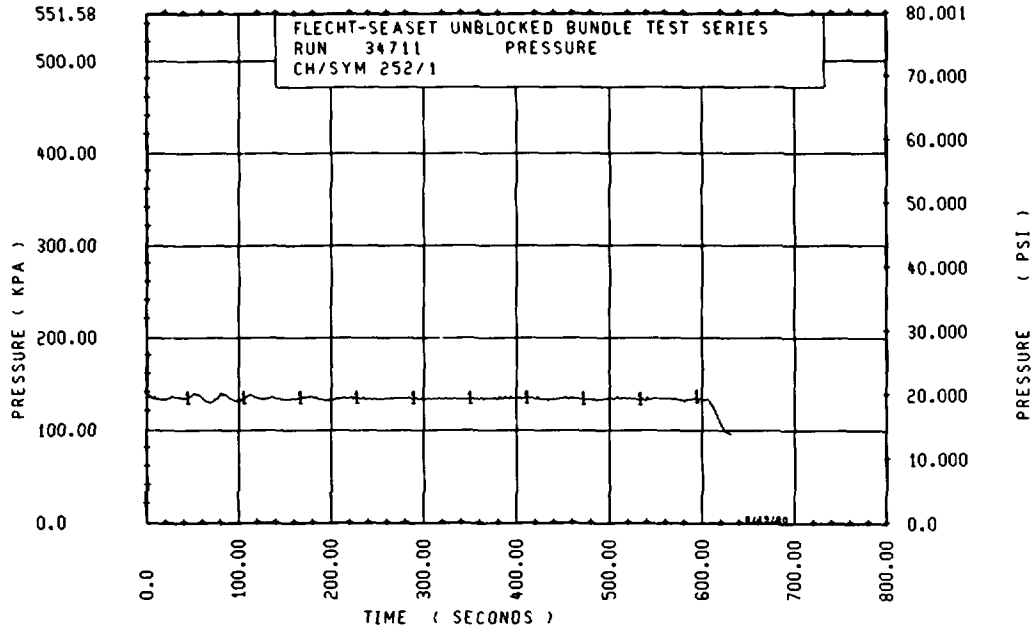

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

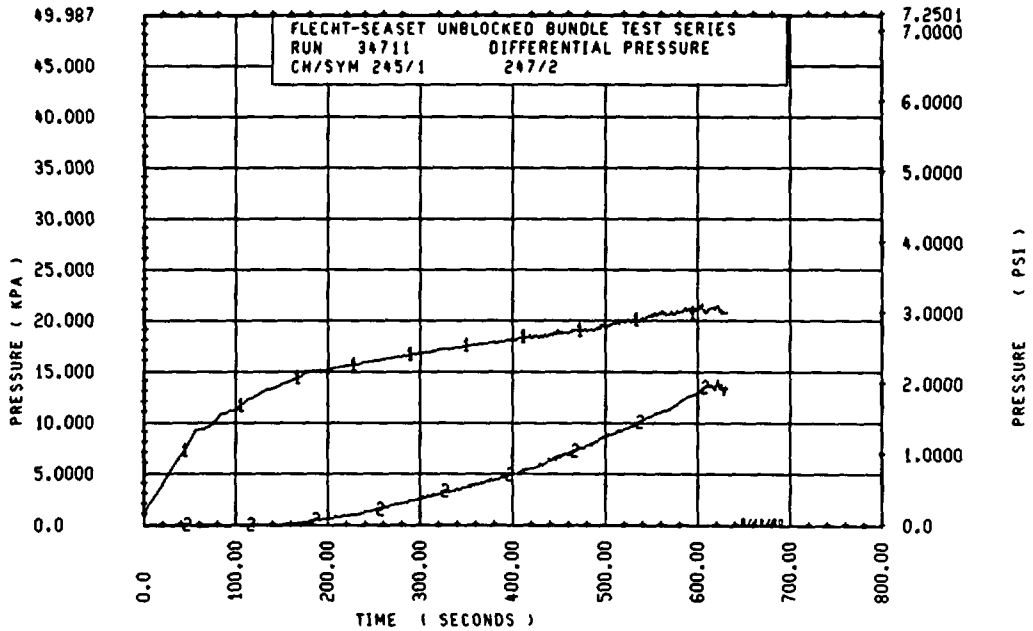


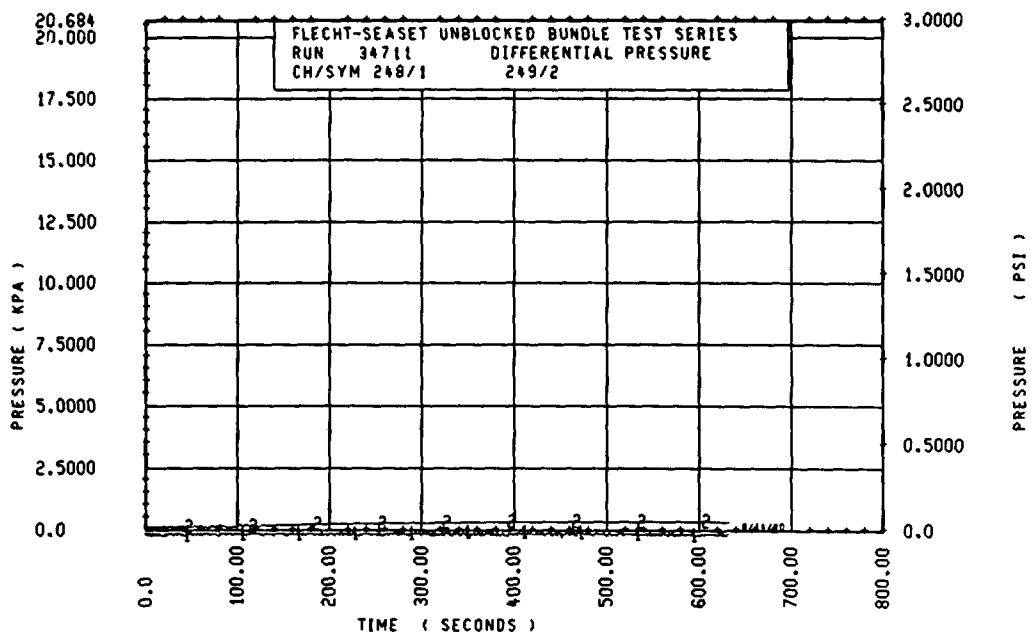


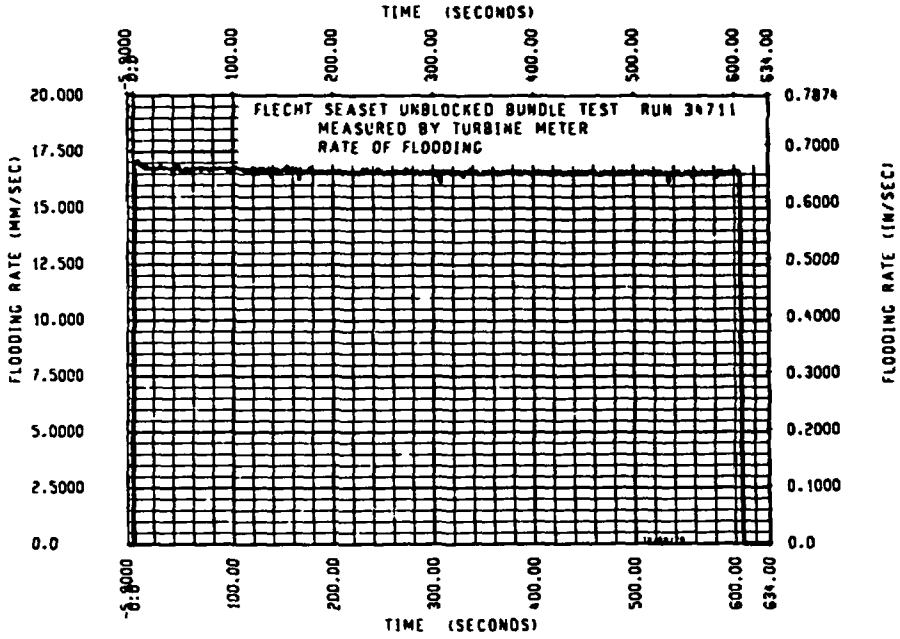
CH 203-7L, 0.30 m (12 in.); CH 202-4C, 0.61 m (24 in.); CH 178-7L, 0.99 m (39 in.); CH 205-4C, 1.52 m (60 in.); CH 207-4I, 3.05 m (120 in.)

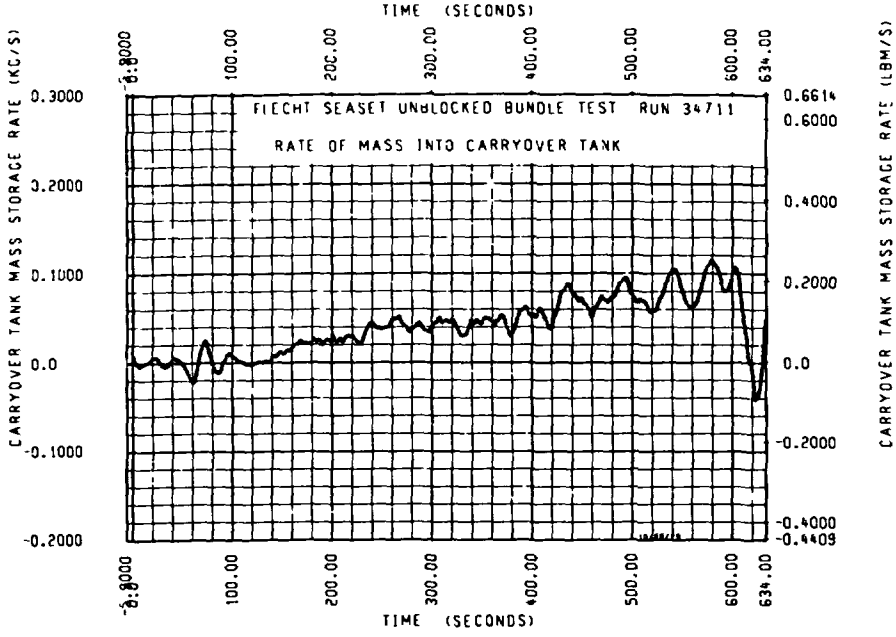

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

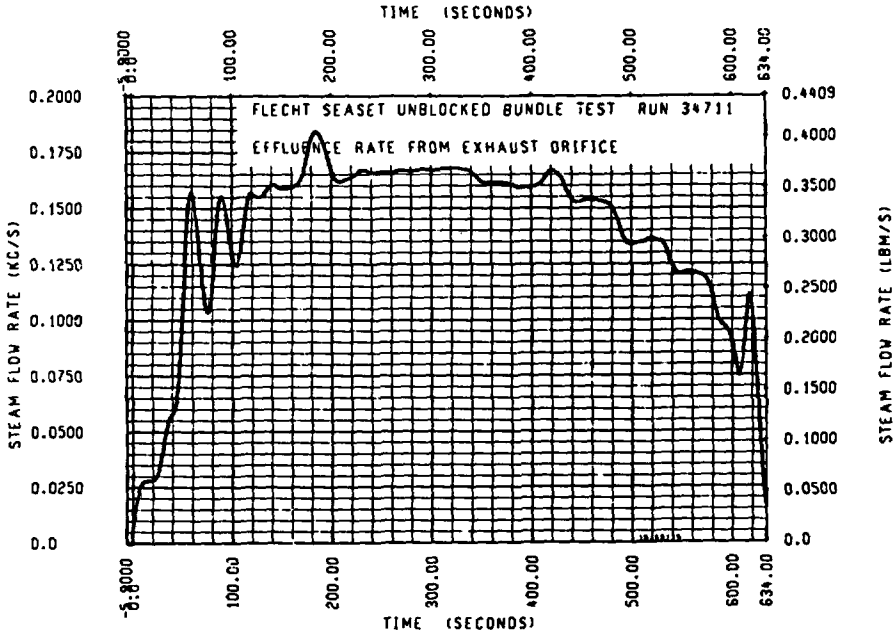

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

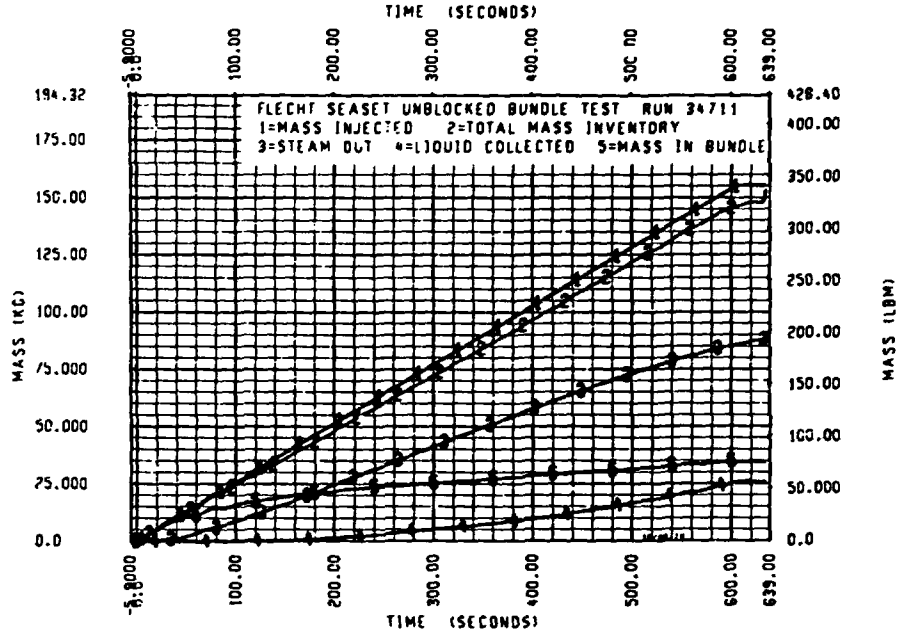

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

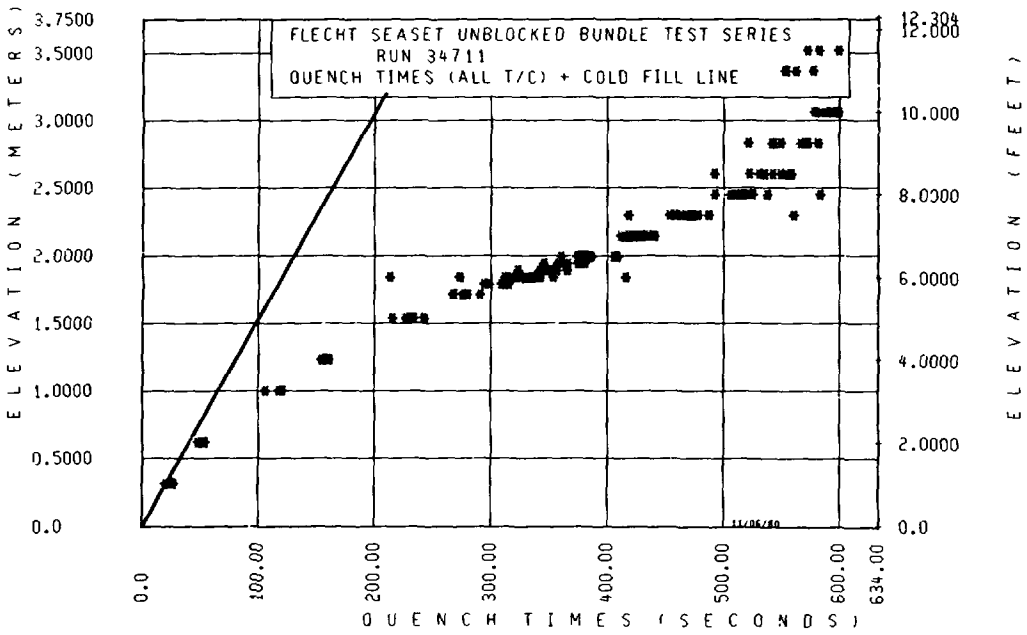

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

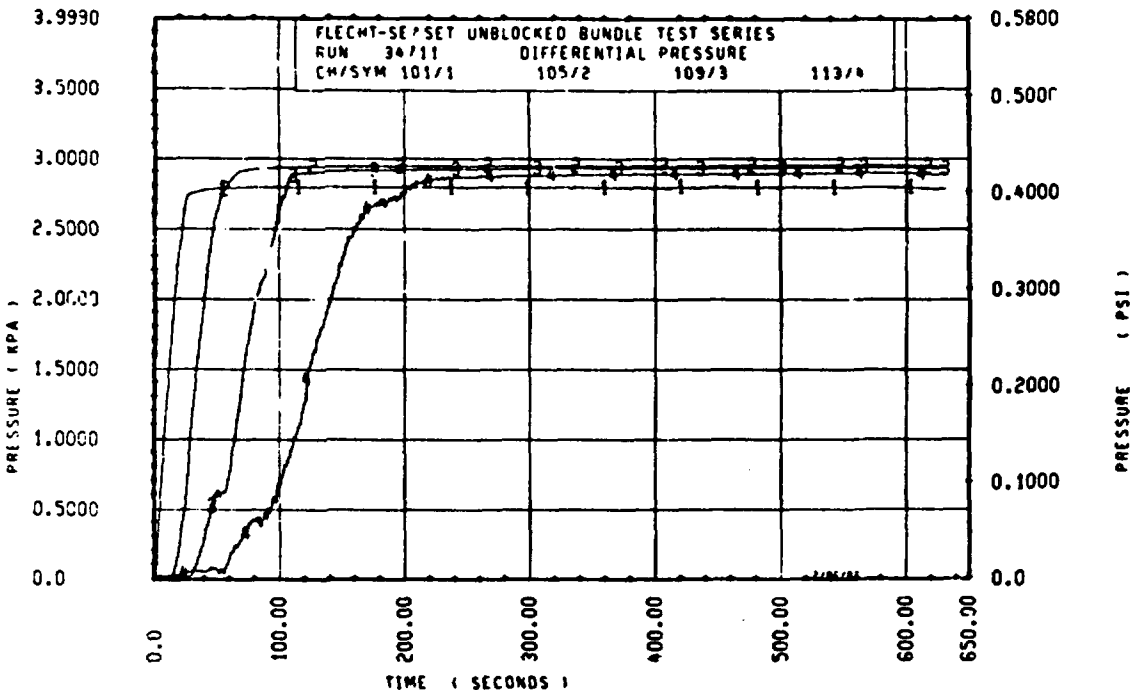

TIME (SECONDS)
-5.8000
100.00
200.00
300.00
400.00
500.00
600.00
634.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34711
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
FLOODING RATE (IN/SEC)
0.7874
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0

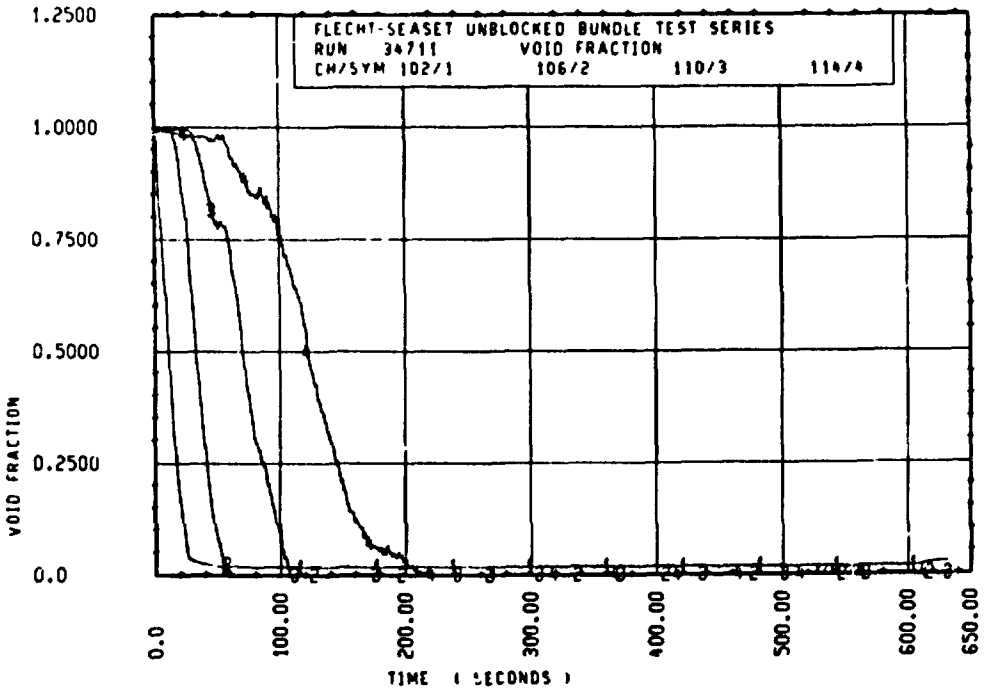

TIME (SECONDS)
-5.8000
100.00
200.00
300.00
400.00
500.00
600.00
634.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34711
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
0.3000
0.2000
0.1000
0.0
-0.1000
-0.2000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.6614
0.6000
0.4000
0.2000
0.0
-0.2000
-0.4000
-0.4409

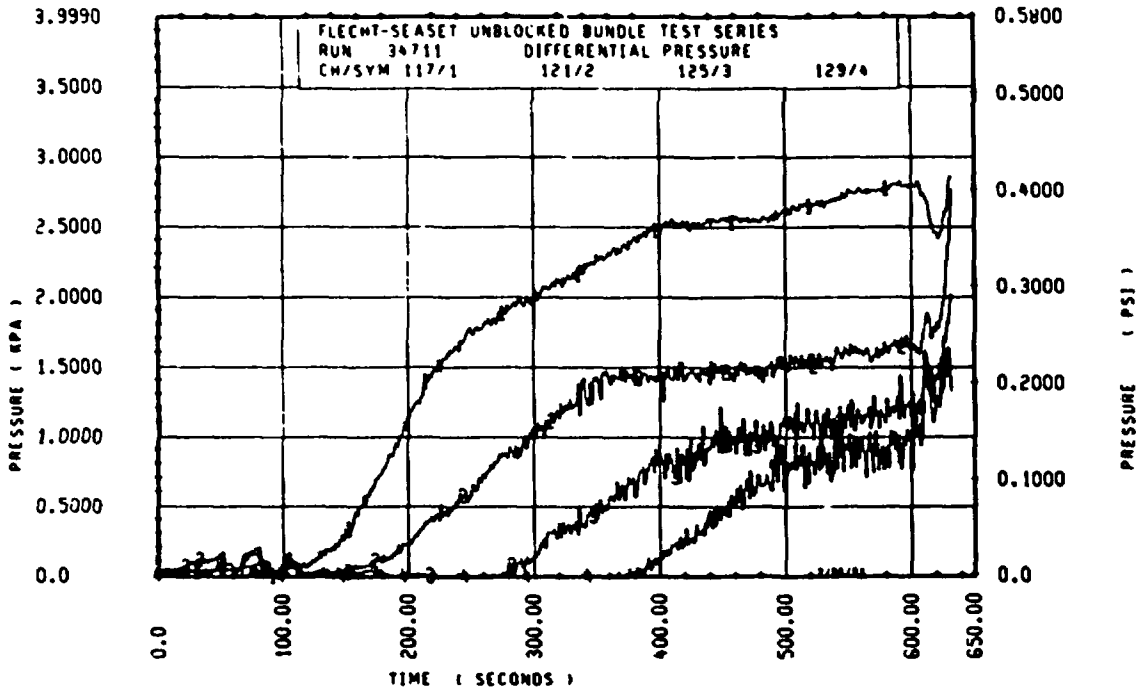

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34711
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0
0.4409
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0
-5.8000
100.00
200.00
300.00
400.00
500.00
600.00
634.00

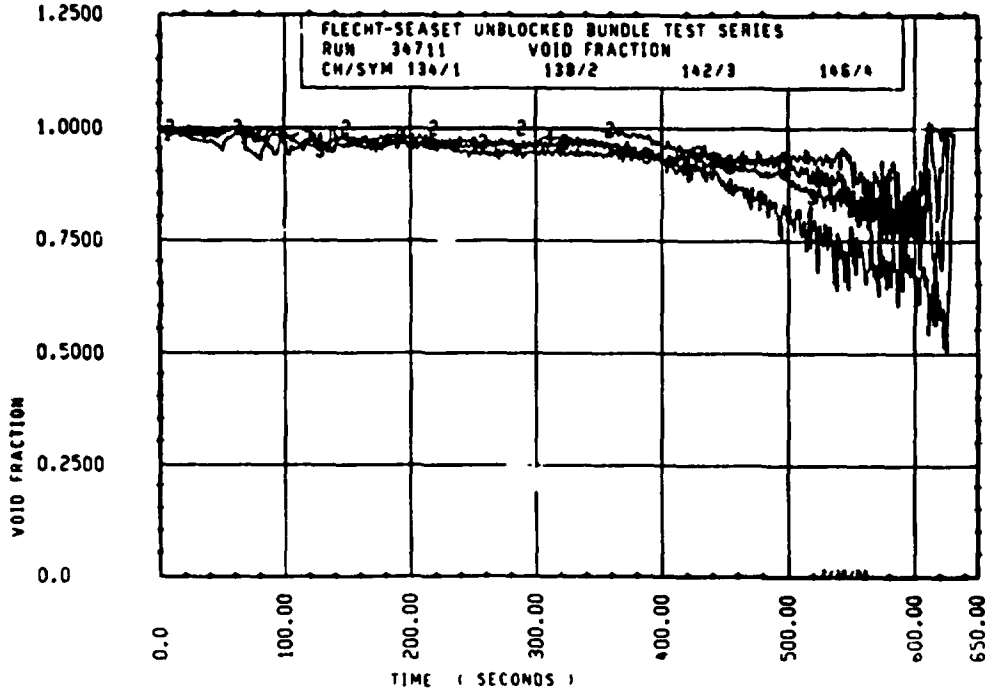

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34711
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
194.32
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
428.40
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-5.8000
100.00
200.00
300.00
400.00
500.00
600.00
639.00

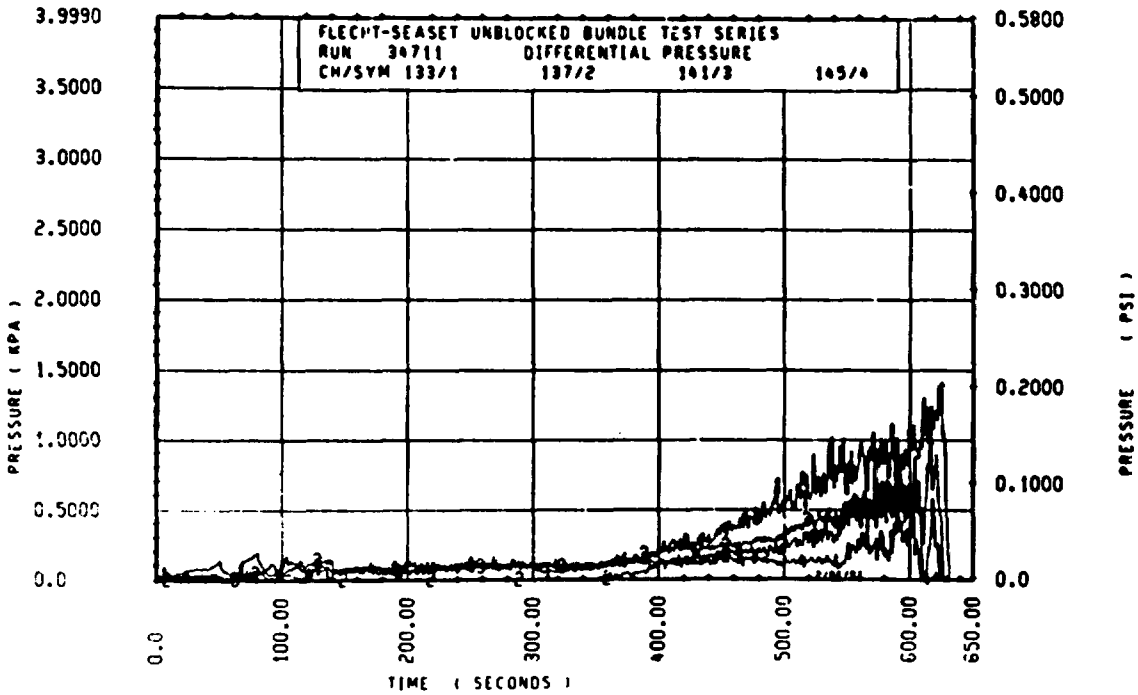

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
634.00
QUENCH TIMES (SECONDS)

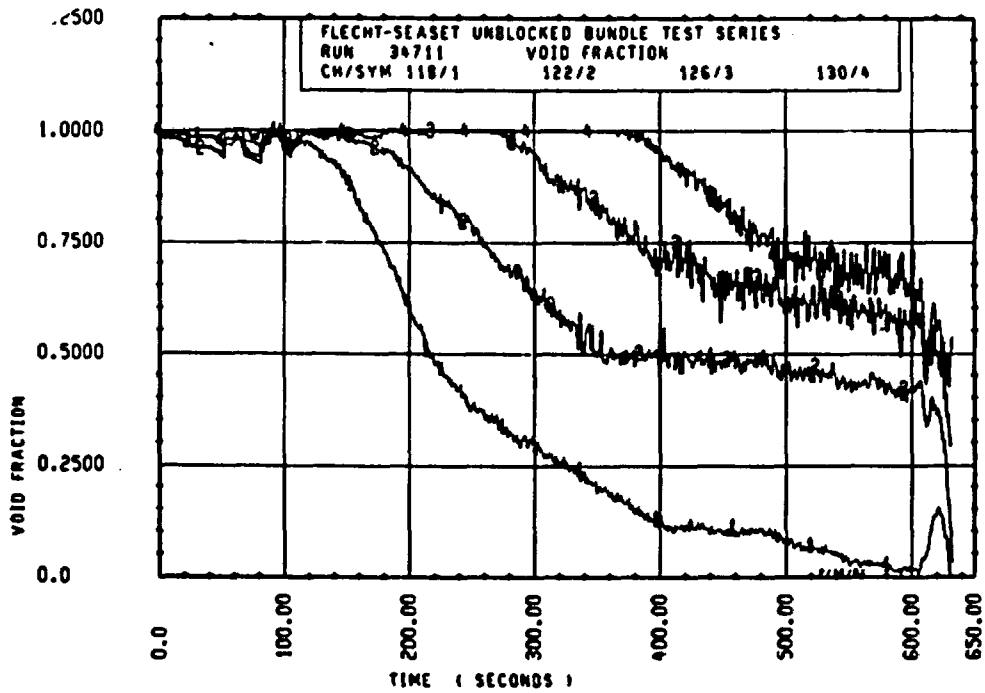

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34711 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 34815

Date: 8/10/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.14 MPa (20 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	895°C (1643°F)
Rod peak power	2.4 kw/m (0.74 kw/ft)
Flow rate	25 mm/sec (0.98 in./sec)
Coolant temperature	94°C (221°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	118°C (244°F)	111°C (231°F)
1.22 m (48 in.)	136°C-149°C (277°F-300°F)	110°C (230°F)
1.83 m (72 in.)	158°C-206°C (316°F-403°F)	115°C-635°C (239°F-1175°F)
2.44 m (96 in.)	171°C-191°C (340°F-376°F)	109°C-569°C (228°F-1057°F)
2.74 m (108 in.)	151°C (304°F)	108°C (227°F)
3.05 m (120 in.)	122°C-134°C (252°F-274°F)	107°C (225°F)
3.35 m (132 in.)	112°C-120°C (234°F-248°F)	106°C (223°F)

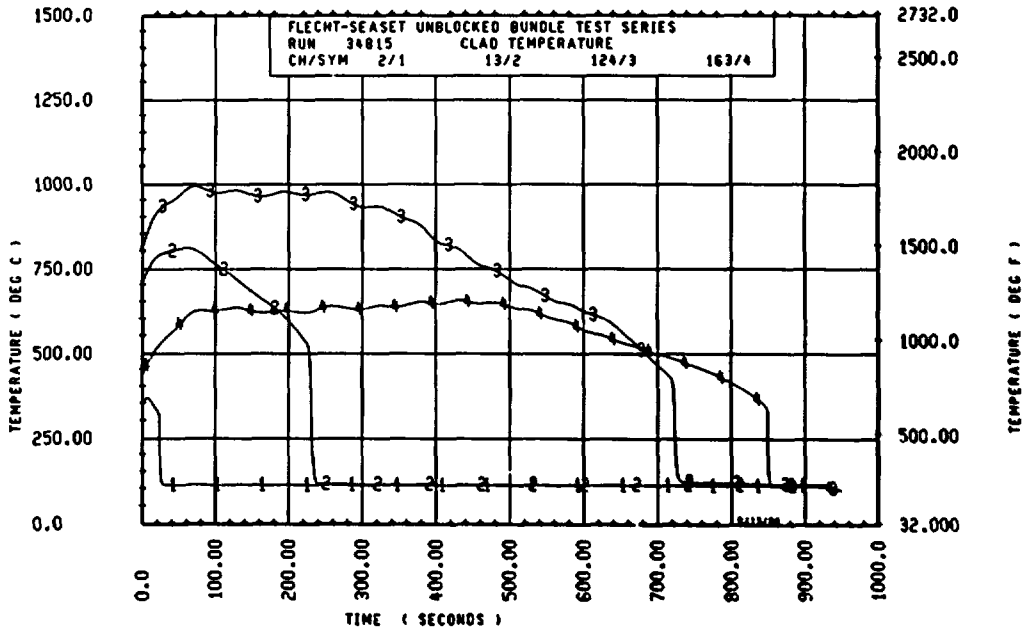
*At 188 seconds after flood

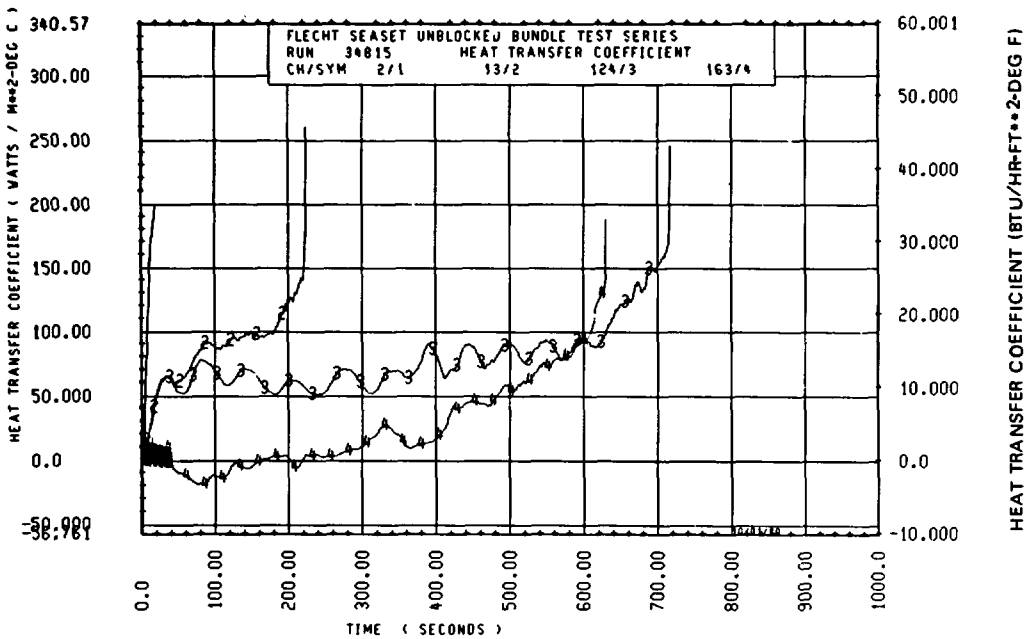
C. Comments

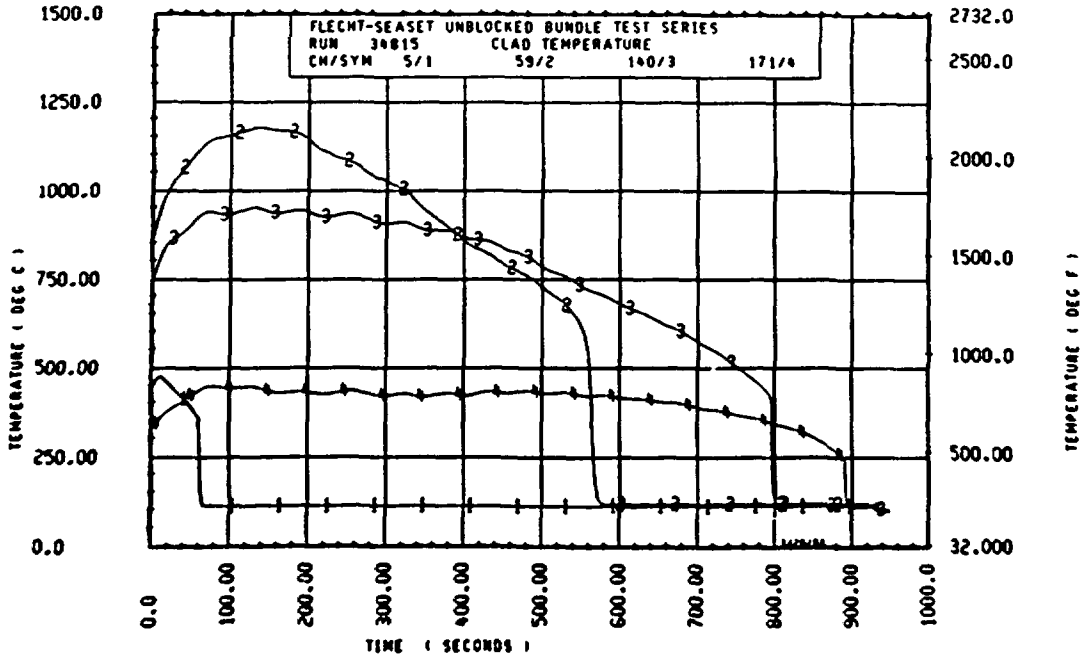
Significant bundle distortion occurred in the center of the bundle between the 1.52m (60 in.) and 2.27m (90 in.) elevations. Power decay of inside power zone was lower than specified by approximately 5 percent, and there were flooding rate oscillations of approximately 8 percent throughout the test.

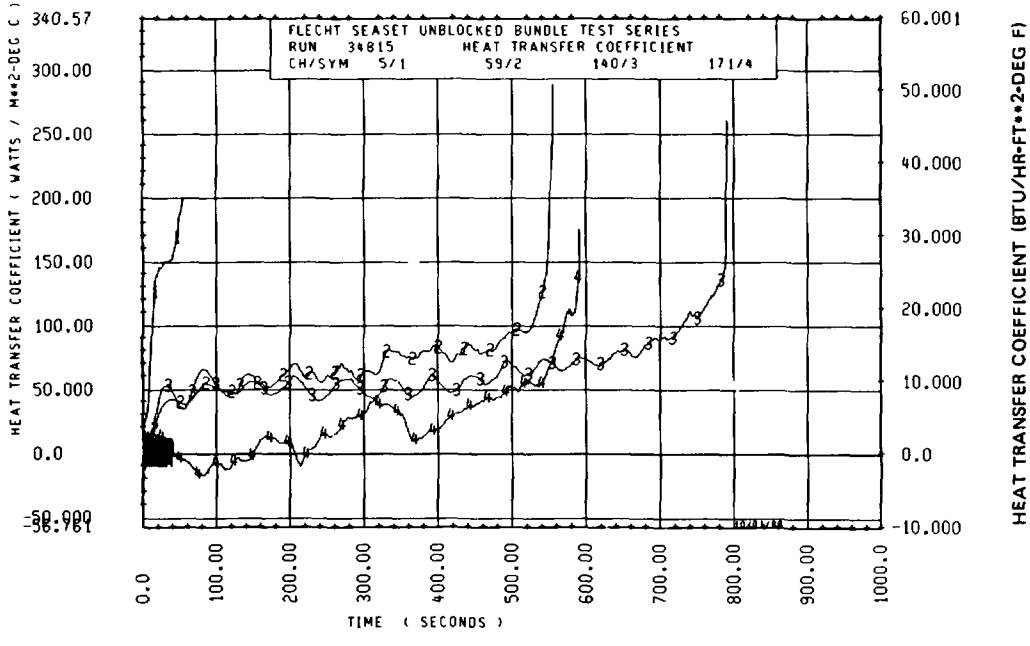
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 34815

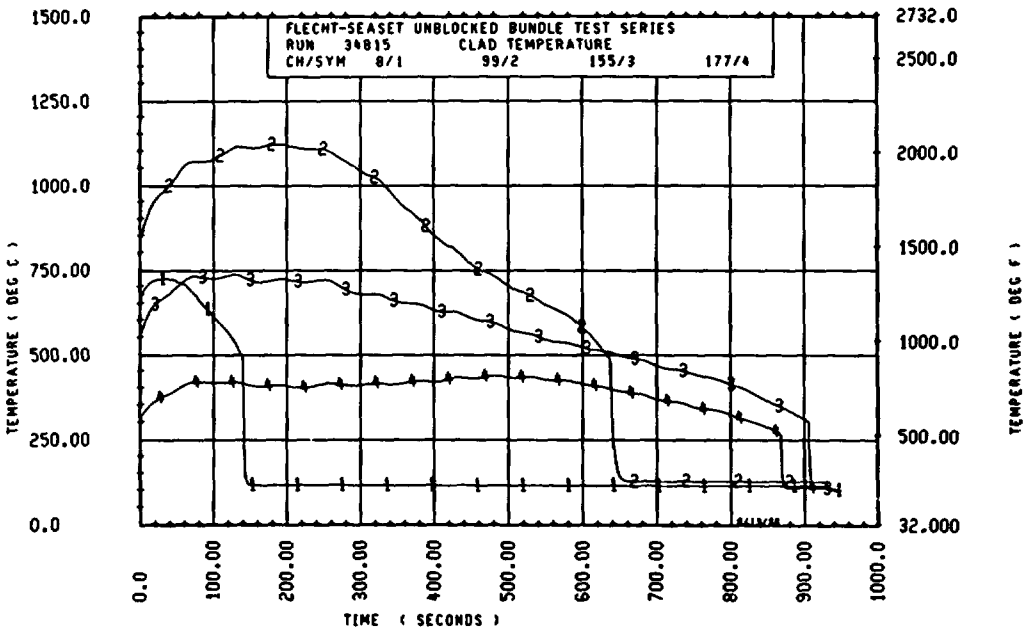
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1287.	1446.	159.	26.0	863.	235.7
2H 6- 0	50	1564.	1856.	292.	68.0	862.	508.6
3C 5- 0	17	1353.	1571.	208.	65.0	695.	395.7
3C 5- 7	28	1448.	1658.	210.	64.0	747.	659.7
4L 8- 0	129	1350.	1667.	316.	68.0	732.	725.4
4L 8- 6	147	1352.	1661.	309.	68.0	758.	725.3
5E11- 0	168	639.	819.	180.	125.0	489.	827.0
5J 4- 0	12	1249.	1457.	208.	53.0	774.	243.6
5J 8- 6	146	1128.	1336.	209.	66.0	632.	807.5
5J11- 6	175	579.	763.	184.	131.0	382.	901.0
7B 6- 0	57	1496.	1748.	252.	72.0	889.	435.8
7B 8- 6	142	1124.	1370.	246.	126.0	619.	764.0
7B10- 0	162	849.	1266.	417.	189.0	577.	842.9
7B11- 6	176	651.	968.	316.	245.0	512.	848.9
7D 6- 4	84	1648.	2114.	466.	124.0	886.	548.6
7D 7- 6	119	1504.	1765.	261.	66.0	753.	718.7
7D 9- 3	151	1023.	1372.	349.	127.0	624.	846.0
7G 5- 0	23	1532.	1790.	258.	75.0	921.	354.7
7J 6- 0	59	1597.	2152.	555.	132.0	873.	562.2
7M 7- 6	120	1488.	1830.	342.	71.0	781.	741.0
7M 8- 0	132	1365.	1735.	371.	69.0	734.	767.3
7M 9- 3	152	1040.	1343.	302.	71.0	649.	813.3
8H 4- 0	13	1310.	1492.	182.	58.0	921.	228.5
8H10- 0	163	825.	1214.	389.	428.0	640.	848.0
8H11- 6	177	603.	821.	218.	479.0	509.	868.0
8K 4- 0	14	1287.	1474.	187.	56.0	904.	220.8
8K 6- 6	99	1546.	2051.	504.	181.0	887.	636.8
8K 8- 0	140	1374.	1749.	375.	130.0	776.	794.7
8K10- 0	164	842.	1189.	346.	130.0	605.	883.9
8N 2- 0	5	839.	889.	50.	11.0	677.	61.0
8N 4- 0	15	1300.	1475.	176.	39.0	864.	224.9
8N 6- 0	61	1557.	1864.	307.	65.0	974.	491.5
8N10- 0	165	850.	1199.	350.	133.0	660.	828.0
9C 7- 0	109	1507.	1759.	252.	69.0	750.	653.1
9C 9- 3	153	1052.	1368.	316.	127.0	648.	843.0
9G 1- 0	2	675.	697.	22.	6.5	607.	23.0
9G 3- 3	8	1232.	1343.	110.	35.0	874.	140.4
9G11- 0	171	626.	841.	215.	74.0	479.	890.0
9I 5- 0	24	1533.	1803.	270.	75.0	872.	358.7
9E 6- 2	46	1566.	2028.	462.	127.0	805.	558.4
10D 6- 6	93	1521.	1895.	374.	127.0	769.	611.0
11E 7- 6	126	1493.	1823.	329.	71.0	751.	721.4
11E 9- 3	155	1047.	1358.	311.	127.0	574.	906.0
11E11- 0	172	628.	875.	247.	252.0	489.	917.6
12D 4- 0	16	1308.	1481.	173.	50.0	836.	227.9
12D 6- 0	66	1593.	1955.	362.	122.0	905.	511.7
12F 6- 6	102	1544.	2058.	514.	127.0	852.	567.8

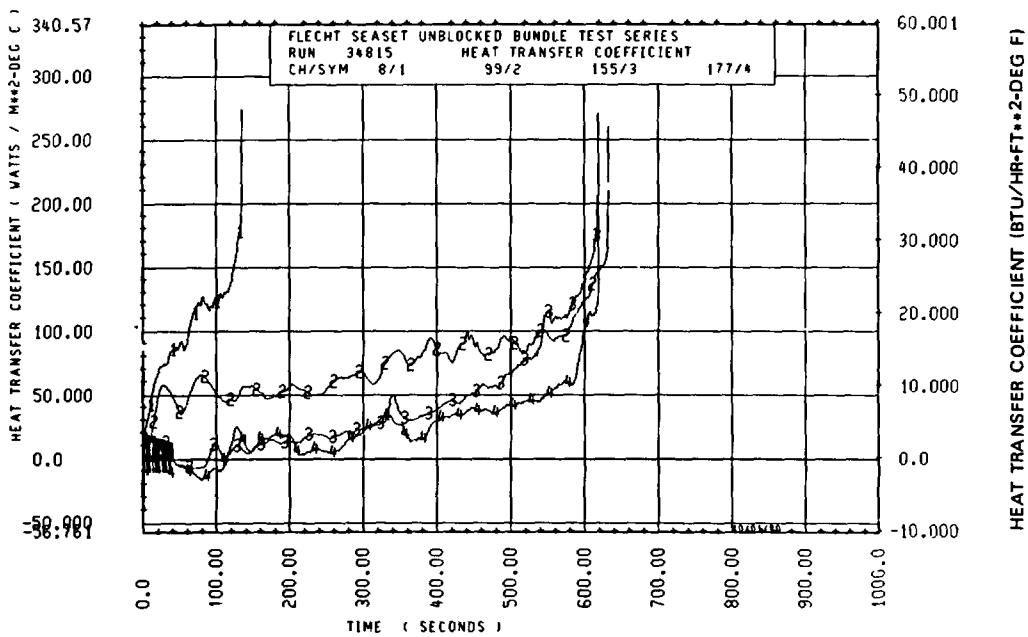

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

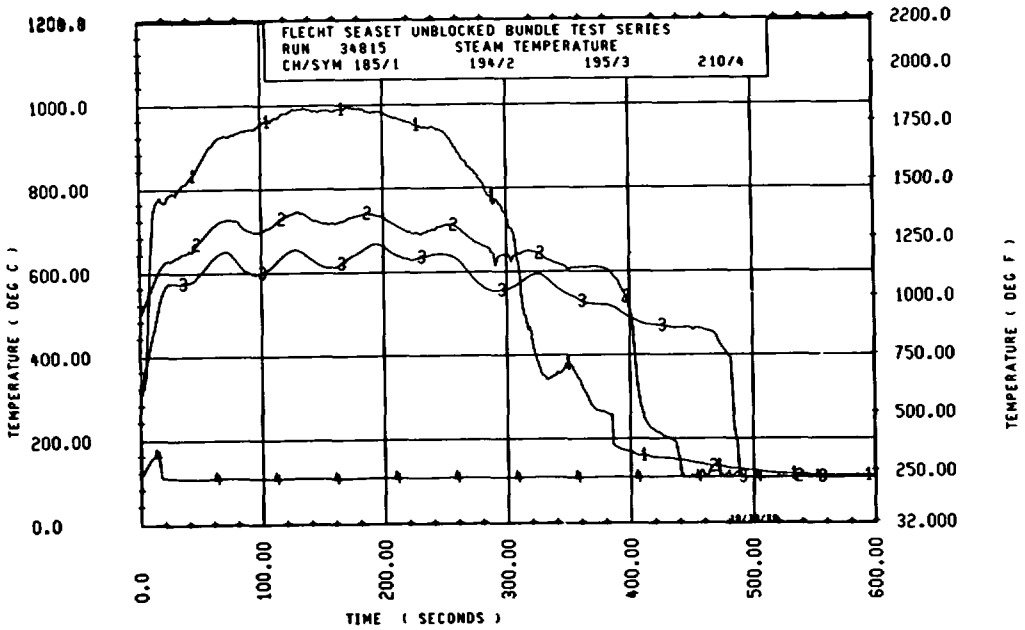

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

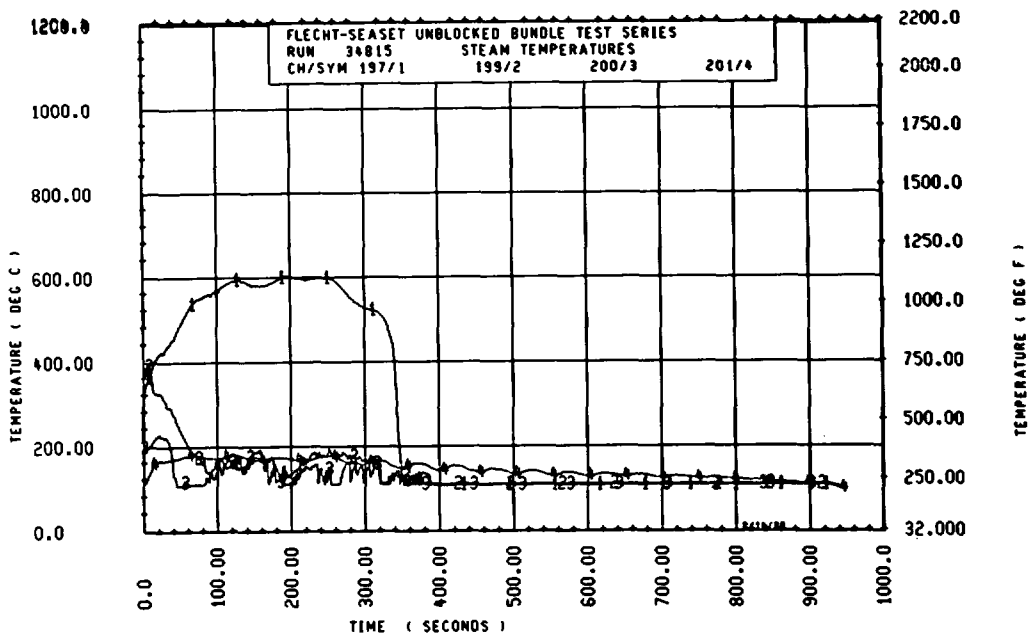

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

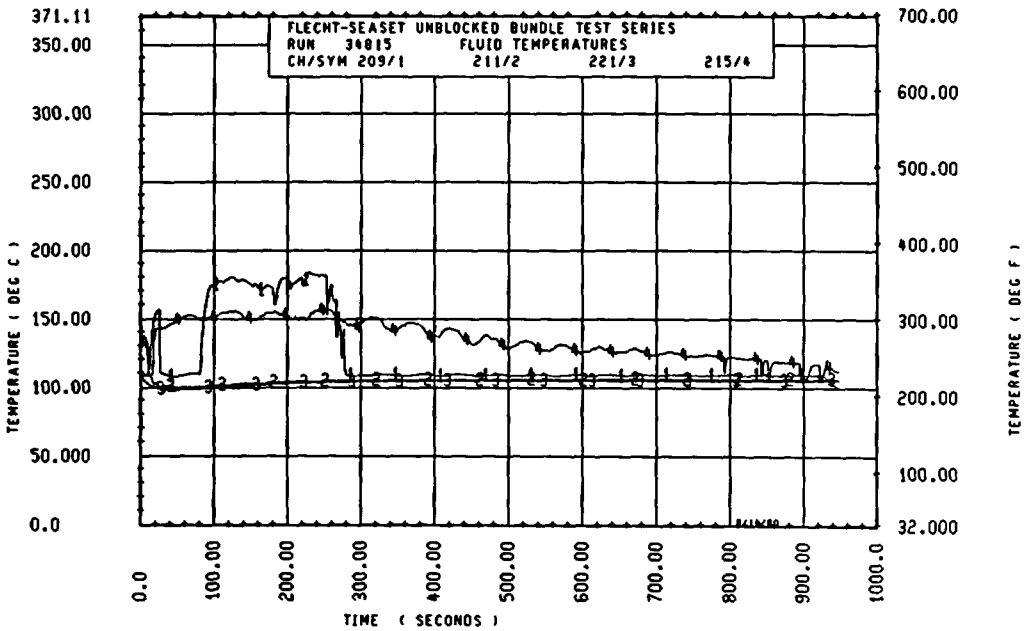

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

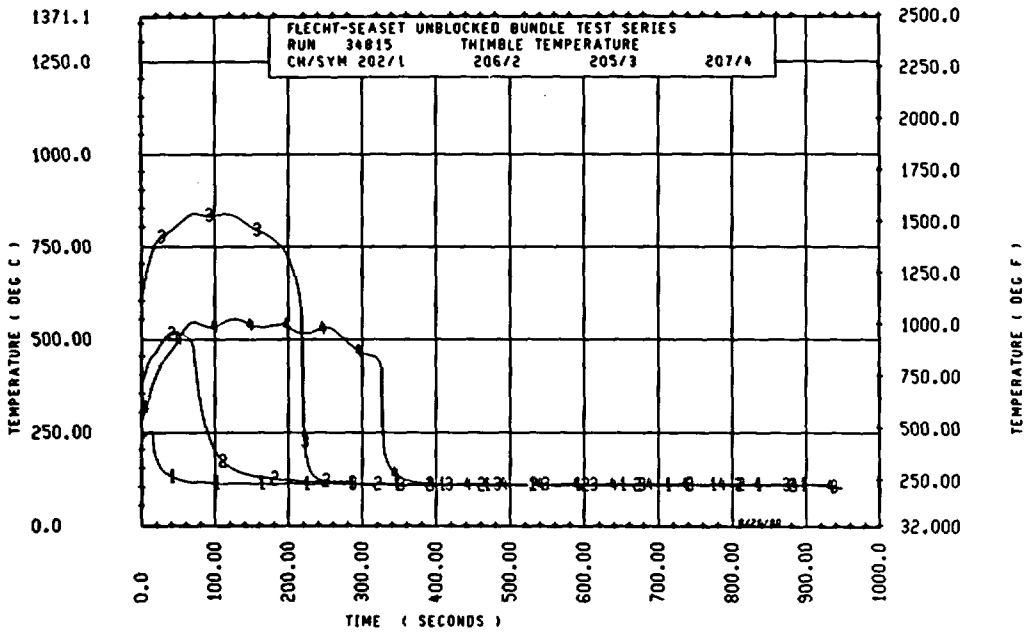

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)

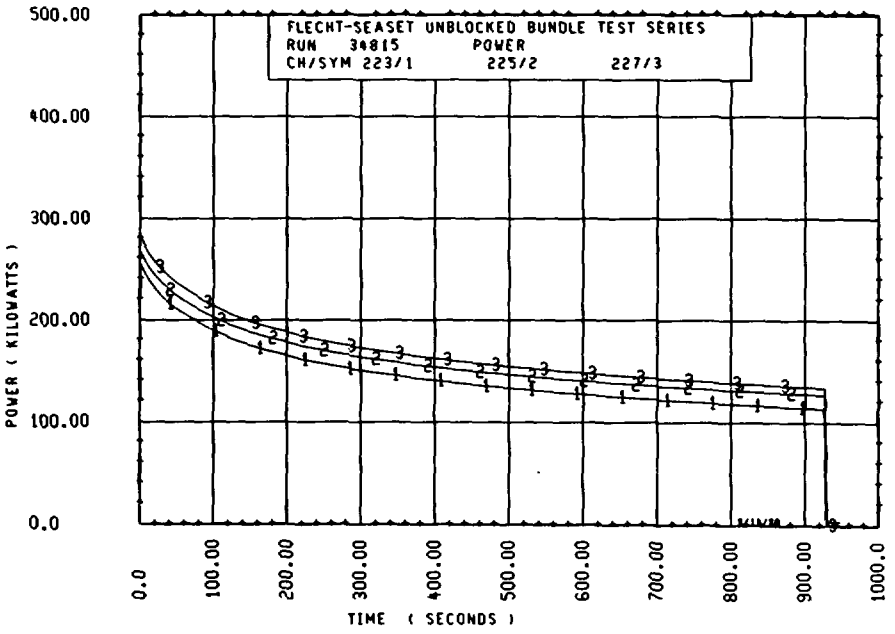

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

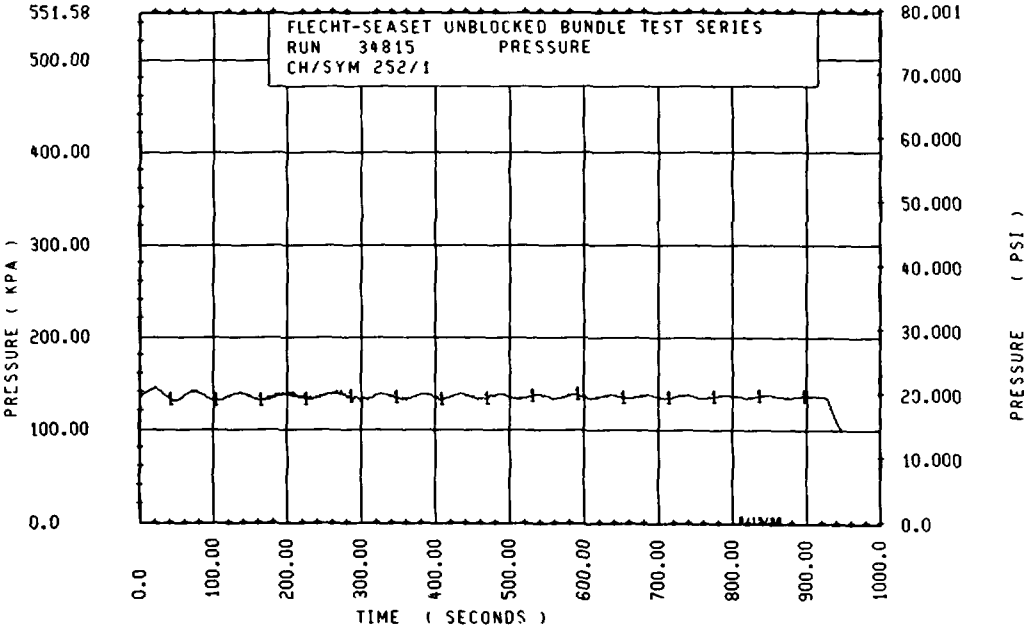

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

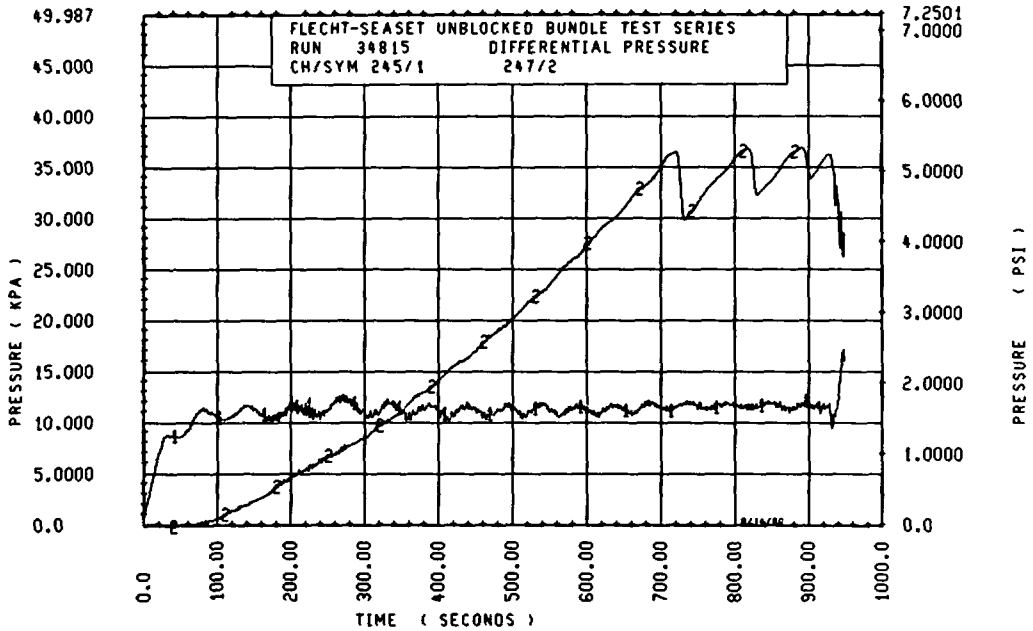


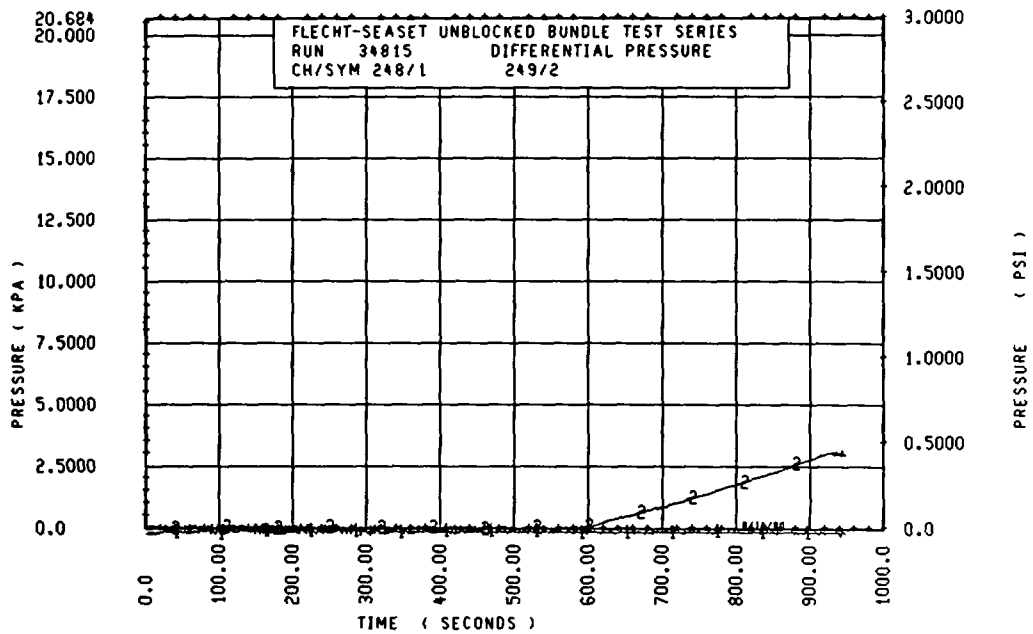


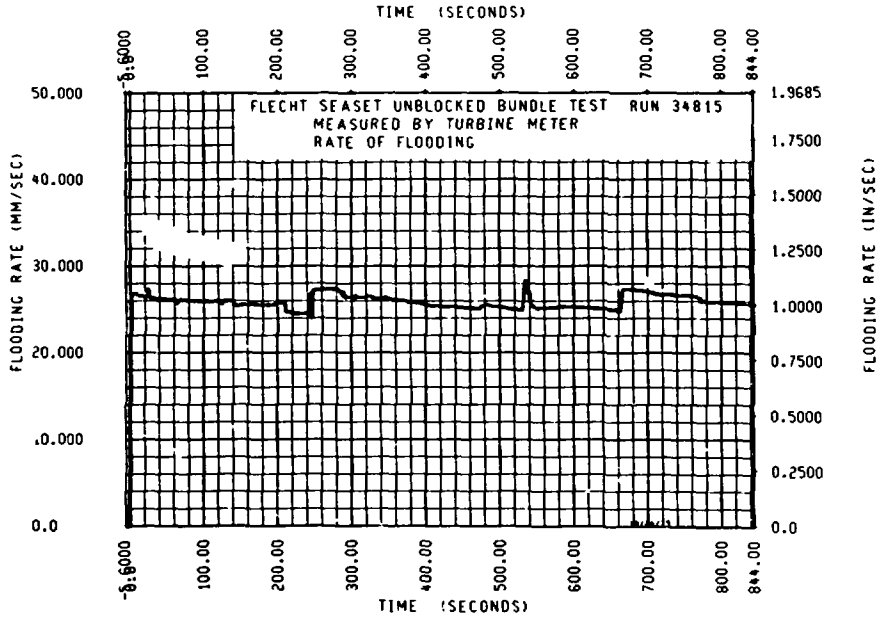
CH 202-4C, 0.61 m (24 in.); CH 206-13L, 1.22 m (48 in.);
CH 205-4C, 1.52 m (60 in.); CH 207-4I, 3.05 m (120 in.)

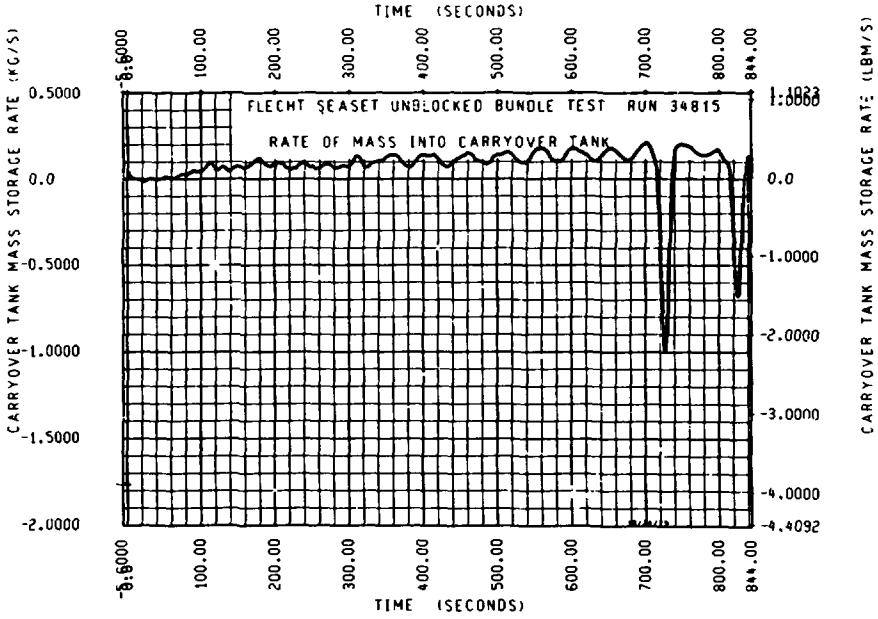

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0
TIME (SECONDS)

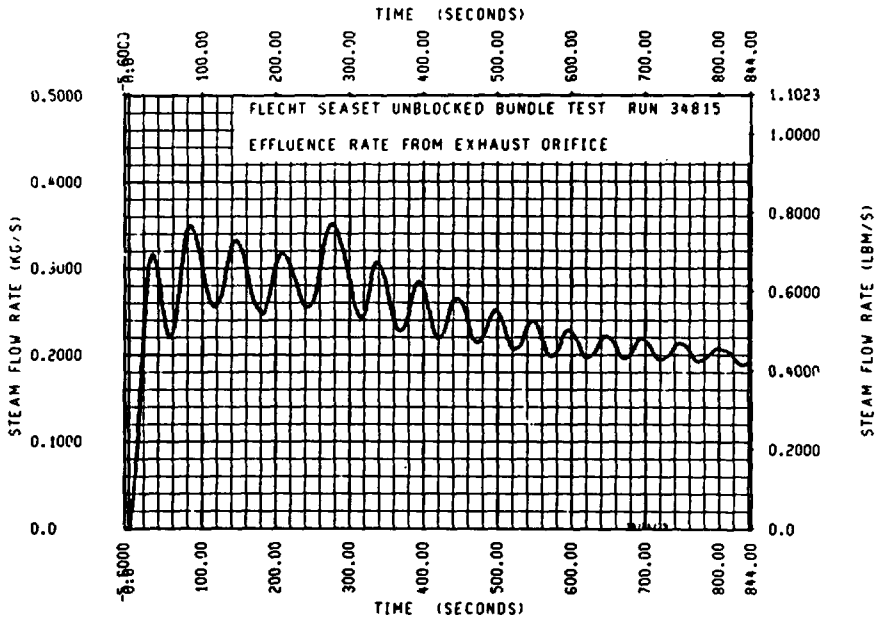

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0
TIME (SECONDS)

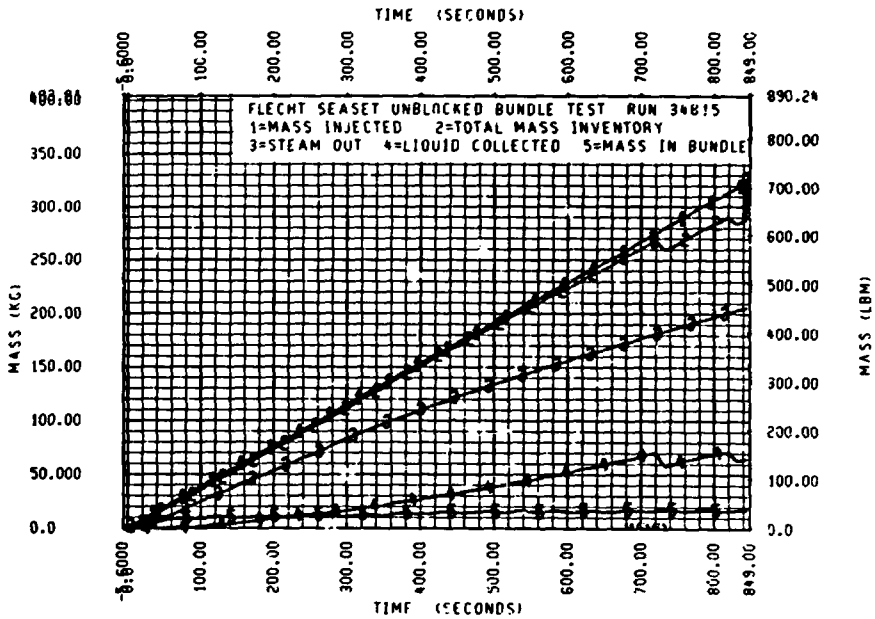

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

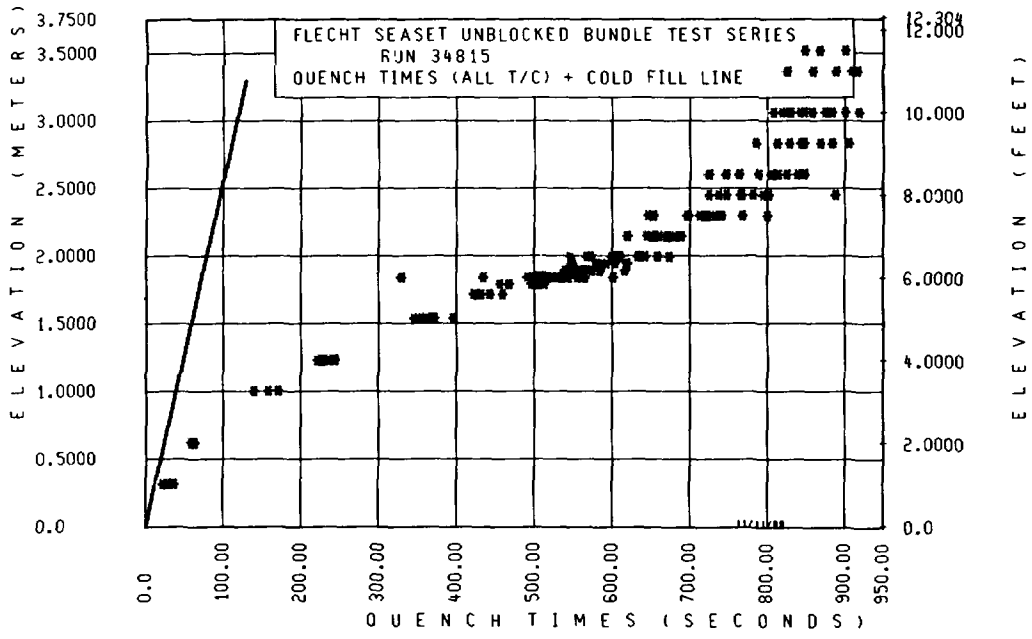

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

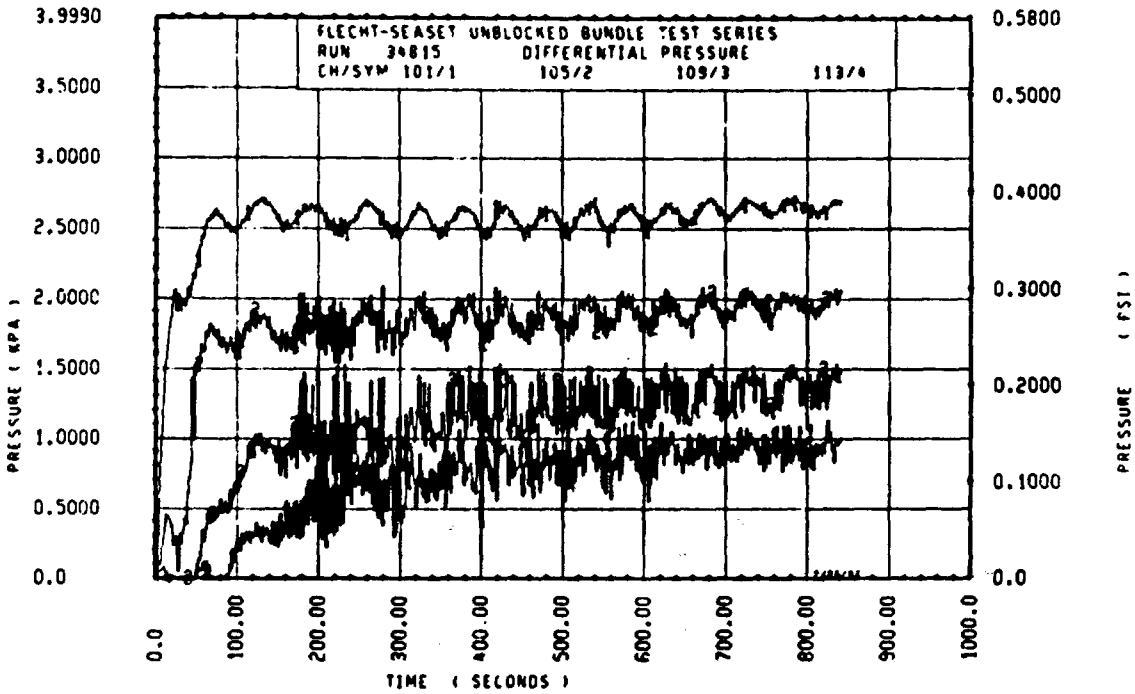

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34815
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
-5.6000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
844.00
FLOODING RATE (MM/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
FLOODING RATE (IN/SEC)
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0

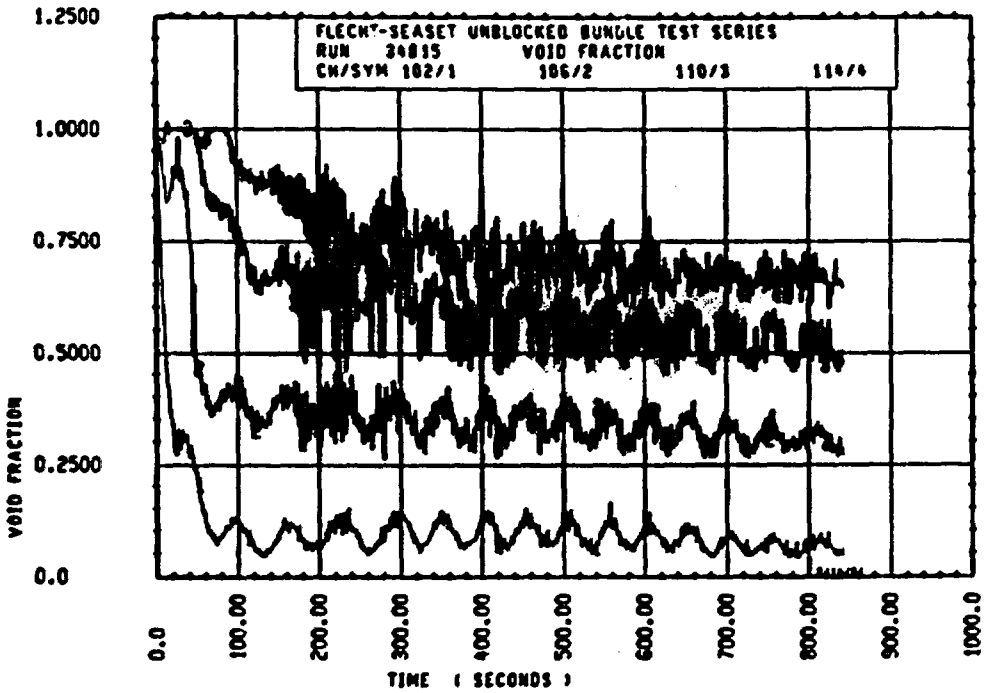

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34815
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
-5.6000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
844.00
CARRYOVER TANK MASS STORAGE RATE (KG/S)
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
1.4092
1.0000
0.0
-1.0000
-2.0000
-3.0000
-4.0000
-4.4092

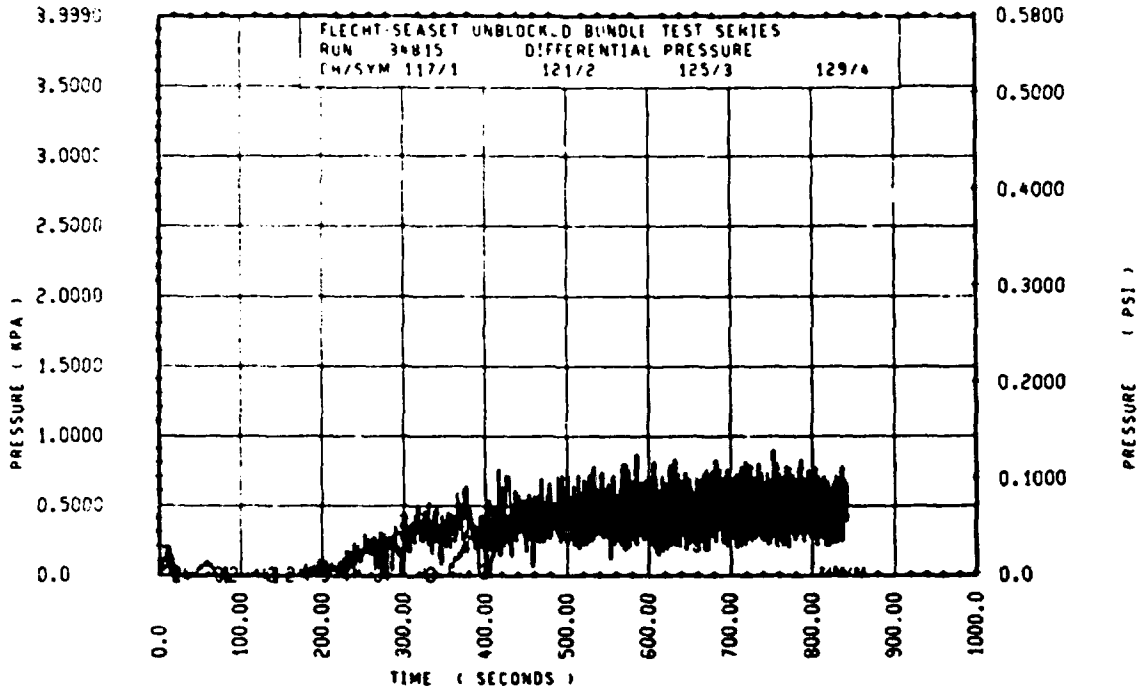

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34815
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.6000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
844.00

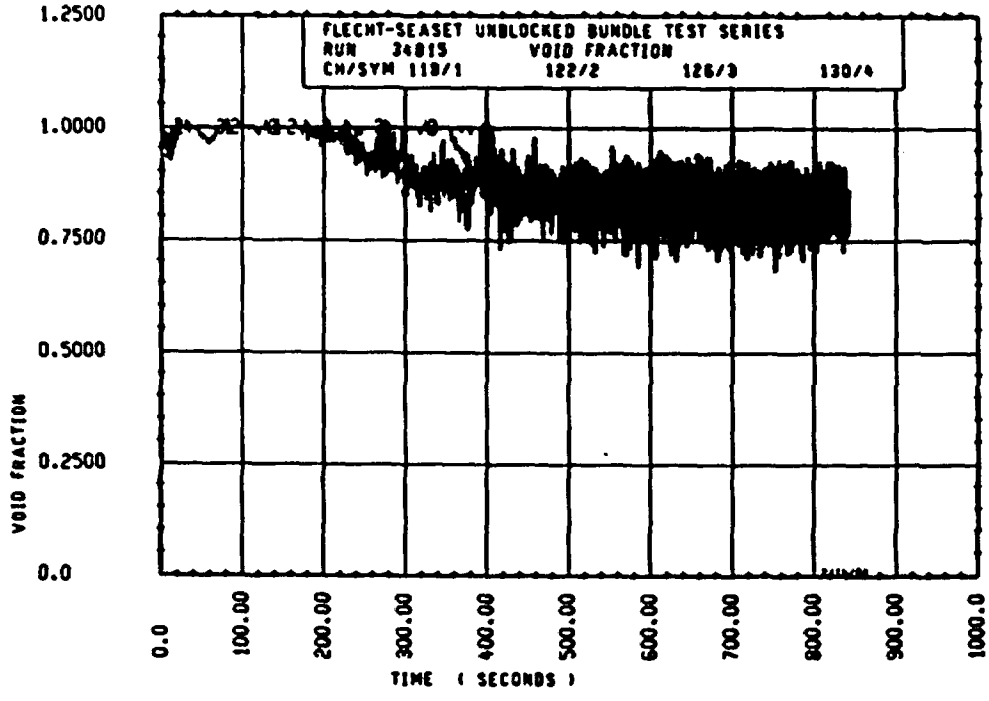

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34815
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
890.24
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-5.6000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
849.00

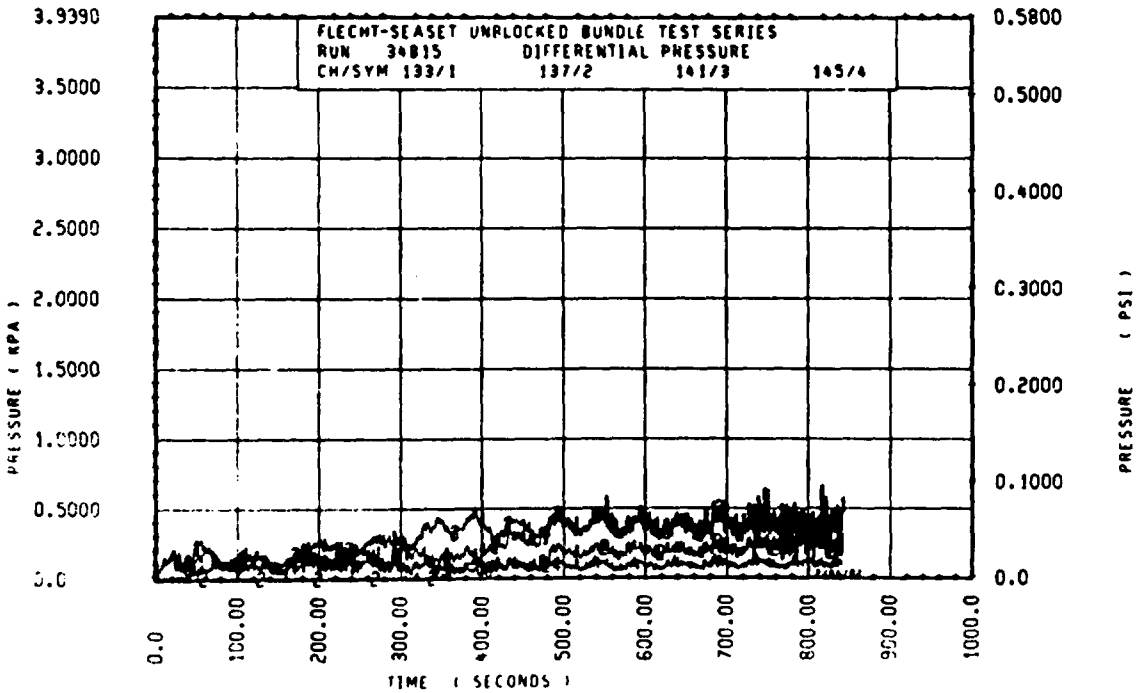

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
950.00
QUENCH TIMES (SECONDS)

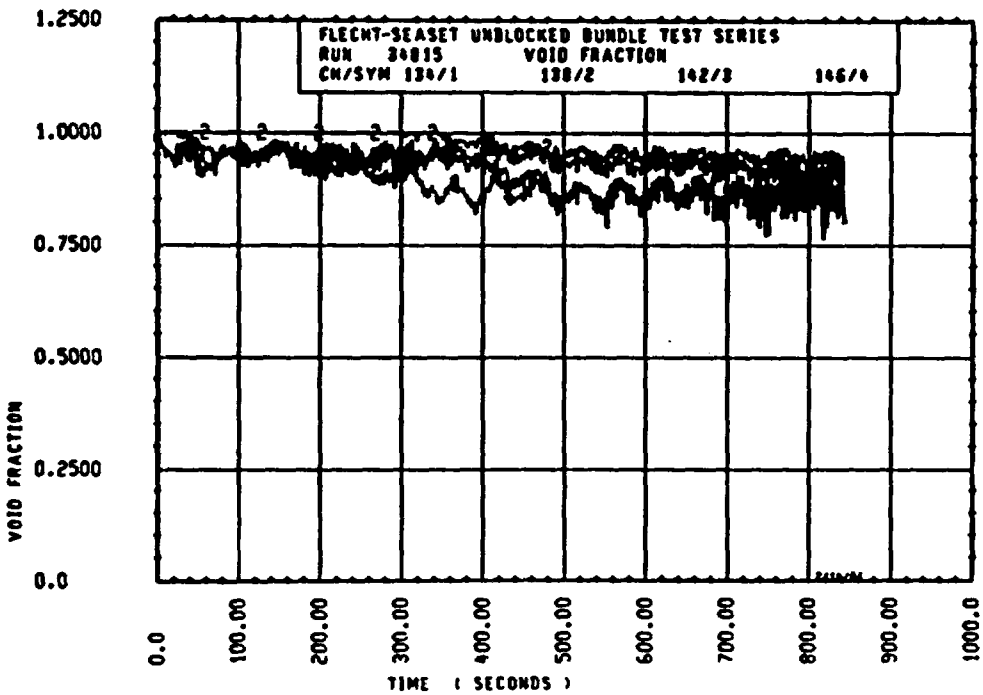

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9390
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34815 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 34907

Date: 8/13/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	897°C (1648°F)
Rod peak power	1.4 kw/m (0.42 kw/ft)
Flow rate	11 mm/sec (0.45 in./sec)
Coolant temperature	51°C (123°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	141°C (285°F)	61°C (141°F)
1.22 m (48 in.)	141°C-173°C (285°F-343°F)	72°C (162°F)
1.83 m (72 in.)	233°C-252°C (452°F-485°F)	94°C-240°C (202°F-464°F)
2.44 m (96 in.)	185°C-227°C (365°F-441°F)	735°C-781°C (1355°F-1438°F)
2.74 m (108 in.)	182°C (360°F)	158°C-278°C (316°F-533°F)
3.05 m (120 in.)	138°C-152°C (281°F-305°F)	129°C-294°C (265°F-562°F)
3.35 m (132 in.)	133°C-139°C (272°F-282°F)	129°C (265°F)

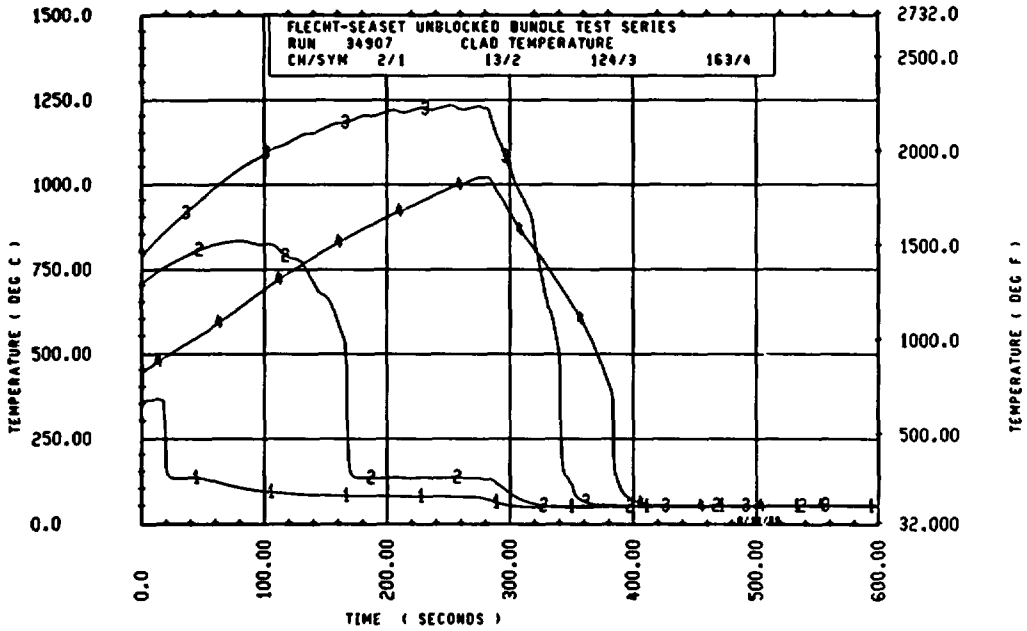
*At 327 seconds after flood

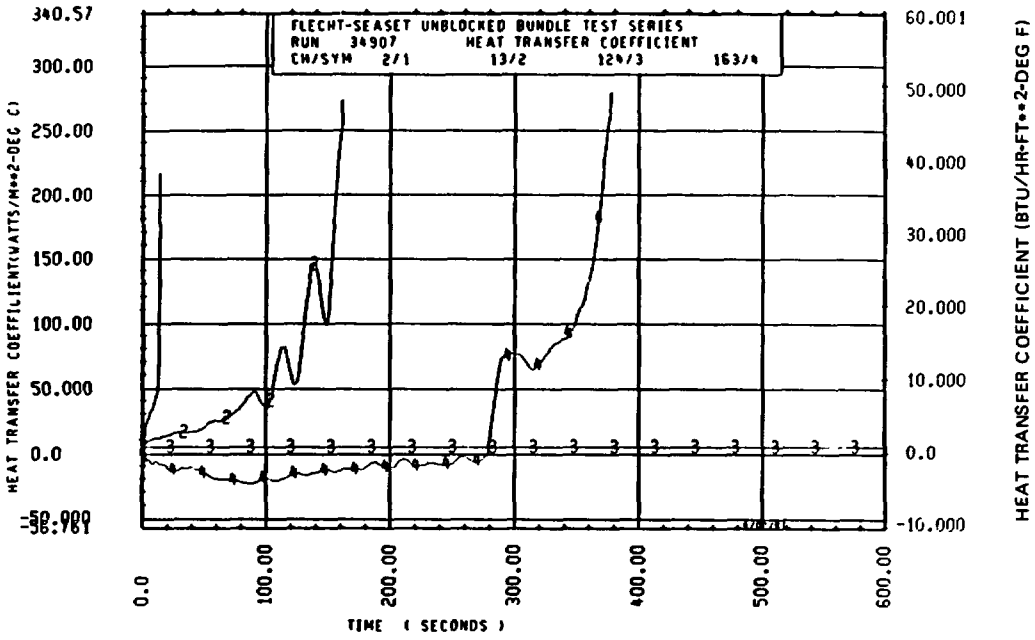
C. Comments

Significant bundle distortion occurred in the center of the bundle between the 1.52m (60 in.) and 2.27m (90 in.) elevations. Test was scrammed at 279 seconds after flood because of high rod temperature. There were severe pressure oscillations throughout the test.

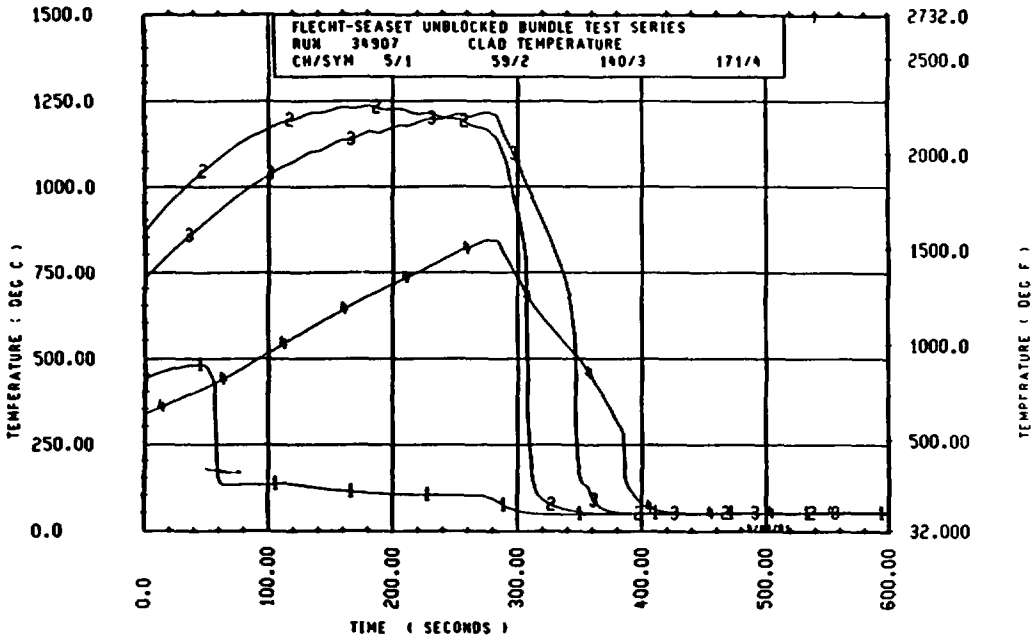
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 34907

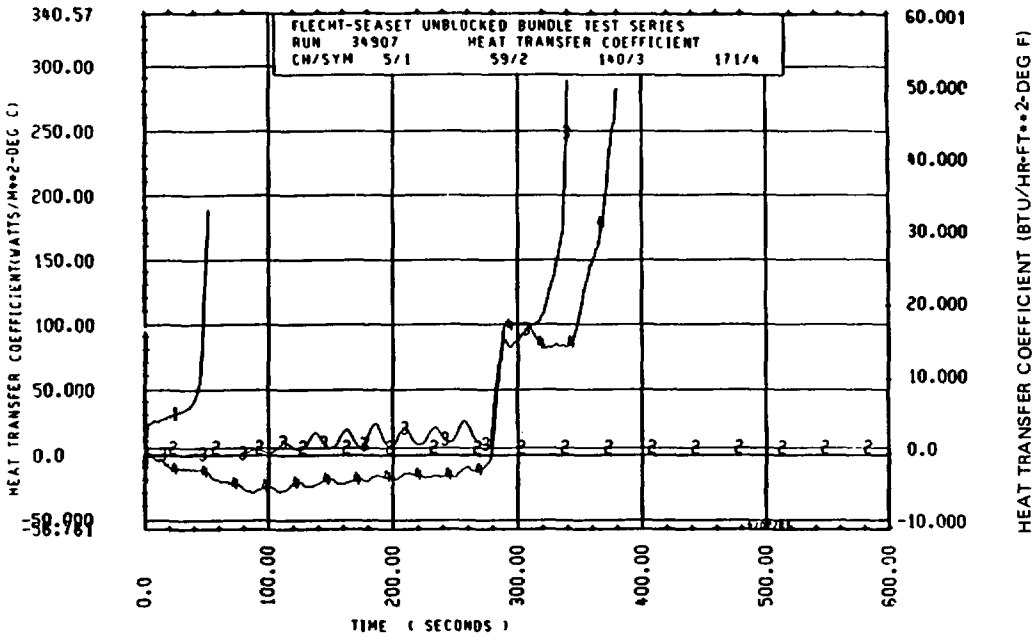
ROD ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1267.	1496.	228.	78.0	950.	164.8
2H 6- 0	50	1528.	1929.	401.	155.0	923.	311.8
3C 5- 0	17	1312.	1536.	223.	81.0	879.	254.8
3C 5- 7	28	1382.	1652.	270.	131.0	881.	296.0
4L 8- 0	129	1312.	1991.	679.	227.0	767.	353.0
4L 8- 6	147	1312.	1971.	658.	204.0	741.	353.0
5E11- 0	168	633.	1392.	759.	277.0	518.	385.0
5J 4- 0	12	1258.	1516.	258.	79.0	892.	167.3
5J 8- 6	146	1116.	2071.	954.	252.0	765.	364.9
5J11- 6	175	589.	1417.	829.	277.0	573.	384.0
7B 6- 0	57	1461.	1806.	345.	131.0	891.	298.0
7B 8- 6	142	1127.	1735.	608.	274.0	739.	363.2
7B10- 0	162	840.	1604.	764.	274.0	587.	381.0
7B11- 6	176	624.	1246.	623.	277.0	499.	385.0
7D 6- 4	84	1613.	2193.	580.	180.0	1612.	302.4
7D 7- 6	119	1469.	2137.	668.	203.0	1179.	328.9
7D 9- 3	151	1027.	1959.	932.	274.0	680.	371.0
7G 5- 0	23	1506.	1795.	289.	80.0	1016.	255.7
7J 6- 0	**BAD THERMOCOUPLE DATA*						
7M 7- 6	120	1450.	2106.	655.	228.0	859.	345.0
7M 8- 0	132	1327.	2054.	727.	250.0	795.	355.8
7M 9- 3	152	1019.	1909.	890.	274.0	644.	372.9
8H 4- 0	13	1307.	1531.	224.	77.0	974.	166.8
8H10- 0	163	837.	1868.	1031.	276.0	714.	382.9
8H11- 6	177	610.	1427.	817.	283.0	587.	385.5
8K 4- 0	14	1285.	1540.	255.	81.0	995.	162.9
8K 6- 6	99	1541.	2188.	647.	228.0	1524.	312.9
8K 8- 0	140	1356.	2221.	864.	274.0	1168.	343.5
8K10- 0	164	846.	1837.	991.	274.0	717.	382.0
8M 2- 0	5	832.	902.	70.	41.0	797.	57.0
8M 4- 0	15	1280.	1520.	240.	80.0	985.	164.6
8M 6- 0	61	1507.	1913.	407.	155.0	933.	311.0
8M10- 0	165	831.	1644.	812.	273.0	613.	381.9
9C 7- 0	109	1451.	2028.	578.	180.0	795.	334.0
9C 9- 3	153	1036.	1896.	860.	274.0	702.	371.0
9G 1- 0	2	679.	691.	12.	12.0	680.	18.6
9G 3- 3	8	1209.	1338.	129.	65.0	918.	113.0
9G11- 0	171	644.	1551.	906.	277.0	536.	385.0
9I 5- 0	24	1494.	1769.	274.	78.0	1045.	253.3
9E 6- 2	46	1556.	2203.	647.	180.0	1091.	312.8
10D 6- 6	93	1508.	1991.	484.	204.0	1043.	318.9
11E 7- 6	**BAD THERMOCOUPLE DATA*						
11E 9- 3	155	1044.	1889.	846.	274.0	675.	372.0
11E11- 0	172	651.	1473.	822.	277.0	555.	383.0
12D 4- 0	16	1277.	1498.	221.	81.0	991.	164.1
12D 6- 0	66	1550.	2037.	486.	132.0	983.	311.0
12F 6- 6	102	1526.	2079.	552.	181.0	956.	322.0



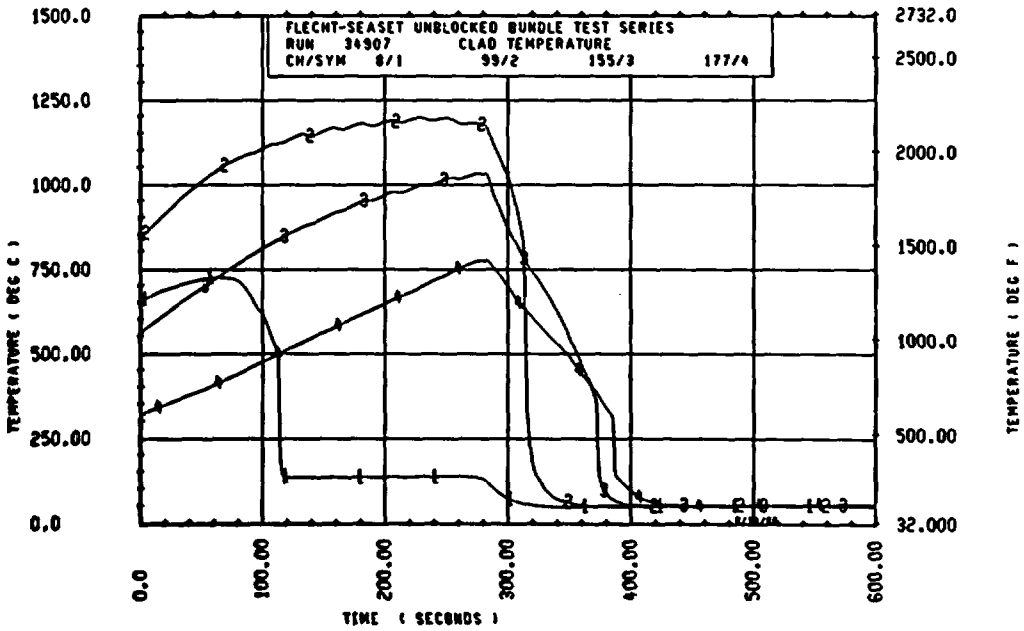


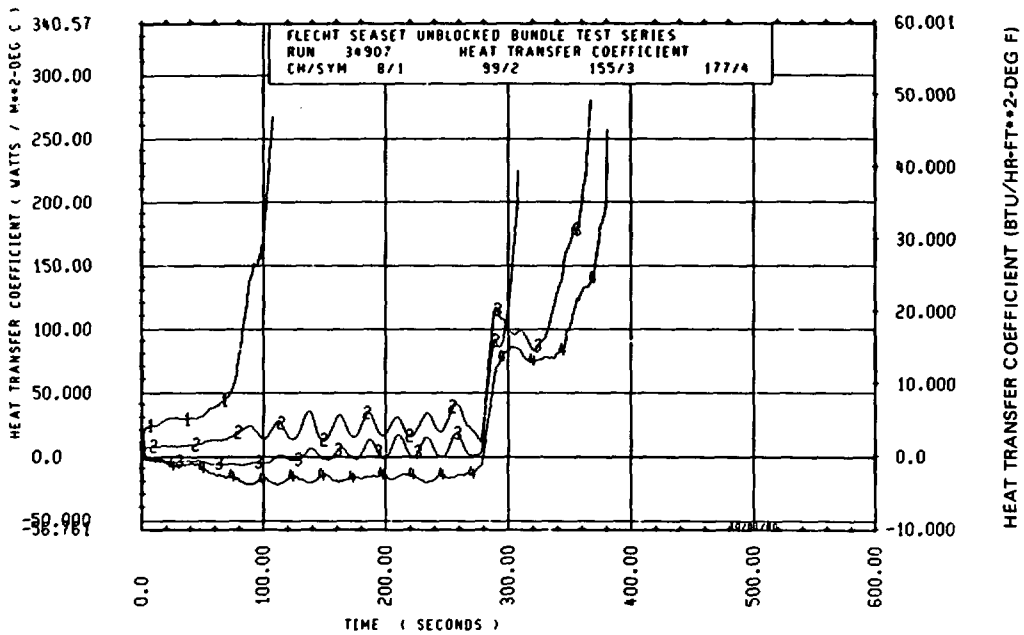
NOTE: Heat transfer coefficient was not calculated for channel 124.

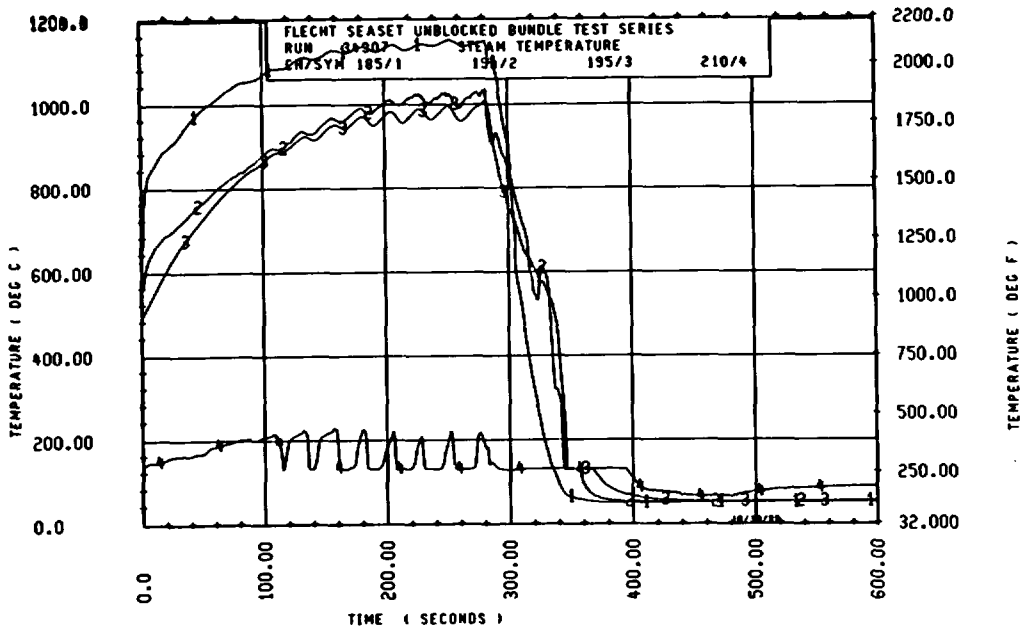


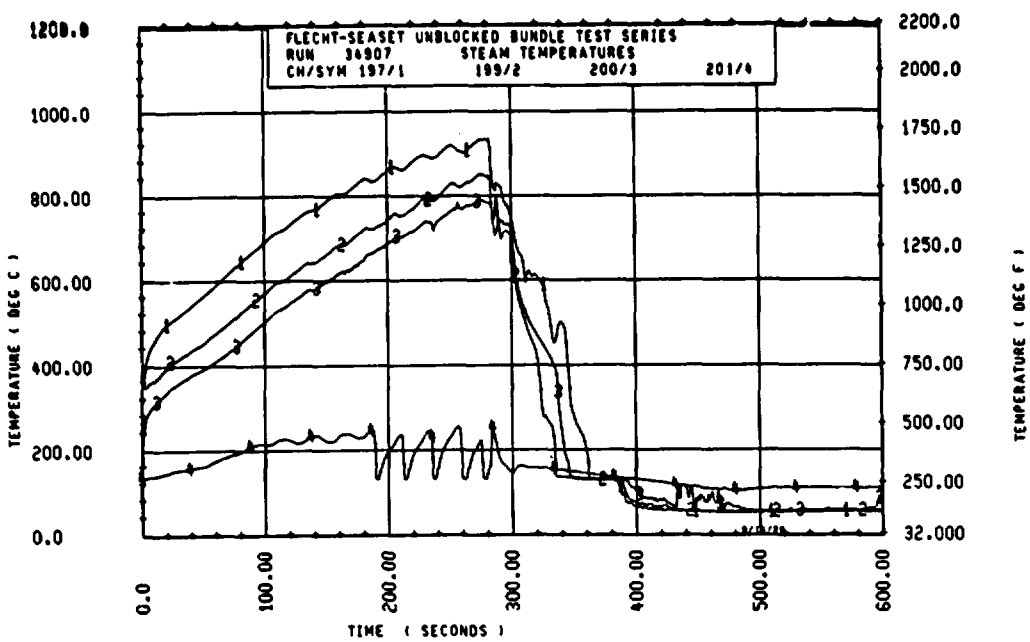


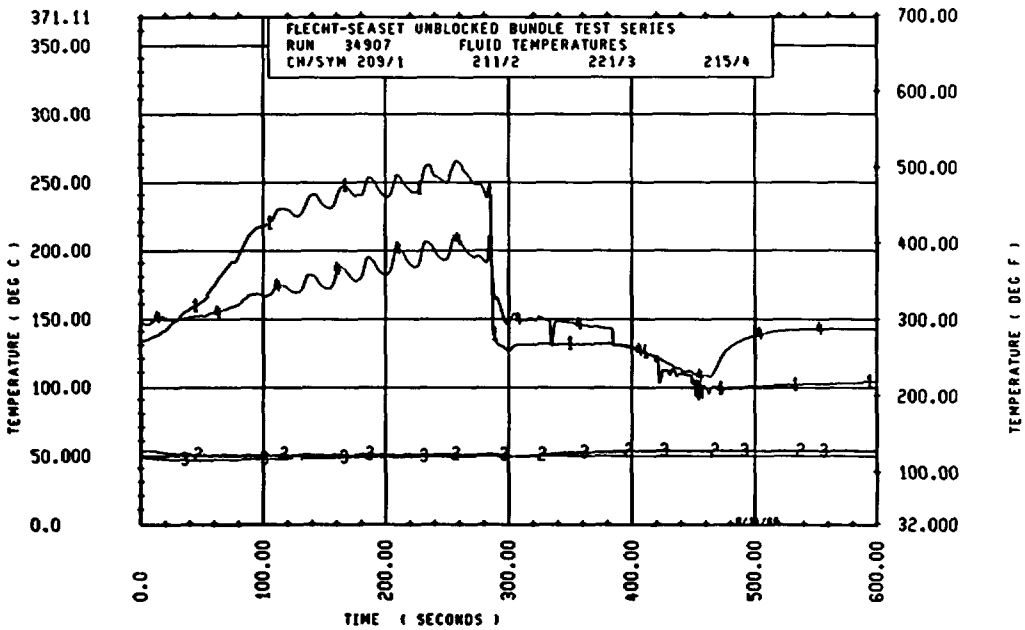
NOTE: Heat transfer coefficient was not calculated for channel 59.

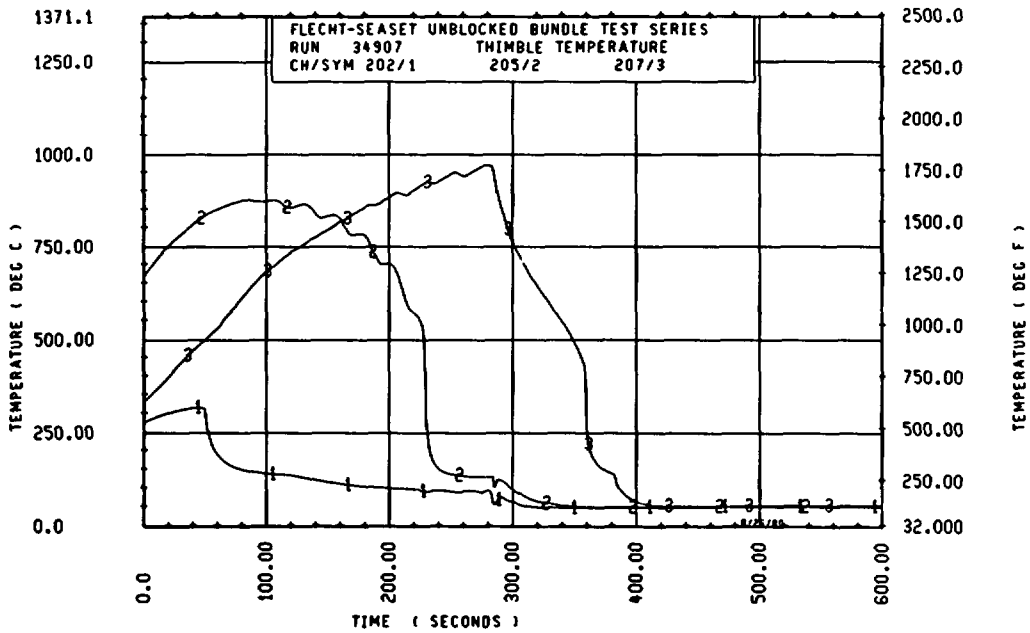

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

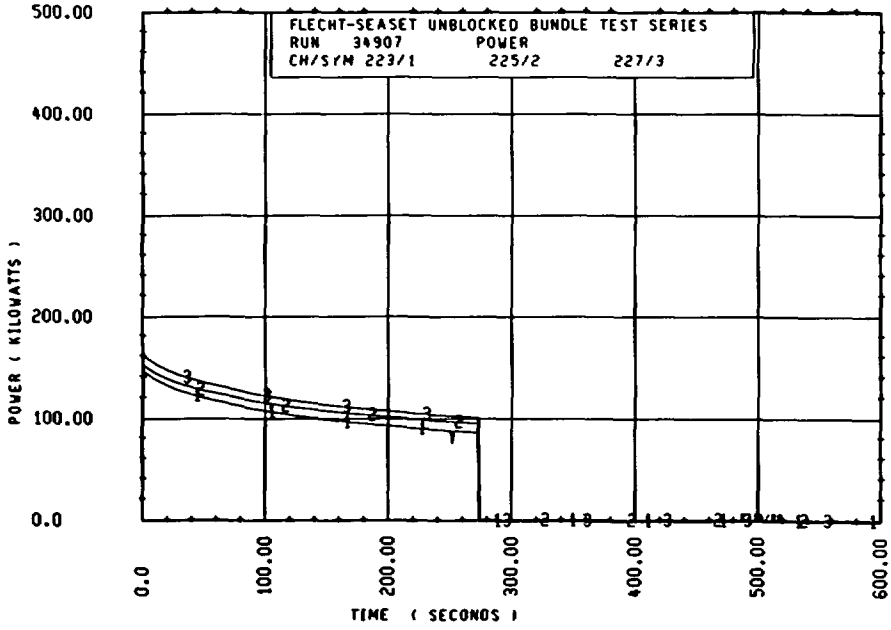

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 STEAM TEMPERATURE
CH/SYM 185/1 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
100.00
200.00
300.00
400.00
500.00
600.00

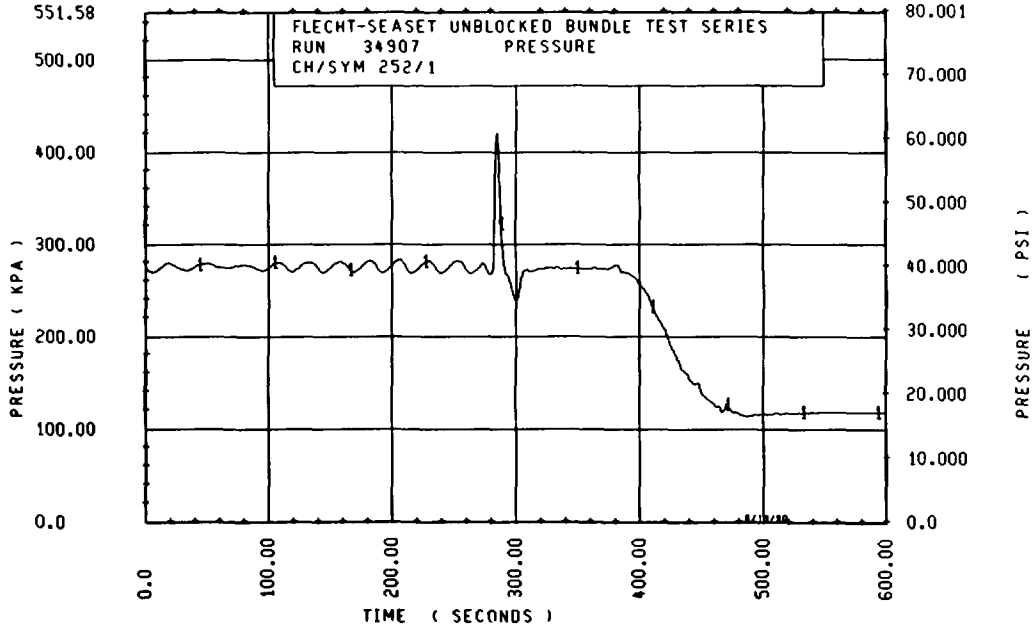

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
100.00
200.00
300.00
400.00
500.00
600.00

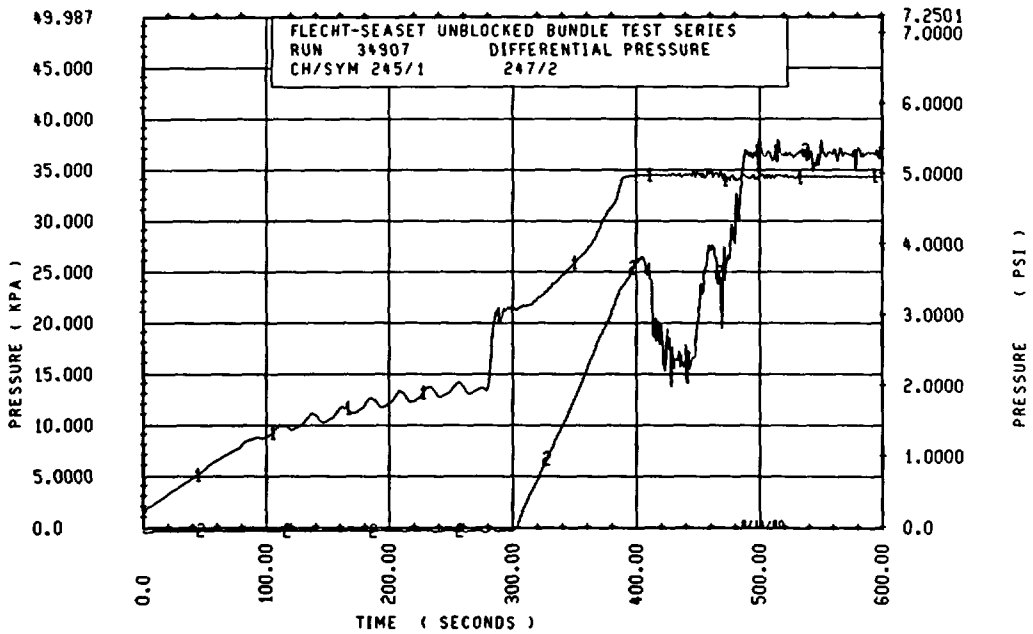


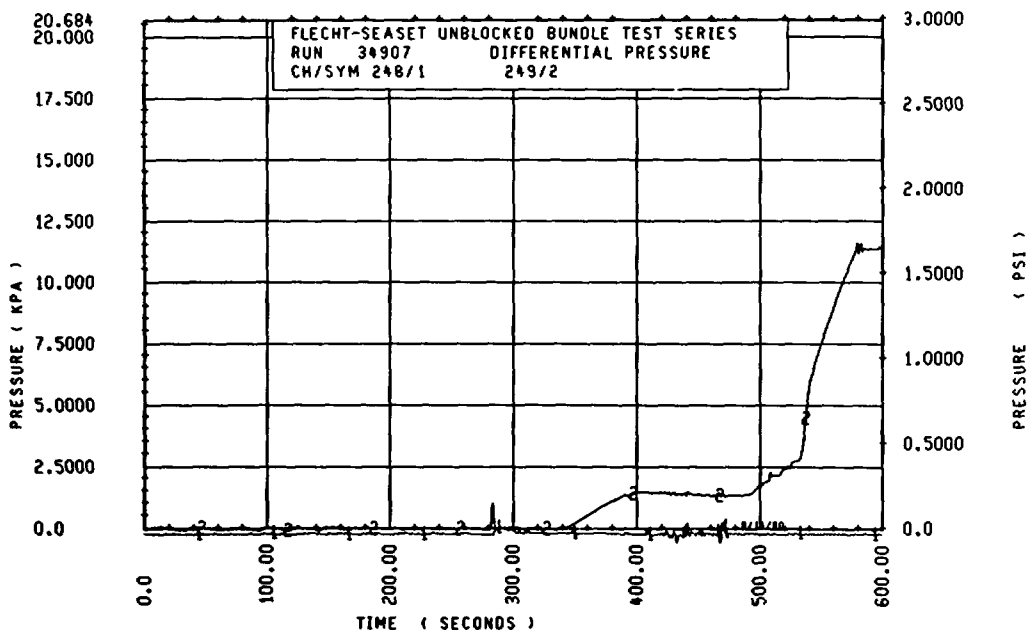


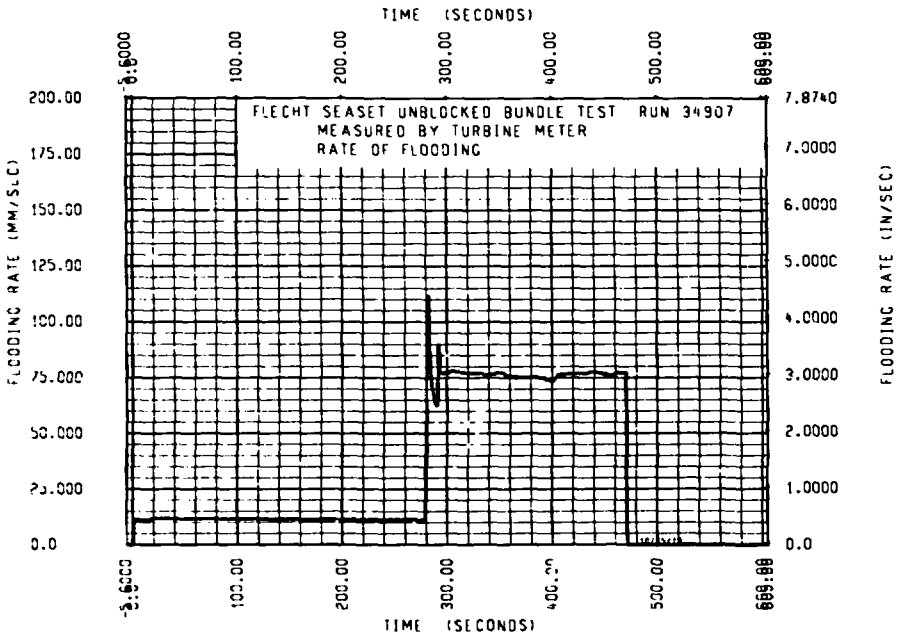
CH 202-4C, 0.61 m (24 in.); CH 205-4C, 1.52 m (60 in.); CH 207-4I, 3.05 m (120 in.)

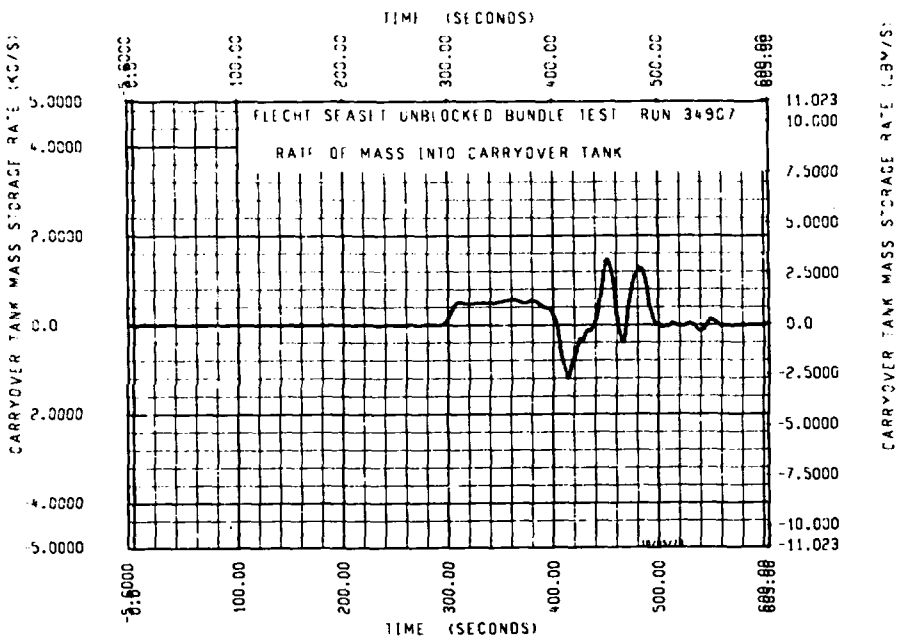

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

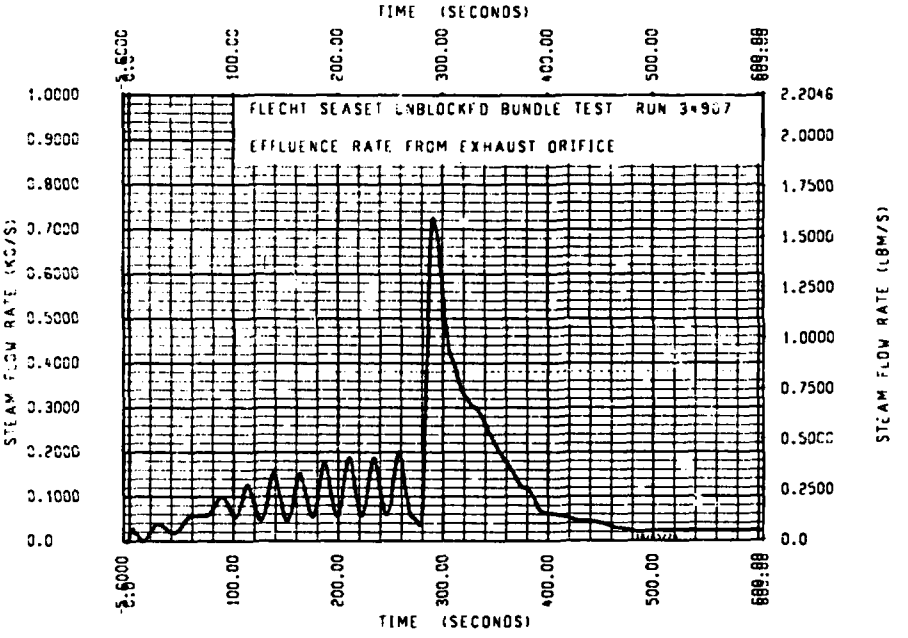

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

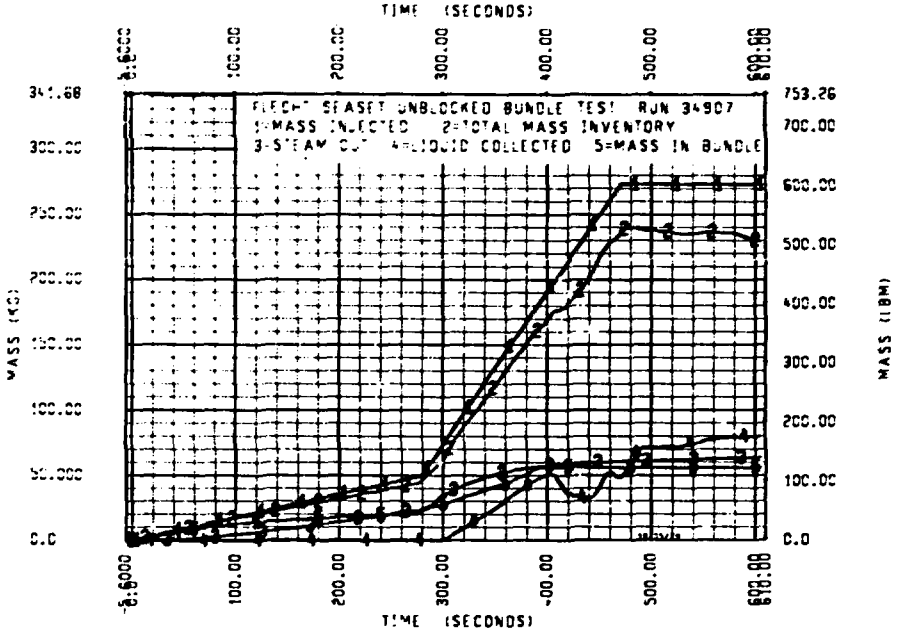

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

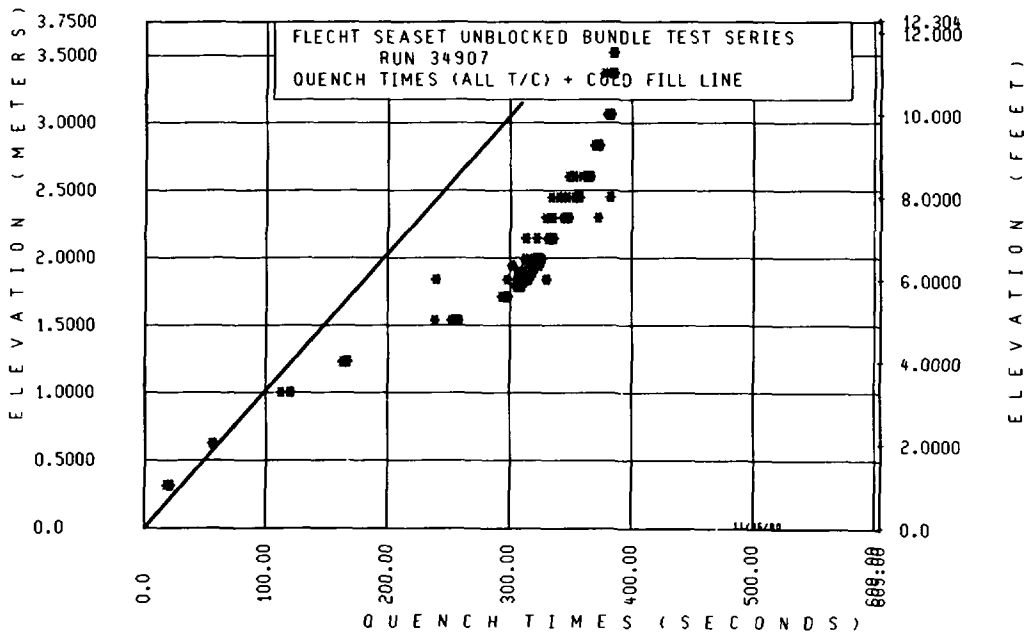

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

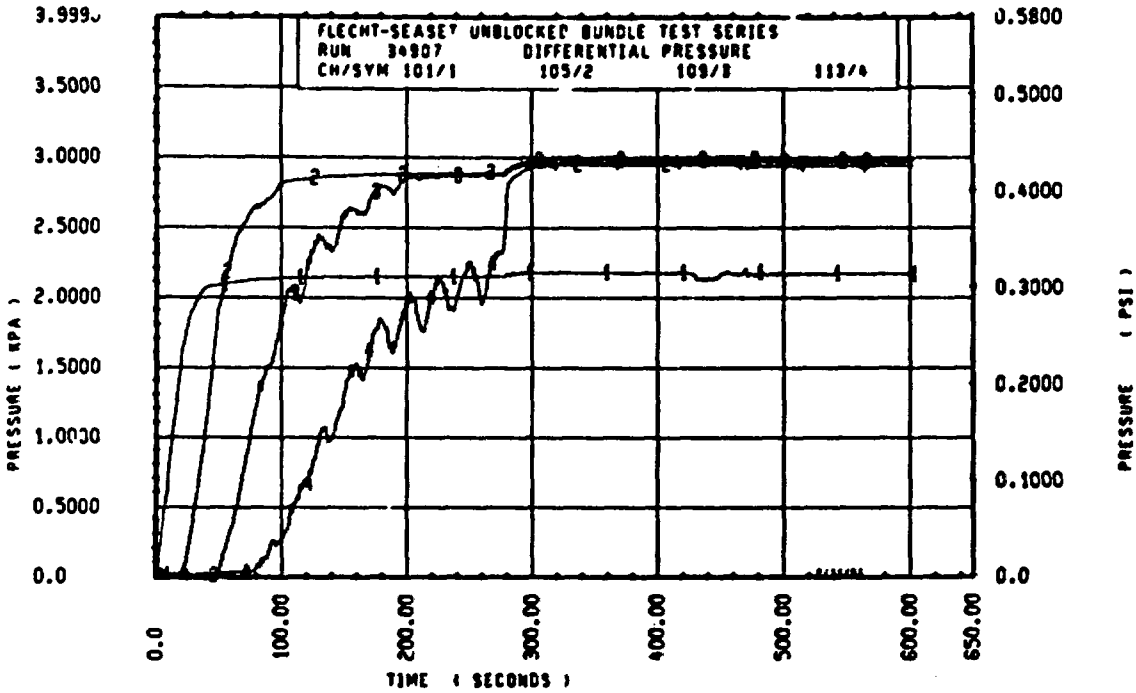

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34907
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
200.00
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
7.8740
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00

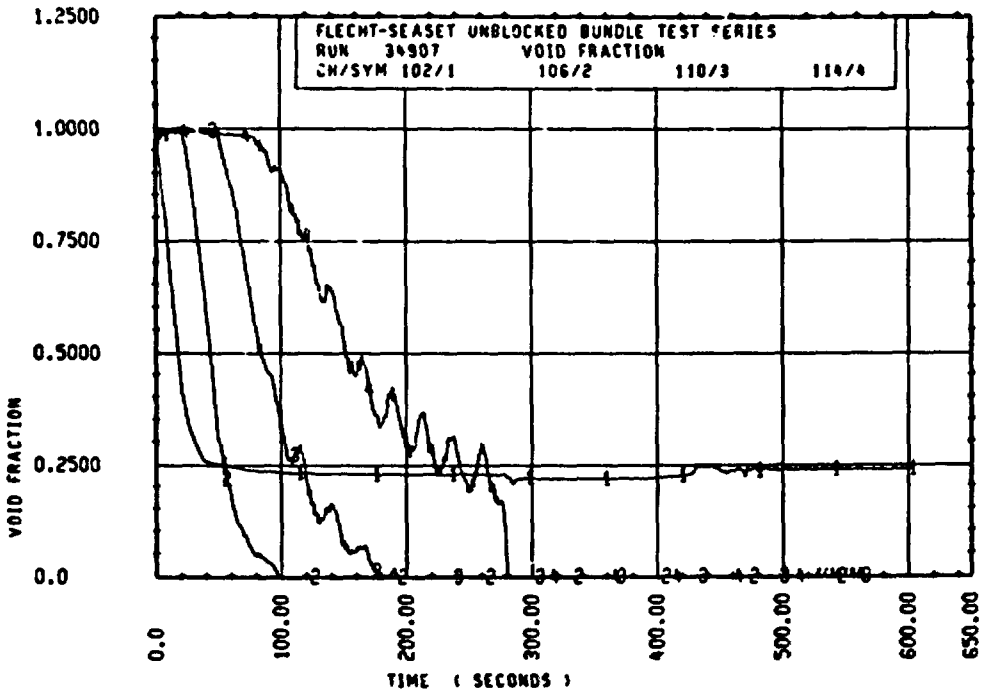

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34907
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
5.0000
4.0000
2.0000
0.0
-2.0000
-4.0000
-5.0000
11.023
10.000
7.5000
5.0000
2.5000
0.0
-2.5000
-5.0000
-7.5000
-10.000
-11.023
100.00
200.00
300.00
400.00
500.00

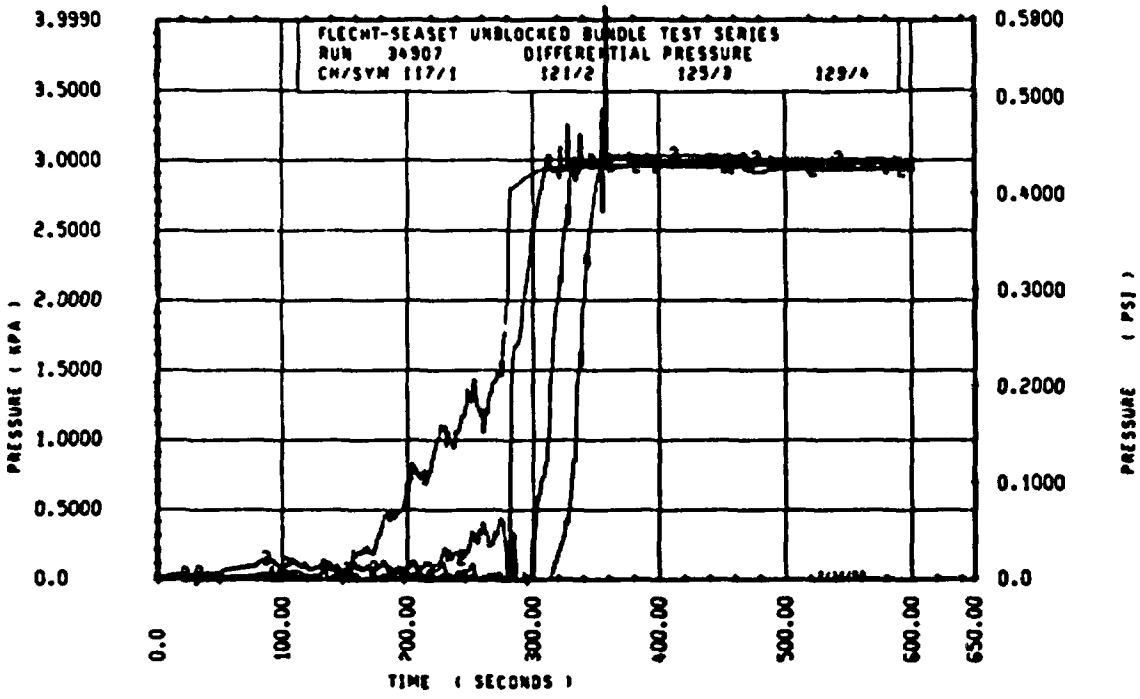

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34907
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
2.2046
2.0000
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.6000
100.00
200.00
300.00
400.00
500.00
600.00

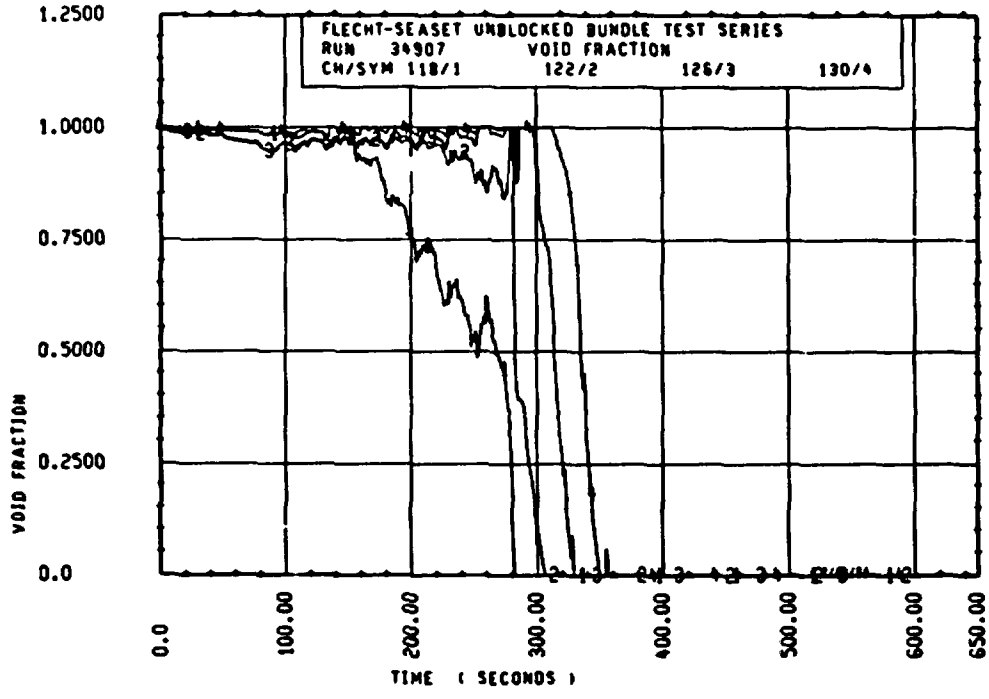

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 34907
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
341.68
300.00
200.00
100.00
50.000
0.0
753.26
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-5.6000
100.00
200.00
300.00
500.00
600.00

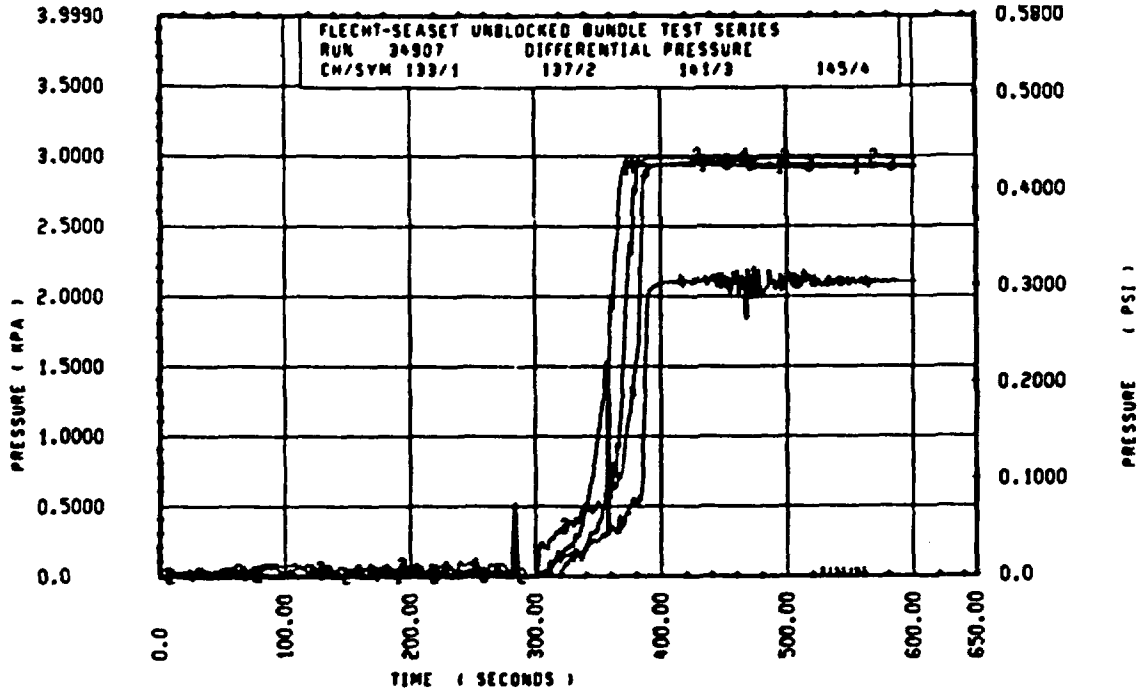

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
QUENCH TIMES (SECONDS)

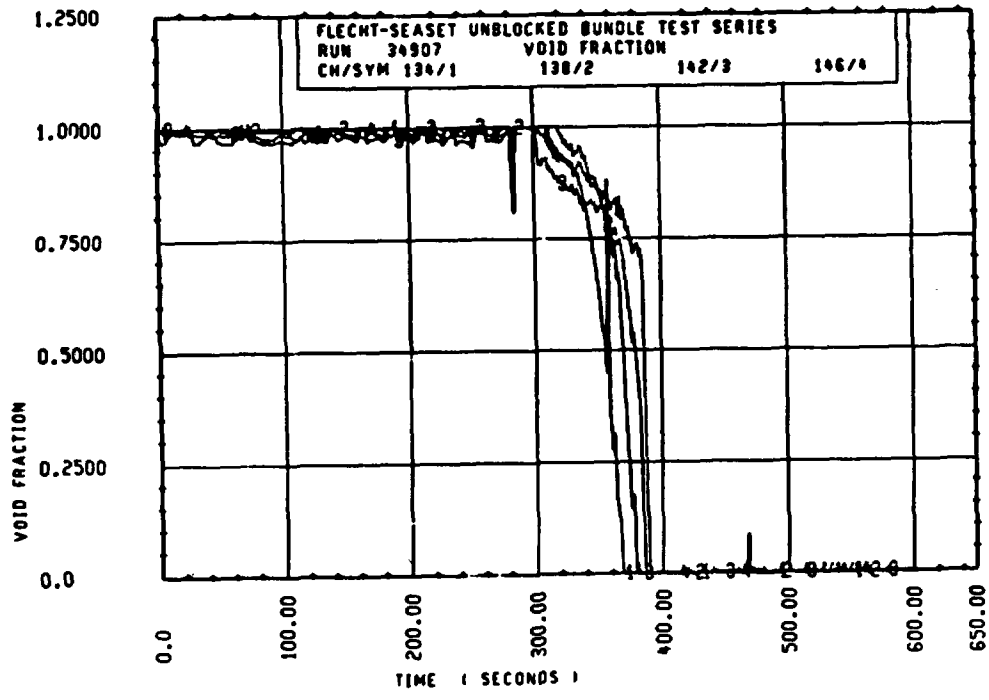

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9999
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 34907 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 35050

Date: 8/14/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.14 MPa (20 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	758°C (1397°F)
Rod peak power	1.6 kw/m (0.48 kw/ft)
Flow rate	25.9 mm/sec (1.02 in./sec)
Coolant temperature	43°C (109°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	114°C (238°F)	79°C (174°F)
1.22 m (48 in.)	136°C (276°F)	110°C (230°F)
1.83 m (72 in.)	133°C-174°C (272°F-346°F)	163°C-386°C (325°F-726°F)
2.44 m (96 in.)	141°C-171°C (286°F-340°F)	131°C-324°C (268°F-615°F)
2.74 m (108 in.)	135°C (275°F)	108°C (227°F)
3.05 m (120 in.)	115°C-123°C (239°F-253°F)	107°C (225°F)
3.35 m (132 in.)	111°C-114°C (231°F-238°F)	107°C (224°F)

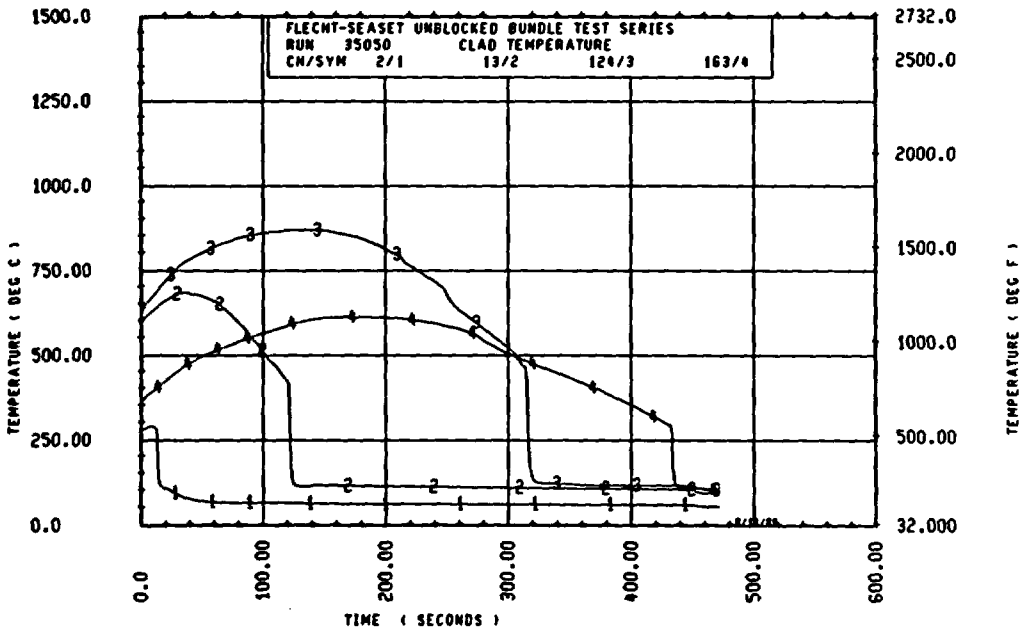
*At 84 seconds after flood

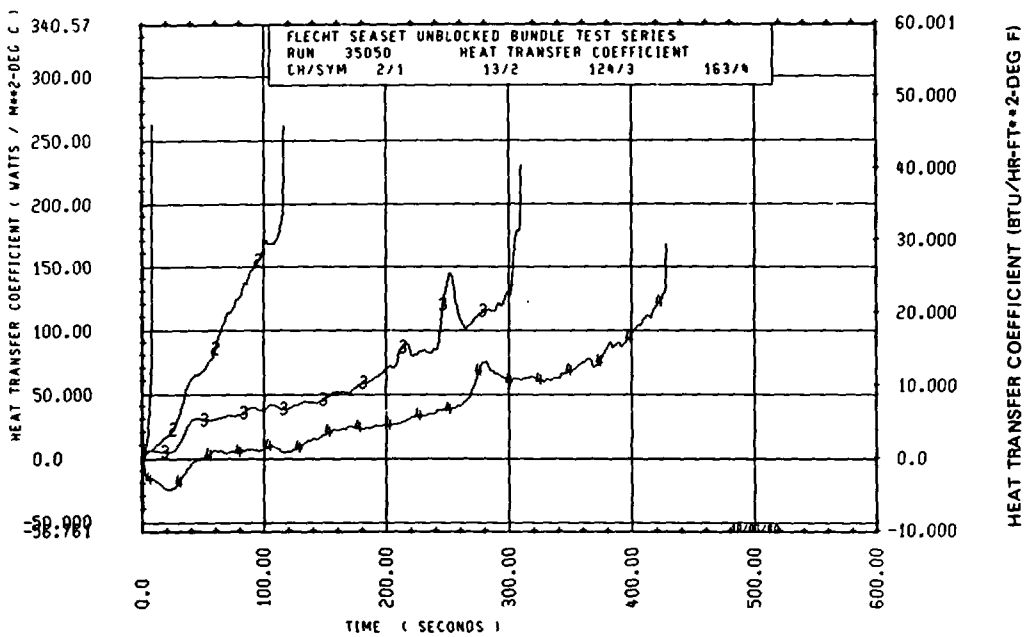
C. Comments

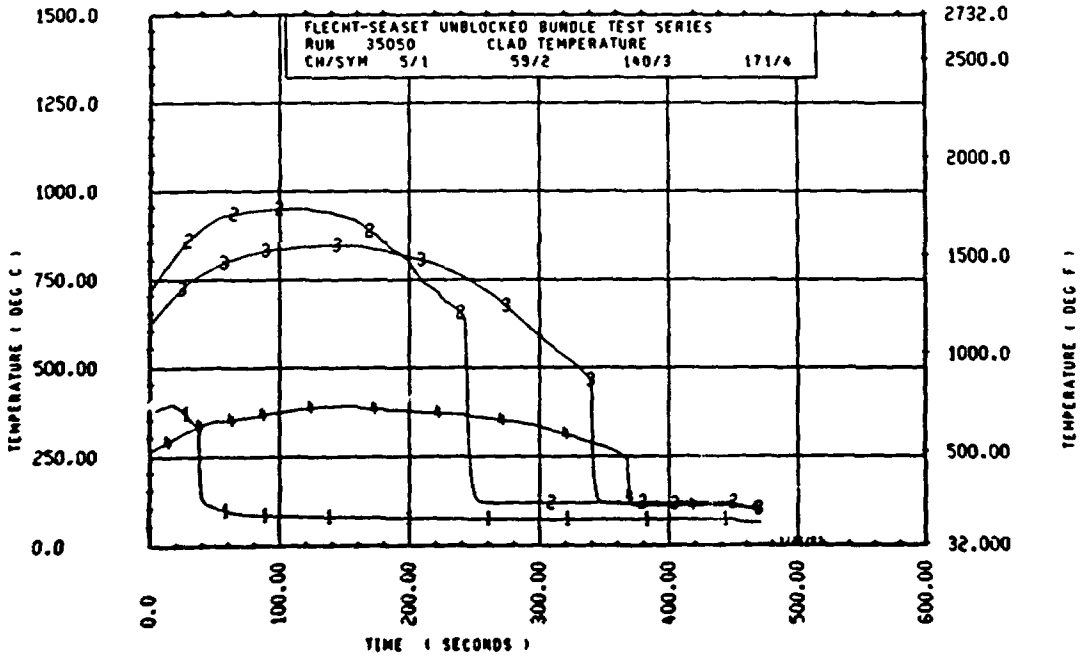
Significant bundle distortion occurred in the center of the bundle between the 1.52m (60 in.) and 2.27m (90 in.) elevations. Power decay of center power zone was lower than specified by approximately 6 percent.

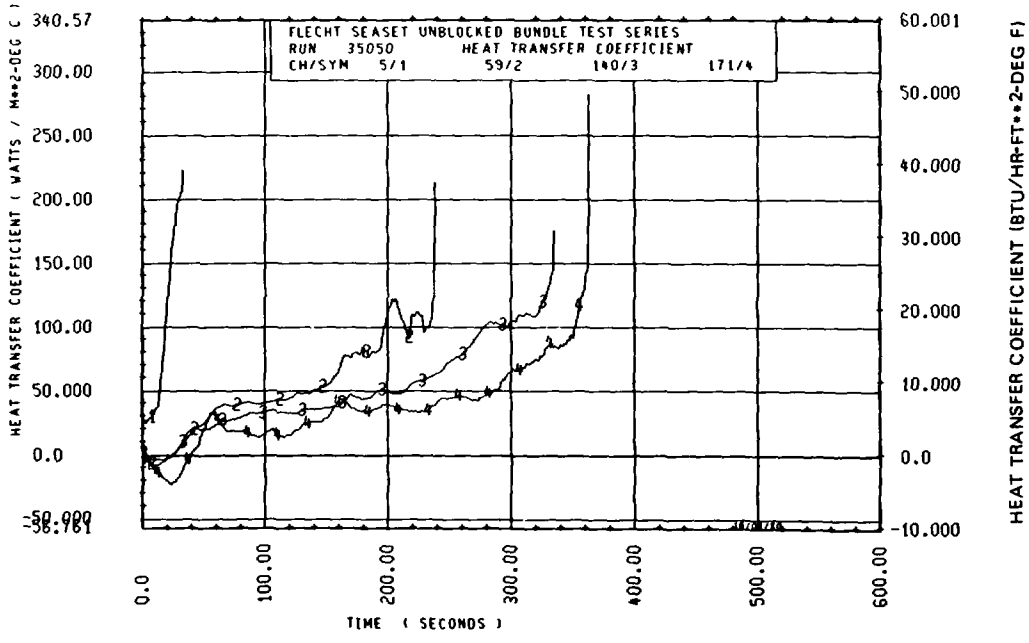
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 35050

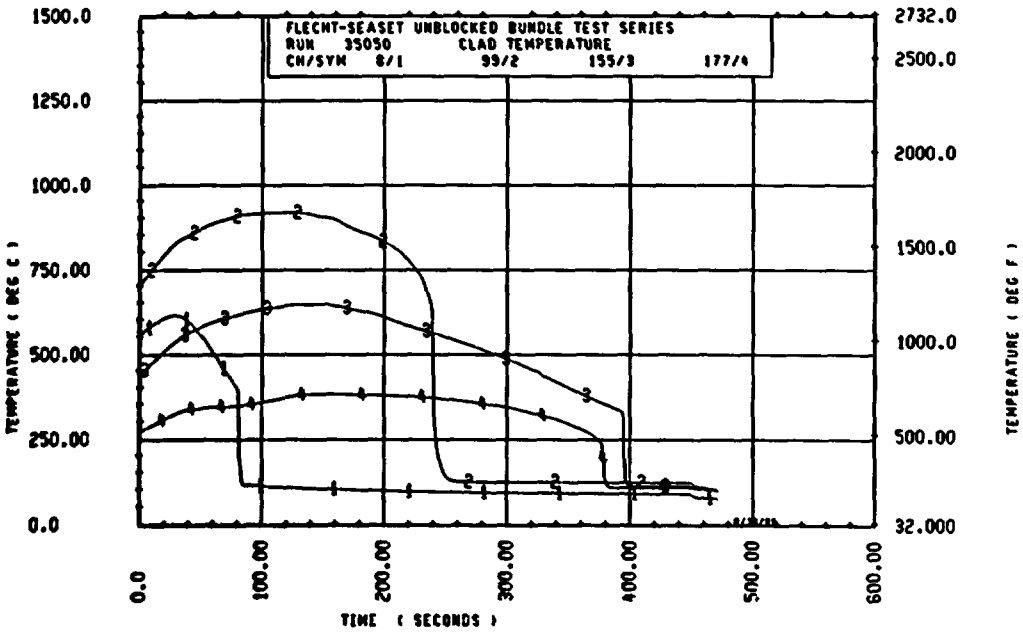
ROD/ELEV	CHAN. NO	INITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1086.	1241.	156.	40.0	725.	127.0
2H 6- 0	50	1311.	1631.	319.	83.0	920.	242.3
3C 5- 0	17	1130.	1300.	169.	41.0	713.	192.8
3C 5- 7	28	1214.	1402.	188.	53.0	671.	231.5
4L 8- 0	129	1121.	1438.	317.	82.0	707.	358.6
4L 8- 6	147	1124.	1437.	313.	81.0	711.	358.5
5E11- 0	168	548.	717.	169.	146.0	444.	378.0
5J 4- 0	12	1055.	1227.	171.	36.5	703.	127.9
5J 8- 6	146	944.	1236.	290.	141.0	609.	380.0
5J11- 6	175	534.	677.	143.	83.0	529.	370.0
7B 6- 0	57	1262.	1492.	230.	56.0	852.	206.0
7B 8- 6	142	950.	1206.	255.	60.0	600.	396.0
7B10- 0	162	711.	1058.	348.	133.0	551.	442.0
7B11- 6	176	553.	747.	194.	119.0	520.	381.1
7D 6- 4	84	1386.	1745.	359.	104.0	1007.	262.5
7D 7- 6	119	1253.	1603.	349.	99.5	810.	323.9
7D 9- 3	151	867.	1240.	373.	137.0	589.	389.7
7G 5- 0	23	1280.	1483.	203.	56.5	922.	169.9
7J 6- 0	59	1325.	1742.	416.	106.0	1161.	242.8
7M 7- 6	120	1230.	1610.	380.	98.0	908.	302.9
7M 8- 0	132	1128.	1563.	434.	101.0	841.	335.0
7M 9- 3	152	867.	1268.	402.	135.0	651.	379.9
8N 4- 0	13	1110.	1264.	154.	35.5	776.	121.0
8N10- 0	163	694.	1133.	439.	164.0	552.	432.9
8N11- 6	177	524.	722.	198.	142.0	457.	377.3
8K 4- 0	14	1088.	1251.	163.	36.0	750.	118.4
8K 6- 6	99	1295.	1684.	389.	107.0	1172.	238.9
8K 8- 0	140	1155.	1556.	401.	145.0	858.	339.9
8K10- 0	164	715.	1148.	434.	212.0	644.	418.8
8M 2- 0	5	700.	749.	49.	18.0	628.	37.9
8M 4- 0	15	1096.	1265.	7.	39.5	756.	122.7
8M 6- 0	61	1303.	1634.	331.	83.5	997.	236.9
8M10- 0	165	707.	1109.	402.	145.0	590.	434.0
9C 7- 0	109	1243.	1553.	310.	86.5	685.	314.9
9C 9- 3	153	869.	1235.	365.	140.0	627.	396.0
9G 1- 0	2	536.	556.	20.	8.5	536.	13.0
9G 3- 3	8	1035.	1139.	104.	27.5	735.	81.0
9G11- 0	171	512.	740.	227.	147.0	472.	367.5
9E 5- 0	24	1278.	1474.	196.	54.5	927.	171.0
9E 6- 2	46	1311.	1705.	394.	91.5	864.	262.0
10D 6- 6	93	1279.	1661.	382.	107.0	804.	278.5
11E 7- 6	124	1169.	1597.	429.	125.0	857.	314.8
11E 9- 3	155	821.	1198.	377.	149.0	622.	394.0
11E11- 0	172	499.	745.	246.	147.0	540.	341.0
12D 4- 0	16	1098.	1247.	149.	35.5	764.	121.9
12D 6- 0	46	1323.	1656.	333.	86.0	989.	245.9
12F 6- 6	102	1281.	1693.	412.	99.0	832.	275.0

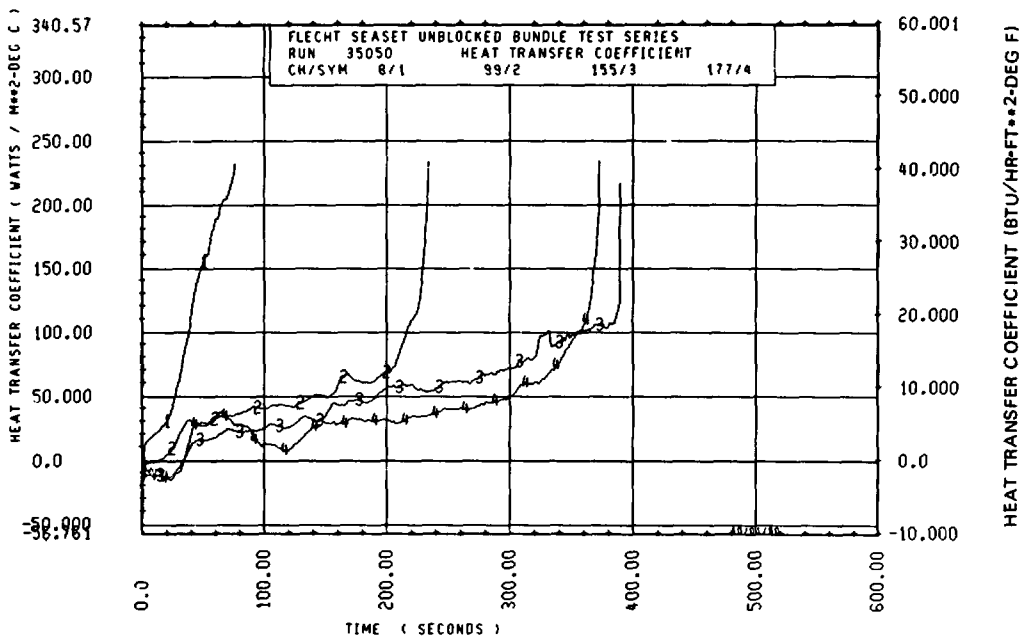

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

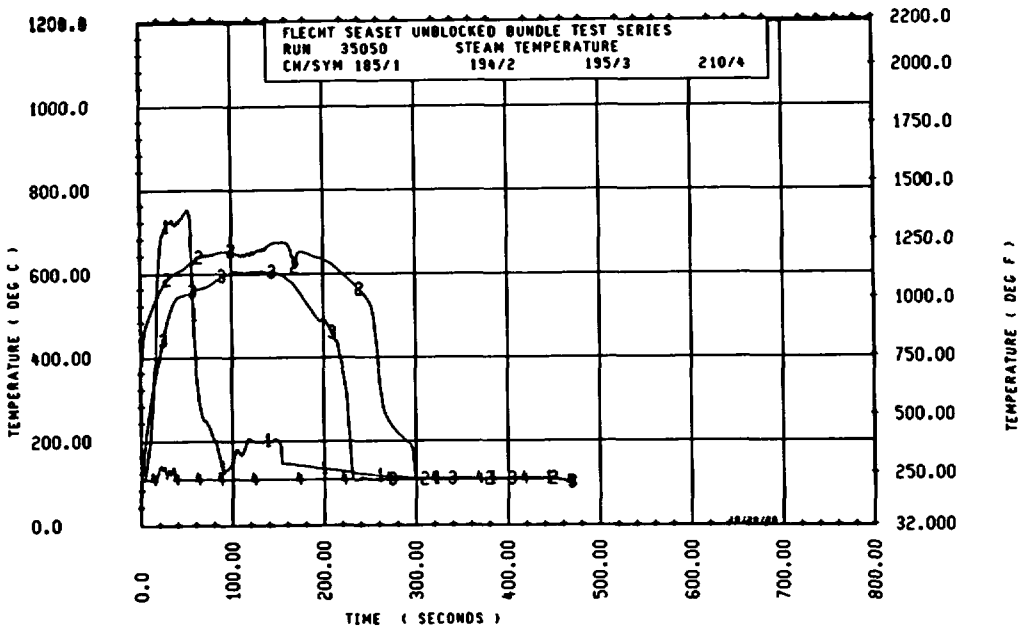

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-58.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

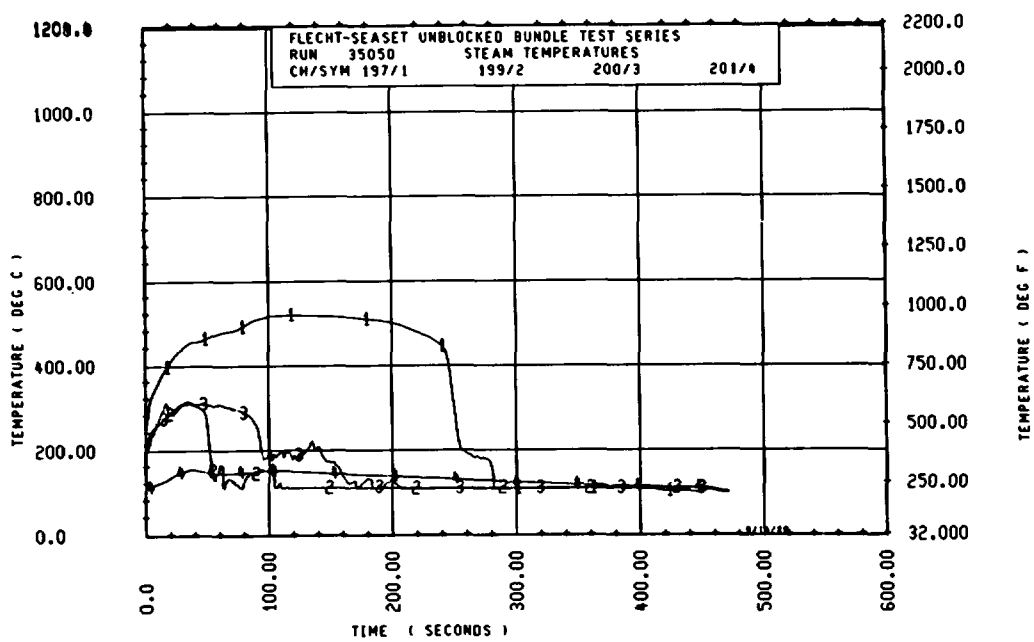

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

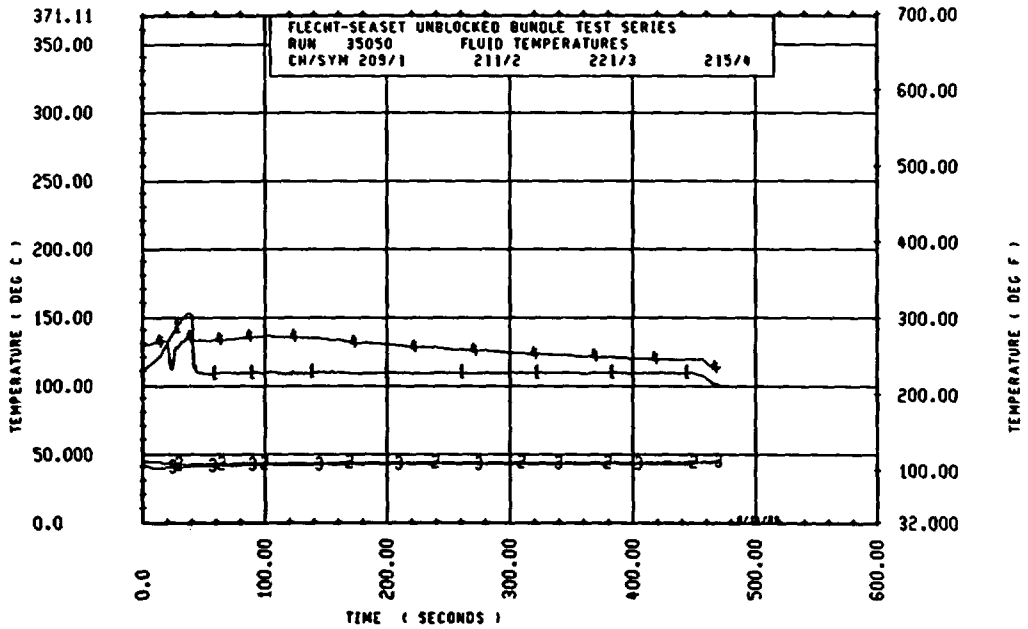

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-58.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

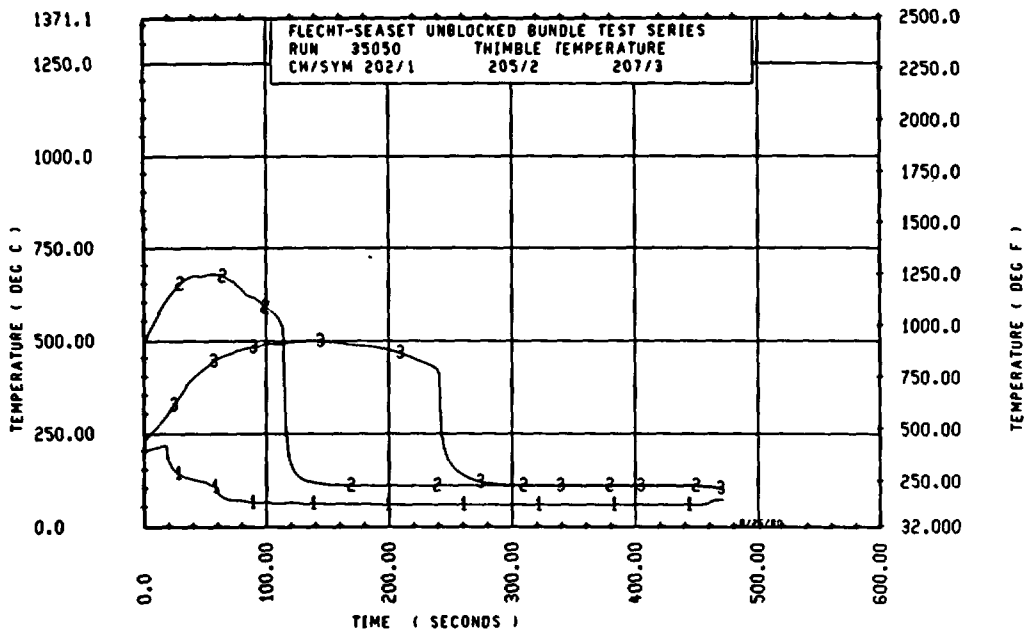

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)

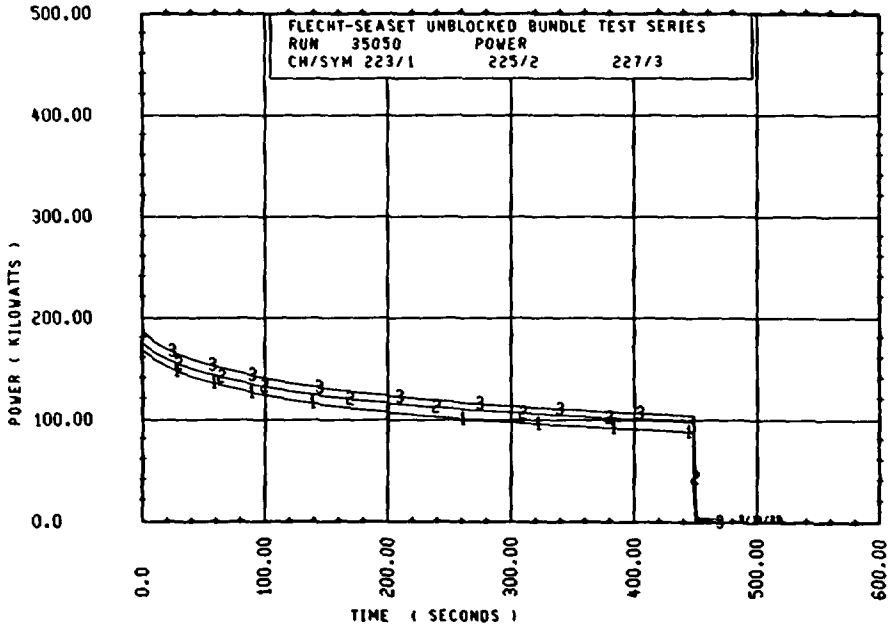

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

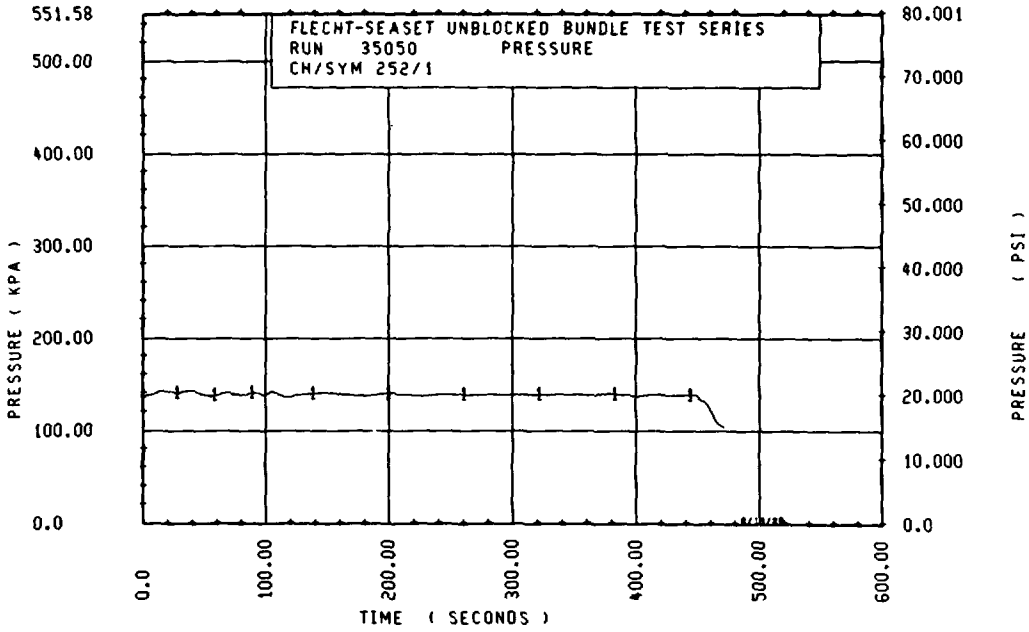

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

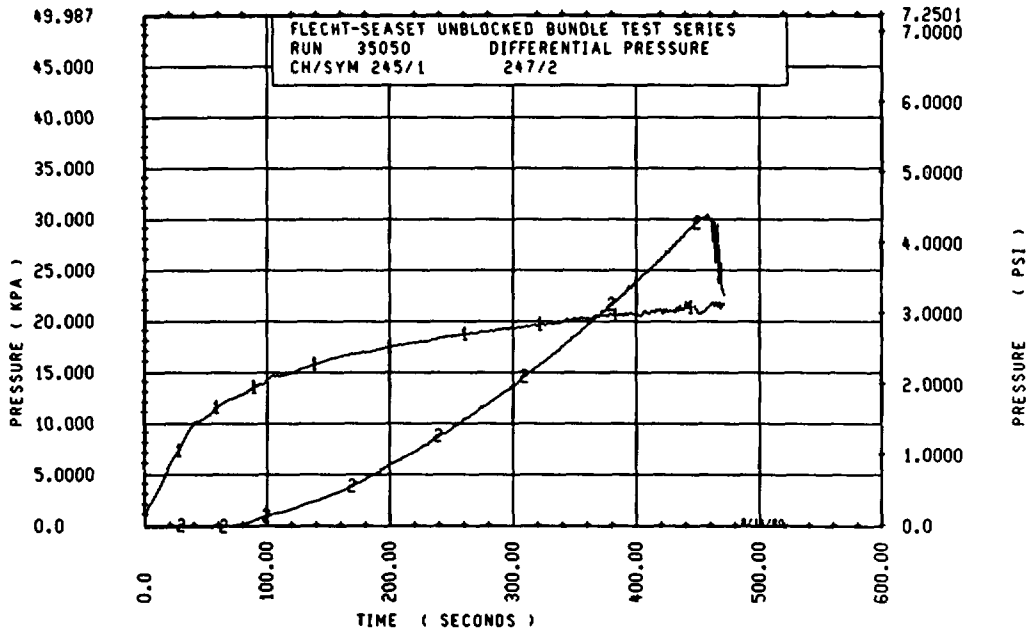


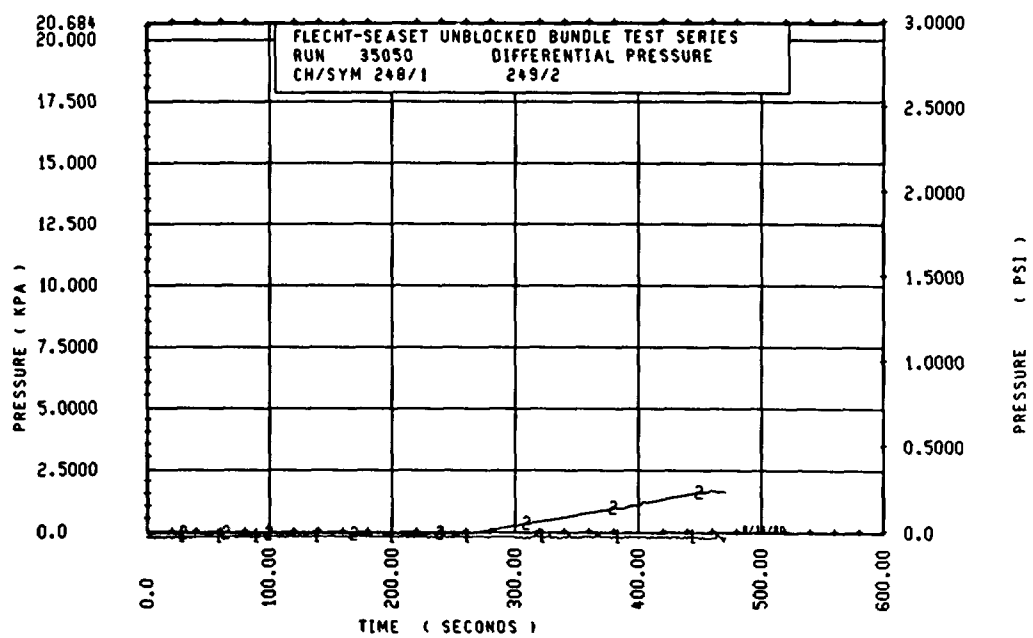


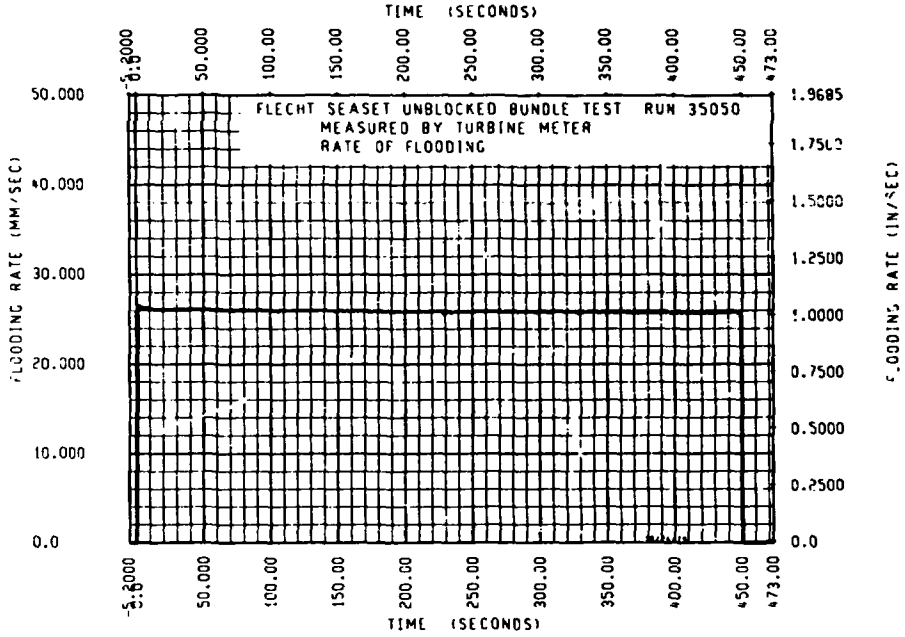
CH 202-4C, 0.61 m (24 in.); CH 205-4C, 1.52 m (60 in.);
CH 207-4I, 3.05 m (120 in.)

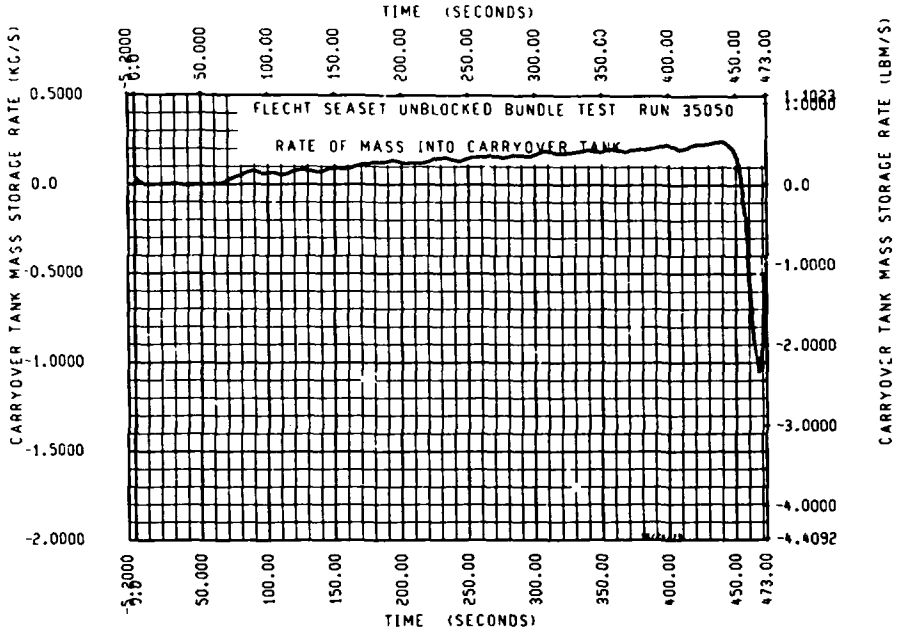

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

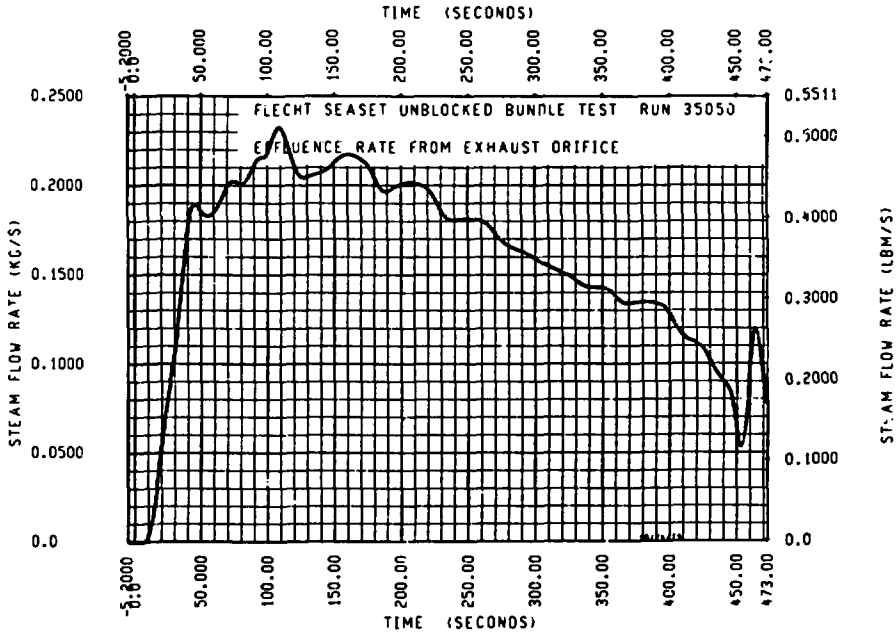

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

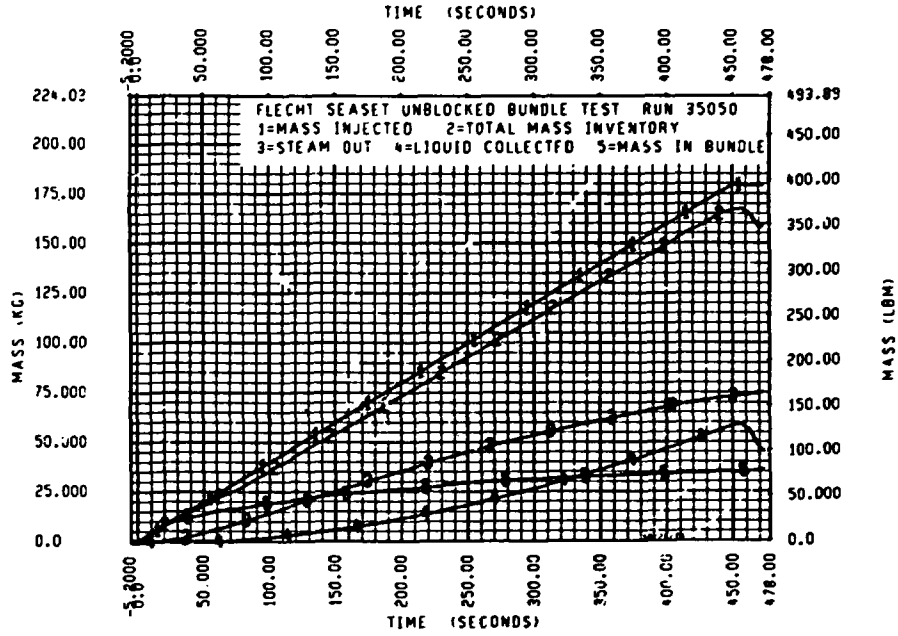

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

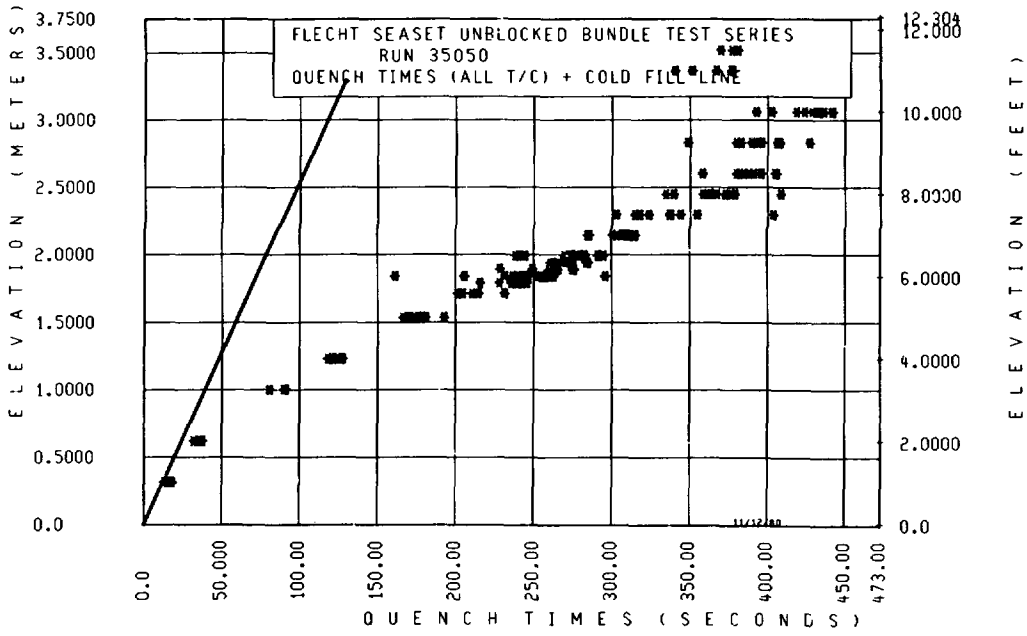

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

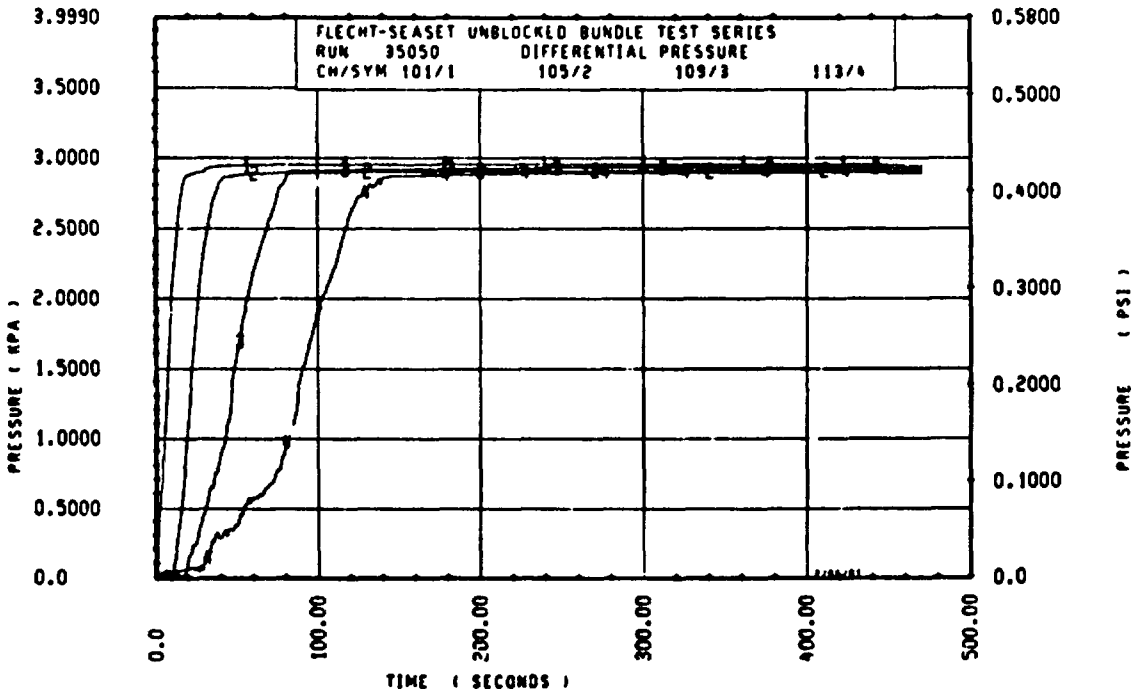

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35050
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
473.00

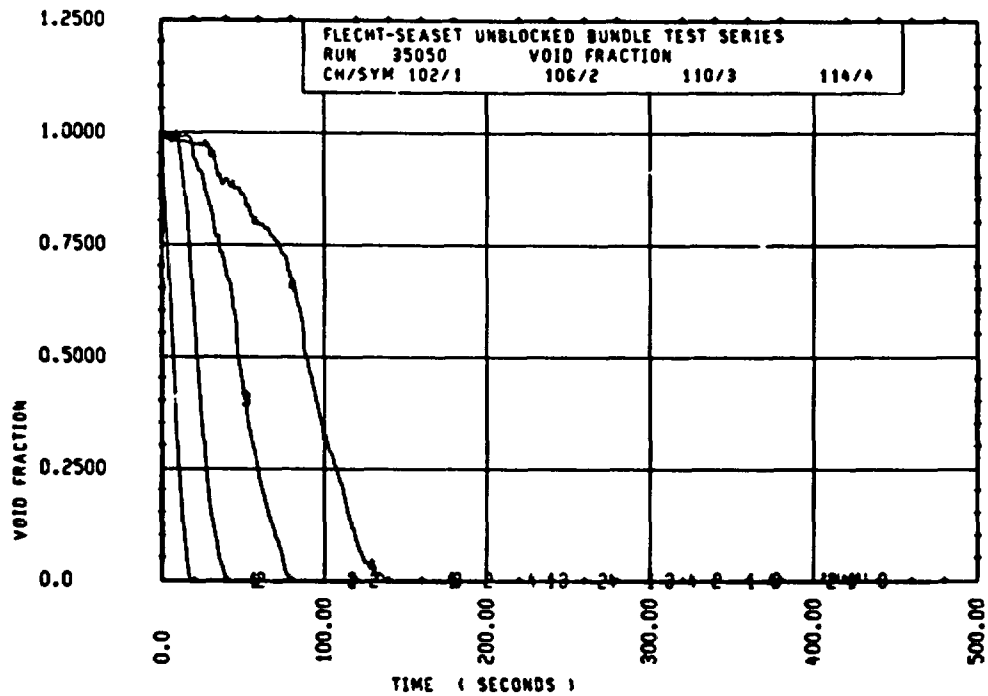

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35050
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
1.1023
1.0000
0.0
-1.0000
-2.0000
-3.0000
-4.0000
-4.4092
-5.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
473.00

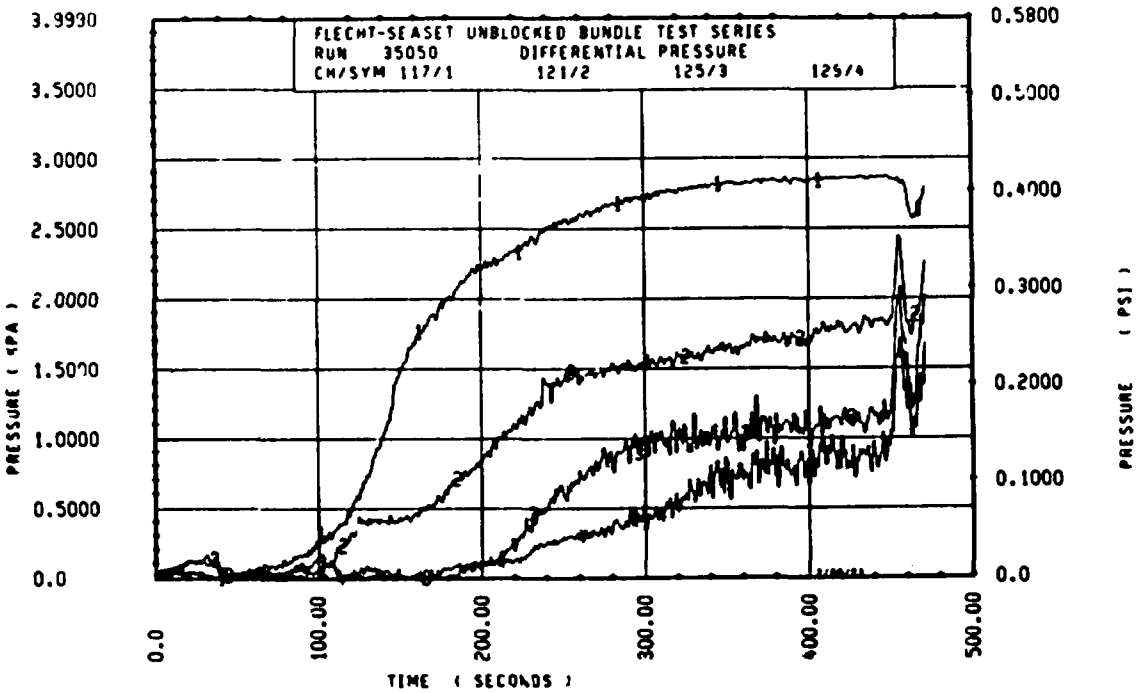

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35050
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.2500
0.2000
0.1500
0.1000
0.0500
0.0
0.5511
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
-5.8000
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
473.00

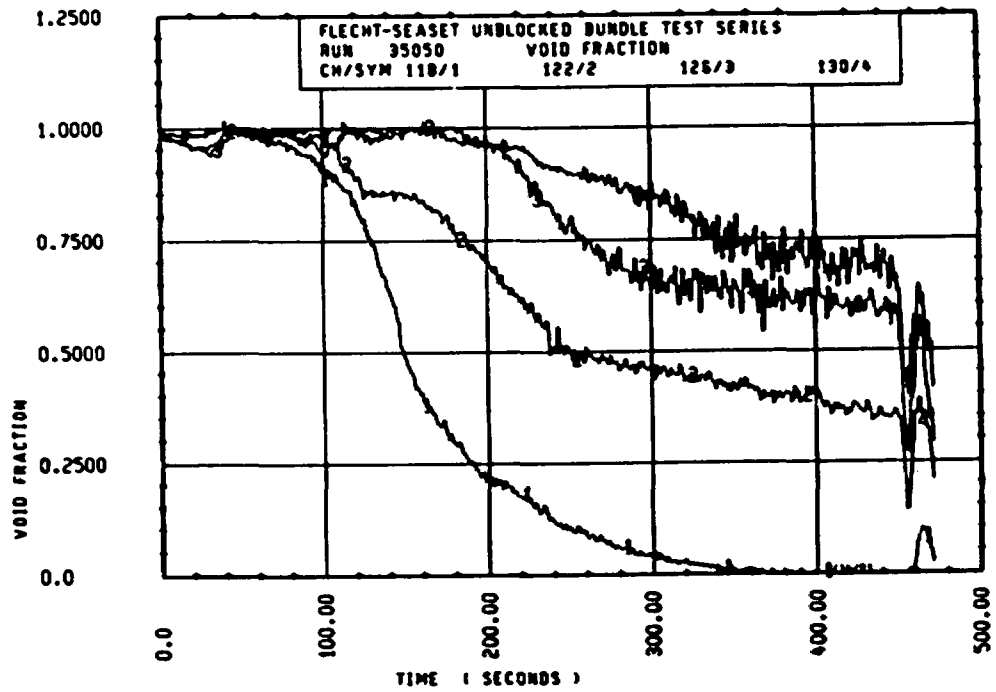

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35050
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
224.03
200.00
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
493.89
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-5.8000
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
478.00

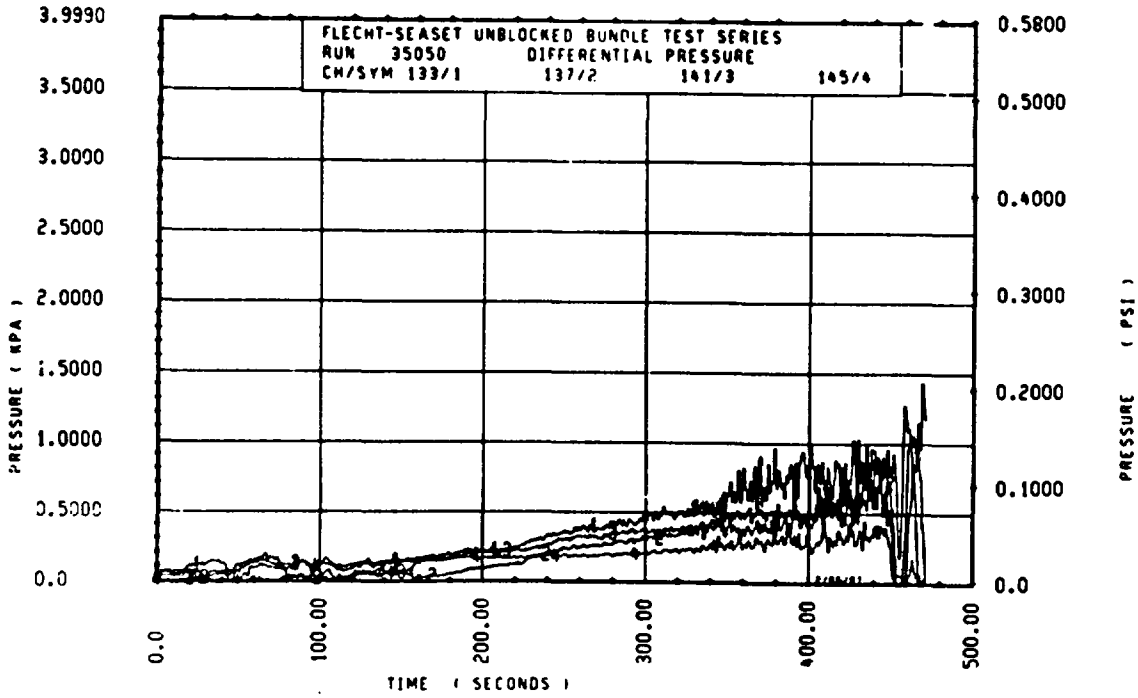

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
473.00
QUENCH TIMES (SECONDS)

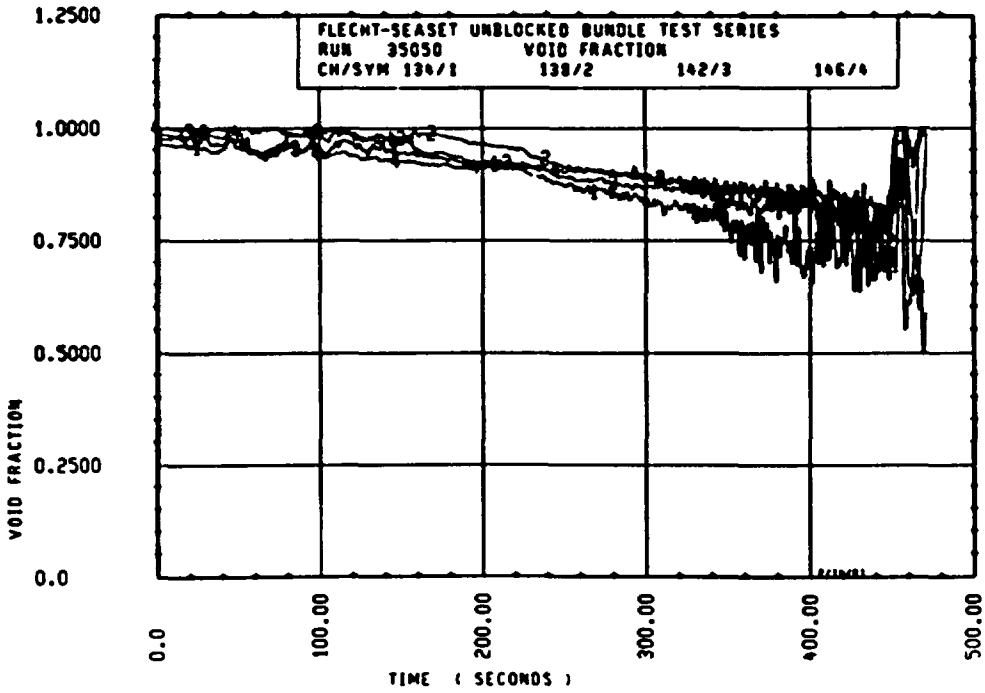

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 125/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35050 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 35114

Date: 8/15/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	892°C (1638°F)
Rod peak power	2.4 kw/m (0.74 kw/ft)
Flow rate	25 mm/sec (0.98 in./sec)
Coolant temperature	123°C (253°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	139°C (282°F)	132°C (270°F)
1.22 m (48 in.)	154°C-163°C (309°F-326°F)	132°C (270°F)
1.83 m (72 in.)	169°C-209°C (336°F-409°F)	118°C-137°C (245°F-279°F)
2.44 m (96 in.)	176°C-204°C (348°F-400°F)	135°C-678°C (275°F-1253°F)
2.74 m (108 in.)	166°C (330°F)	133°C (272°F)
3.05 m (120 in.)	141°C-149°C (285°F-301°F)	134°C-143°C (273°F-289°F)
3.35 m (132 in.)	134°C-139°C (274°F-282°F)	131°C-136°C (267°F-277°F)

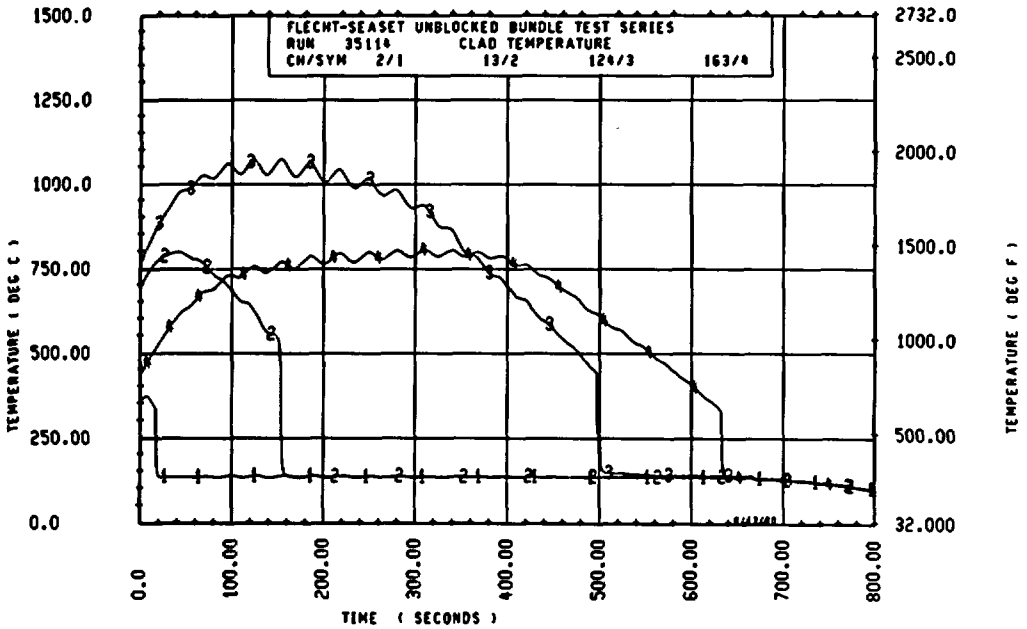
*At 266 seconds after flood

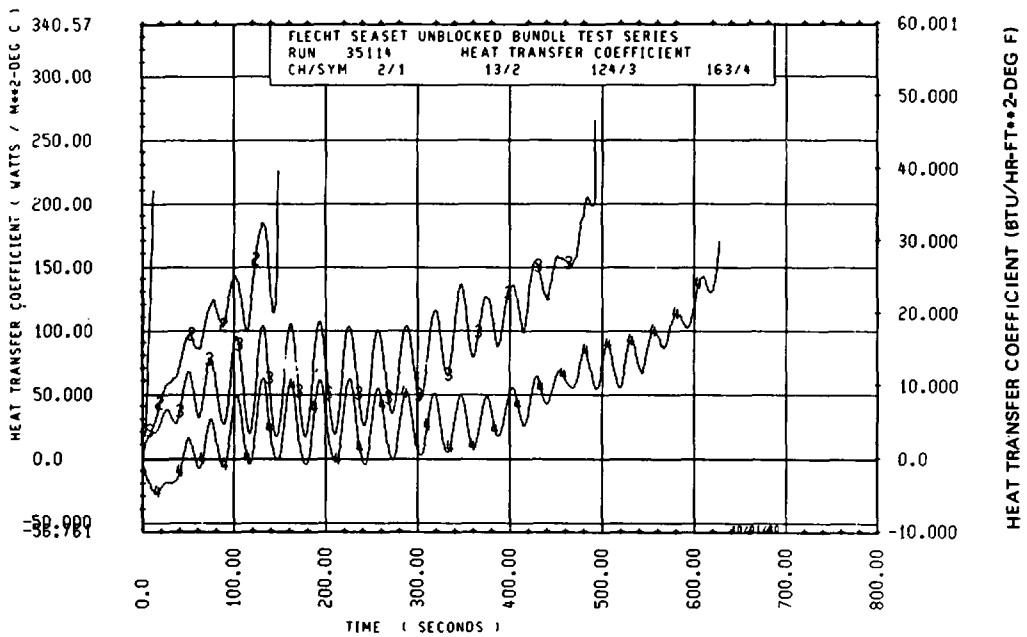
C. Comments

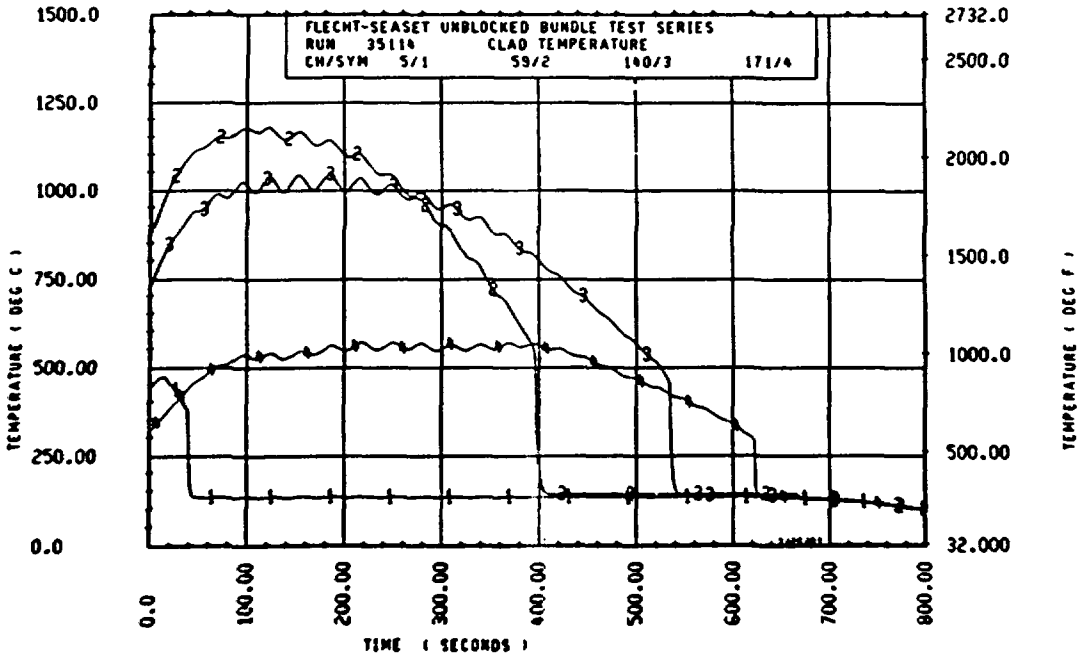
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. Power decay of center power zone was lower than specified by approximately 5 percent. There was a step increase of 8 percent in flooding rate approximately 25 percent of the way through the test.

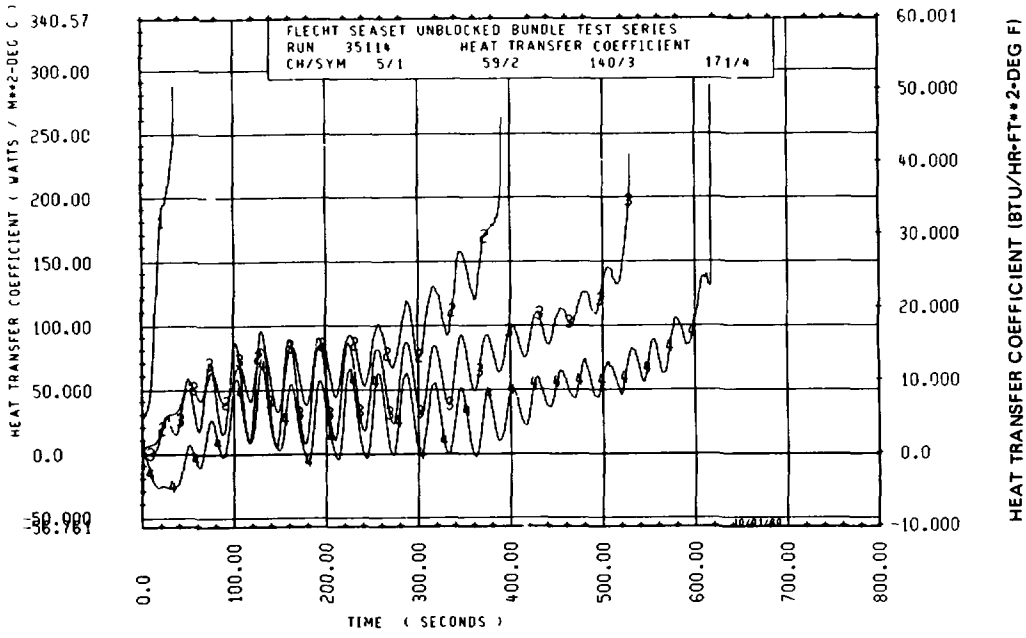
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 35114

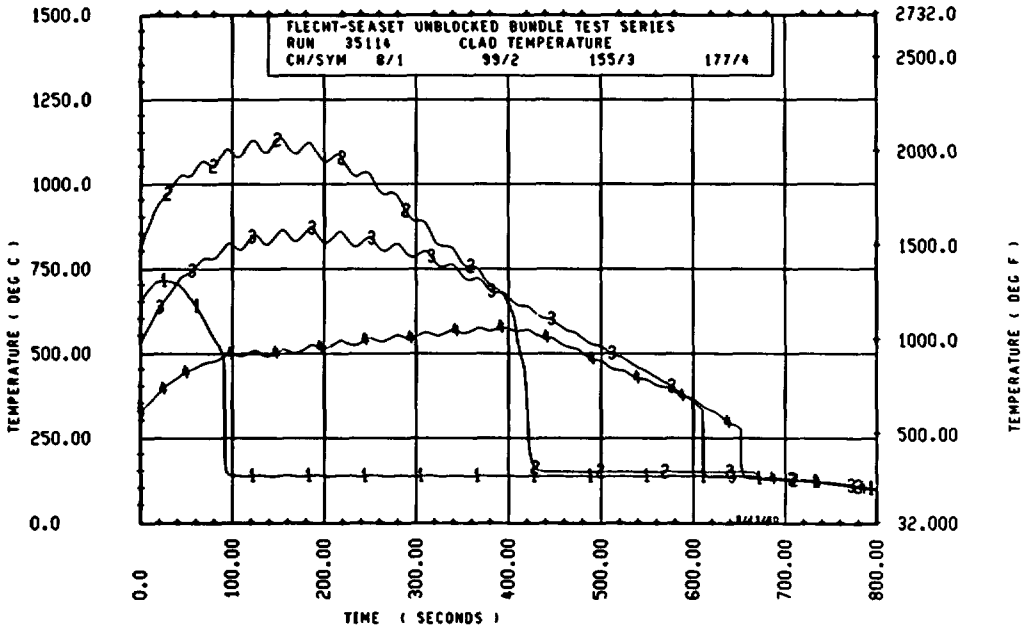
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPERATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1254.	1449.	196.	40.0	923.	155.6
2H 6- 0	50	1527.	1912.	385.	94.0	949.	377.5
3C 5- 0	17	1334.	1534.	200.	42.0	689.	270.6
3C 5- 7	28	1418.	1666.	247.	66.0	872.	318.8
4L 8- 0	129	1311.	1789.	478.	95.0	720.	515.3
4L 8- 6	147	1314.	1785.	471.	95.0	742.	515.8
5E11- 0	168	636.	1034.	398.	217.0	531.	612.0
5J 4- 0	12	1229.	1446.	218.	40.5	898.	156.8
5J 8- 6	146	1105.	1550.	444.	123.0	612.	565.0
5J11- 6	175	608.	906.	298.	217.0	288.	597.0
7B 6- 0	57	1459.	1751.	292.	66.0	926.	313.7
7B 8- 6	142	1094.	1552.	458.	123.0	611.	581.9
7B10- 0	162	829.	1393.	564.	185.0	589.	624.0
7B11- 6	176	639.	1152.	512.	217.0	532.	629.6
7D 6- 4	84	1598.	2120.	521.	121.0	966.	407.3
7D 7- 6	119	1466.	1922.	456.	153.0	921.	476.0
7D 9- 3	151	996.	1598.	602.	184.0	714.	576.0
7G 5- 0	23	1517.	1763.	246.	65.0	974.	259.9
7J 6- 0	59	1600.	2157.	557.	122.0	979.	395.8
7M 7- 6	120	1432.	1958.	526.	95.0	797.	500.0
7M 8- 0	132	1317.	1899.	582.	124.0	805.	523.0
7M 9- 3	152	1013.	1597.	584.	154.0	681.	566.9
8H 4- 0	13	1283.	1472.	189.	41.0	966.	152.8
8H10- 0	163	824.	1482.	657.	311.0	624.	632.0
8H11- 6	177	625.	1069.	444.	393.0	527.	651.0
8K 4- 0	16	1257.	1468.	211.	41.5	865.	147.9
8K 6- 6	99	1502.	2073.	571.	152.0	854.	416.9
8K 8- 0	140	1342.	1914.	573.	184.0	856.	534.2
8K10- 0	164	833.	1458.	625.	217.0	688.	614.9
8N 2- 0	5	830.	886.	56.	13.0	711.	40.3
8N 4- 0	15	1265.	1470.	205.	41.0	938.	149.9
8N 6- 0	61	1514.	1903.	389.	94.0	1014.	364.9
8N10- 0	165	828.	1395.	567.	154.0	647.	606.2
9C 7- 0	109	1454.	1890.	436.	124.0	716.	486.0
9C 9- 3	153	1019.	1610.	592.	185.0	634.	605.5
9G 1- 0	2	683.	707.	23.	7.5	635.	17.0
9G 3- 3	8	1212.	1318.	107.	24.0	906.	90.8
9G11- 0	171	612.	1060.	449.	218.0	565.	622.0
9I 5- 0	24	1514.	1768.	253.	67.0	965.	259.7
9E 6- 2	46	1521.	2089.	568.	123.0	915.	397.9
10D 6- 6	93	1484.	1964.	480.	154.0	826.	442.7
11E 7- 6	124	1411.	1966.	555.	153.0	824.	497.0
11E 9- 3	155	991.	1596.	605.	185.0	630.	609.5
11E11- 0	172	585.	1147.	562.	217.0	564.	610.7
12D 4- 0	16	1277.	1462.	186.	40.5	967.	150.9
12D 6- 0	66	1546.	2012.	466.	94.0	959.	376.7
12F 6- 6	102	1501.	2080.	579.	123.0	822.	425.9

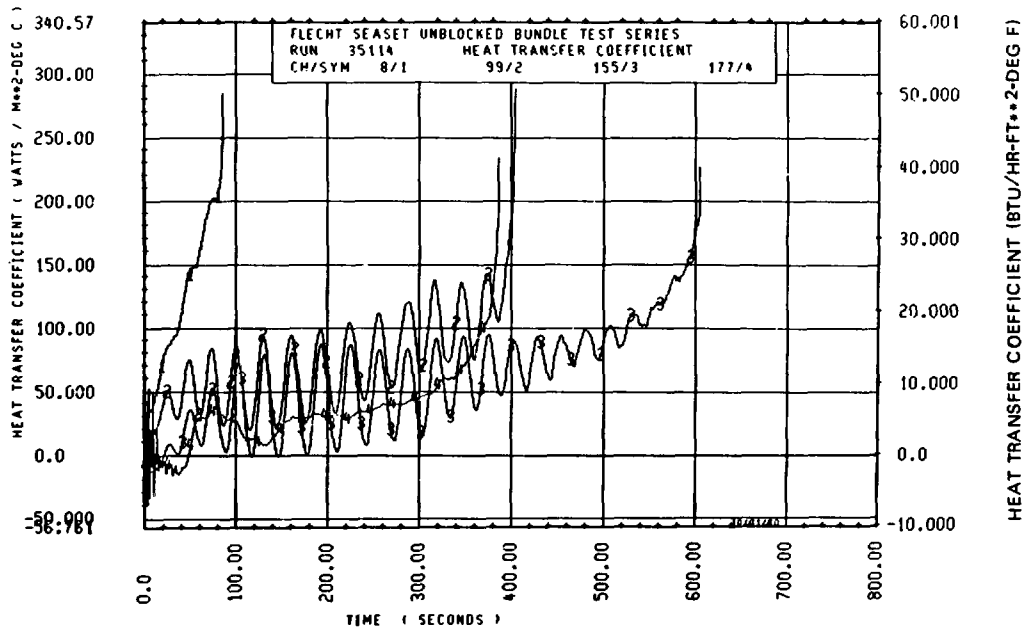

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

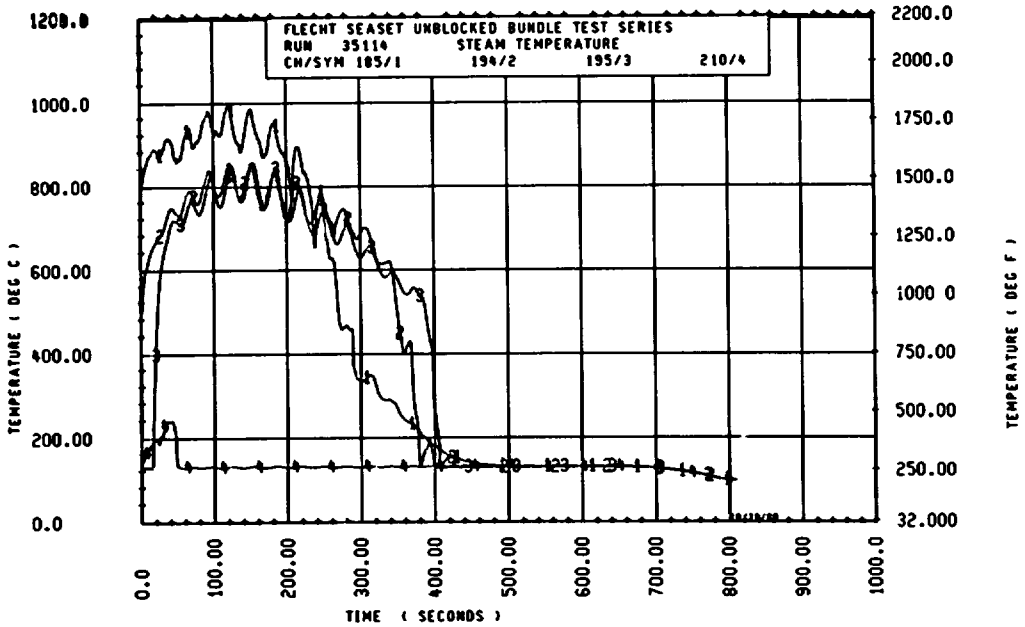

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-58.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

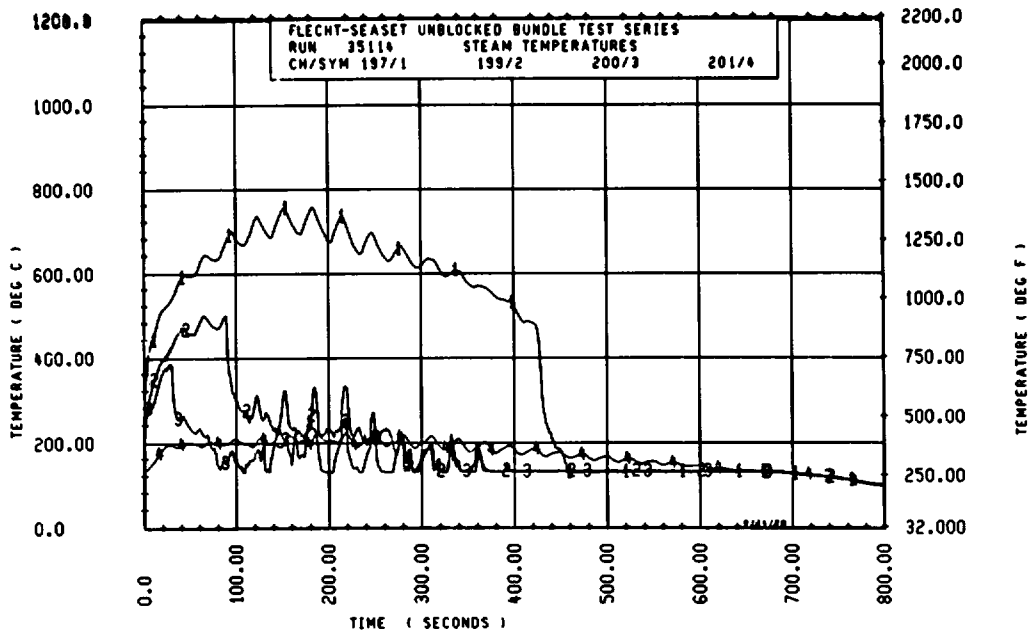

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

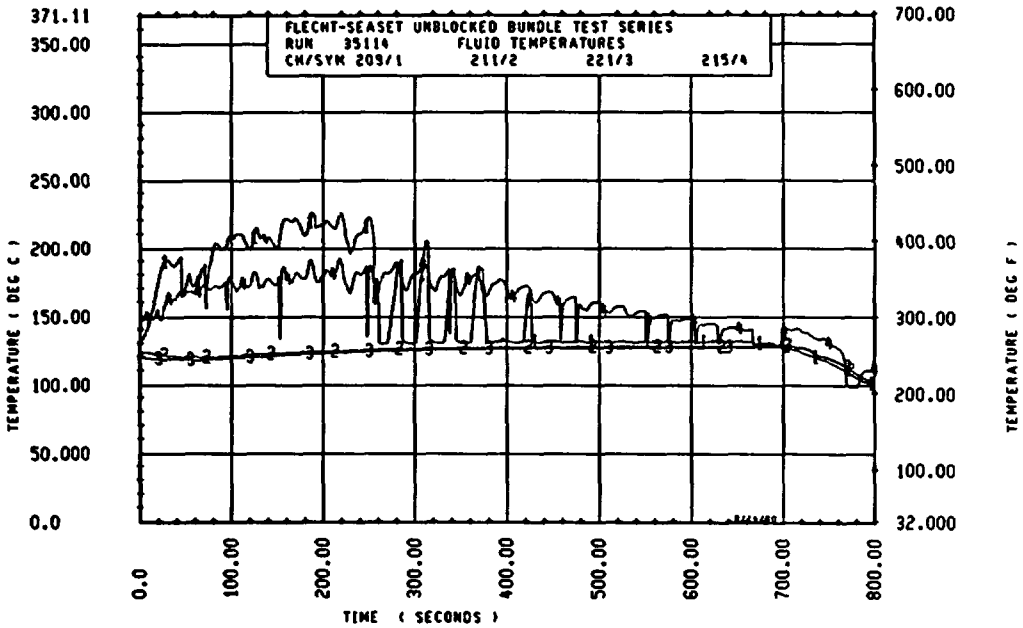

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

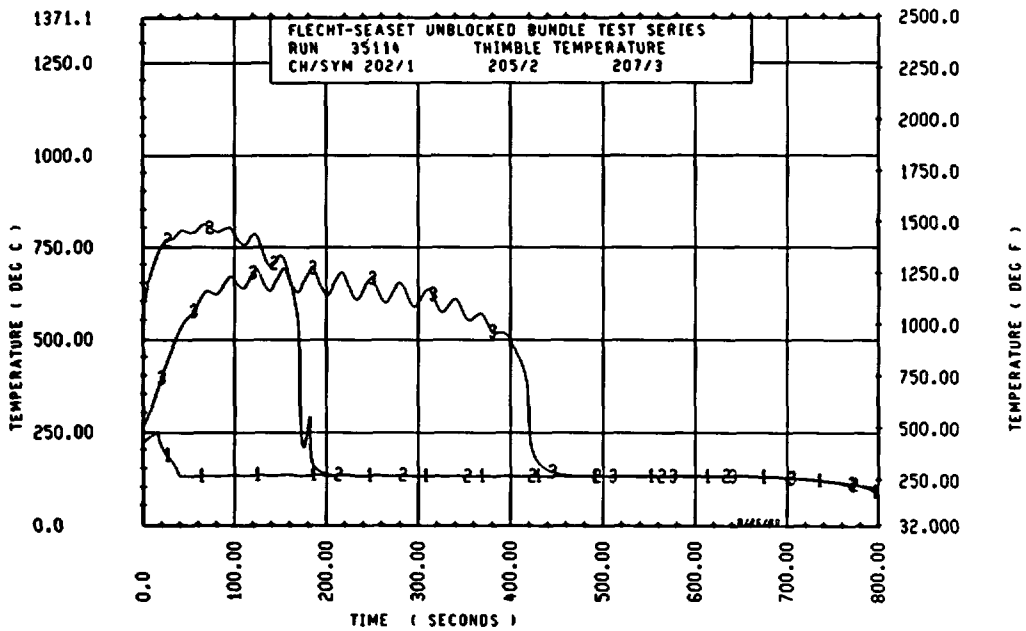

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

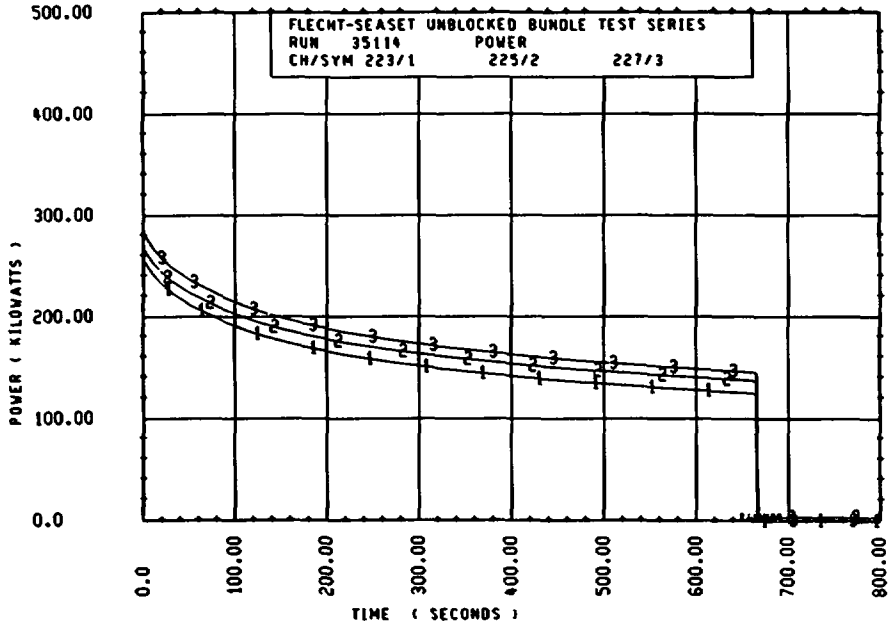

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000 0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

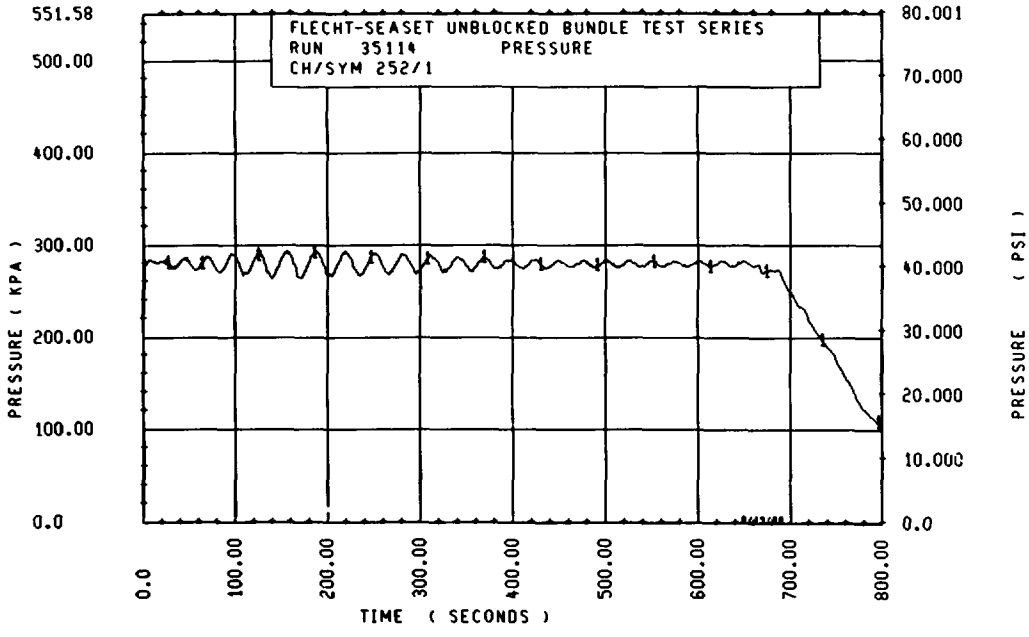

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

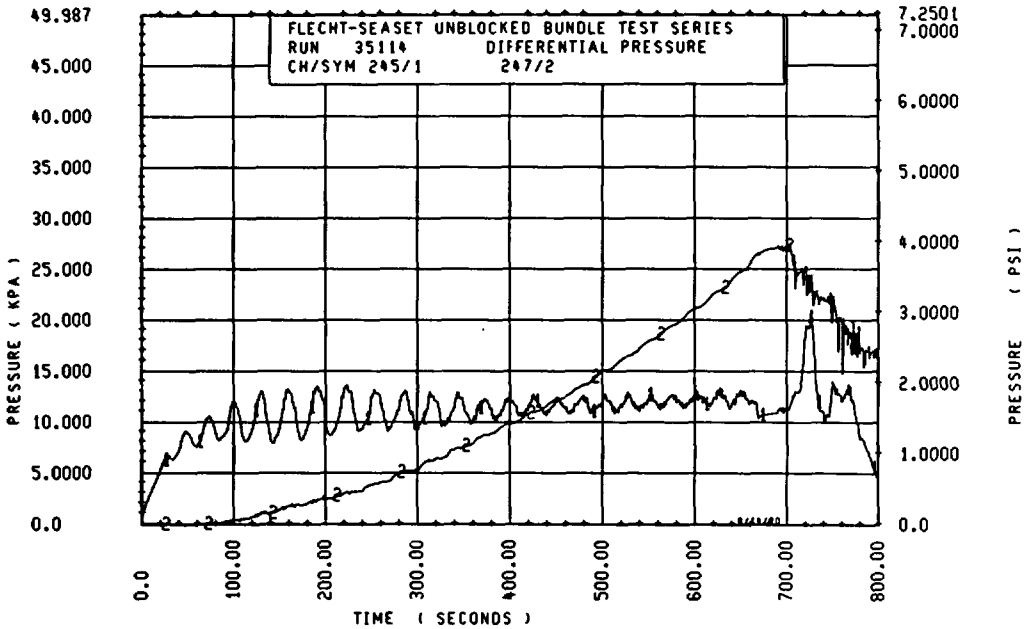


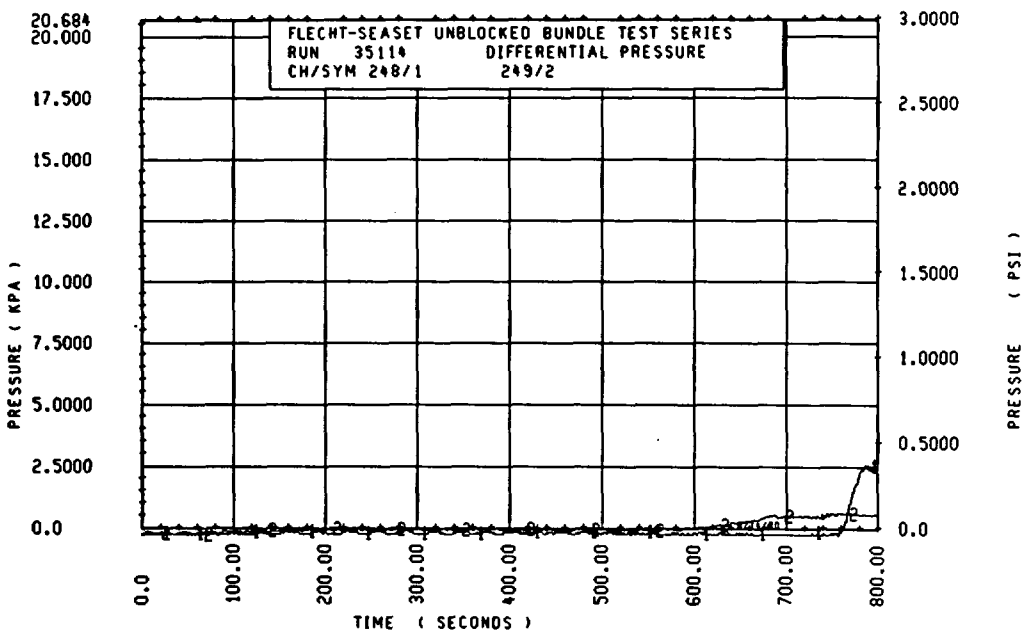


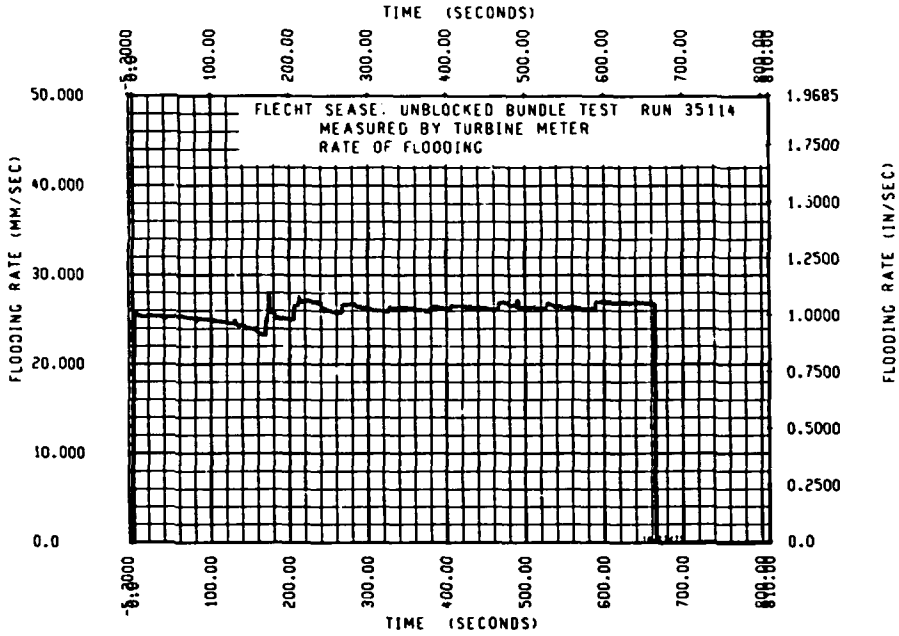
CH 202-4C, 0.61 m (24 in.); CH 205-4C, 1.52 m (60 in.);
CH 207-4I, 3.05 m (120 in.)

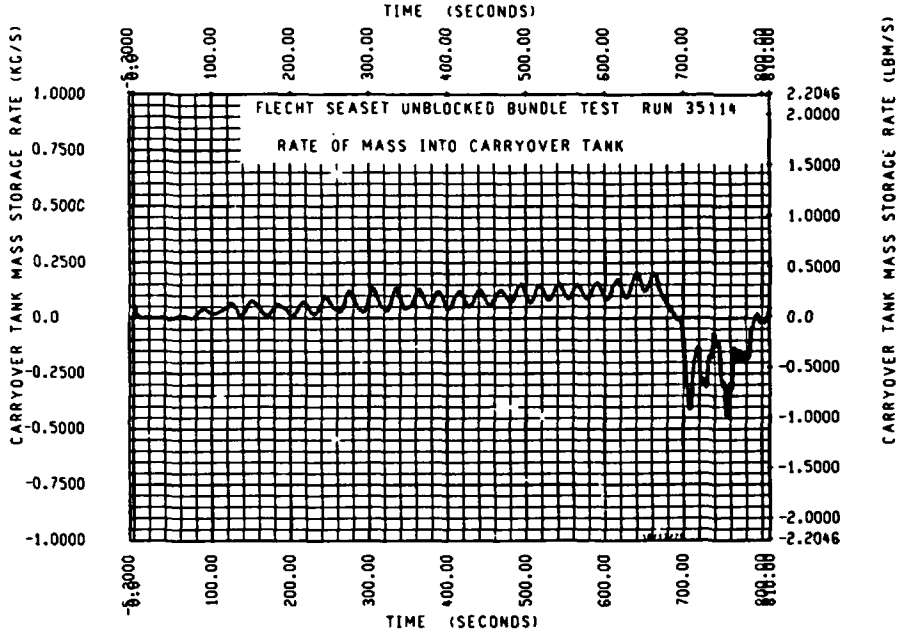

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

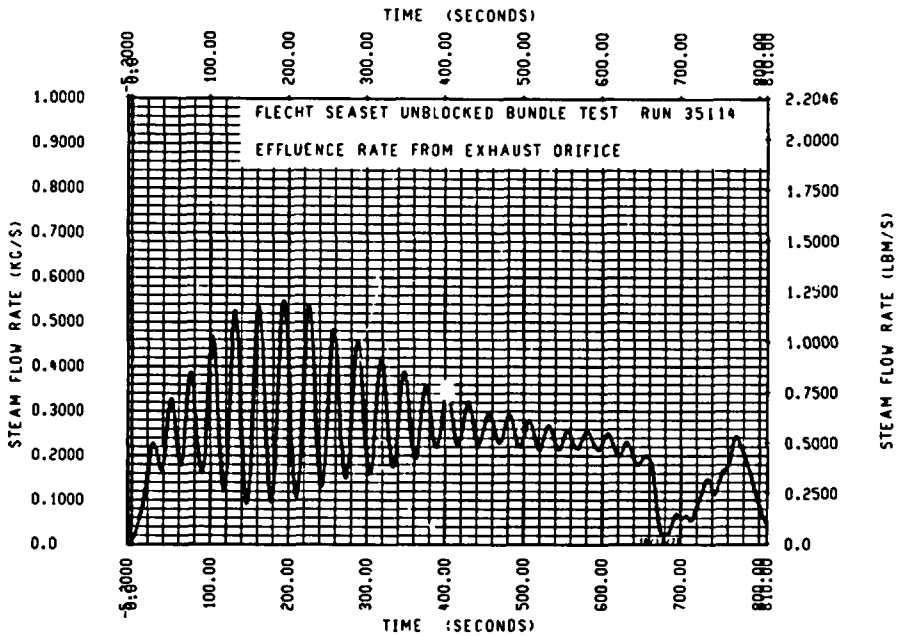

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

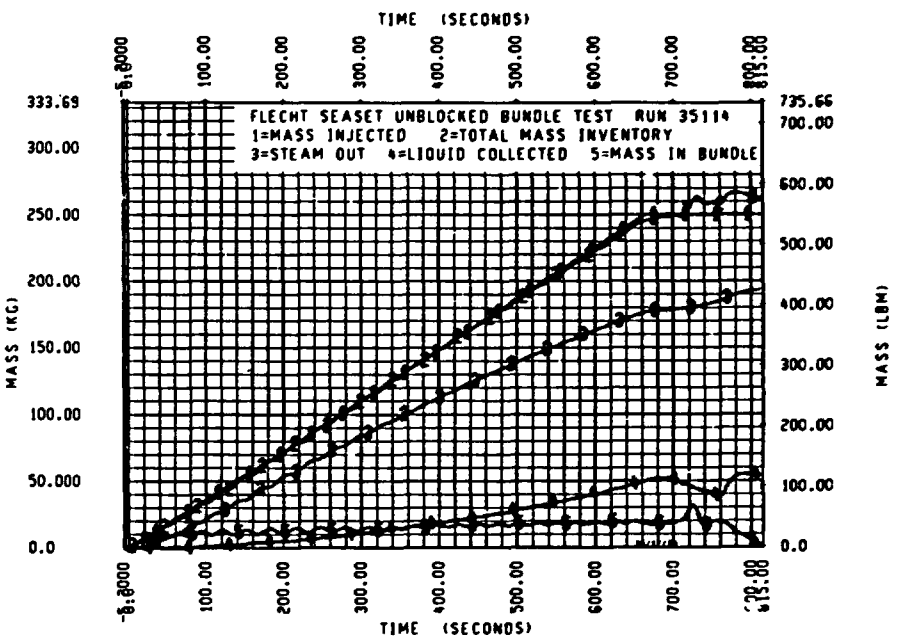

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

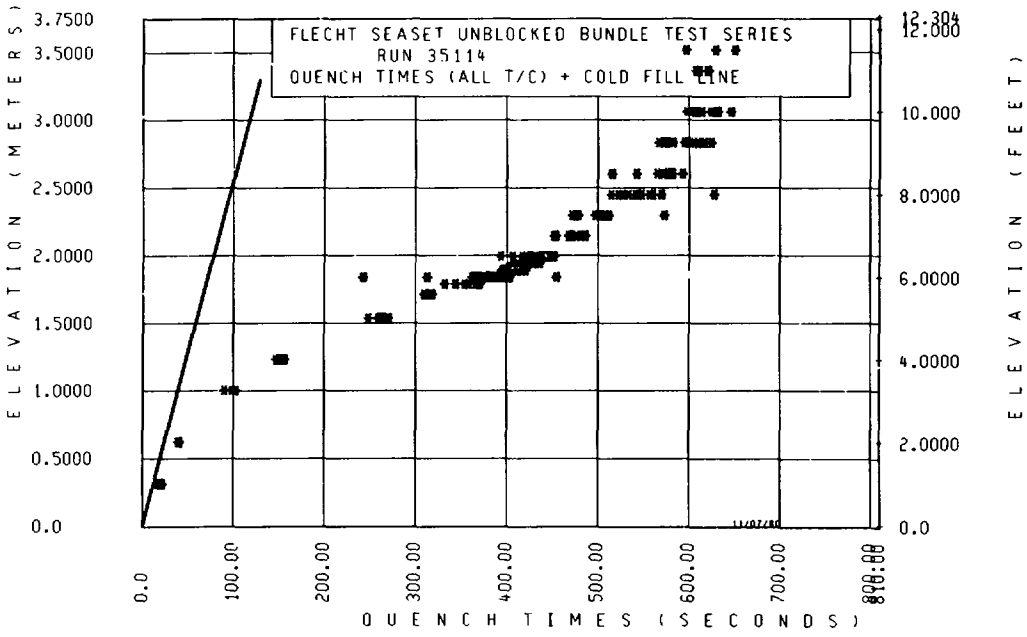

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

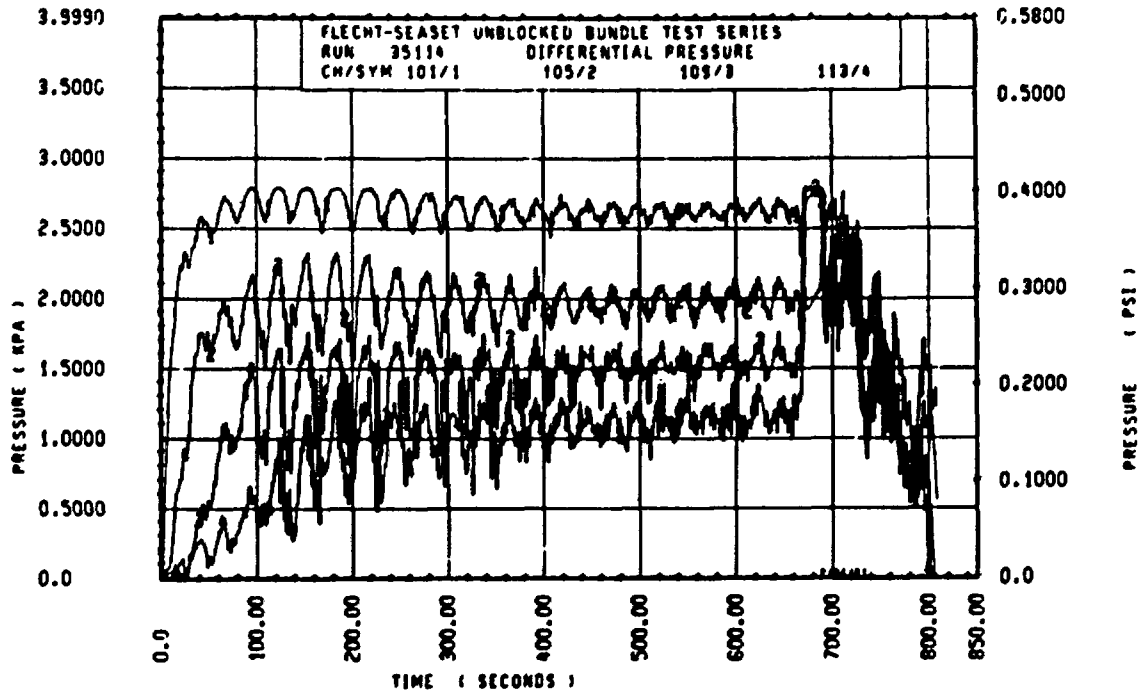

FLECHT SEASE. UNBLOCKED BUNDLE TEST RUN 35114
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

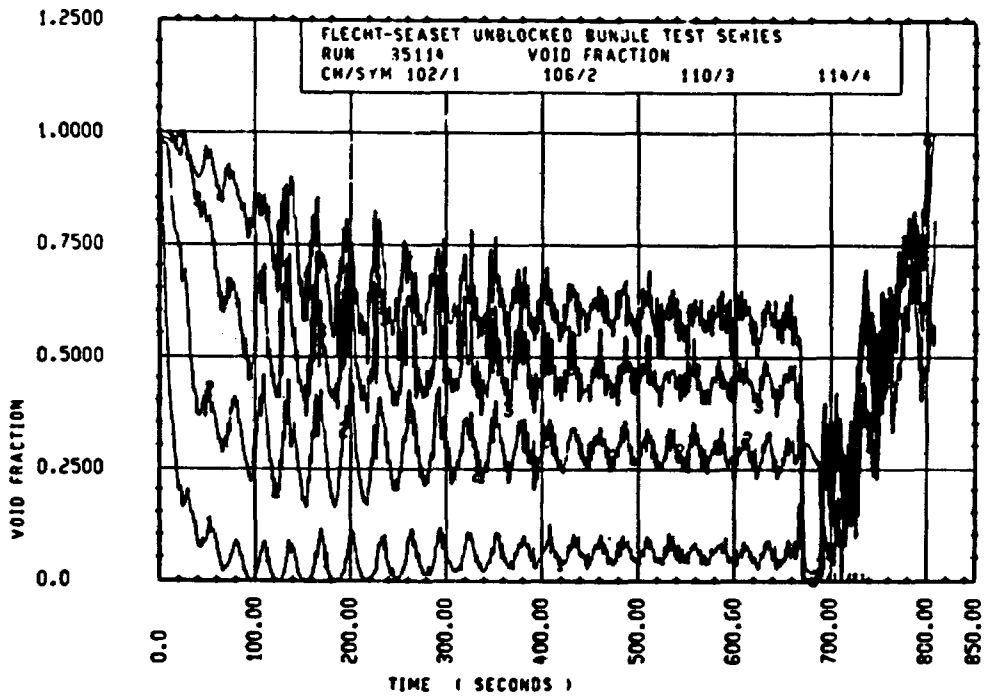

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35114
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
1.0000
0.7500
0.5000
0.2500
0.0
-0.2500
-0.5000
-0.7500
-1.0000
2.2046
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
-2.2046
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

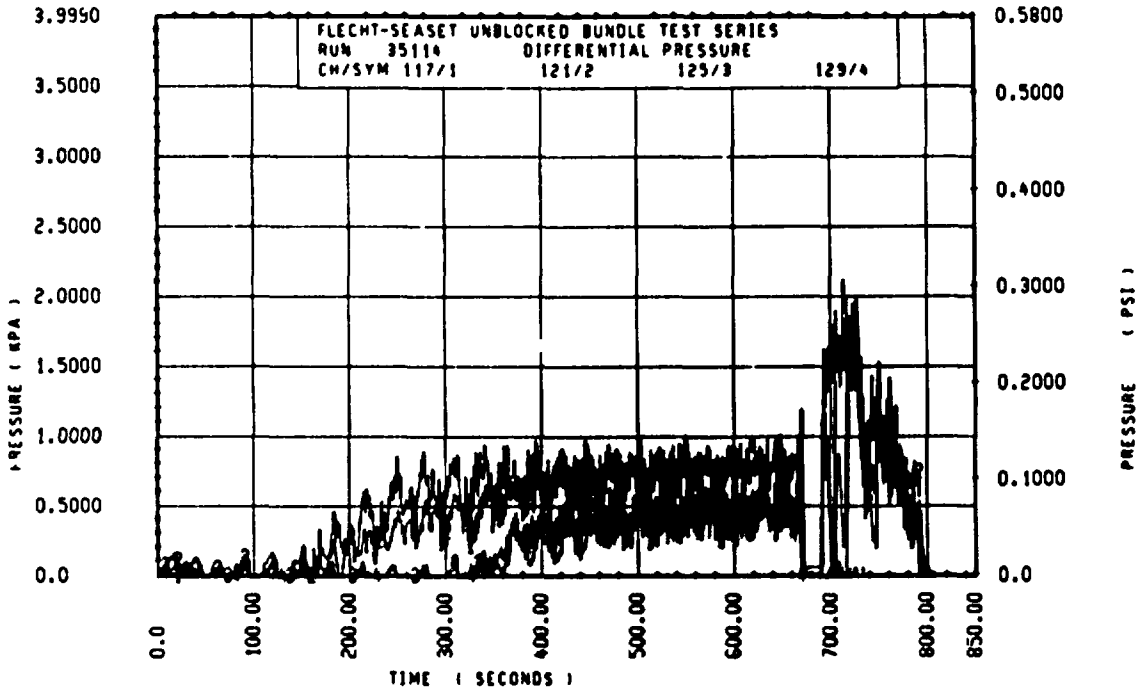

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35114
EFFLUENCE RATE FROM EXHAUST ORIFICE
TIME (SECONDS)
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
2.2046
2.0000
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

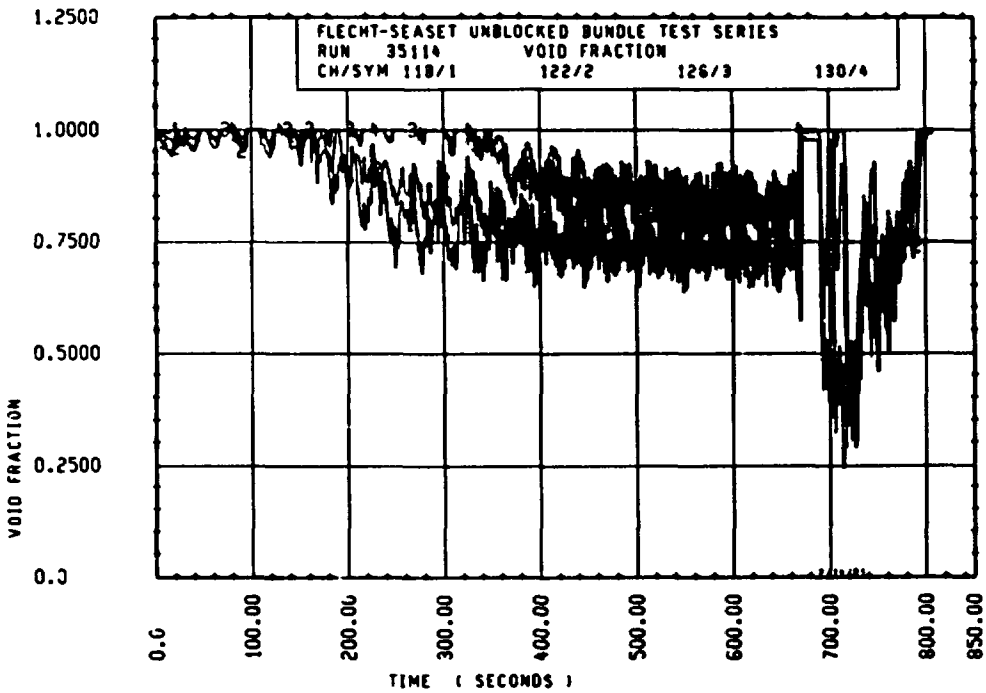

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35114
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
TIME (SECONDS)
MASS (KG)
MASS (LBM)
333.69
300.00
250.00
200.00
150.00
100.00
50.000
0.0
735.66
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

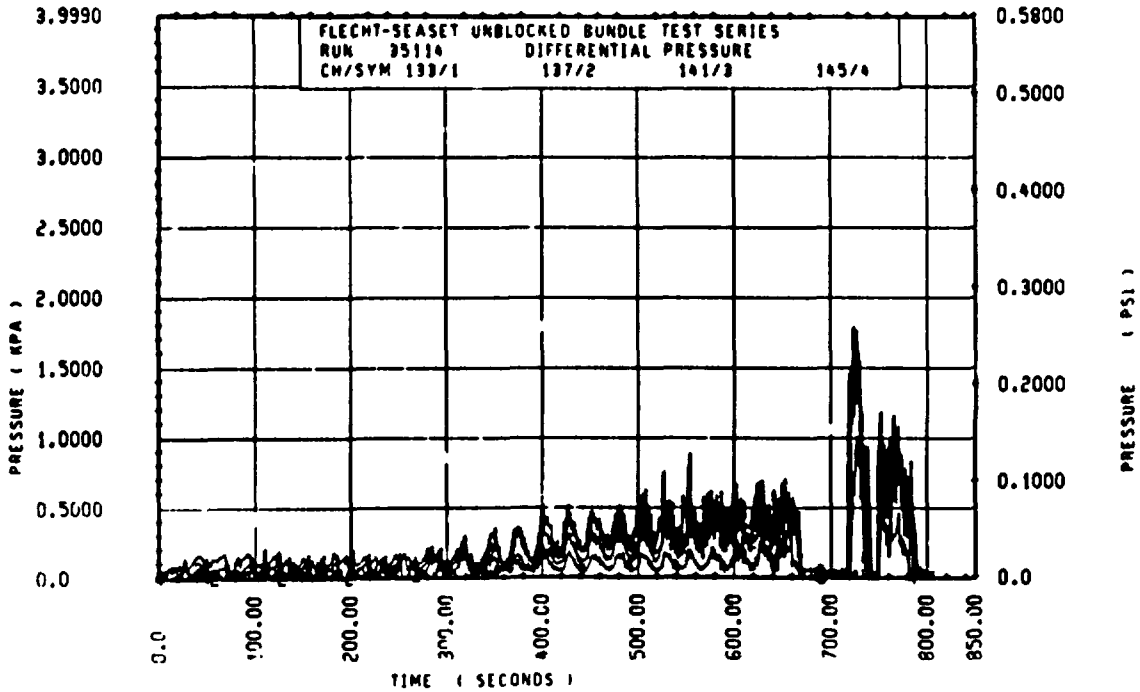

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
QUENCH TIMES (SECONDS)

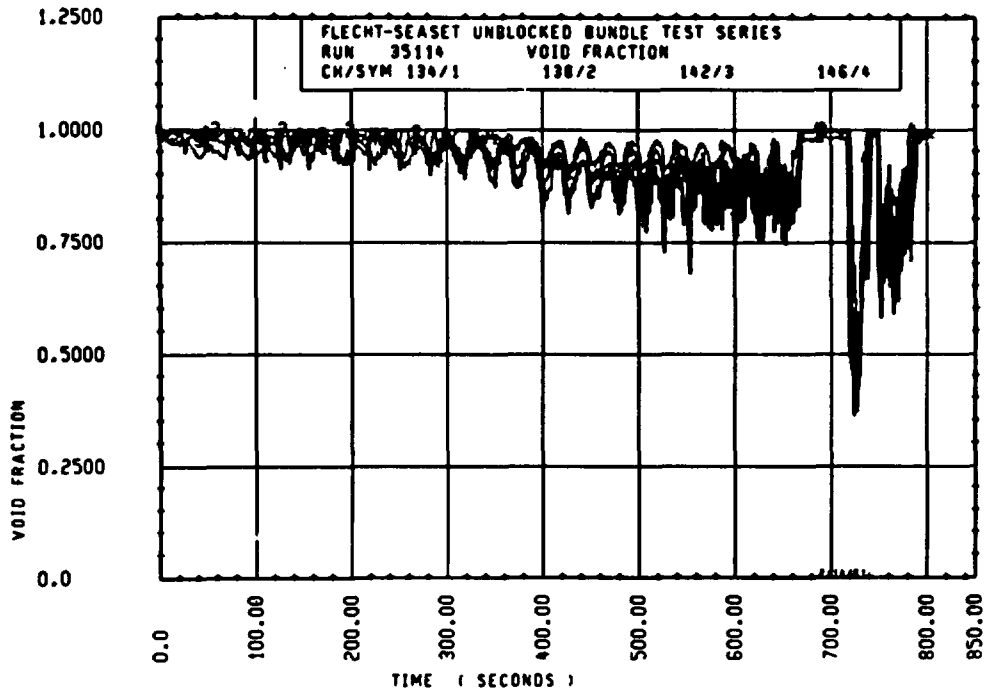

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (MPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35114 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 35212
Date: 8/16/79
Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.14 MPa (20 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	879°C (1613°F)
Rod peak power	1.4 kw/m (0.42 kw/ft)
Flow rate	11 mm/sec (0.43 in./sec)
Coolant temperature	32°C (89°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	119°C (247°F)	69°C (157°F)
1.22 m (48 in.)	150°C-163°C (302°F-326°F)	143°C (289°F)
1.83 m (72 in.)	236°C-254°C (456°F-490°F)	492°C-701°C (918°F-1294°F)
2.44 m (96 in.)	176°C-230°C (349°F-446°F)	490°C-588°C (914°F-1090°F)
2.74 m (108 in.)	193°C (380°F)	380°C (716°F)
3.05 m (120 in.)	117°C-134°C (242°F-274°F)	124°C-158°C (256°F-316°F)
3.35 m (132 in.)	112°C-118°C (234°F-244°F)	122°C (252°F)

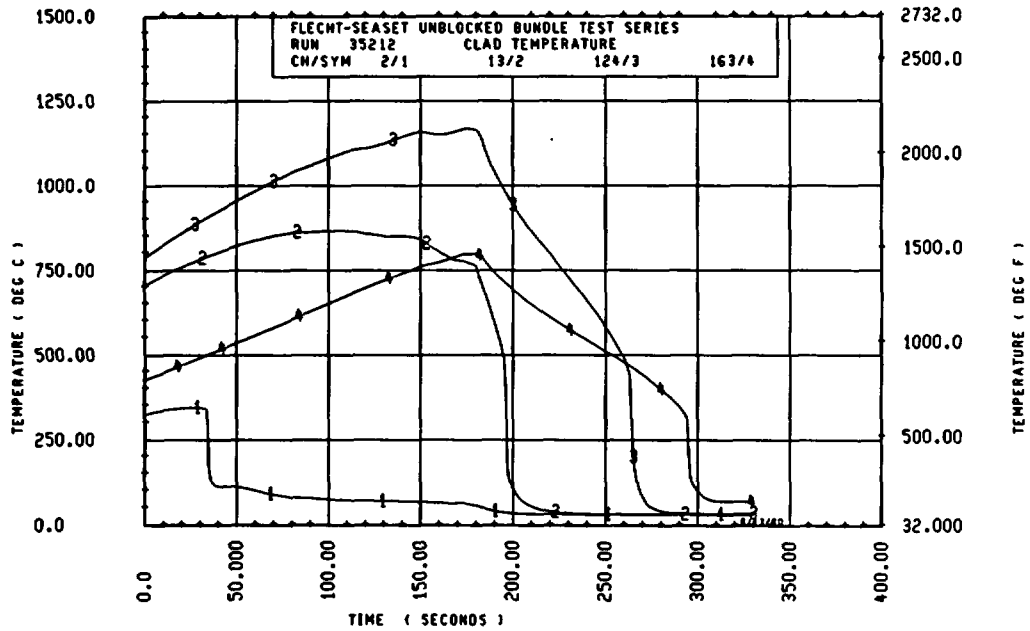
*At 186 seconds after flood

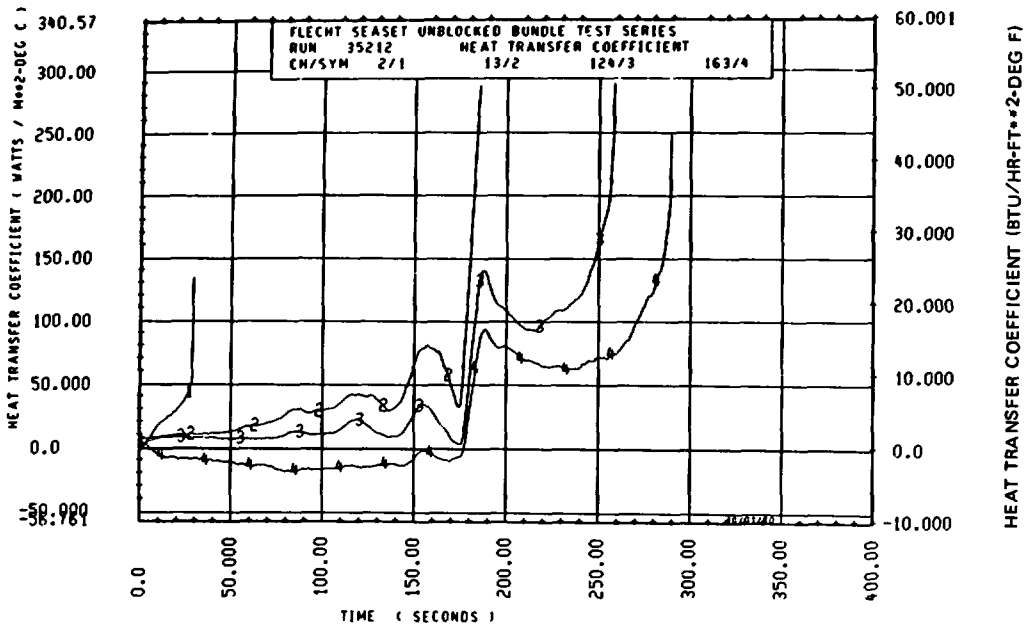
C. Comments

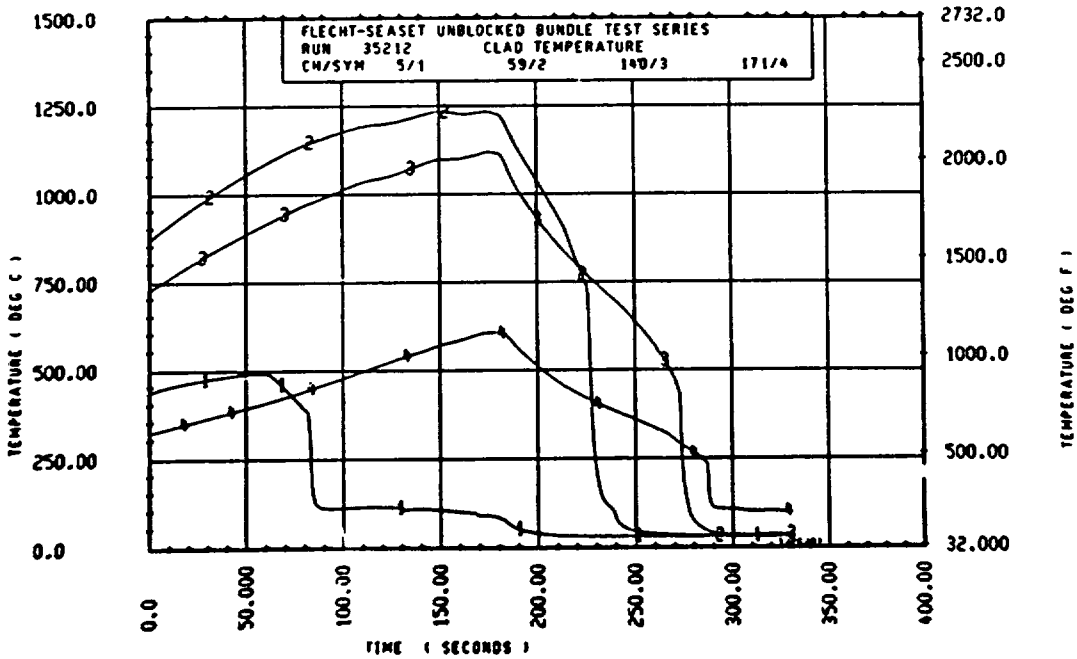
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. Test was scrammed at 178 seconds after flood because of high rod temperature.

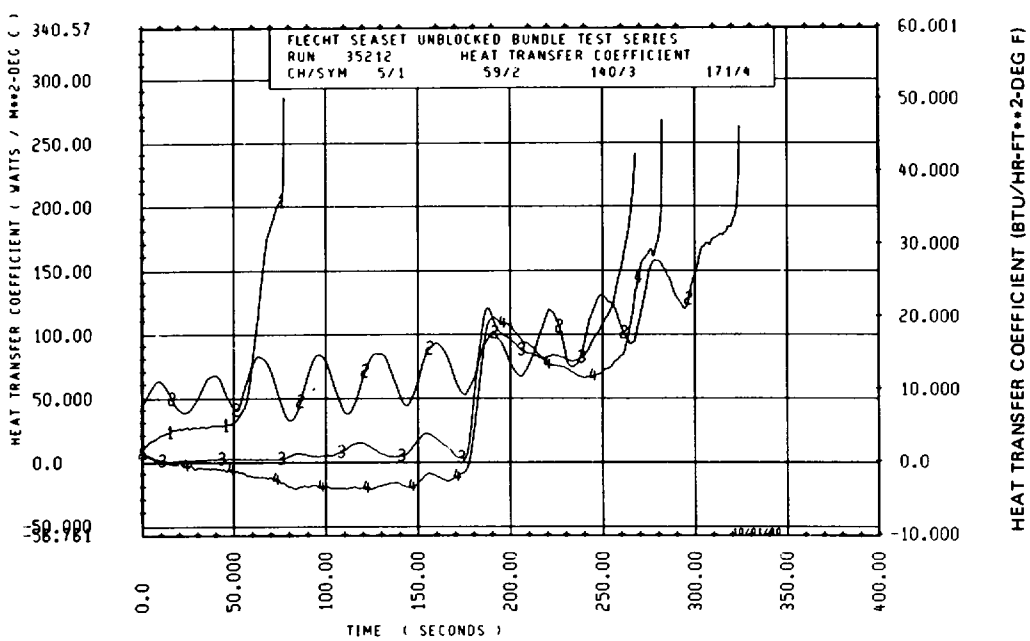
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 35212

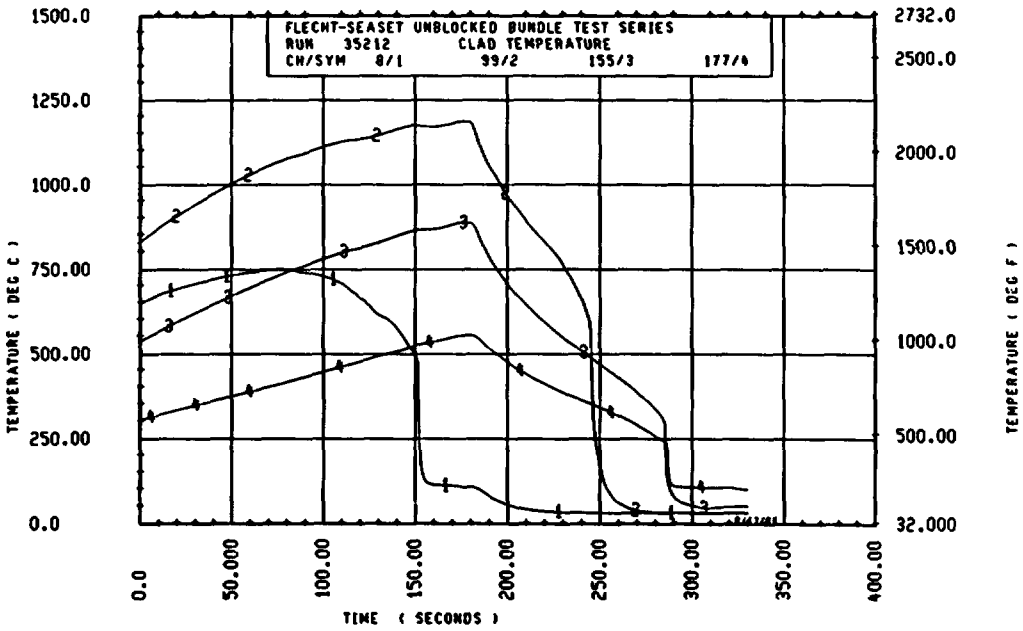
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1266.	1555.	289.	108.0	909.	195.0
2H 6- 0	50	1536.	1983.	447.	146.0	905.	239.0
3C 3- 0	17	1291.	1583.	292.	112.0	829.	216.0
3C 5- 7	28	1395.	1735.	340.	145.0	812.	227.8
4L 8- 0	129	1309.	1926.	617.	173.0	690.	271.9
4L 8- 6	147	1309.	1912.	603.	173.0	684.	272.0
5E11- 0	168	608.	1044.	436.	180.0	427.	282.0
5J 4- 0	12	1242.	1588.	346.	108.0	932.	195.0
5J 8- 6	146	1091.	1818.	727.	149.0	606.	280.9
5J11- 6	175	560.	1007.	447.	180.0	449.	276.0
7E 6- 0	57	1456.	1872.	417.	146.0	815.	228.9
7E 8- 6	142	1112.	1670.	558.	173.0	652.	280.2
7E10- 0	162	815.	1361.	546.	173.0	533.	292.9
7E11- 6	176	621.	991.	370.	174.0	502.	263.0
7D 6- 4	84	1590.	2222.	632.	174.0	1304.	229.8
7D 7- 6	119	1470.	2085.	614.	147.0	942.	255.0
7D 9- 3	151	1014.	1688.	674.	178.0	573.	284.0
7G 5- 0	23	1489.	1885.	396.	142.0	933.	217.0
7J 6- 0	**BAD THERMOCOUPLE DATA*						
7M 7- 6	120	1405.	2040.	635.	173.0	759.	264.0
7M 8- 0	132	1311.	1973.	662.	173.0	744.	274.0
7M 9- 3	152	1001.	1655.	654.	173.0	551.	281.0
8H 4- 0	13	1299.	1591.	292.	104.0	883.	195.7
8H10- 0	163	801.	1468.	667.	180.0	603.	294.0
8H11- 6	177	582.	1028.	446.	180.0	459.	286.0
8K 4- 0	14	1277.	1607.	330.	110.0	941.	193.9
8K 6- 6	99	1527.	2166.	639.	174.0	1091.	244.9
8K 8- 0	140	1344.	2045.	701.	175.0	816.	273.0
8K10- 0	164	820.	1461.	641.	180.0	562.	293.0
8N 2- 0	5	821.	920.	99.	56.0	713.	82.6
8N 4- 0	15	1276.	1581.	305.	107.0	913.	195.8
8N 6- 0	61	1495.	1965.	469.	173.0	918.	236.9
8N10- 0	165	809.	1386.	577.	174.0	517.	294.0
9C 7- 0	109	1449.	2038.	588.	148.0	721.	255.9
9C 9- 3	153	1011.	1642.	631.	173.0	616.	282.0
9G 1- 0	2	615.	652.	37.	24.0	643.	34.0
9G 3- 3	8	1202.	1381.	180.	76.0	914.	150.9
9G11- 0	171	616.	1126.	509.	180.0	453.	287.0
9I 5- 0	24	1475.	1832.	357.	141.0	895.	217.0
9E 6- 2	**BAD THERMOCOUPLE DATA*						
10D 6- 6	93	1497.	1956.	459.	172.0	956.	246.7
11E 7- 6	124	1448.	2133.	685.	175.0	820.	263.0
11E 9- 3	155	1000.	1628.	627.	174.0	570.	285.0
11E11- 0	172	617.	1101.	483.	180.0	481.	281.0
12D 6- 0	16	1274.	1560.	287.	100.0	934.	195.0
12D 6- 0	66	1550.	2108.	558.	173.0	1052.	237.0
12F 6- 6	102	1498.	2140.	643.	149.0	1226.	234.0

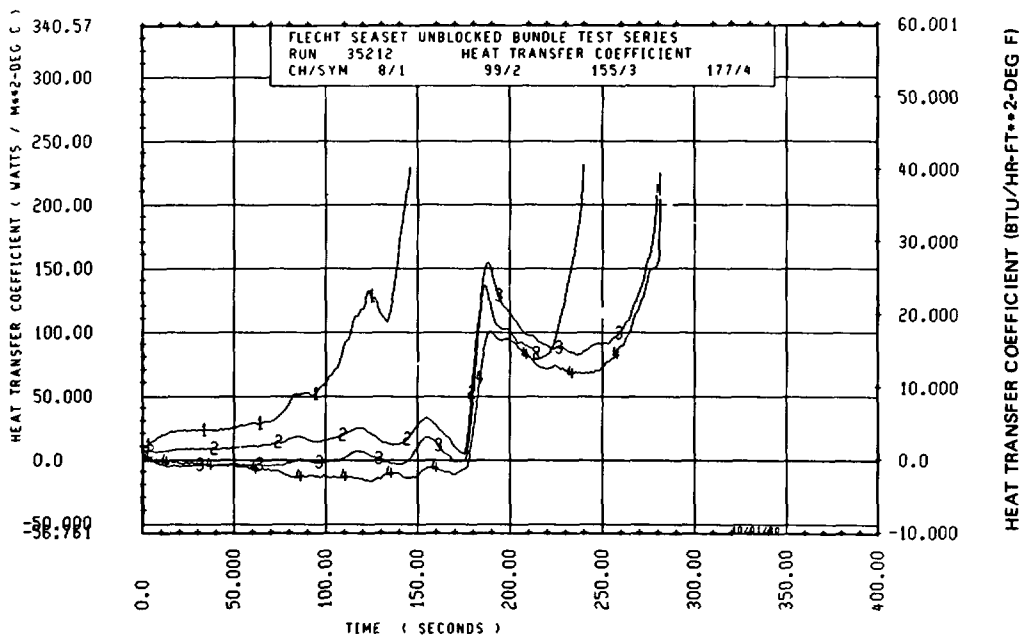

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

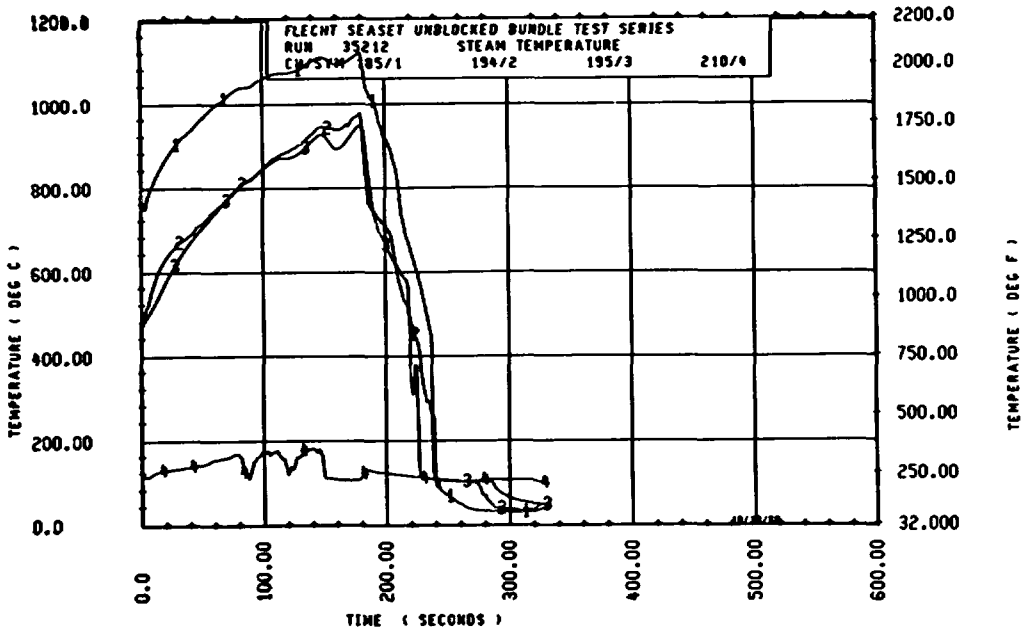

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

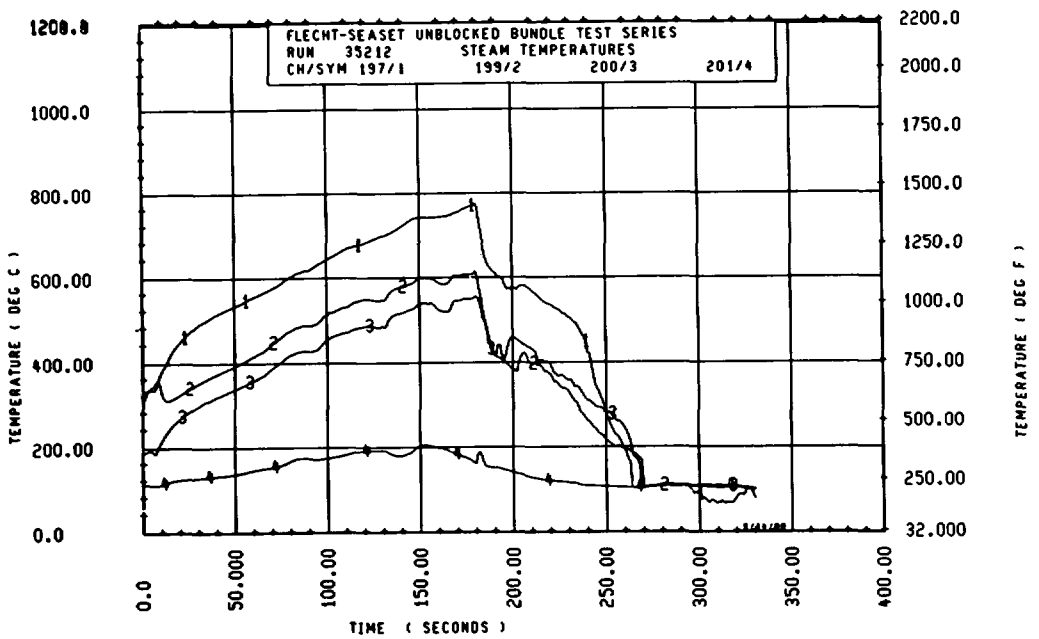

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

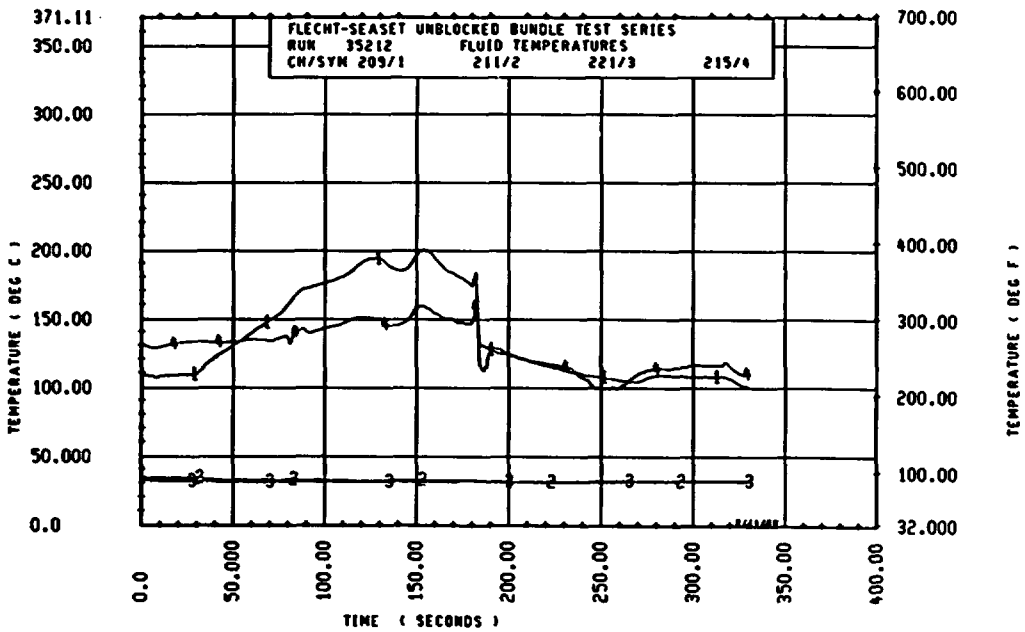

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)

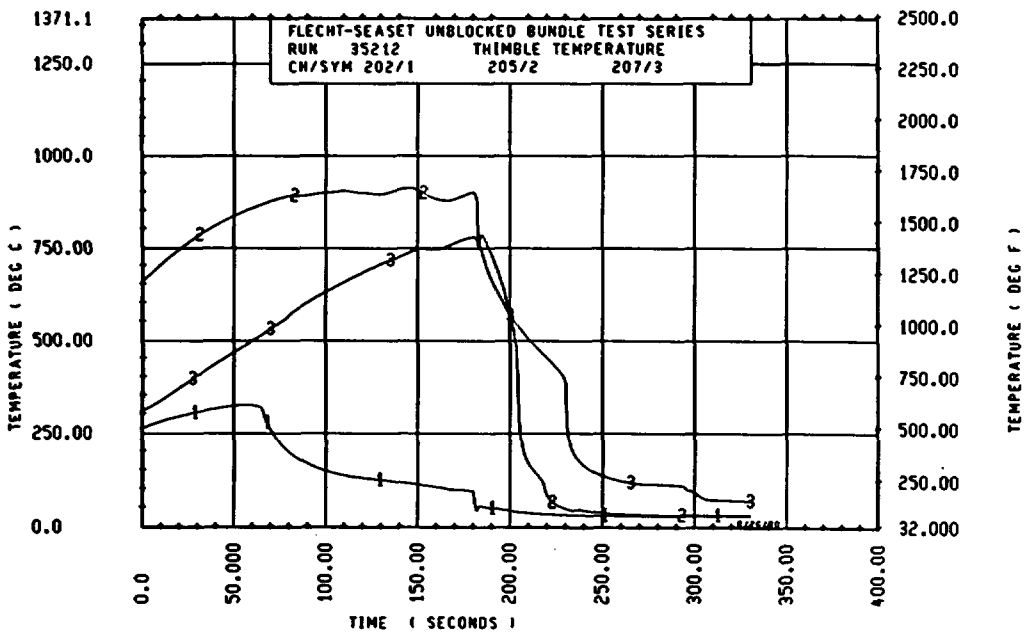

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

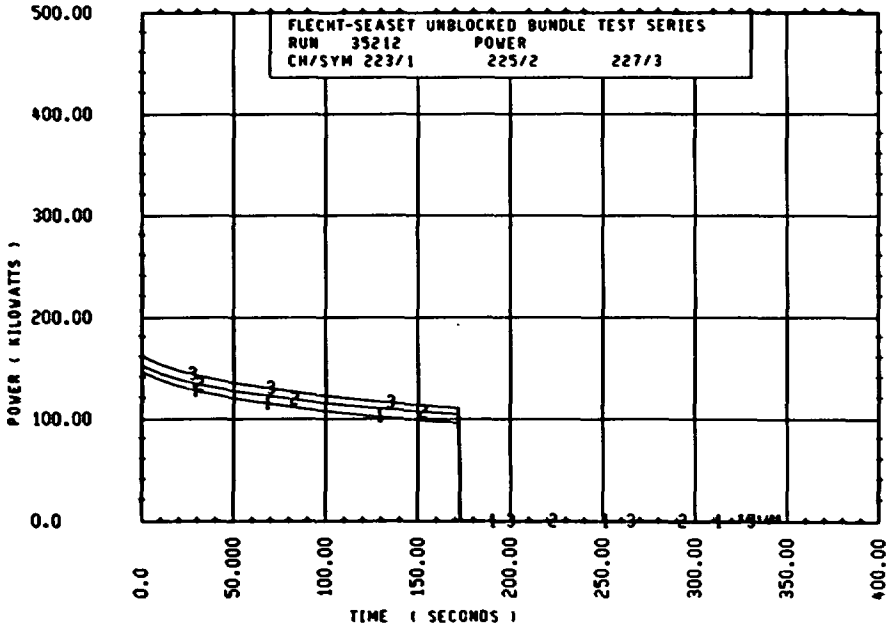

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

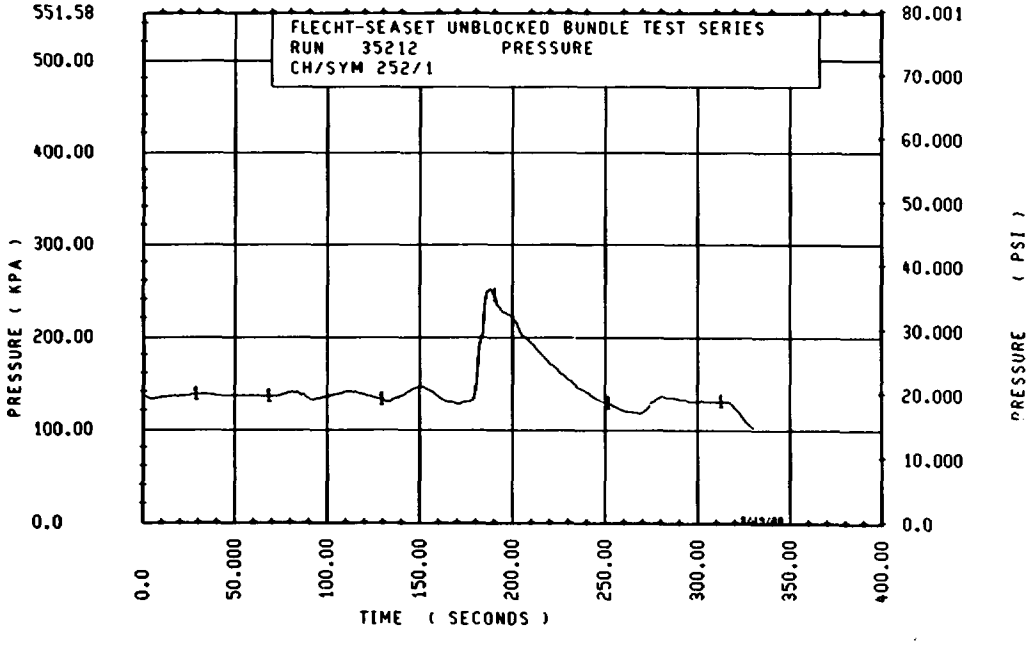

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

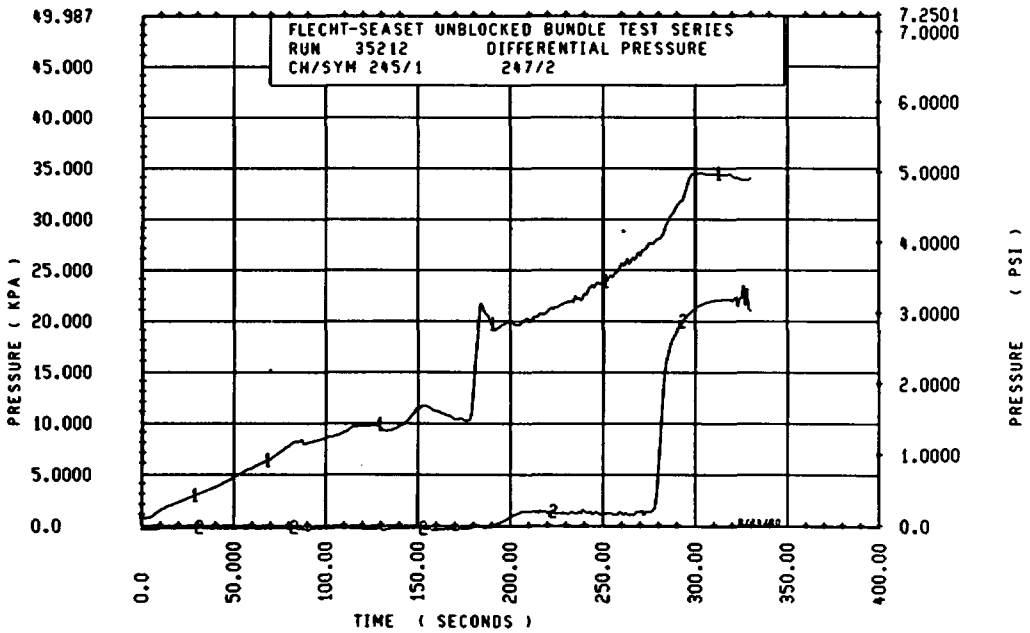


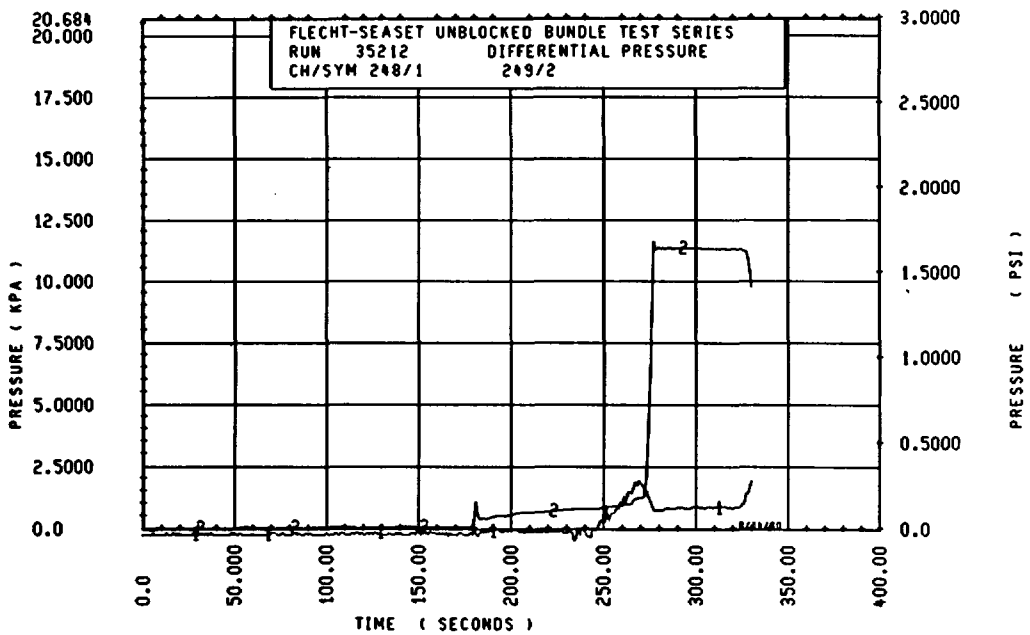


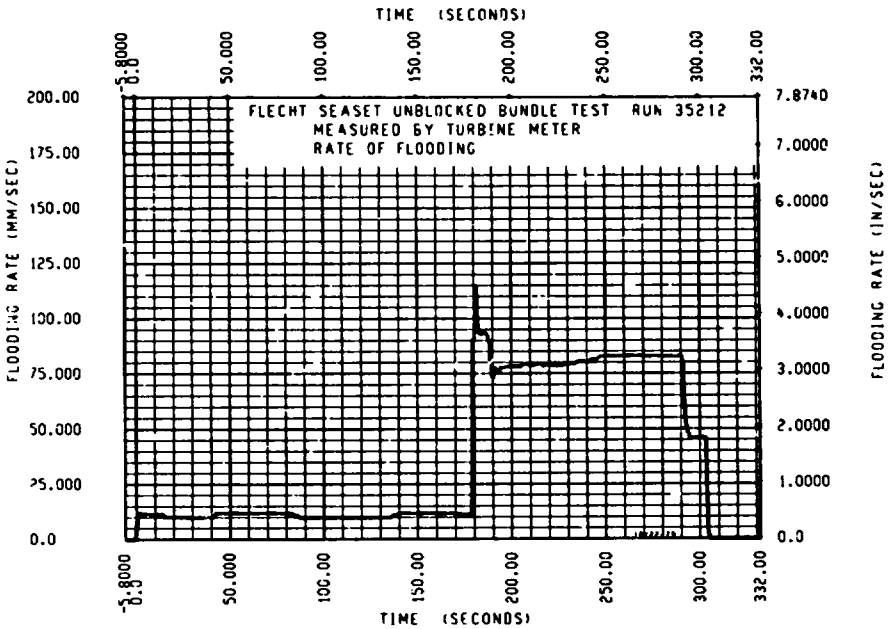
CH 202-4C, 0.61 m (24 in.); CH 205-4C, 1.52 m (60 in.);
CH 207-4I, 3.05 m (120 in.)

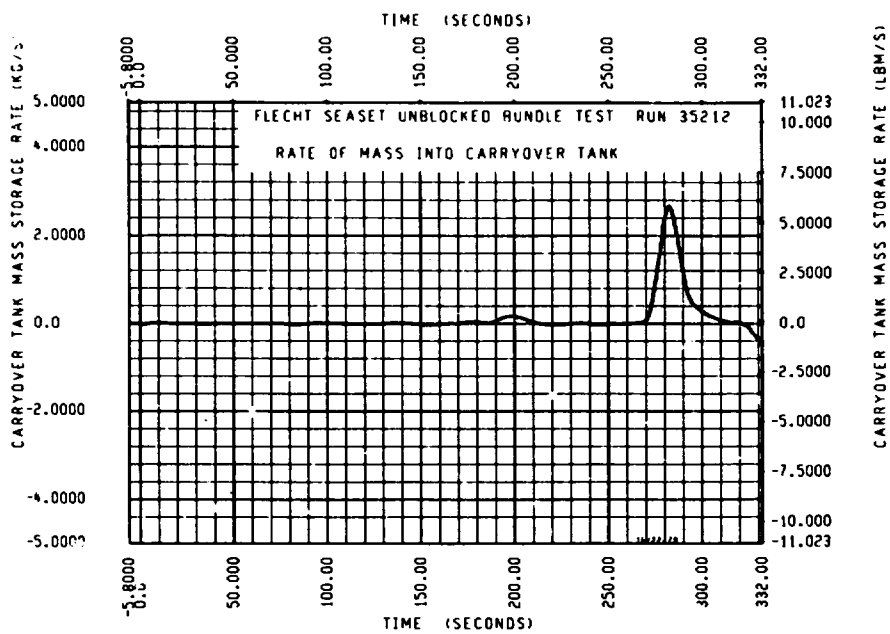

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

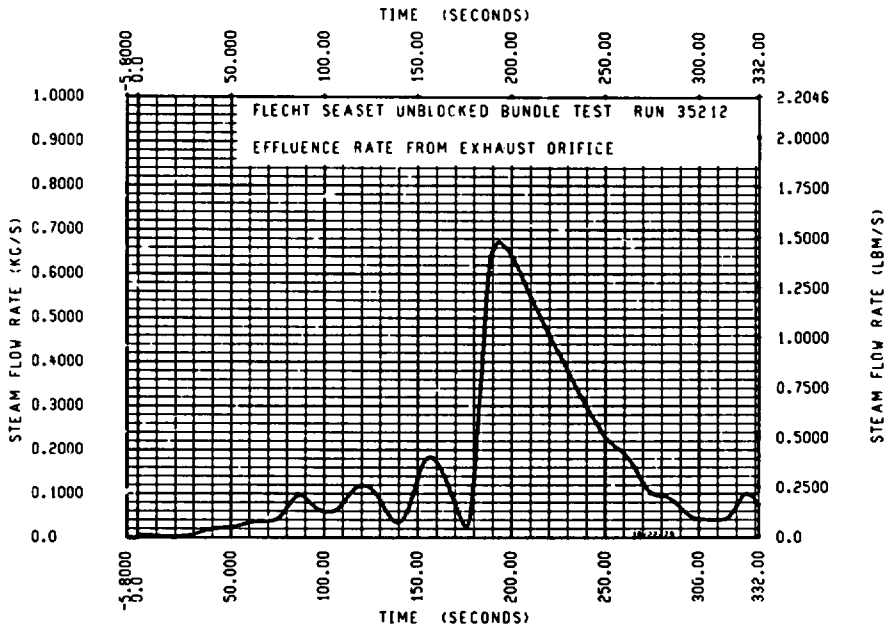

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00
TIME (SECONDS)

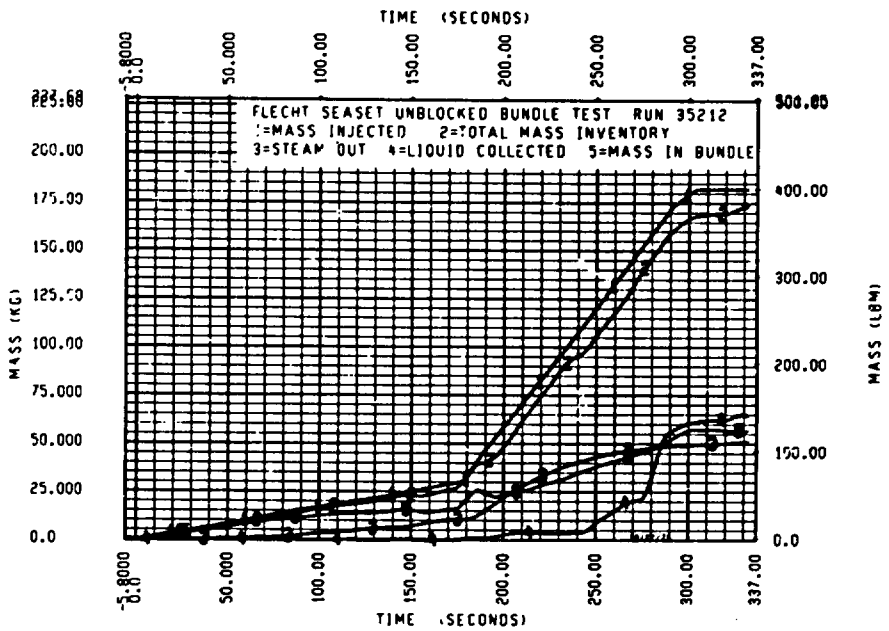

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

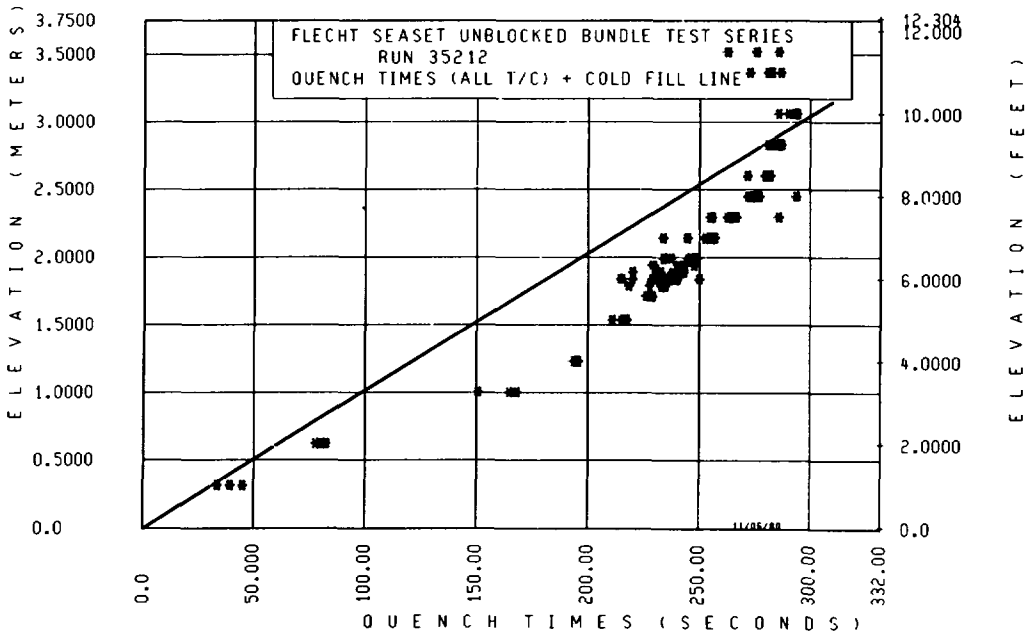

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

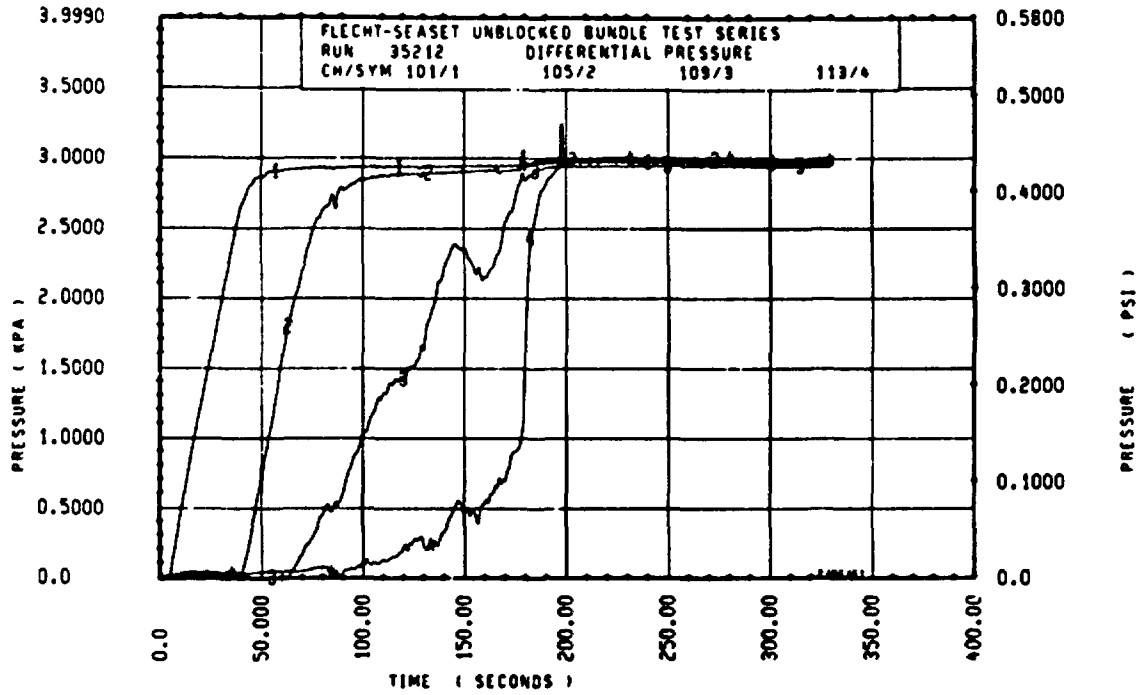

TIME (SECONDS)
-5.8000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
332.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35212
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
200.00
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
FLOODING RATE (IN/SEC)
7.8740
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0

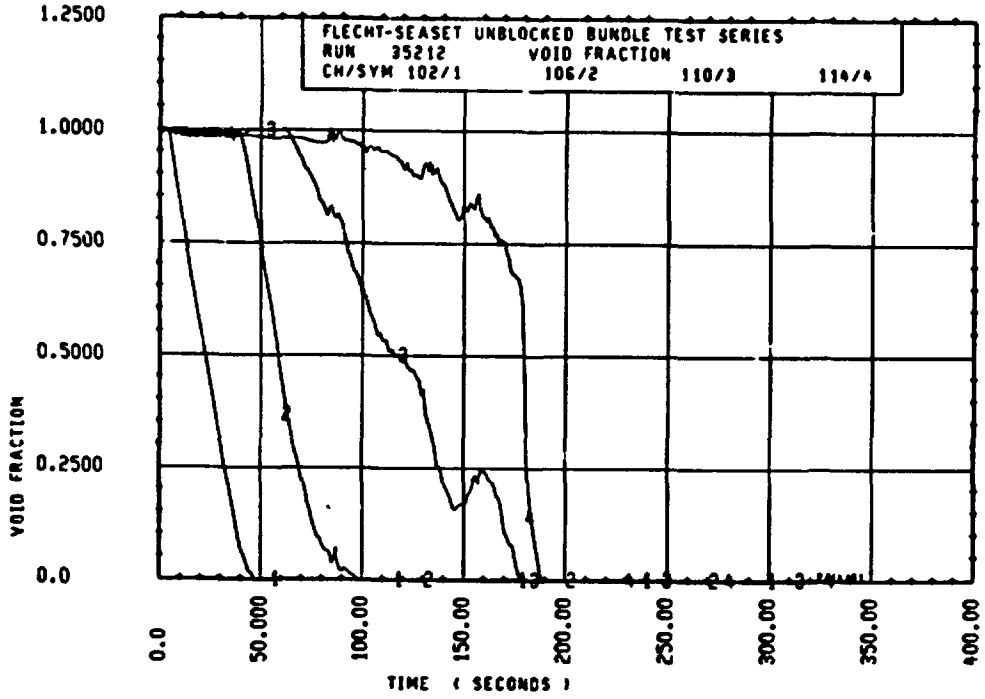

TIME (SECONDS)
-5.8000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
332.00
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35212
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
5.0000
4.0000
2.0000
0.0
-2.0000
-4.0000
-5.0000
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
11.023
10.000
7.5000
5.0000
2.5000
0.0
-2.5000
-5.0000
-7.5000
-10.000
-11.023

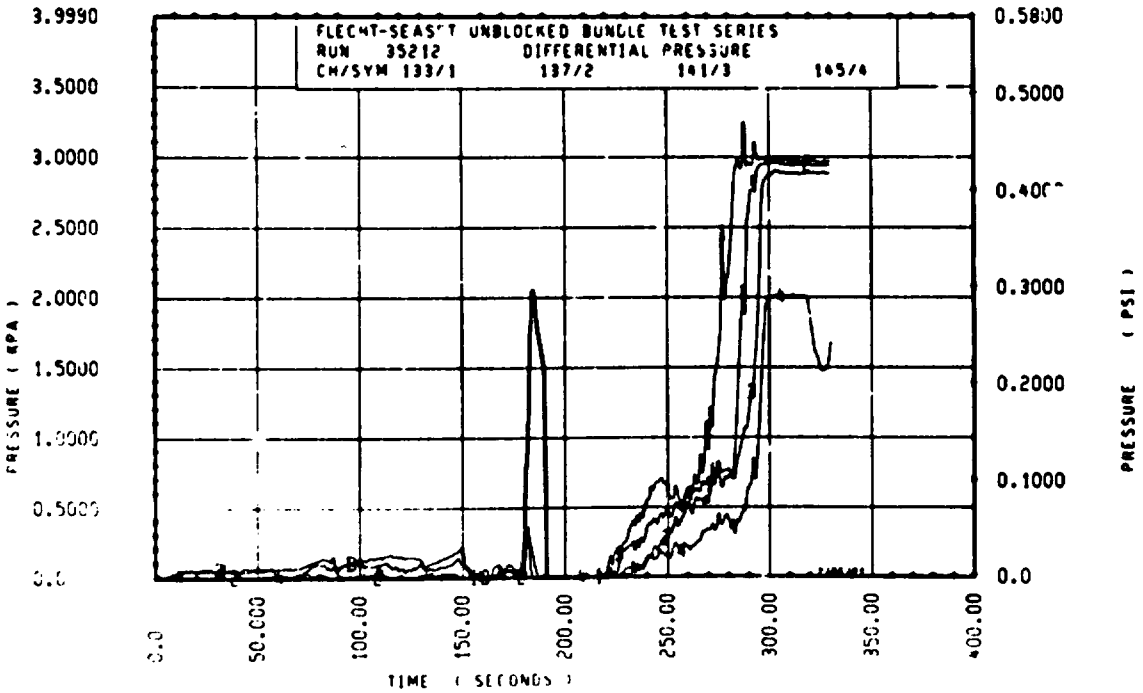

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35212
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
2.2046
2.0000
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.8000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
332.00

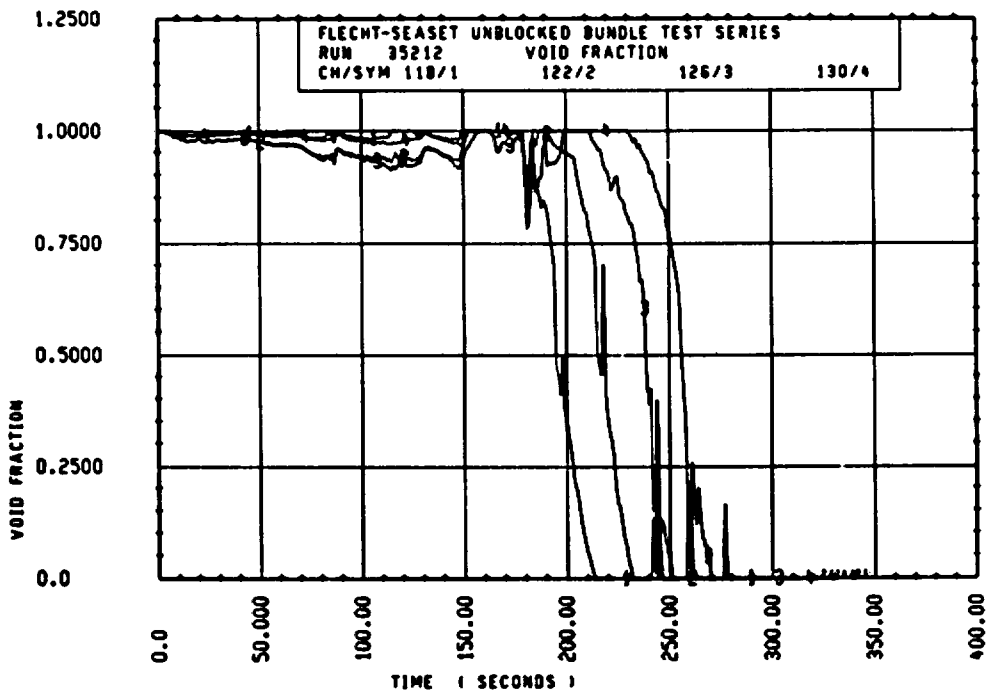

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35212
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
200.00
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
400.00
300.00
200.00
100.00
0.0
-5.8000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
337.00

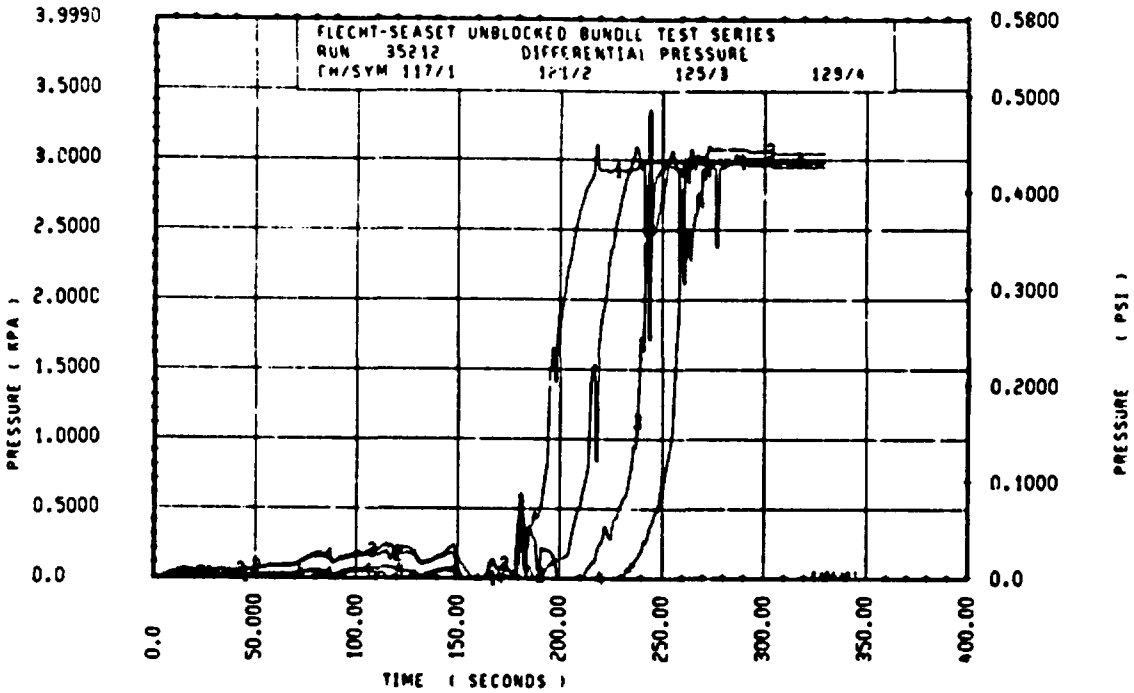

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
332.00
QUENCH TIMES (SECONDS)

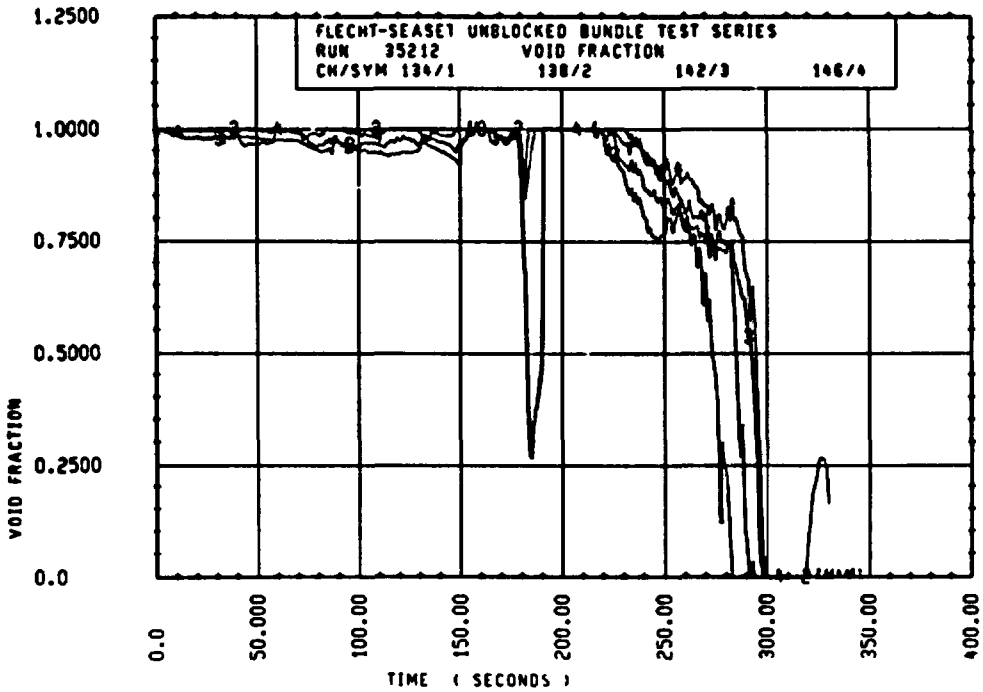

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.3000
0.2000
0.1000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35212 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 35304
Date: 8/17/79
Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	915°C (1679°F)
Rod peak power	2.4 kw/m (0.74 kw/ft)
Flow rate	25.9 mm/sec (1.02 in./sec)
Coolant temperature	51°C (124°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	132°C (269°F)	78°C (173°F)
1.22 m (48 in.)	161°C (322°F)	133°C (272°F)
1.83 m (72 in.)	169°C-219°C (336°F-426°F)	120°C-138°C (248°F-280°F)
2.44 m (96 in.)	173°C-227°C (344°F-440°F)	275°C-681°C (527°F-1258°F)
2.74 m (108 in.)	162°C (324°F)	135°C (275°F)
3.05 m (120 in.)	140°C-147°C (284°F-296°F)	131°C (267°F)
3.35 m (132 in.)	133°C-138°C (272°F-280°F)	130°C (266°F)

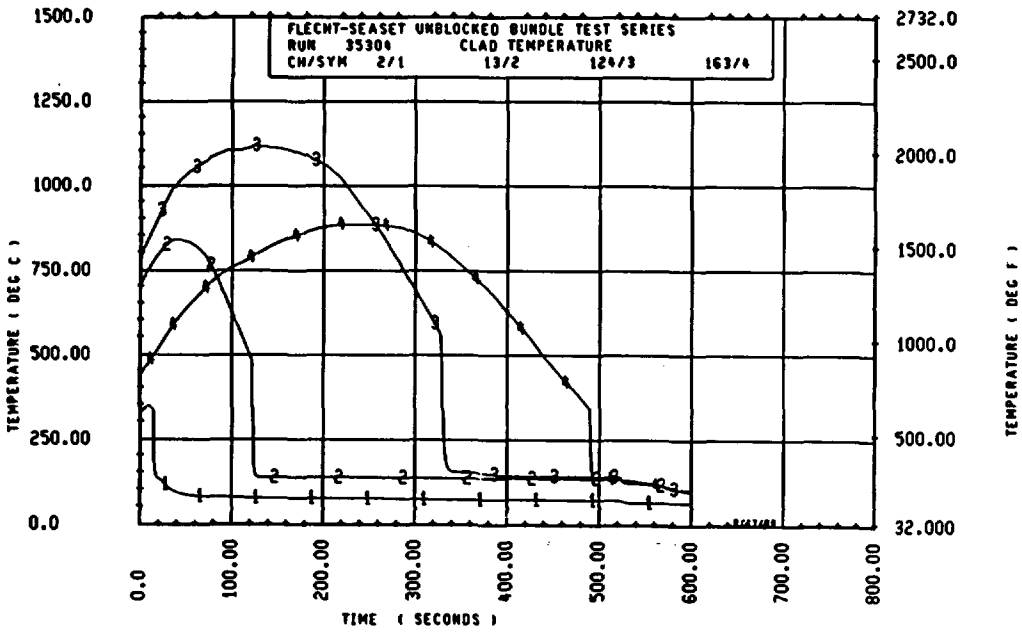
*At 203 seconds after flood

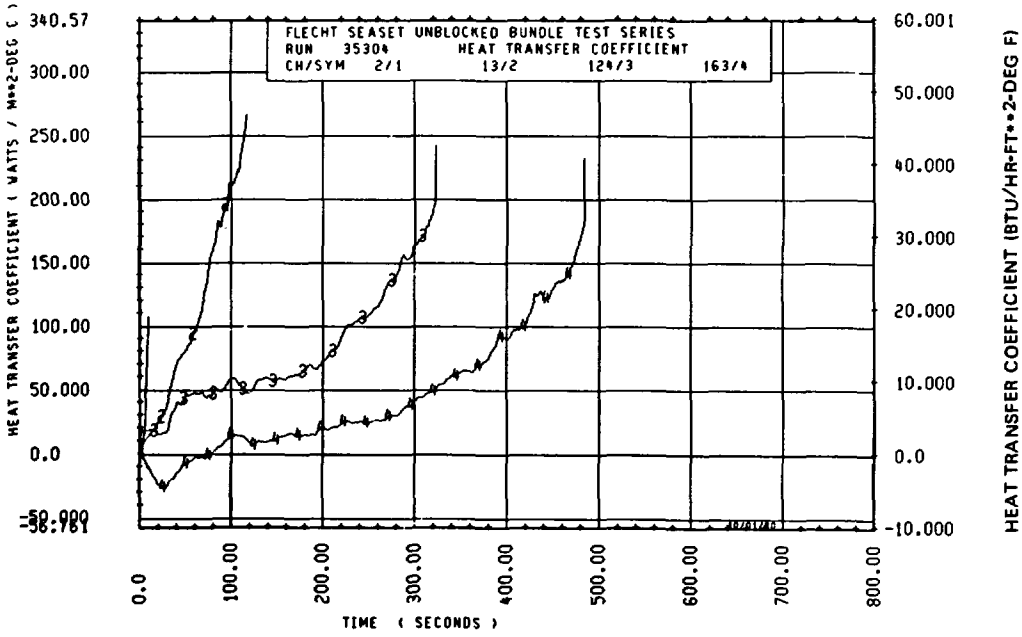
C. Comments

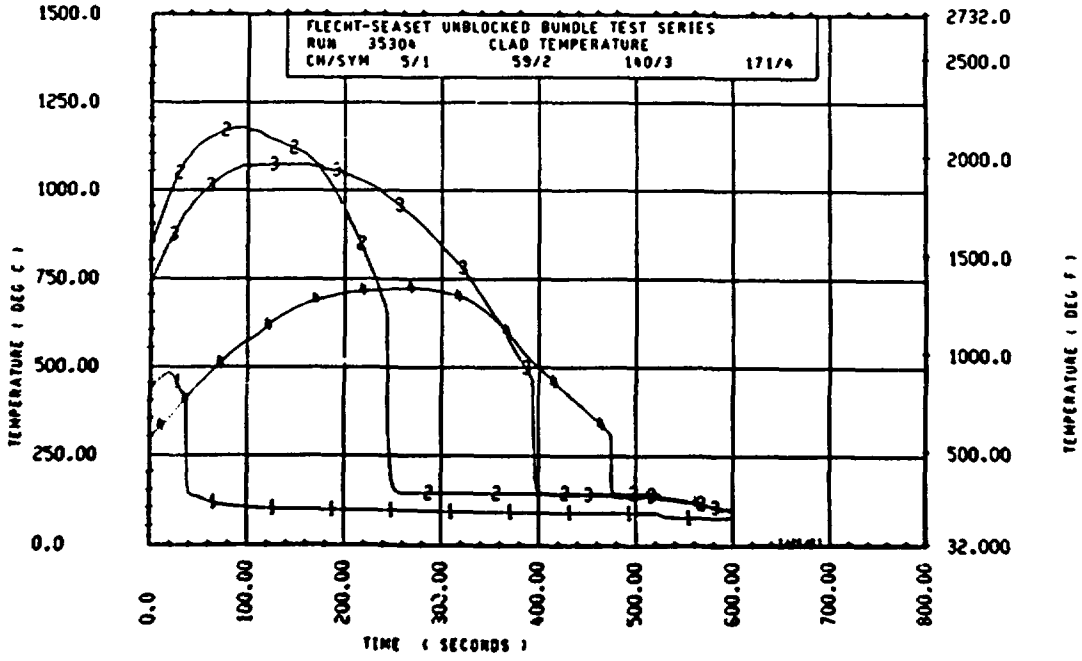
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. Power decay of inside power zone was lower than specified by approximately 5 percent.

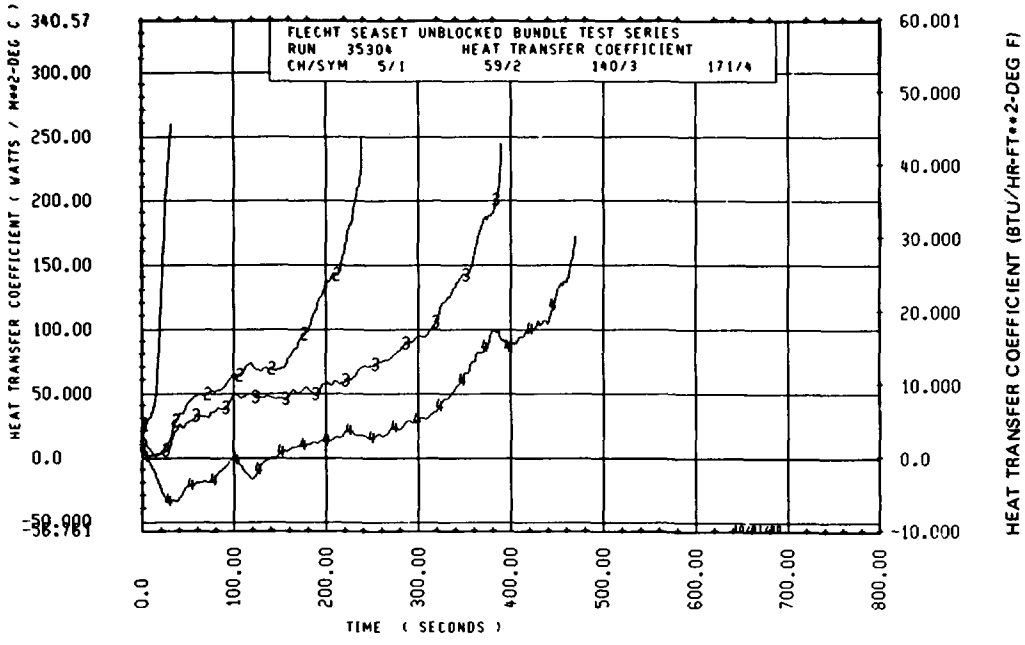
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 35304

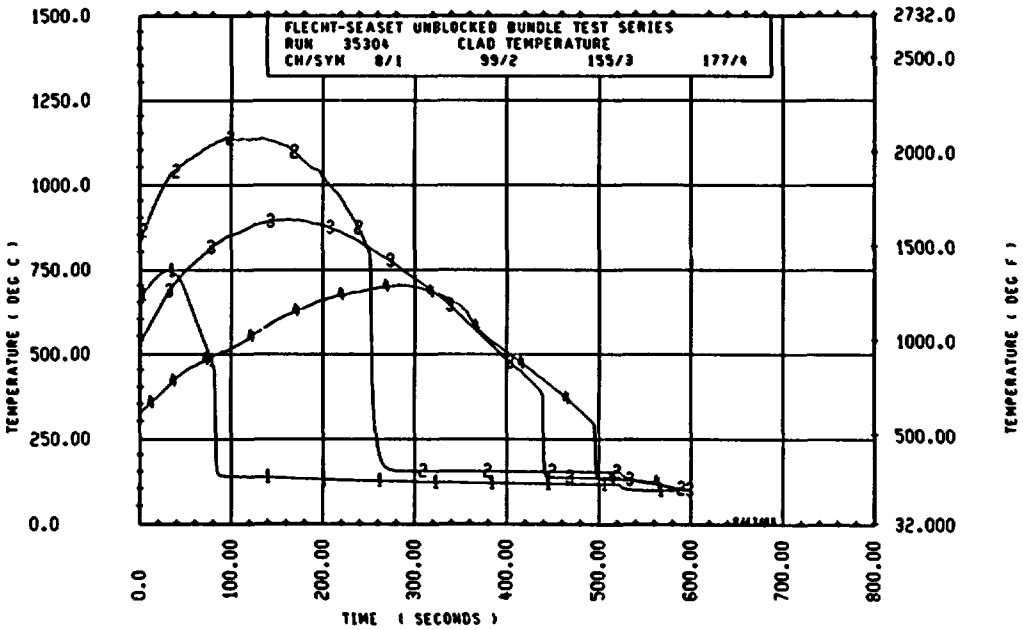
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2N 4- 0	10	1272.	1515.	243.	35.5	882.	120.7
2N 6- 0	50	1543.	2021.	479.	94.0	1000.	240.9
3C 5- 0	17	1350.	1608.	258.	53.0	879.	189.7
3C 5- 7	28	1443.	1751.	309.	70.0	881.	223.8
4L 8- 0	129	1328.	1853.	525.	94.0	821.	376.5
4L 8- 6	147	1332.	1853.	521.	94.0	829.	376.4
5E11- 0	168	639.	1161.	522.	219.0	556.	475.0
5J 4- 0	12	1243.	1513.	270.	43.0	852.	124.0
5J 8- 6	146	1113.	1603.	489.	94.0	715.	395.8
5J11- 6	175	604.	1131.	526.	268.0	639.	468.5
7B 6- 0	57	1483.	1816.	333.	53.0	983.	213.0
7B 8- 6	142	1114.	1641.	527.	113.0	639.	440.9
7B10- 0	162	841.	1412.	571.	139.0	623.	483.2
7B11- 6	176	648.	1148.	501.	184.0	527.	499.0
7D 6- 4	84	1626.	2175.	549.	94.0	1333.	252.5
7D 7- 6	119	1494.	1964.	470.	78.0	1062.	322.8
7D 9- 3	151	1019.	1630.	611.	125.0	740.	430.8
7G 5- 0	23	1537.	1837.	300.	65.0	1060.	179.9
7J 6- 0	59	1563.	2152.	589.	94.0	1205.	243.6
7M 7- 6	120	1437.	2016.	579.	95.0	949.	339.0
7M 8- 0	132	1331.	1961.	630.	96.0	917.	369.0
7M 9- 3	152	1022.	1639.	617.	114.0	712.	413.9
8H 4- 0	13	1304.	1545.	241.	41.0	895.	122.0
8H10- 0	163	827.	1625.	798.	219.0	648.	489.0
8H11- 6	177	623.	1303.	680.	282.0	561.	495.0
8K 4- 0	14	1277.	1532.	255.	41.0	909.	117.8
8K 6- 6	99	1525.	2083.	558.	95.0	1433.	251.7
8K 8- 0	140	1362.	1965.	602.	159.0	853.	393.9
8K10- 0	164	841.	1528.	687.	195.0	712.	469.9
8N 2- 0	5	817.	904.	86.	20.0	748.	37.6
8N 4- 0	15	1287.	1546.	259.	53.0	925.	119.1
8N 6- 0	61	1526.	1973.	447.	77.0	1058.	251.6
8N10- 0	165	839.	1399.	560.	114.0	673.	464.9
9C 7- 0	109	1468.	1934.	466.	113.0	734.	339.0
9C 9- 3	153	1032.	1667.	635.	160.0	677.	446.0
9G 1- 0	2	627.	663.	36.	9.5	630.	14.5
9G 3- 3	8	1222.	1379.	157.	31.0	840.	82.0
9G11- 0	171	576.	1337.	762.	264.0	586.	474.0
9E 5- 0	24	1530.	1808.	277.	71.0	1069.	176.5
9E 6- 2	46	1507.	2184.	678.	113.0	988.	274.8
10D 6- 6	93	1500.	2038.	538.	135.0	984.	290.0
11E 7- 6	124	1450.	2045.	595.	124.0	1004.	328.3
11E 9- 3	155	992.	1647.	655.	161.0	712.	439.0
11E11- 0	172	579.	1239.	660.	194.0	629.	445.0
12D 4- 0	16	1296.	1533.	237.	37.0	898.	120.0
12D 6- 0	66	1565.	2118.	553.	96.0	1149.	261.8
12F 6- 6	102	1538.	2132.	594.	94.0	921.	290.8

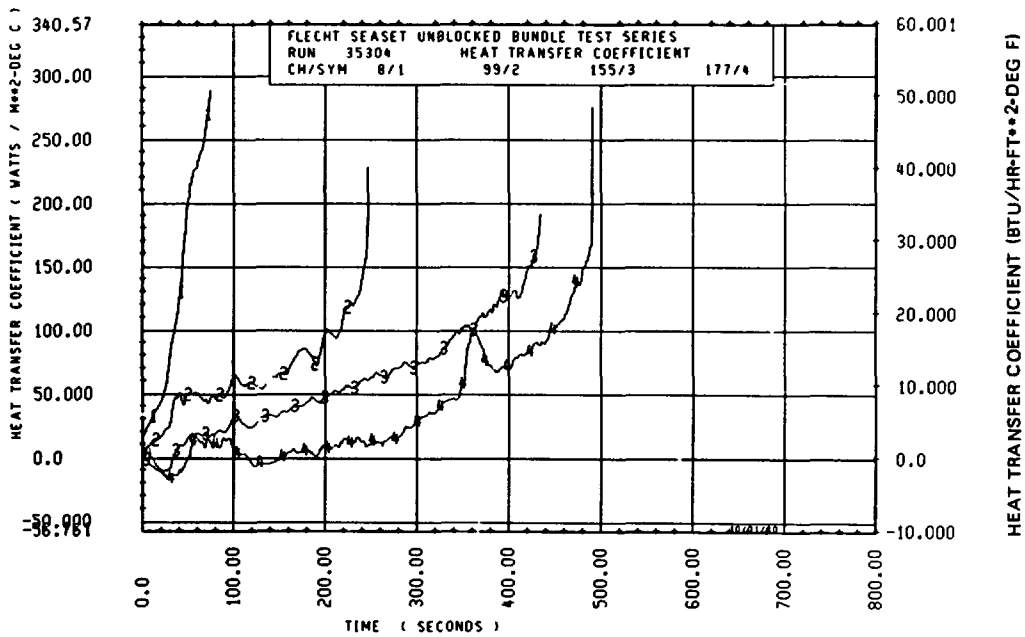

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

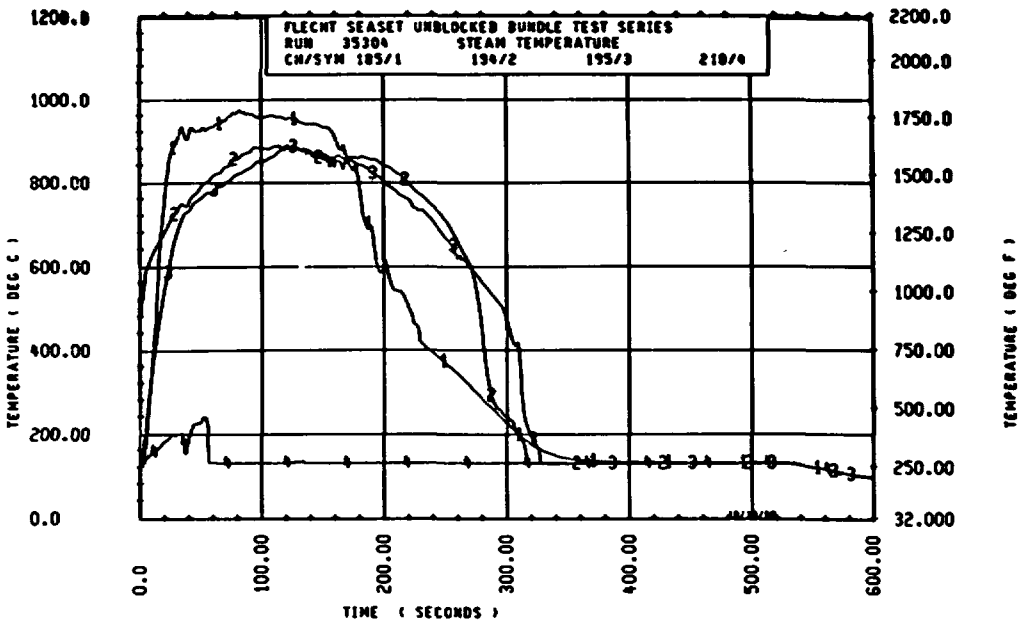

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

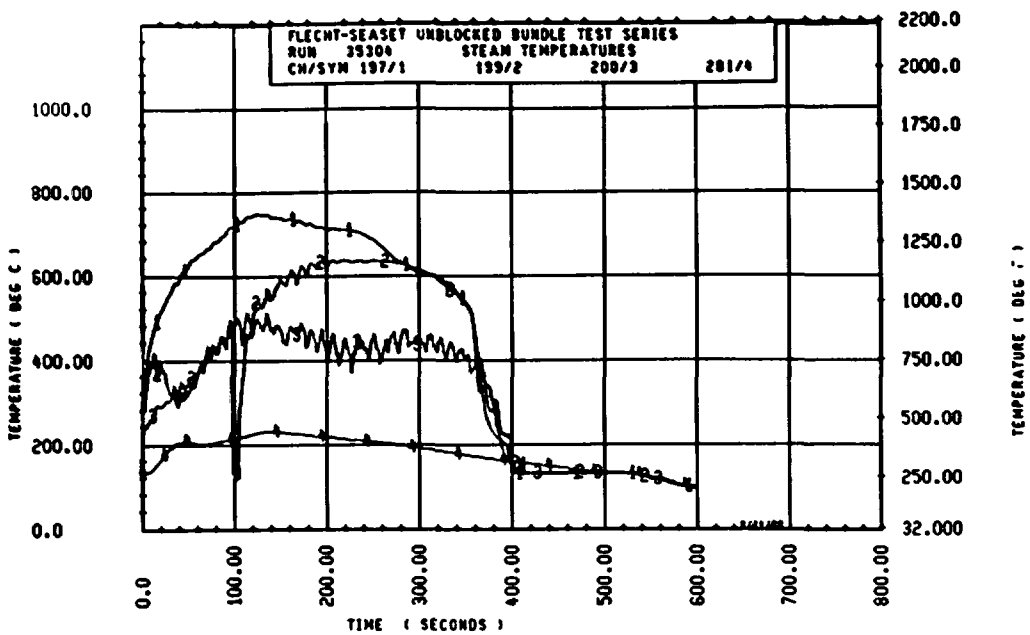

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

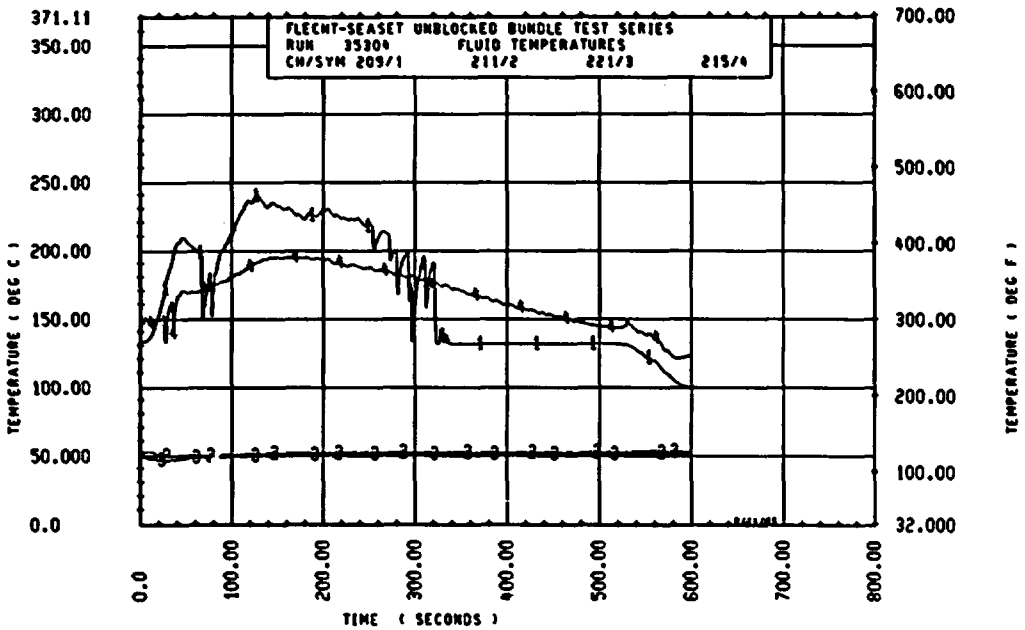

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

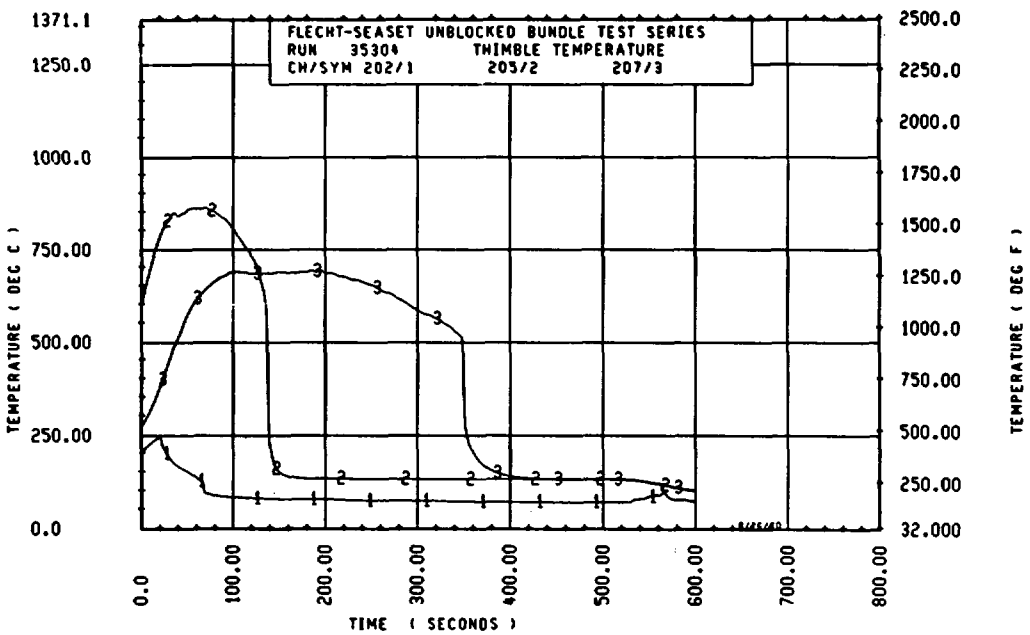

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

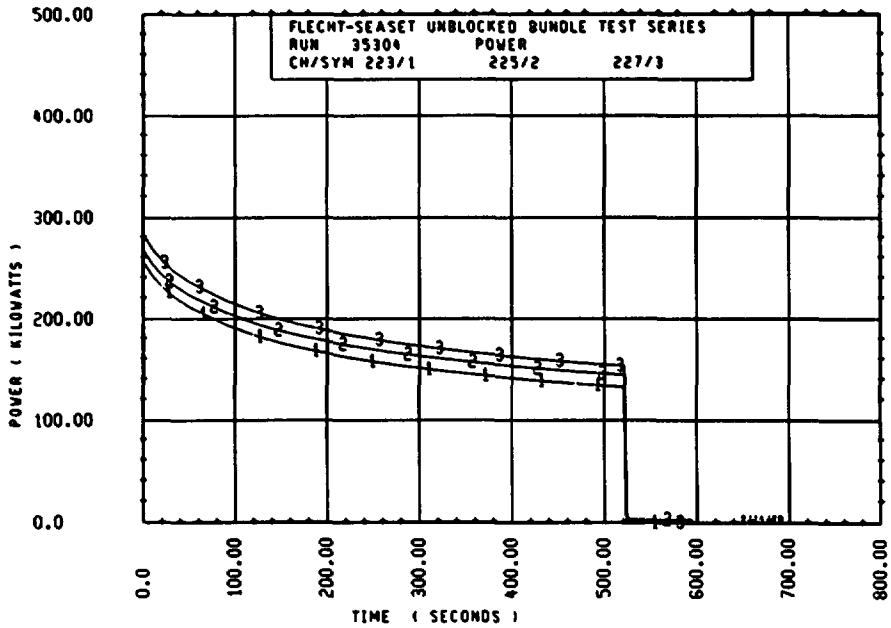

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0
32.000
250.00
500.00
750.00
1000.0
1250.0
1500.0
1750.0
2000.0
2200.0
100.00
300.00
500.00

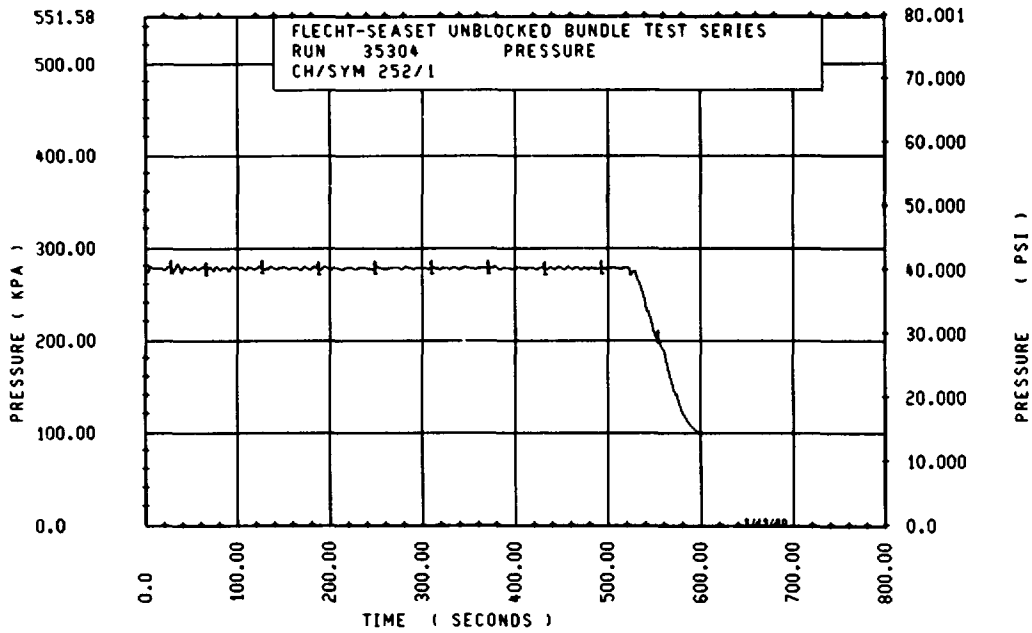

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
0.0
200.00
400.00
600.00
800.00
1000.0
32.000
250.00
500.00
750.00
1000.0
1250.0
1500.0
1750.0
2000.0
2200.0
100.00
300.00
500.00
700.00

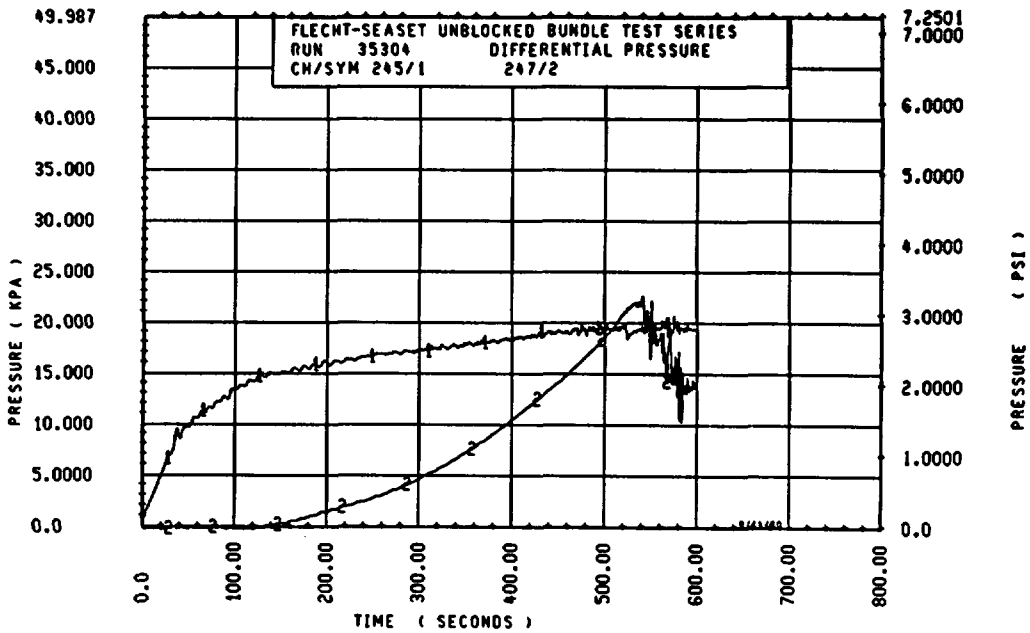


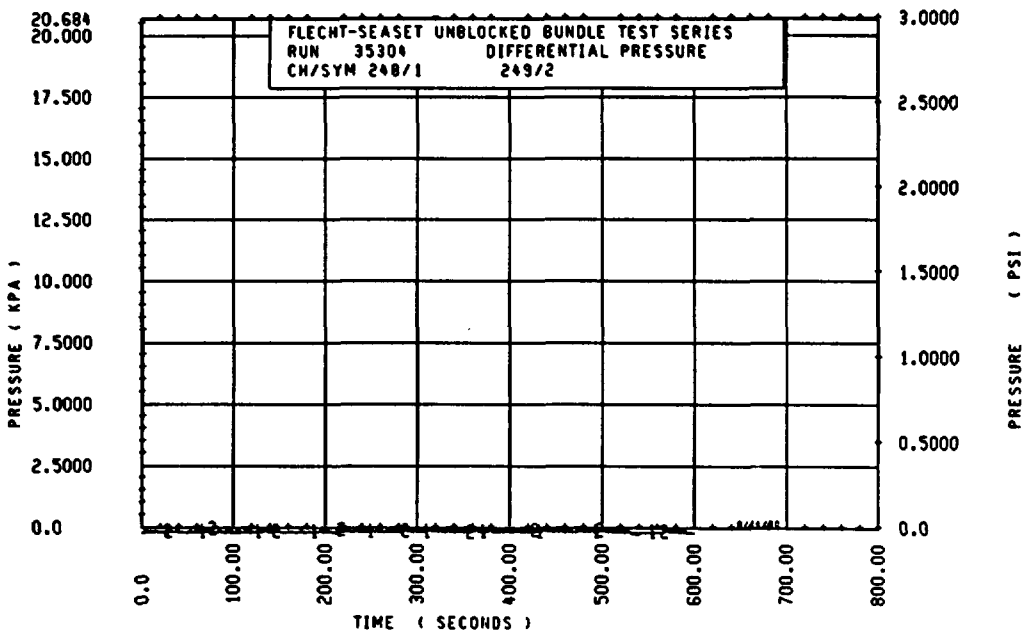


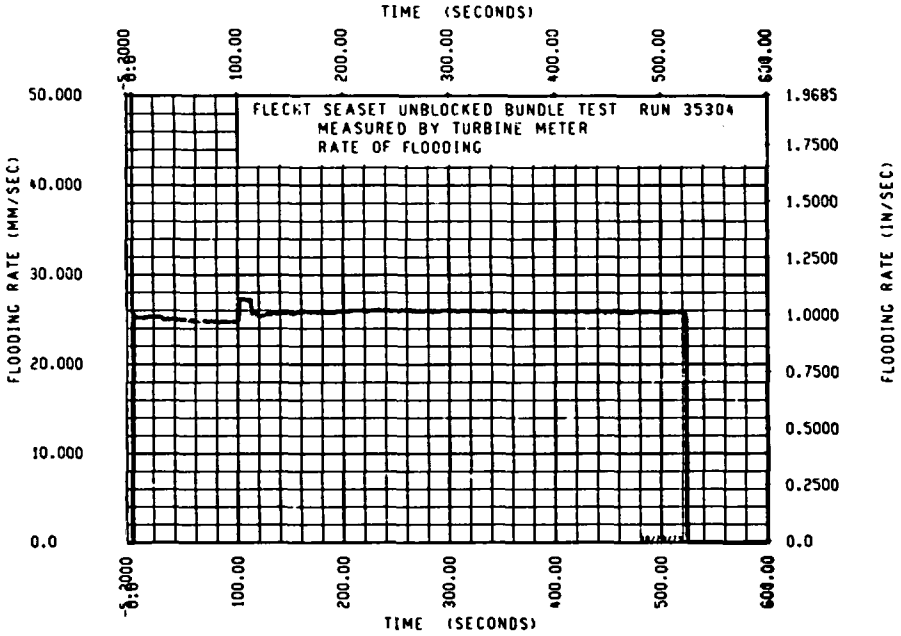
CH 202-4C, 0.61 m (24 in.); CH 205-4C, 1.52 m (60 in.); CH 207-4I, 3.05 m (120 in.)

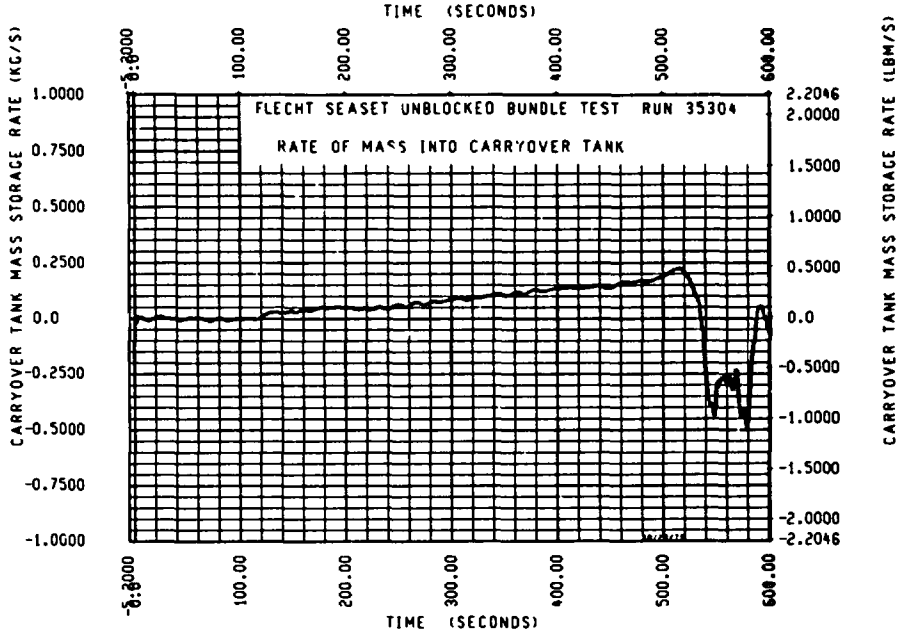

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

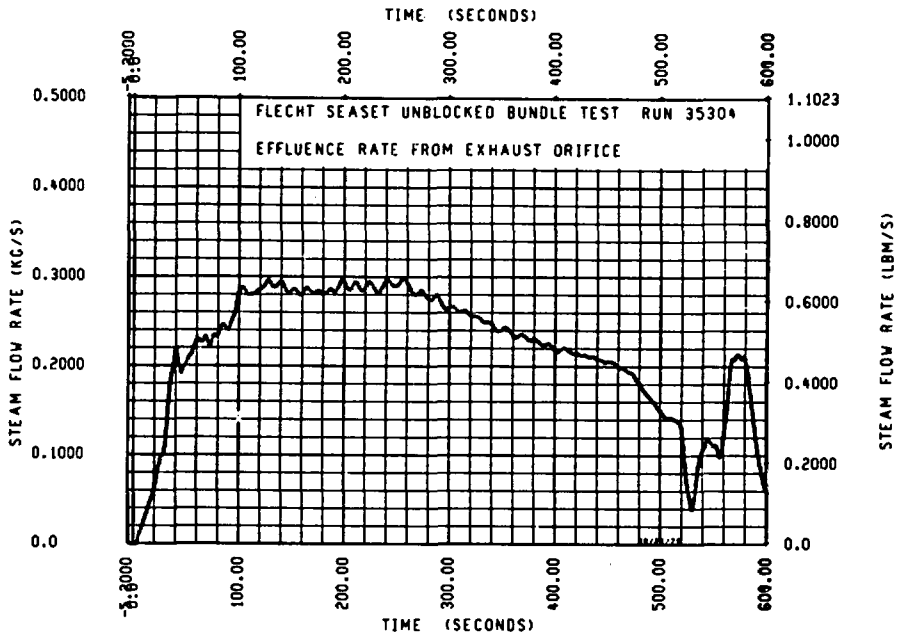

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

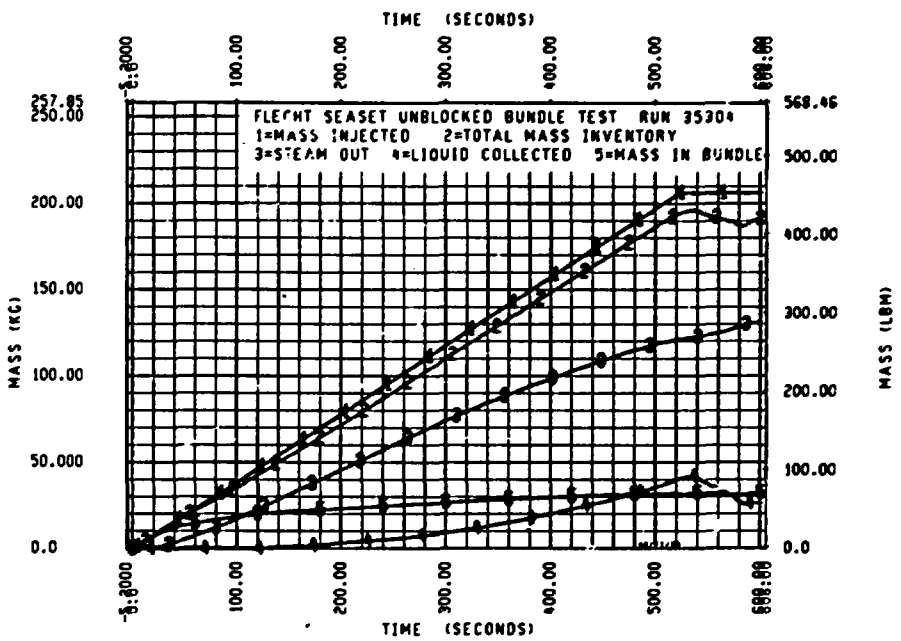

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

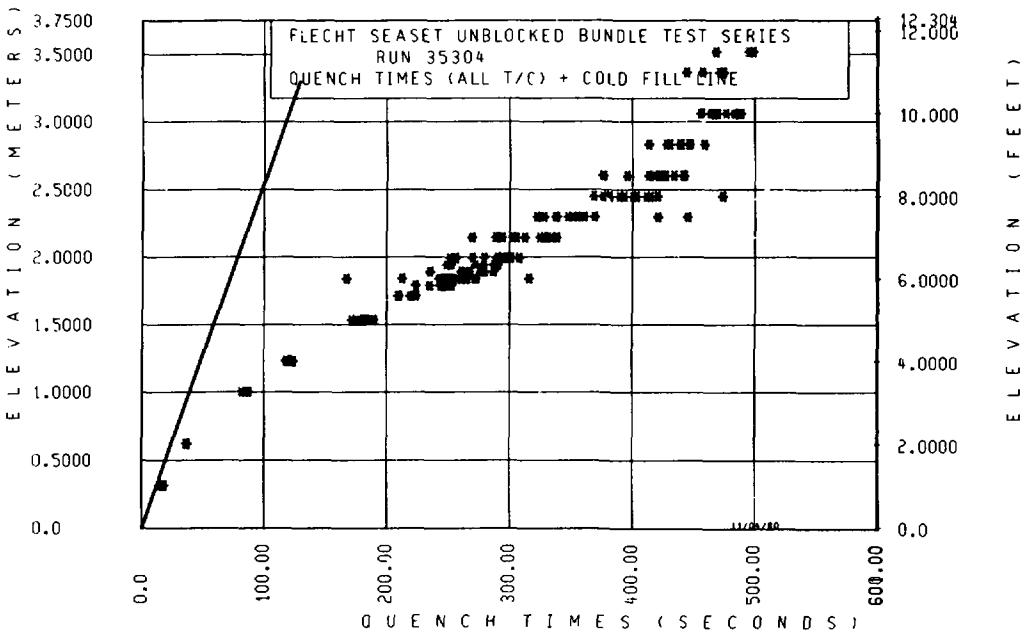

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

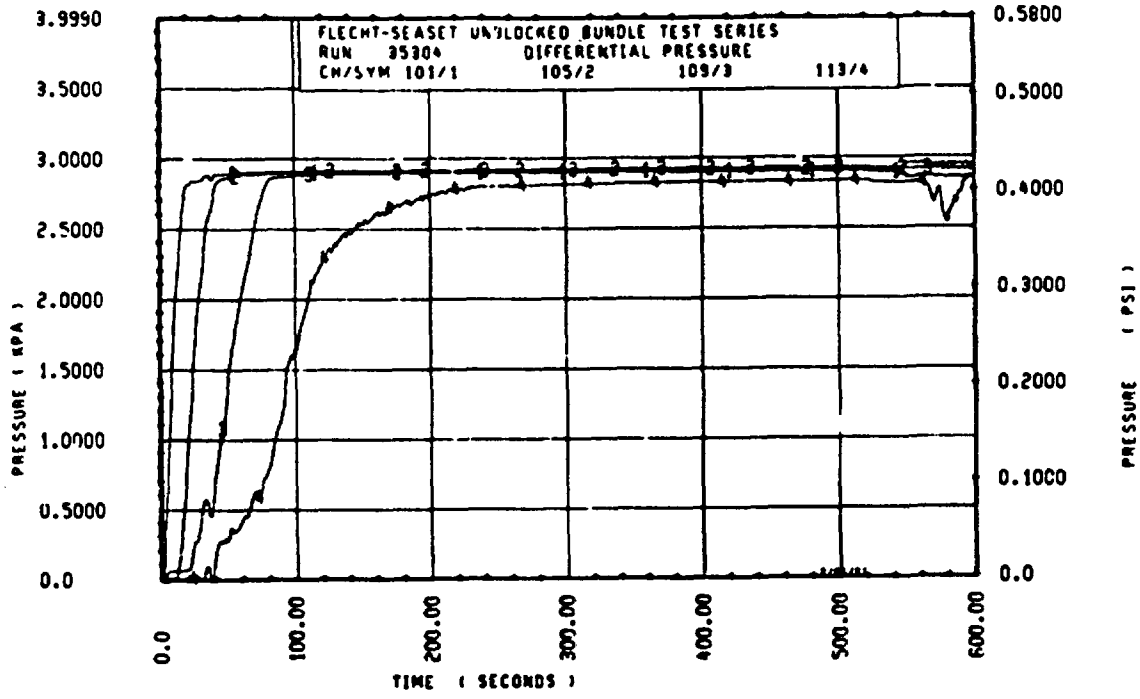

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35304
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00

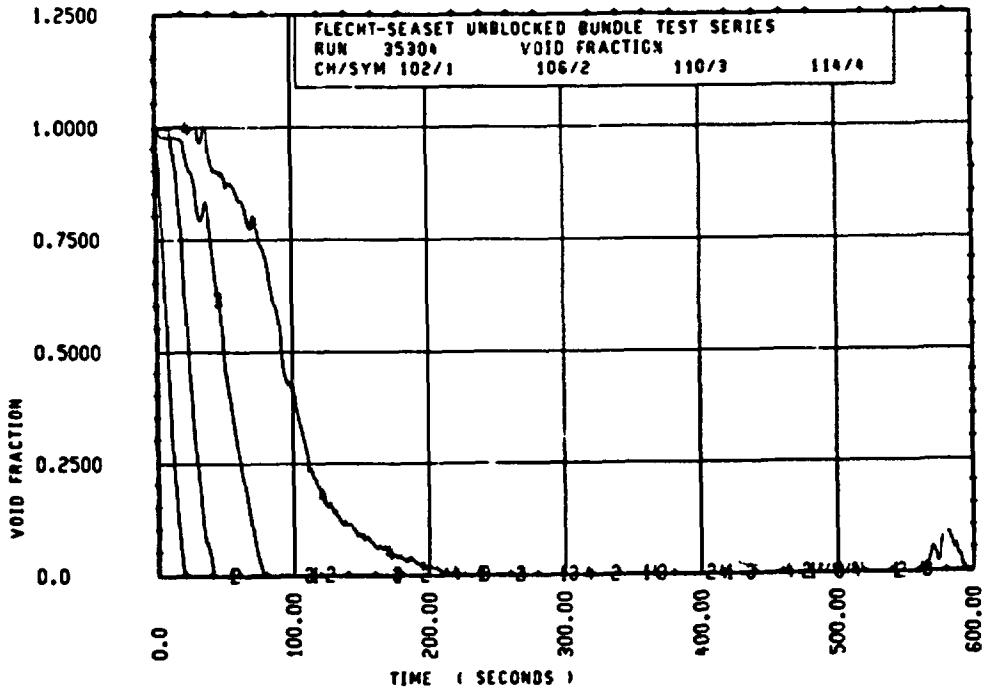

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35304
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
1.0000
0.7500
0.5000
0.2500
0.0
-0.2500
-0.5000
-0.7500
-1.0000
2.2046
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
-2.2046
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00

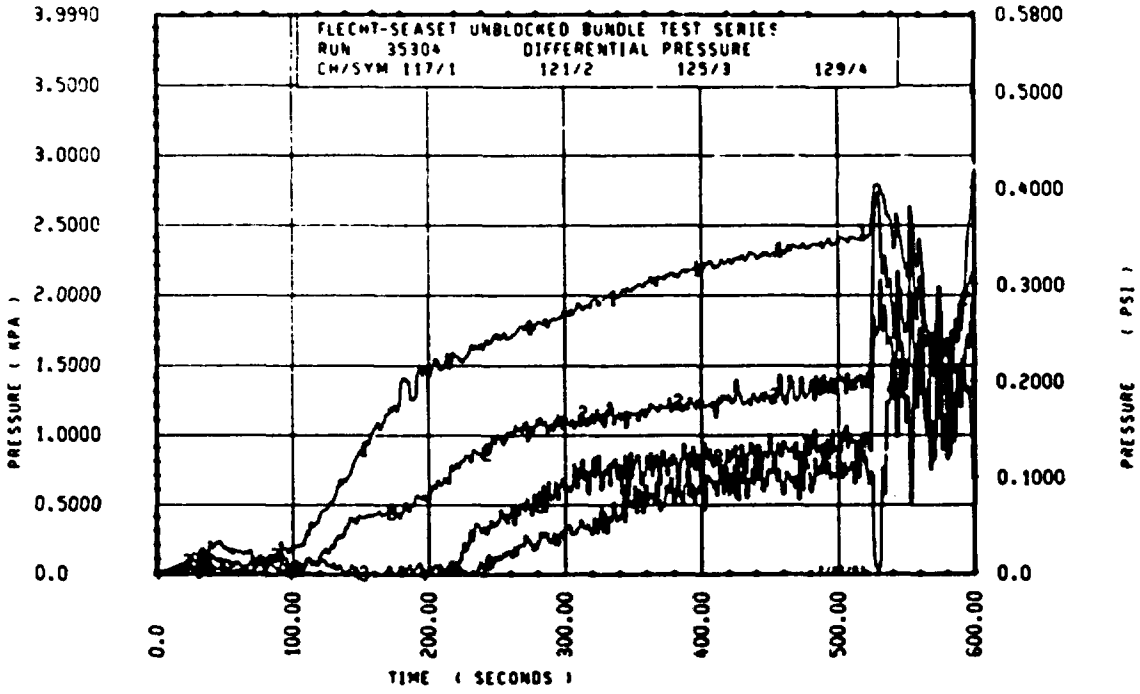

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35304
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00

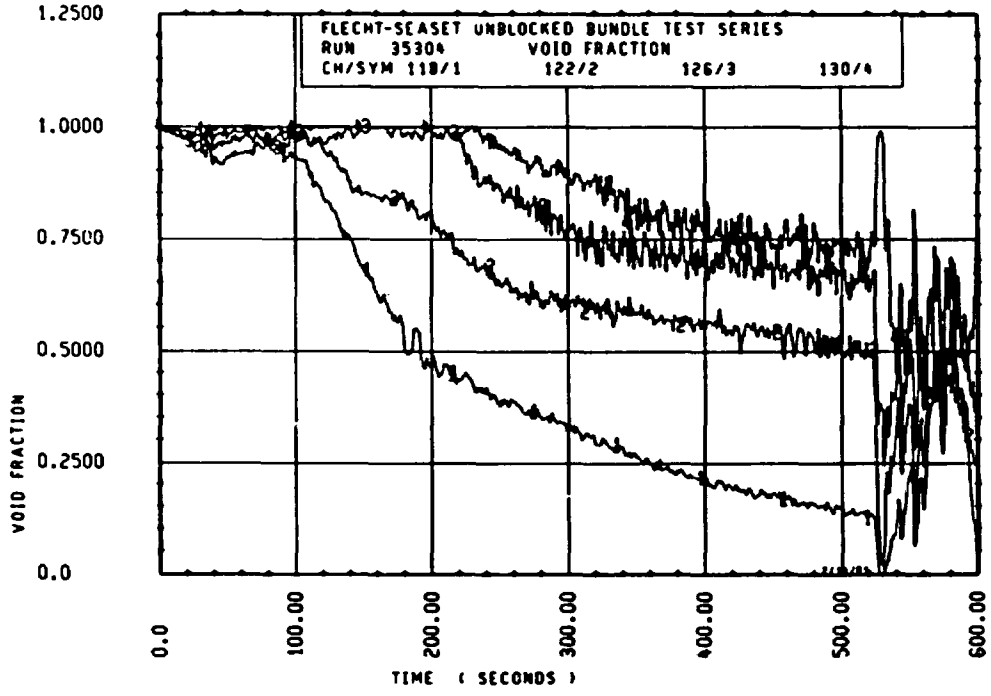

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35304
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
257.85
250.00
200.00
150.00
100.00
50.000
0.0
568.46
500.00
400.00
300.00
200.00
100.00
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00

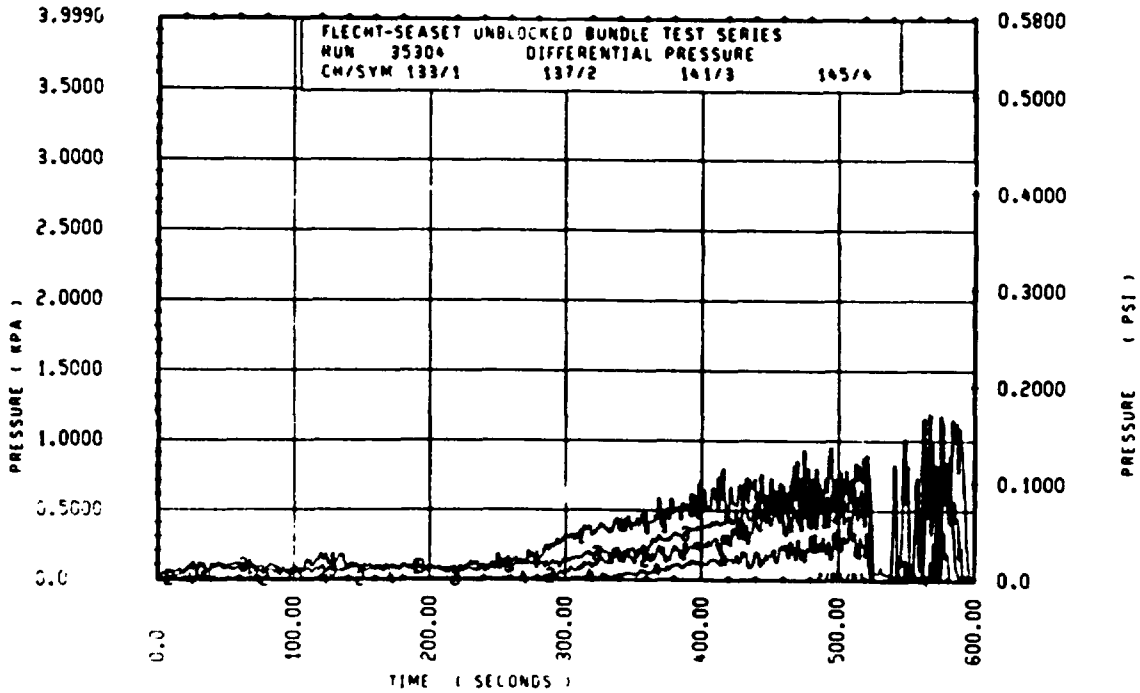

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
QUENCH TIMES (SECONDS)

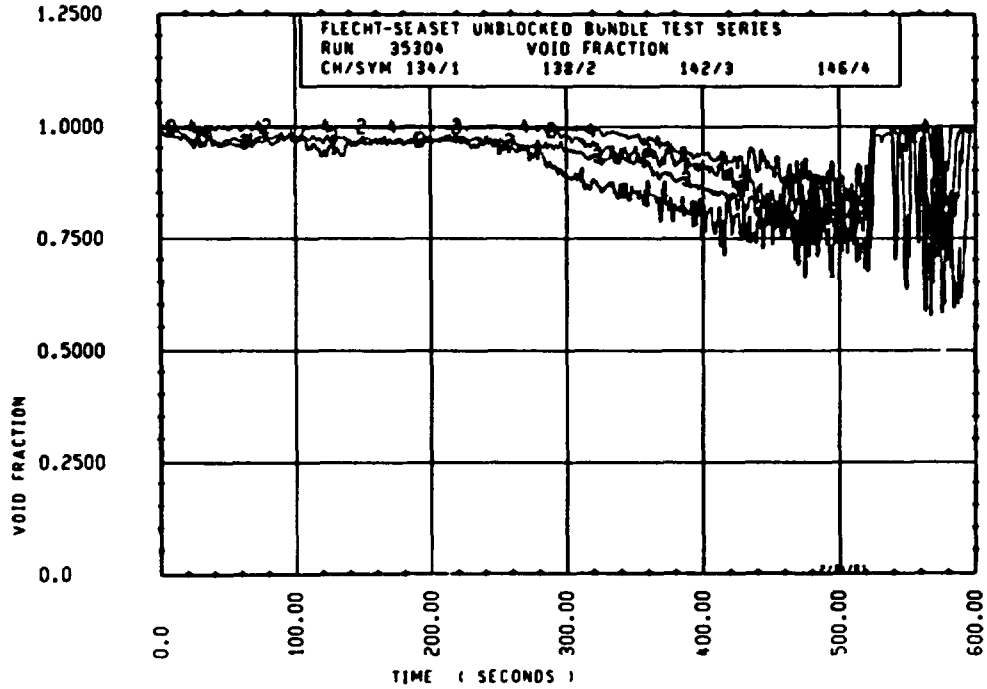

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35304 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
100.00
200.00
300.00
400.00
500.00
600.00

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 35426
Date: 8/23/79
Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	886°C (1627°F)
Rod peak power	2.54 kw/m (0.773 kw/ft)
	2.42 kw/m (0.737 kw/ft)
	2.08 kw/m (0.633 kw/ft)
Flow rate	25.7 mm/sec (1.01 in./sec)
Coolant temperature	52°C (126°F)
Bundle radial power profile	FLECHT
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	135°C (275°F)	76°C (168°F)
1.22 m (48 in.)	154°C (309°F)	131°C (267°F)
1.83 m (72 in.)	187°C-232°C (369°F-450°F)	132°C-229°C (269°F-444°F)
2.44 m (96 in.)	158°C-198°C (316°F-389°F)	262°C-717°C (503°F-1322°F)
2.74 m (108 in.)	167°C (332°F)	129°C (265°F)
3.05 m (120 in.)	136°C-142°C (277°F-287°F)	129°C (265°F)
3.35 m (132 in.)	131°C-134°C (268°F-273°F)	128°C (262°F)

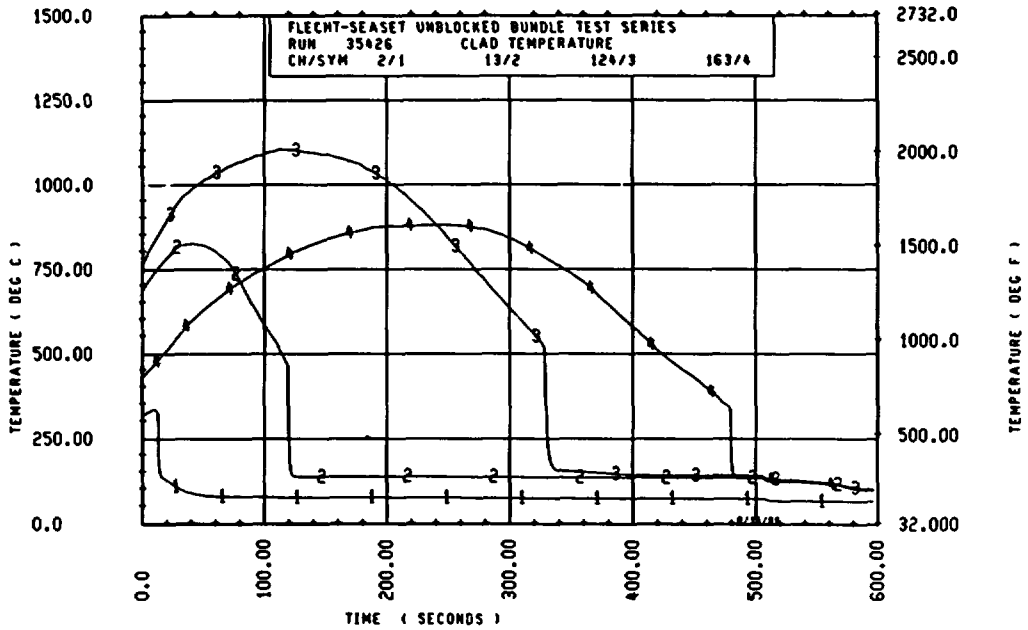
*At 230 seconds after flood

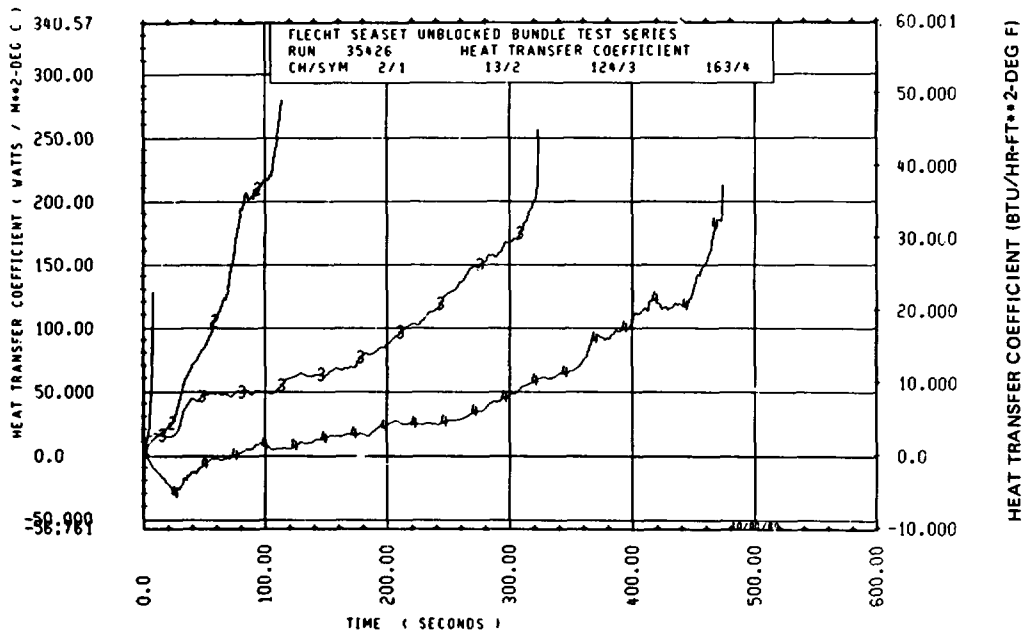
C. Comments

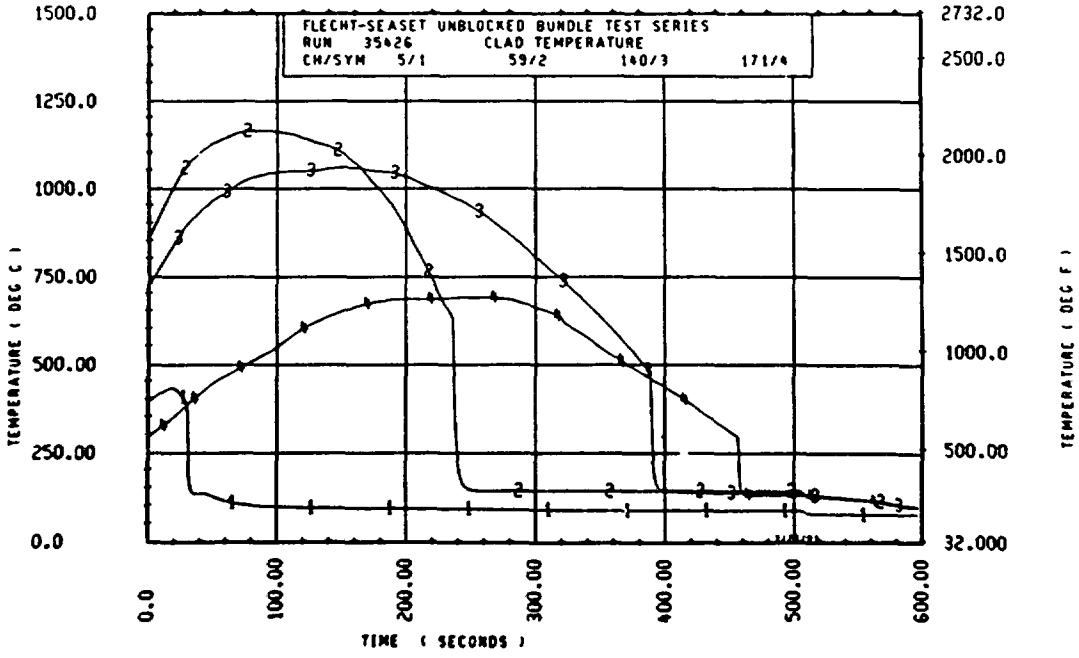
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. Inside two power zones had initial power 5 percent higher than specified and outside power zone had initial power 5 percent lower than specified.

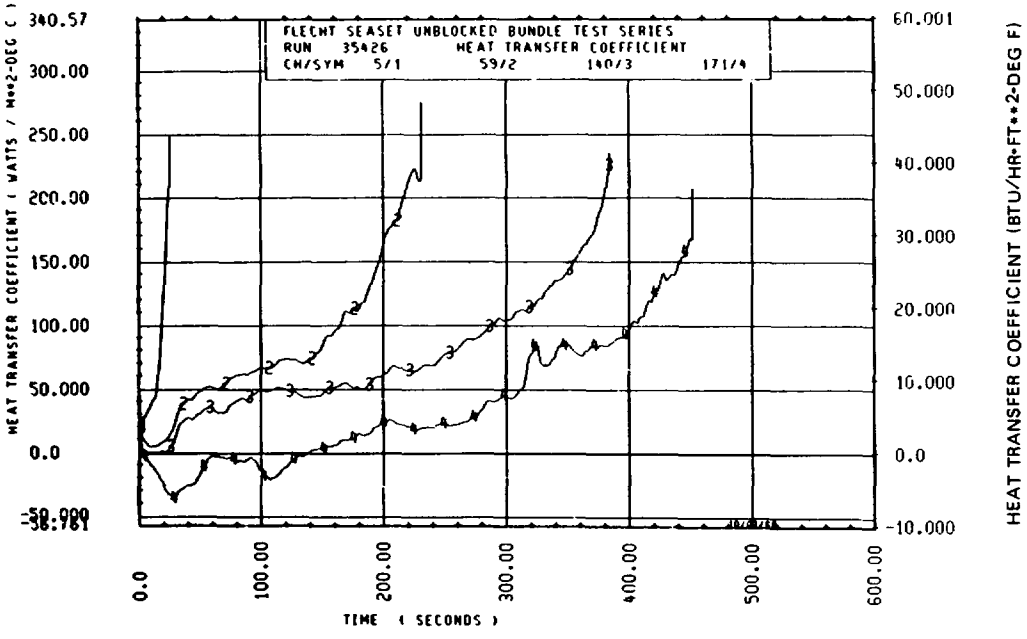
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 35426

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)
2H 4- 0	10	1137.	1367.	230.	41.0	861.	111.8
2H 6- 0	50	1393.	1851.	458.	93.0	980.	245.5
3C 5- 0	17	1310.	1552.	242.	50.0	880.	179.9
3C 5- 7	28	1399.	1709.	309.	69.0	903.	209.9
4L 8- 0	129	1189.	1687.	498.	92.0	843.	345.9
4L 8- 6	147	1191.	1688.	497.	93.0	853.	346.0
5E11- 0	168	628.	1168.	540.	202.0	549.	460.0
5J 4- 0	12	1251.	1518.	267.	42.0	848.	121.7
5J 8- 6	146	1127.	1554.	426.	77.0	712.	389.0
5J11- 6	175	613.	1101.	488.	244.0	647.	448.0
7B 6- 0	57	1465.	1772.	307.	52.0	959.	205.0
7B 8- 6	142	1119.	1617.	498.	95.0	629.	429.2
7B10- 0	162	848.	1374.	526.	136.0	620.	468.0
7B11- 6	176	655.	1159.	504.	176.0	515.	485.0
7D 6- 4	84	1627.	2211.	584.	105.0	1314.	241.1
7D 7- 6	119	1489.	1932.	442.	94.0	963.	325.8
7D 9- 3	151	1013.	1633.	620.	125.0	730.	419.3
7G 5- 0	23	1539.	1829.	290.	59.0	1057.	172.0
7J 6- 0	59	1578.	2131.	552.	86.0	1171.	236.0
7M 7- 6	120	1387.	1896.	509.	94.0	898.	329.1
7M 8- 0	132	1282.	1855.	574.	94.0	873.	359.2
7M 9- 3	152	992.	1560.	569.	138.0	713.	396.0
8H 4- 0	13	1271.	1517.	246.	40.0	869.	119.0
8H10- 0	163	810.	1617.	807.	246.0	638.	478.9
8H11- 6	177	615.	1258.	643.	269.0	584.	463.7
8K 4- 0	14	1245.	1512.	266.	41.0	894.	114.1
8K 6- 6	99	1488.	2096.	609.	122.0	1430.	241.1
8K 8- 0	140	1332.	1942.	610.	152.0	871.	389.0
8K10- 0	164	825.	1519.	694.	228.0	731.	452.7
8N 2- 0	5	742.	815.	73.	18.5	729.	30.9
8N 4- 0	15	1150.	1408.	257.	50.0	882.	110.6
8N 6- 0	61	1351.	1825.	474.	85.0	1033.	233.8
8N10- 0	165	759.	1317.	559.	126.0	702.	426.6
9C 7- 0	109	1472.	1952.	480.	95.0	742.	333.7
9C 9- 3	153	1031.	1646.	615.	151.0	684.	435.0
9G 1- 0	2	605.	637.	33.	9.0	617.	12.9
9G 3- 3	8	1199.	1365.	166.	30.5	839.	79.0
9G11- 0	171	565.	1276.	711.	242.0	563.	456.4
9I 5- 0	24	1531.	1804.	274.	68.0	1049.	170.1
9E 6- 2	46	1441.	2153.	712.	103.0	992.	270.9
10D 6- 6	93	1482.	2019.	537.	128.0	1009.	284.9
11E 7- 6	124	1412.	2018.	606.	112.0	954.	328.3
11E 9- 3	155	976.	1610.	635.	152.0	671.	430.9
11E11- 0	172	568.	1201.	633.	177.0	641.	417.0
12D 4- 0	16	1254.	1484.	230.	38.0	866.	117.0
12D 6- 0	66	1478.	2044.	566.	103.0	1088.	256.8
12F 6- 6	102	1522.	2146.	624.	112.0	1074.	286.7

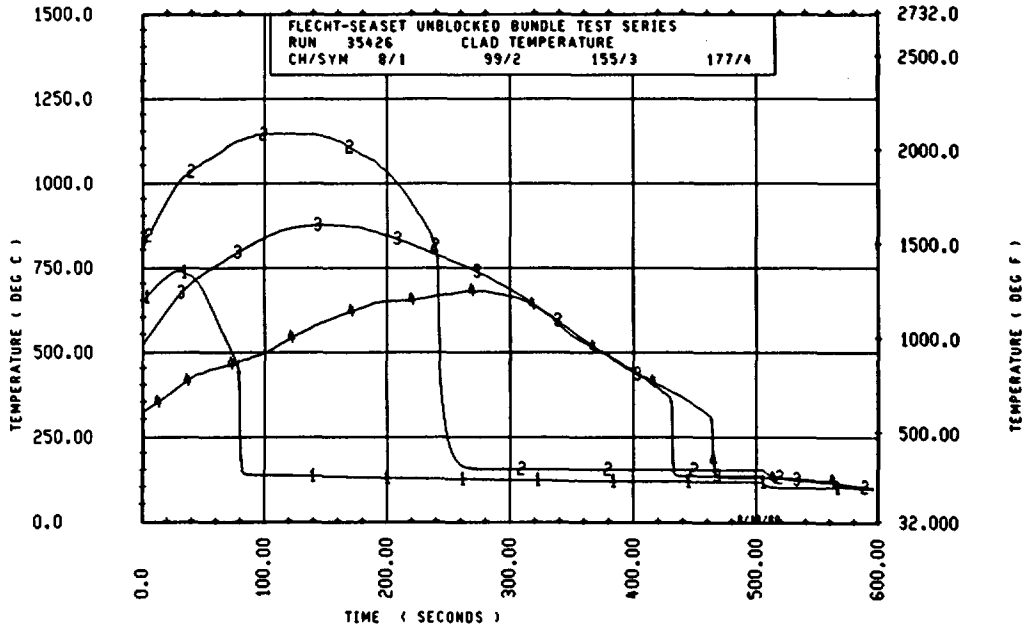

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

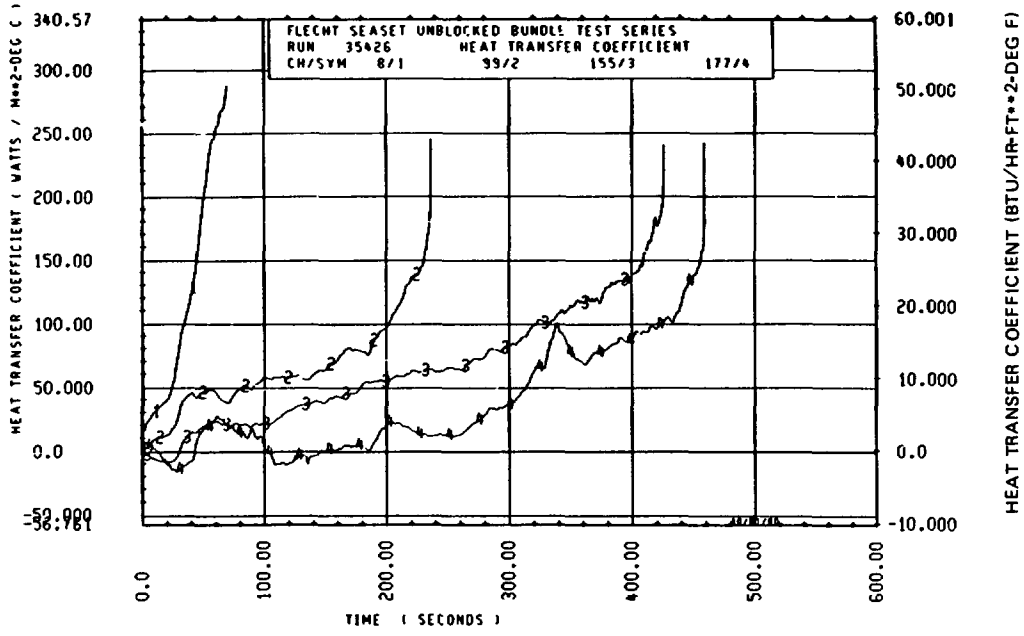

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

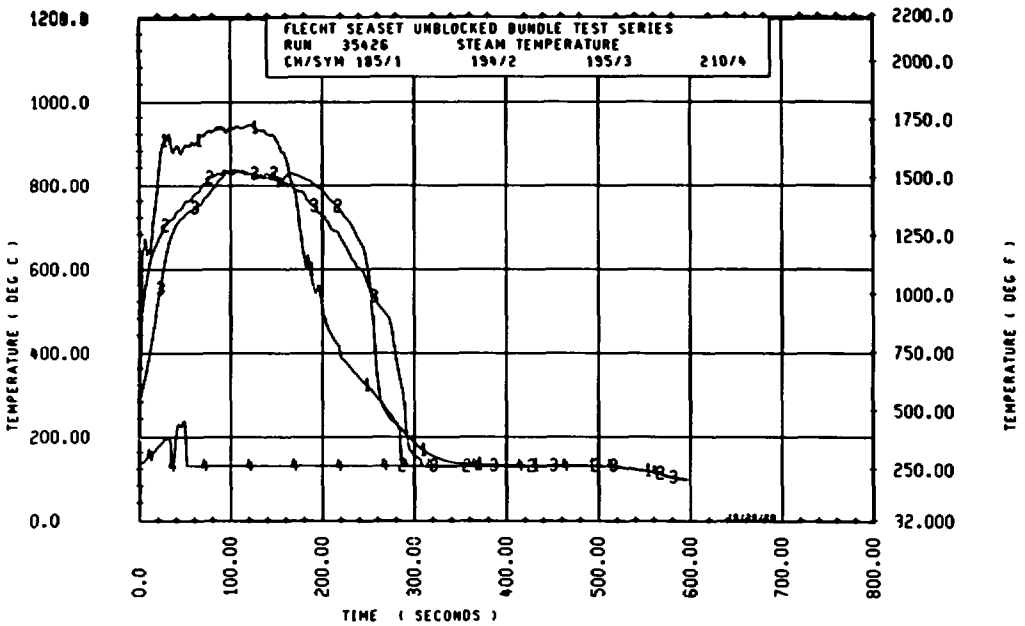

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

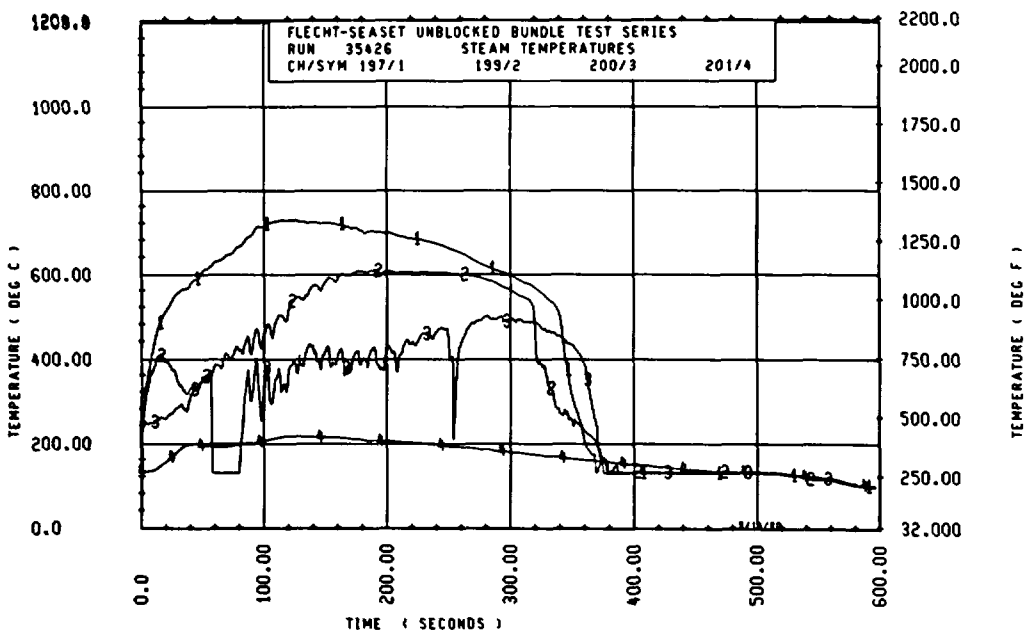

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-58.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

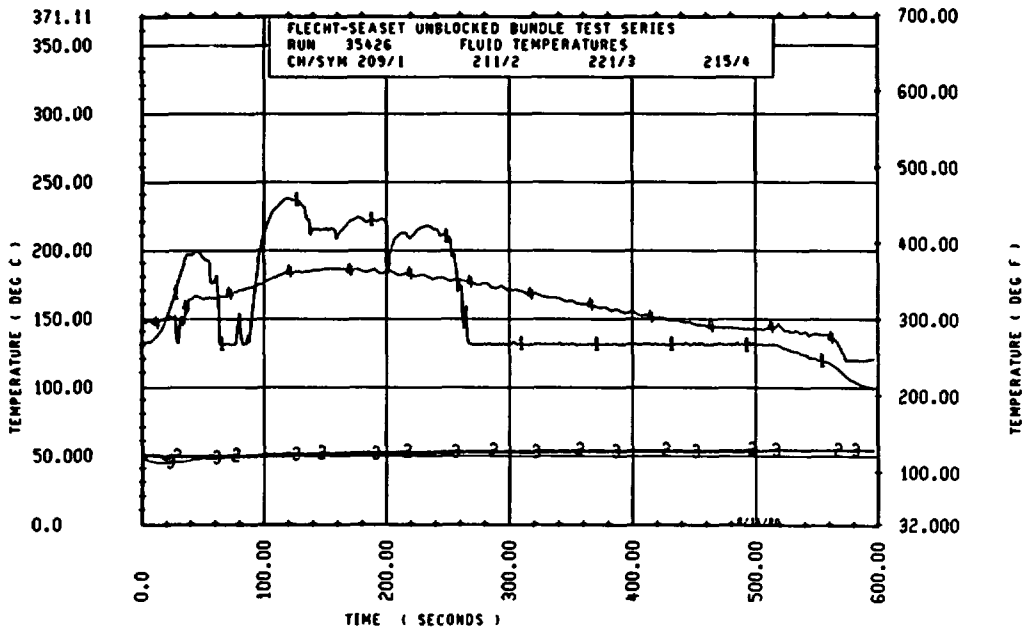
35426-4

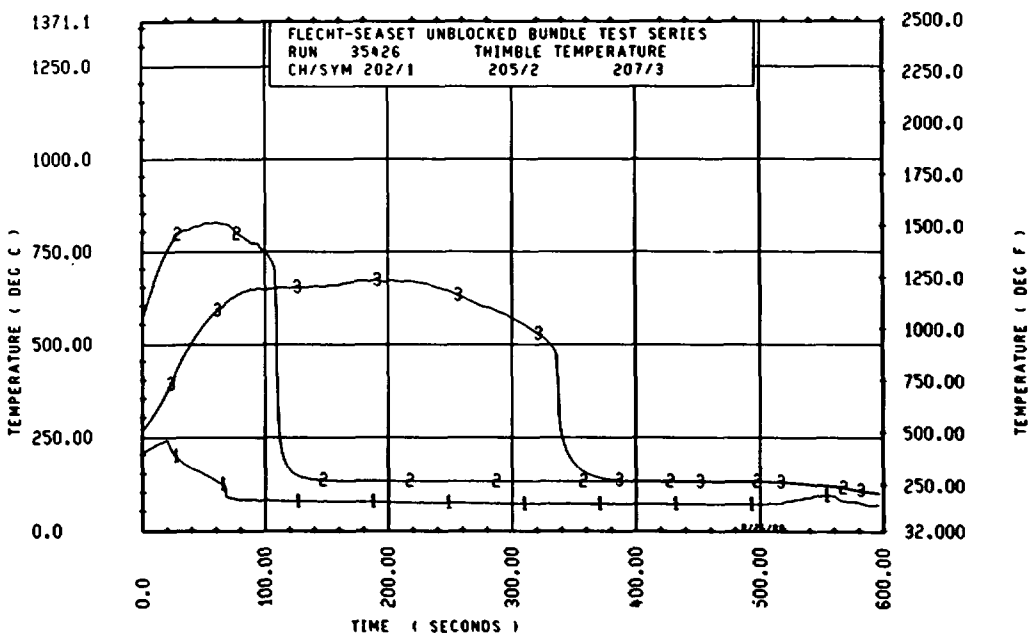

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

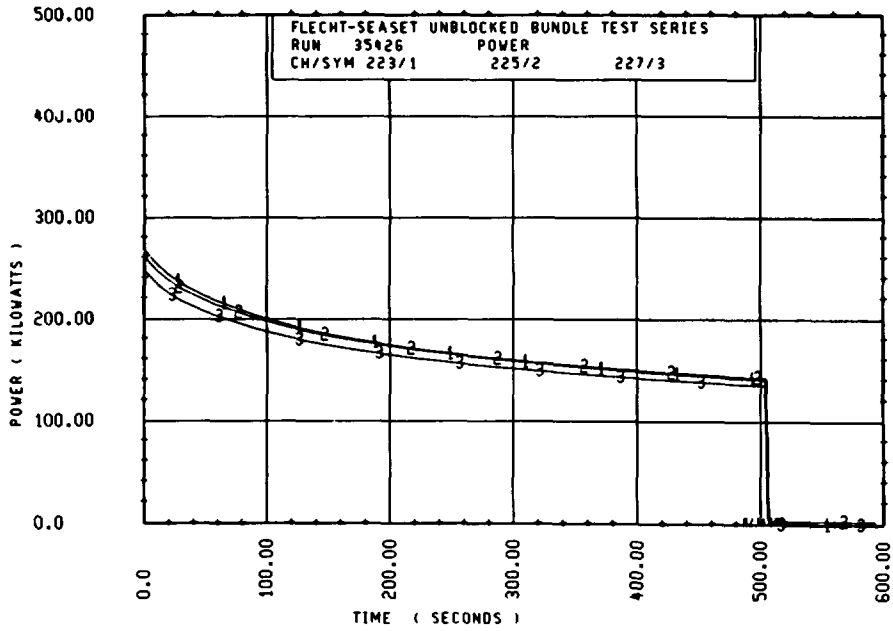

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

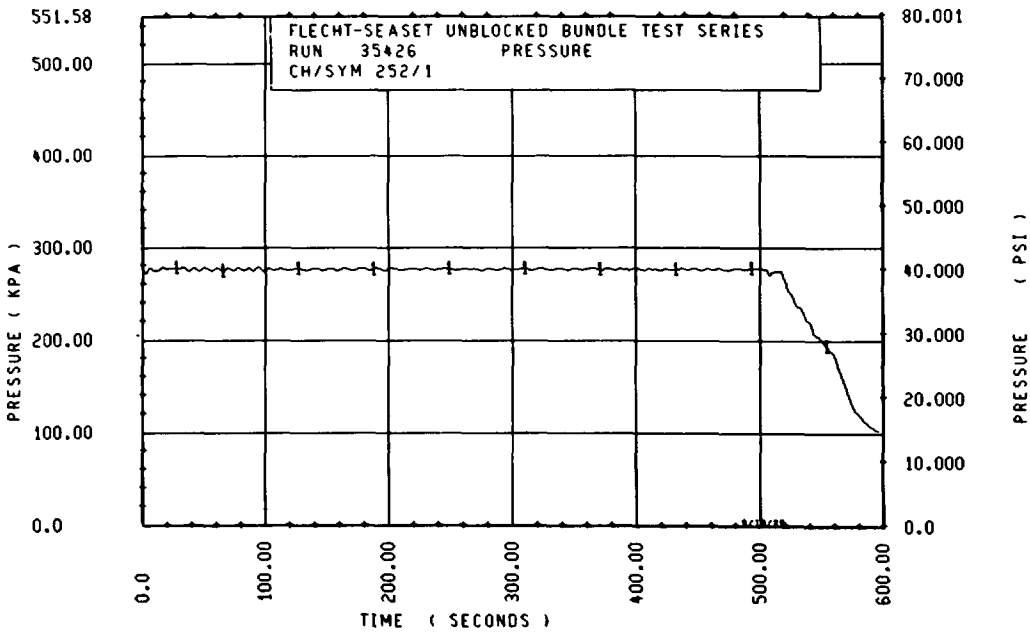

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

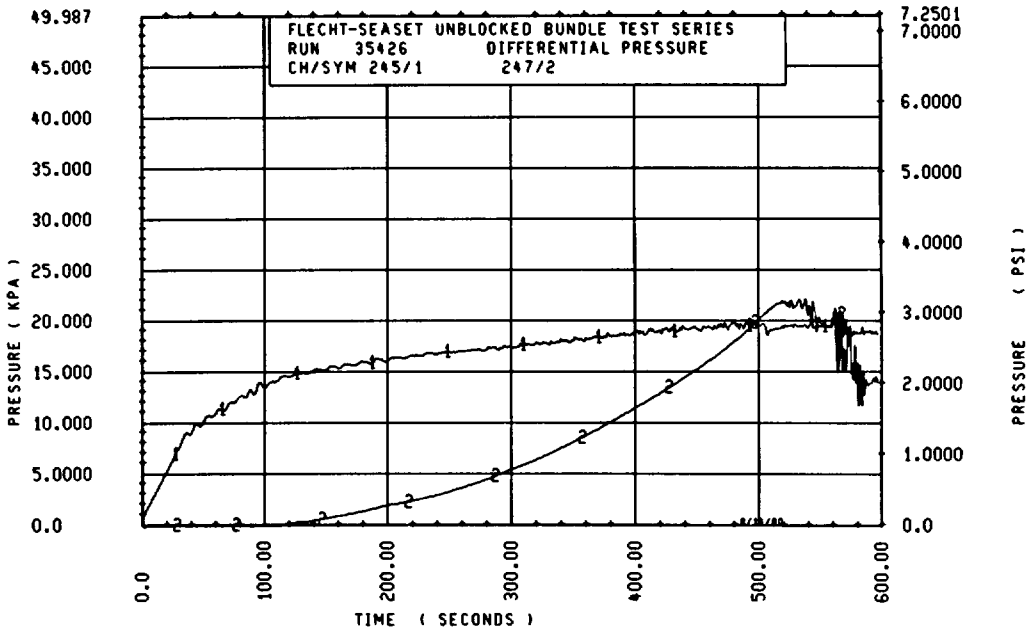


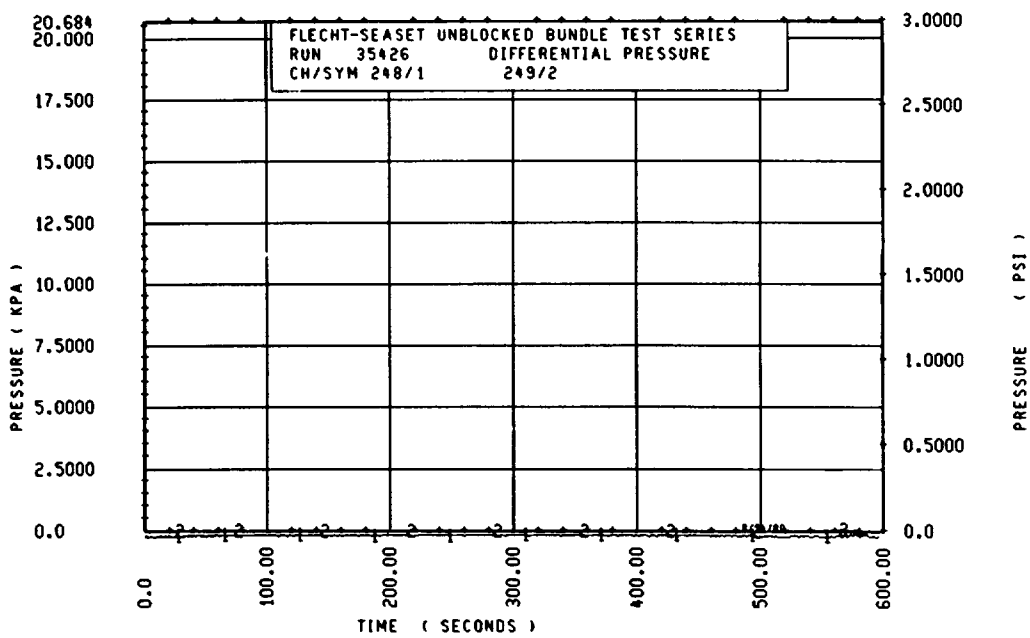


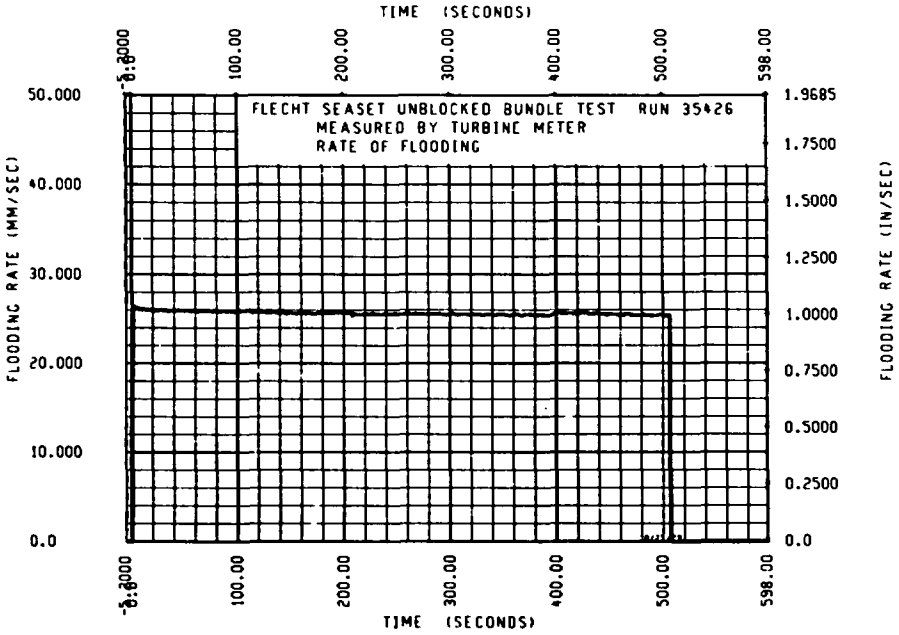
CH 202-4C, 0.61 m (24 in.); CH 205-4C, 1.52 m (60 in.);
CH 207-4I, 3.05 m (120 in.)

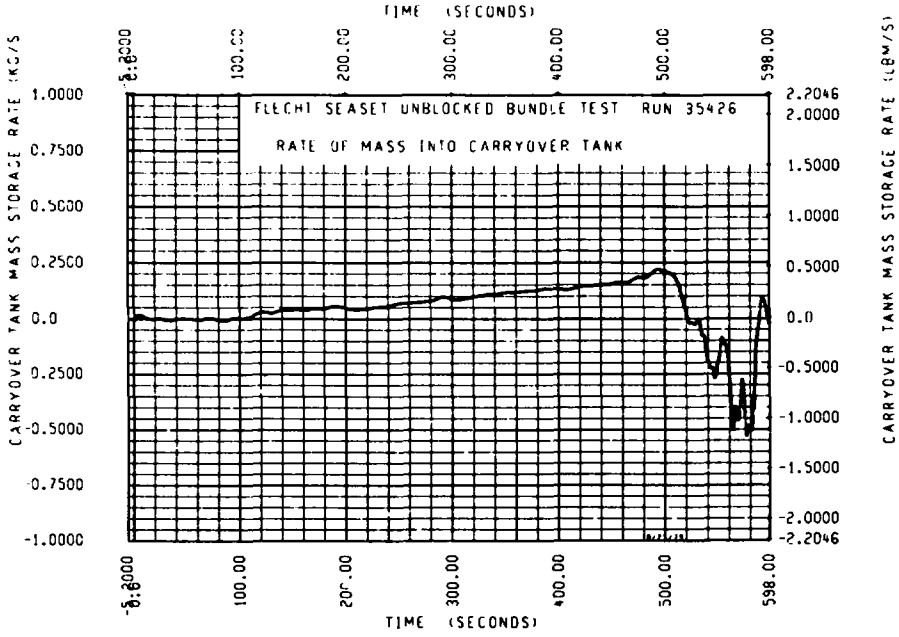

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

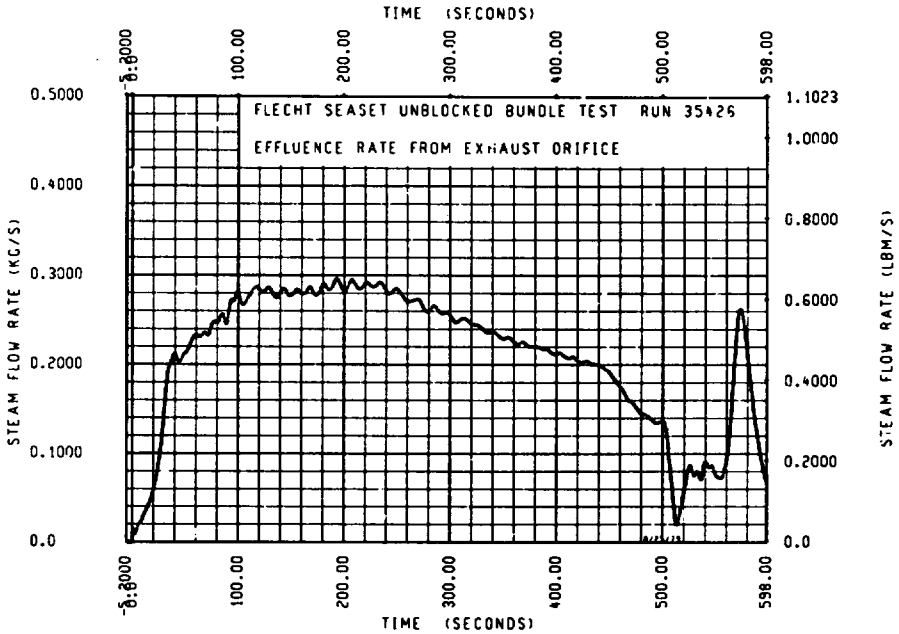

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

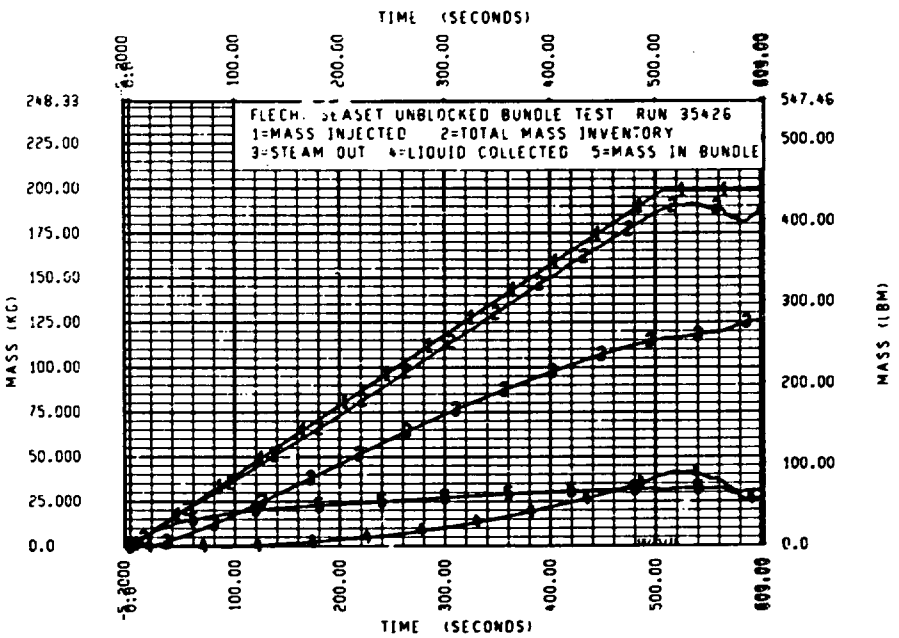

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

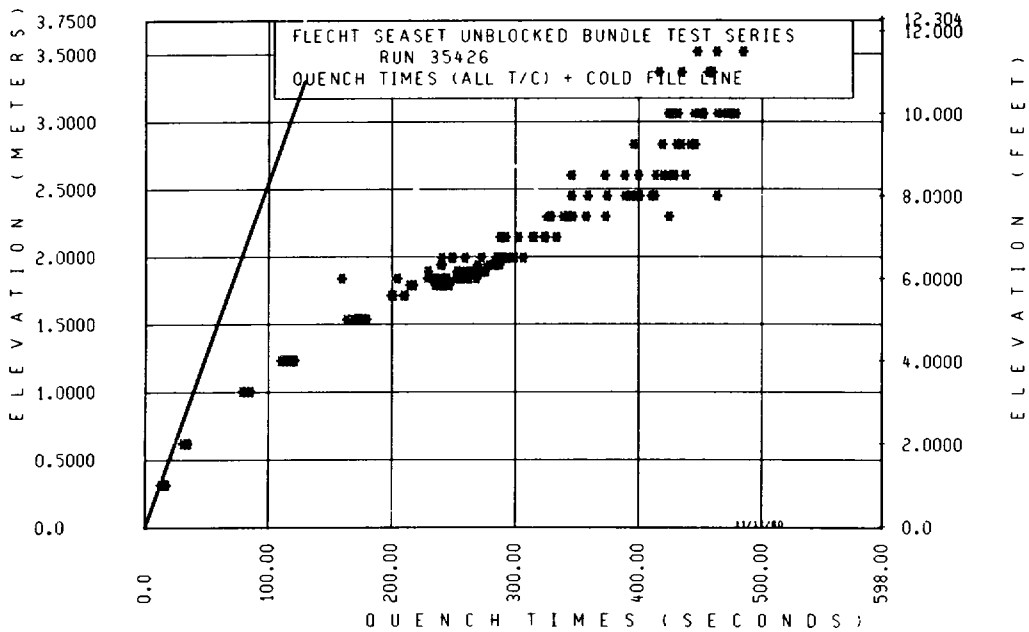

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

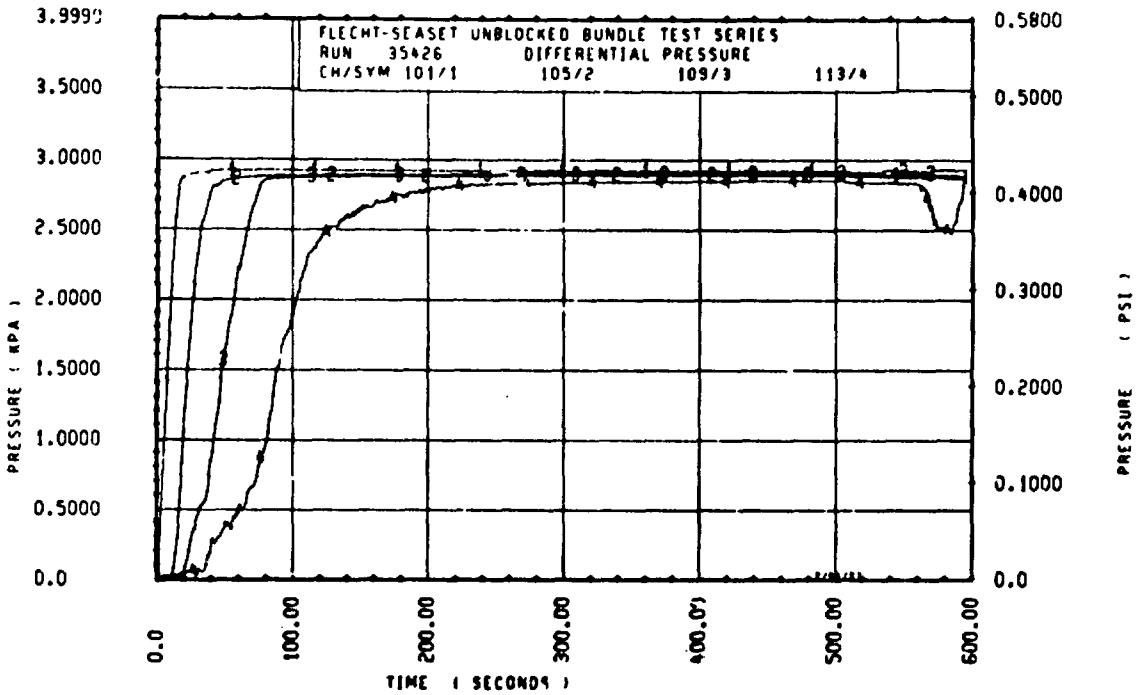

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35426
MEASURED BY TURBINE METER
RATE OF FLOODING
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
598.00

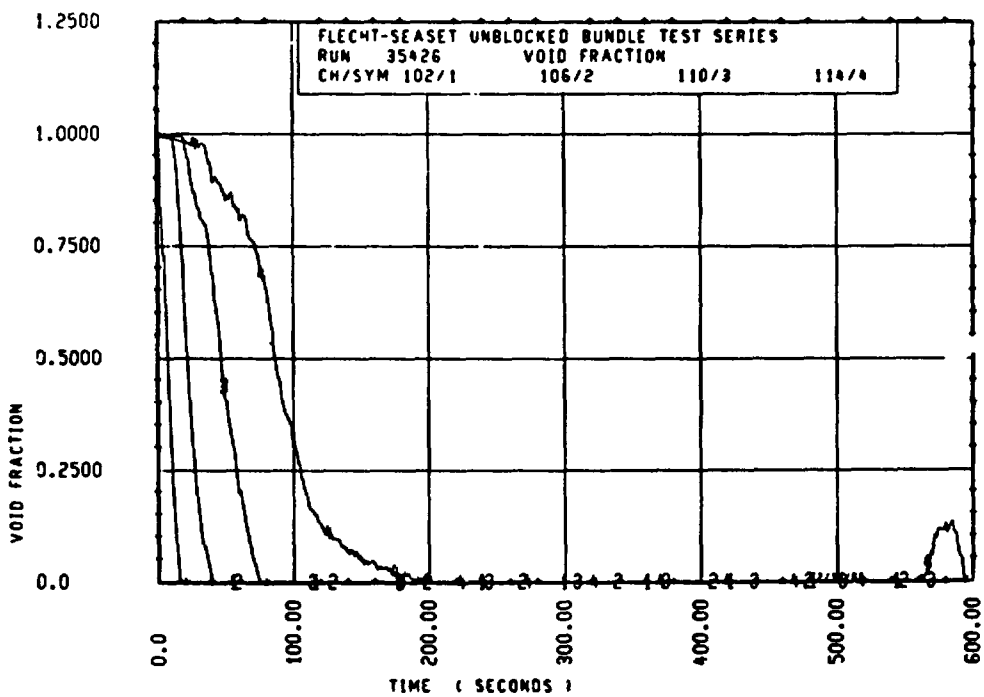

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35426
RATE OF MASS INTO CARRYOVER TANK
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
1.0000
0.7500
0.5000
0.2500
0.0
-0.2500
-0.5000
-0.7500
-1.0000
2.2046
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
-2.2046
-5.0000
100.00
200.00
300.00
400.00
500.00
598.00

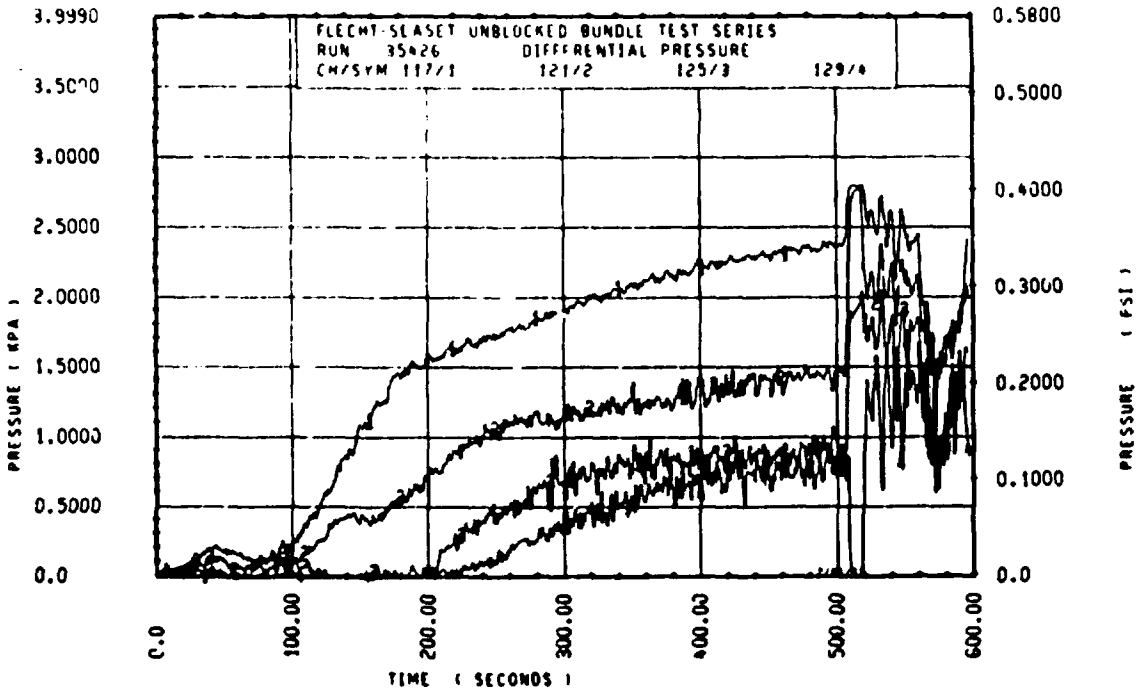

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35426
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.8000
100.00
200.00
300.00
400.00
500.00
598.00

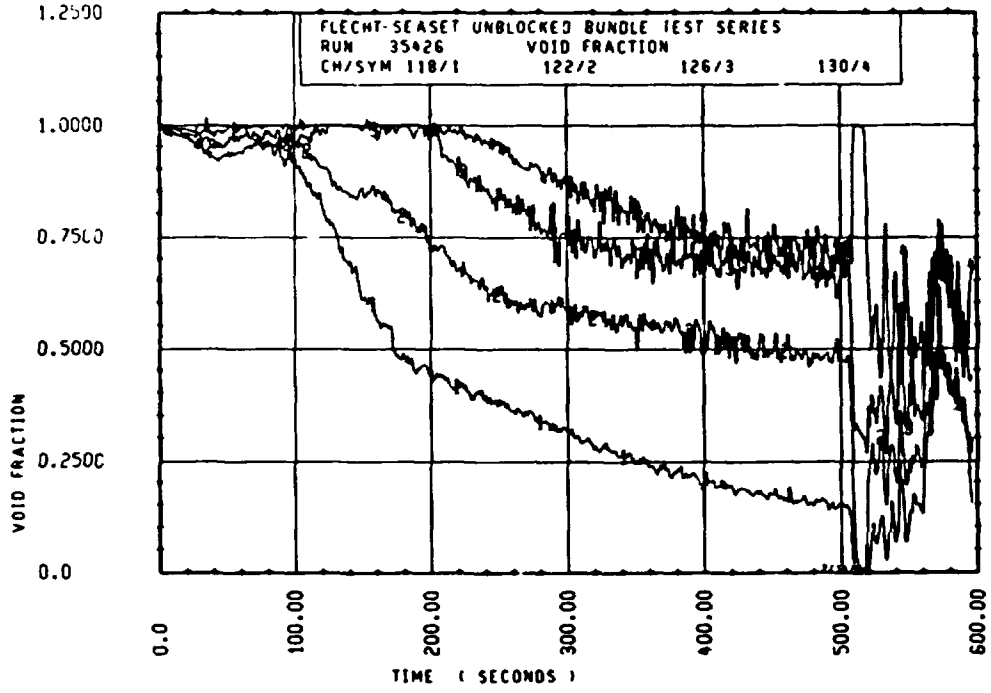

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35426
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
248.33
225.00
200.00
175.00
150.00
125.00
100.00
75.000
50.000
25.000
0.0
547.46
500.00
400.00
300.00
200.00
100.00
0.0
-5.8000
100.00
200.00
300.00
400.00
500.00
609.00

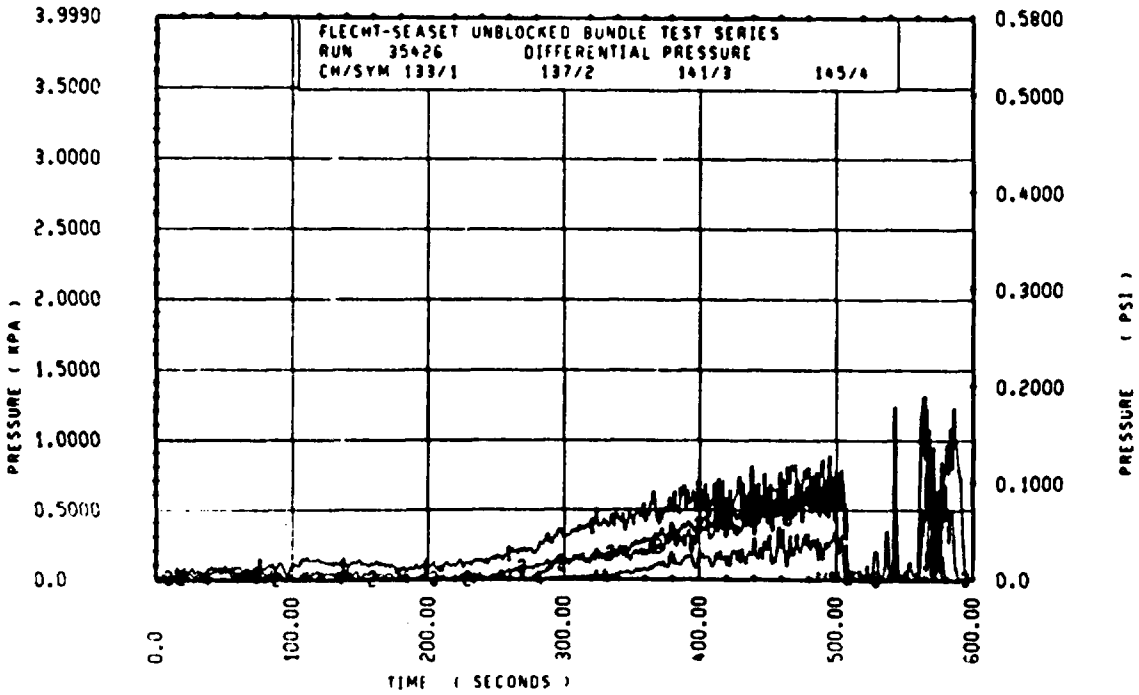

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
598.00
QUENCH TIMES (SECONDS)

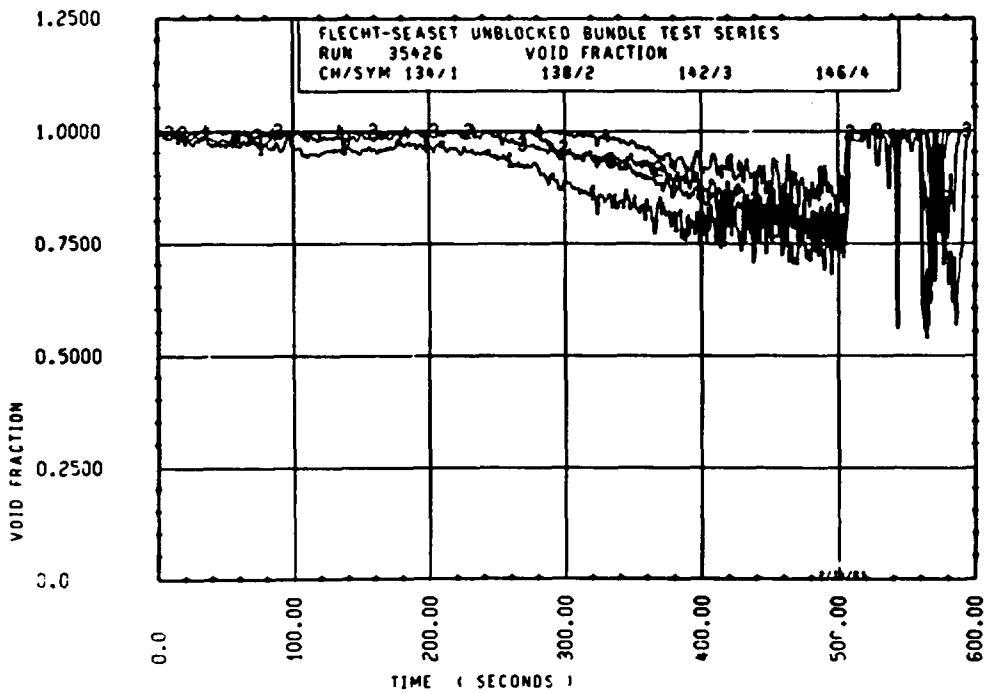

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9999
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35426 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 35557

Date: 8/24/79

Boiloff Test

A. Run Conditions

Upper plenum pressure	0.41 MPa (60 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	135°C (275°F)
Rod peak power	1.38 kw/m (0.422 kw/ft)
Initial water level	3.053 m (120.2 in.)
Coolant temperature	138°C (281°F)
Bundle radial power profile	Uniform
Disconnected rods	4G 5G, 11IJK, 12IJK, 13JK

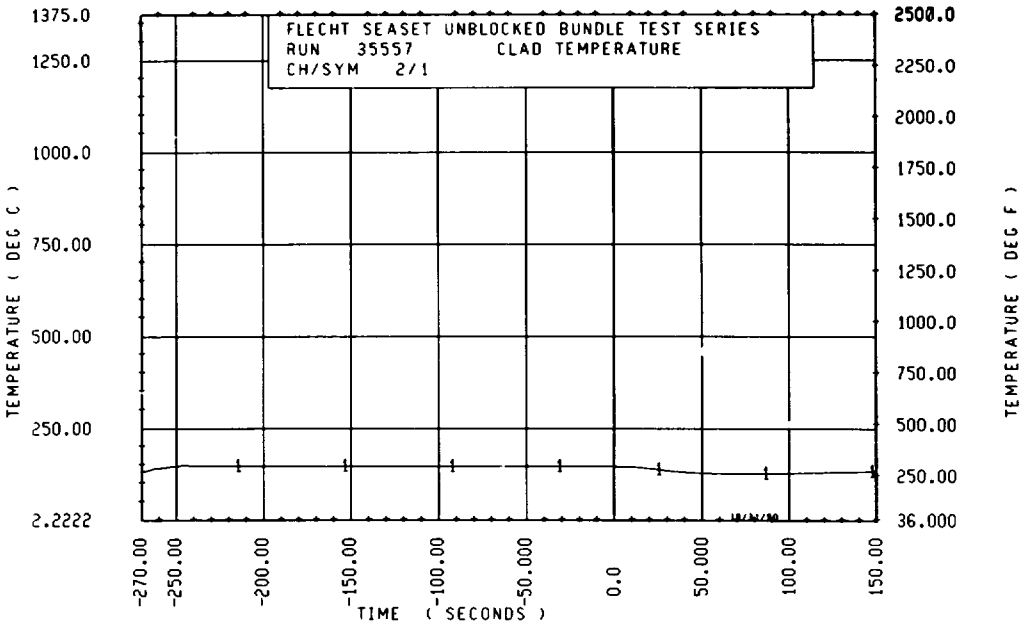
B. Housing Temperatures

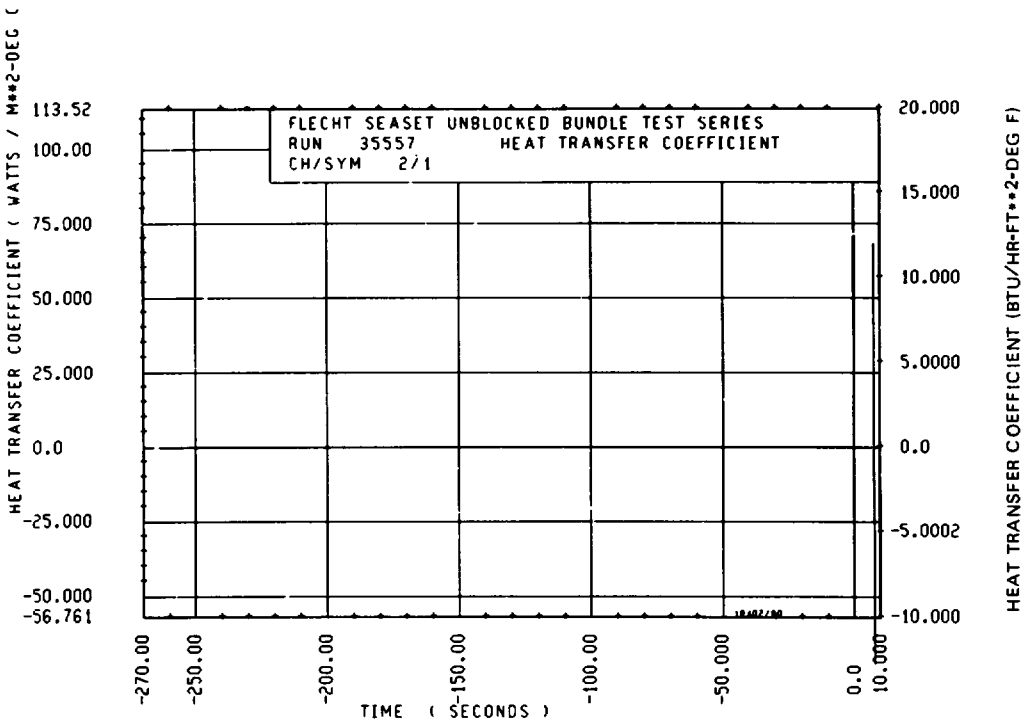
Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	134°C (273°F)	144°C (292°F)
1.22 m (48 in.)	133°C (271°F)	174°C (345°F)
1.83 m (72 in.)	111°C-133°C (232°F-272°F)	295°C-418°C (564°F-786°F)
2.44 m (96 in.)	136°C-140°C (277°F-284°F)	322°C-396°C (613°F-735°F)
2.74 m (108 in.)	141°C (285°F)	263°C (506°F)
3.05 m (120 in.)	140°C (284°F)	186°C-215°C (367°F-420°F)
3.35 m (132 in.)	142°C (287°F)	145°C-152°C (294°F-307°F)

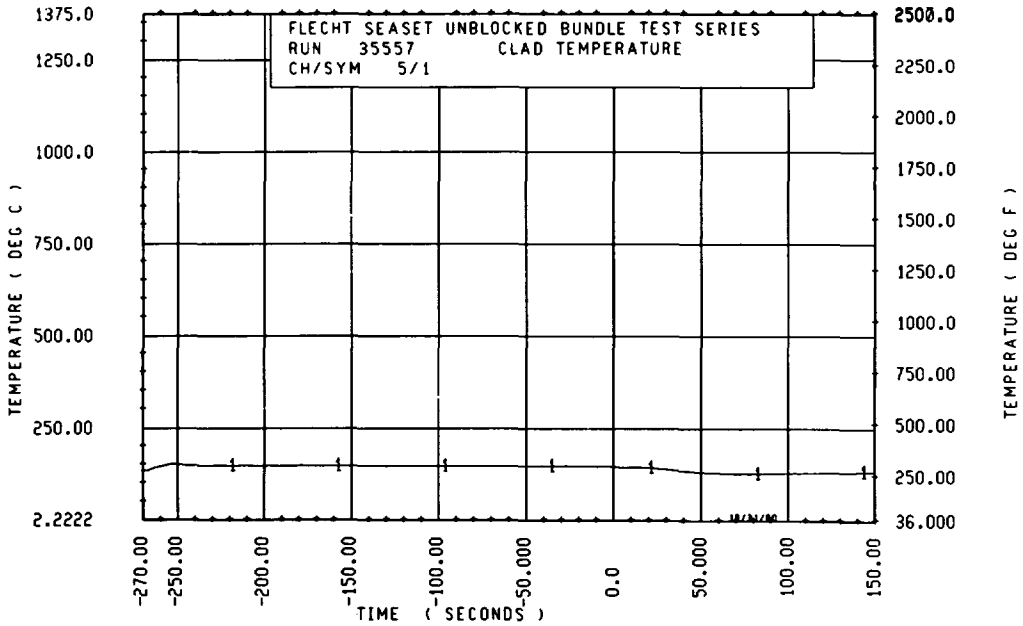
*At initiation of reflood

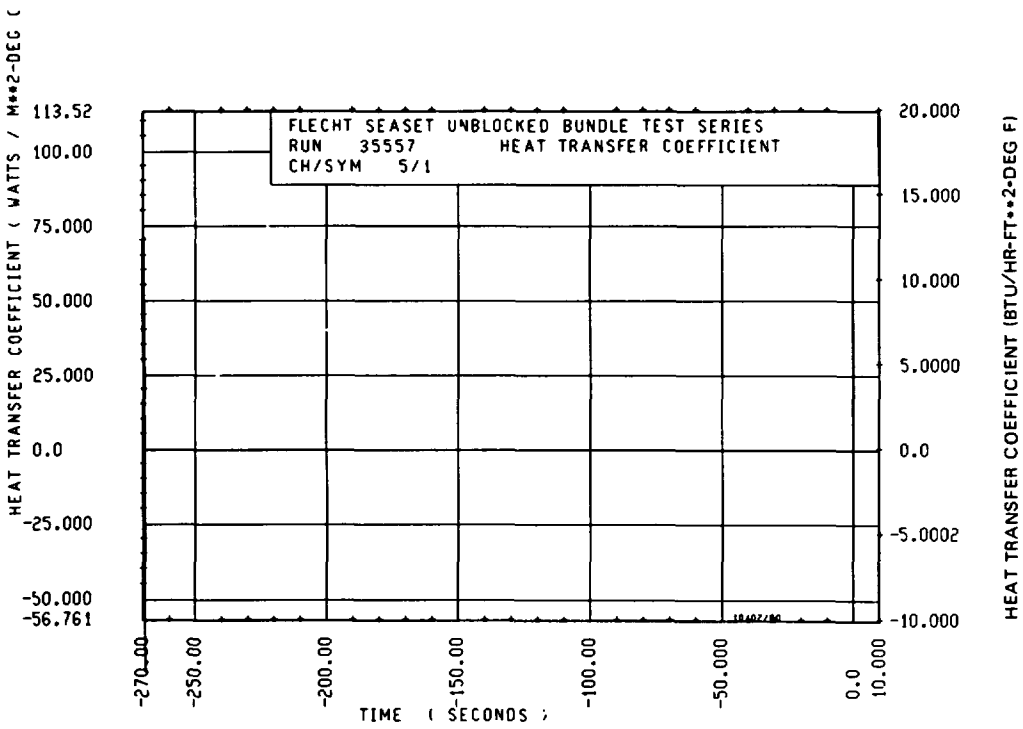
C. Comments

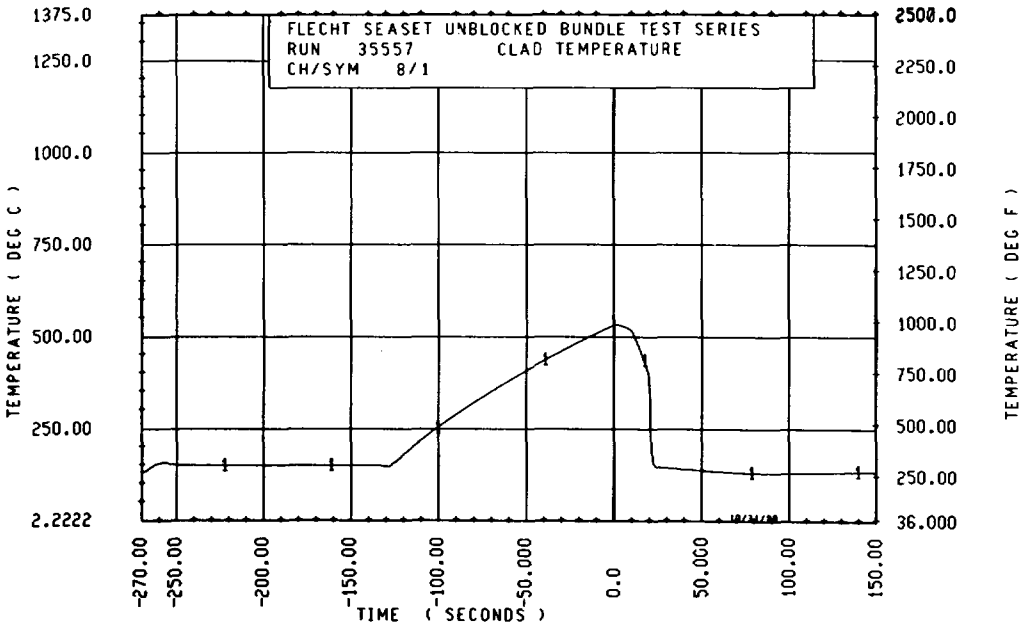
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. There was 4.8 percent mass loss through steam probes.

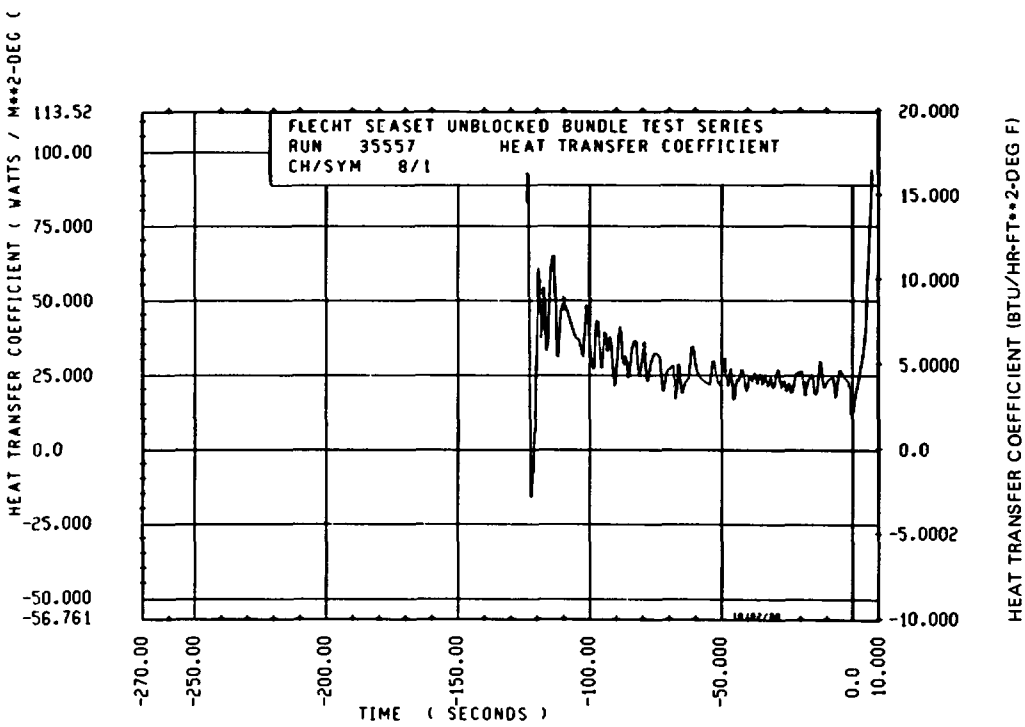

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 CLAD TEMPERATURE
CH/SYM 2/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

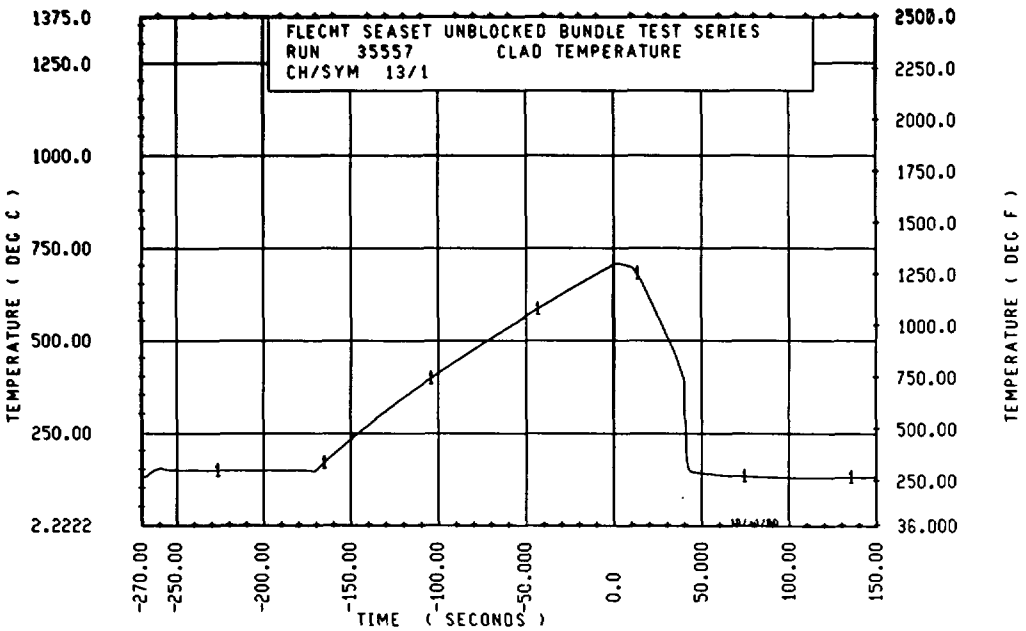

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

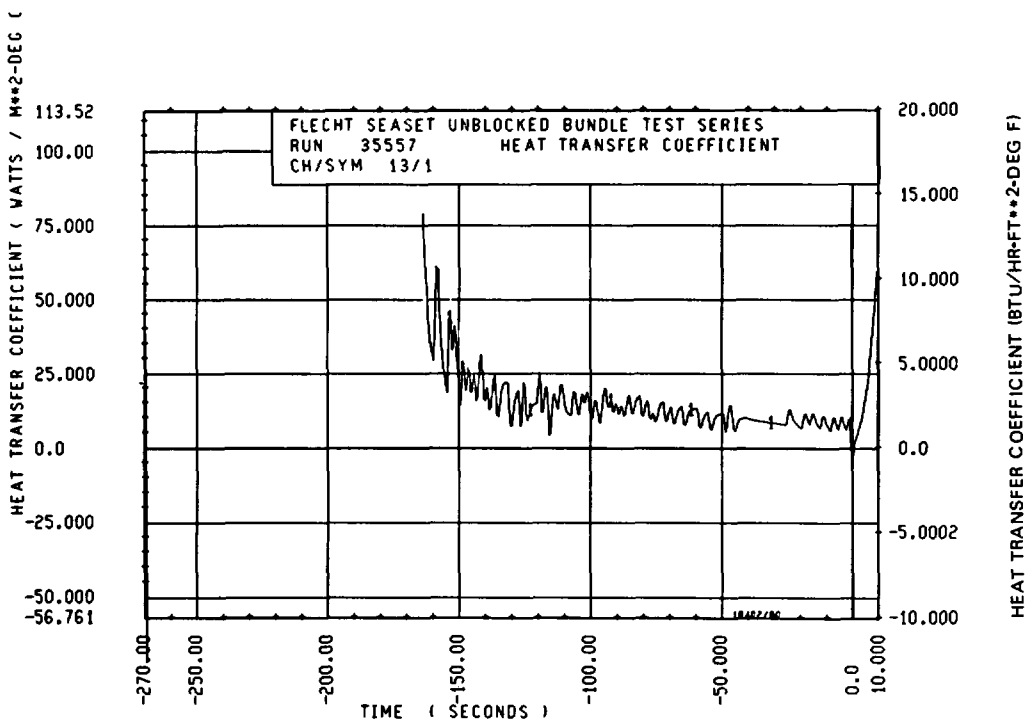

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 CLAD TEMPERATURE
CH/SYM 5/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

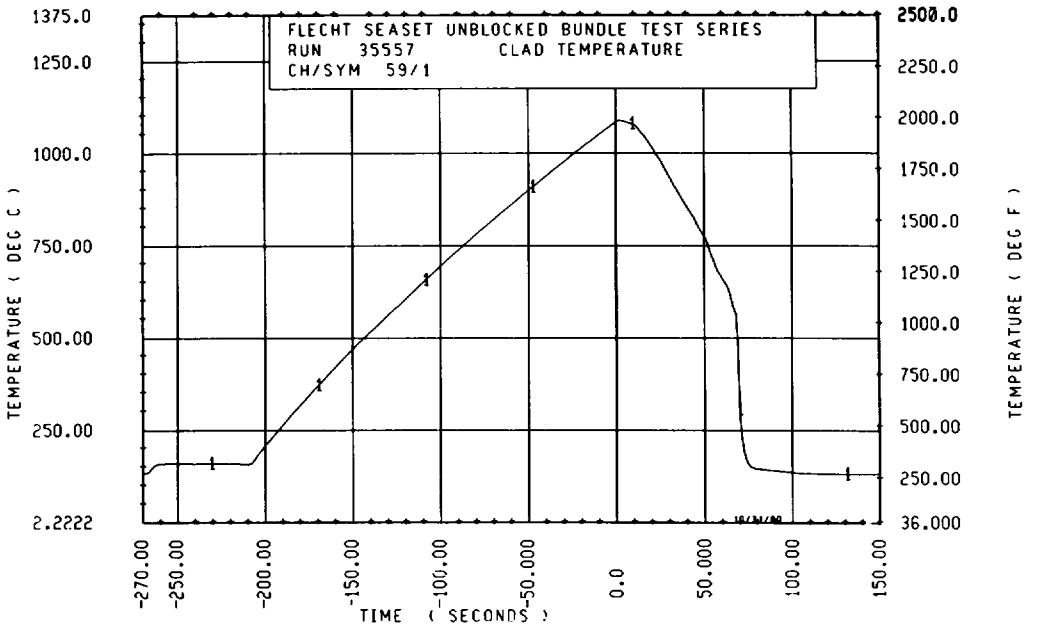

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

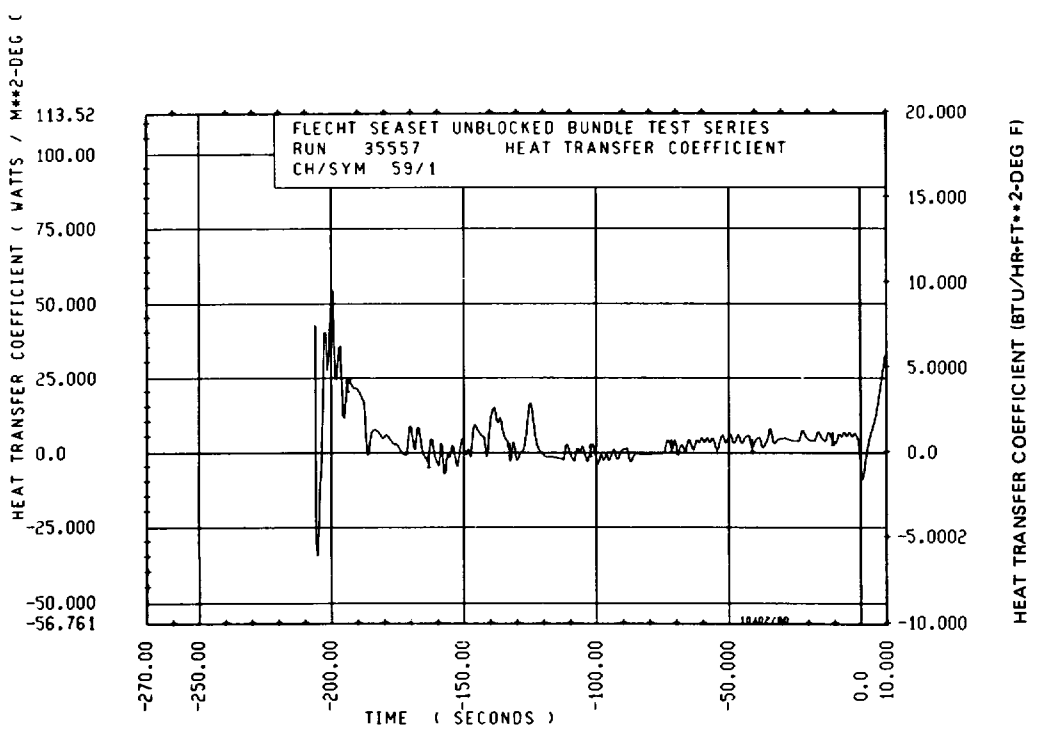

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 CLAD TEMPERATURE
CH/SYM 8/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

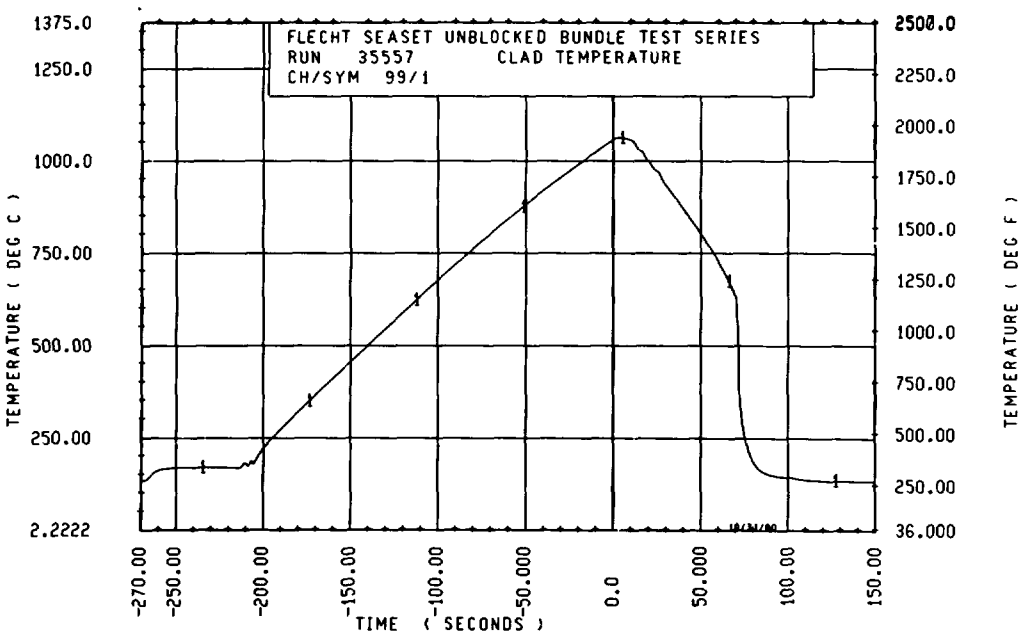

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG (
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

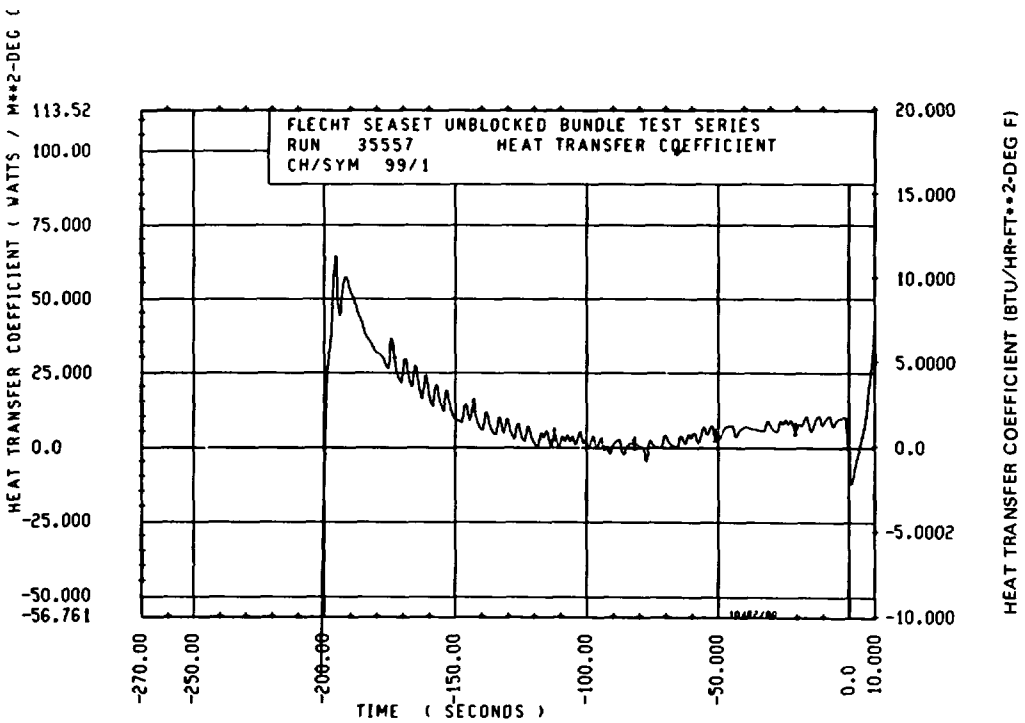

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 CLAD TEMPERATURE
CH/SYM 13/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

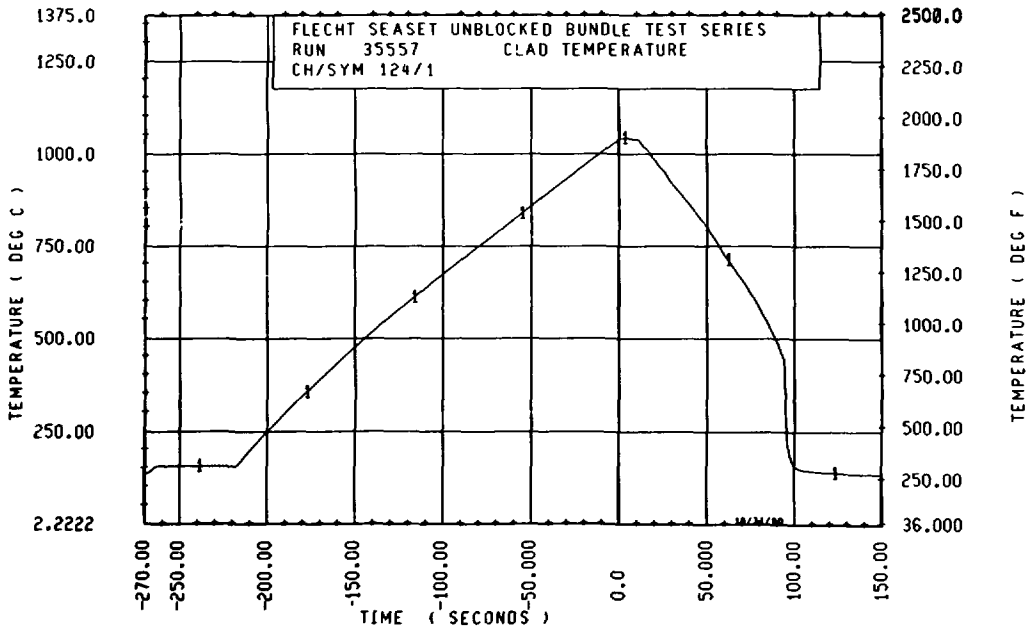

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 HEAT TRANSFER COEFFICIENT
CH/SYM 13/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

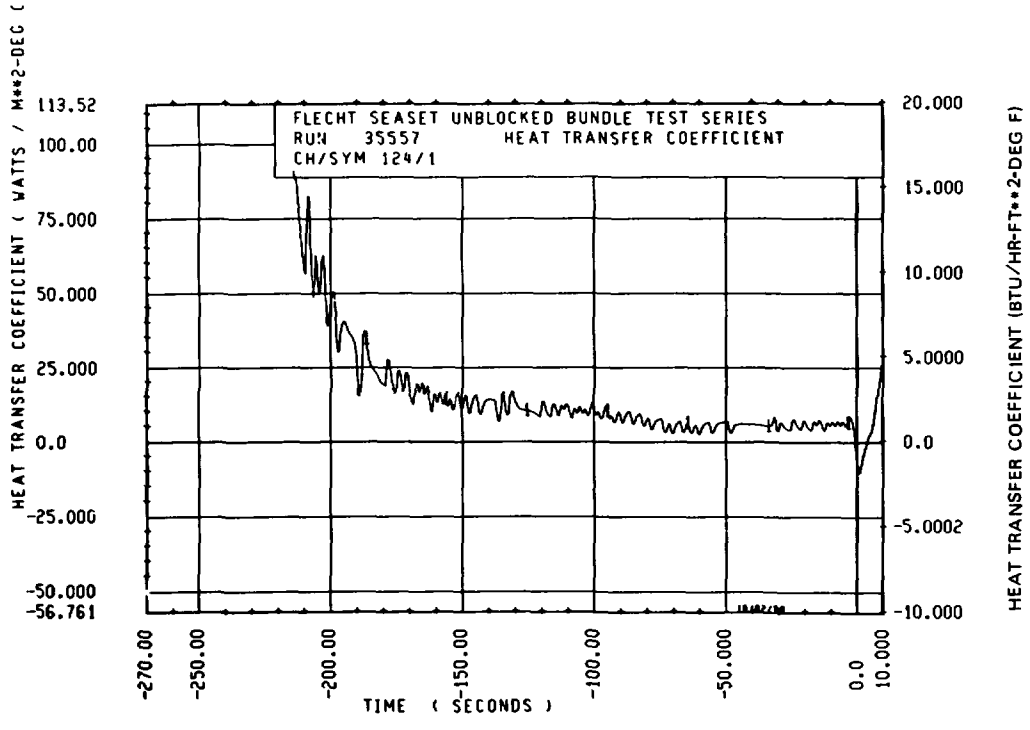

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 CLAD TEMPERATURE
CH/SYM 59/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

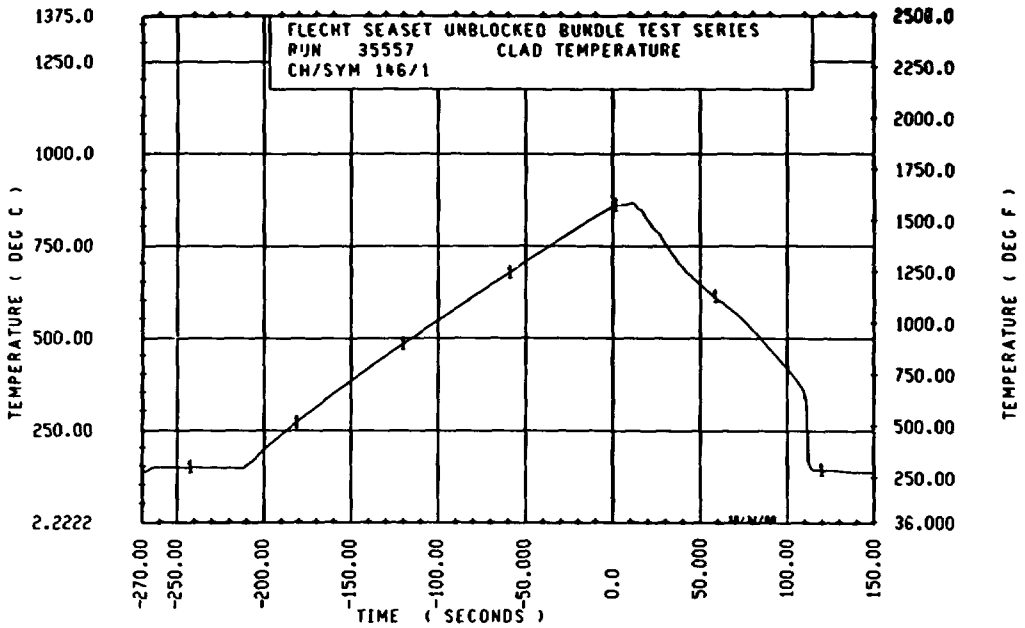

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 HEAT TRANSFER COEFFICIENT
CH/SYM 59/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

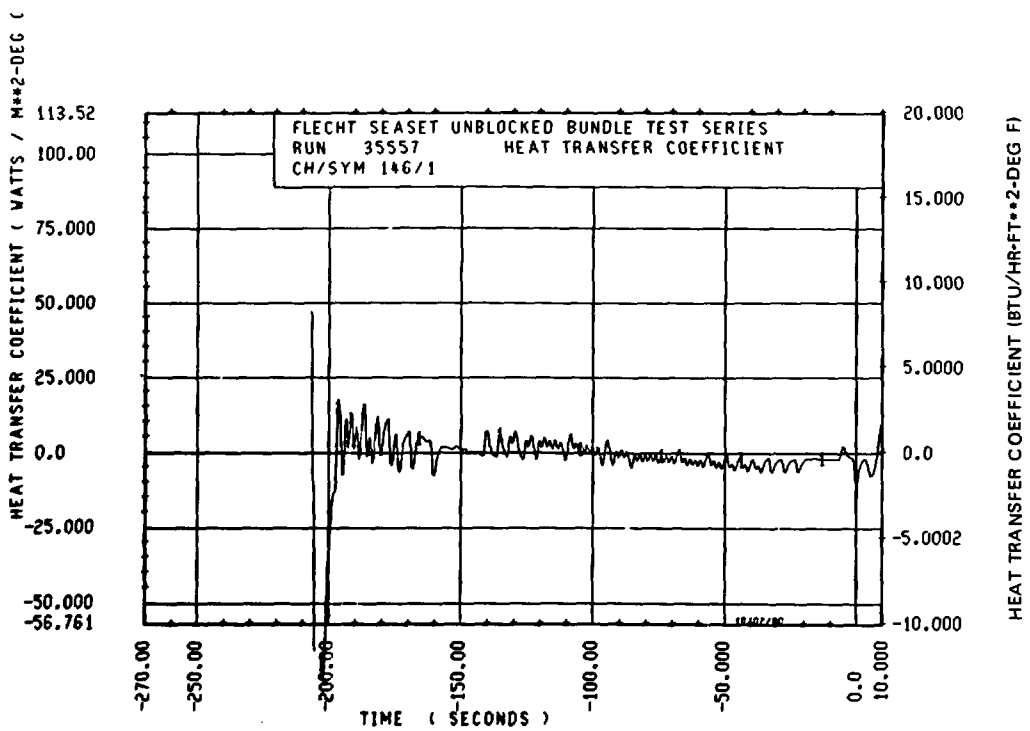

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 CLAD TEMPERATURE
CH/SYM 99/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

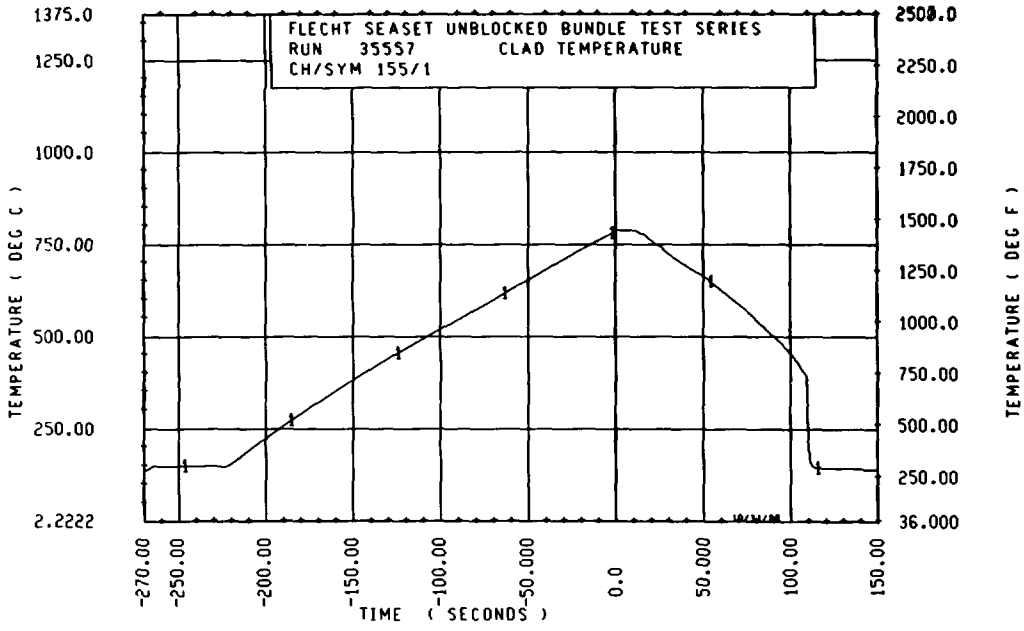

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 HEAT TRANSFER COEFFICIENT
CH/SYM 99/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG (
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

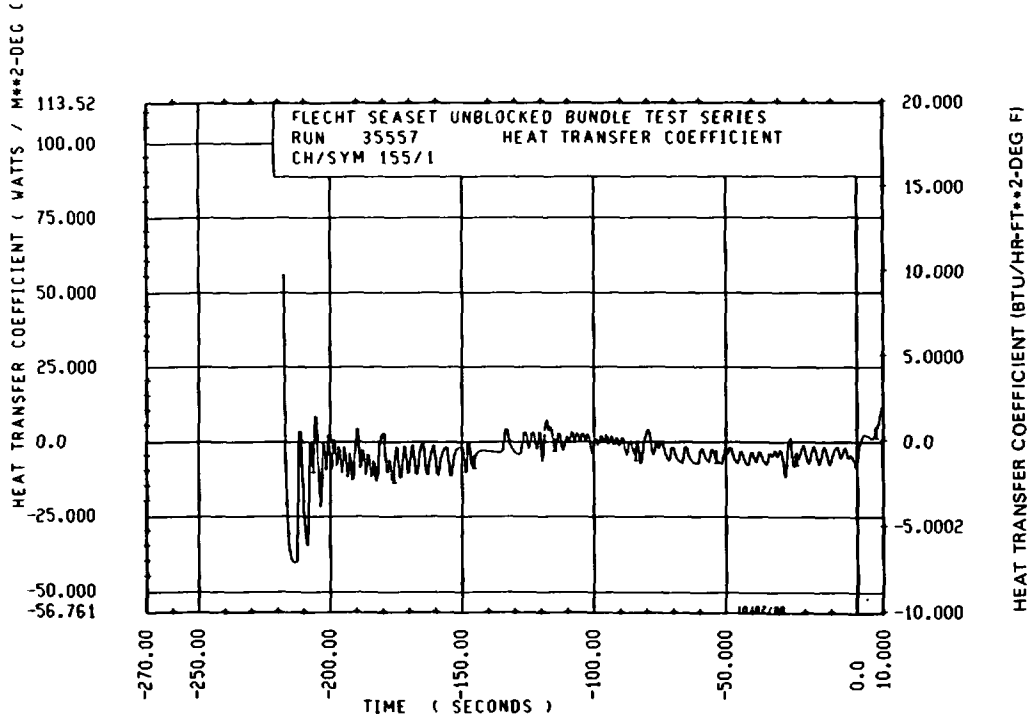

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 CLAD TEMPERATURE
CH/SYM 124/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

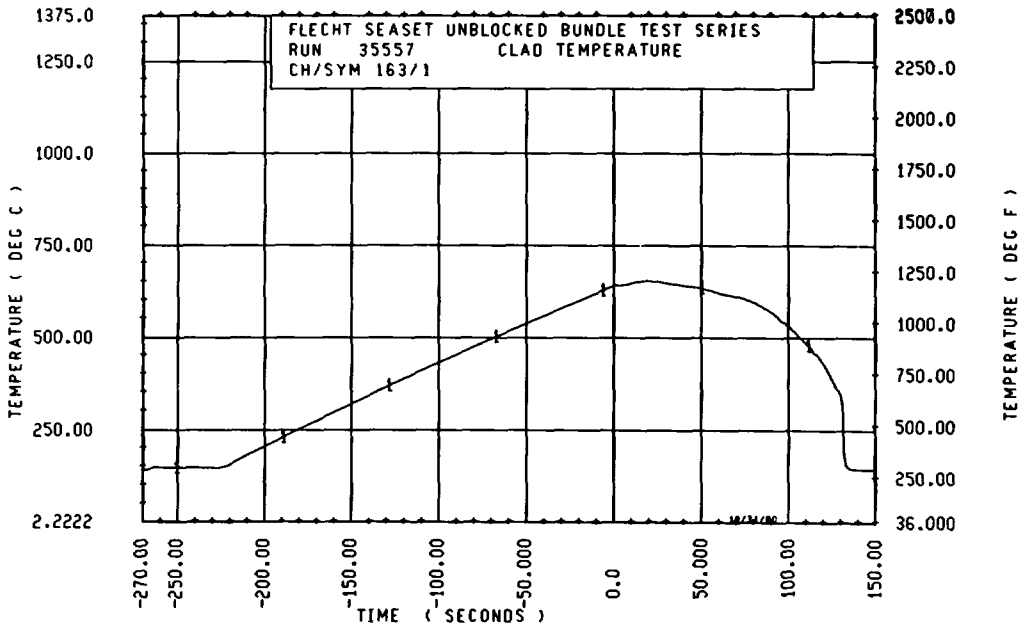

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 HEAT TRANSFER COEFFICIENT
CH/SYM 124/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

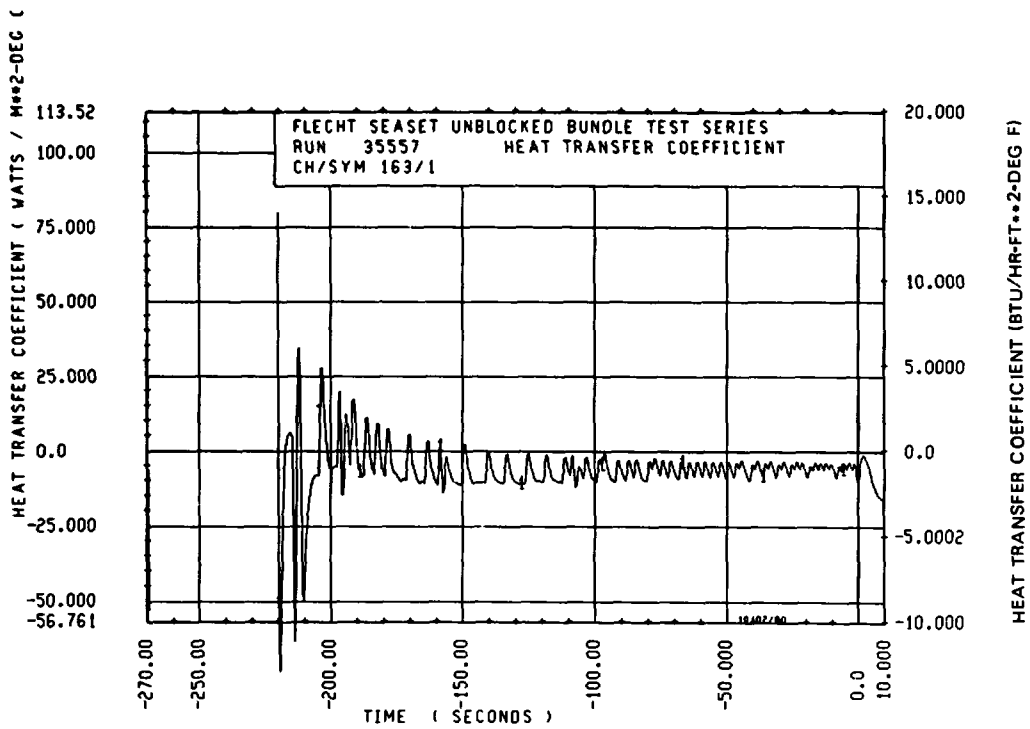

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 CLAD TEMPERATURE
CH/SYM 146/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

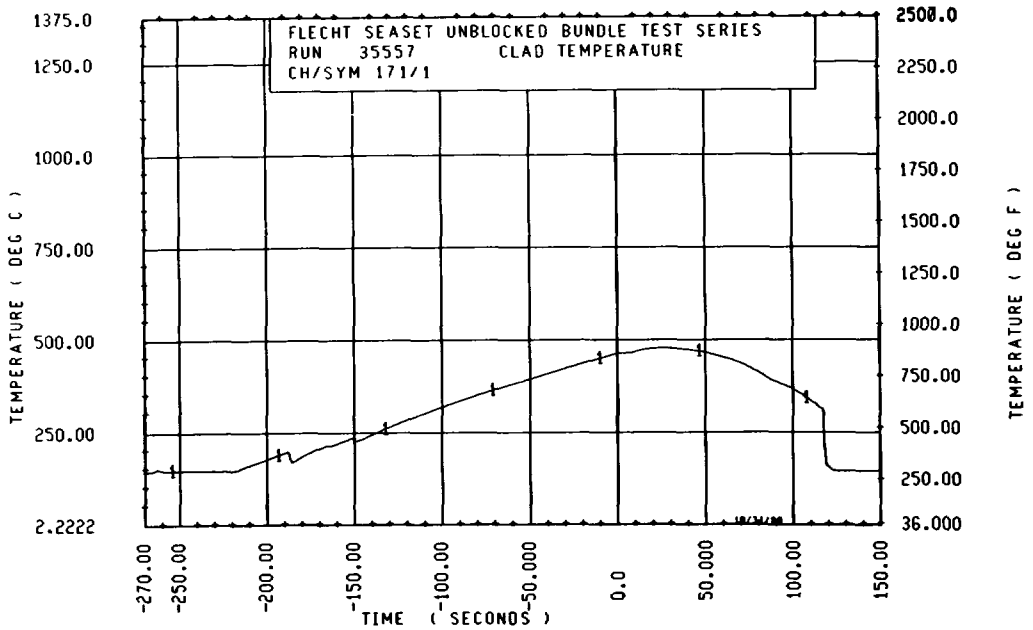

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 HEAT TRANSFER COEFFICIENT
CH/SYM 146/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG (
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

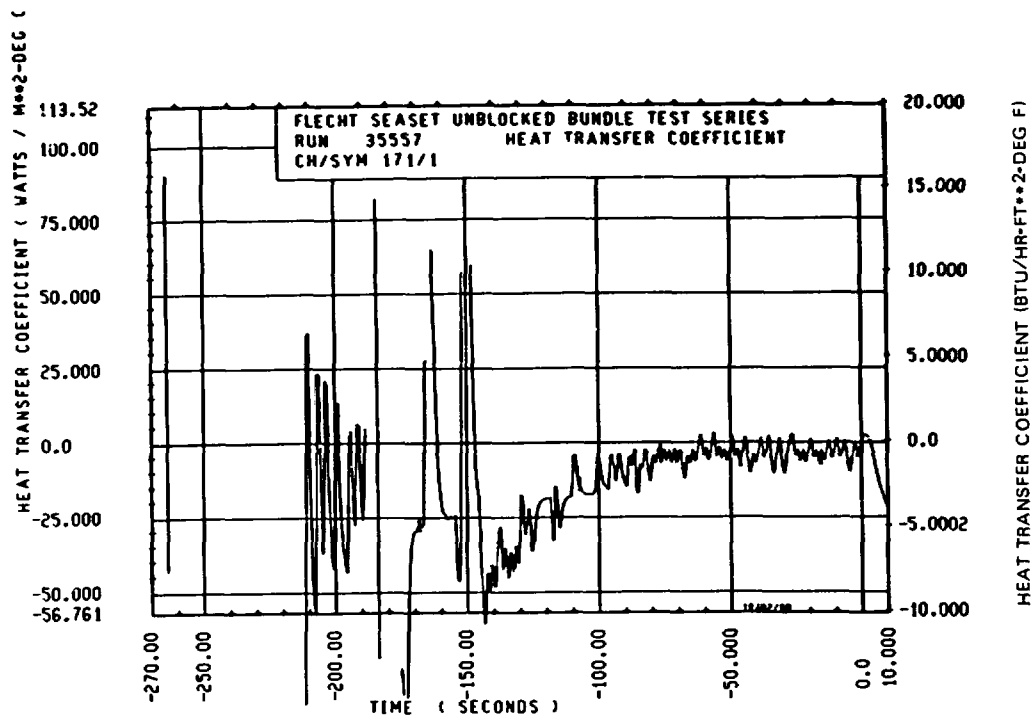

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 CLAD TEMPERATURE
CH/SYM 155/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

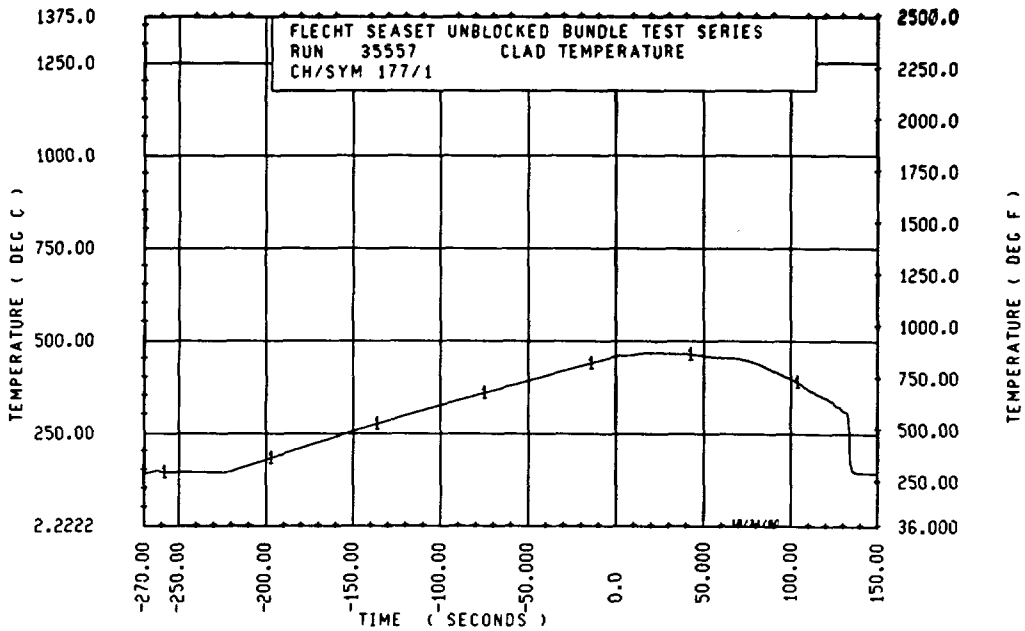

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 HEAT TRANSFER COEFFICIENT
CH/SYM 155/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

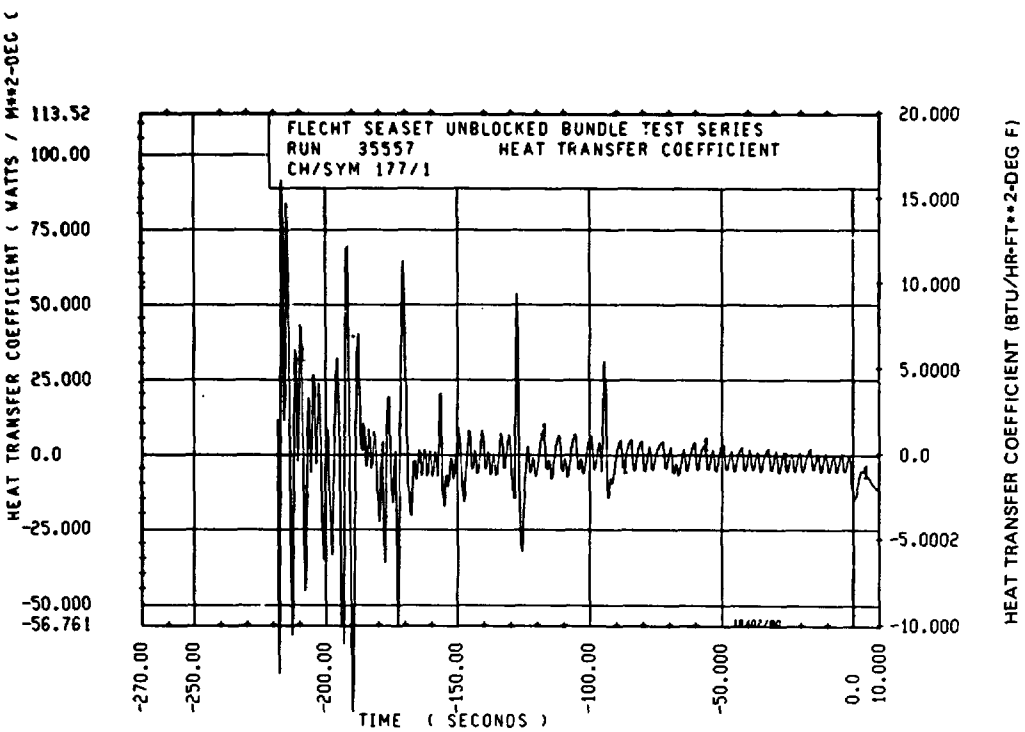

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 CLAD TEMPERATURE
CH/SYM 163/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

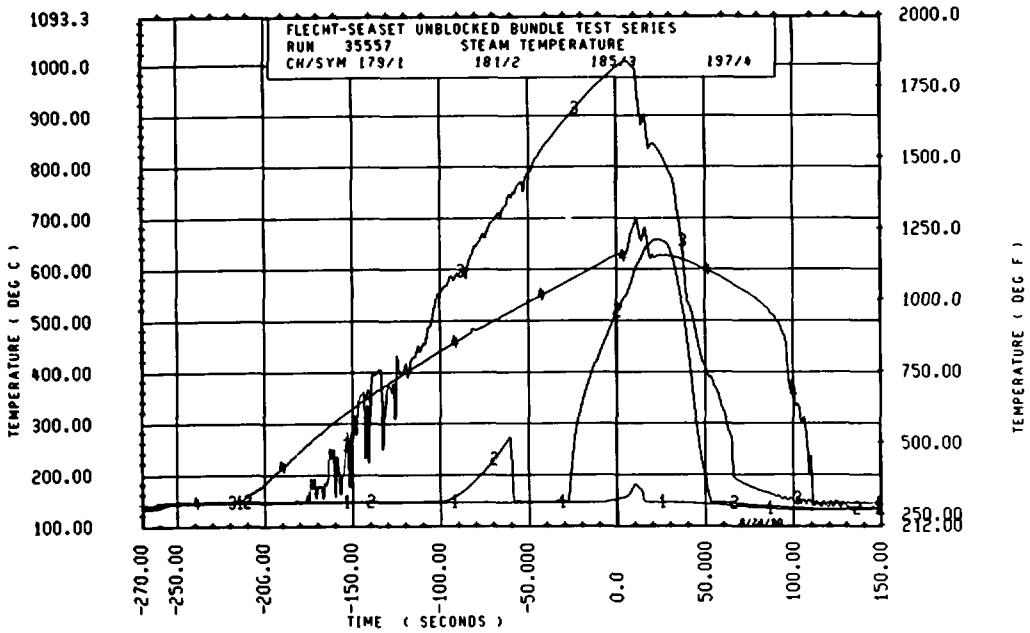

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 HEAT TRANSFER COEFFICIENT
CH/SYM 163/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

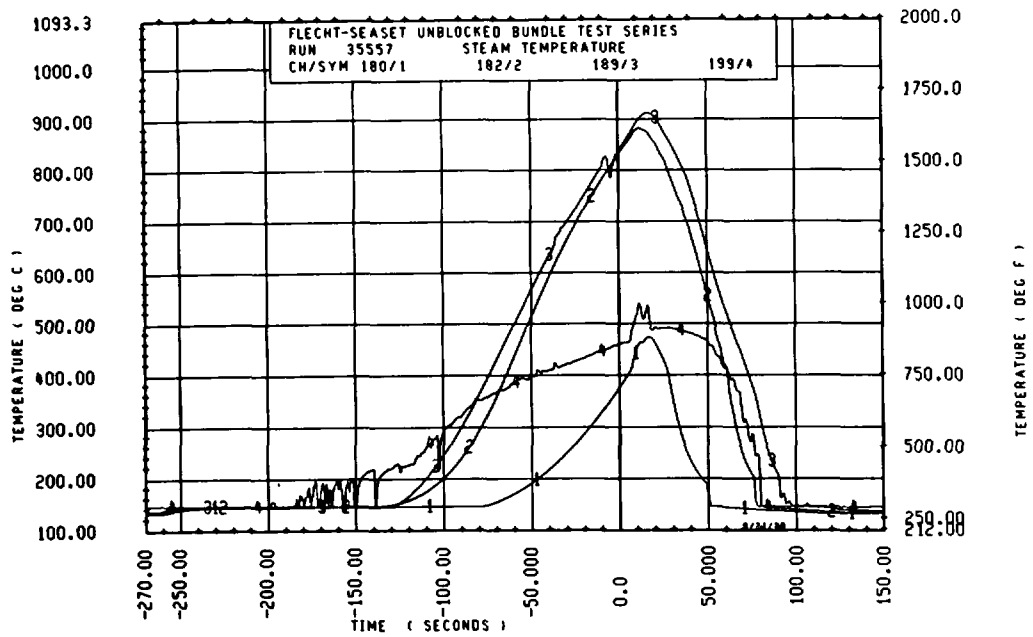

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 CLAD TEMPERATURE
CH/SYM 171/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

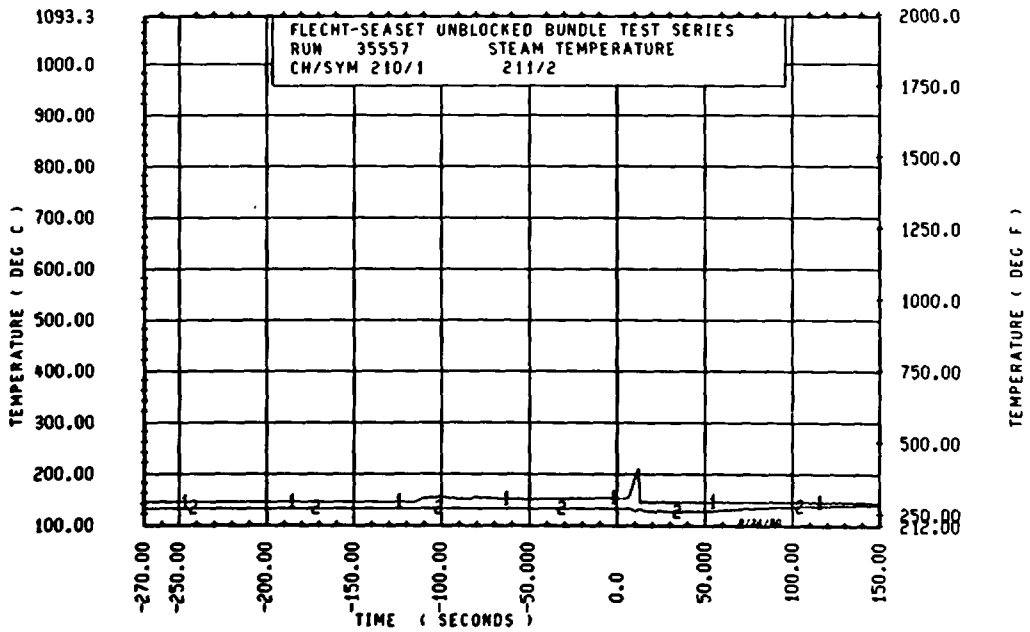

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 HEAT TRANSFER COEFFICIENT
CH/SYM 171/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

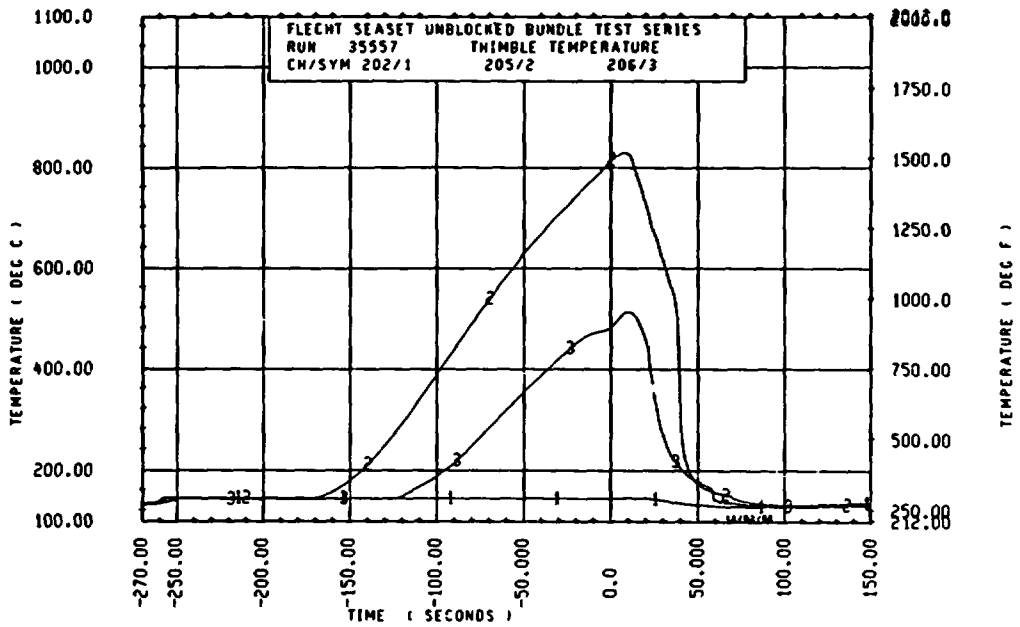

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 CLAD TEMPERATURE
CH/SYM 177/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

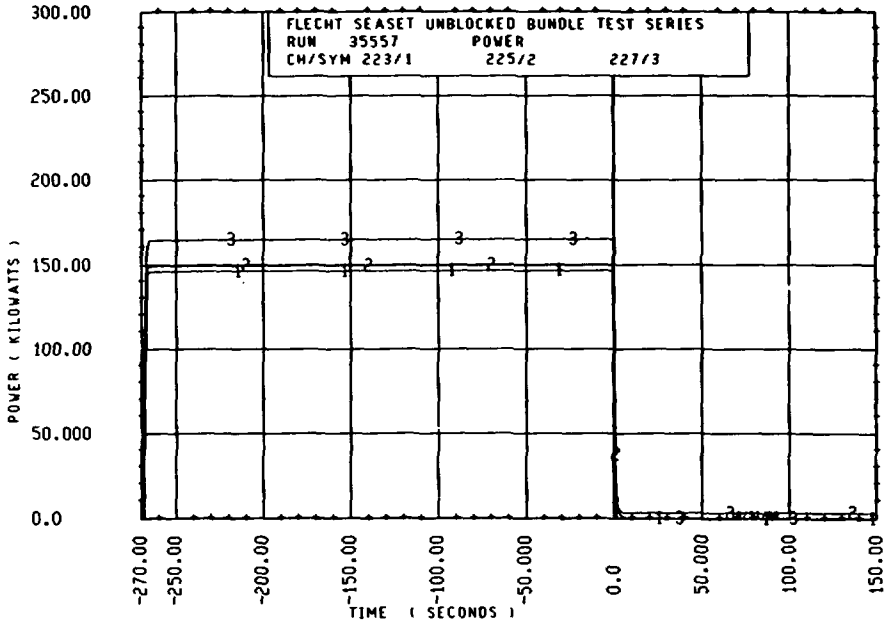

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 HEAT TRANSFER COEFFICIENT
CH/SYM 177/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

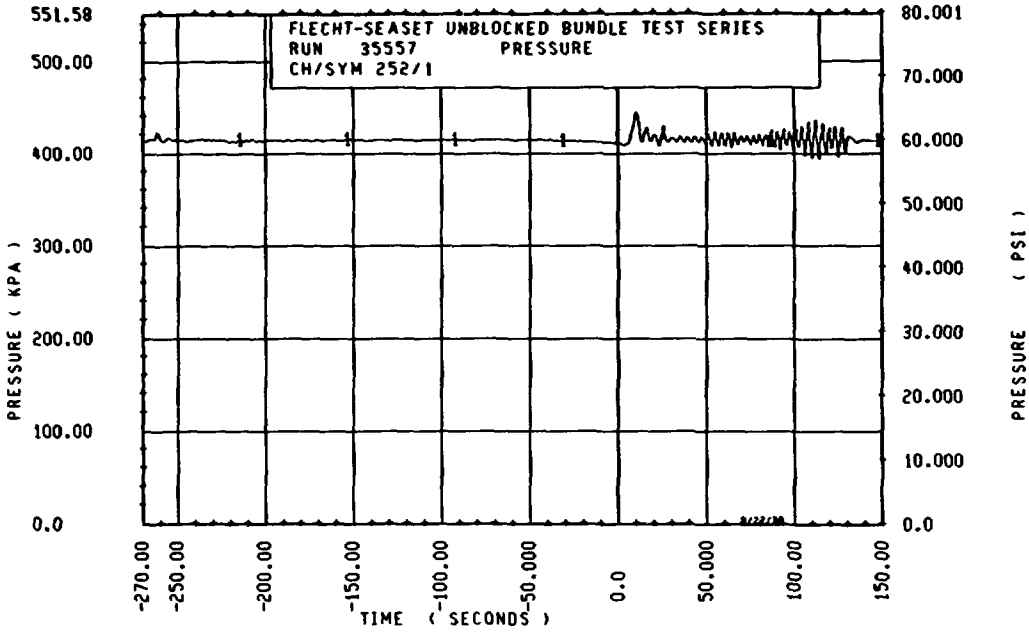

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 STEAM TEMPERATURE
CH/SYM 179/1 181/2 185/3 197/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

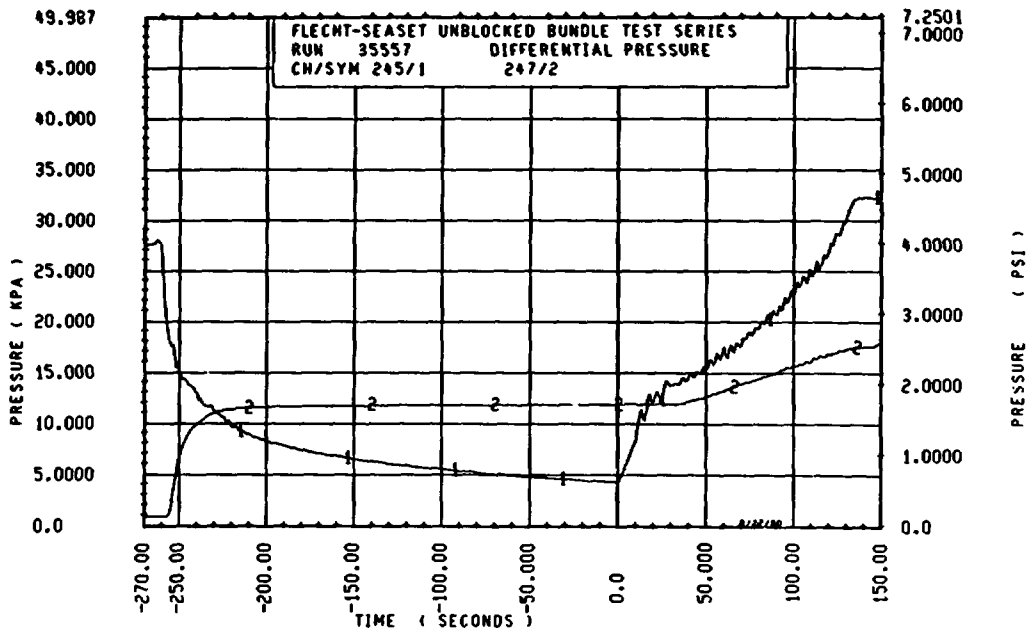

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 STEAM TEMPERATURE
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

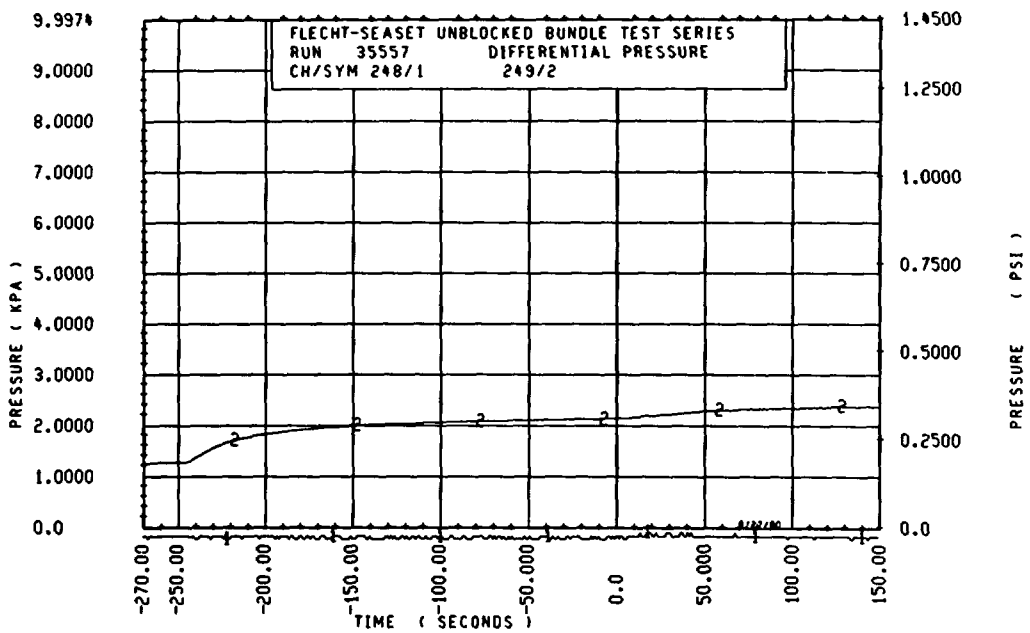

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 STEAM TEMPERATURE
CH/SYM 210/1 211/2
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

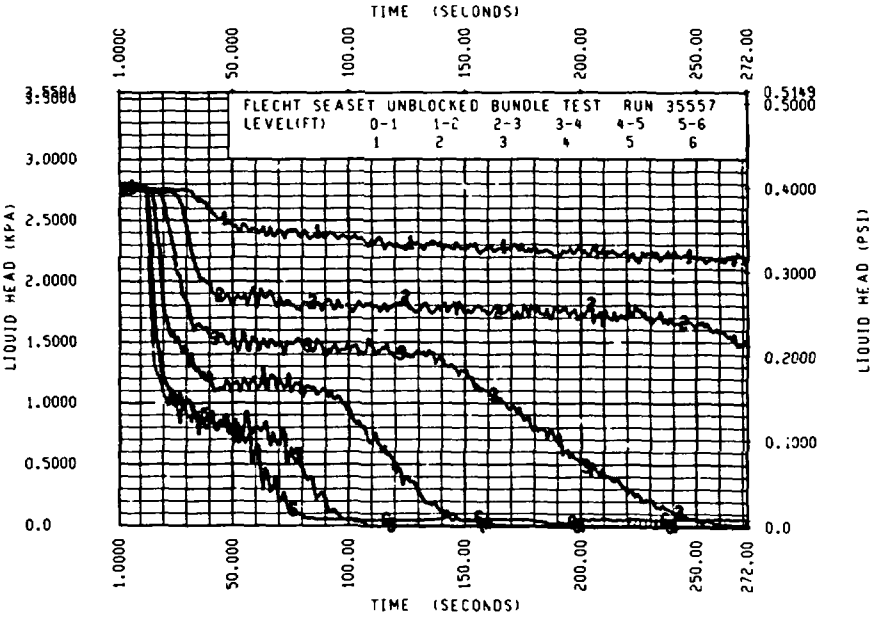

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 THIMBLE TEMPERATURE
CH/SYM 202/1 205/2 206/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

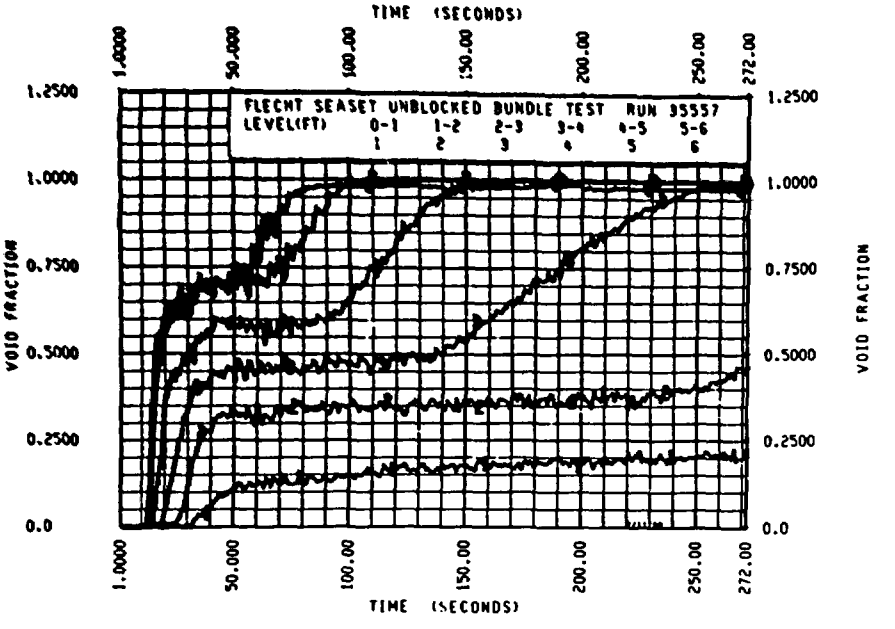

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00
TIME (SECONDS)

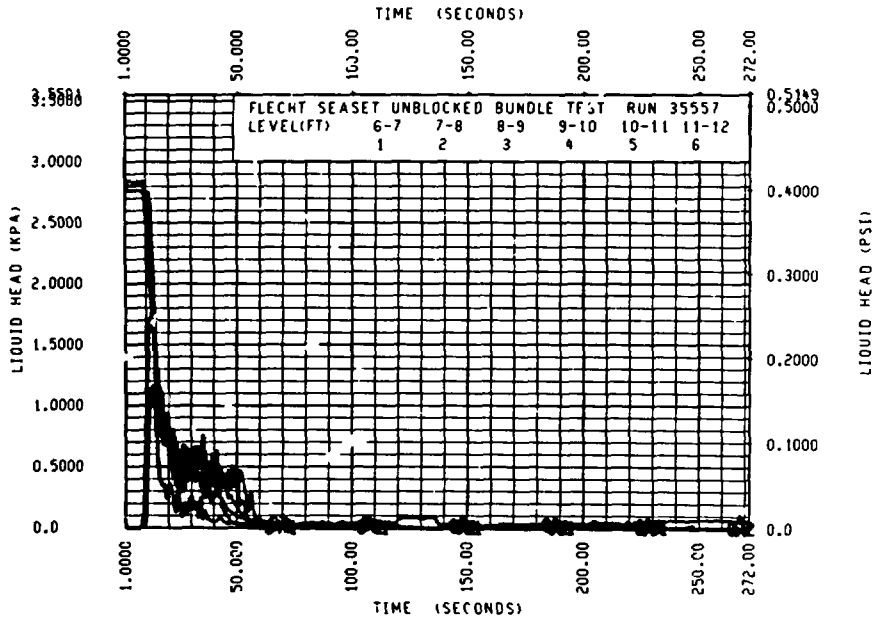

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

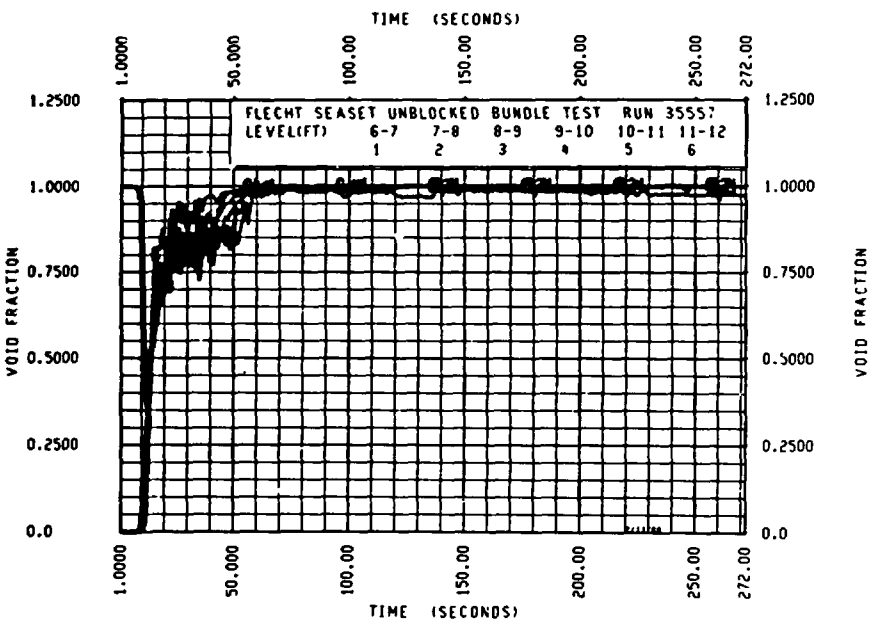

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35557 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
9.9974
9.0000
8.0000
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
1.4500
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-270.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00





NOTE: In these two plots, 1 second is really the initiation of the boiloff test at -271 seconds.





NOTE: In these two plots, 1 second is really the initiation of the boiloff test at -271 seconds.

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 35658
Date: 8/24/79
Boiloff Test

A. Run Conditions

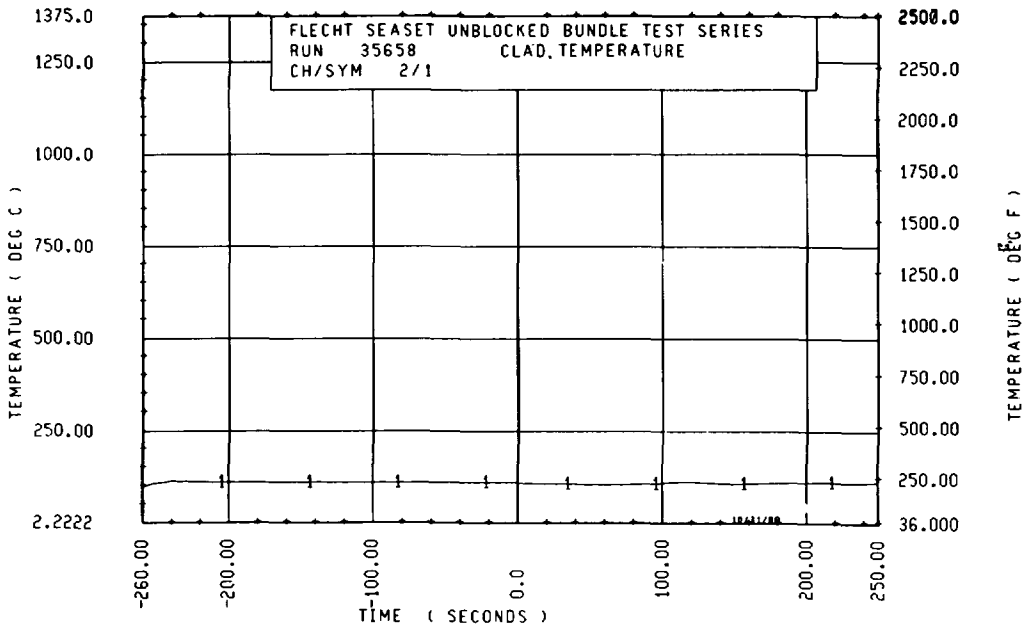
Upper plenum pressure	0.14 MPa (20 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	104°C (220°F)
Rod peak power	1.38 kw/m (0.422 kw/ft)
Initial water level	3.063 m (120.6 in.)
Coolant temperature	108°C (227°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

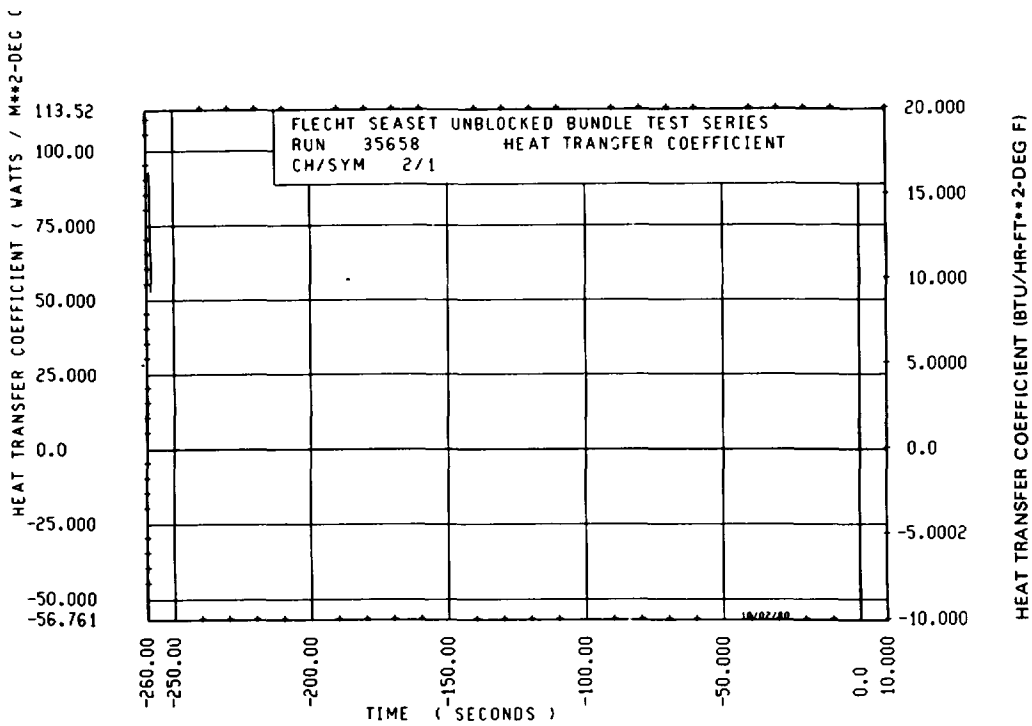
B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature
0.61 m (24 in.)		
1.22 m (48 in.)		
1.83 m (72 in.)		
2.44 m (96 in.)	(No housing temperatures available)	
2.74 m (108 in.)		
3.05 m (120 in.)		
3.35 m (132 in.)		

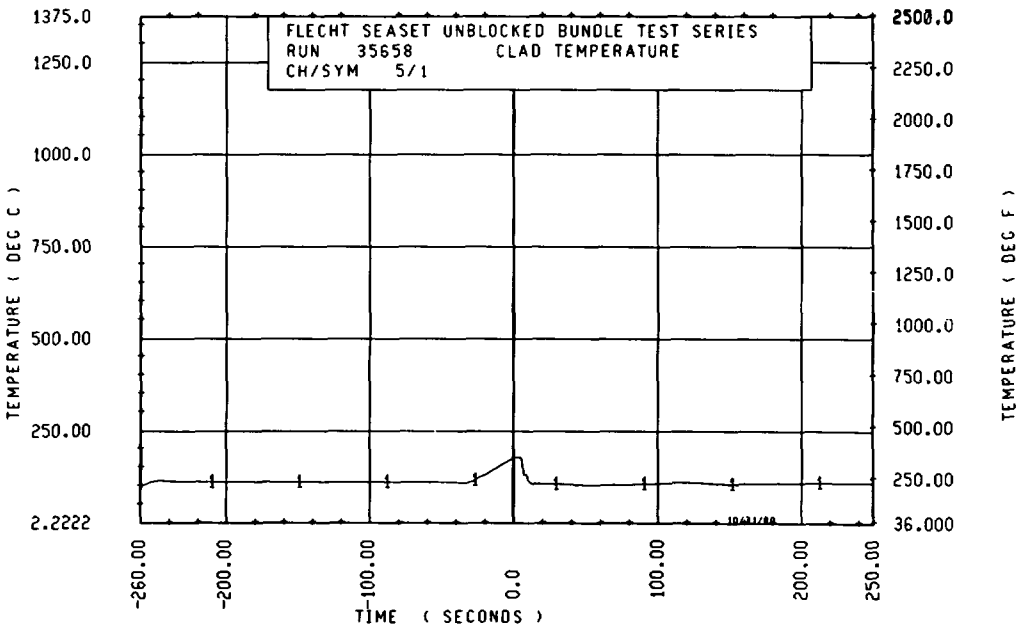
C. Comments

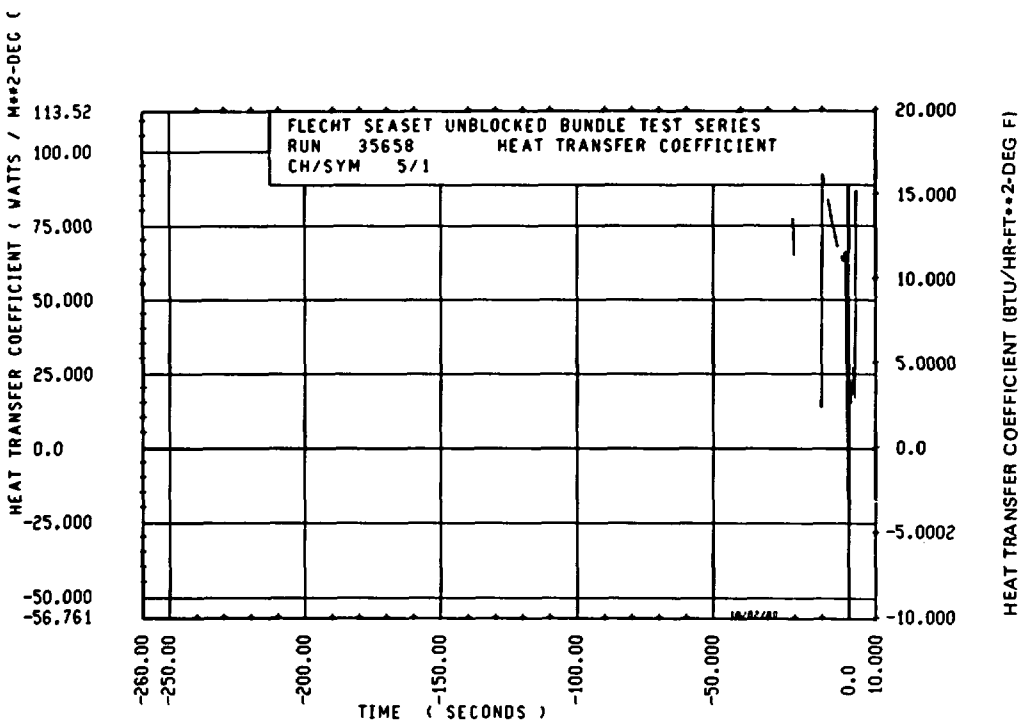
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. There was 3.2 percent mass loss through steam probes.

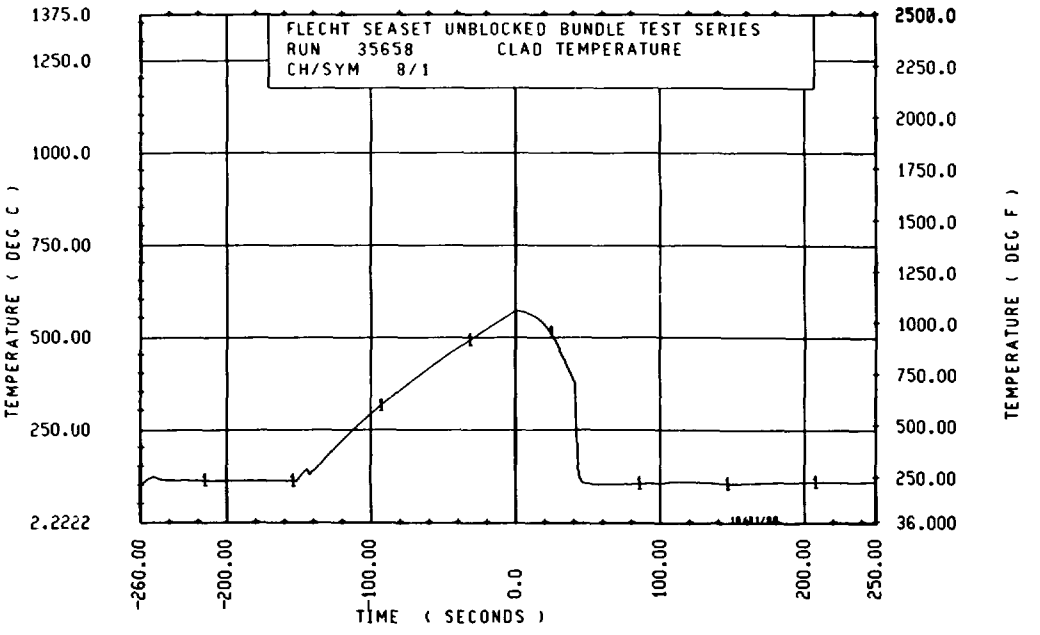

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 CLAD. TEMPERATURE
CH/SYM 2/1
TEMPERATURE (DEG C)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
TEMPERATURE (DEG F)
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00
TIME (SECONDS)

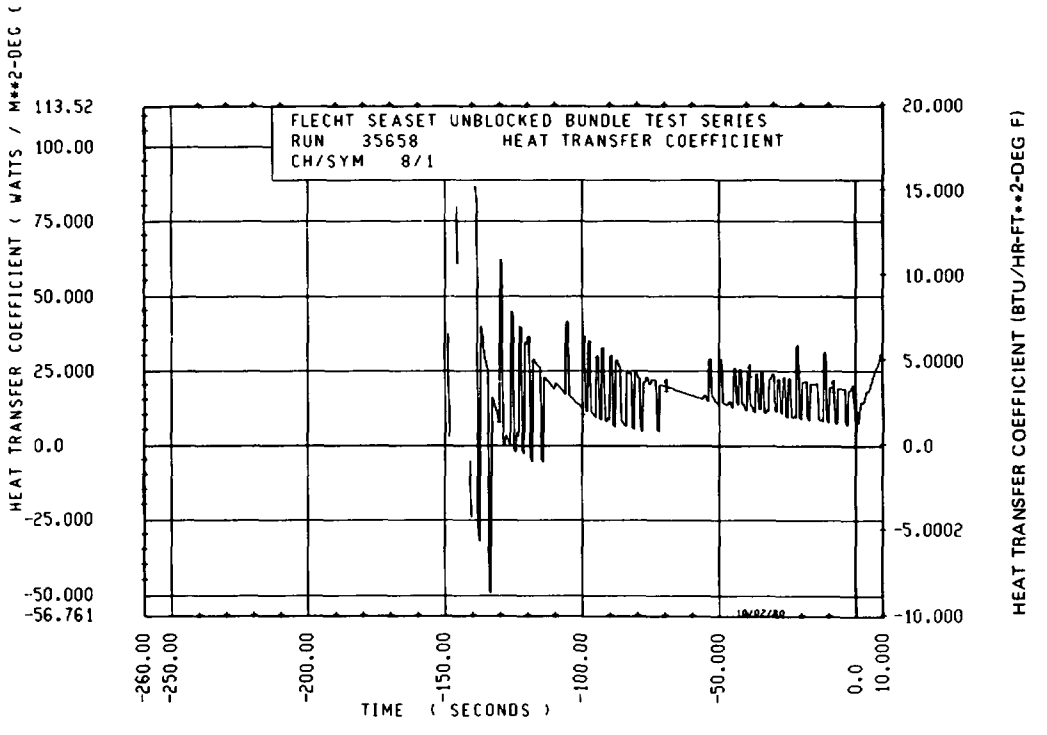

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-260.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000
TIME (SECONDS)

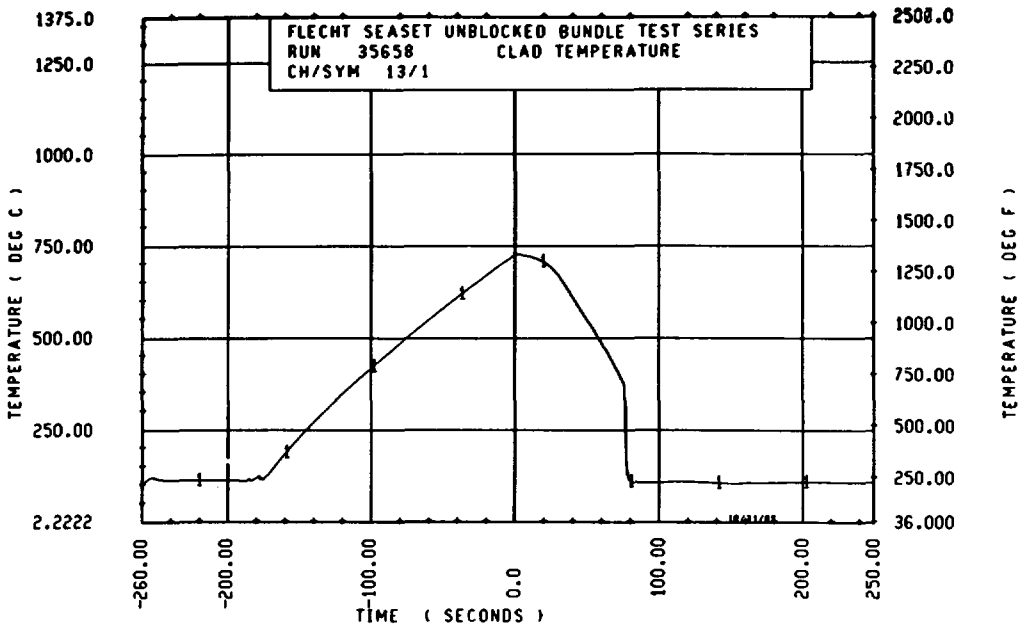
35658-2

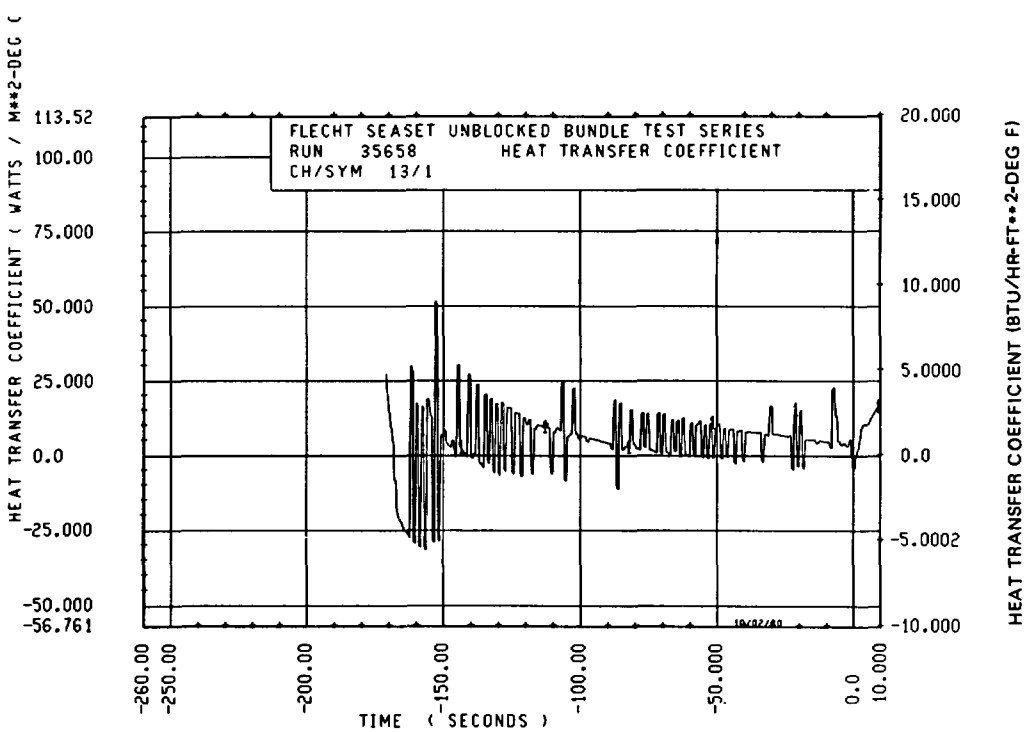

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 CLAD TEMPERATURE
CH/SYM 5/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-260.00
-200.00
100.00
0.0
100.00
200.00
250.00

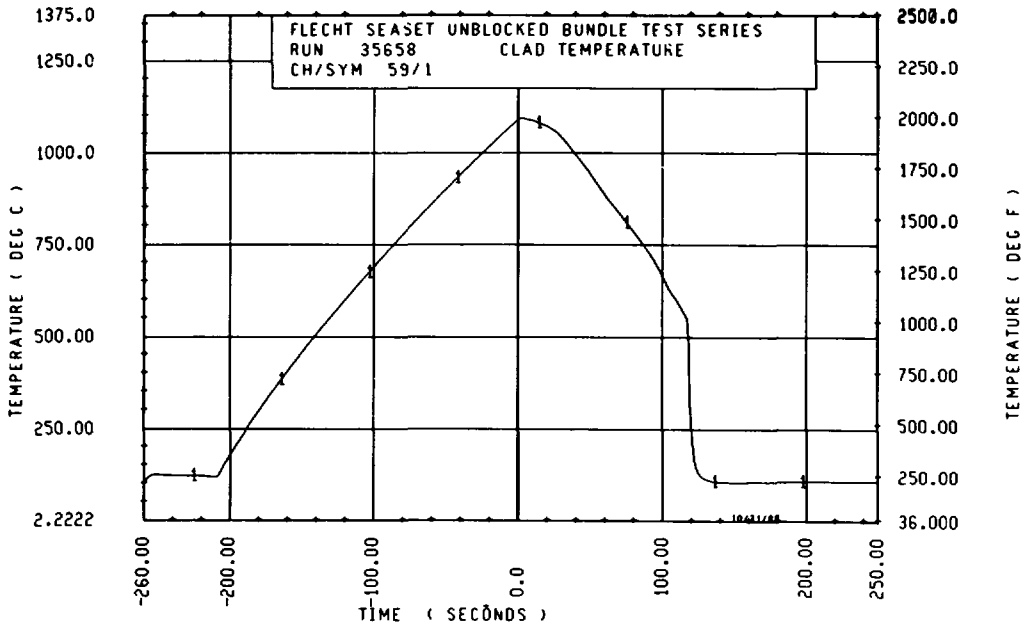

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-260.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

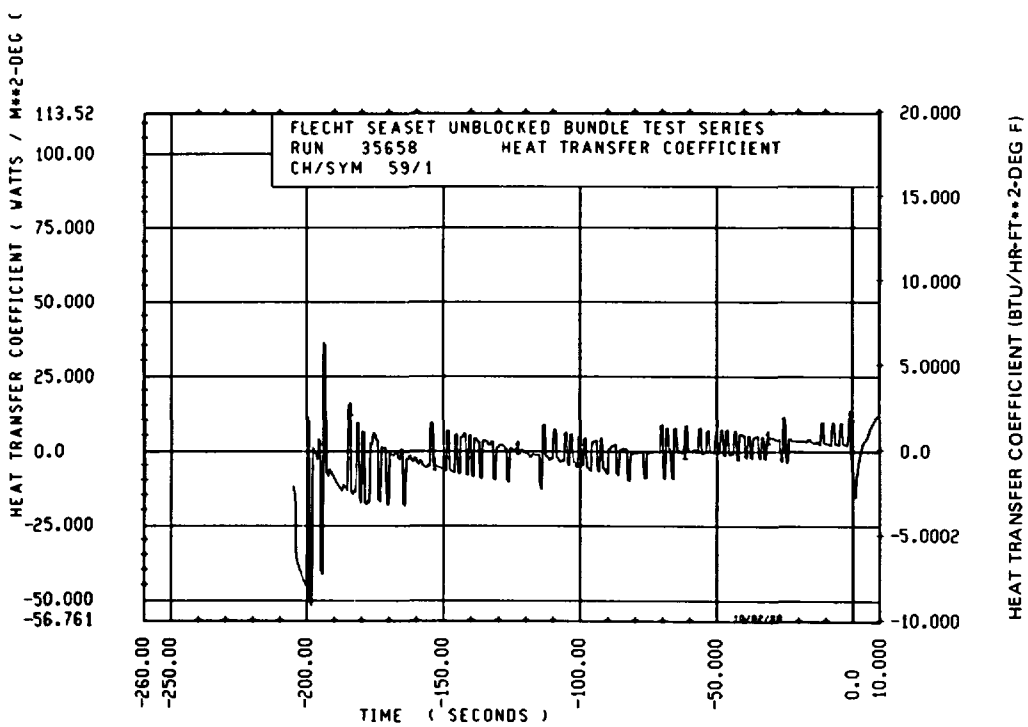

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 CLAD TEMPERATURE
CH/SYM 8/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00

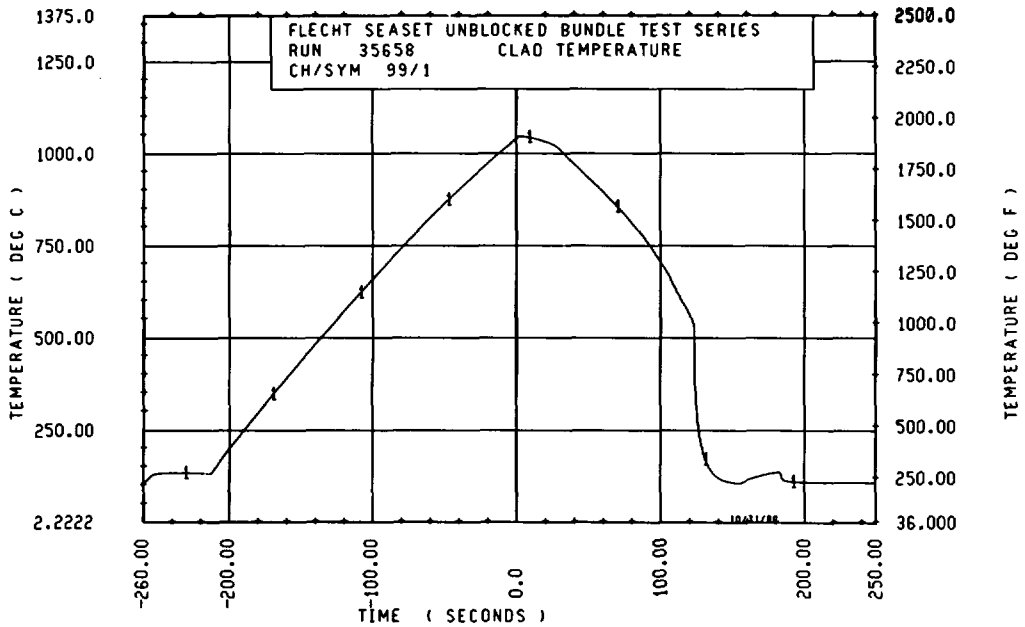

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG (
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-260.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

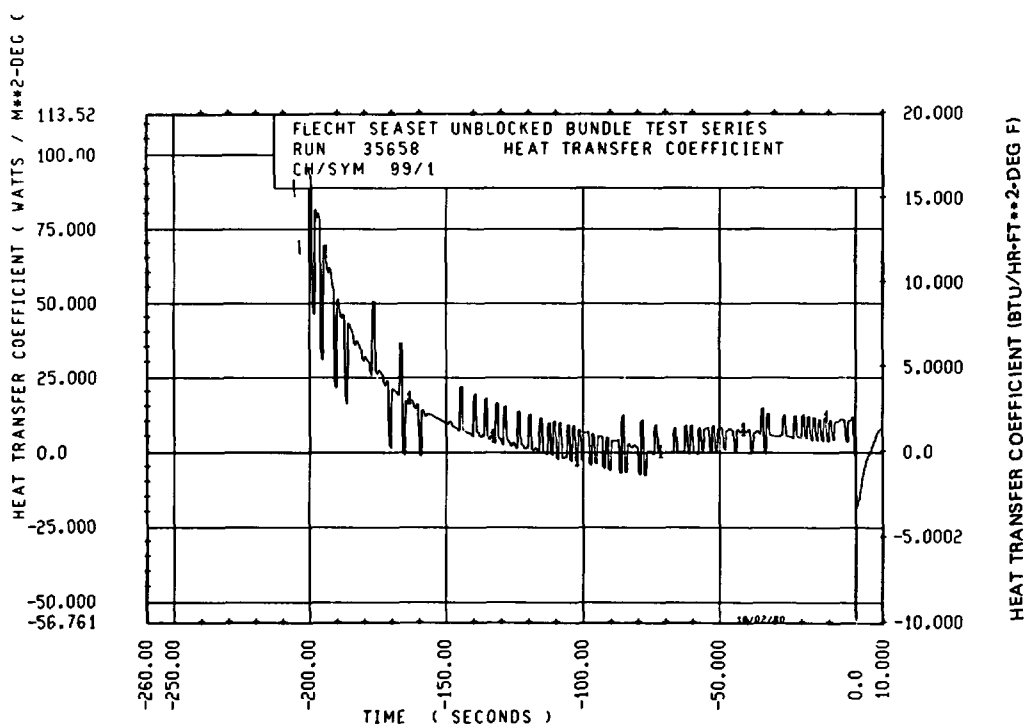

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 CLAD TEMPERATURE
CH/SYM 13/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00

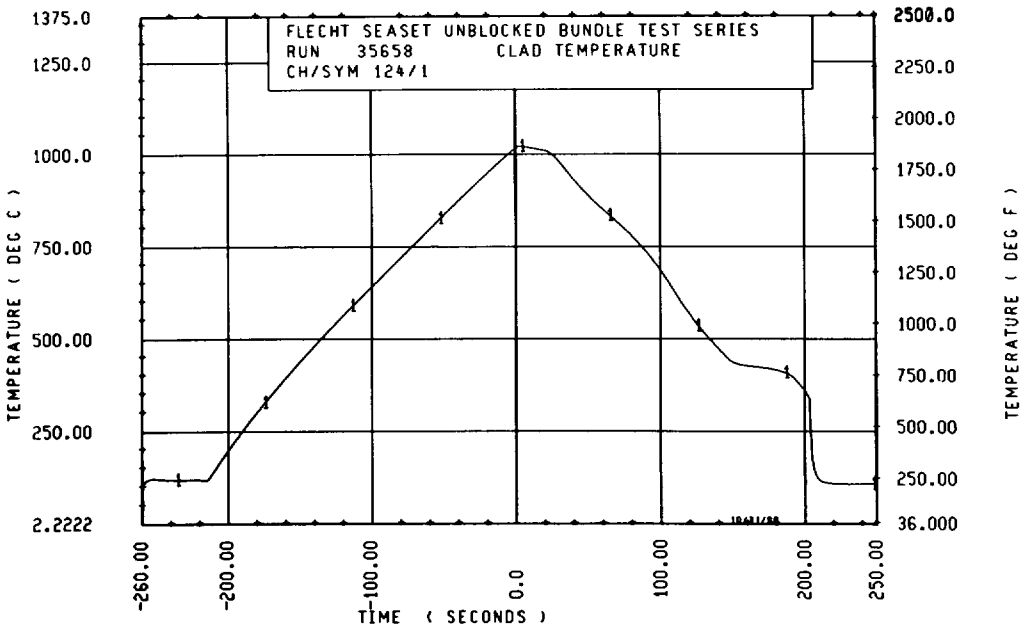

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 HEAT TRANSFER COEFFICIENT
CH/SYM 13/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG (
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-260.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

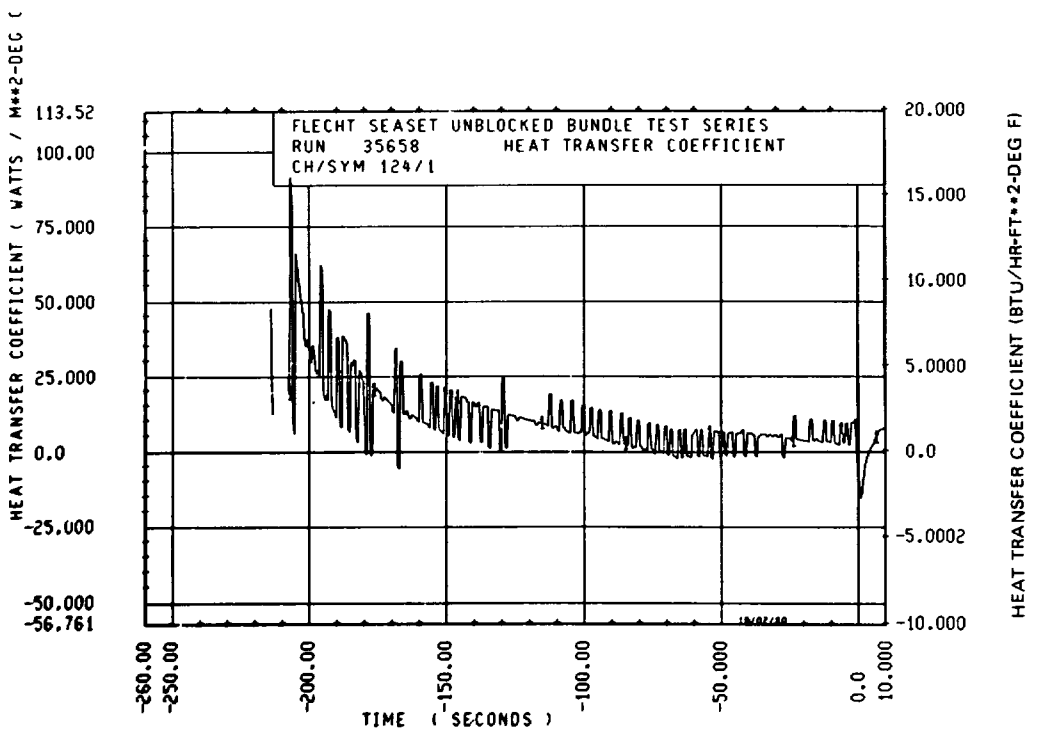

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 CLAD TEMPERATURE
CH/SYM 59/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00

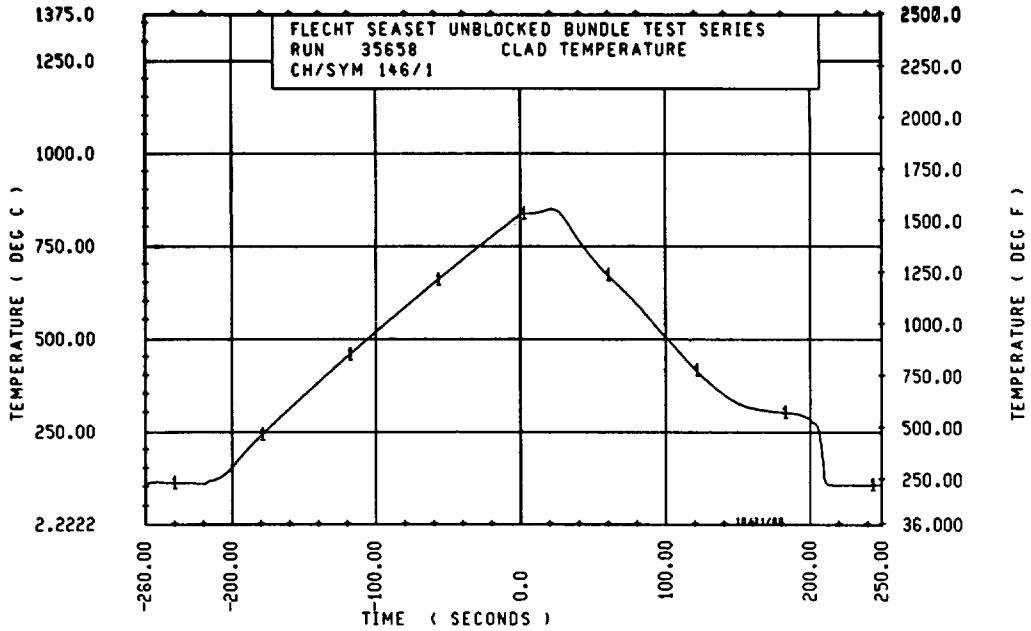

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 HEAT TRANSFER COEFFICIENT
CH/SYM 59/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG (
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-260.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

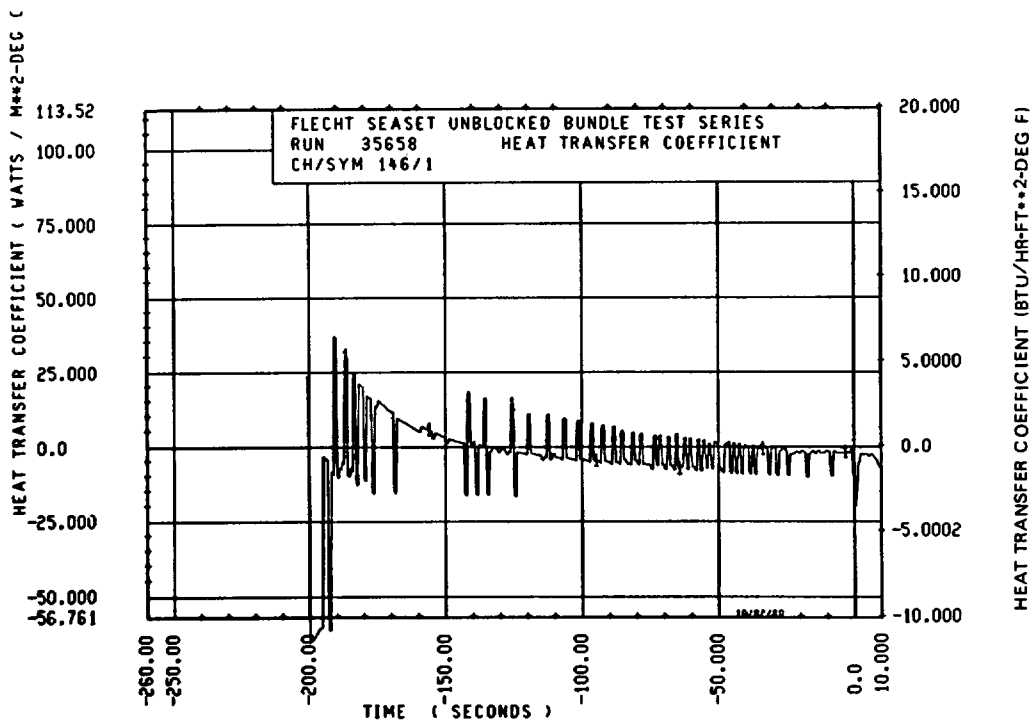

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 CLAD TEMPERATURE
CH/SYM 99/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00

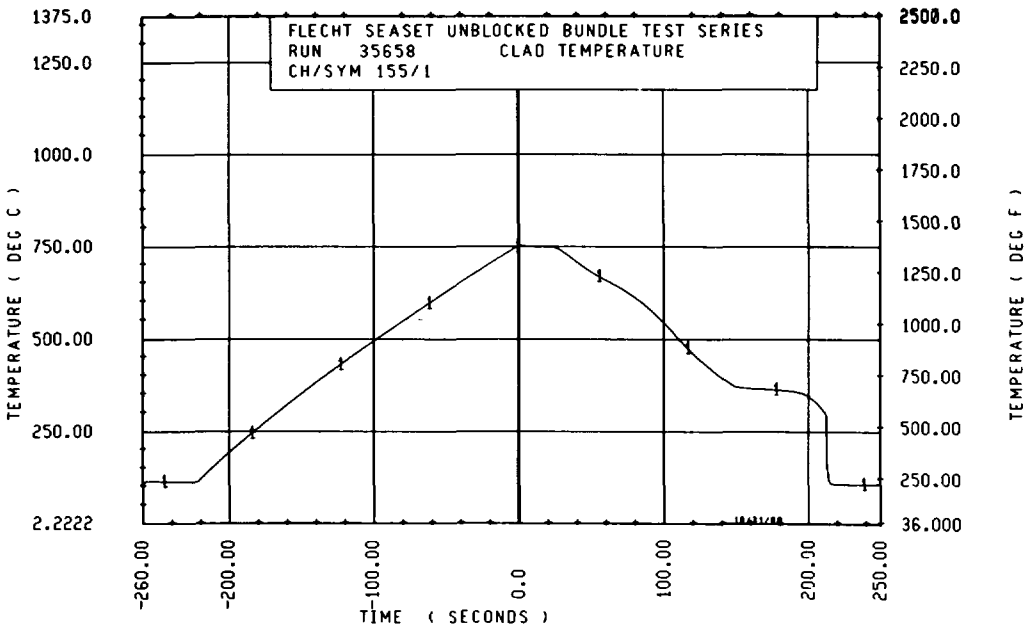

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 HEAT TRANSFER COEFFICIENT
CH/SYM 99/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-260.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

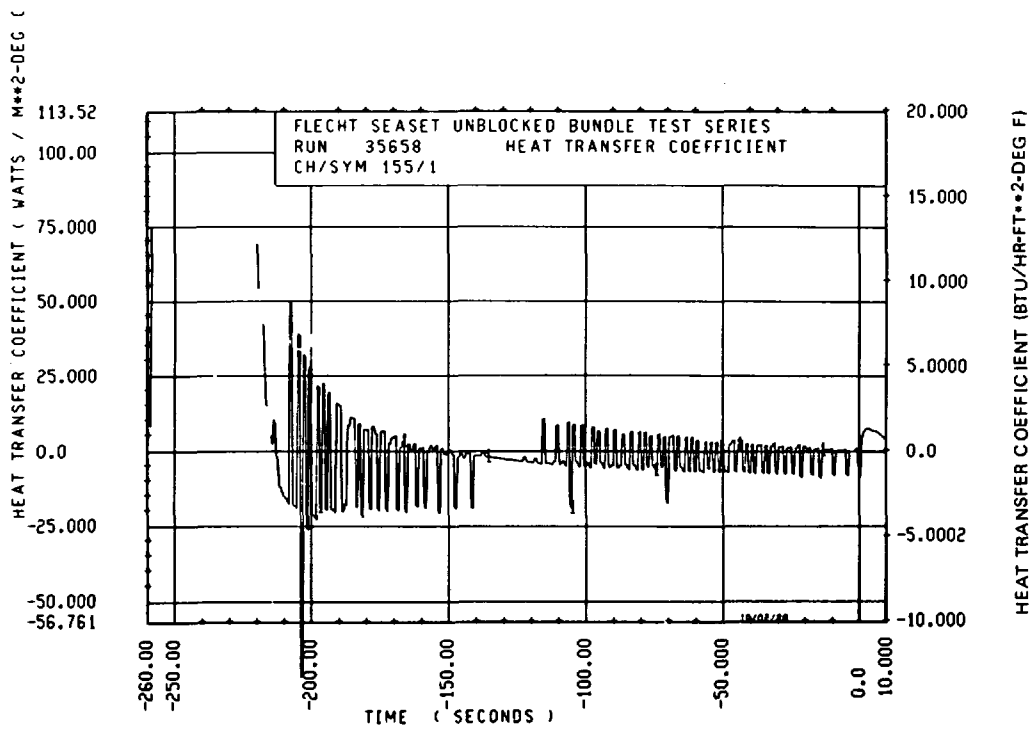

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 CLAD TEMPERATURE
CH/SYM 124/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00

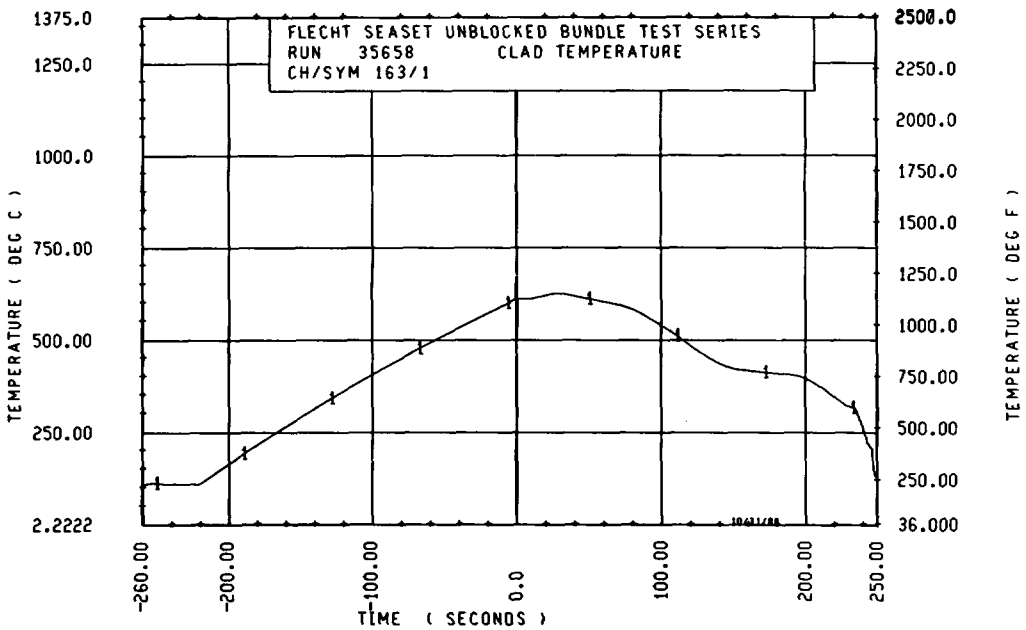

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 HEAT TRANSFER COEFFICIENT
CH/SYM 124/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-260.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

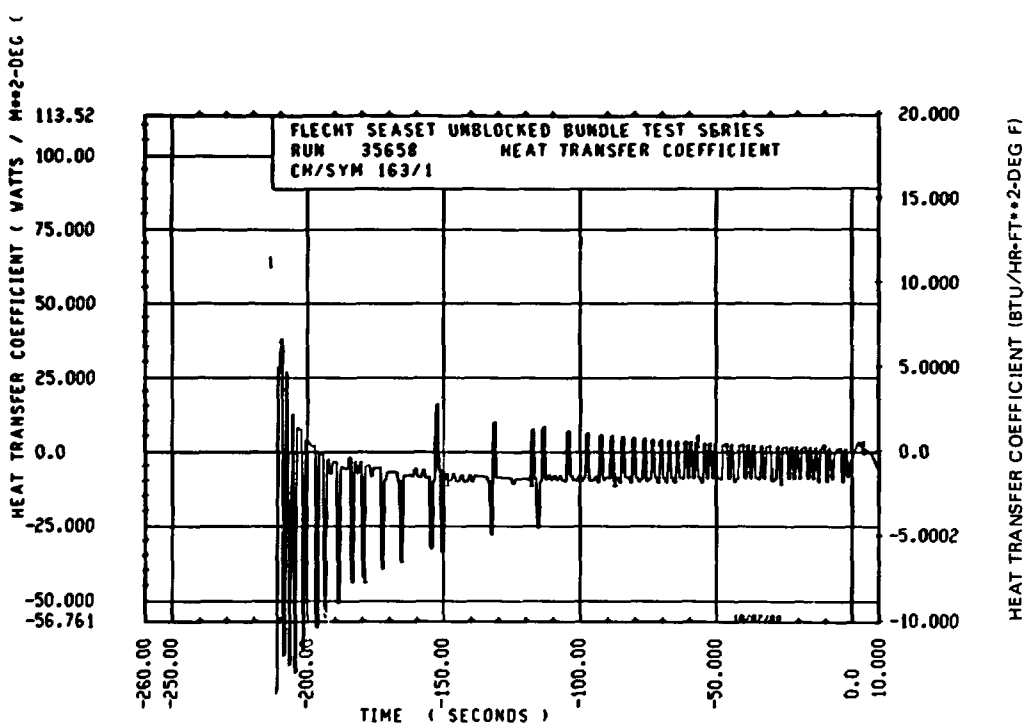

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 CLAD TEMPERATURE
CH/SYM 146/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00

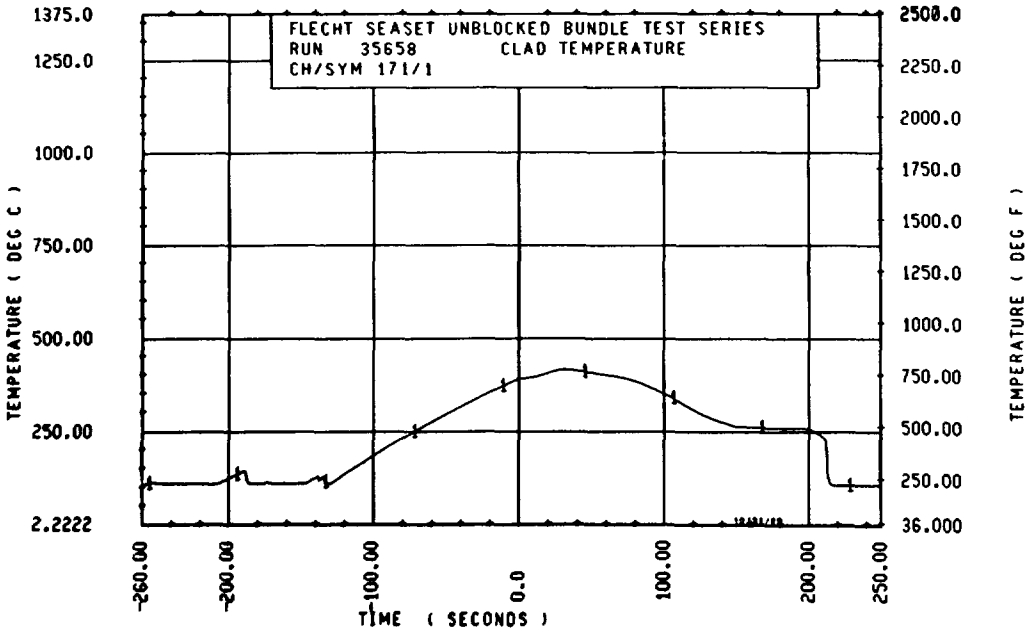

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 HEAT TRANSFER COEFFICIENT
CH/SYM 146/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-260.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

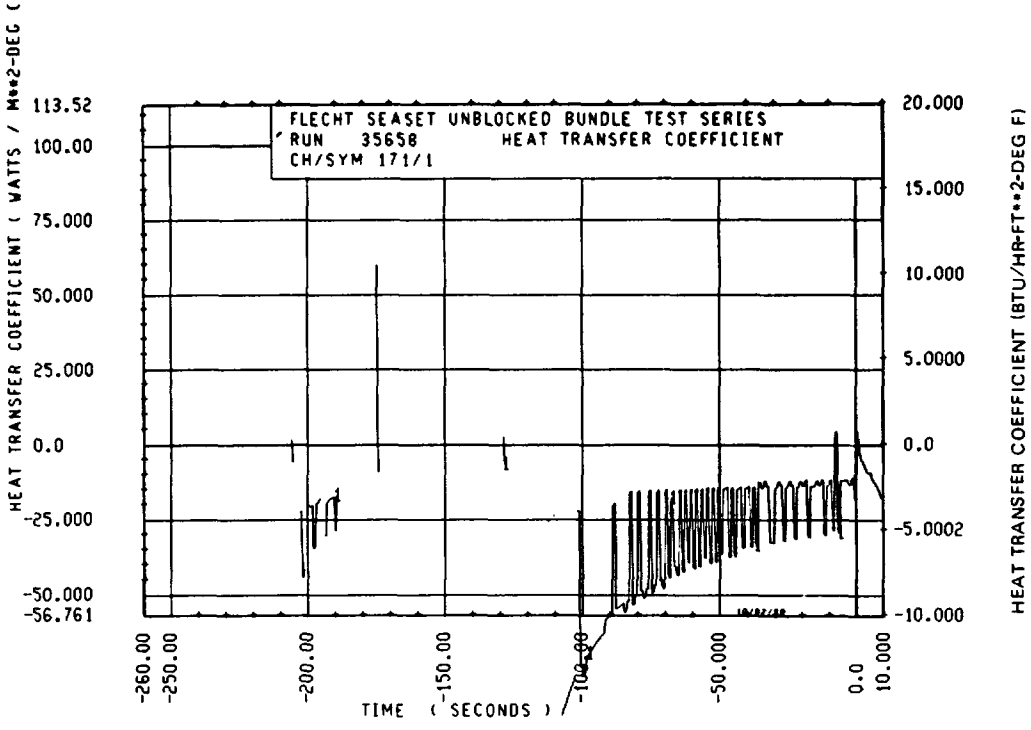

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 CLAD TEMPERATURE
CH/SYM 155/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00

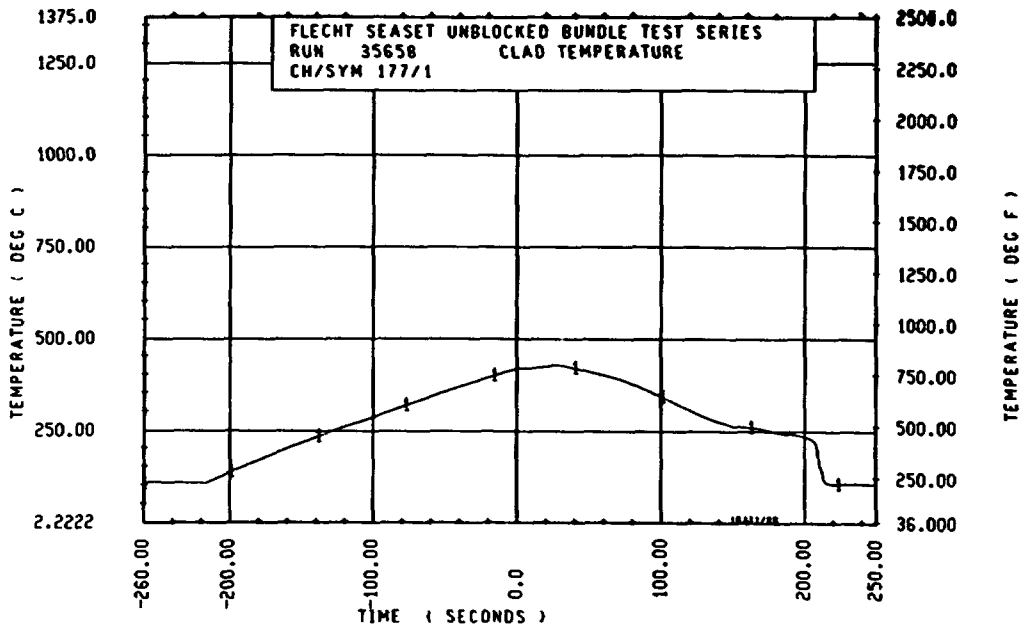

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 HEAT TRANSFER COEFFICIENT
CH/SYM 155/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-260.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

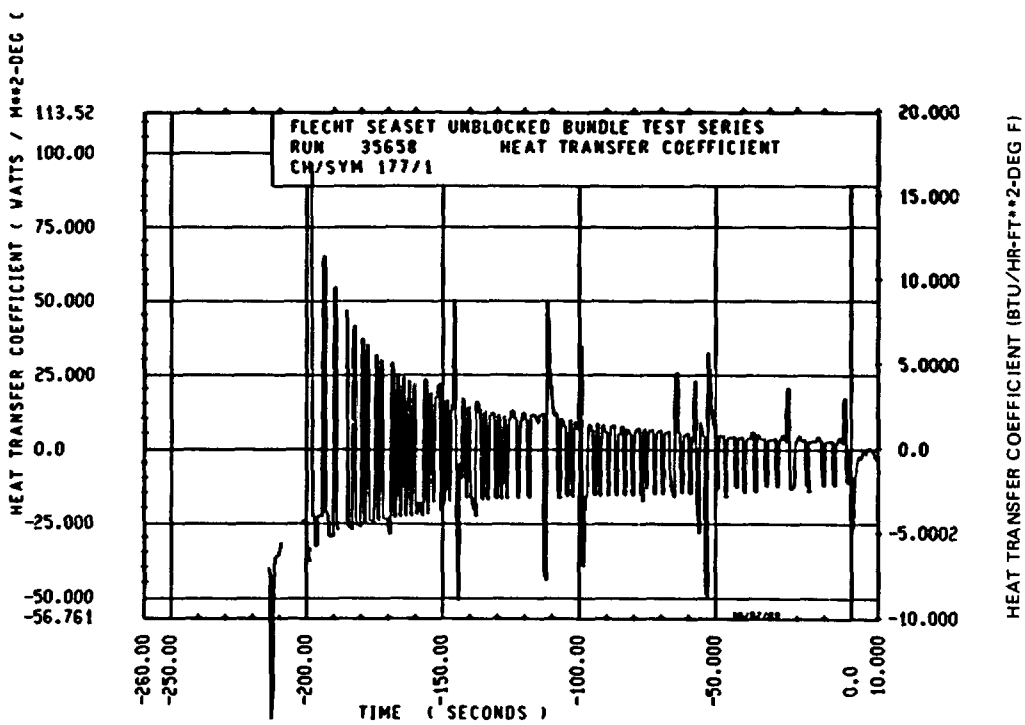

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 CLAD TEMPERATURE
CH/SYM 163/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00

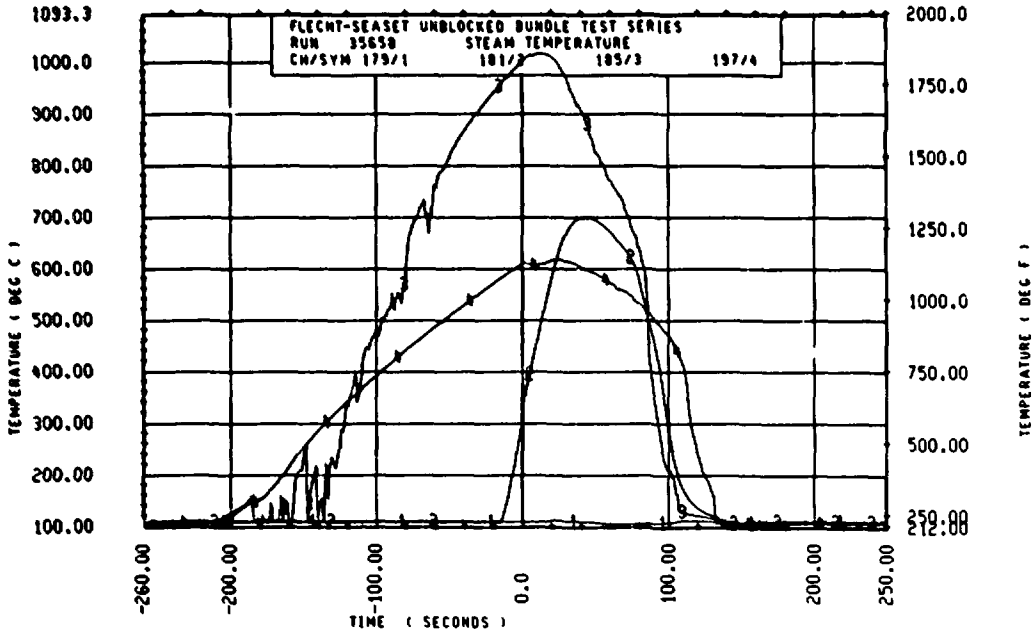

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 HEAT TRANSFER COEFFICIENT
CH/SYM 163/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG (
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-260.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

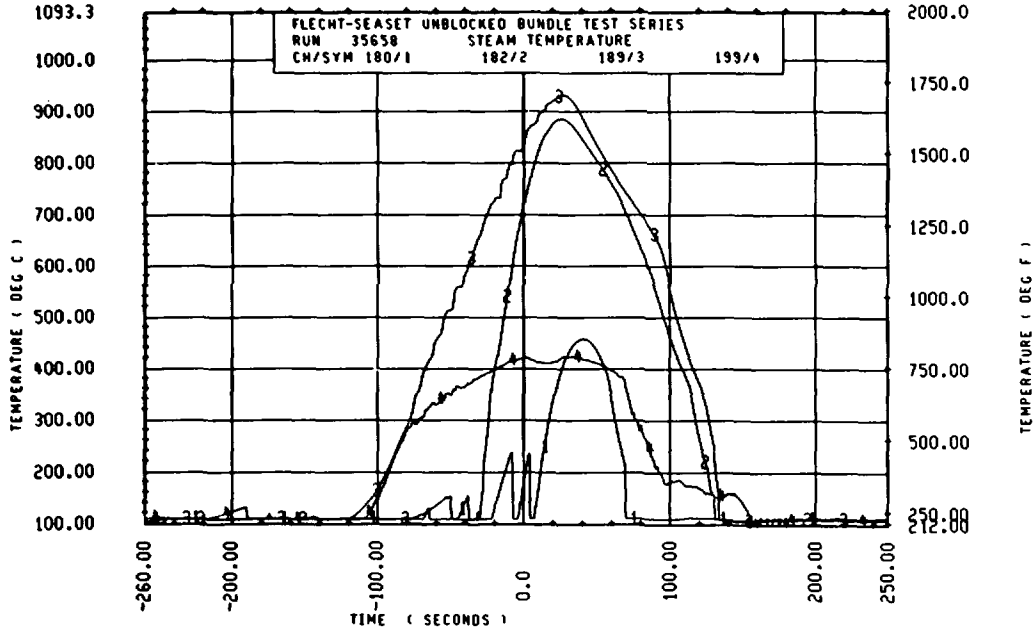

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 CLAD TEMPERATURE
CH/SYM 171/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00

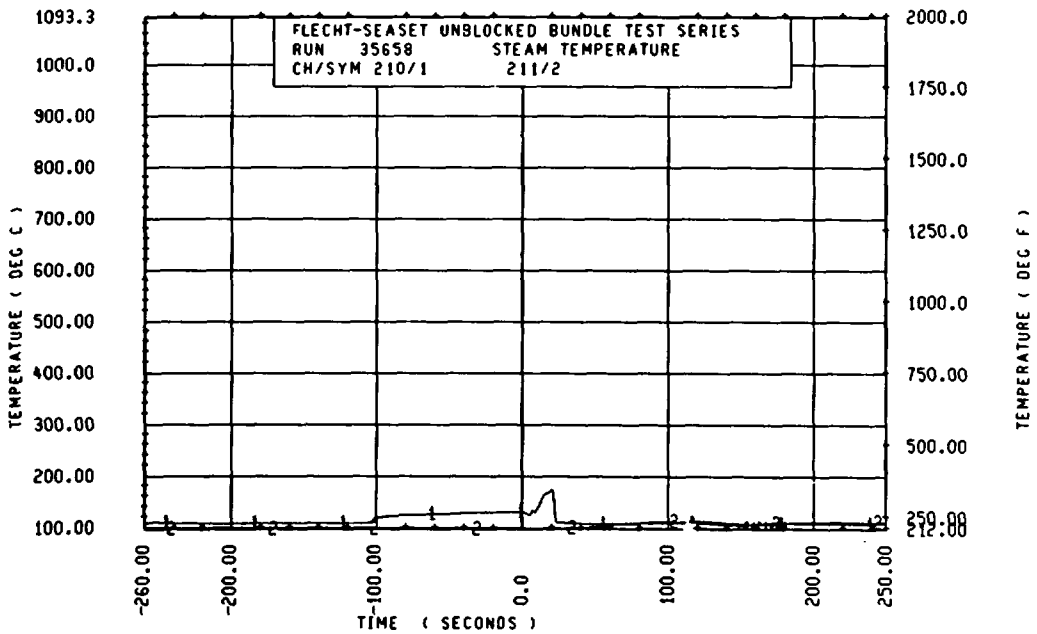

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 HEAT TRANSFER COEFFICIENT
CH/SYM 171/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-260.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

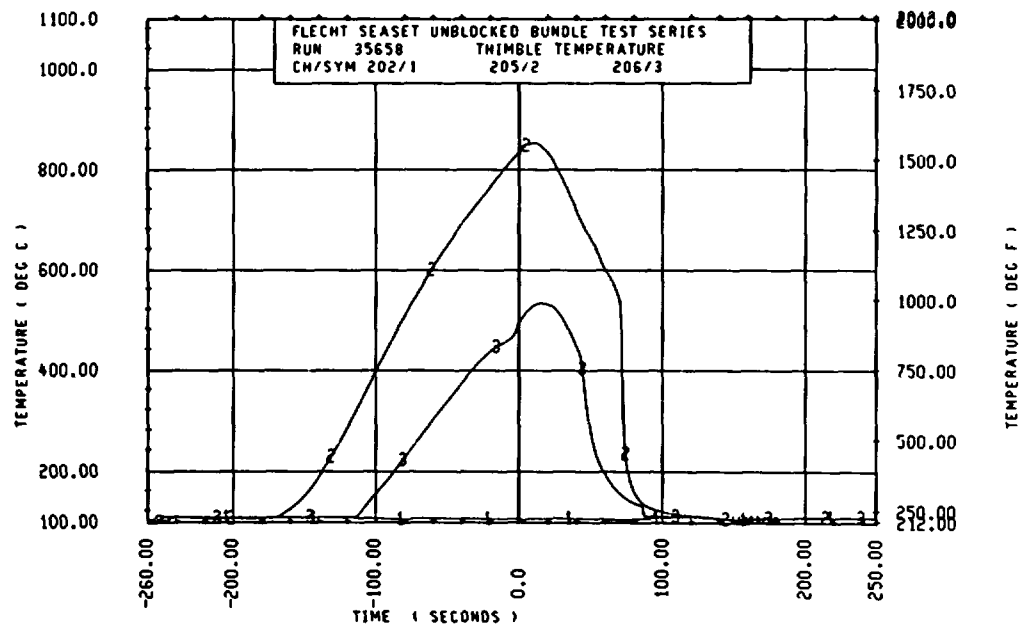

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 CLAD TEMPERATURE
CH/SYM 177/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00

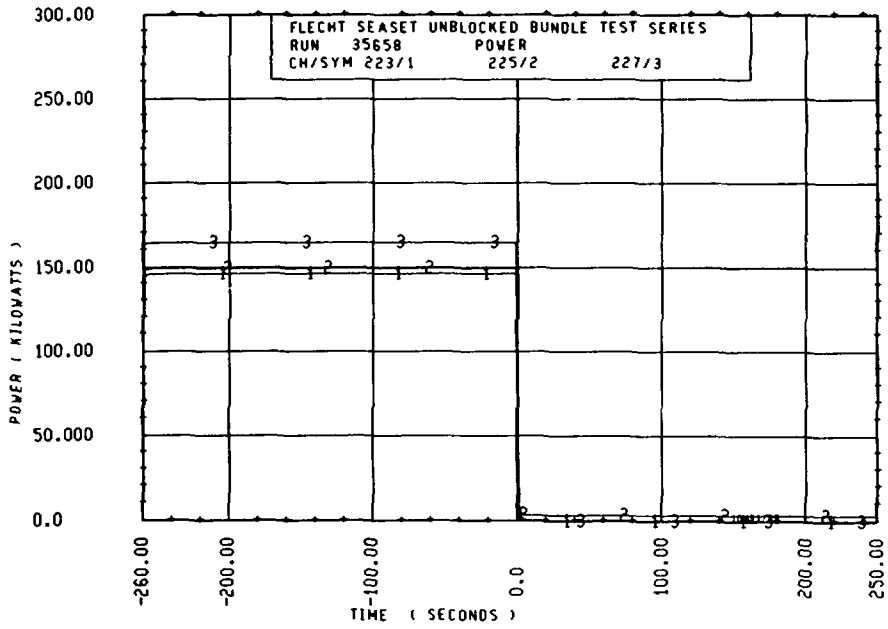

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 HEAT TRANSFER COEFFICIENT
CH/SYM 177/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-260.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
10.000

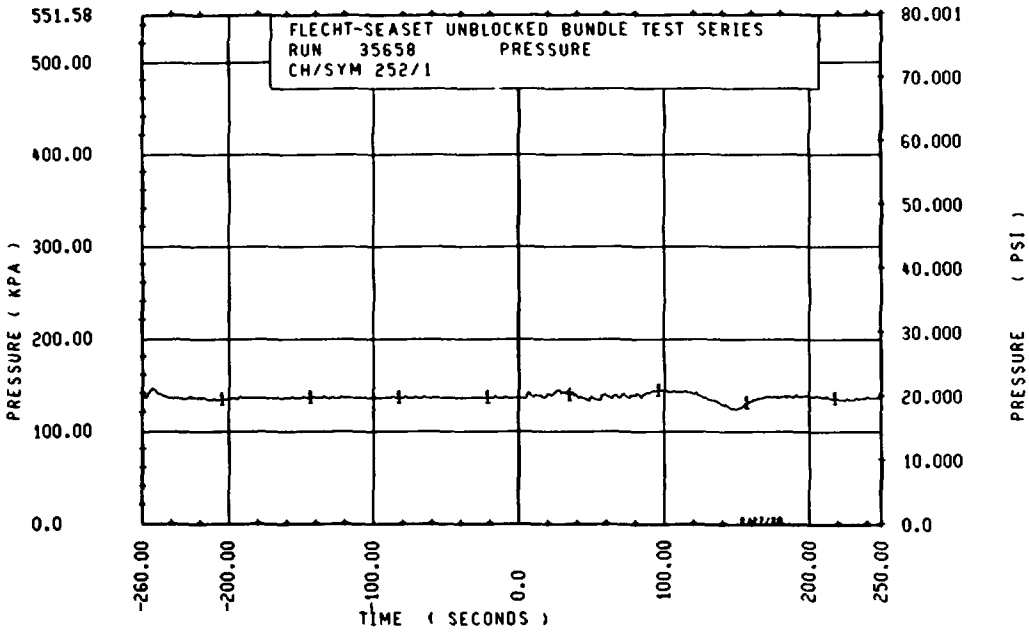

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 STEAM TEMPERATURE
CH/SYM 179/1 181/2 185/3 197/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1093.3
1000.0
900.00
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
212.00
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00

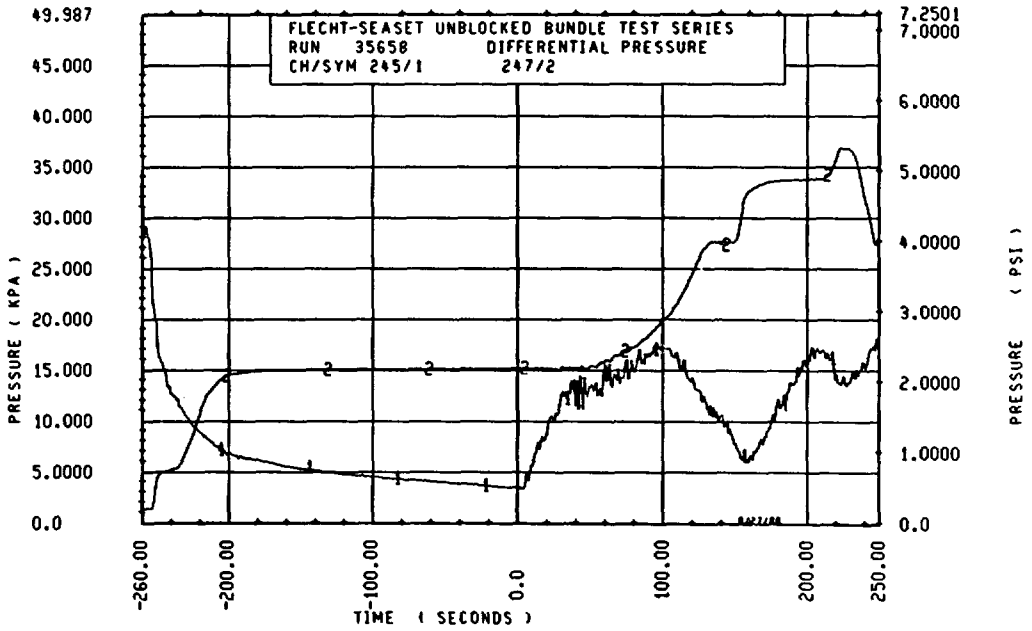

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 STEAM TEMPERATURE
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1093.3
1000.0
900.00
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
212.00
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00

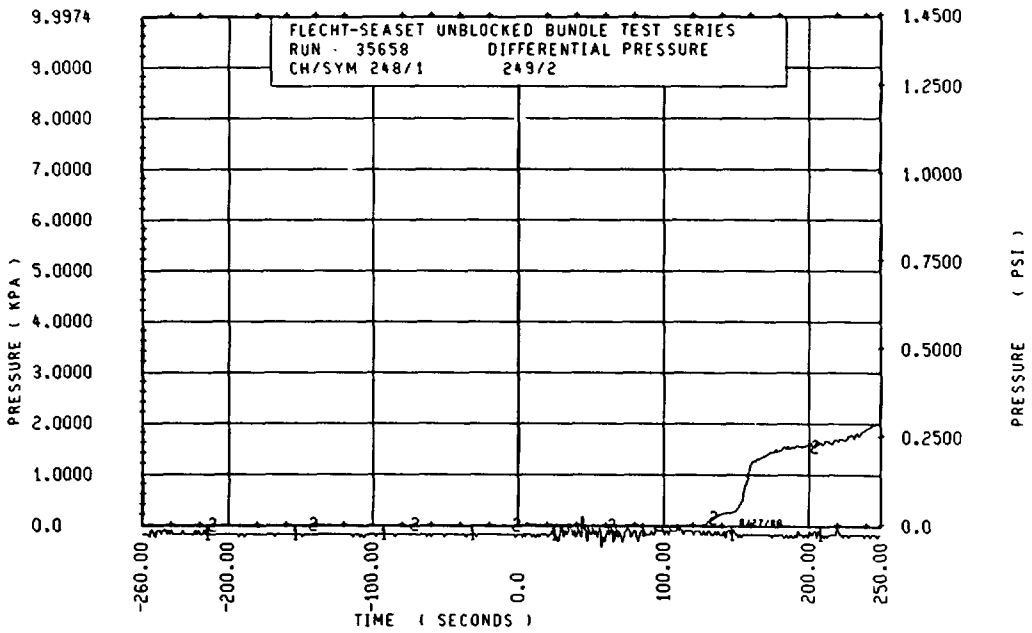

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 STEAM TEMPERATURE
CH/SYM 210/1 211/2
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

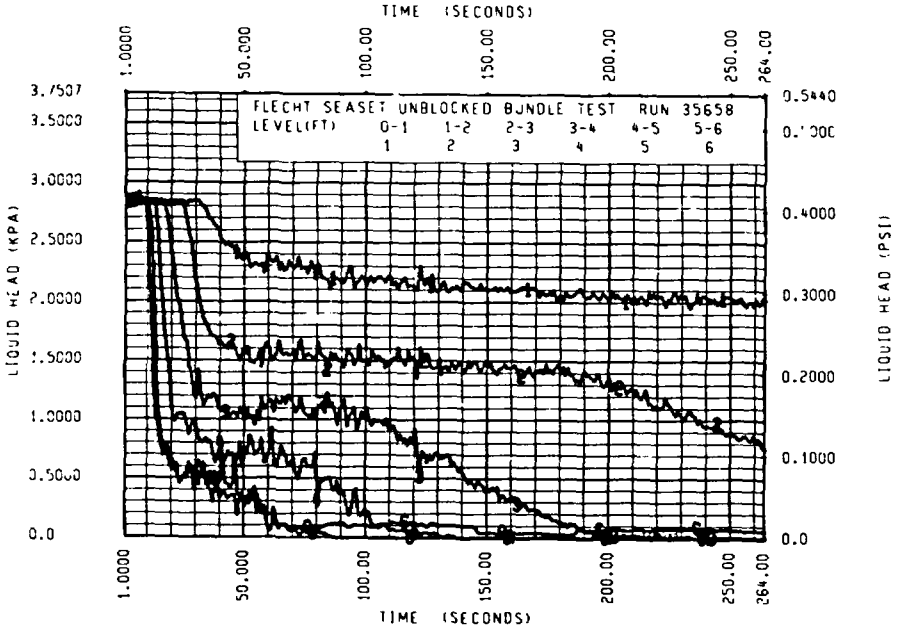

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 THIMBLE TEMPERATURE
CH/SYM 202/1 205/2 206/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

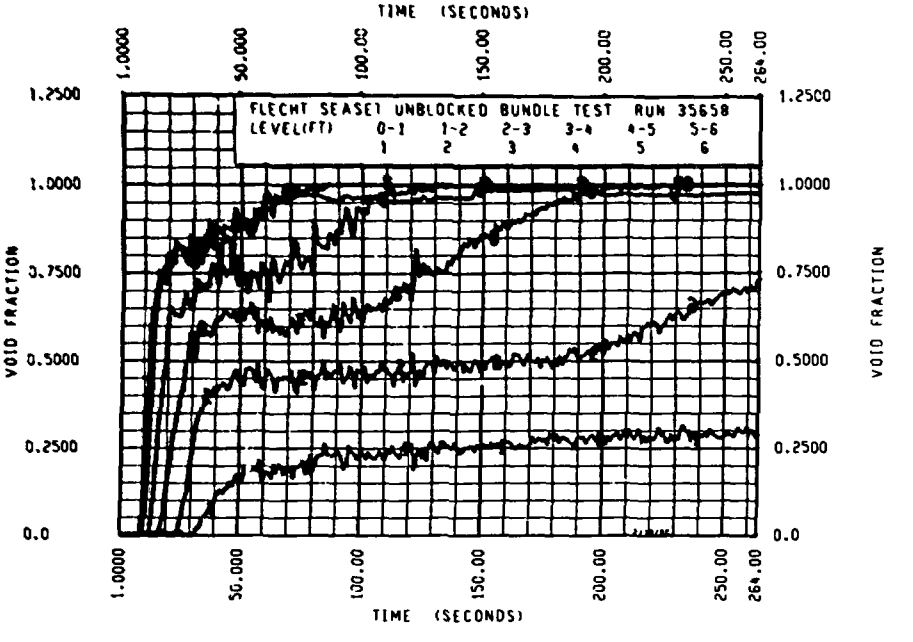

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 POWER
CH/SYM 223/1 225/2 227/3
300.00
250.00
200.00
150.00
100.00
50.000
0.0
POWER (KILOWATTS)
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 PRESSURE
CH/SYM 252/1
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (KPA)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
PRESSURE (PSI)
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00
TIME (SECONDS)

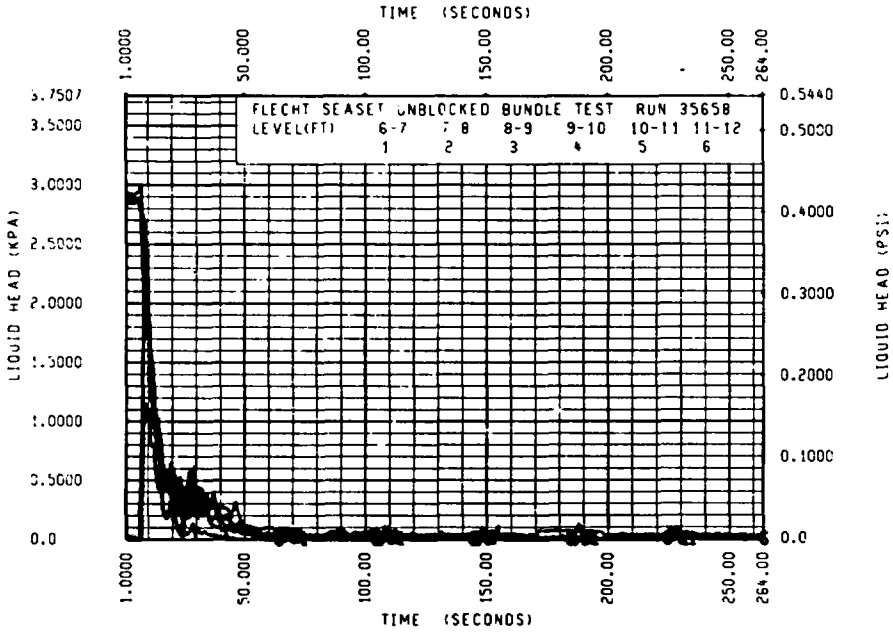

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35658 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00

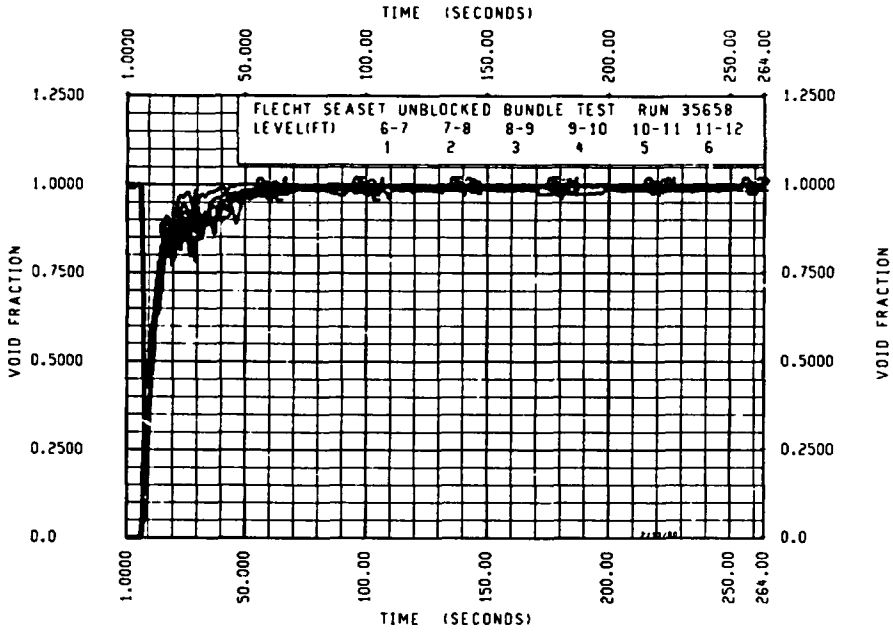

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN - 35658 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
9.9974
9.0000
8.0000
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
1.4500
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-260.00
-200.00
-100.00
0.0
100.00
200.00
250.00





NOTE: In these two plots, 1 second is really the initiation of the boiloff test at time -263 seconds.





NOTE: In these two plots, 1 second is really the initiation of the boiloff test at time -263 seconds.

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 35759

Date: 8/24/79

Boiloff Test

A. Run Conditions

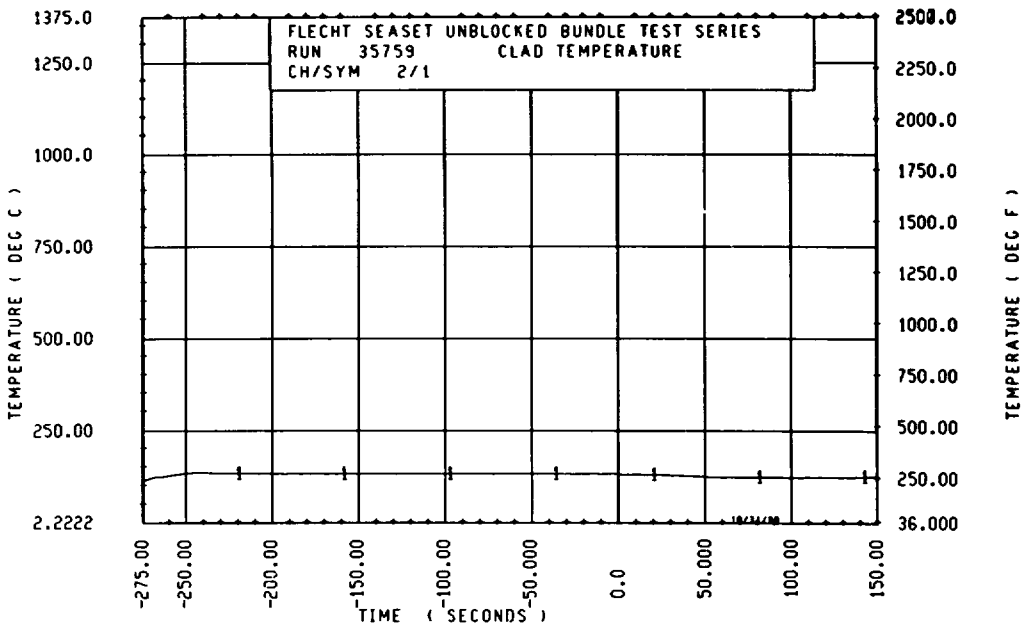
Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	122°C (251°F)
Rod peak power	1.38 kw/m (0.422 kw/ft)
Initial water level	3.002 m (118.2 in.)
Coolant temperature	123°C (254°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

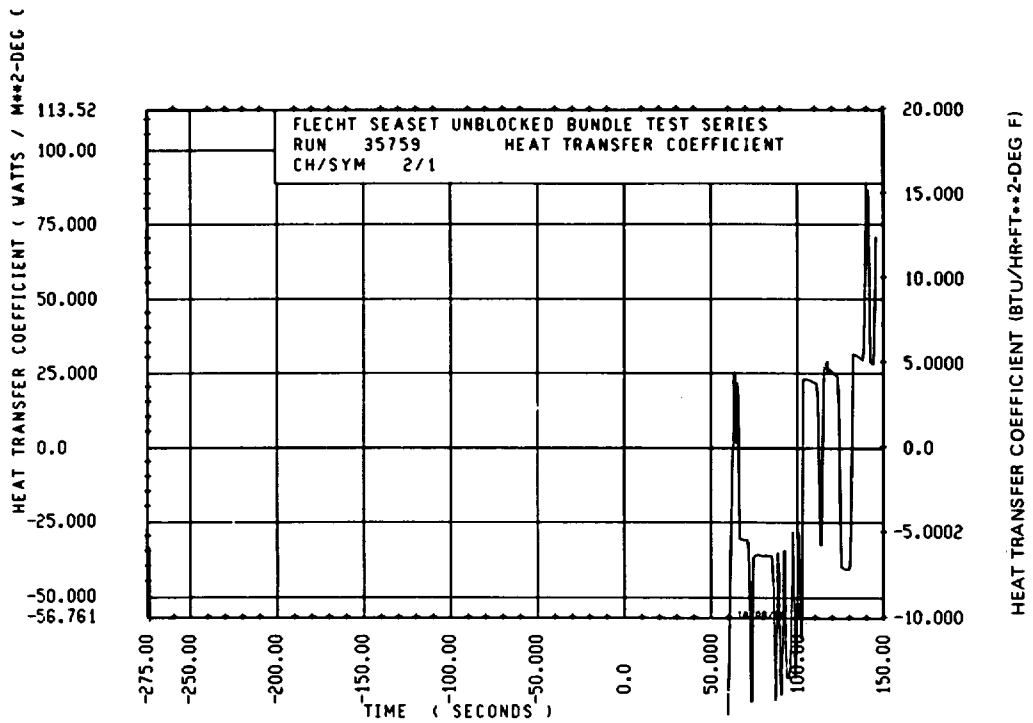
B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature
0.61 m (24 in.)		
1.22 m (48 in.)		
1.83 m (72 in.)		
2.44 m (96 in.)	(No housing temperatures available)	
2.74 m (108 in.)		
3.05 m (120 in.)		
3.35 m (132 in.)		

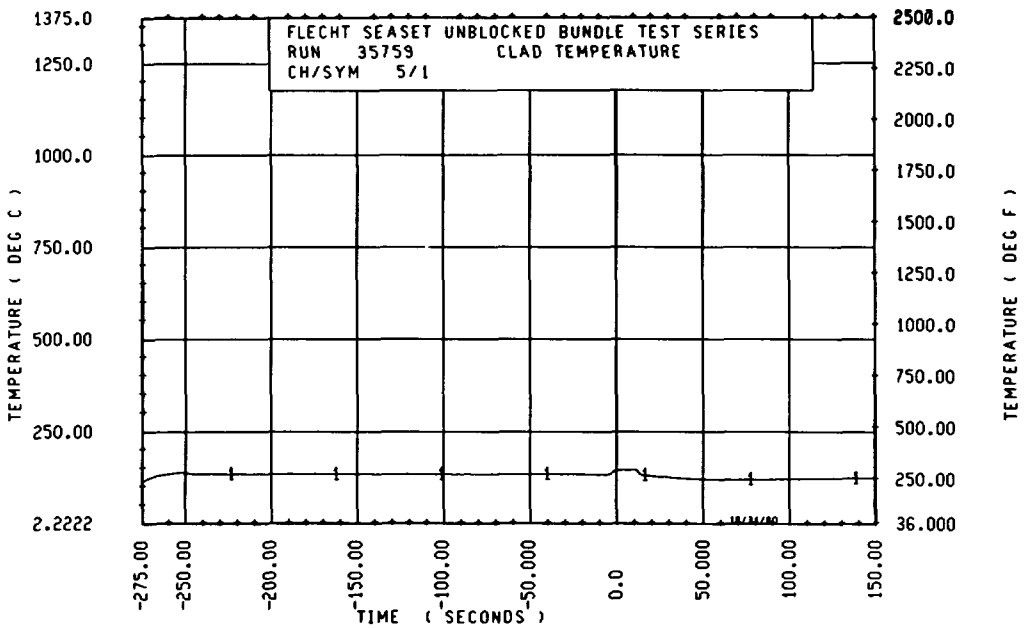
C. Comments

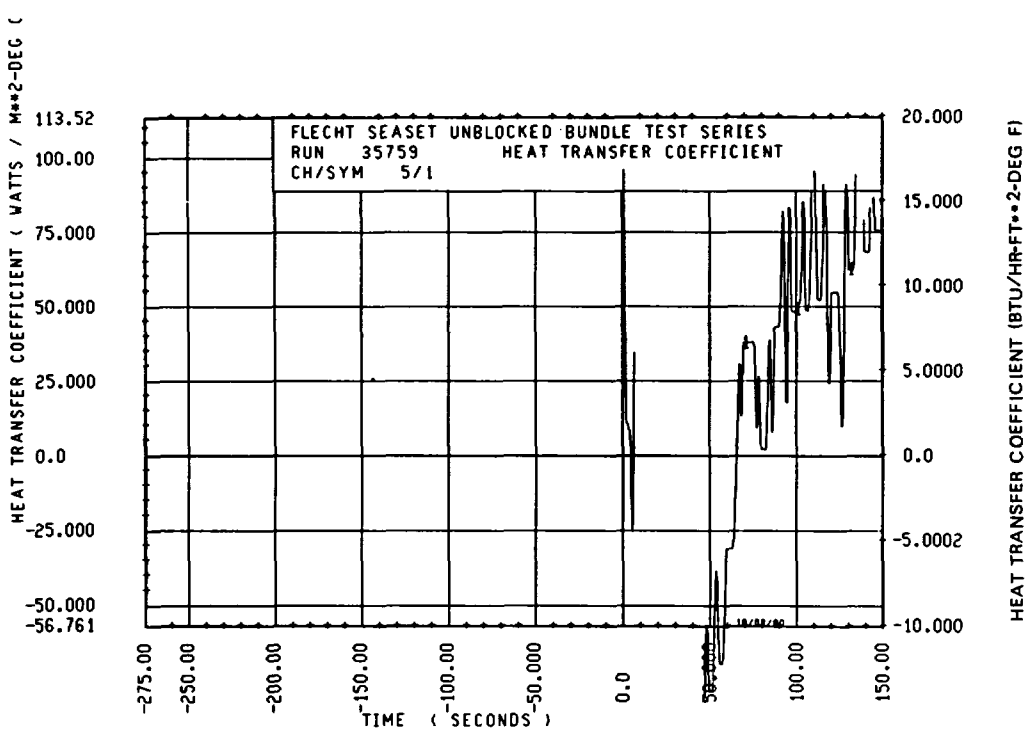
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. There was 6.6 percent mass loss through steam probes.

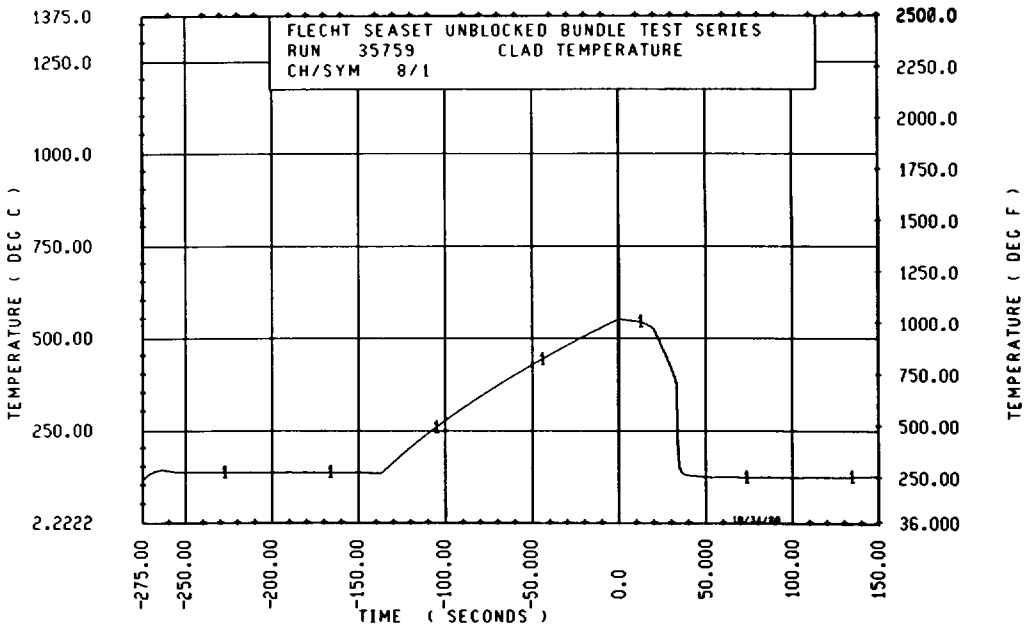

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 CLAD TEMPERATURE
CH/SYM 2/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

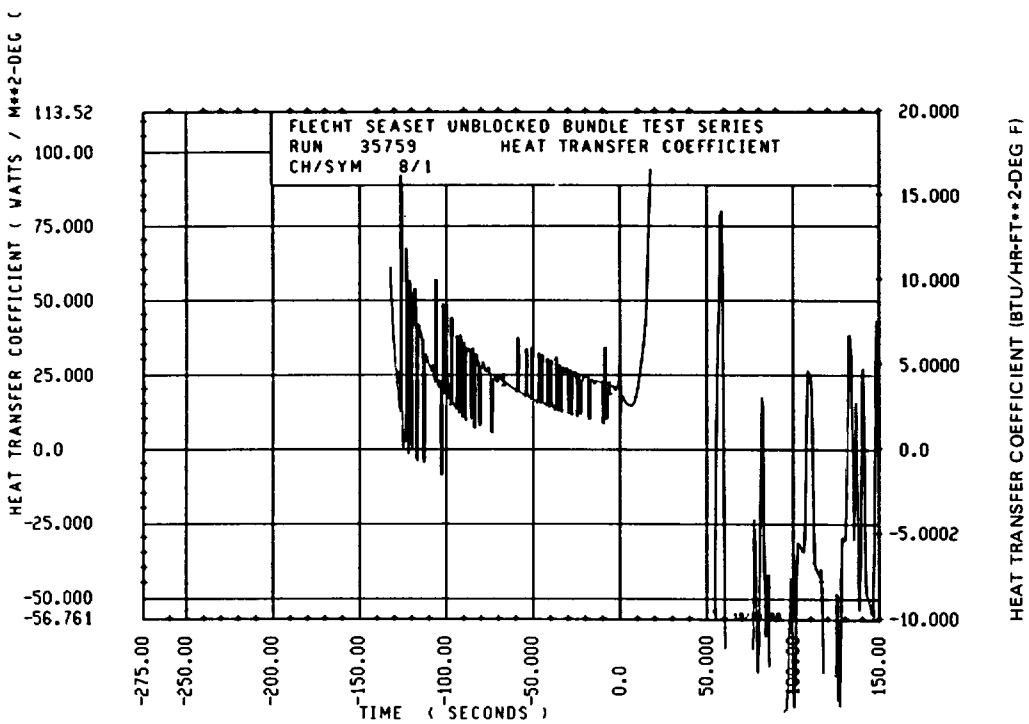

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
150.00

35759-2

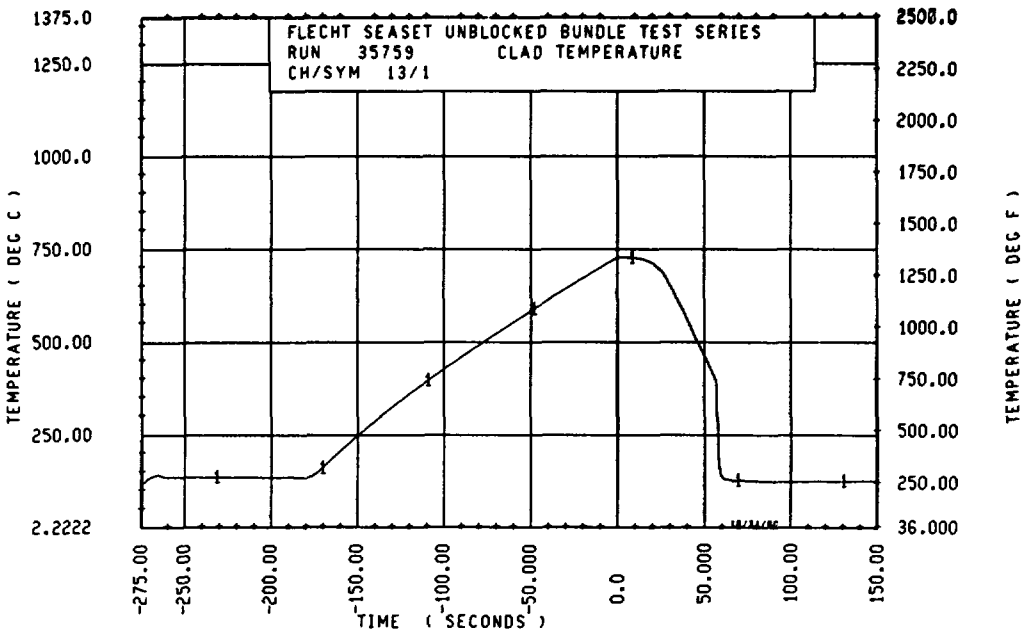

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 CLAD TEMPERATURE
CH/SYM 5/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

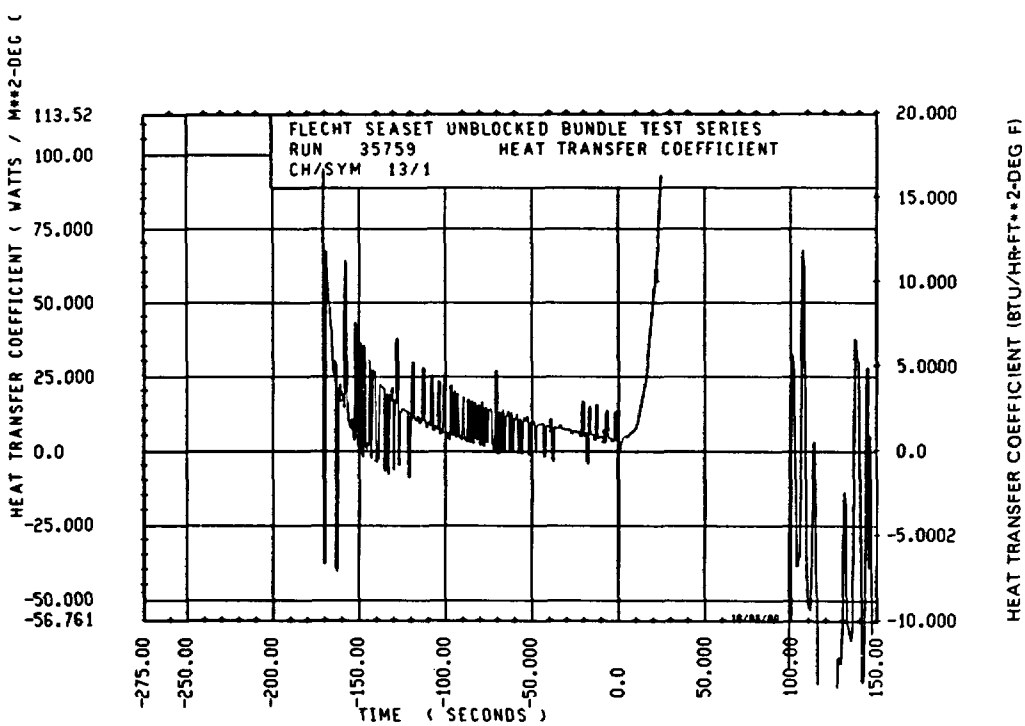

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)

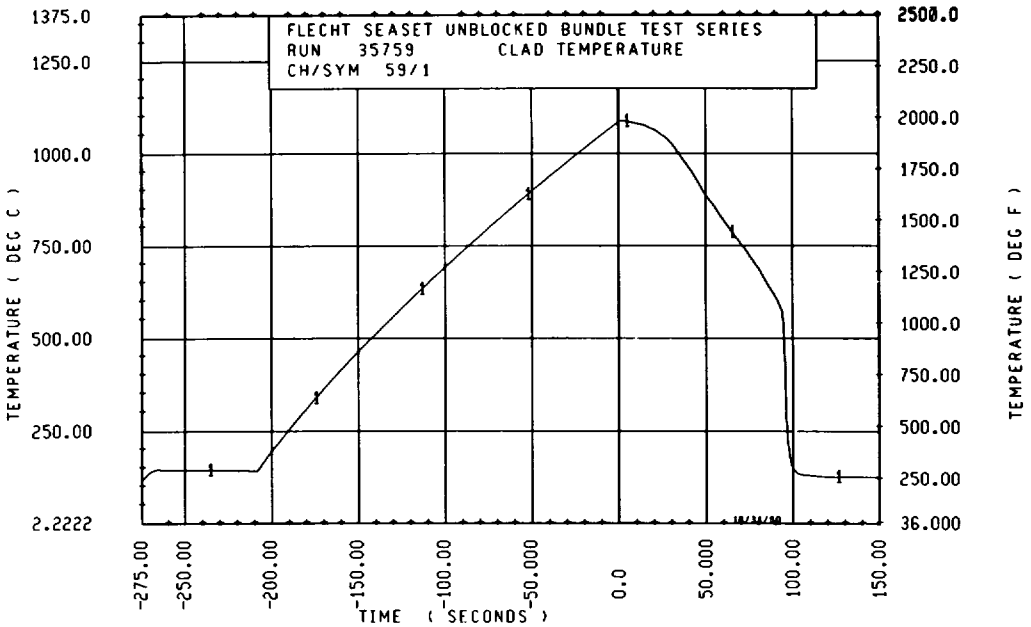

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 CLAD TEMPERATURE
CH/SYM 8/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

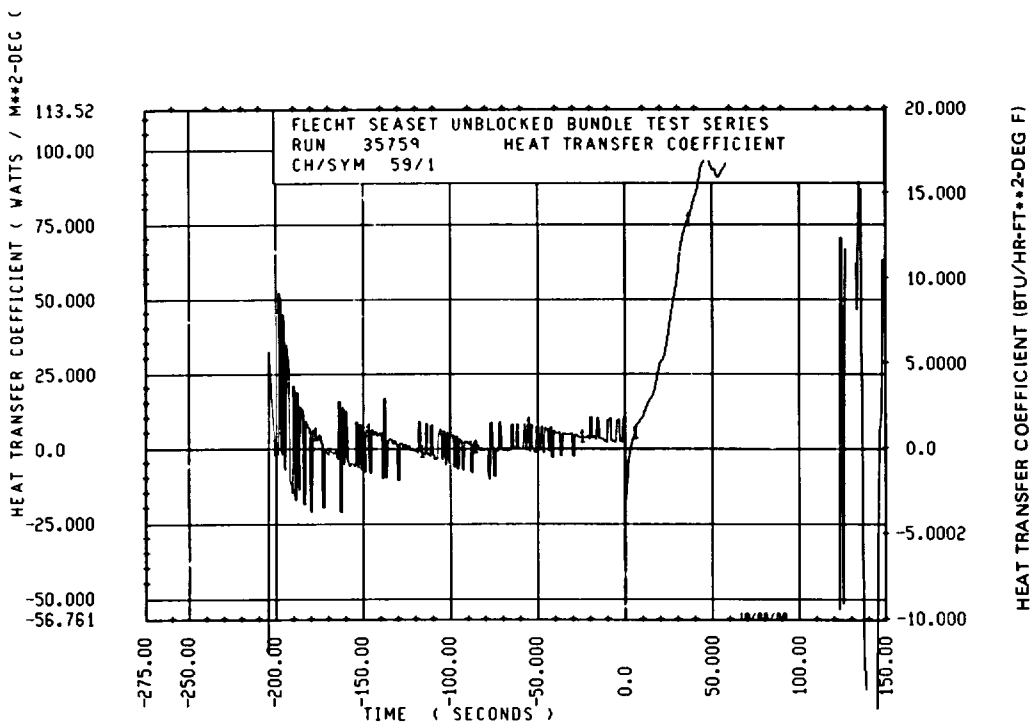

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG (
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
150.00

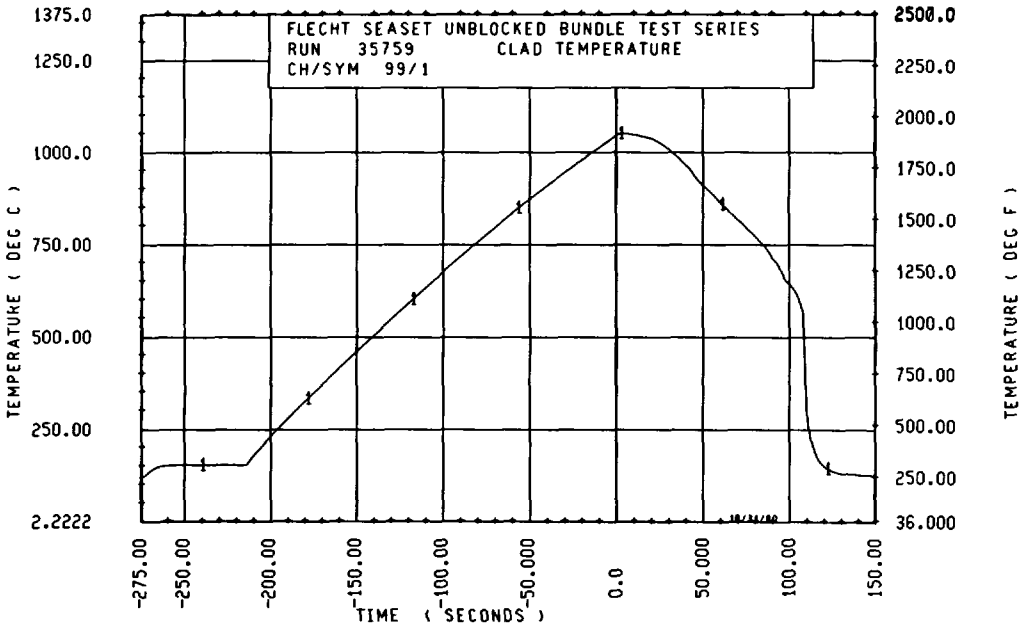
35759-4

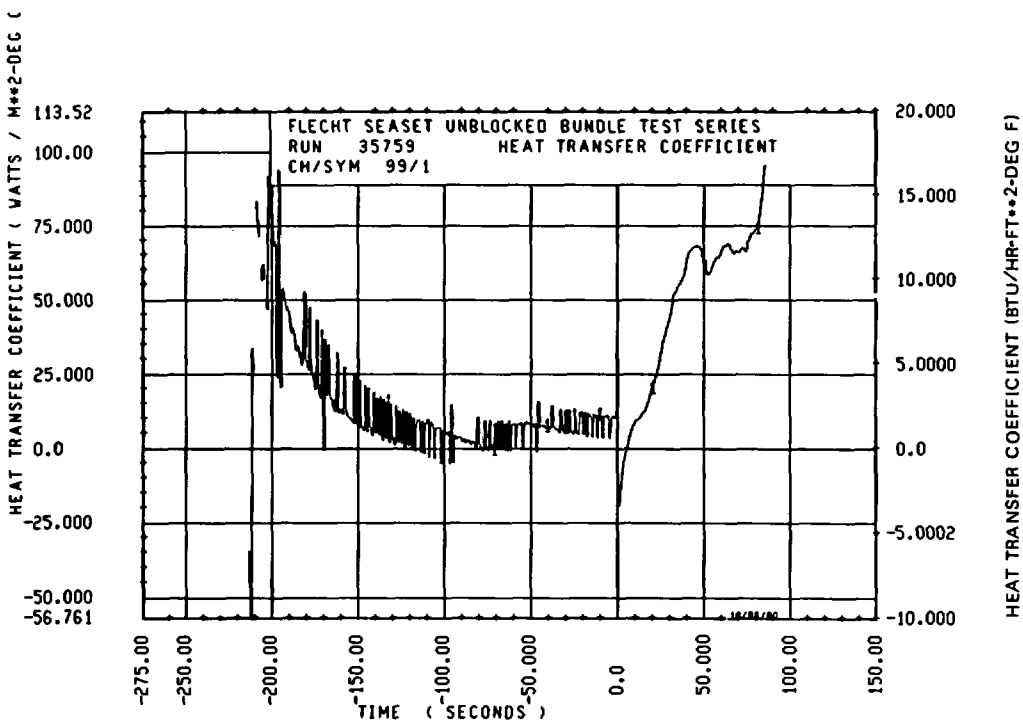

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 CLAD TEMPERATURE
CH/SYM 13/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

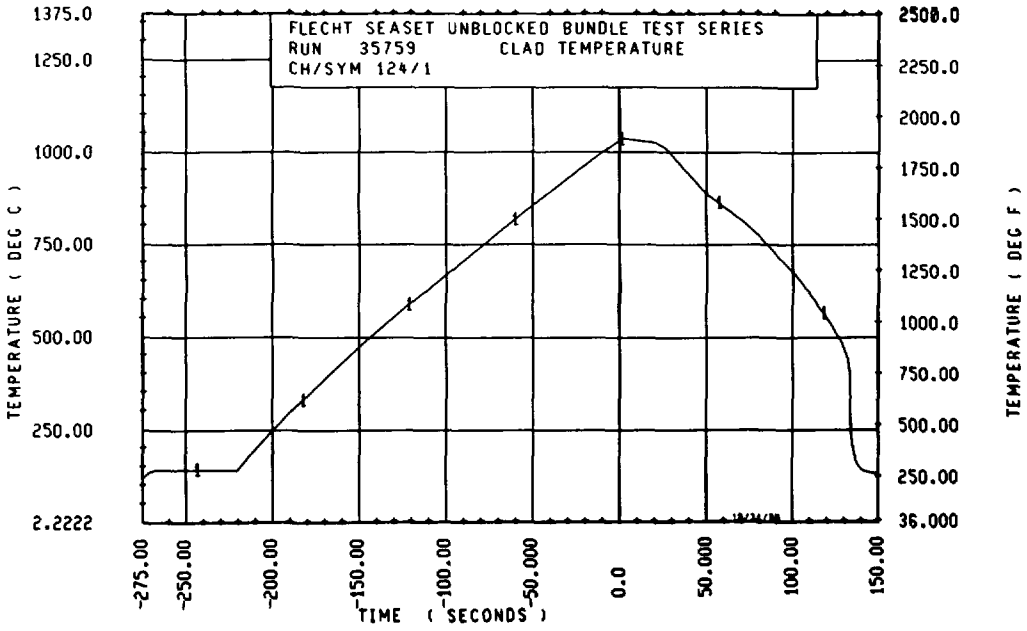

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 HEAT TRANSFER COEFFICIENT
CH/SYM 13/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

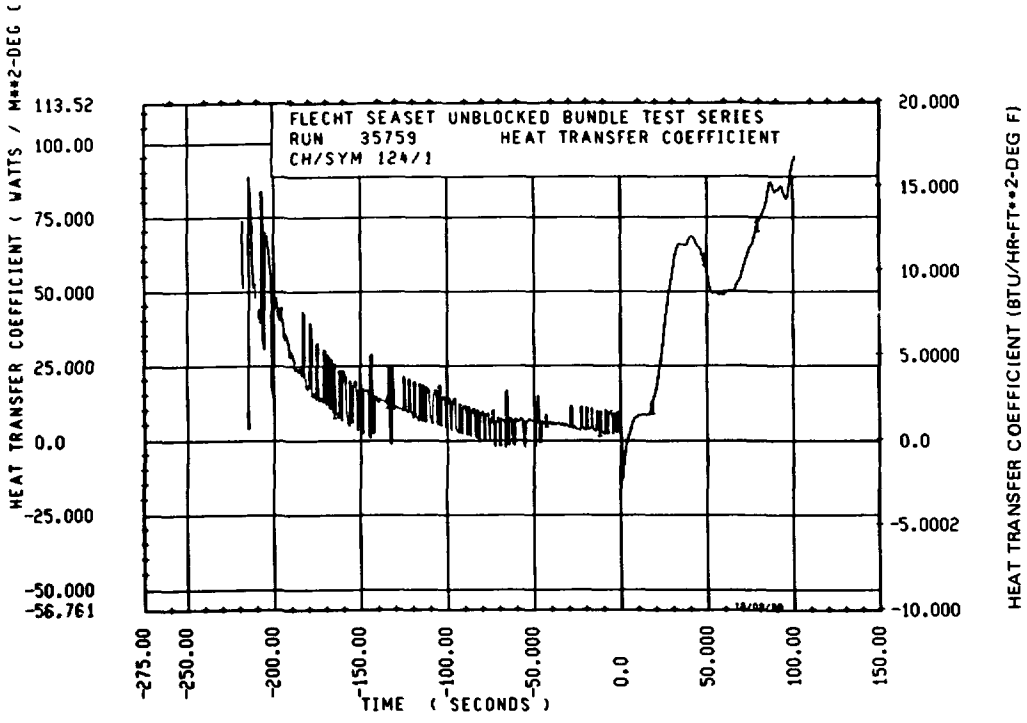

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 CLAD TEMPERATURE
CH/SYM 59/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

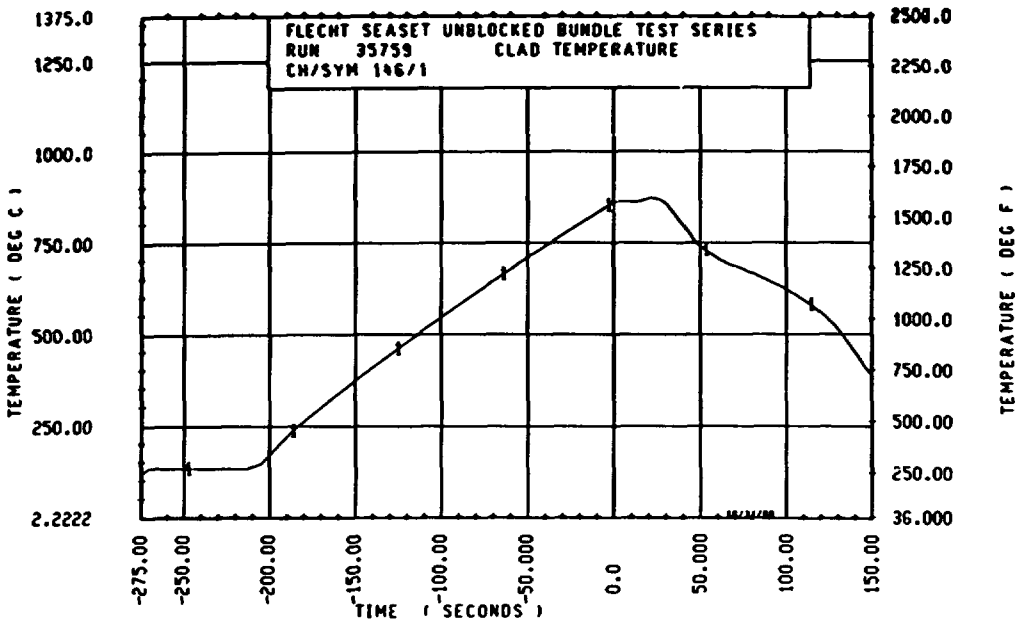

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 HEAT TRANSFER COEFFICIENT
CH/SYM 59/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG (
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

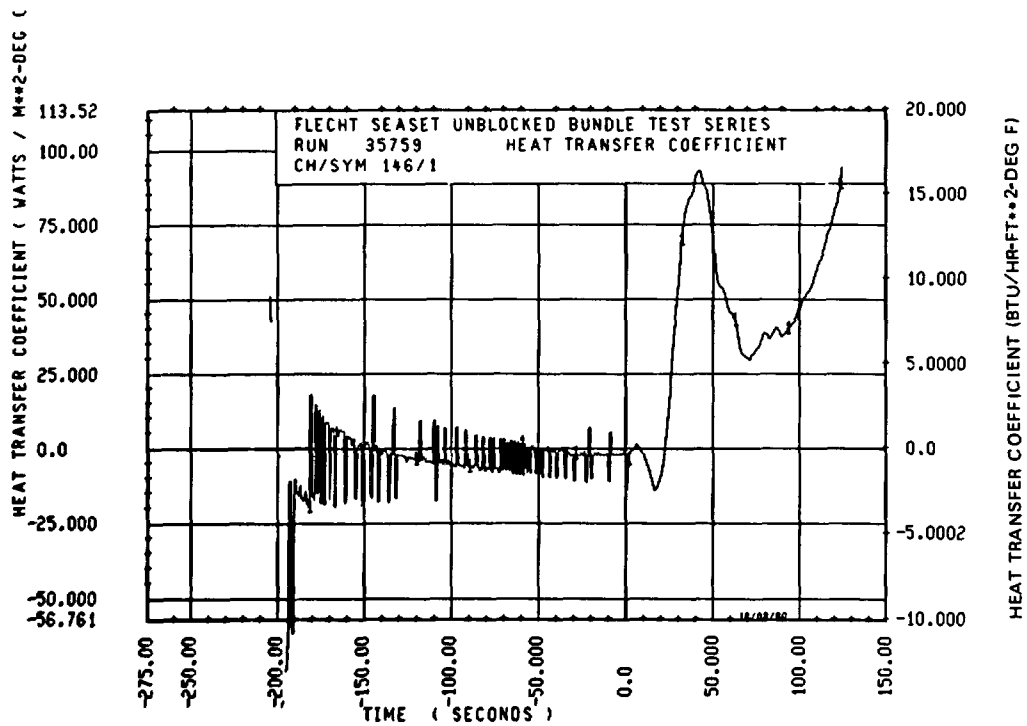

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 CLAD TEMPERATURE
CH/SYM 99/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

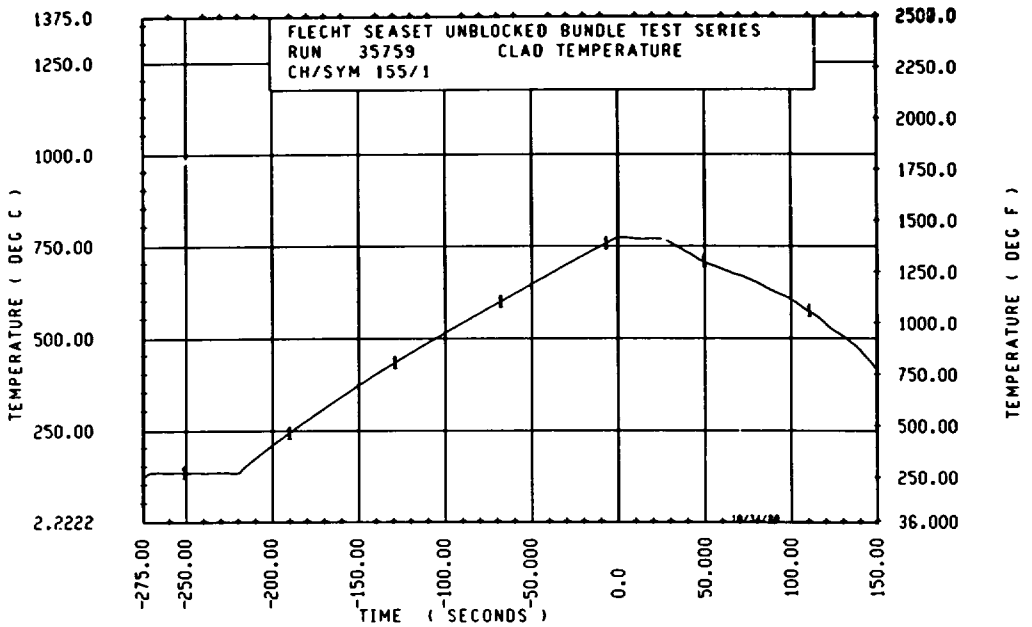

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 HEAT TRANSFER COEFFICIENT
CH/SYM 99/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

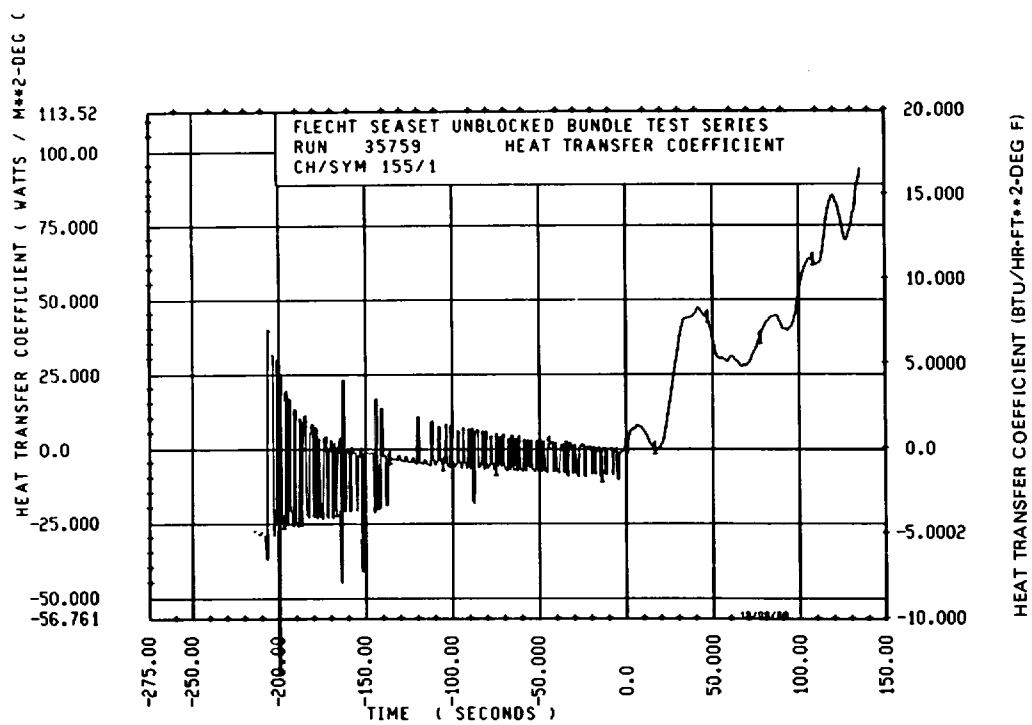

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 CLAD TEMPERATURE
CH/SYM 124/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

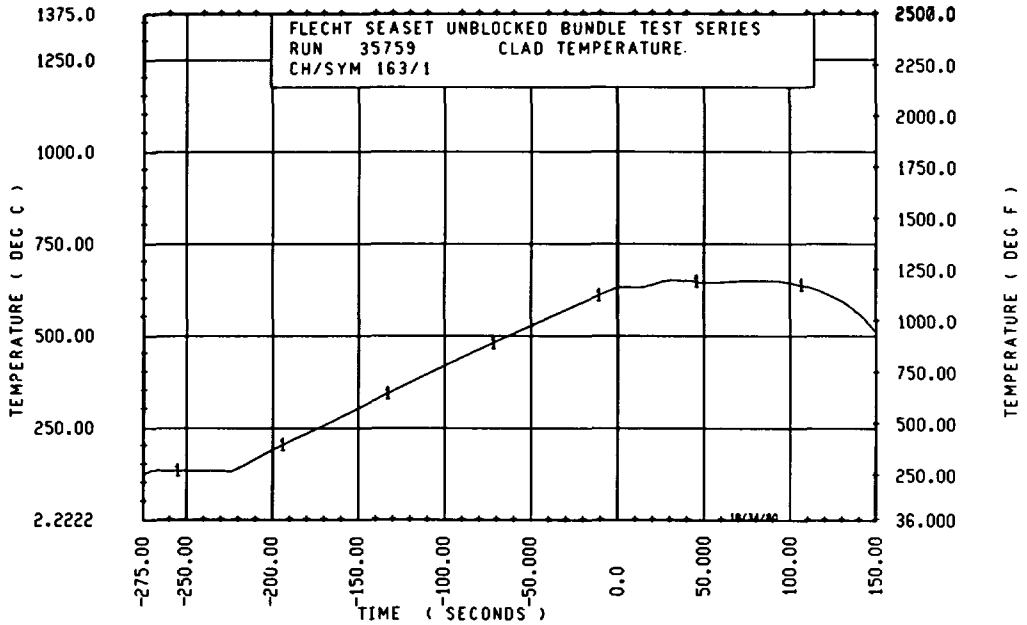

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 HEAT TRANSFER COEFFICIENT
CH/SYM 124/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG (
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

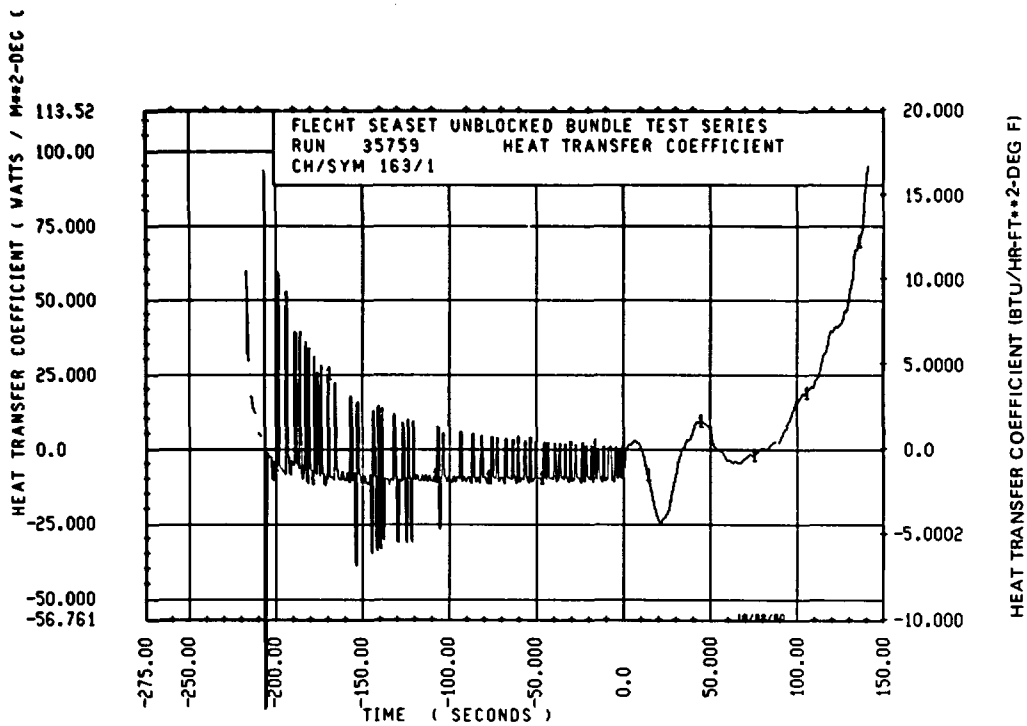

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 CLAD TEMPERATURE
CH/SYM 146/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

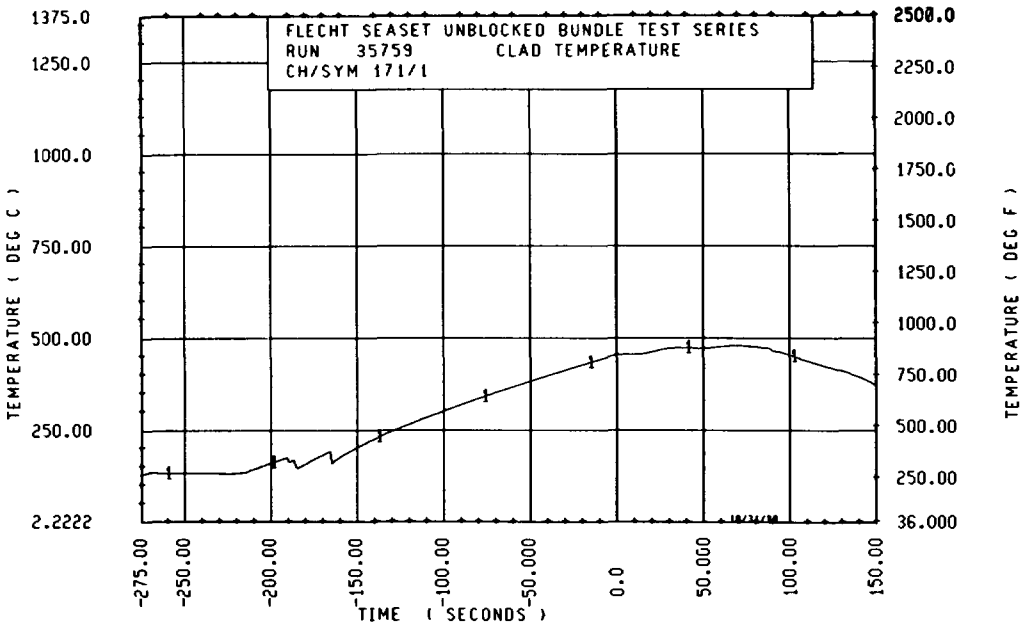

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 HEAT TRANSFER COEFFICIENT
CH/SYM 146/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

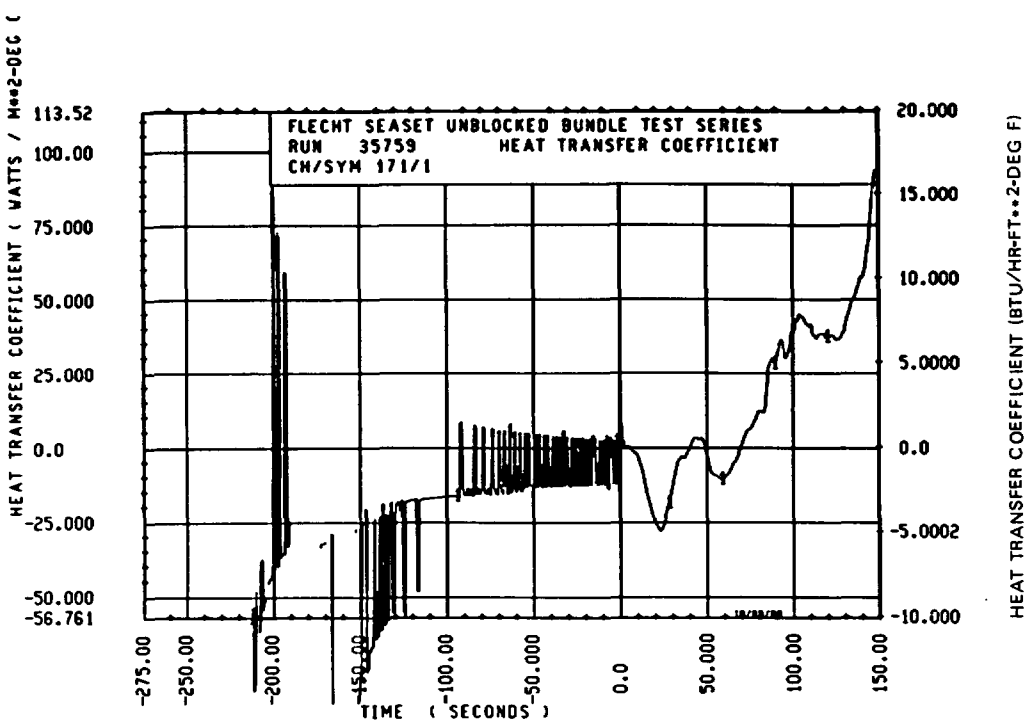

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 CLAD TEMPERATURE
CH/SYM 155/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

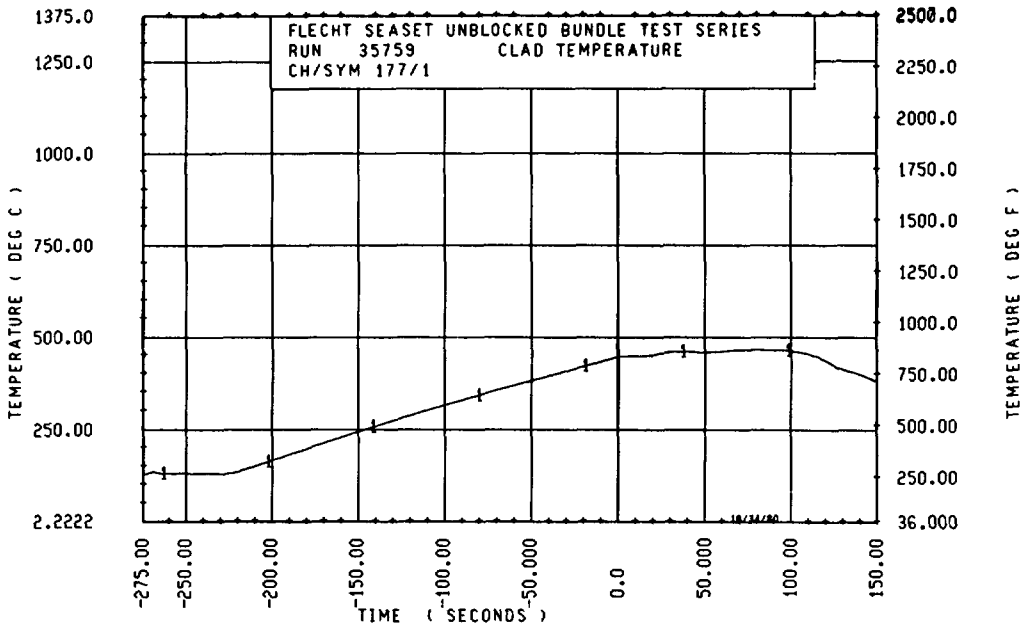

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 HEAT TRANSFER COEFFICIENT
CH/SYM 155/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

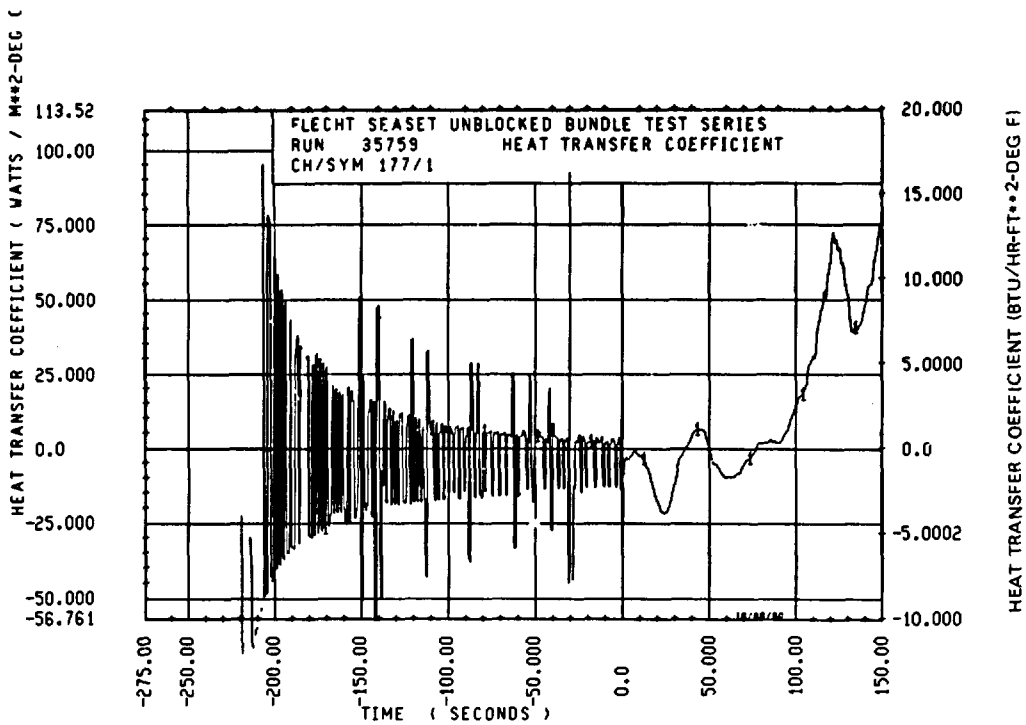

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 CLAD TEMPERATURE
CH/SYM 163/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

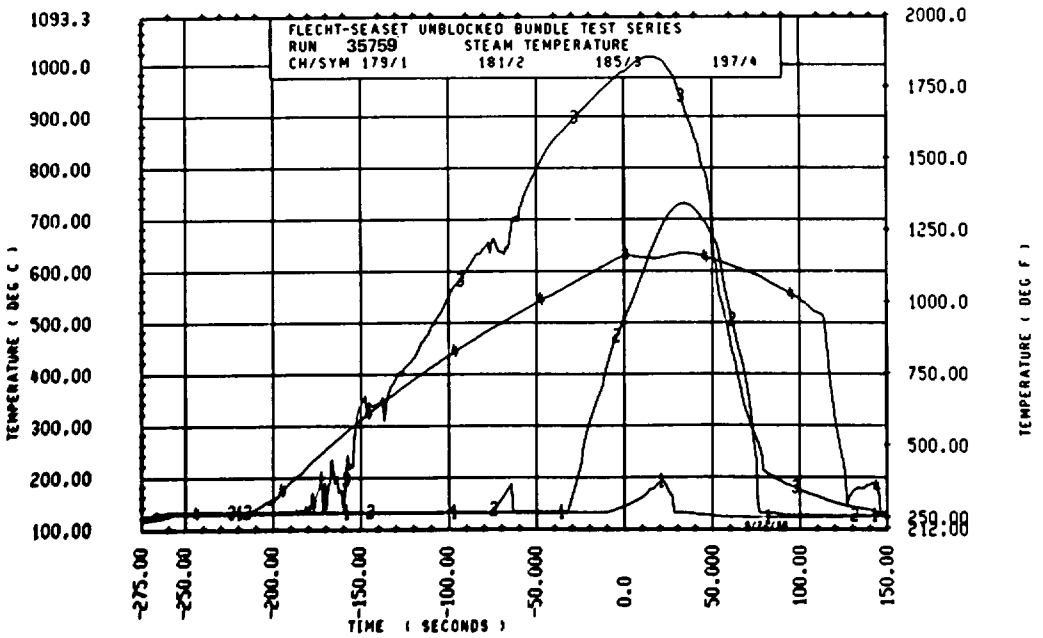

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 HEAT TRANSFER COEFFICIENT
CH/SYM 163/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

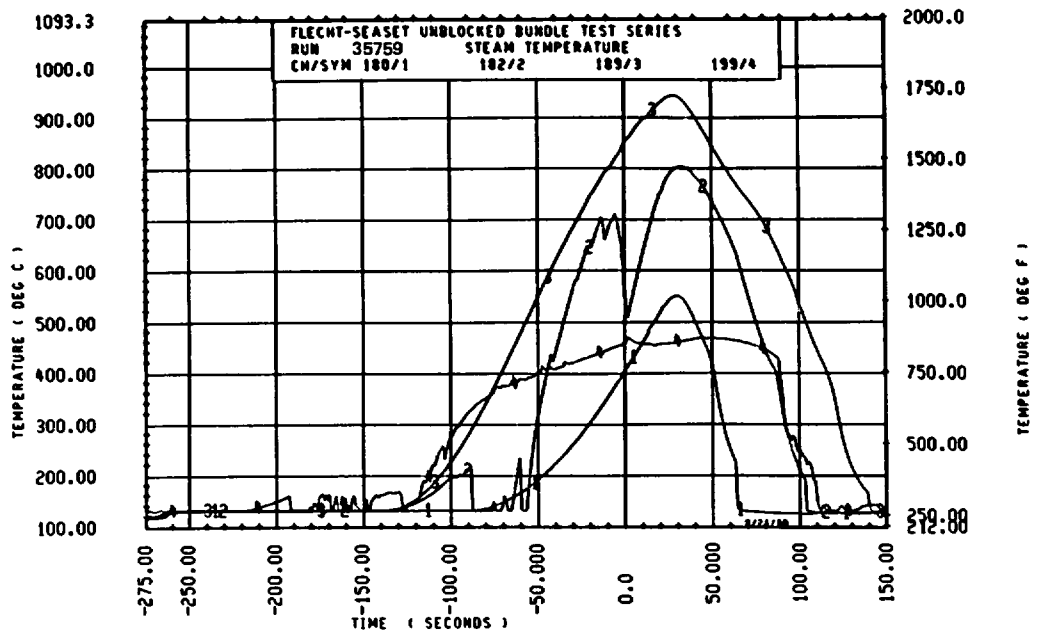

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 CLAD TEMPERATURE
CH/SYM 171/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

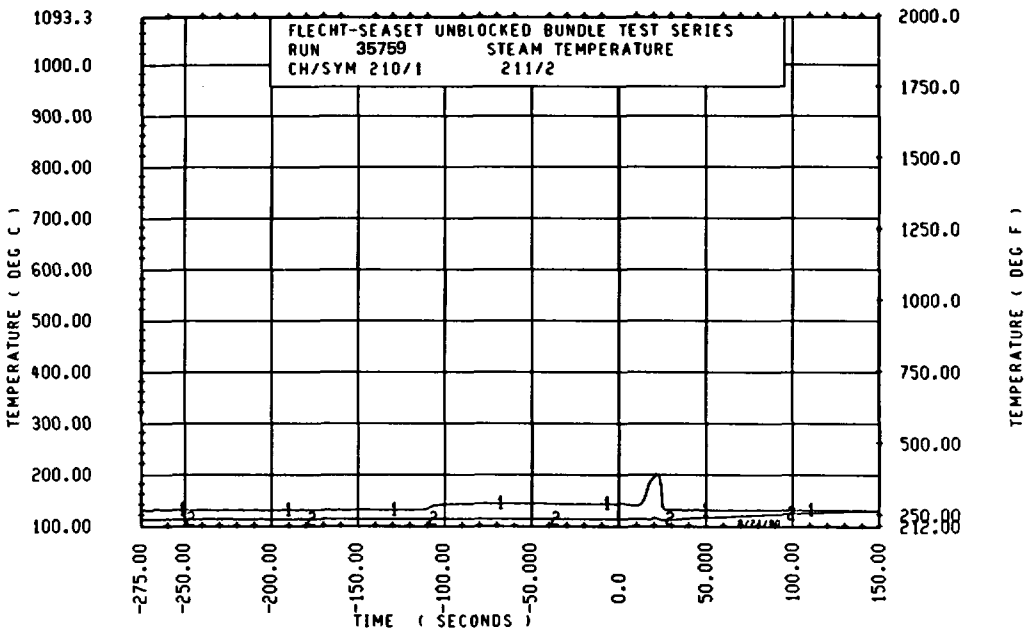

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 HEAT TRANSFER COEFFICIENT
CH/SYM 171/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

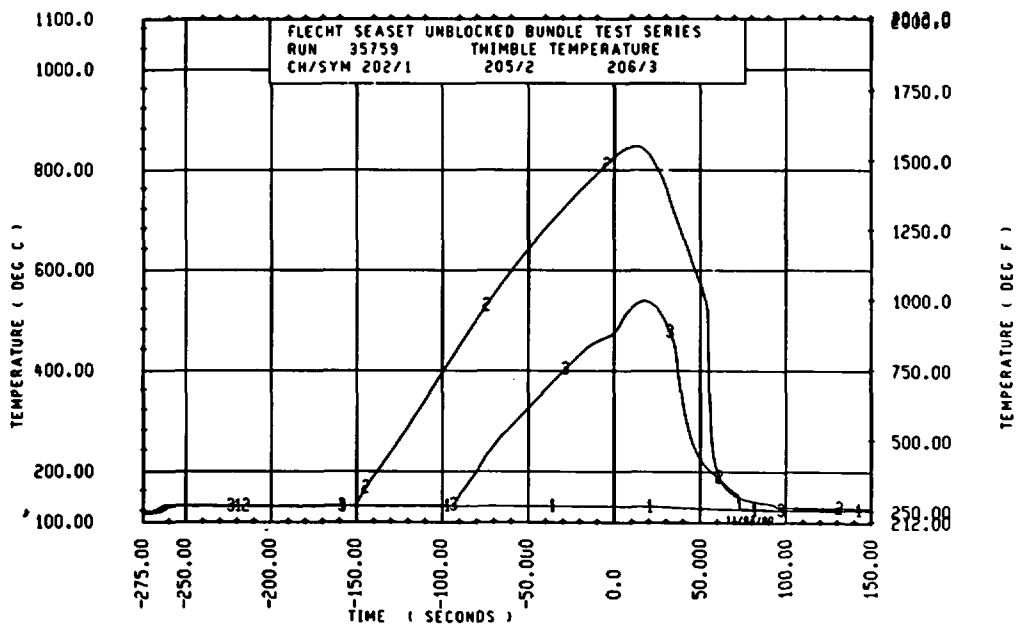

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 CLAD TEMPERATURE
CH/SYM 177/1
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1375.0
1250.0
1000.0
750.00
500.00
250.00
2.2222
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
36.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

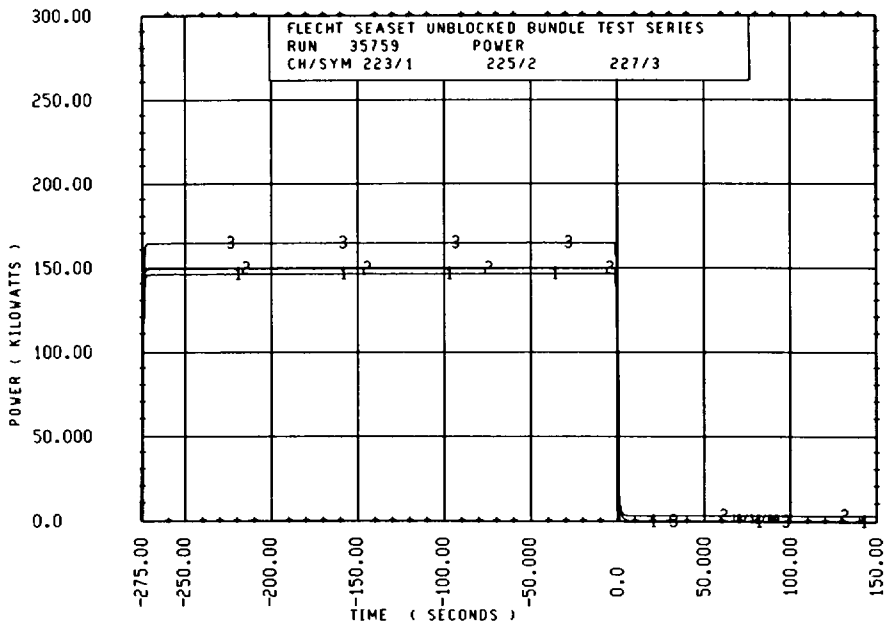

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 HEAT TRANSFER COEFFICIENT
CH/SYM 177/1
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
113.52
100.00
75.000
50.000
25.000
0.0
-25.000
-50.000
-56.761
20.000
15.000
10.000
5.0000
0.0
-5.0002
-10.000
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

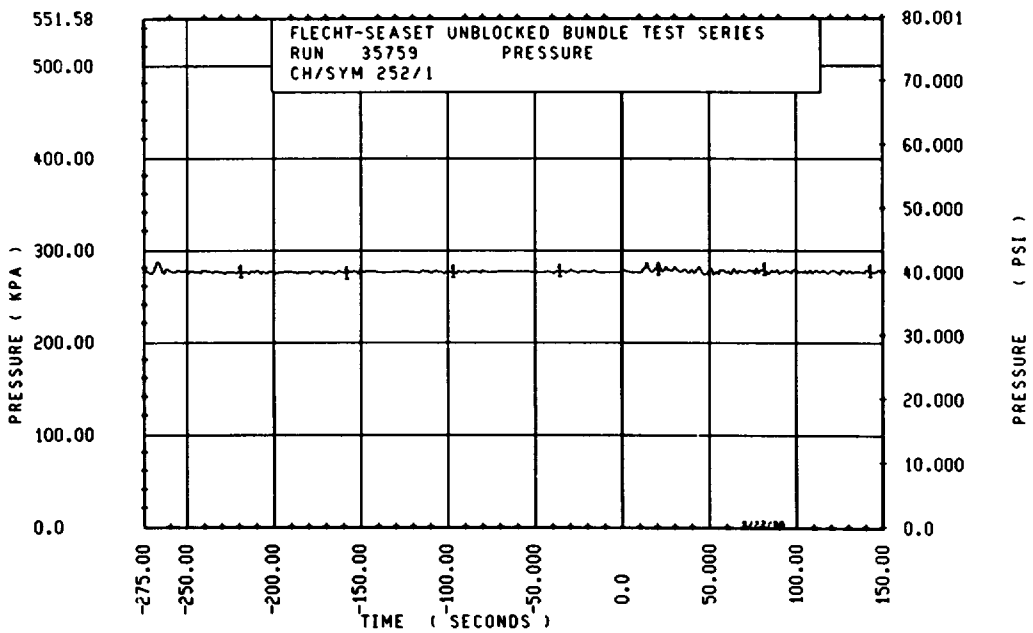

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 STEAM TEMPERATURE
CH/SYM 179/1 181/2 185/3 197/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

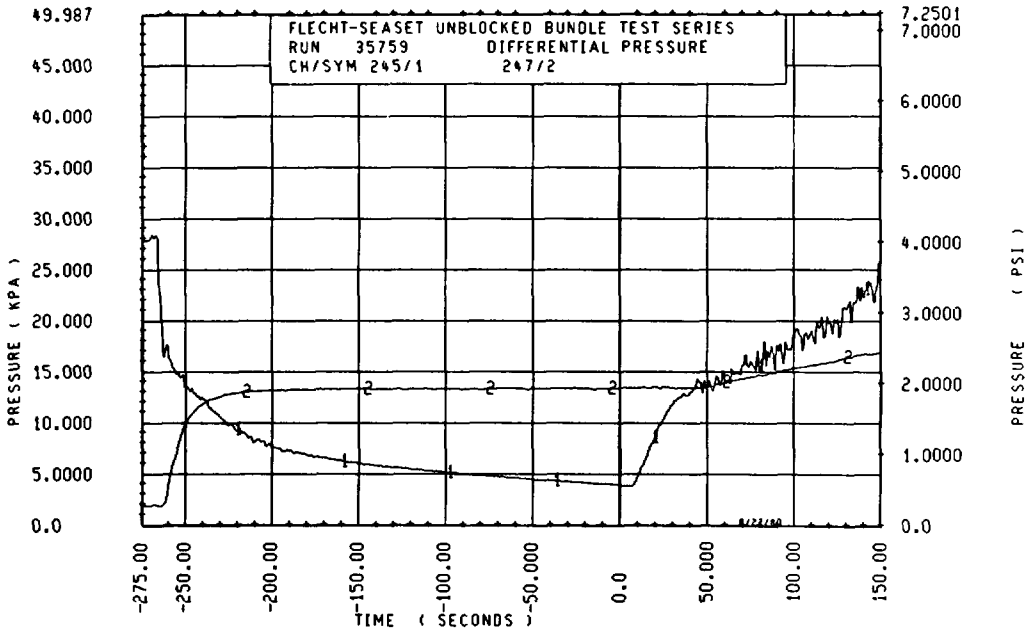

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 STEAM TEMPERATURE
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

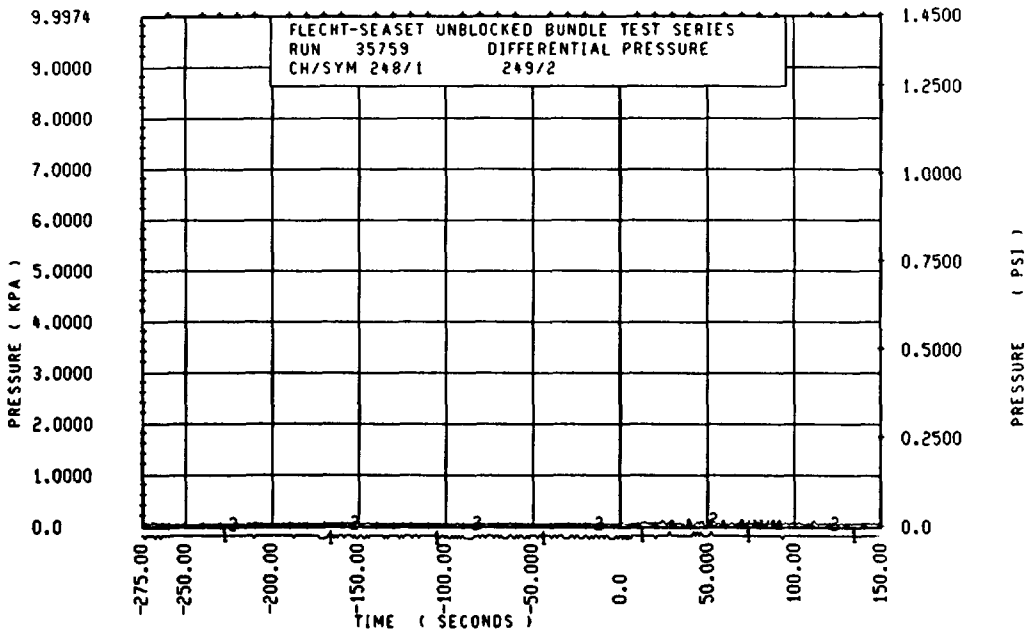

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 STEAM TEMPERATURE
CH/SYM 210/1 211/2
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

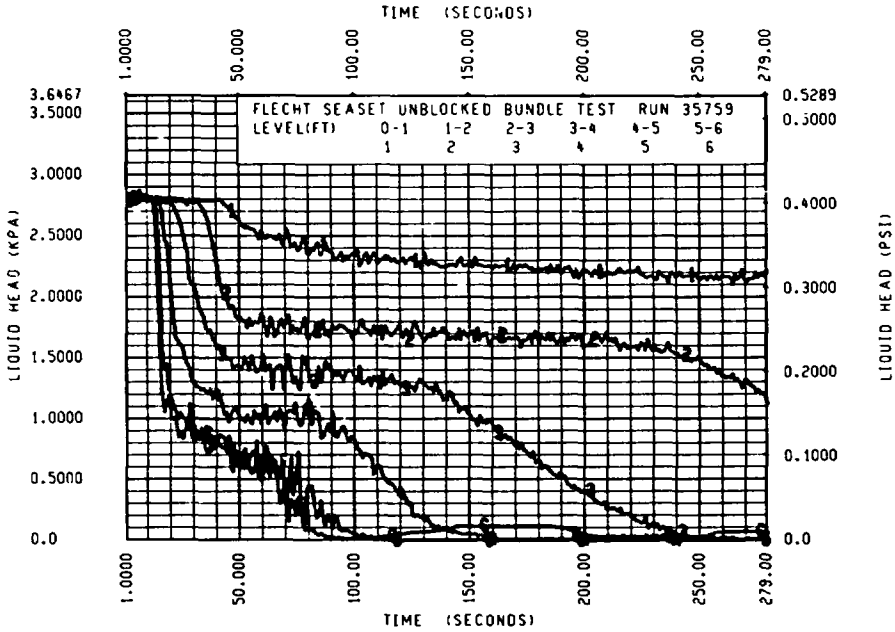

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 THIMBLE TEMPERATURE
CH/SYM 202/1 205/2 206/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

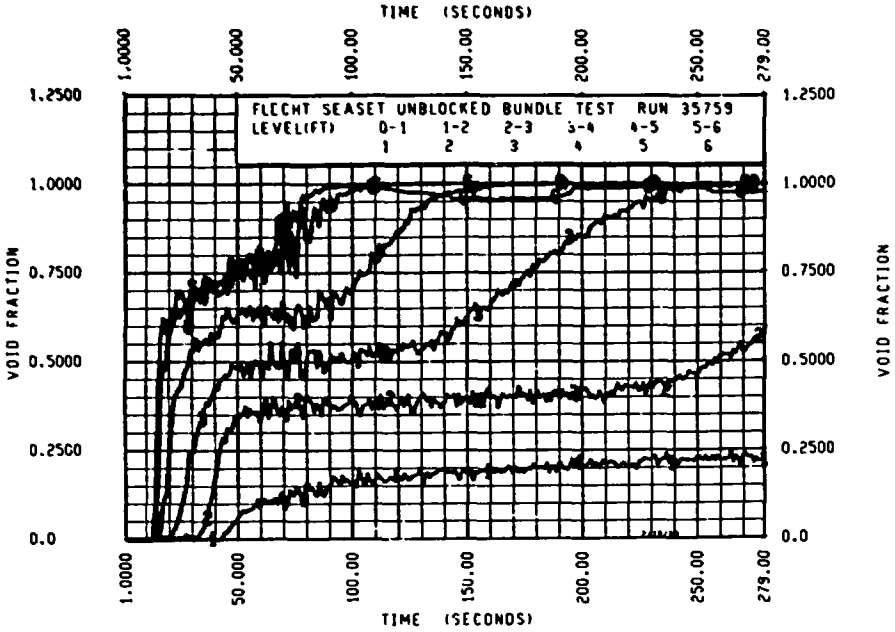

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00
TIME (SECONDS)

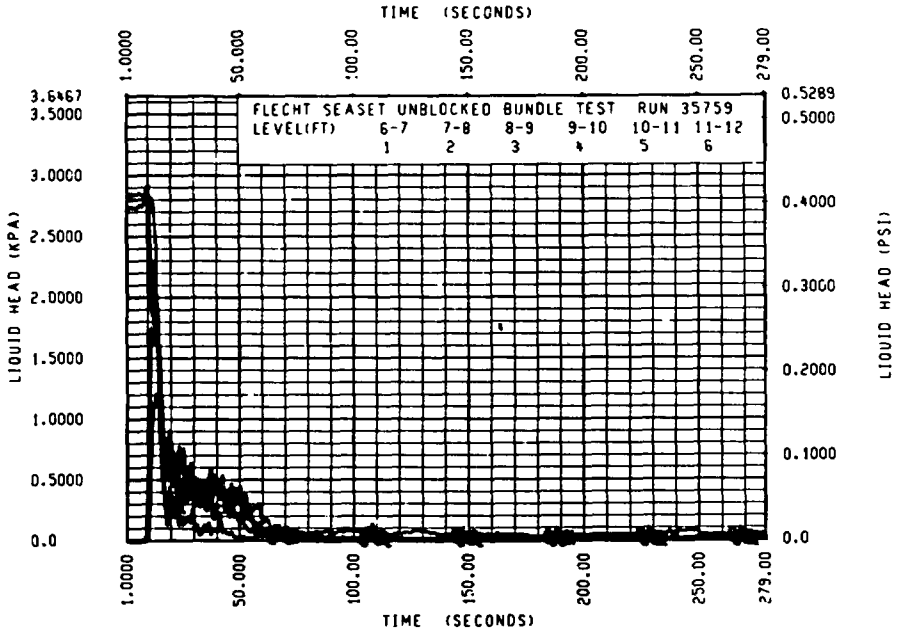

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00

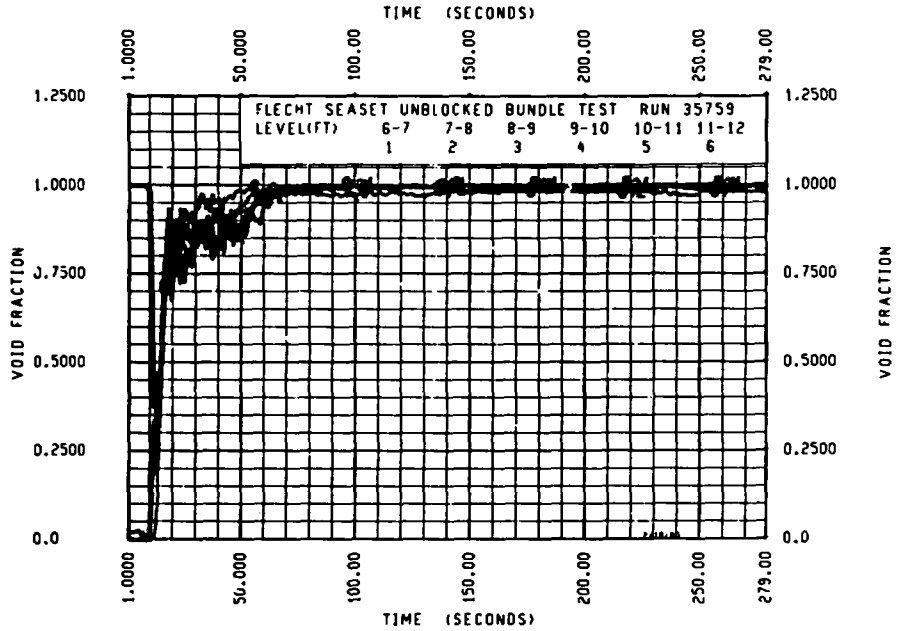

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35759 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
9.9974
9.0000
8.0000
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
1.4500
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-275.00
-250.00
-200.00
-150.00
-100.00
-50.000
0.0
50.000
100.00
150.00





NOTE: In these two plots, 1 second is really the initiation of the boiloff test at time -278 seconds.





NOTE: In these two plots, 1 second is really the initiation of the boiloff test at time -278 seconds.

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 35807
Date: 8/27/79
Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	886°C (1628°F)
Rod peak power	0.89 kw/m (0.27 kw/ft)
Flow rate	10 mm/sec (0.41 in./sec)
Coolant temperature	50°C (121°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	108°C (227°F)	81°C (178°F)
1.22 m (48 in.)	184°C-201°C (363°F-394°F)	131°C (268°F)
1.83 m (72 in.)	211°C-279°C (411°F-535°F)	140°C-184°C (284°F-364°F)
2.44 m (96 in.)	218°C-265°C (425°F-509°F)	654°C-708°C (1209°F-1307°F)
2.74 m (108 in.)	187°C (369°F)	536°C (997°F)
3.05 m (120 in.)	138°C-158°C (281°F-317°F)	139°C-429°C (282°F-805°F)
3.35 m (132 in.)	131°C-142°C (268°F-288°F)	133°C-323°C (272°F-614°F)

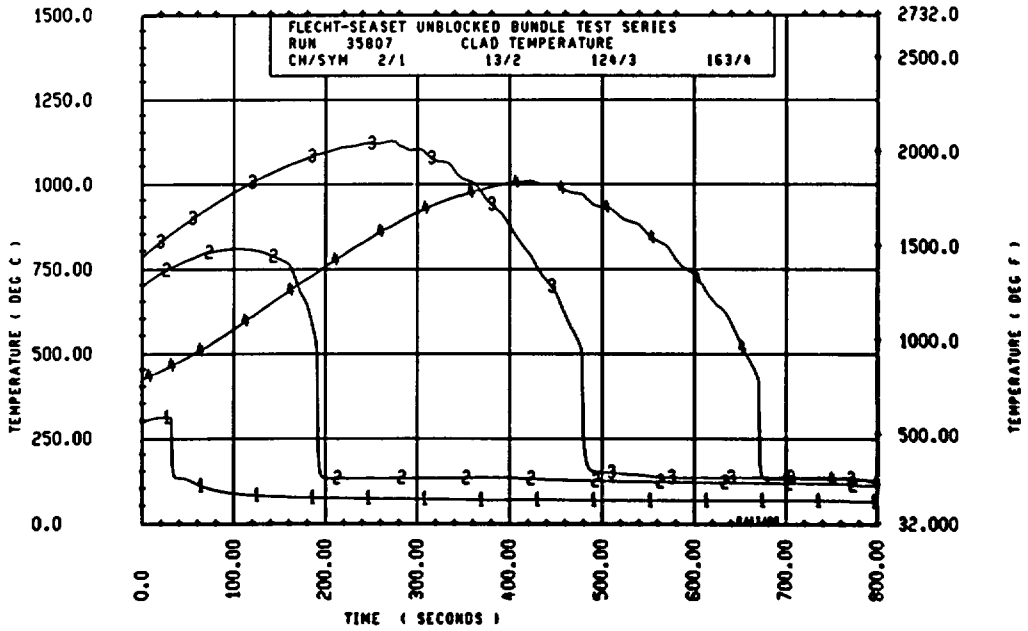
*At 355 seconds after flood

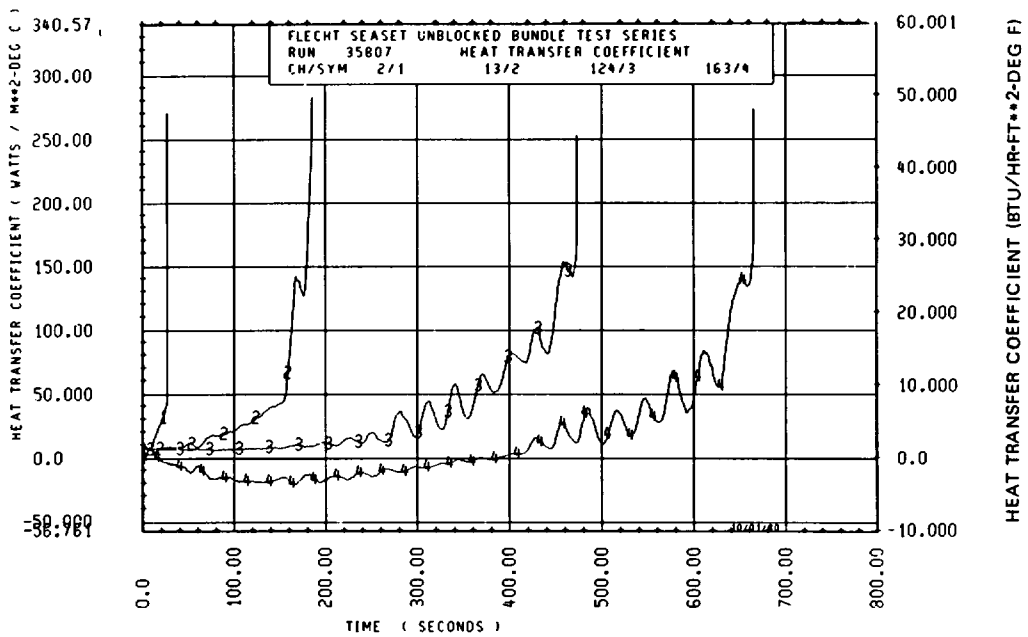
C. Comments

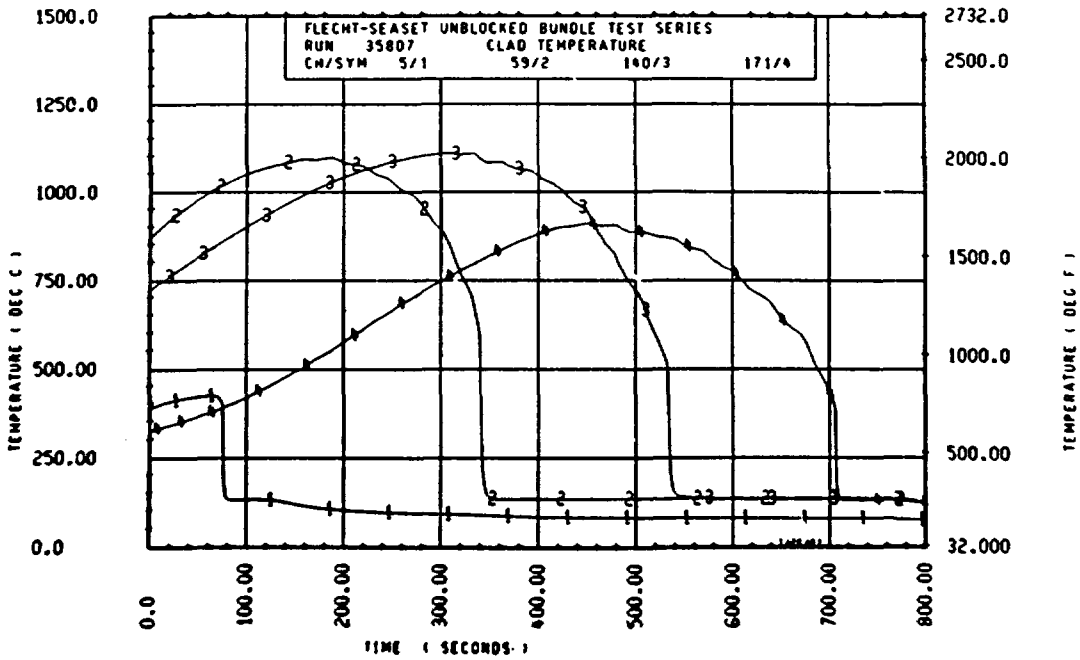
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. Power decay of center power zone was lower than specified by approximately 10 percent. There was a 15 percent step increase in flooding rate 40 percent of the way through the test.

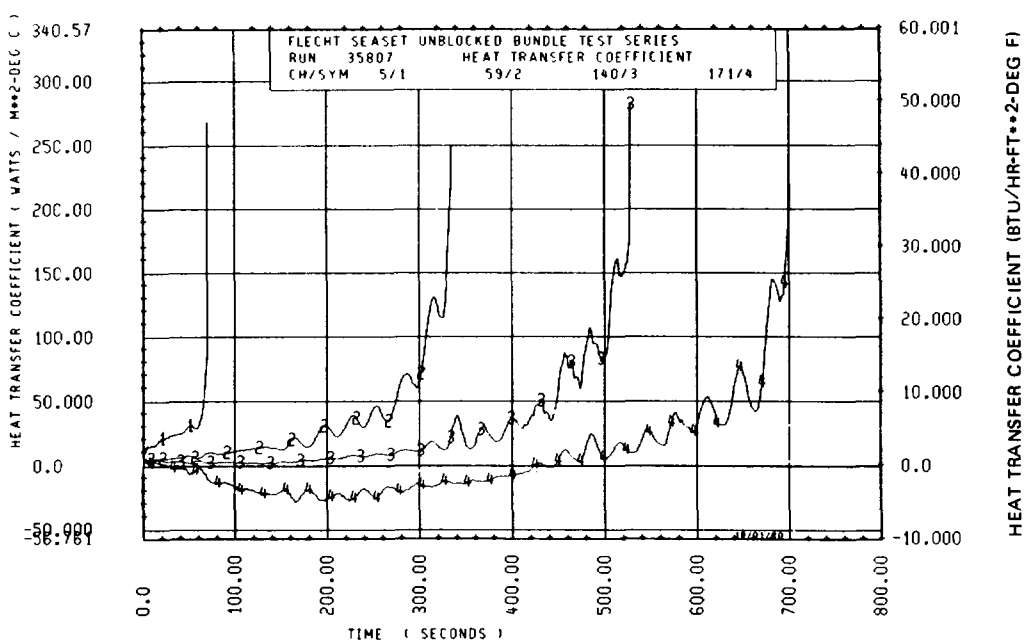
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 35807

ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1247.	1419.	173.	97.0	938.	189.1
2H 6- 0	50	1466.	1803.	337.	187.0	1096.	359.5
3C 5- 0	17	1255.	1474.	219.	121.0	841.	265.8
3C 5- 7	28	1331.	1612.	282.	159.0	909.	310.5
4L 8- 0	129	1301.	1806.	505.	244.0	901.	509.9
4L 8- 6	147	1300.	1793.	493.	243.0	902.	509.9
5E11- 0	168	628.	1451.	822.	423.0	710.	701.9
5J 4- 0	12	1266.	1472.	205.	98.0	911.	190.9
5J 8- 6	146	1133.	1903.	770.	305.0	667.	563.0
5J11- 6	175	589.	1498.	908.	451.0	725.	728.0
7B 6- 0	57	1402.	1679.	277.	122.0	976.	306.9
7B 8- 6	142	1128.	1617.	488.	273.0	603.	570.0
7B10- 0	162	827.	1432.	605.	307.0	659.	652.3
7B11- 6	176	642.	1128.	486.	480.0	636.	714.9
7D 6- 4	84	1558.	2024.	466.	189.0	1086.	366.5
7D 7- 6	119	1466.	2018.	551.	273.0	989.	474.4
7D 9- 3	151	1027.	1812.	786.	335.0	793.	607.8
7G 5- 0	23	1478.	1746.	268.	110.0	1047.	264.8
7J 6- C	59	1600.	2007.	407.	185.0	1104.	339.9
7M 7- 6	120	1409.	1916.	506.	245.0	948.	479.4
7M 8- 0	132	1310.	1867.	556.	301.0	851.	528.4
7M 9- 3	152	1009.	1732.	723.	362.0	828.	611.9
8H 4- 0	13	1292.	1489.	198.	101.0	976.	190.9
8H10- 0	163	799.	1847.	1048.	421.0	791.	670.0
8H11- 6	177	577.	1582.	1005.	479.0	744.	733.9
8K 4- 0	14	1273.	1489.	216.	105.0	971.	185.1
8K 6- 6	99	1499.	2004.	505.	217.0	1220.	385.6
8K 8- 0	140	1333.	2031.	697.	304.0	945.	532.9
8K10- 0	164	820.	1755.	935.	413.0	767.	669.0
8N 2- 0	5	733.	799.	66.	60.0	759.	75.4
8N 4- 0	15	1265.	1460.	195.	100.0	981.	188.4
8N 6- 0	61	1409.	1717.	308.	159.0	998.	354.8
8N10- 0	165	809.	1486.	677.	360.0	737.	655.6
9C 7- 0	109	1433.	1903.	470.	218.0	839.	433.9
9C 9- 3	153	1020.	1719.	699.	332.0	783.	604.0
9G 1- 0	2	572.	596.	24.	24.0	590.	32.0
9G 3- 3	8	1133.	1230.	97.	69.0	882.	133.8
9G11- 0	171	617.	1672.	1055.	449.0	738.	705.9
9I 5- 0	24	1445.	1659.	214.	114.0	1042.	261.8
9E 6- 2	46	1549.	2032.	482.	215.0	924.	376.2
10D 6- 6	93	1505.	1861.	356.	243.0	874.	392.6
11E 7- 6	124	1446.	2061.	615.	271.0	950.	477.9
11E 9- 3	155	999.	1732.	733.	335.0	790.	609.7
11E11- 0	172	634.	1500.	866.	449.0	726.	702.9
12D 4- 0	16	1266.	1446.	180.	100.0	984.	188.8
12D 6- 0	66	1477.	1870.	393.	188.0	985.	356.8
12F 6- 6	102	1522.	1950.	428.	218.0	841.	396.9

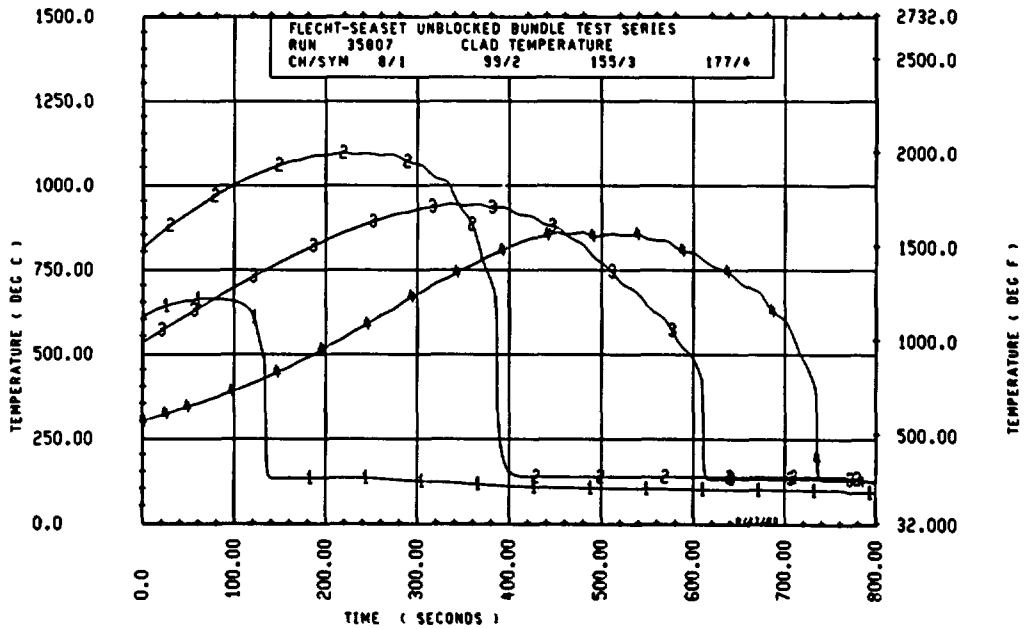

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

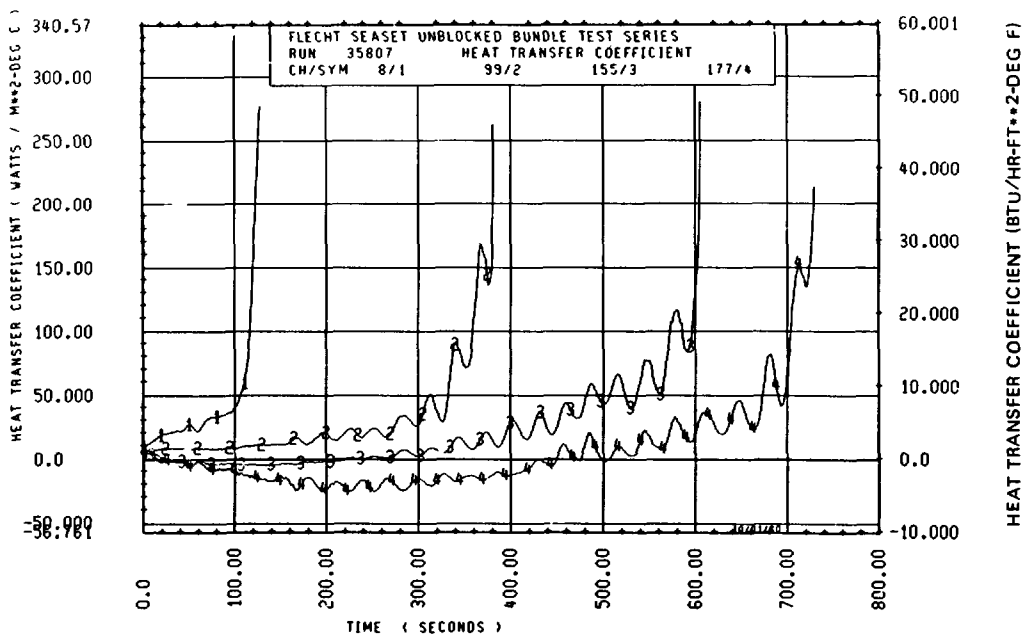

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

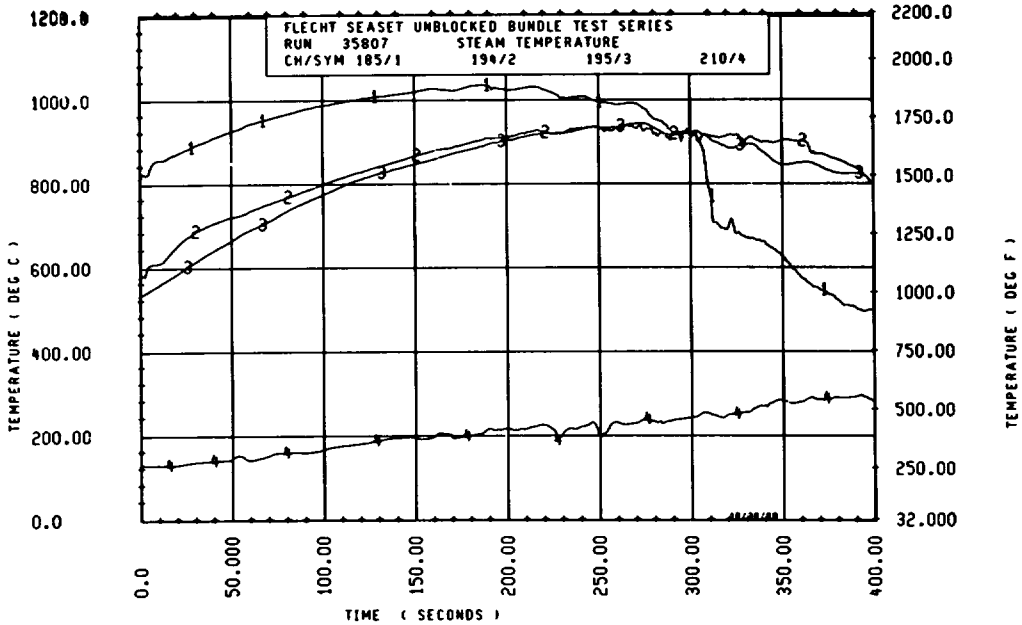

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

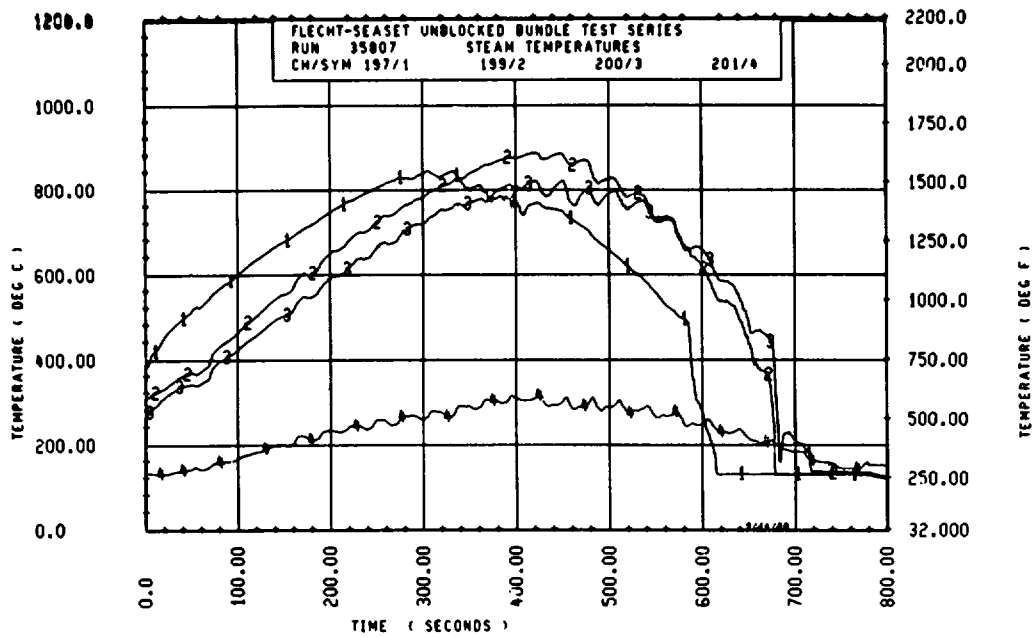

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

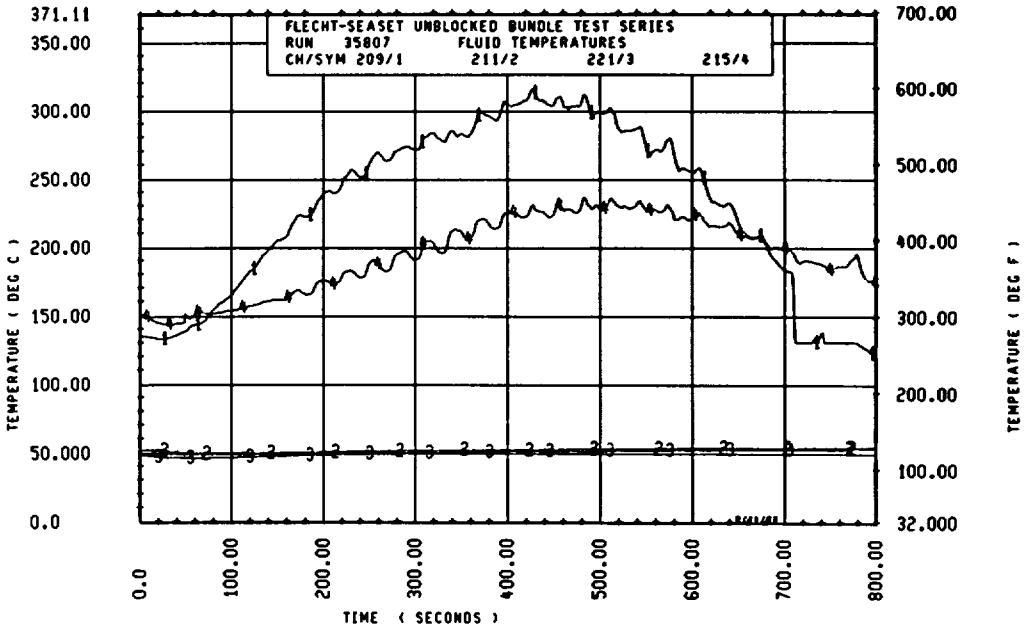
35807-4

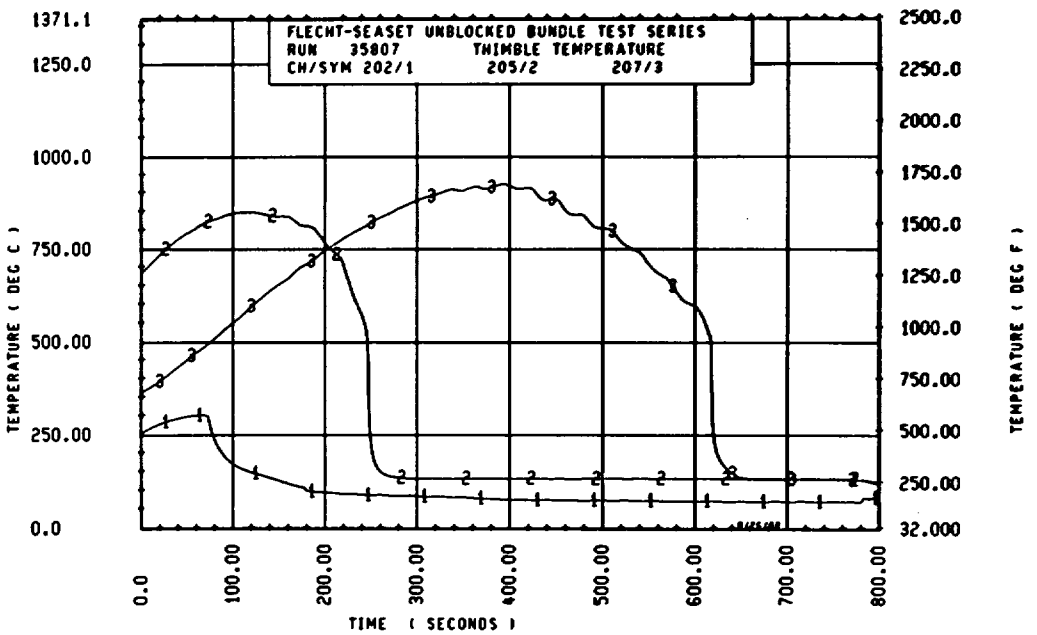

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

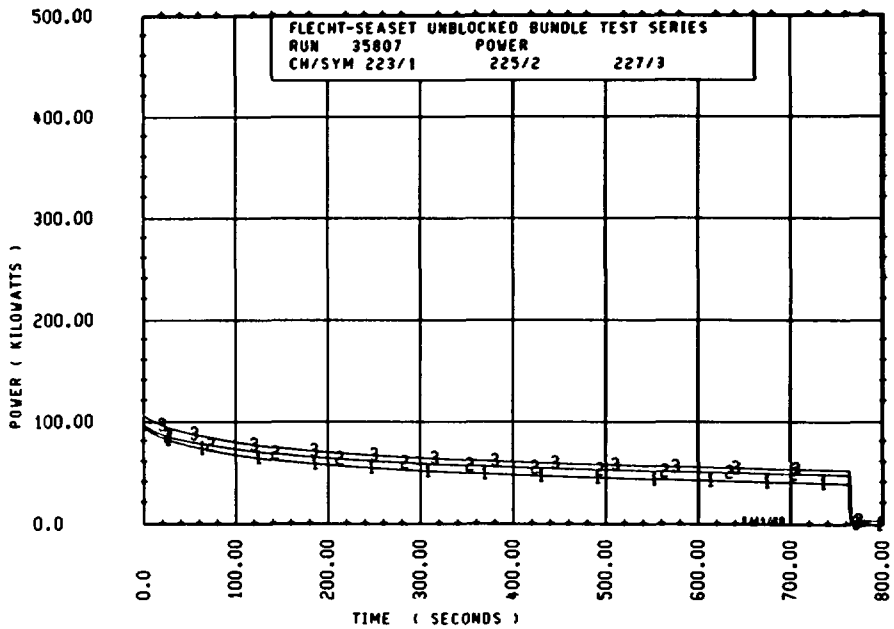

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
50.000
100.00
150.00
200.00
250.00
300.00
350.00
400.00

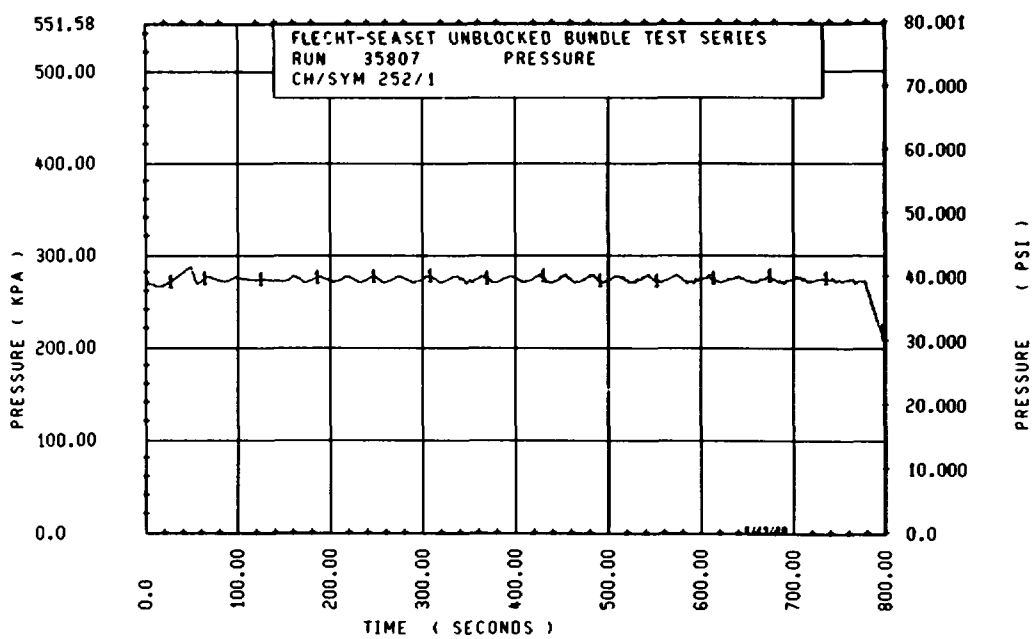

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

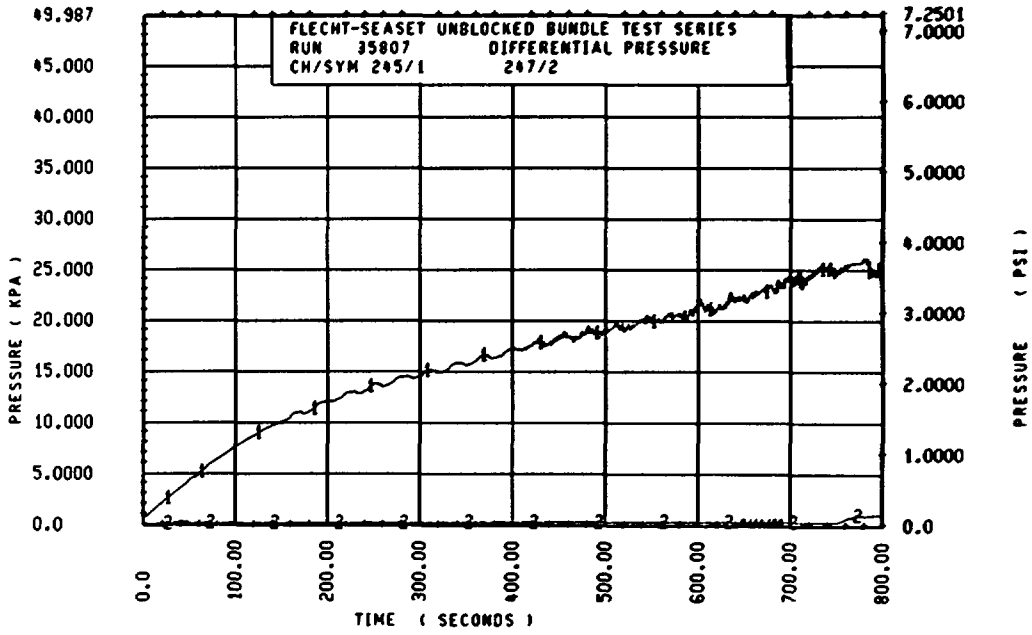


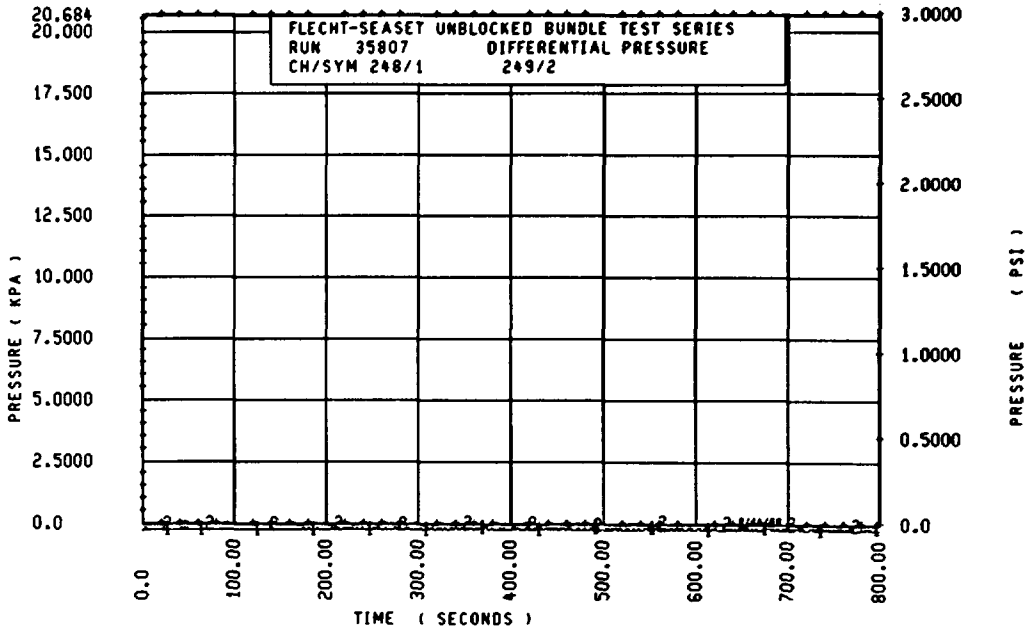


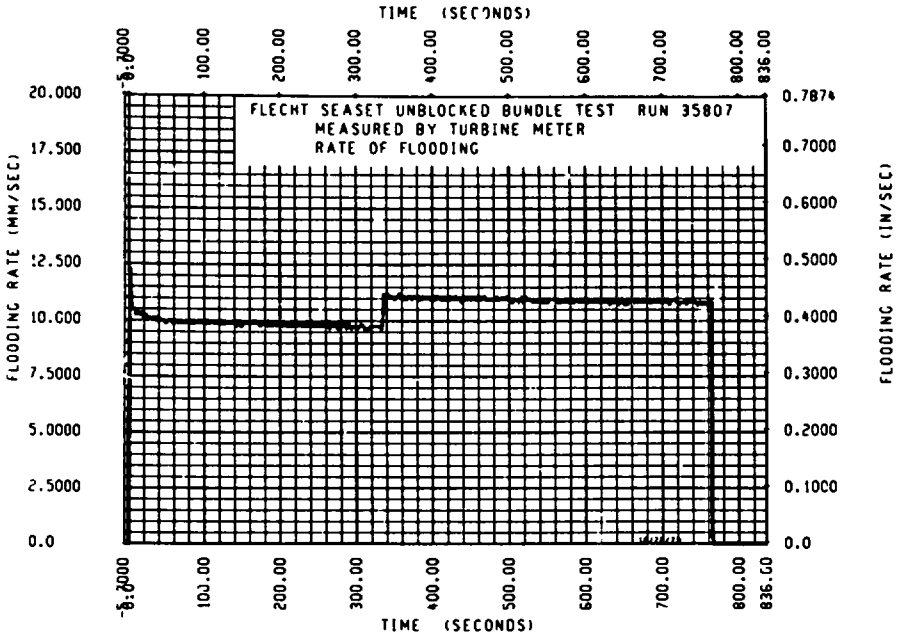
CH 202-4C, 0.61 m (24 in.); CH 205-4C, 1.52 m (60 in.);
CH 207-4I, 3.05 m (120 in.)

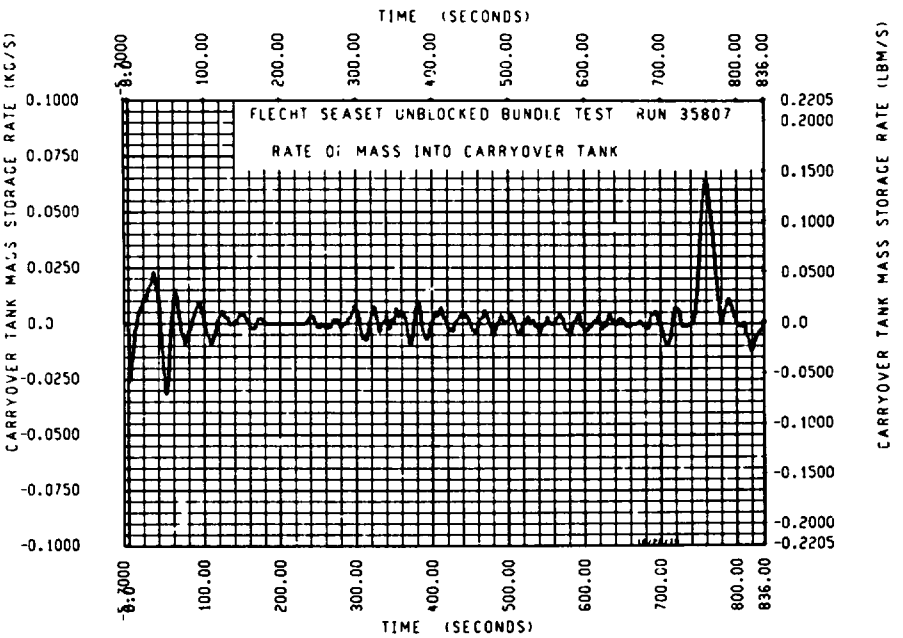

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

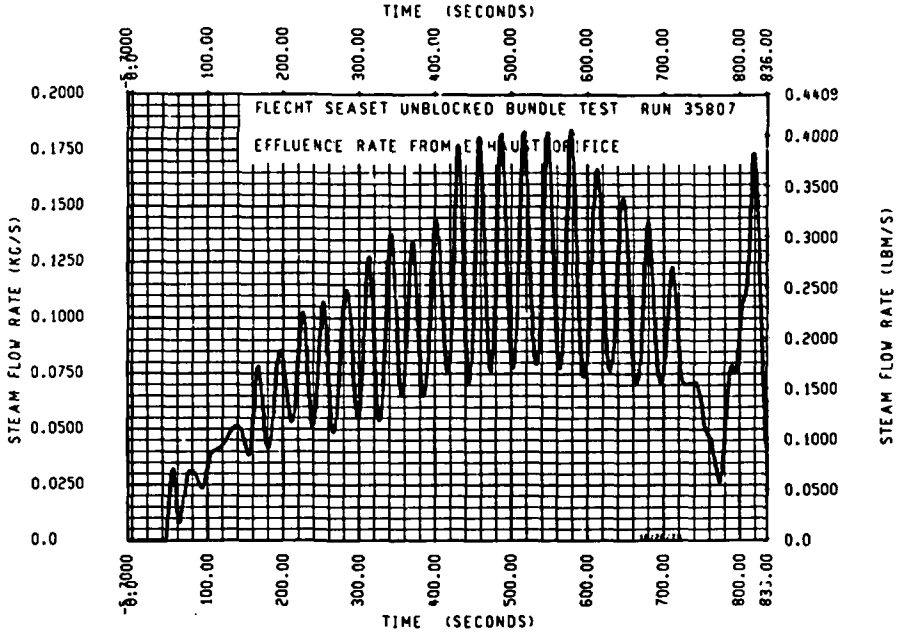

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

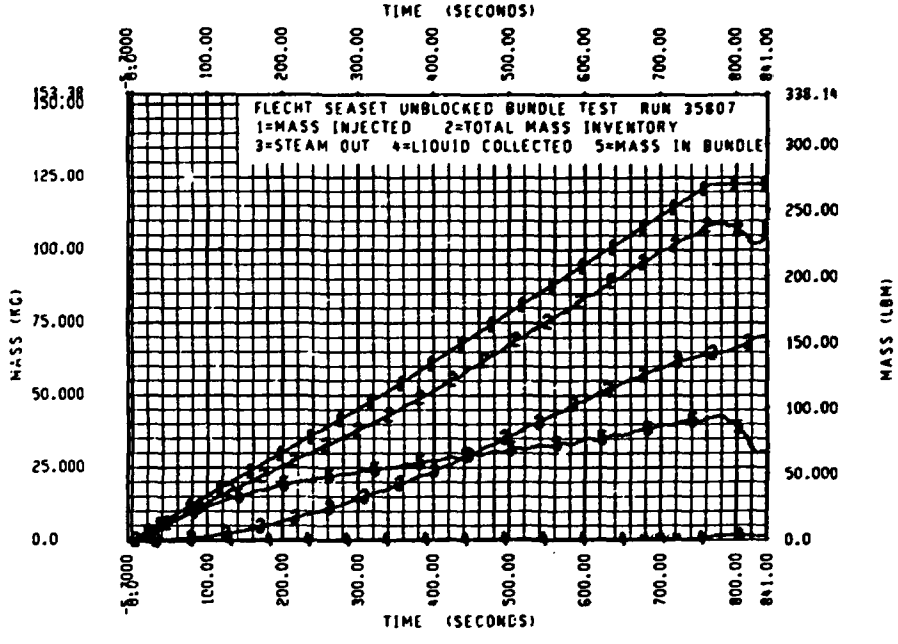

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

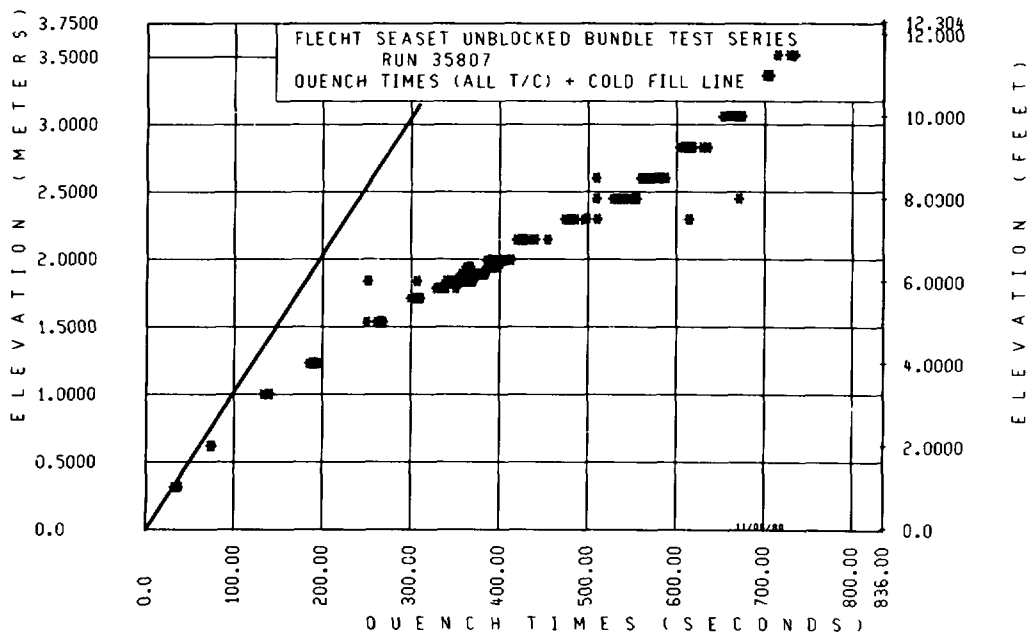

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

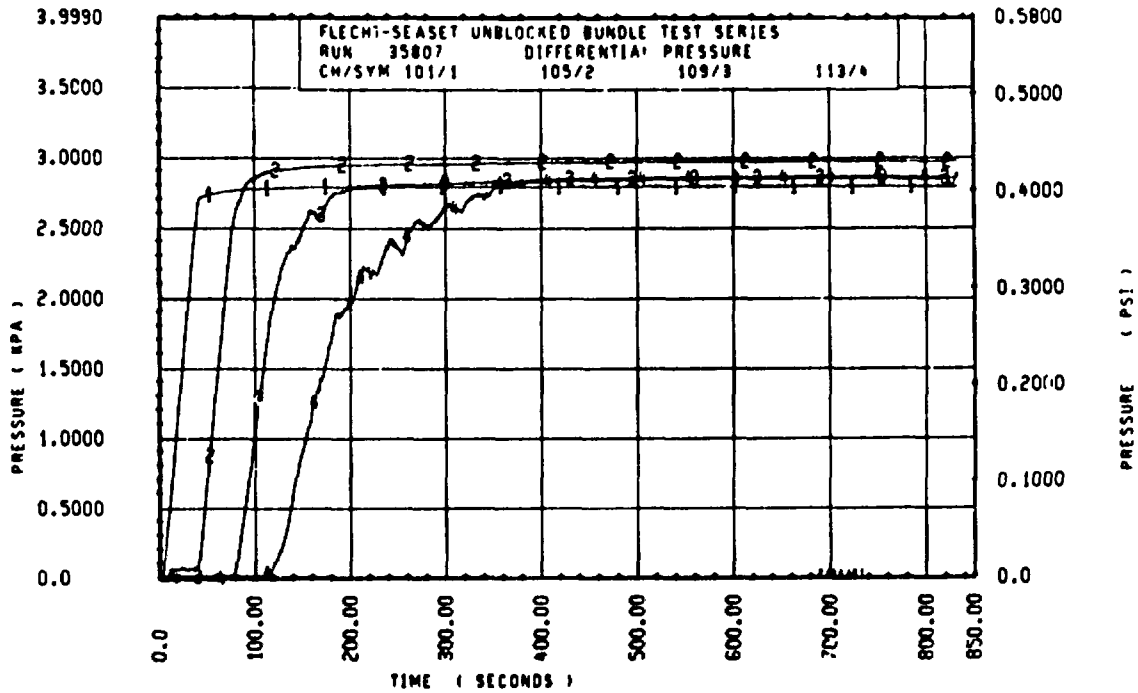

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35807
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
-8.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
836.00
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.7874
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0

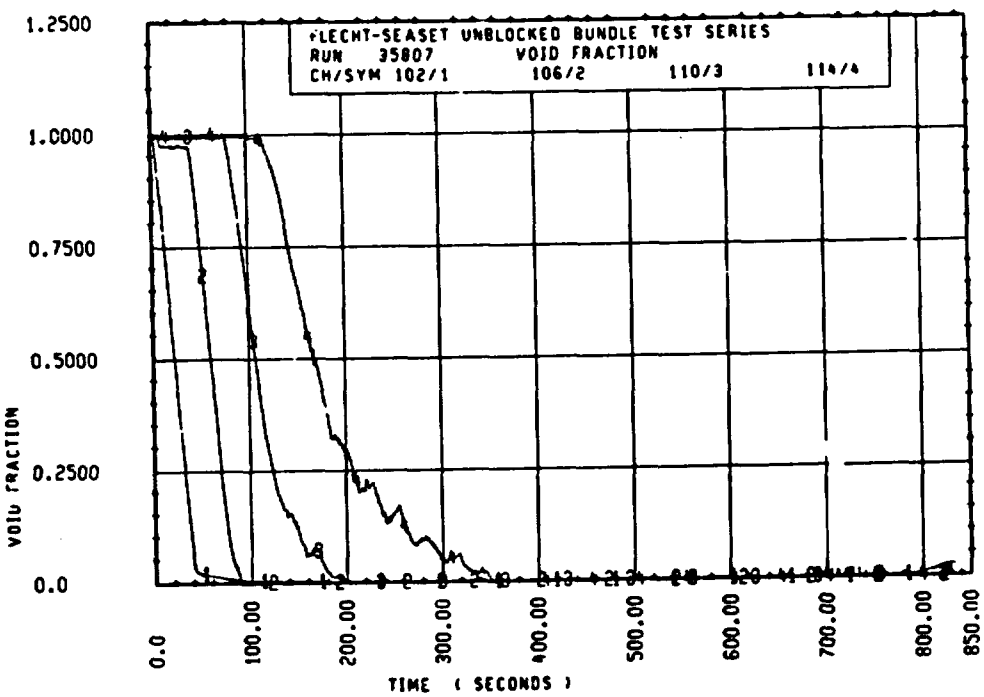

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35807
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
-8.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
836.00
0.1000
0.0750
0.0500
0.0250
0.0
-0.0250
-0.0500
-0.0750
-0.1000
0.2205
0.2000
0.1500
0.1000
0.0500
0.0
-0.0500
-0.1000
-0.1500
-0.2000
-0.2205

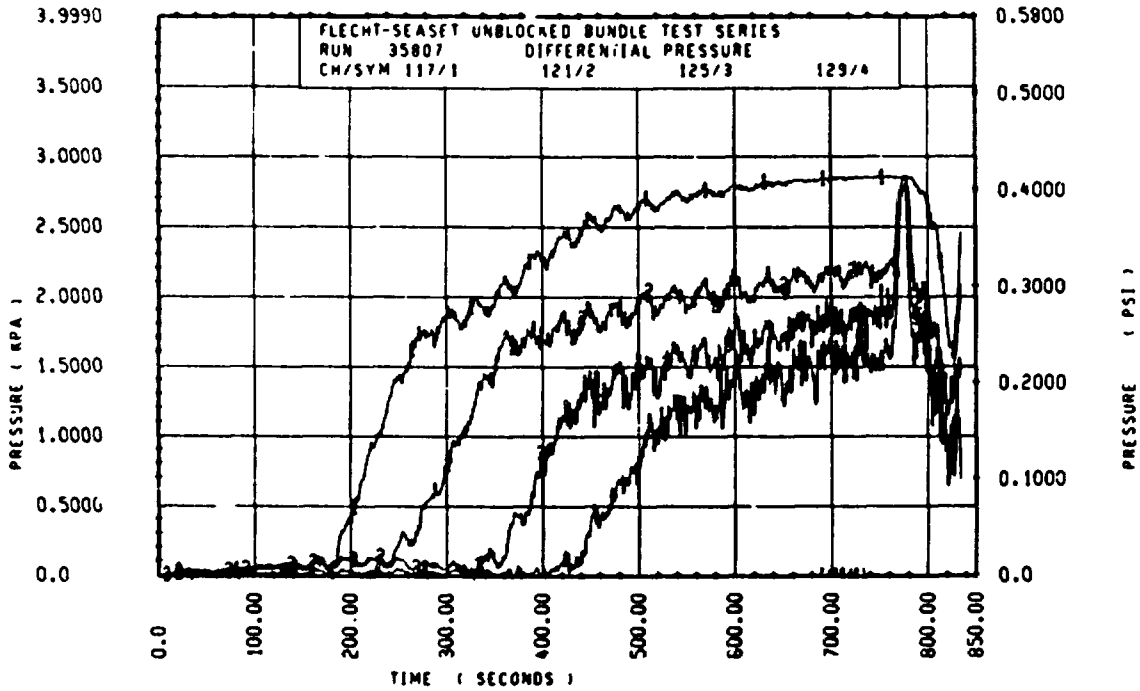

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35807
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0
0.4409
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0
-8.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
836.00

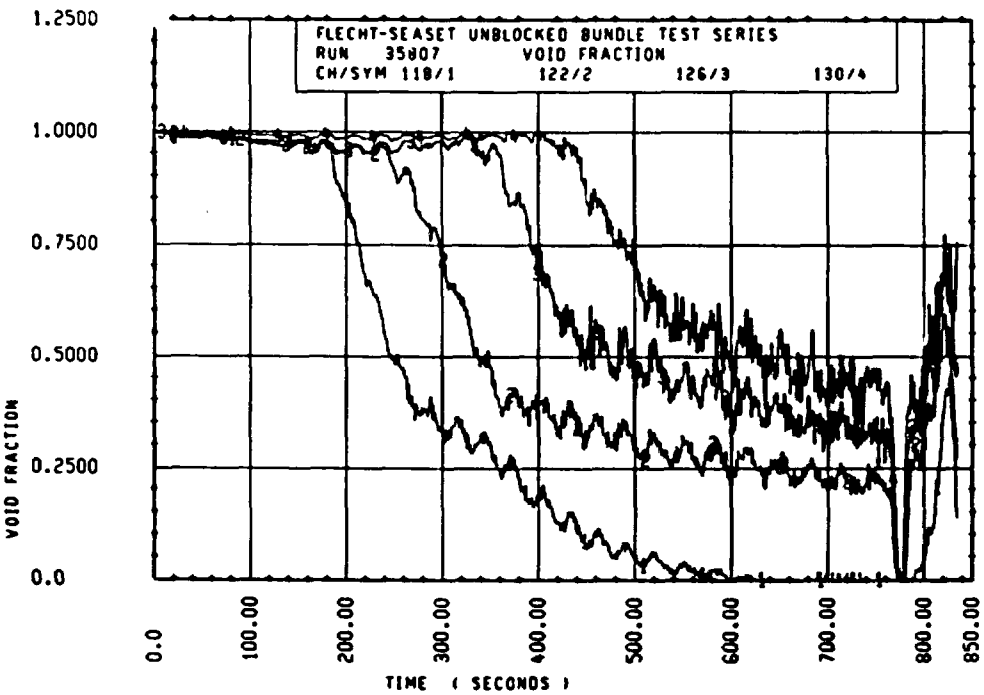

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35807
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
153.38
150.00
125.00
100.00
75.000
50.000
25.000
0.0
338.14
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-8.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
841.00

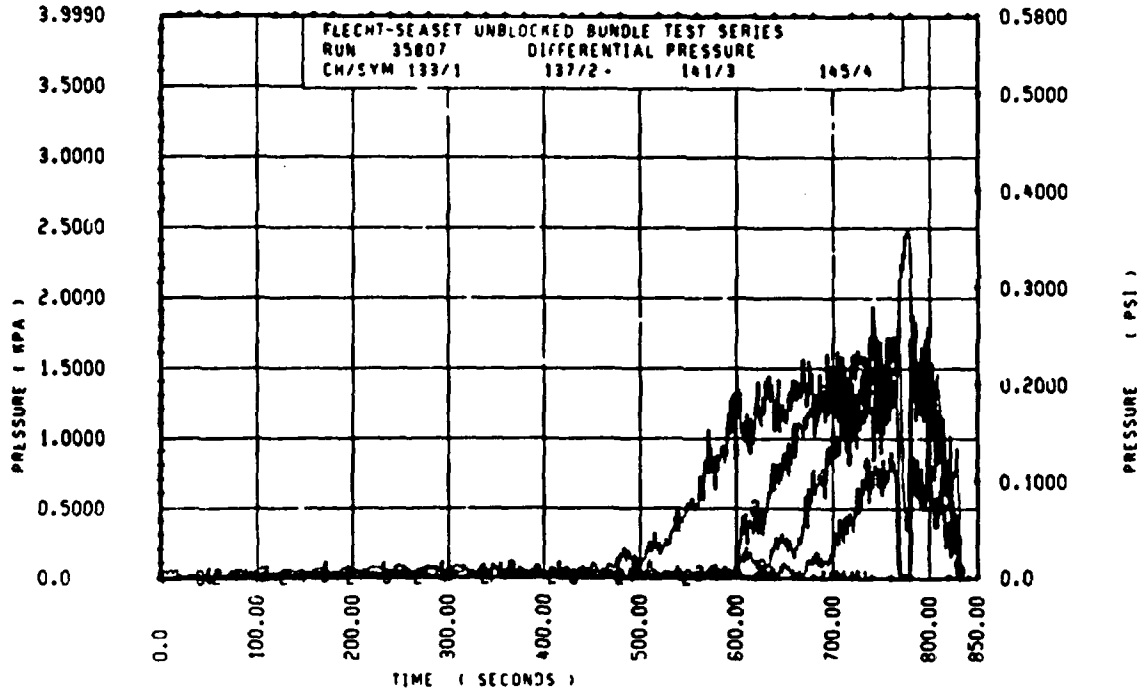

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
836.00
QUENCH TIMES (SECONDS)

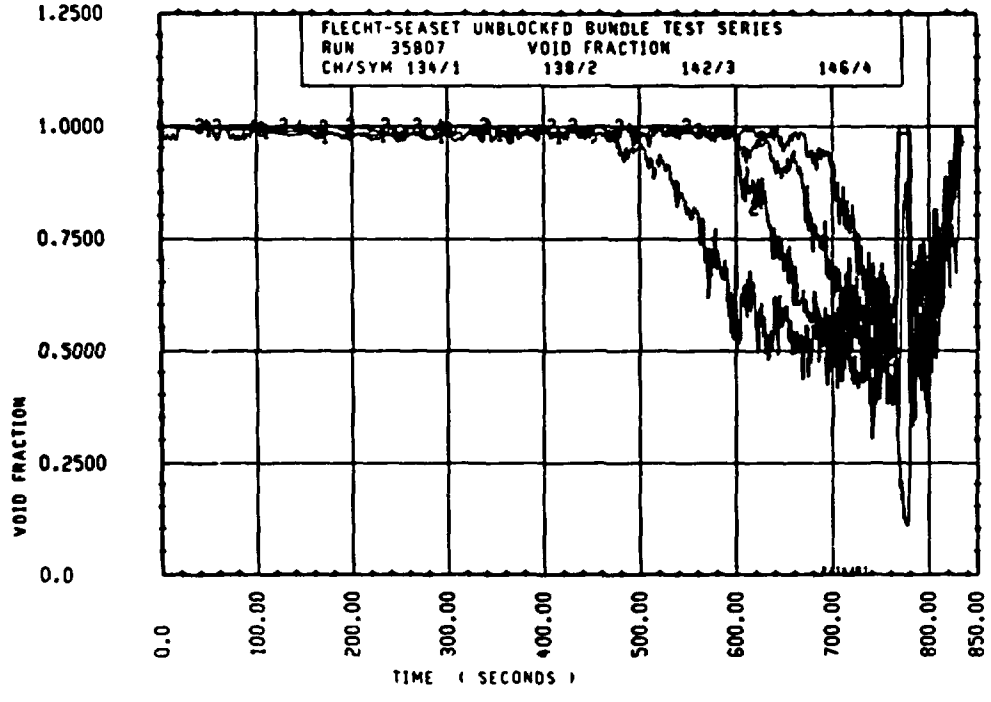

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35807 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 35912
Date: 8/28/79
Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.14 MPa (20 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	889°C (1632°F)
Rod peak power	0.89 kw/m (0.27 kw/ft)
Flow rate	11 mm/sec (0.42 in./sec)
Coolant temperature	34°C (93°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	128°C (262°F)	61°C (142°F)
1.22 m (48 in.)	172°C-182°C (342°F-359°F)	108°C (227°F)
1.83 m (72 in.)	192°C-279°C (377°F-534°F)	110°C-447°C (230°F-836°F)
2.44 m (96 in.)	195°C-242°C (383°F-468°F)	613°C-686°C (1135°F-1266°F)
2.74 m (108 in.)	158°C (317°F)	106°C (223°F)
3.05 m (120 in.)	117°C-137°C (242°F-278°F)	104°C-301°C (220°F-573°F)
3.35 m (132 in.)	109°C-116°C (229°F-241°F)	104°C-263°C (219°F-506°F)

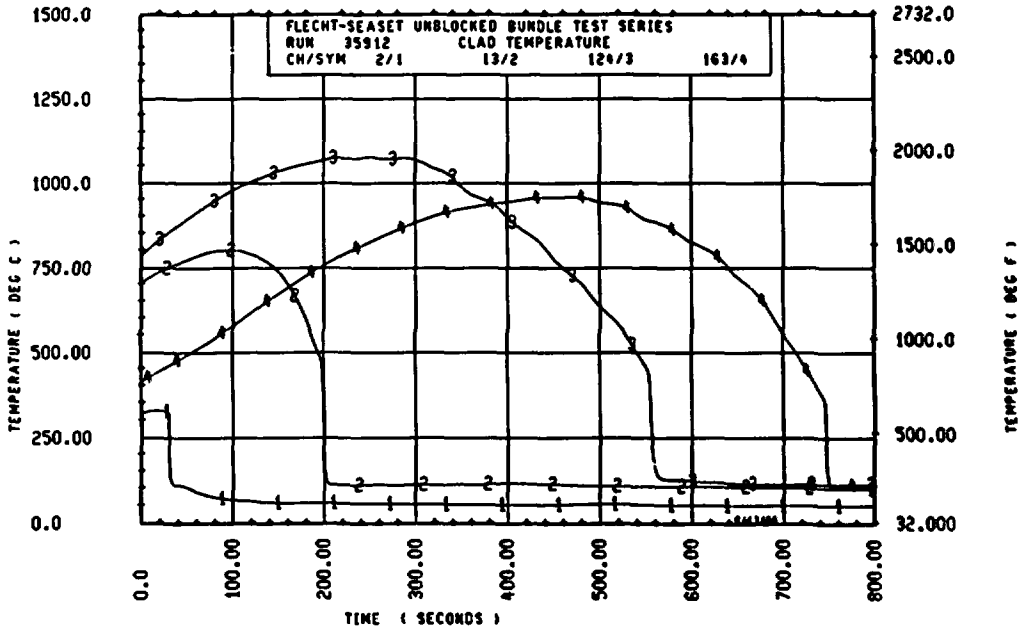
*At 356 seconds after flood

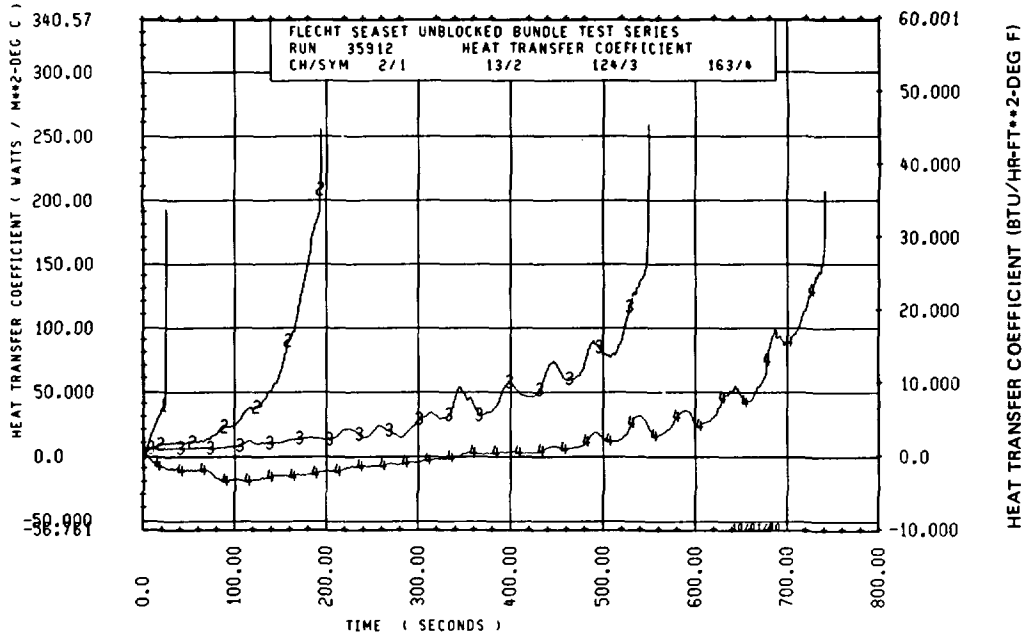
C. Comments

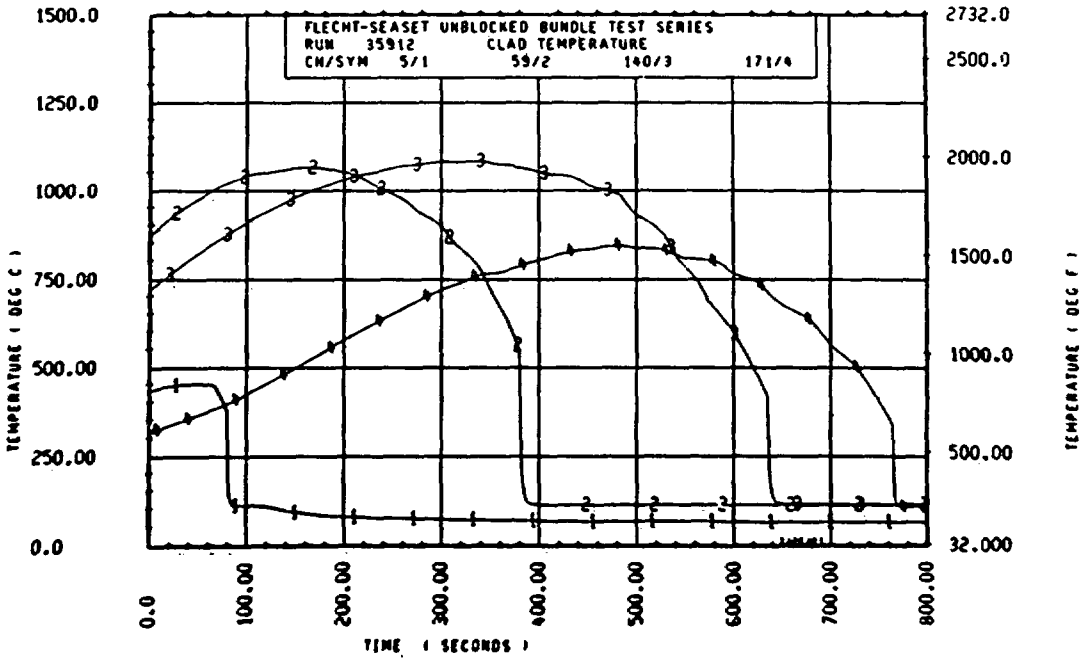
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. Power decay of center zone was lower than specified by approximately 12 percent.

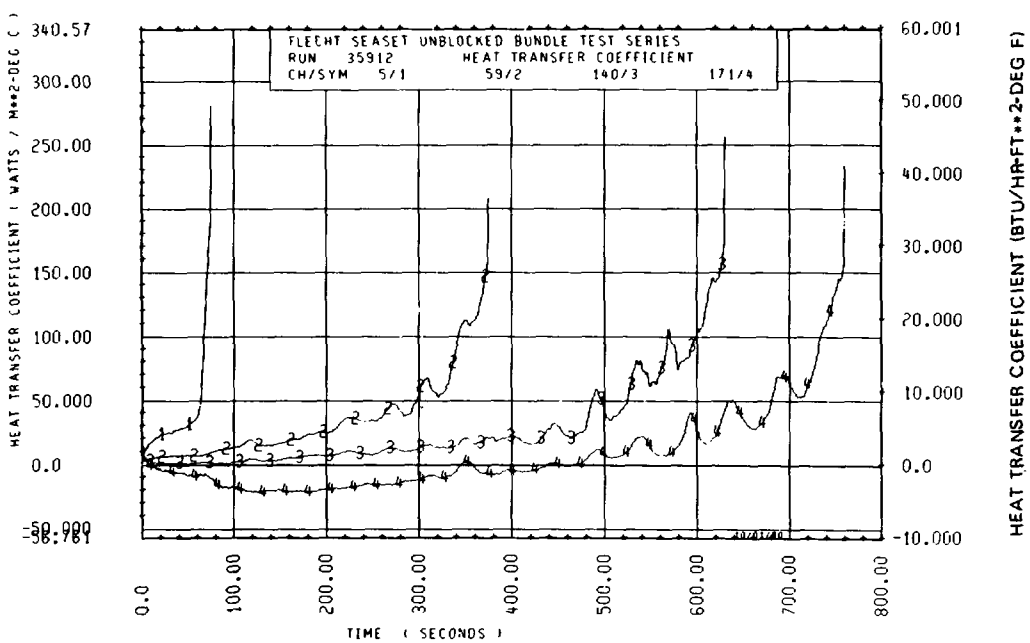
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 35912

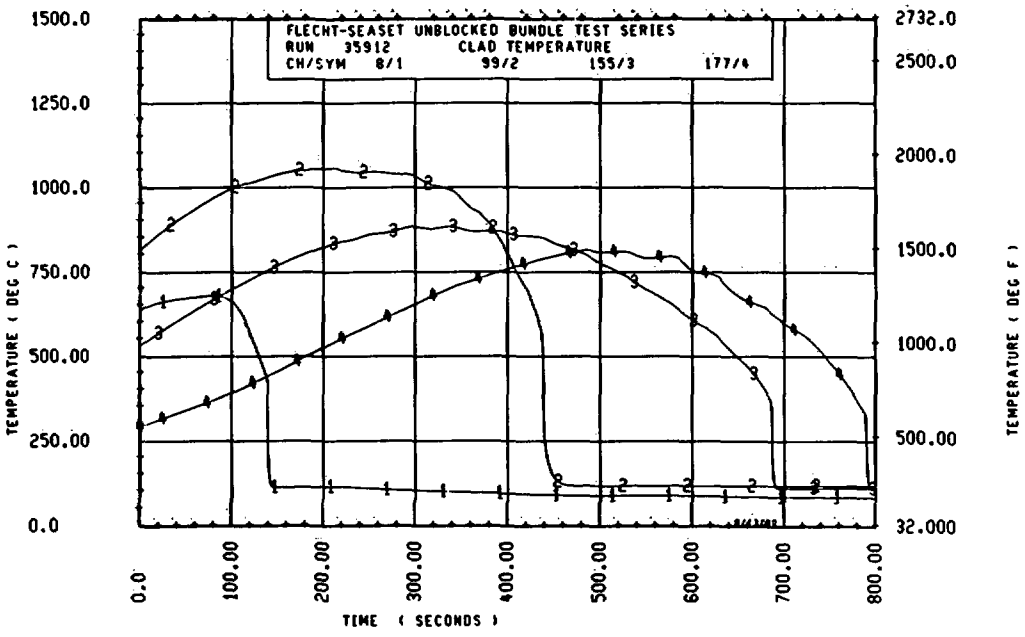
ROD/ELEV	CHAN. NO	TINITIAL AT FLOOD (DEG F)	MAXIMUM TEMPERATURE (DEG F)	TEMPERATURE RISE (DEG F)	TURNAROUND TIME (SECONDS)	QUENCH TEMPREATURE (DEG F)	QUENCH TIME (SECONDS)
2H 4- 0	10	1256.	1409.	152.	93.0	770.	202.9
2H 6- 0	50	1461.	1746.	286.	156.0	1012.	400.8
3C 5- 0	17	1262.	1443.	181.	102.0	761.	292.8
3C 5- 7	28	1346.	1567.	221.	119.0	727.	347.6
4L 8- 0	129	1301.	1766.	465.	213.0	773.	593.4
4L 8- 6	147	1300.	1753.	453.	209.0	783.	593.7
5E11- 0	168	599.	1245.	647.	485.0	573.	757.0
5J 4- 0	12	1271.	1471.	200.	98.0	746.	204.7
5J 8- 6	146	1131.	1801.	670.	254.0	617.	643.2
5J11- 6	175	543.	1415.	872.	478.0	767.	743.8
7B 6- 0	57	1423.	1649.	227.	105.0	926.	334.8
7B 8- 6	142	1122.	1555.	433.	256.0	519.	655.9
7B10- 0	162	815.	1309.	494.	291.0	574.	722.9
7B11- 6	176	617.	1023.	407.	333.0	510.	764.4
7D 6- 4	84	1546.	1930.	384.	209.0	942.	414.8
7D 7- 6	119	1473.	1932.	459.	212.0	815.	550.4
7D 9- 3	151	1023.	1670.	647.	294.0	712.	681.0
7G 5- 0	23	1487.	1725.	238.	104.0	956.	287.8
7J 6- 0	59	1601.	1951.	350.	159.0	1015.	379.7
7M 7- 6	120	1415.	1897.	482.	254.0	802.	565.5
7M 8- 0	132	1307.	1841.	534.	252.0	779.	622.0
7M 9- 3	152	997.	1636.	639.	343.0	728.	681.5
8H 4- 0	13	1300.	1474.	174.	91.0	863.	198.8
8H10- 0	163	781.	1756.	976.	463.0	667.	745.8
8H11- 6	177	559.	1496.	936.	483.0	623.	789.0
8K 4- 0	14	1281.	1477.	196.	98.0	864.	195.0
8K 6- 6	99	1499.	1934.	434.	211.0	1045.	437.8
8K 8- 0	140	1330.	1982.	652.	340.0	784.	634.6
8K10- 0	164	808.	1694.	886.	433.0	719.	738.9
8N 2- 0	5	812.	851.	39.	45.0	719.	80.0
8N 4- 0	15	1270.	1444.	174.	96.0	822.	199.6
8N 6- 0	61	1407.	1680.	273.	149.0	969.	390.8
8N10- 0	165	789.	1336.	547.	295.0	655.	722.8
9C 7- 0	109	1457.	1852.	395.	207.0	704.	499.0
9C 9- 3	153	1011.	1615.	604.	290.0	749.	668.8
9G 1- 0	2	611.	626.	14.	14.5	614.	30.0
9G 3- 3	8	1178.	1255.	76.	75.0	807.	139.0
9G11- 0	171	606.	1553.	947.	478.0	643.	764.0
9I 5- 0	24	1452.	1636.	184.	95.0	995.	283.8
9E 6- 2	46	1560.	1965.	404.	174.0	823.	432.9
10D 6- 6	93	1514.	1827.	313.	215.0	771.	451.6
11E 7- 6	124	1448.	1971.	522.	250.0	799.	553.8
11E 9- 3	155	990.	1621.	631.	336.0	685.	685.9
11E11- 0	172	619.	1361.	743.	480.0	610.	758.5
12D 4- 0	16	1268.	1426.	158.	86.0	835.	198.5
12D 6- 0	66	1493.	1800.	307.	175.0	940.	404.8
12F 6- 6	102	1535.	1914.	379.	208.0	671.	465.0

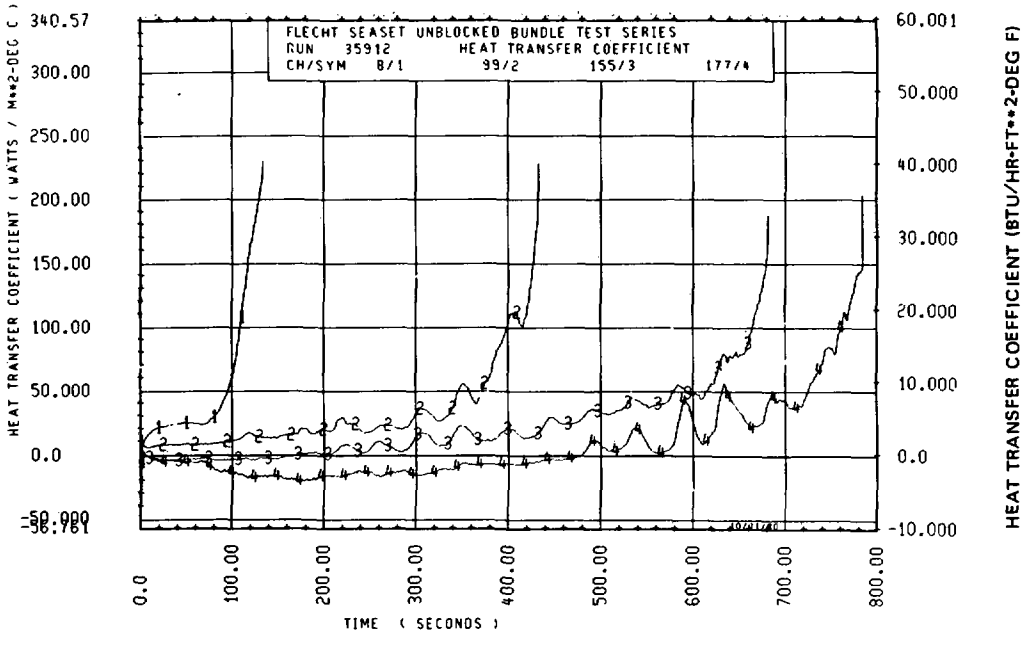

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

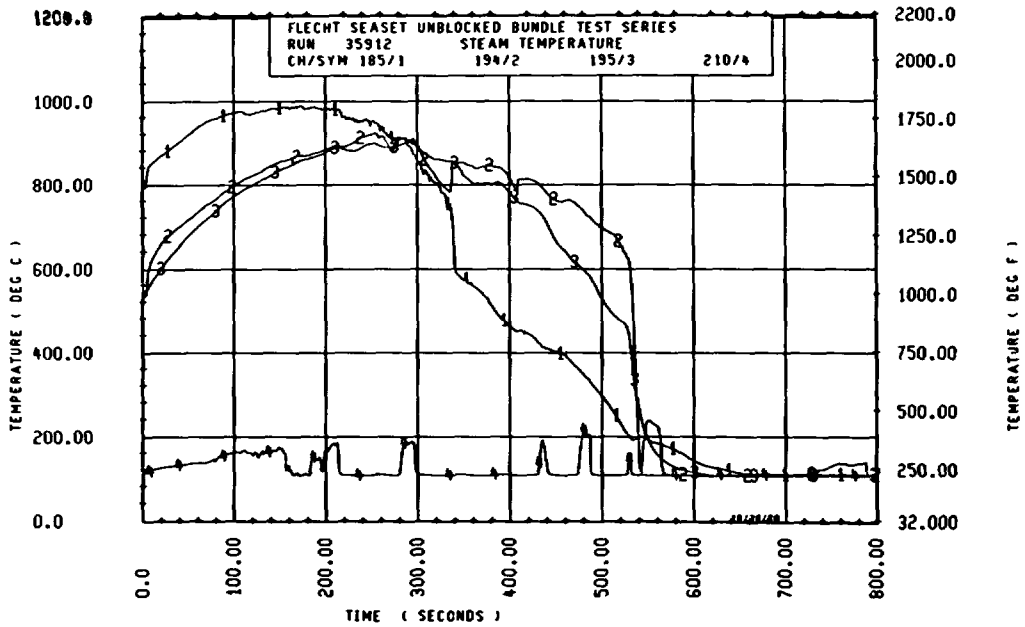

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

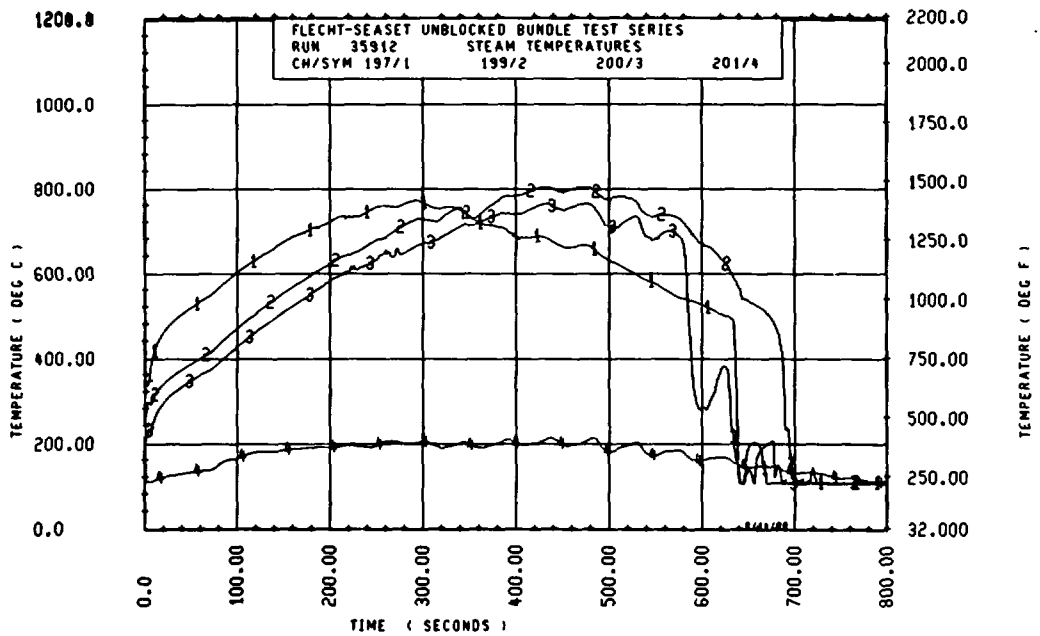

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

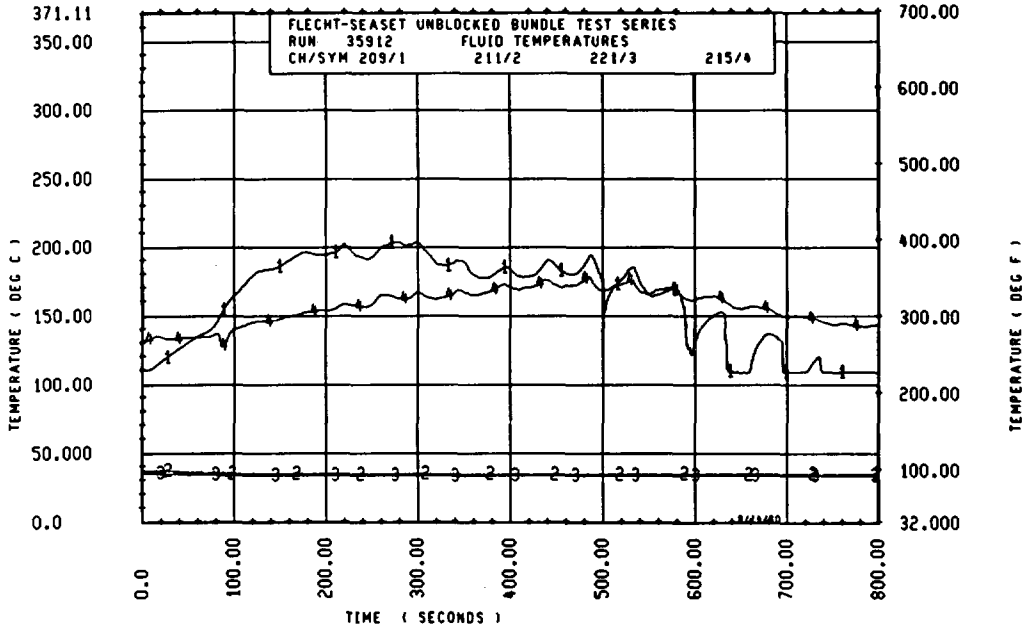

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

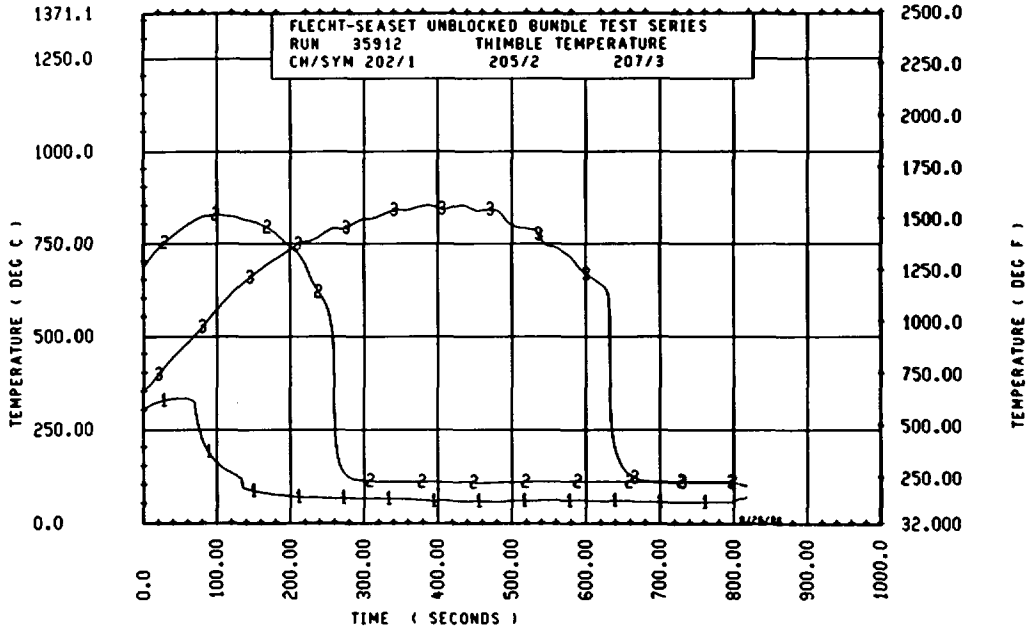

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

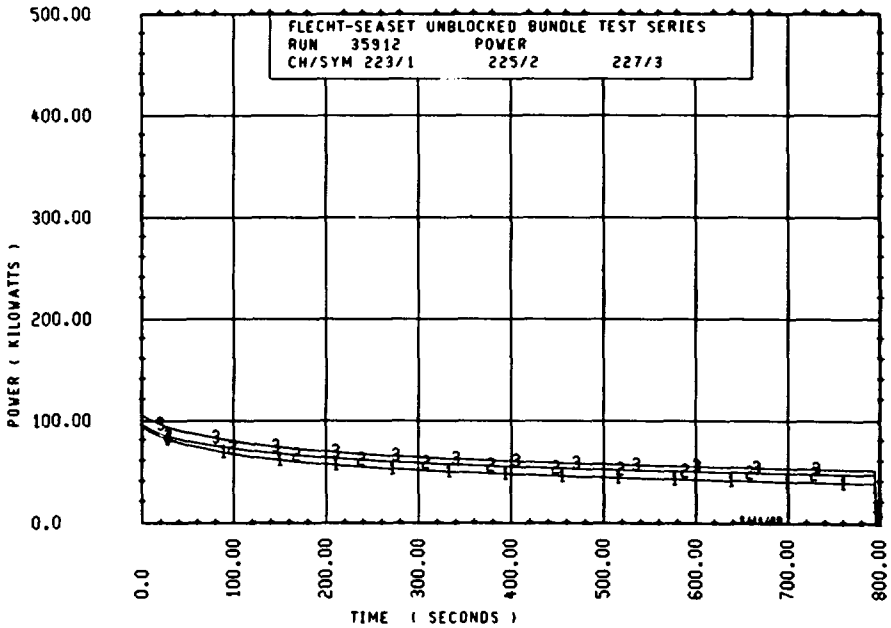

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

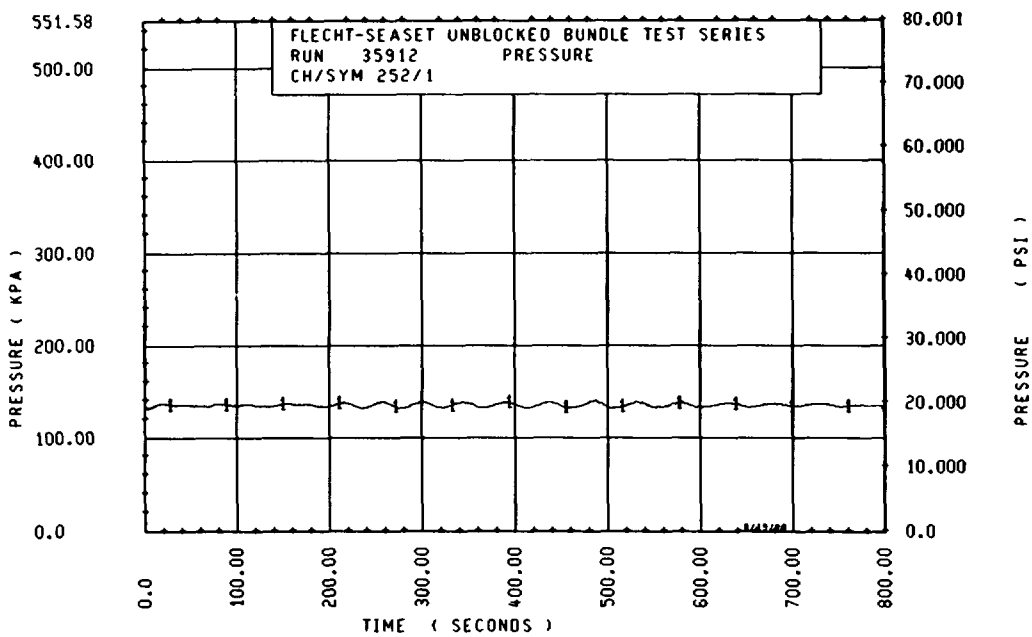

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

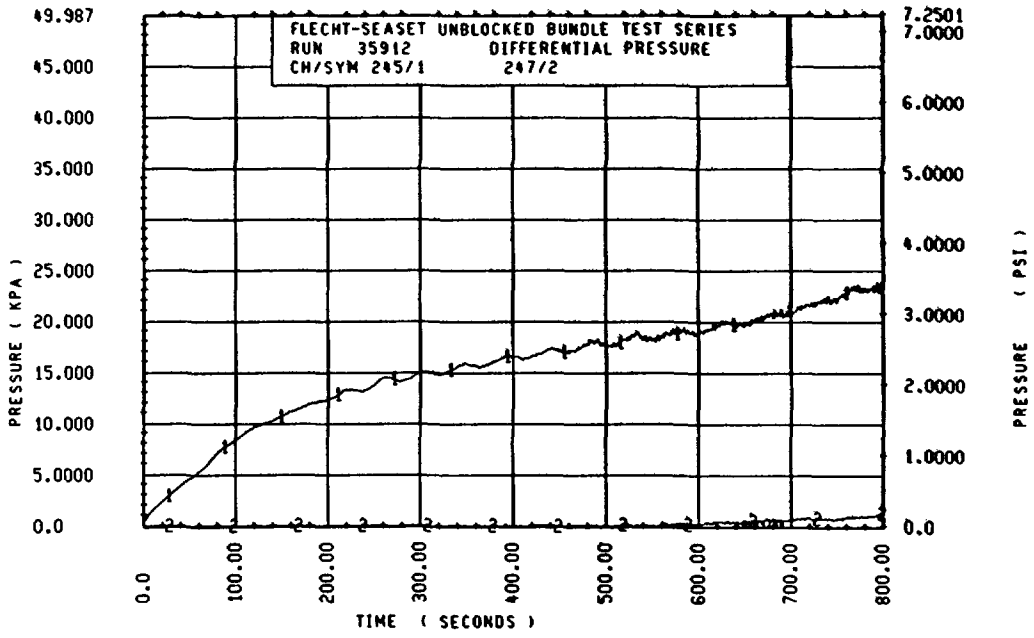


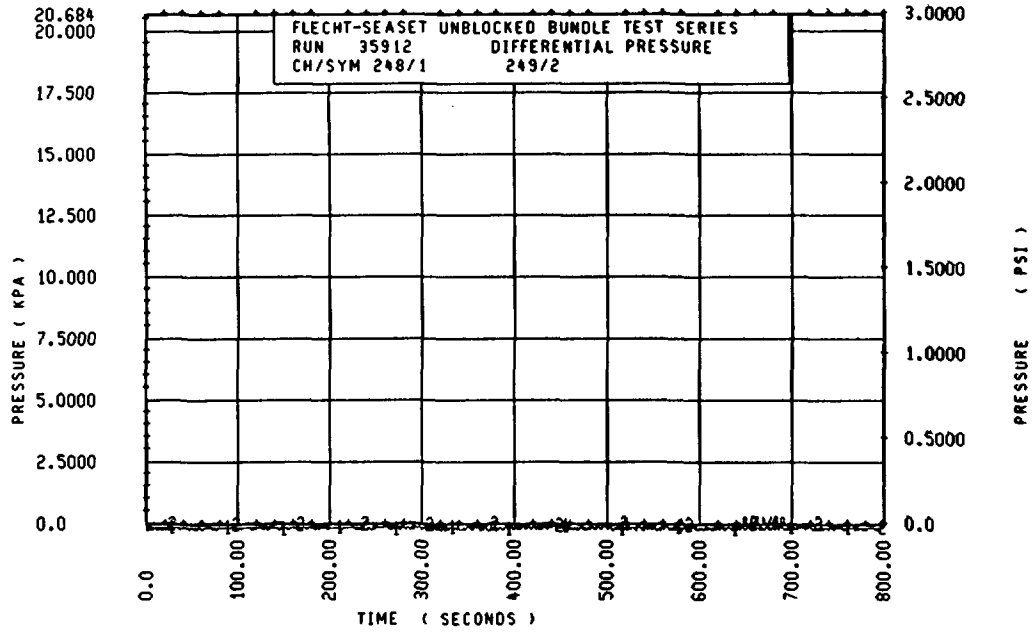


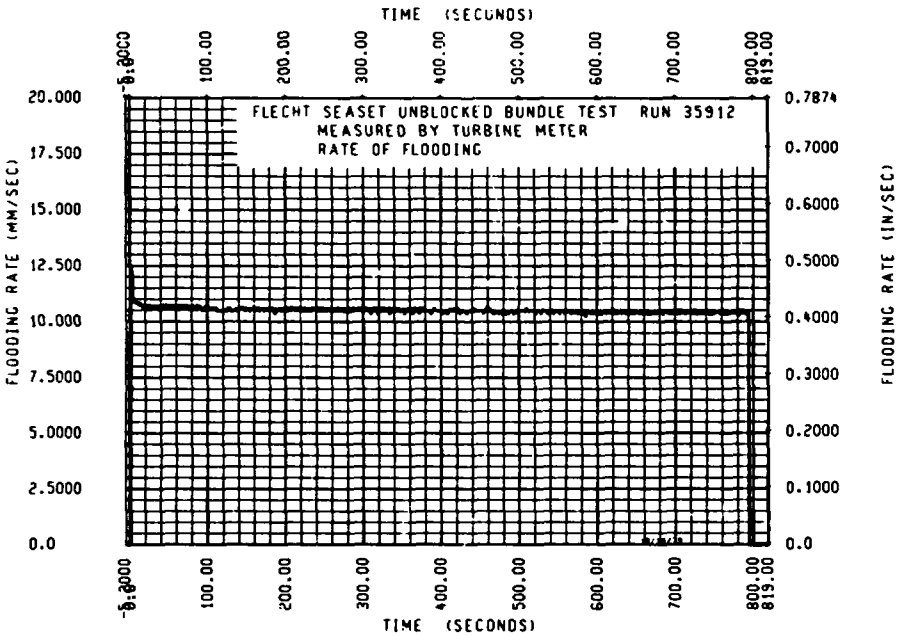
CH 202-4C, 0.61 m (24 in.); CH 205-4C, 1.52 m (60 in.);
CH 207-4I, 3.05 m (120 in.)

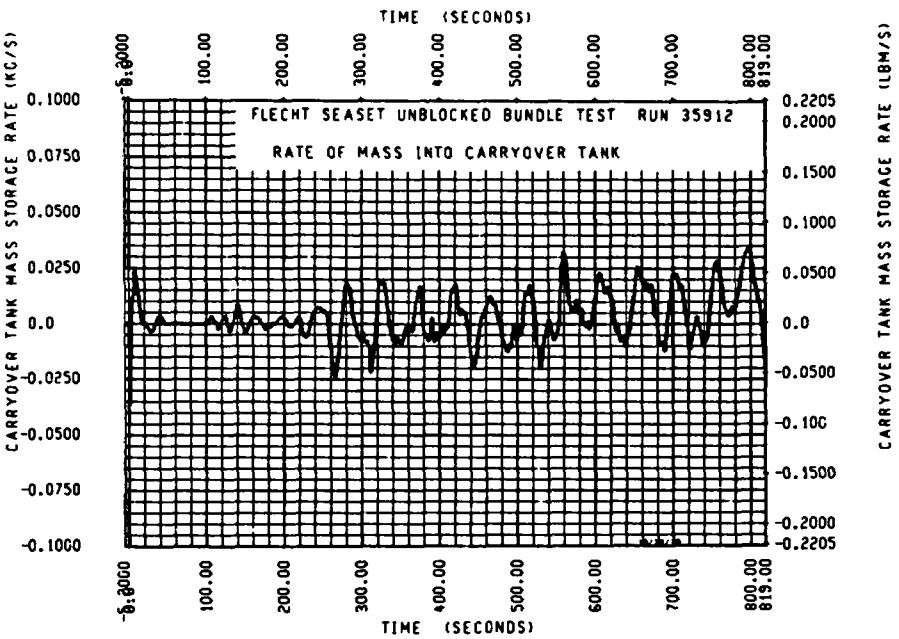

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

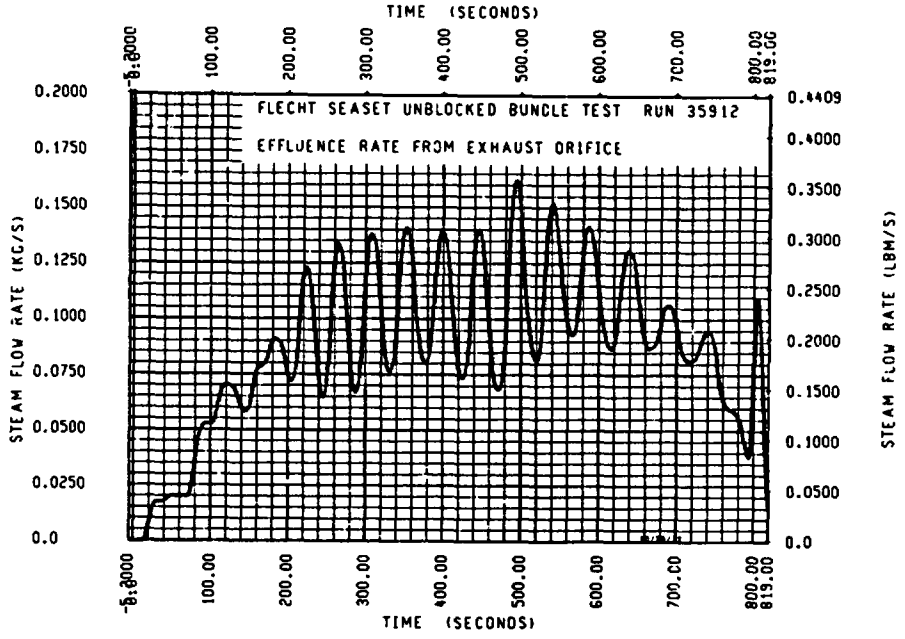

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
TIME (SECONDS)

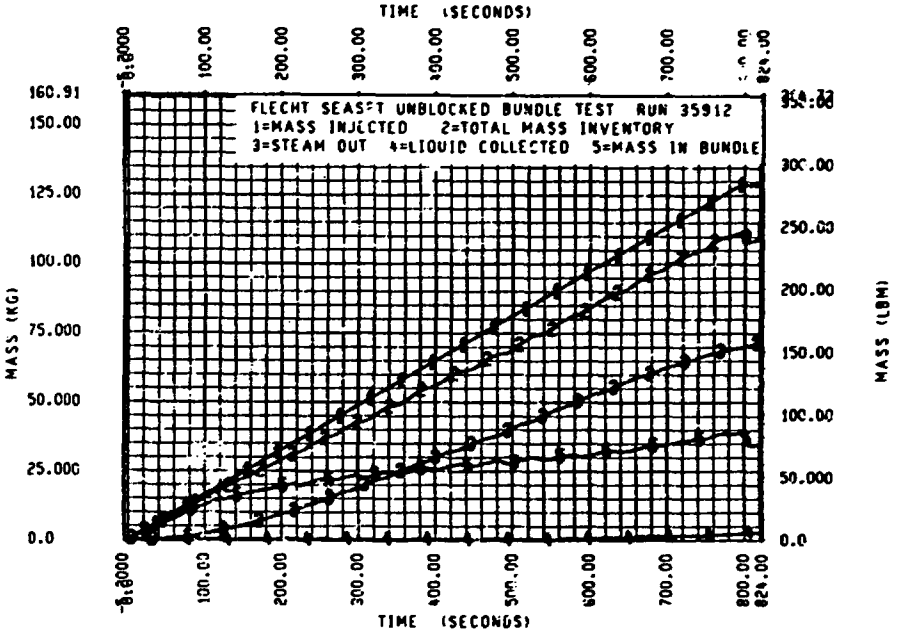

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

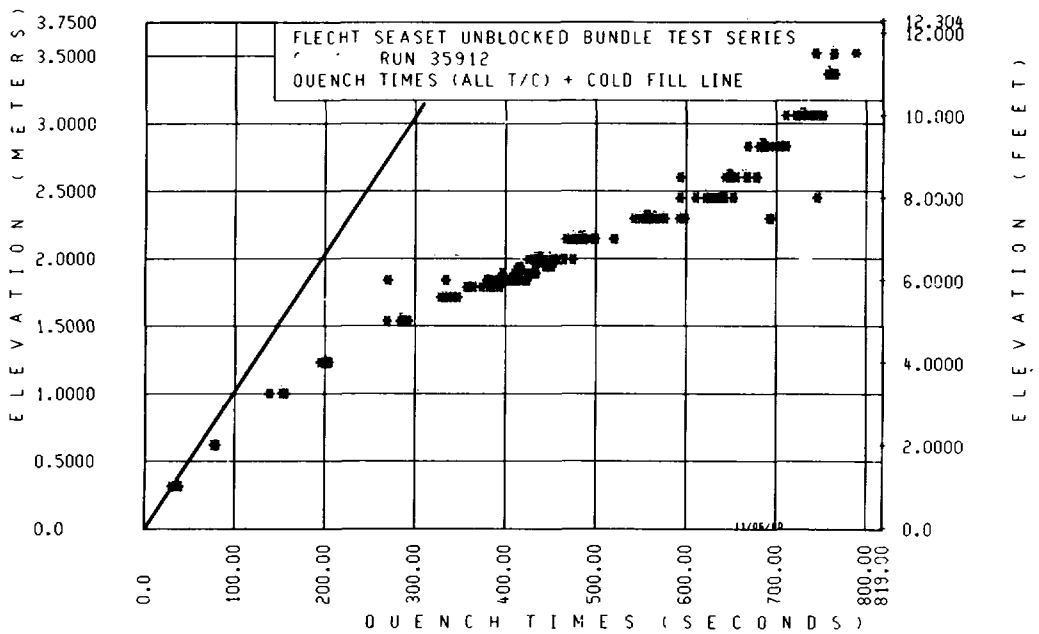

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

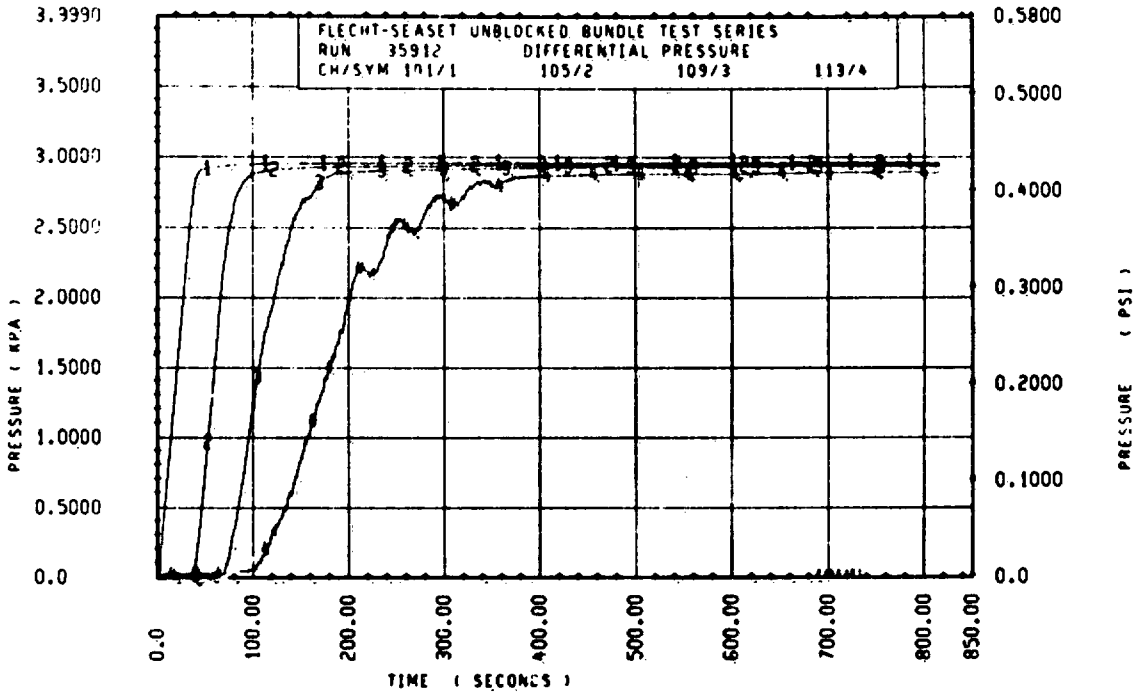

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35912
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
819.00
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
0.7874
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0

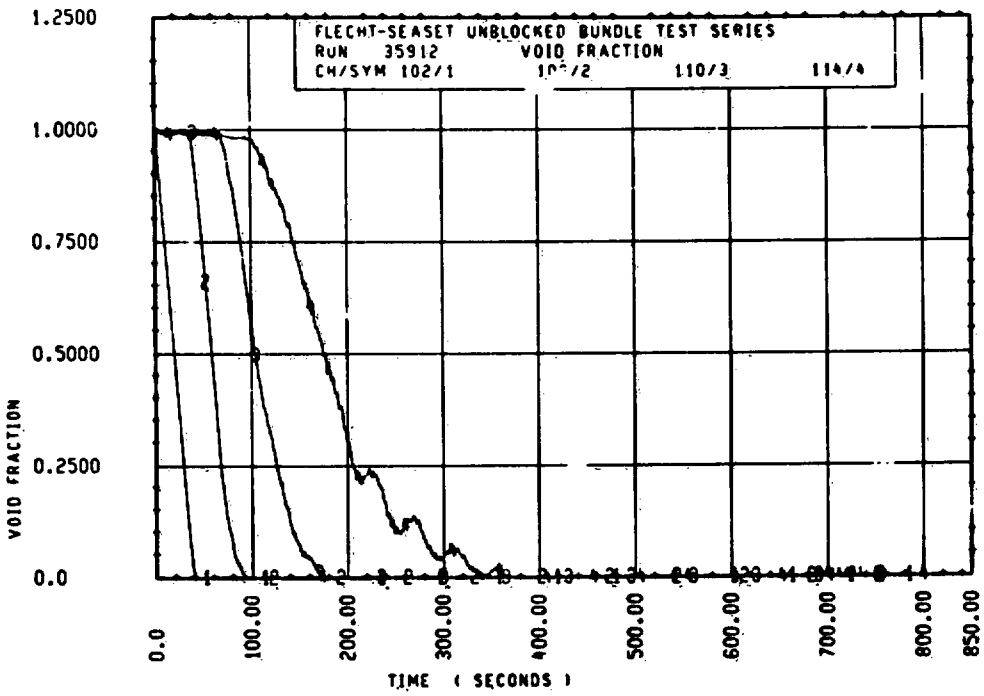

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35912
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
819.00
0.1000
0.0750
0.0500
0.0250
0.0
-0.0250
-0.0500
-0.0750
-0.1000
0.2205
0.2000
0.1500
0.1000
0.0500
0.0
-0.0500
-0.100
-0.1500
-0.2000
-0.2205

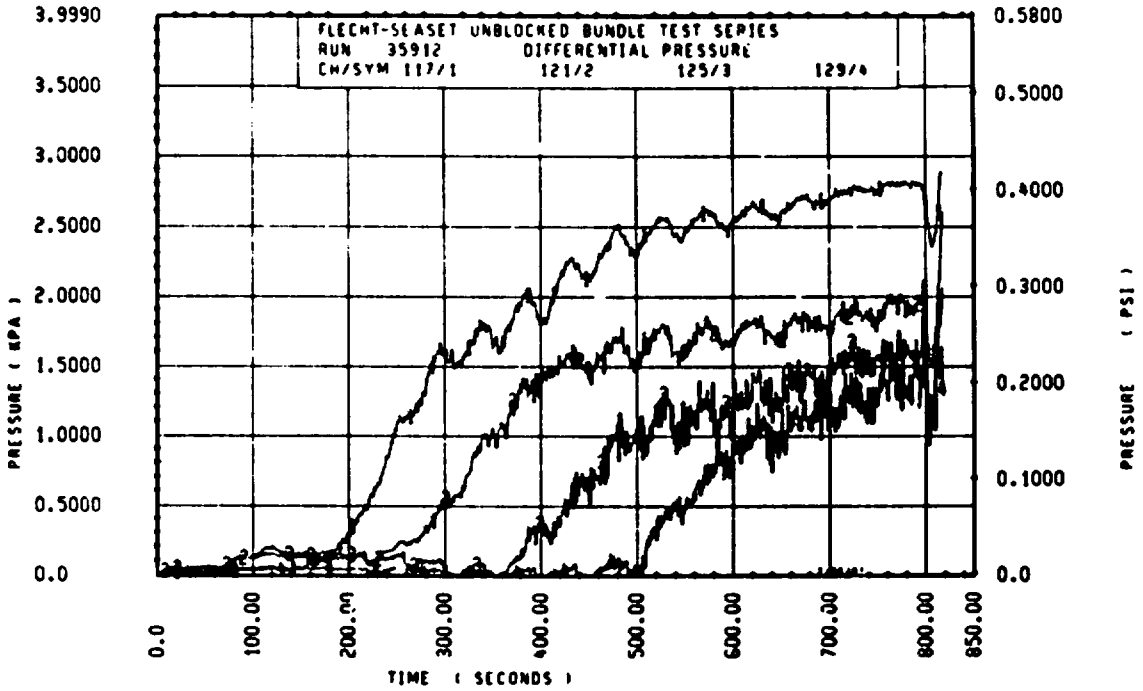

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35912
EFFLUENCE RATE FROM EXHAUST ORIFICE
TIME (SECONDS)
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0
0.4409
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0
-8.8000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
819.00

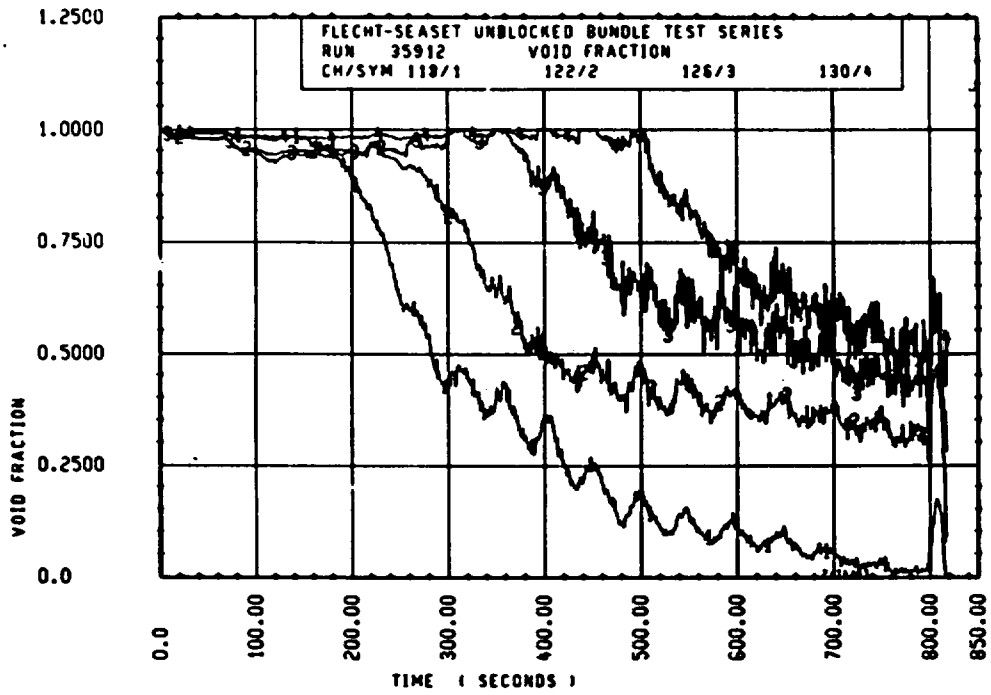

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 35912
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
TIME (SECONDS)
MASS (KG)
MASS (LBM)
160.91
150.00
125.00
100.00
75.000
50.000
25.000
0.0
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-8.8000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
824.00

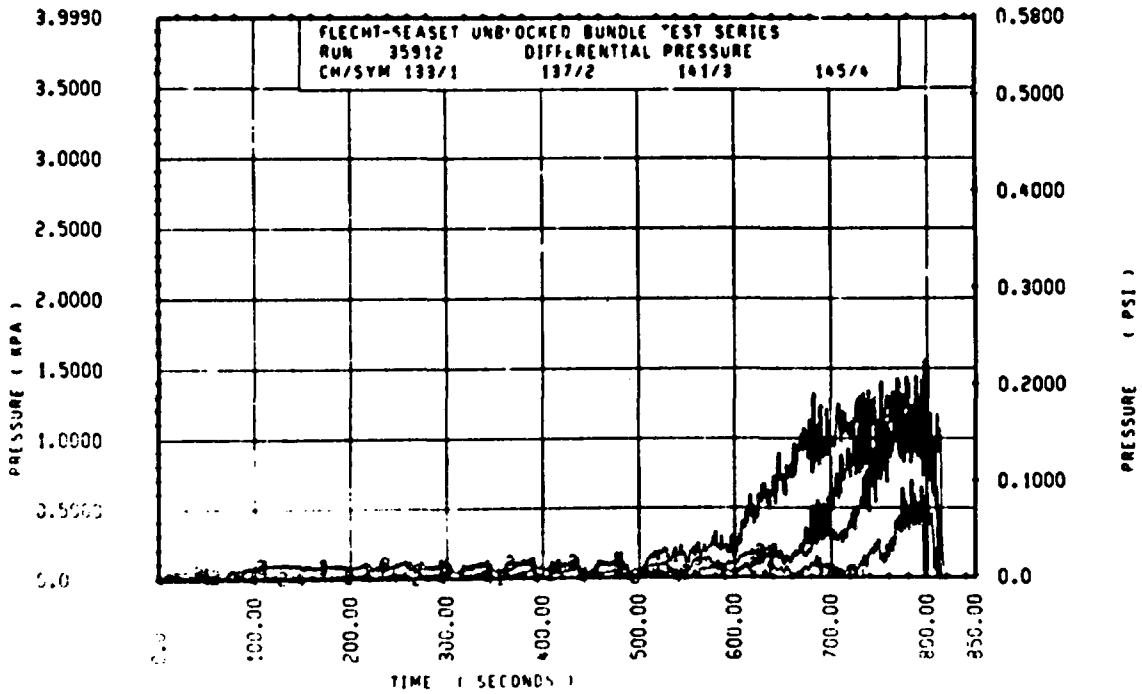

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
819.00
QUENCH TIMES (SECONDS)

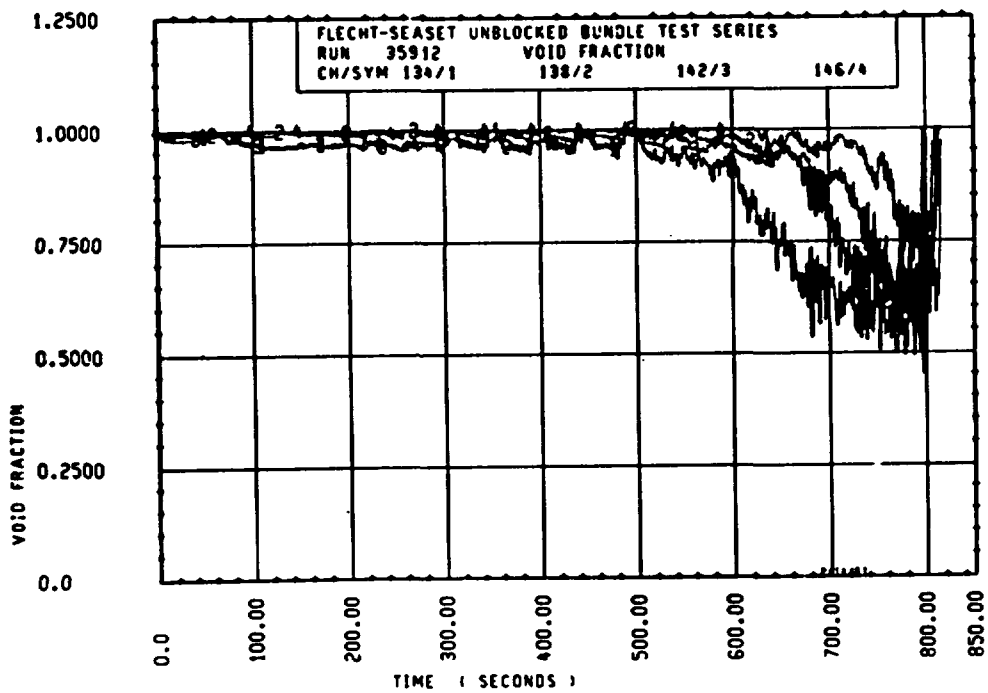

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.3990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 VOID FRACTION
CH/SYM 102/1 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
850.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 35912 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET

Run 36026

Date: 8/29/79

Forced Reflood Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	900°C (1651°F)
Rod peak power	2.42 kw/m (0.737 kw/ft) 2.31 kw/m (0.703 kw/ft) 2.19 kw/m (0.667 kw/ft)
Flow rate	25 mm/sec (1.0 in./sec)
Coolant temperature	51°C (124°F)
Bundle radial power profile	FLECHT
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK

B. Housing Temperatures

Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	124°C (255°F)	78°C (172°F)
1.22 m (48 in.)	147°C-156°C (297°F-313°F)	131°C (268°F)
1.83 m (72 in.)	158°C-306°C (317°F-583°F)	112°C-135°C (233°F-275°F)
2.44 m (96 in.)	293°C-322°C (560°F-611°F)	139°C-624°C (283°F-1155°F)
2.74 m (108 in.)	152°C (306°F)	129°C (264°F)
3.05 m (120 in.)	134°C-141°C (273°F-285°F)	128°C-287°C (262°F-548°F)
3.35 m (132 in.)	128°C-133°C (263°F-271°F)	127°C (261°F)

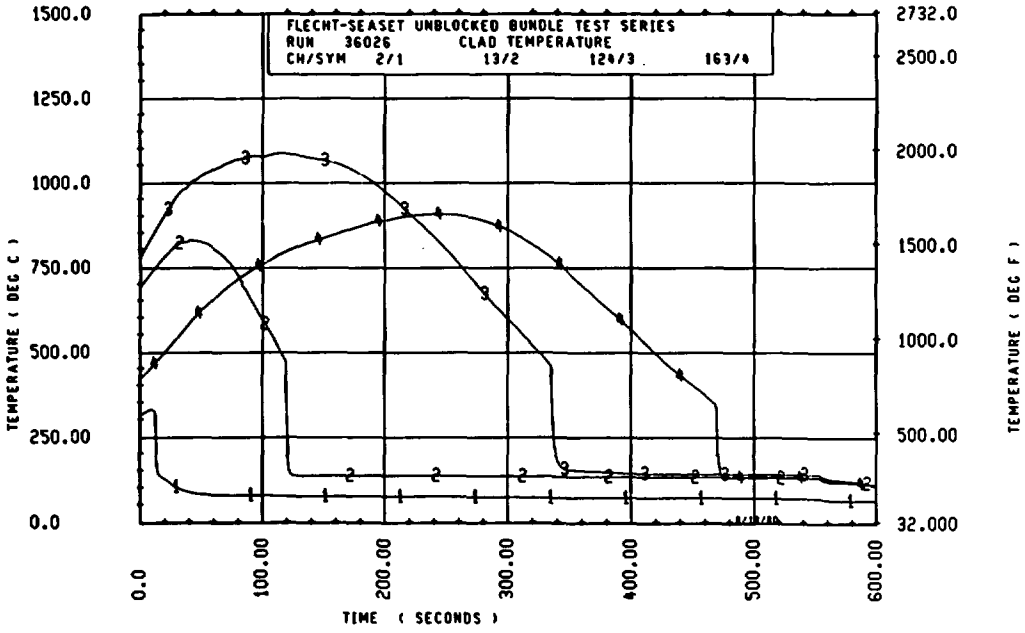
*At 189 seconds after flood

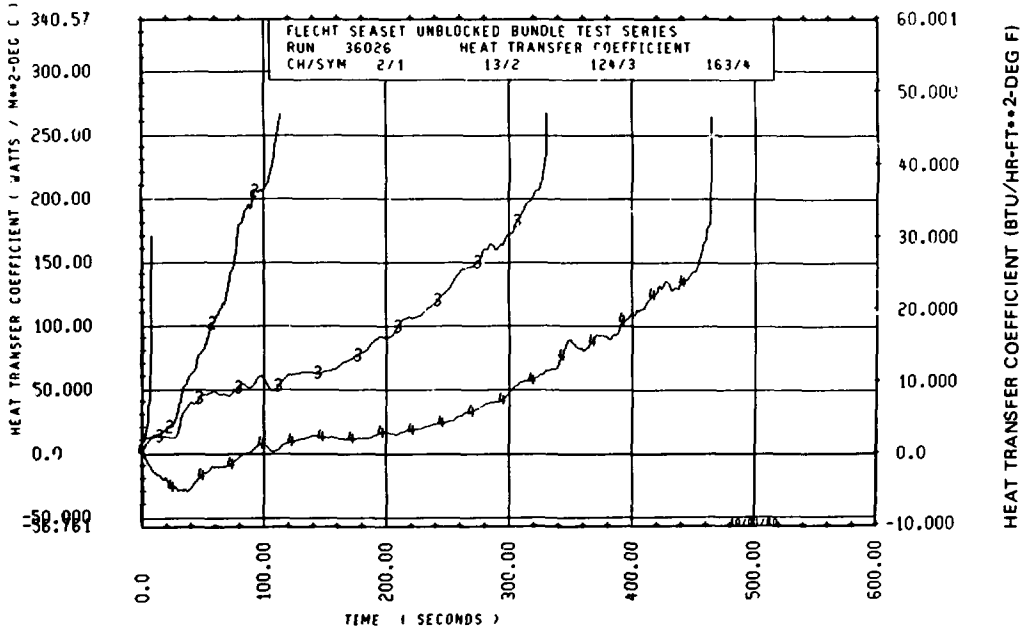
C. Comments

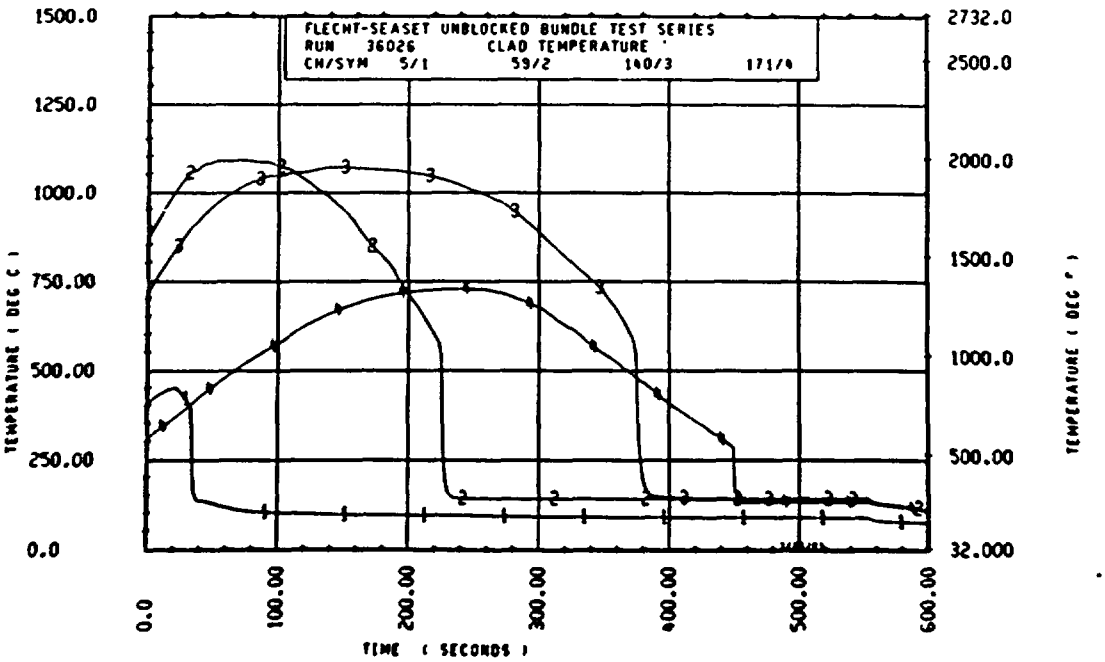
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. Power decay of center power zone was lower than specified by approximately 5 percent.

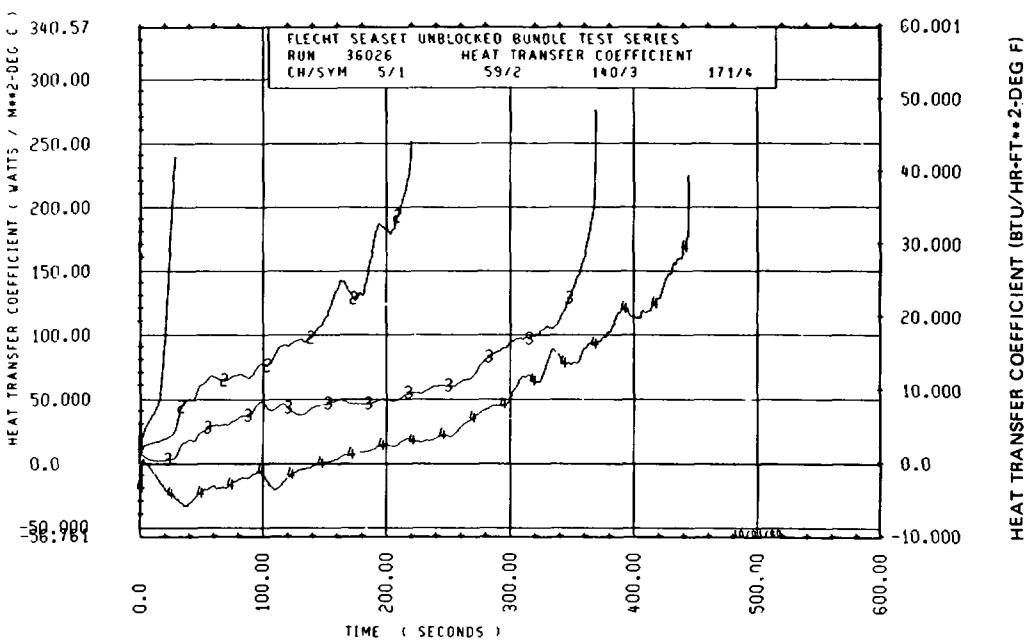
FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN NUMBER 36026

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)
2H 4- 0	10	1206.	1436.	229.	41.0	861.	114.9
2H 8- 0	50	1458.	1924.	465.	89.0	1041.	244.7
3C 5- 0	17	1315.	1559.	244.	52.0	891.	179.0
3C 5- 7	28	1401.	1700.	298.	70.0	909.	206.9
4L 8- 0	129	1250.	1744.	494.	92.0	838.	350.9
4L 8- 6	147	1255.	1753.	498.	90.0	840.	350.8
5E11- 0	168	632.	1127.	494.	209.0	544.	443.0
5J 4- 0	12	1256.	1523.	266.	44.0	847.	121.8
5J 8- 6	144	1126.	1584.	458.	80.0	684.	391.2
5J11- 6	175	617.	1222.	605.	258.0	648.	443.0
7B 6- 0	57	1482.	1775.	293.	51.0	966.	205.0
7B 8- 6	142	1124.	1548.	422.	93.0	626.	418.7
7B10- 0	162	854.	1342.	488.	119.0	604.	451.0
7B11- 6	176	658.	1087.	429.	153.0	503.	466.0
7D 6- 4	84	1631.	2119.	487.	107.0	1170.	251.8
7D 7- 6	119	1496.	1981.	485.	93.0	1007.	305.7
7D 9- 3	151	1025.	1607.	582.	122.0	701.	402.0
7G 5- 0	23	1545.	1840.	295.	50.0	1027.	175.0
7J 6- 0	59	1600.	1998.	398.	69.0	1054.	224.9
7M 7- 6	120	1396.	1897.	501.	92.0	992.	318.9
7M 8- 0	132	1291.	1871.	580.	109.0	904.	356.7
7M 9- 3	152	1004.	1583.	579.	131.0	720.	393.0
8H 4- 0	13	1277.	1528.	251.	41.0	880.	119.1
8H10- 0	163	793.	1665.	872.	238.0	652.	469.0
8H11- 6	177	614.	1351.	737.	258.0	534.	470.0
8K 4- 0	14	1251.	1504.	253.	42.0	874.	112.8
8K 6- 6	99	1471.	2024.	552.	108.0	1310.	247.3
8K 8- 0	140	1326.	1963.	637.	147.0	1055.	373.8
8K10- 0	164	823.	1566.	743.	230.0	682.	460.0
8N 2- 0	5	767.	847.	79.	20.5	739.	34.0
8N 4- 0	15	1222.	1471.	249.	47.0	899.	114.0
8N 6- 0	61	1427.	1835.	408.	76.0	1011.	232.8
8N10- 0	165	802.	1315.	513.	133.0	720.	420.0
9C 7- 0	109	1488.	1938.	450.	96.0	740.	323.0
9C 9- 3	153	1036.	1623.	587.	121.0	681.	411.0
9G 1- 0	2	601.	631.	30.	8.5	613.	12.5
9G 3- 3	8	1198.	1357.	159.	31.0	815.	78.0
9G11- 0	171	597.	1346.	749.	241.0	545.	449.0
9E 5- 0	24	1533.	1785.	252.	60.0	1053.	171.8
9E 6- 2	46	1497.	2096.	599.	96.0	984.	277.3
10D 6- 6	93	1499.	1949.	450.	126.0	903.	292.0
11E 7- 6	124	1437.	1989.	552.	114.0	855.	335.0
11E 9- 3	155	978.	1615.	636.	149.0	597.	428.0
11E11- 0	172	601.	1221.	620.	171.0	610.	414.0
12D 4- 0	16	1266.	1498.	231.	41.0	864.	117.9
12D 6- 0	66	1502.	1997.	495.	96.0	1031.	264.9
12F 6- 6	102	1535.	2122.	588.	114.0	902.	312.3

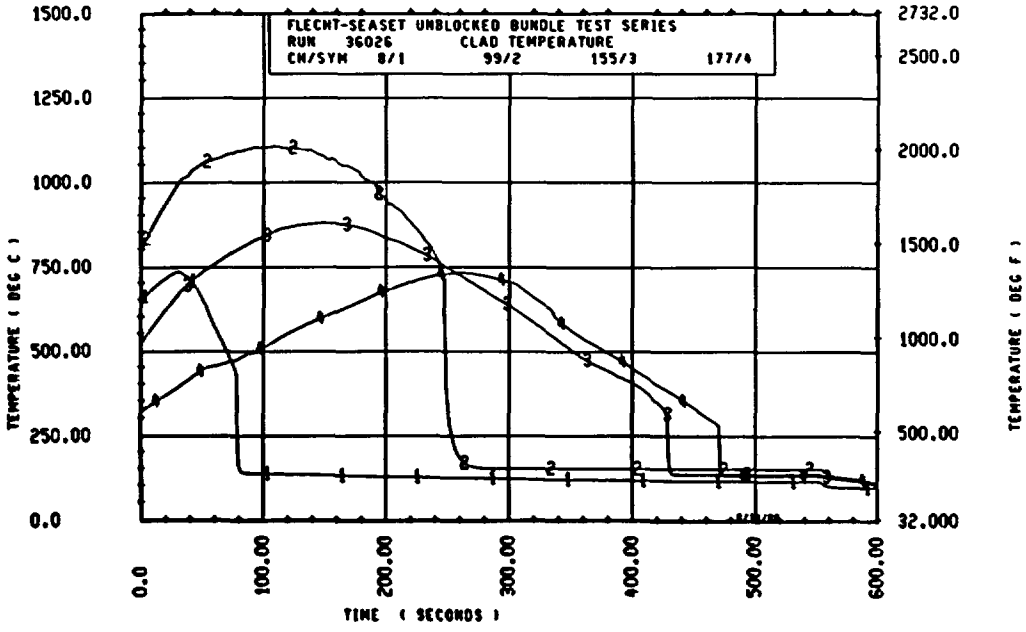

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

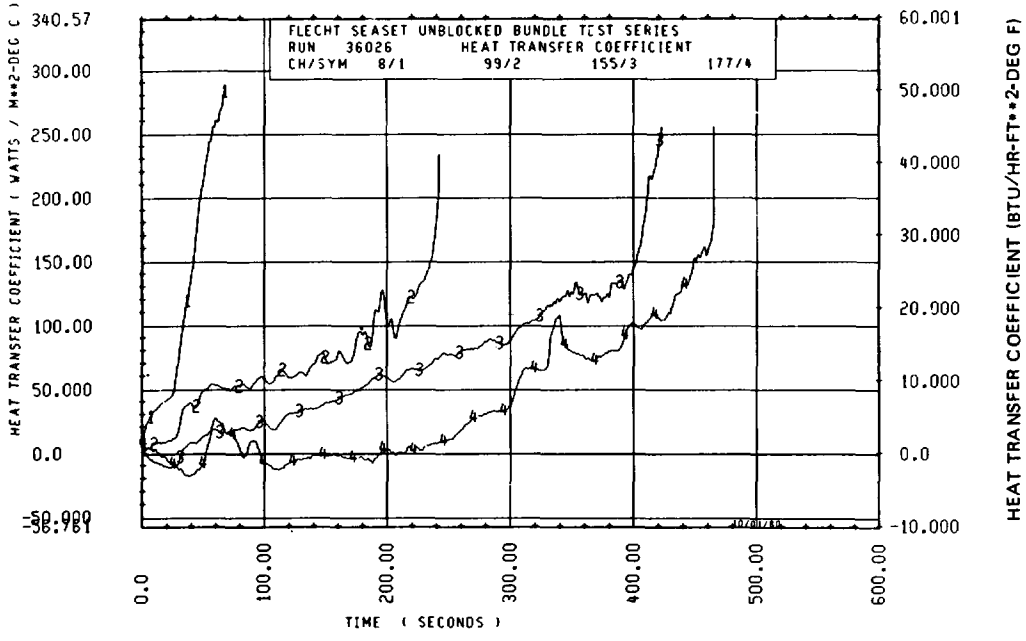

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 HEAT TRANSFER COEFFICIENT
CH/SYM 2/1 13/2 124/3 163/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

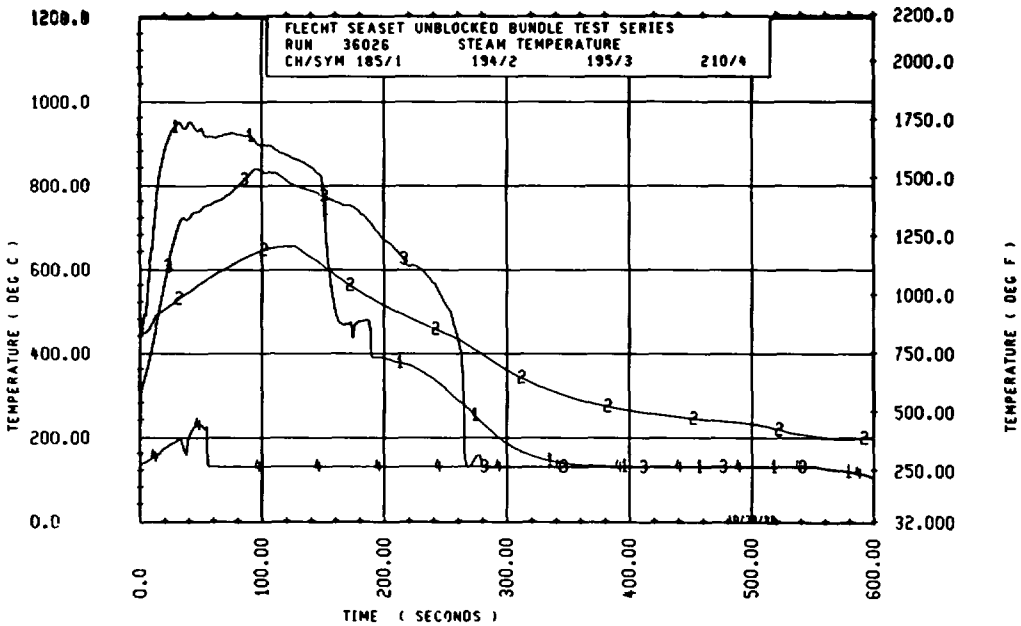

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

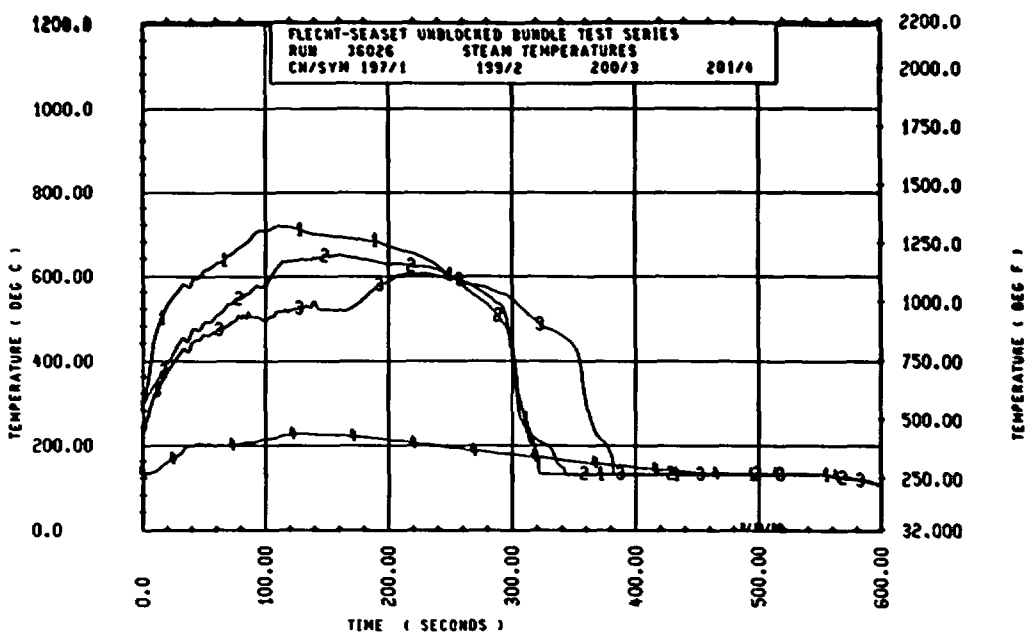

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 HEAT TRANSFER COEFFICIENT
CH/SYM 5/1 59/2 140/3 171/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

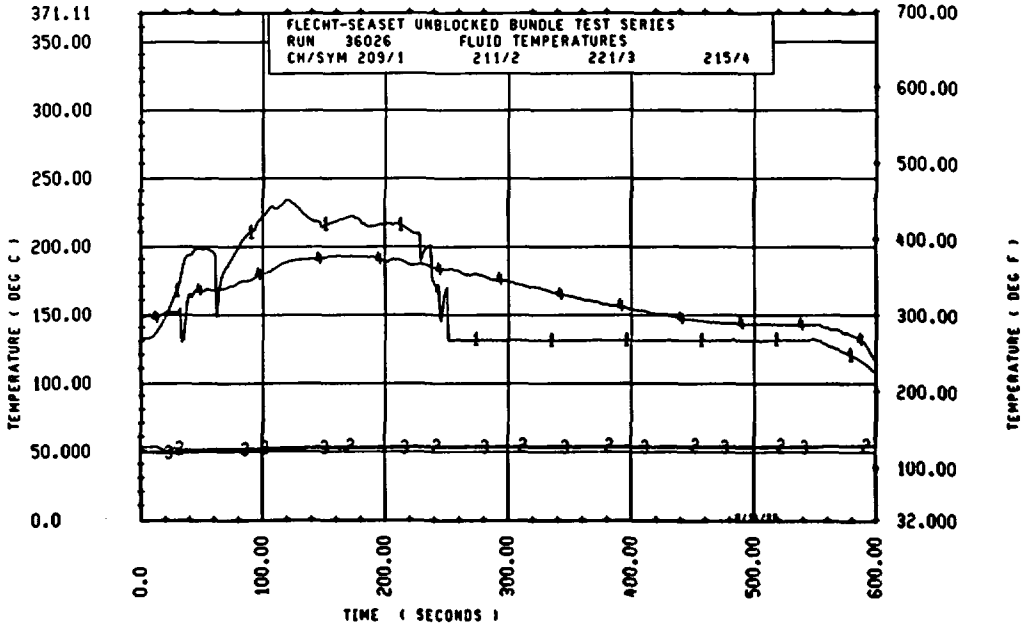
36026-4

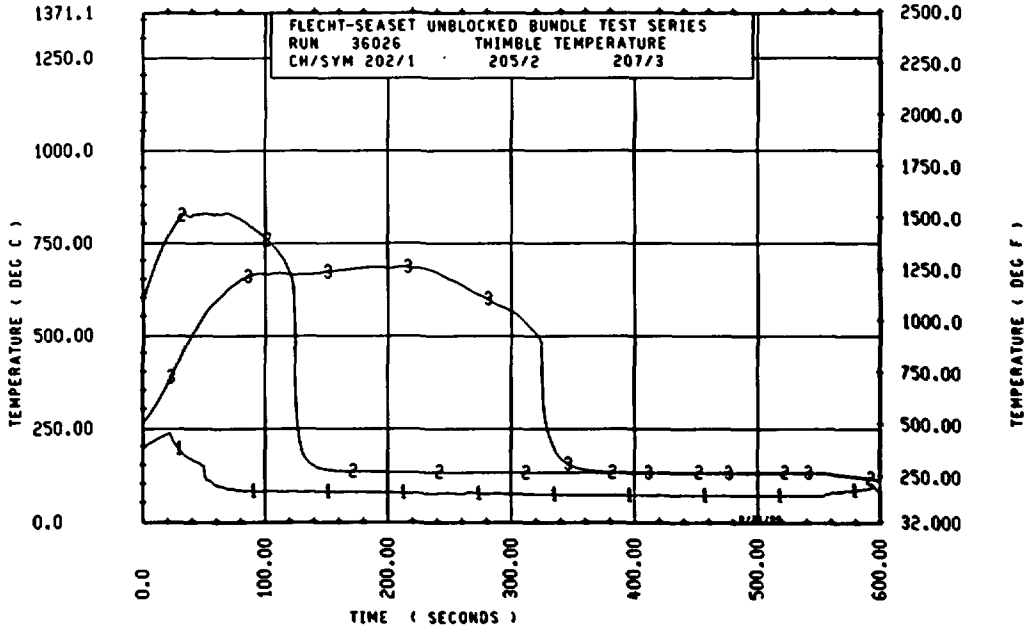

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
2732.0
2500.0
2000.0
1500.0
1000.0
500.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 HEAT TRANSFER COEFFICIENT
CH/SYM 8/1 99/2 155/3 177/4
HEAT TRANSFER COEFFICIENT (WATTS / M**2-DEG C)
HEAT TRANSFER COEFFICIENT (BTU/HR-FT**2-DEG F)
TIME (SECONDS)
340.57
300.00
250.00
200.00
150.00
100.00
50.000
0.0
-50.000
-56.761
60.001
50.000
40.000
30.000
20.000
10.000
0.0
-10.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

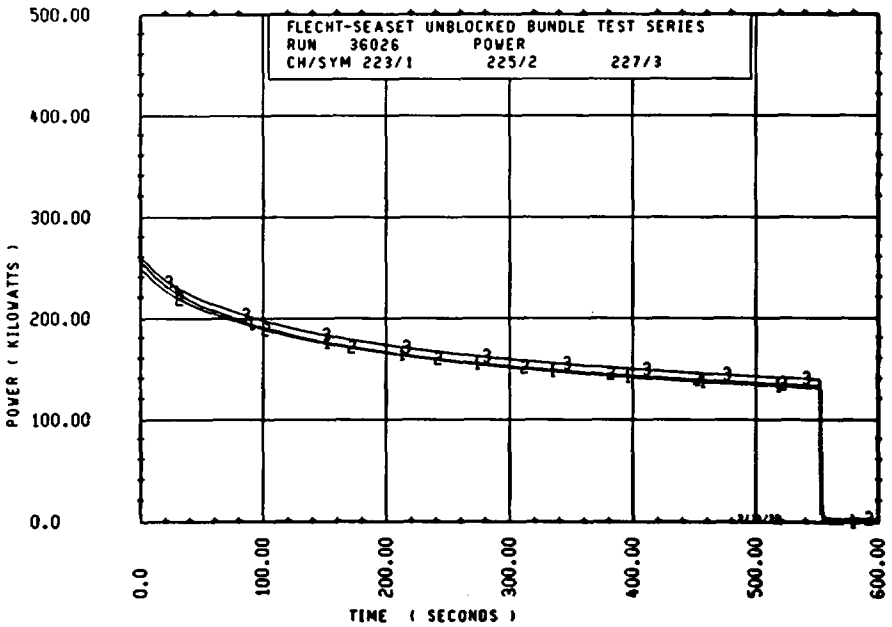

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 STEAM TEMPERATURE
CH/SYM 185/1 194/2 195/3 210/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

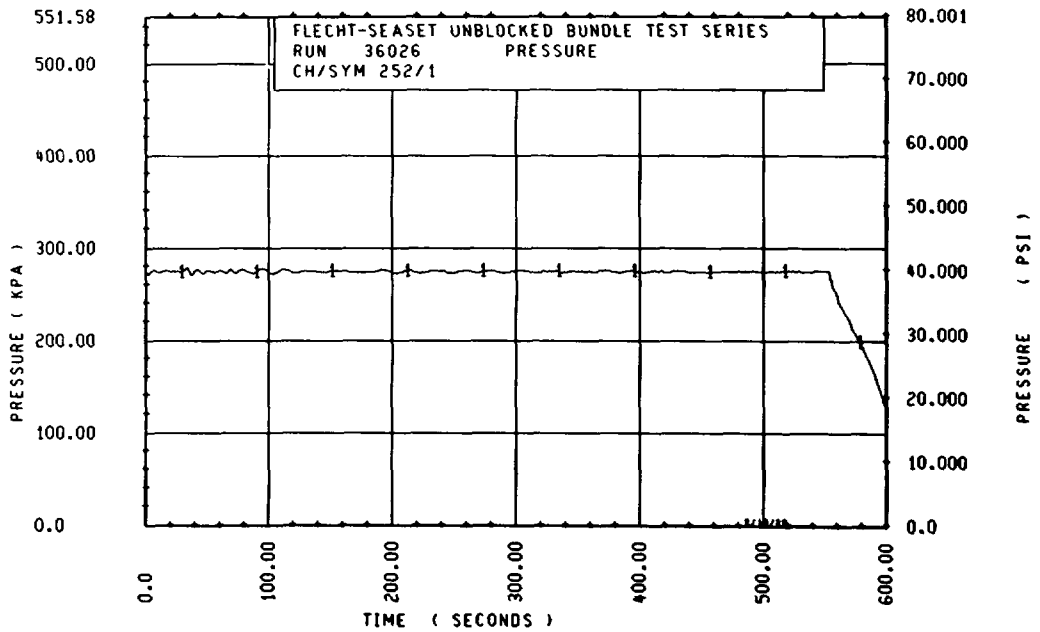

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 STEAM TEMPERATURES
CH/SYM 197/1 199/2 200/3 201/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
1200.0
1000.0
800.00
600.00
400.00
200.00
0.0
2200.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.00
500.00
250.00
32.000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

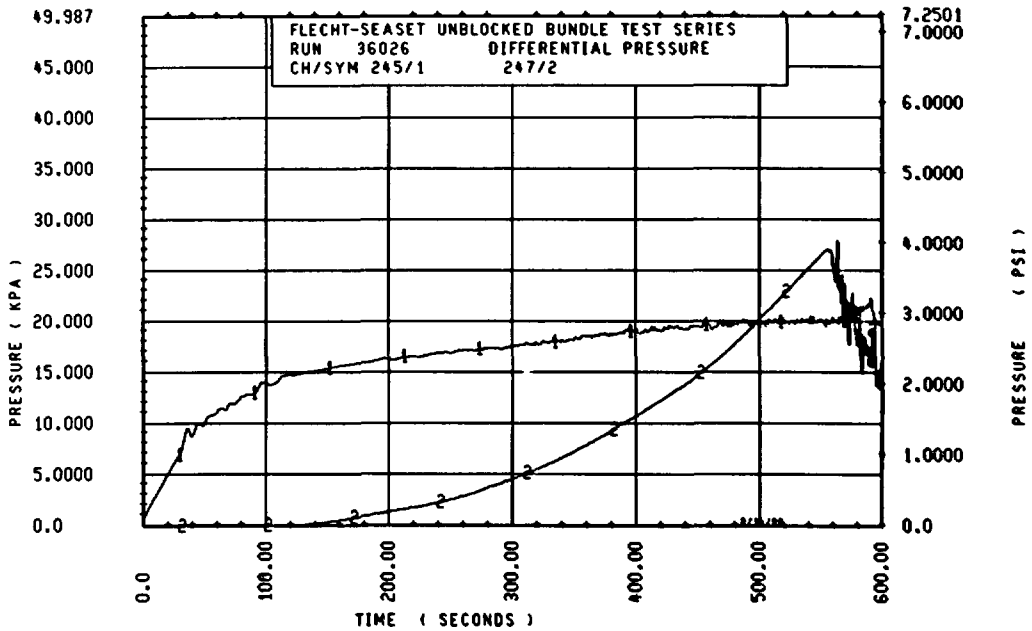


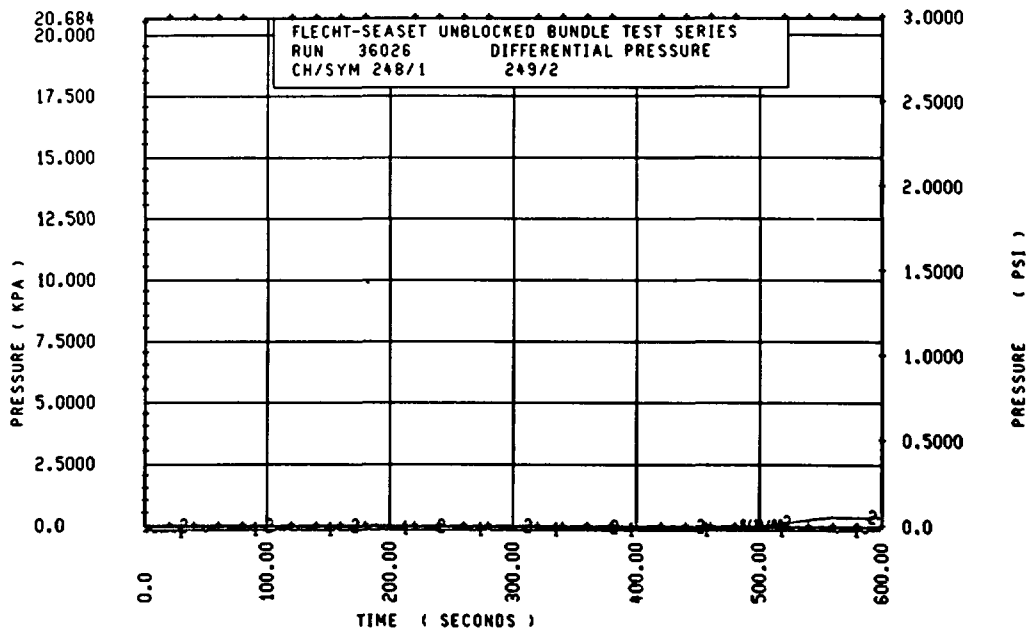


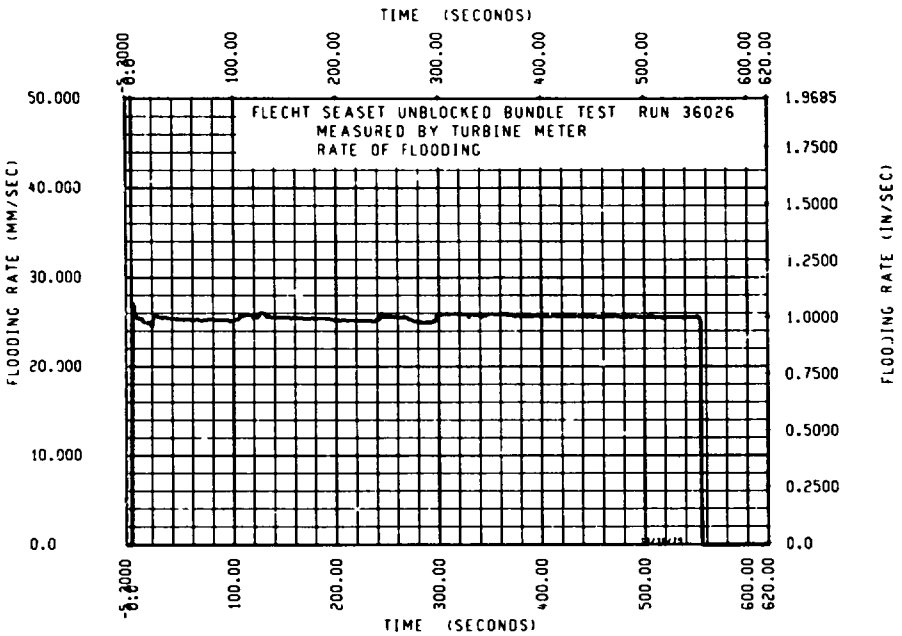
CH 202-4C, 0.61 m (24 in.); CH 205-4C, 1.52 m (60 in.);
CH 207-4I, 3.05 m (120 in.)

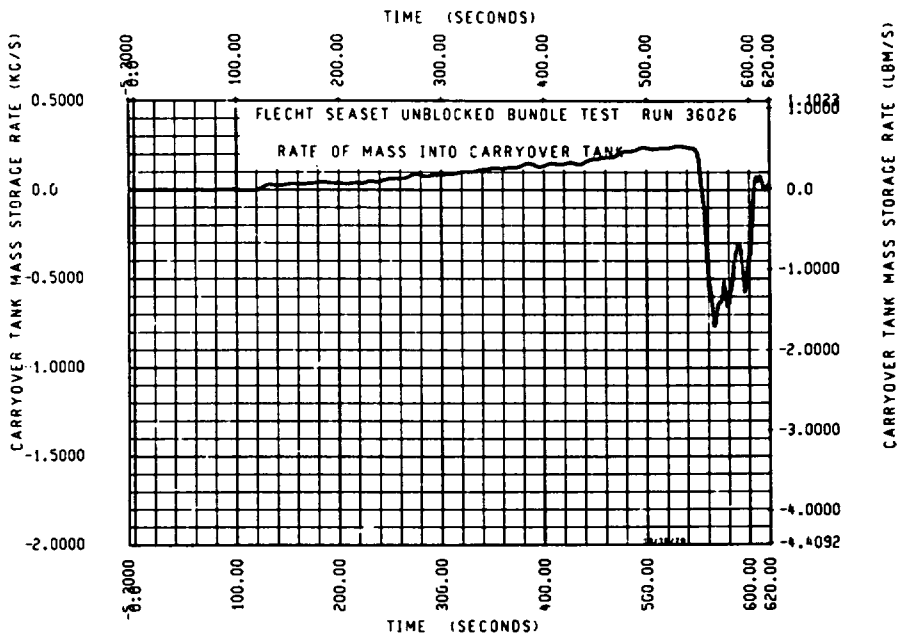

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 POWER
CH/SYM 223/1 225/2 227/3
POWER (KILOWATTS)
500.00
400.00
300.00
200.00
100.00
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

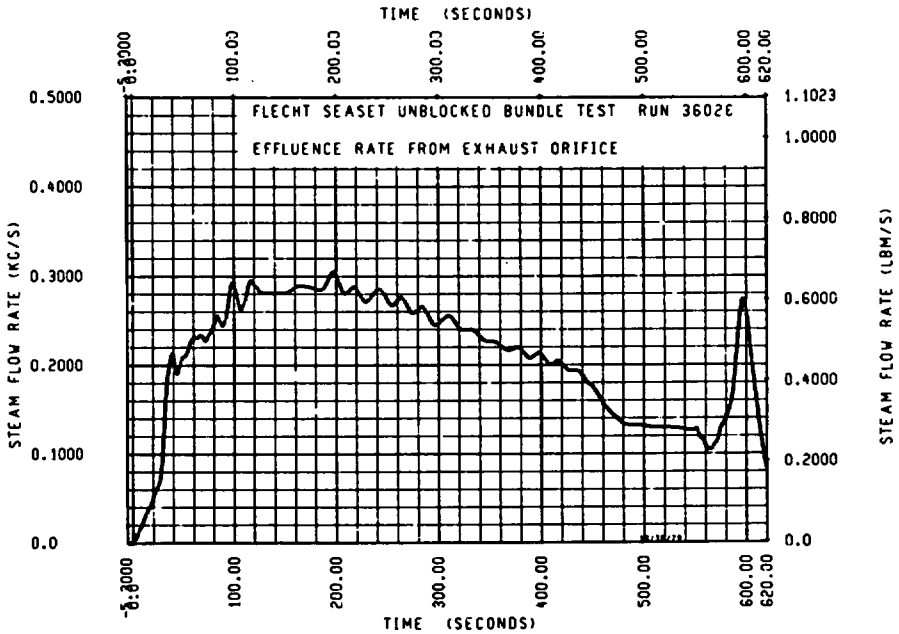

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 PRESSURE
CH/SYM 252/1
PRESSURE (KPA)
551.58
500.00
400.00
300.00
200.00
100.00
0.0
PRESSURE (PSI)
80.001
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
TIME (SECONDS)

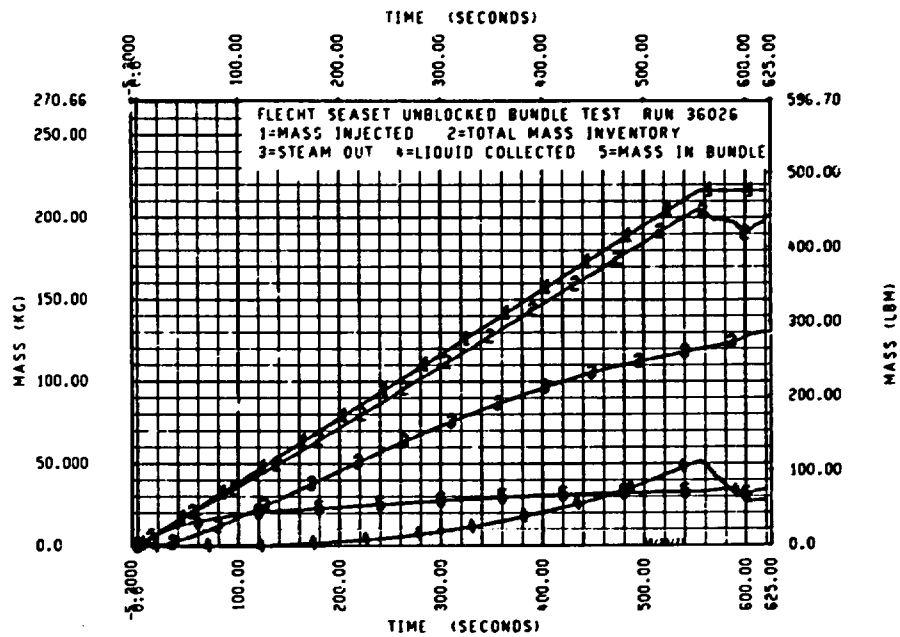

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 DIFFERENTIAL PRESSURE
CH/SYM 245/1 247/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
49.987
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.0000
0.0
7.2501
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

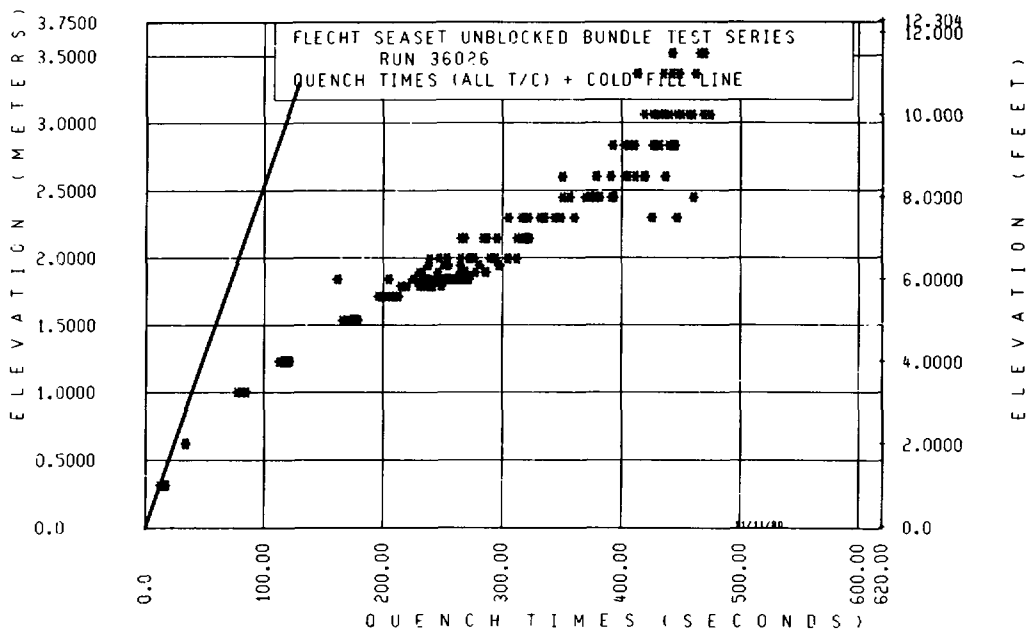

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 DIFFERENTIAL PRESSURE
CH/SYM 248/1 249/2
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
20.684
20.000
17.500
15.000
12.500
10.000
7.5000
5.0000
2.5000
0.0
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
100.00
200.00
300.00
400.00
500.00
600.00

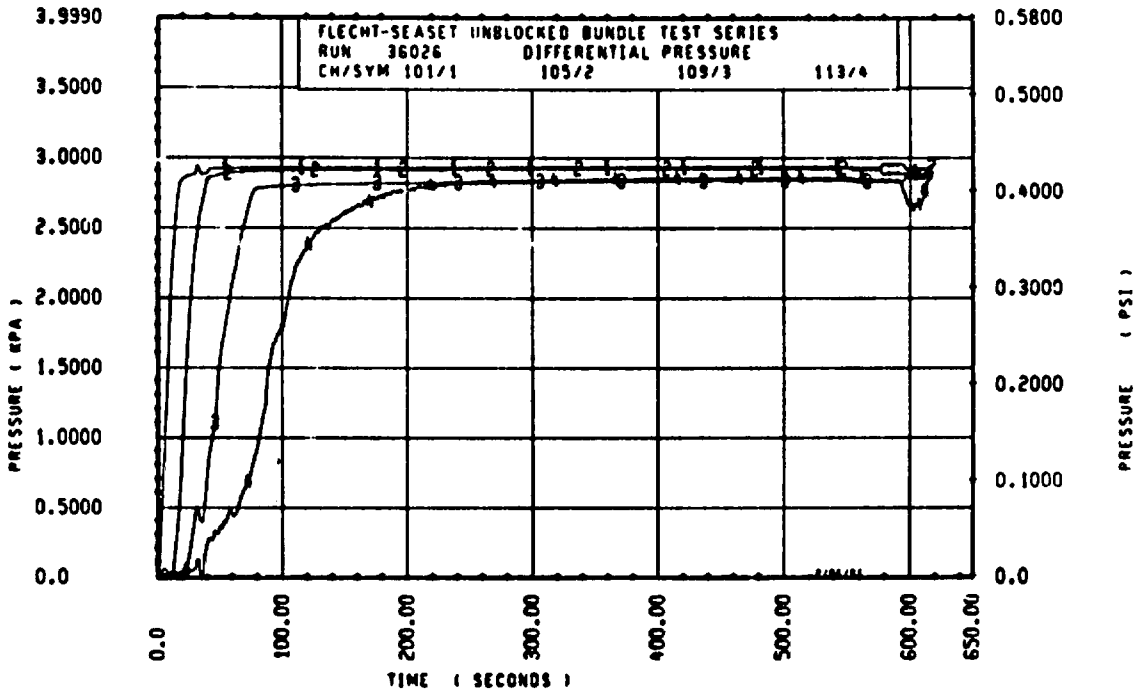

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 36026
MEASURED BY TURBINE METER
RATE OF FLOODING
TIME (SECONDS)
FLOODING RATE (MM/SEC)
FLOODING RATE (IN/SEC)
50.000
40.000
30.000
20.000
10.000
0.0
1.9685
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
-0.2000
100.00
200.00
300.00
400.00
500.00
600.00
620.00

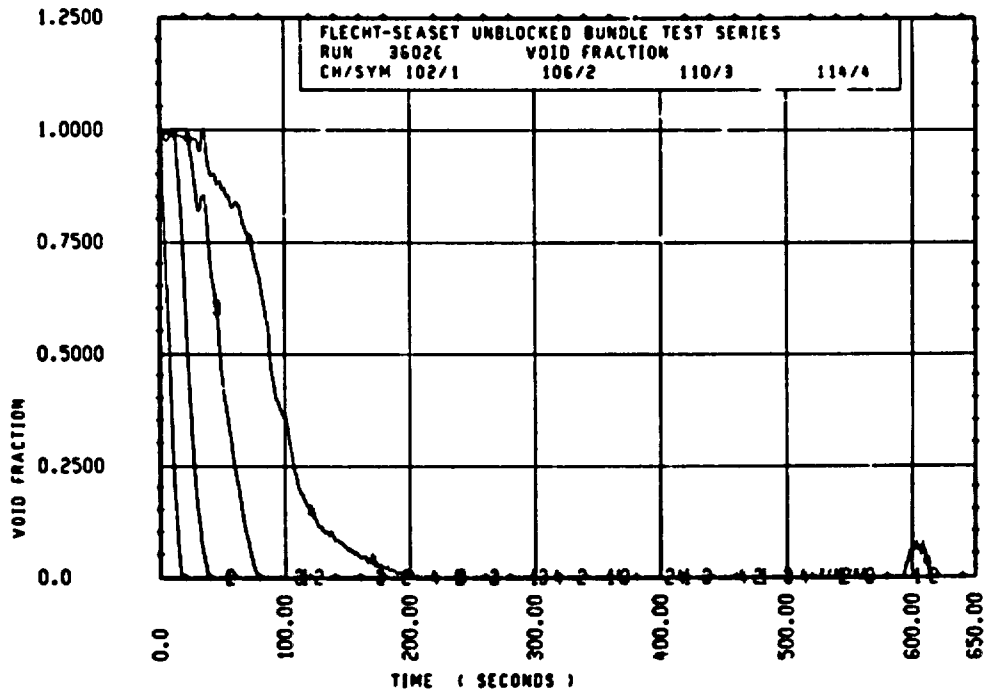

FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 36026
RATE OF MASS INTO CARRYOVER TANK
TIME (SECONDS)
CARRYOVER TANK MASS STORAGE RATE (KG/S)
CARRYOVER TANK MASS STORAGE RATE (LBM/S)
0.5000
0.0
-0.5000
-1.0000
-1.5000
-2.0000
1.1023
1.0000
0.0
-1.0000
-2.0000
-3.0000
-4.0000
-4.4092
-0.2000
100.00
200.00
300.00
400.00
500.00
600.00
620.00

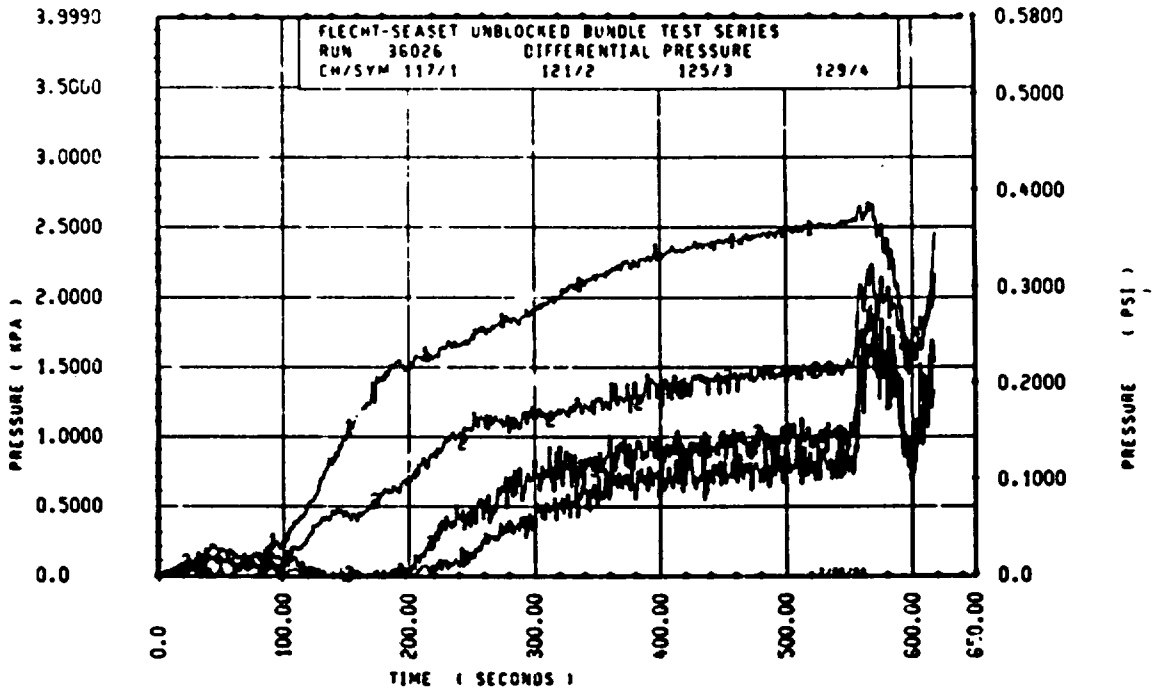

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 36026
EFFLUENCE RATE FROM EXHAUST ORIFICE
STEAM FLOW RATE (KG/S)
STEAM FLOW RATE (LBM/S)
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
1.1023
1.0000
0.8000
0.6000
0.4000
0.2000
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
620.00

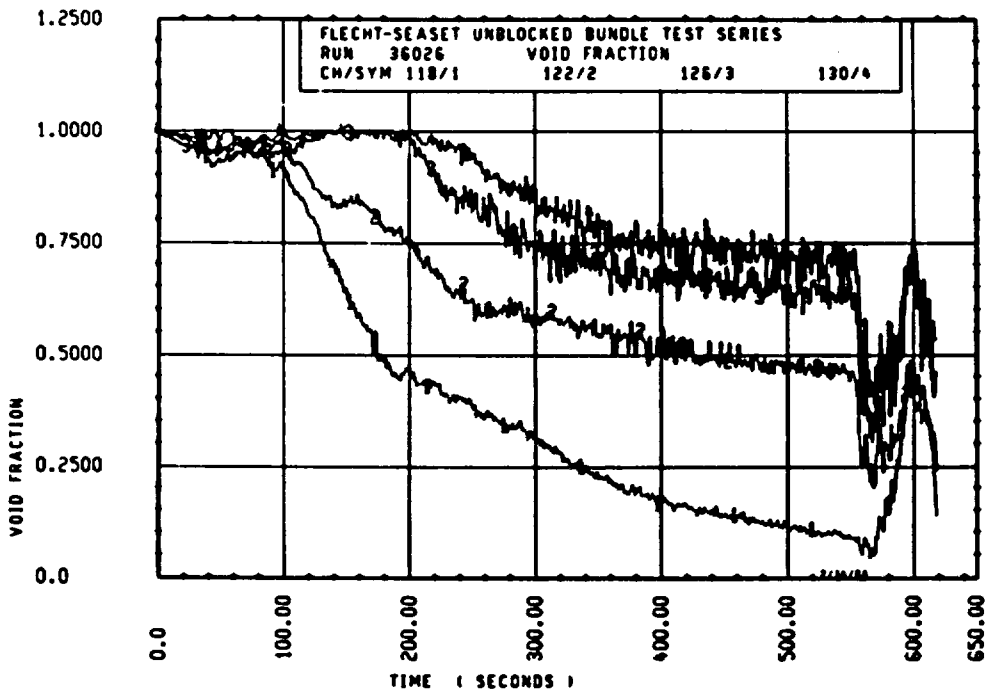

TIME (SECONDS)
FLECHT SEASET UNBLOCKED BUNDLE TEST RUN 36026
1=MASS INJECTED 2=TOTAL MASS INVENTORY
3=STEAM OUT 4=LIQUID COLLECTED 5=MASS IN BUNDLE
MASS (KG)
MASS (LBM)
270.66
250.00
200.00
150.00
100.00
50.000
0.0
596.70
500.00
400.00
300.00
200.00
100.00
0.0
-5.0000
100.00
200.00
300.00
400.00
500.00
600.00
625.00

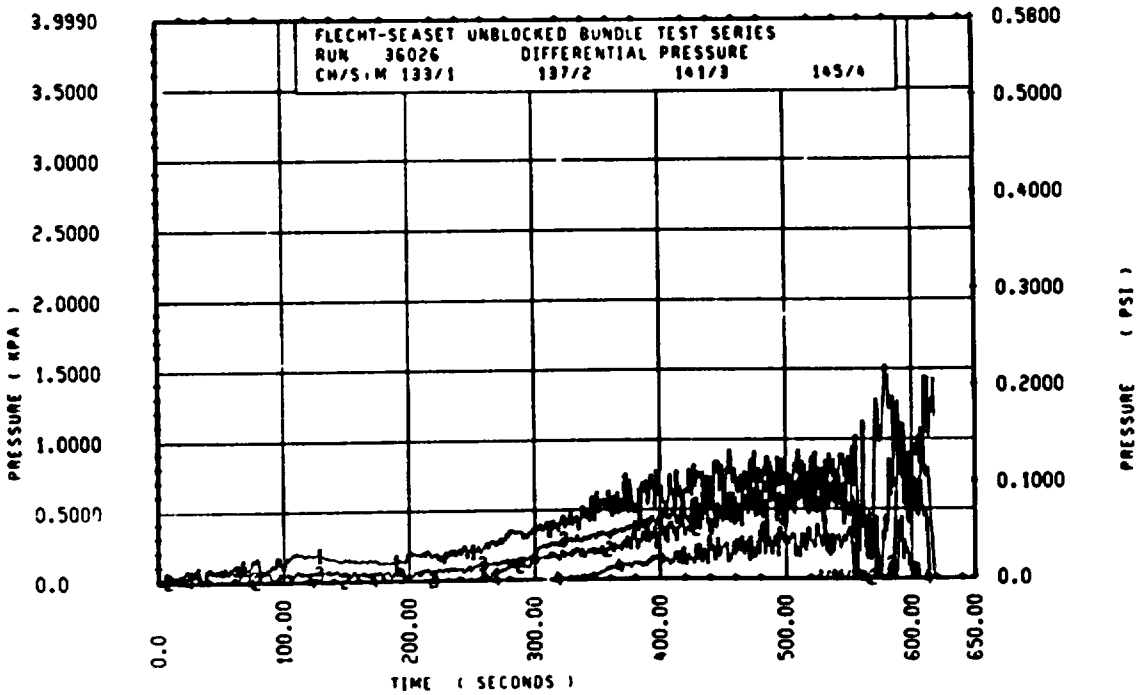

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026
QUENCH TIMES (ALL T/C) + COLD FILL LINE
ELEVATION (METERS)
3.7500
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
ELEVATION (FEET)
12.304
12.000
10.000
8.0000
6.0000
4.0000
2.0000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
620.00
QUENCH TIMES (SECONDS)

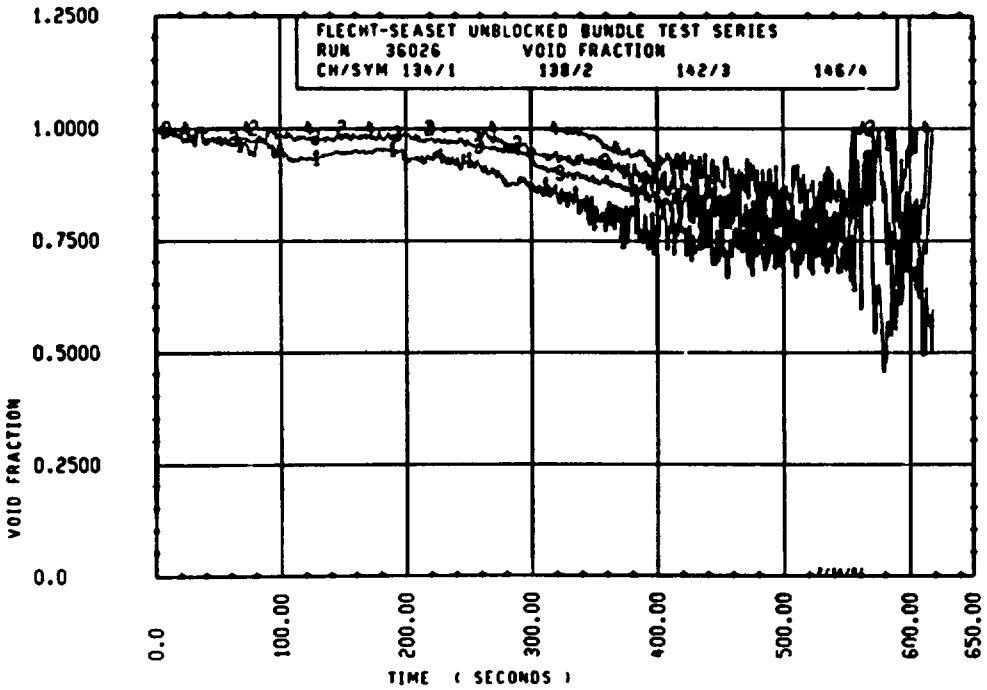

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 DIFFERENTIAL PRESSURE
CH/SYM 101/1 105/2 109/3 113/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 VOID FRACTION
CH/SYM 102/1 106/2 110/3 114/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 DIFFERENTIAL PRESSURE
CH/SYM 117/1 121/2 125/3 129/4
PRESSURE (KPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5800
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 VOID FRACTION
CH/SYM 118/1 122/2 126/3 130/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 DIFFERENTIAL PRESSURE
CH/SYM 133/1 137/2 141/3 145/4
PRESSURE (MPA)
PRESSURE (PSI)
TIME (SECONDS)
3.9990
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
0.5000
0.4000
0.3000
0.2000
0.1000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36026 VOID FRACTION
CH/SYM 134/1 138/2 142/3 146/4
VOID FRACTION
TIME (SECONDS)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
650.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 36160

Date: 9/5/79

Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	143°C (289°F)
Rod peak power	0.16 kw/m (0.049 kw/ft)
Flow rate	0.37 kg/sec (0.81 lb/sec)
Coolant temperature	144°C (292°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK
Inlet Reynolds number	16575

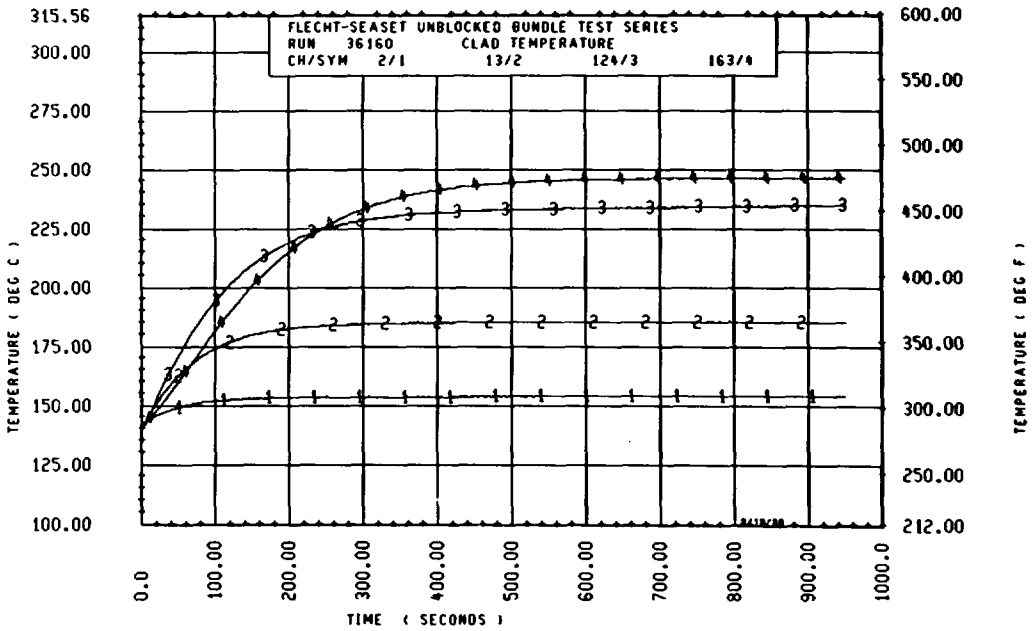
B. Housing Temperatures

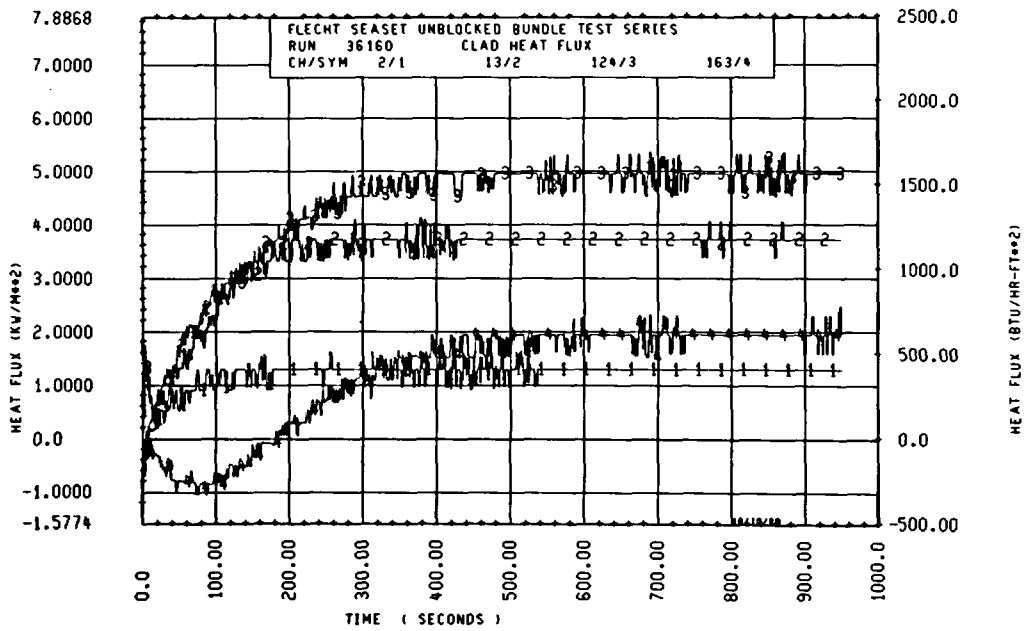
Elevation	Initial Temperature*	Maximum Temperature**
0.61 m (24 in.)	139°C (282°F)	143°C (290°F)
1.22 m (48 in.)	141°C (286°F)	152°C (306°F)
1.83 m (72 in.)	117°C-143°C (242°F-290°F)	153°C-172°C (308°F-342°F)
2.44 m (96 in.)	142°C-145°C (289°F-294°F)	175°C-191°C (347°F-376°F)
2.74 m (108 in.)	146°C (296°F)	186°C (367°F)
3.05 m (120 in.)	139°C-142°C (283°F-289°F)	187°C-193°C (369°F-381°F)
3.35 m (132 in.)	136°C-141°C (278°F-287°F)	183°C-198°C (363°F-390°F)

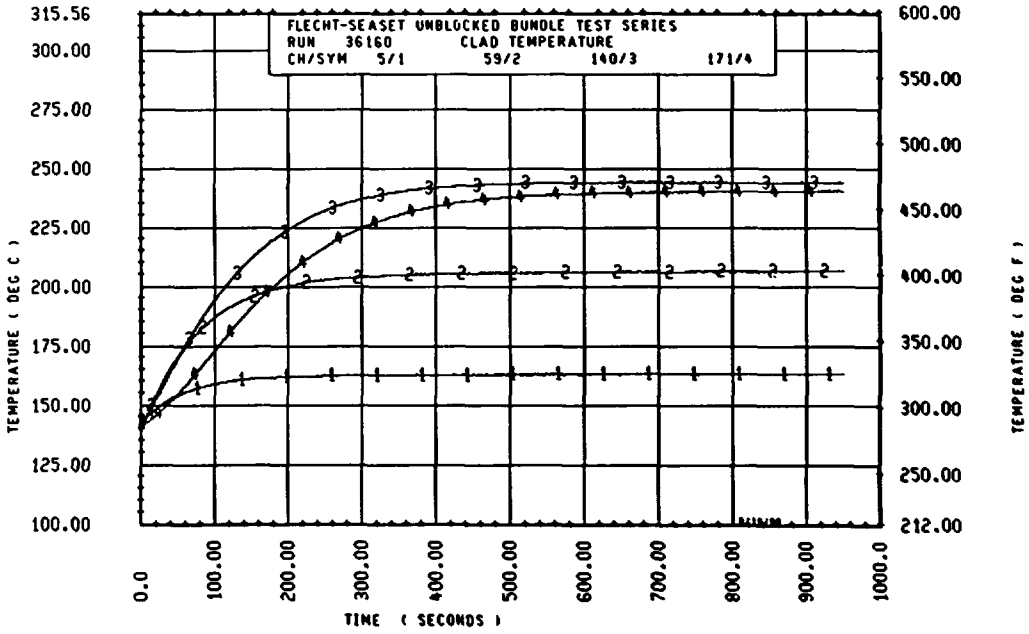
*At 104 seconds after test initiation
**At end of test

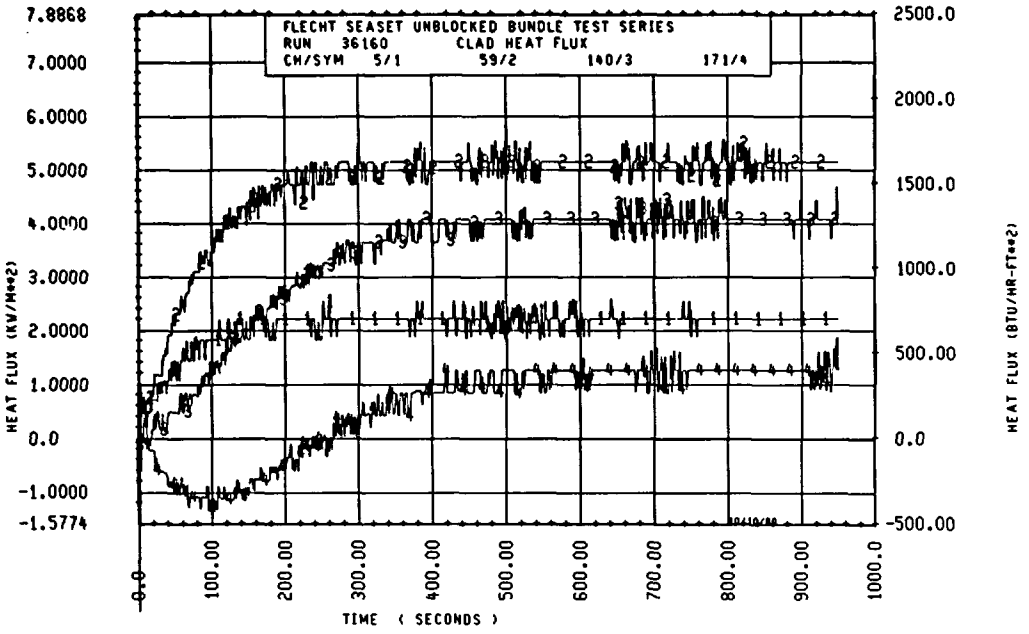
C. Comments

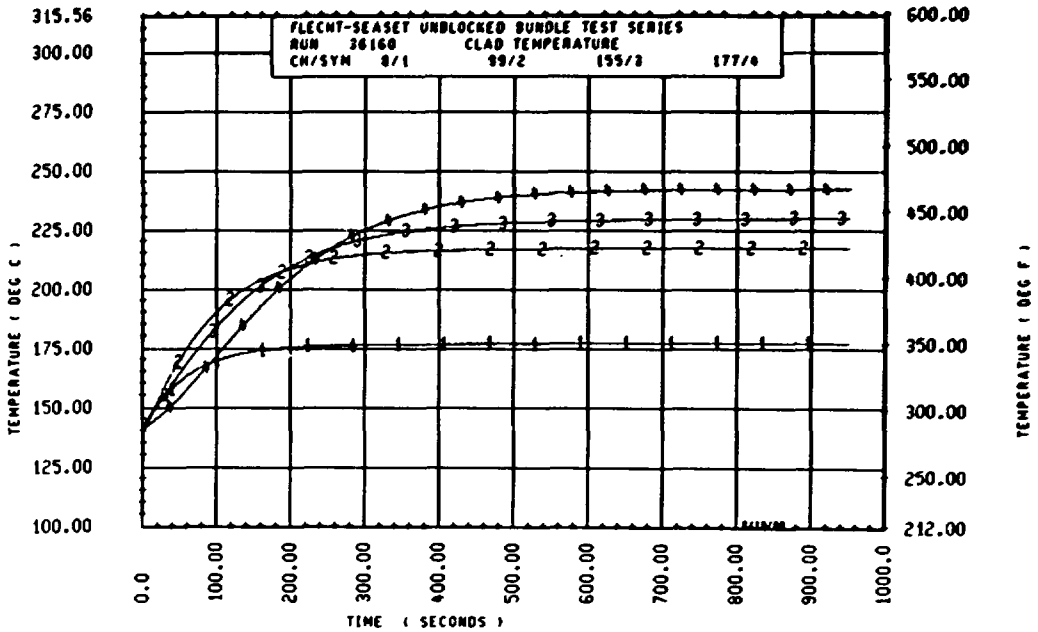
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. There was 0.5 percent mass loss through steam probes from 0.99 to 2.13 m (39 to 84 in.) and 0.5 percent mass loss through steam probes from 2.29 m to 3.51 m (90 to 138 in.).

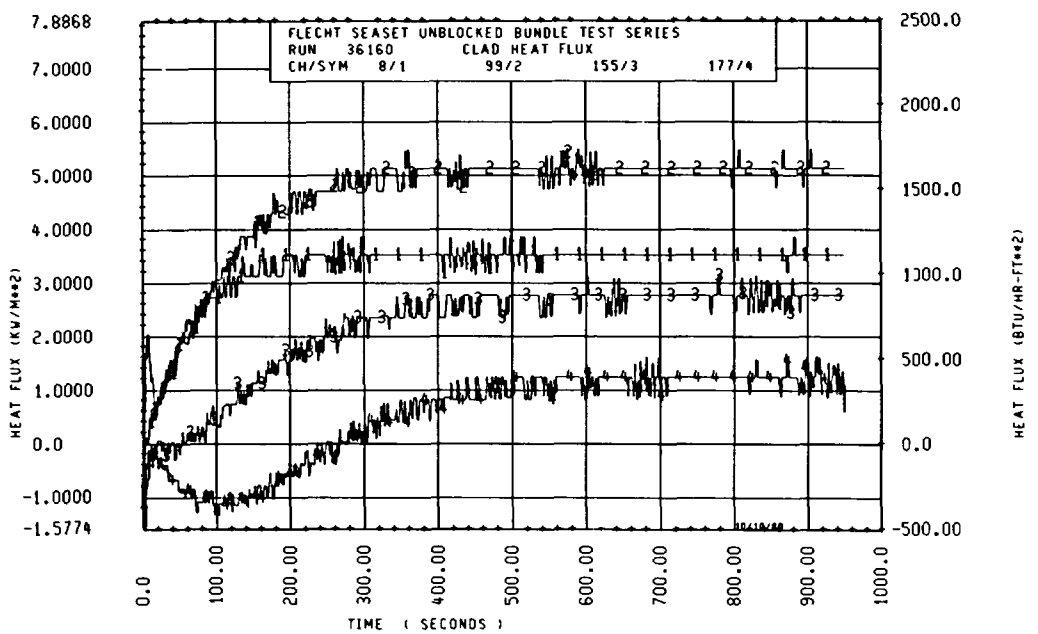

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36160 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

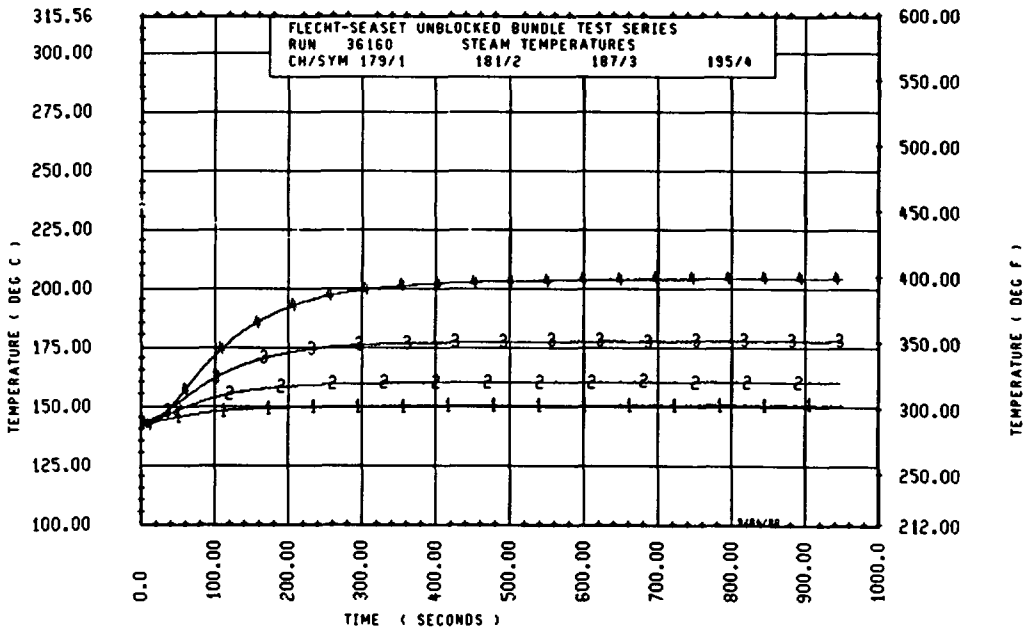

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36160 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
7.8868
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
2500.0
2000.0
1500.0
1000.0
500.00
0.0
-500.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

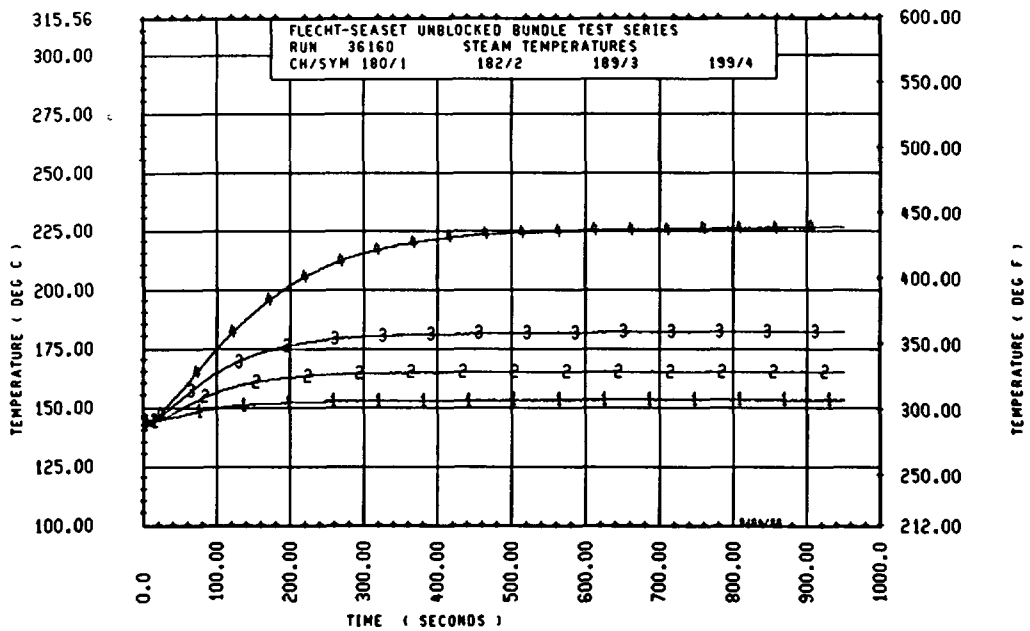

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36160 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

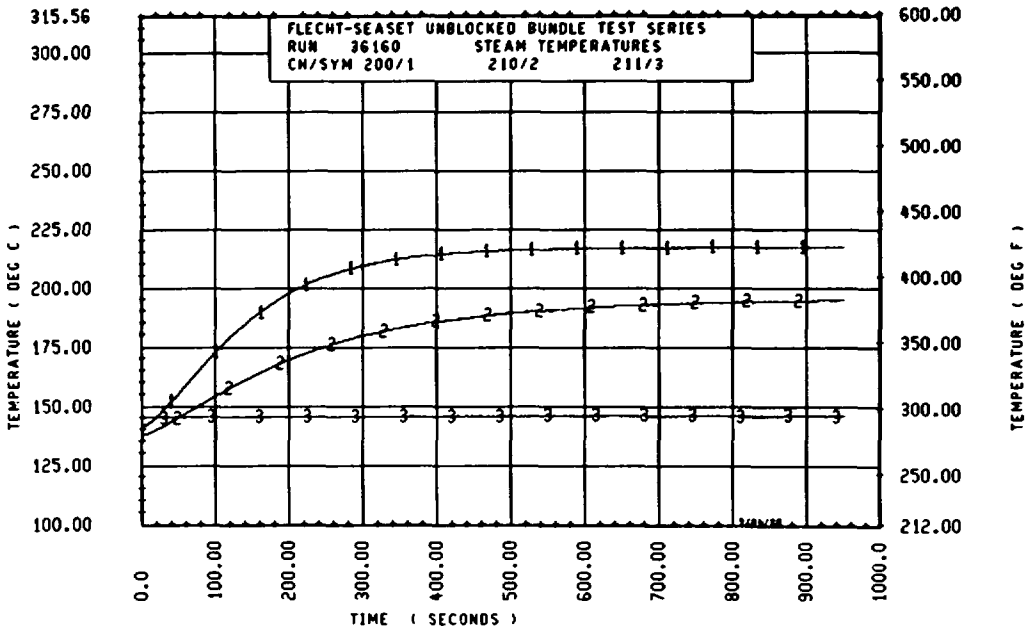

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36160 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
7.8868
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
2500.0
2000.0
1500.0
1000.0
500.00
0.0
-500.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0

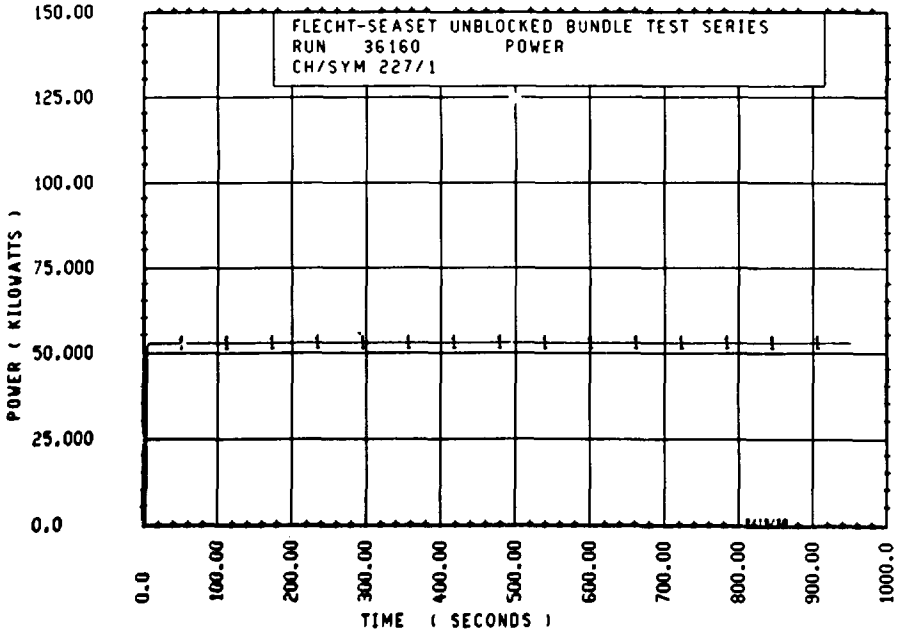

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36160 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36160 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36160 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36160 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36160 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
TEMPERATURE (DEG F)
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36160 POWER
CH/SYM 227/1
POWER (KILOWATTS)
150.00
125.00
100.00
75.000
50.000
25.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00
900.00
1000.0
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 36261
Date: 9/5/79
Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	139°C (283°F)
Rod peak power	0.13 kw/m (0.039 kw/ft)
Flow rate	0.297 kg/sec (0.655 lb/sec)
Coolant temperature	142°C (287°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK
Inlet Reynolds number	13480

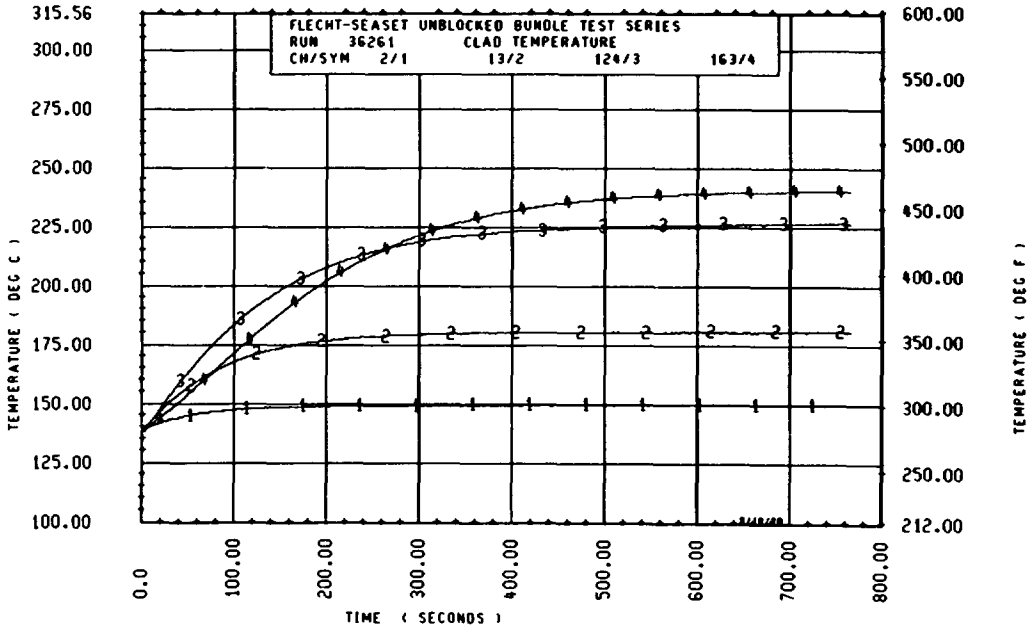
B. Housing Temperatures

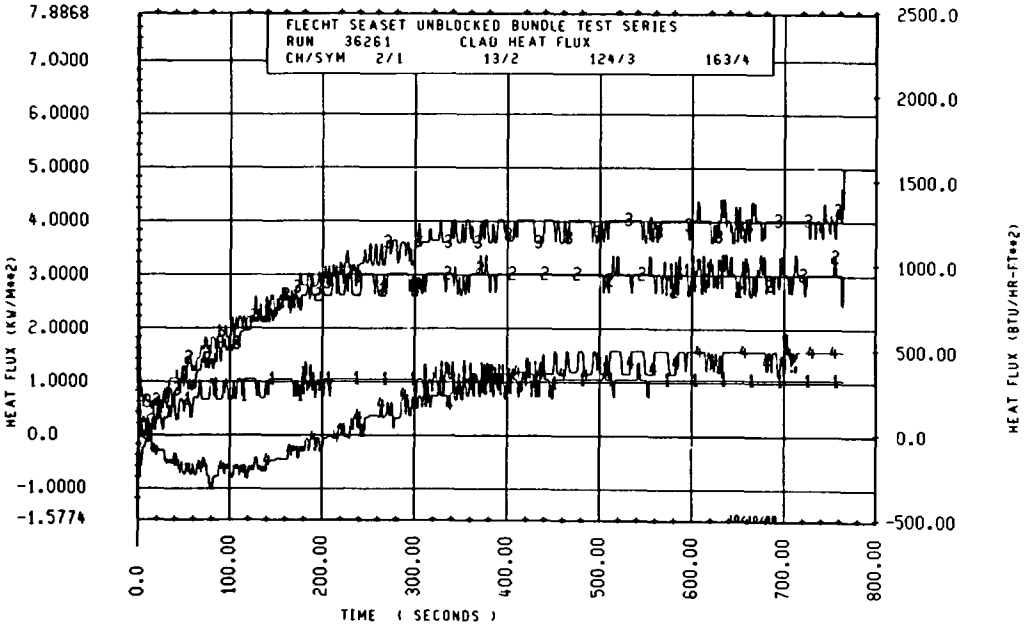
Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	134°C (274°F)	139°C (282°F)
1.22 m (48 in.)	135°C (275°F)	148°C (298°F)
1.83 m (72 in.)	109°C-134°C (228°F-273°F)	149°C-167°C (300°F-333°F)
2.44 m (96 in.)	133°C (272°F)	167°C-183°C (333°F-361°F)
2.74 m (108 in.)	135°C (275°F)	180°C (356°F)
3.05 m (120 in.)	129°C-133°C (265°F-271°F)	178°C-184°C (352°F-368°F)
3.35 m (132 in.)	129°C-132°C (265°F-270°F	169°C-187°C (336°F-368°F)

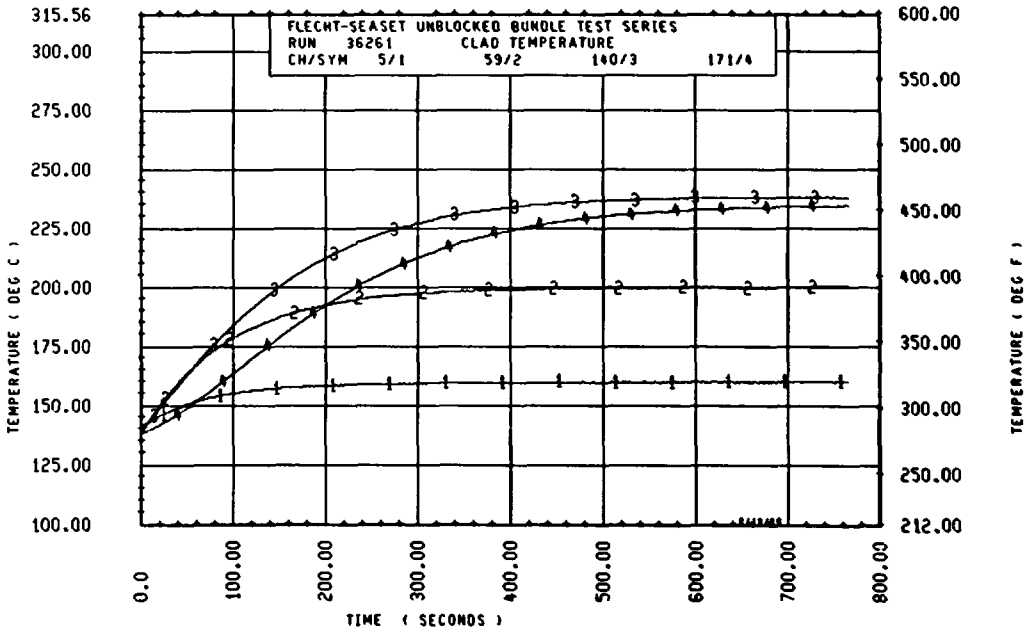
*At end of test

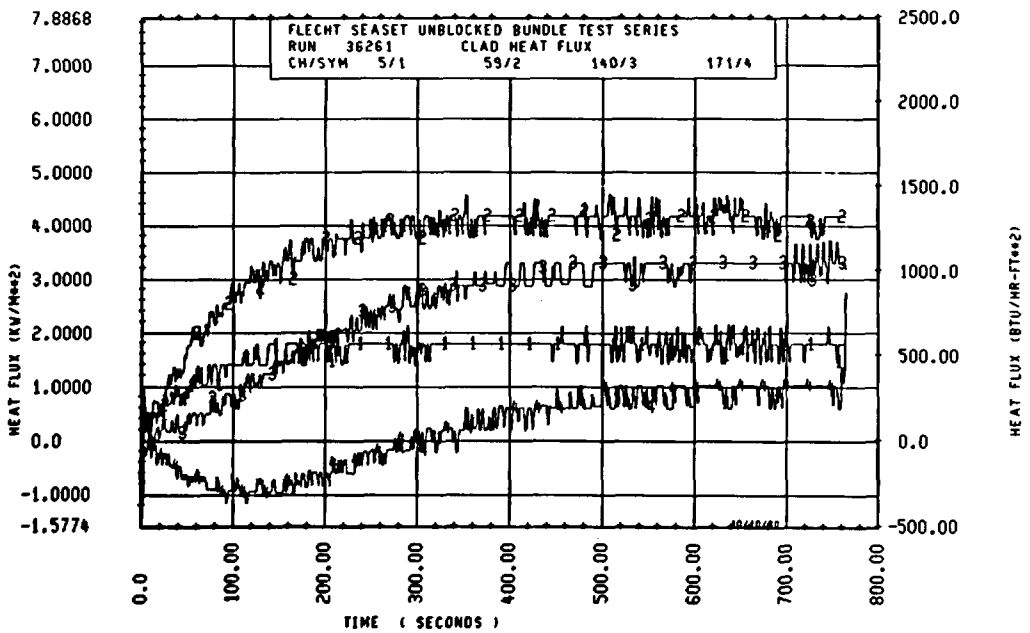
C. Comments

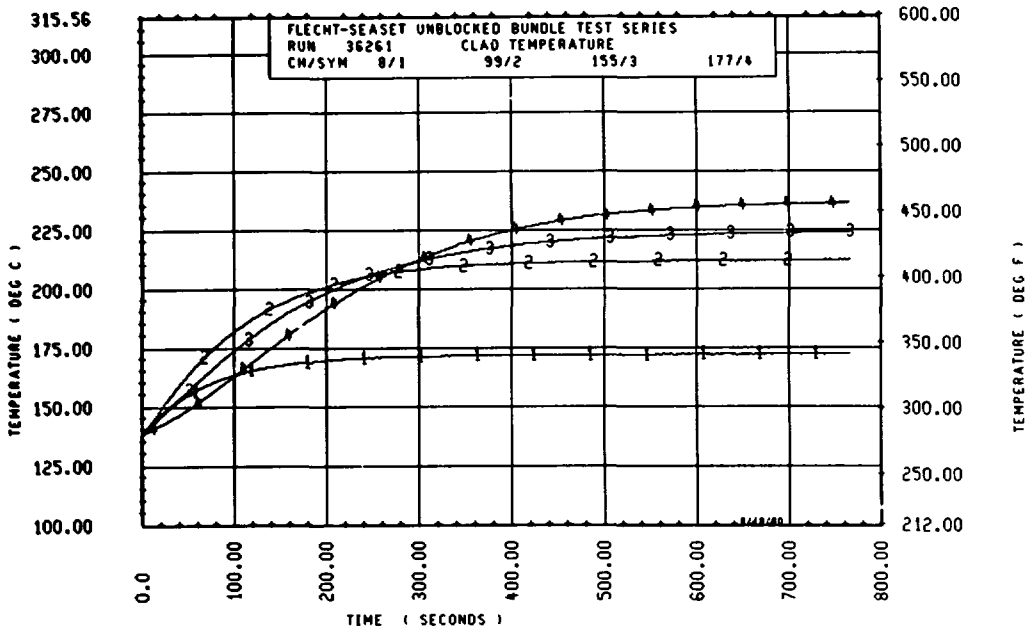
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. There was 0.85 percent mass loss through steam probes from 0.99 to 2.13 m (39 to 84 in.) and 0.65 percent mass loss through steam probes from 2.29 to 3.51 m (90 to 138 in.).

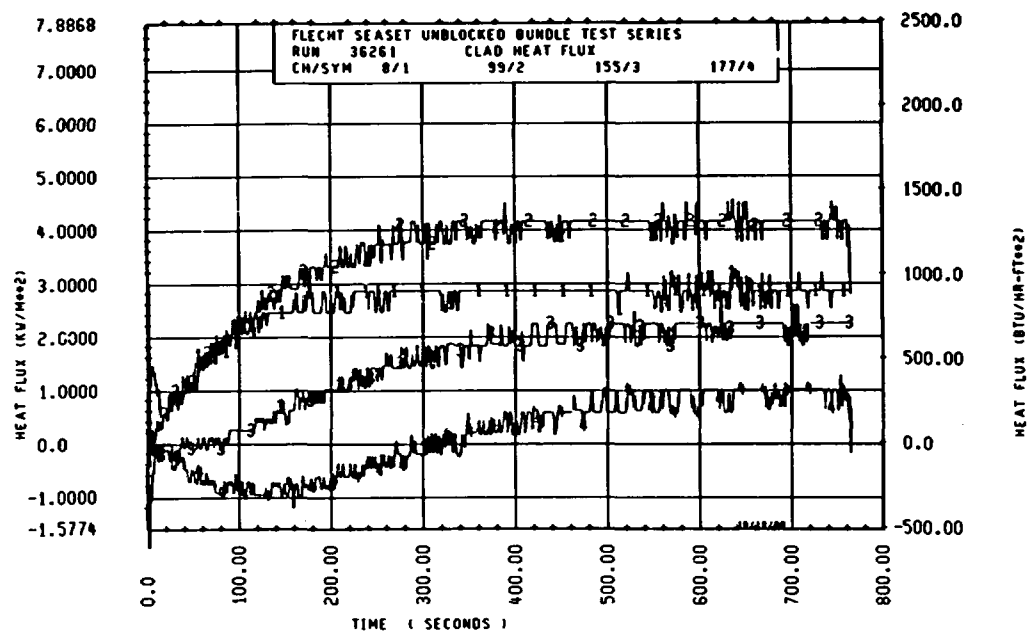

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36261 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

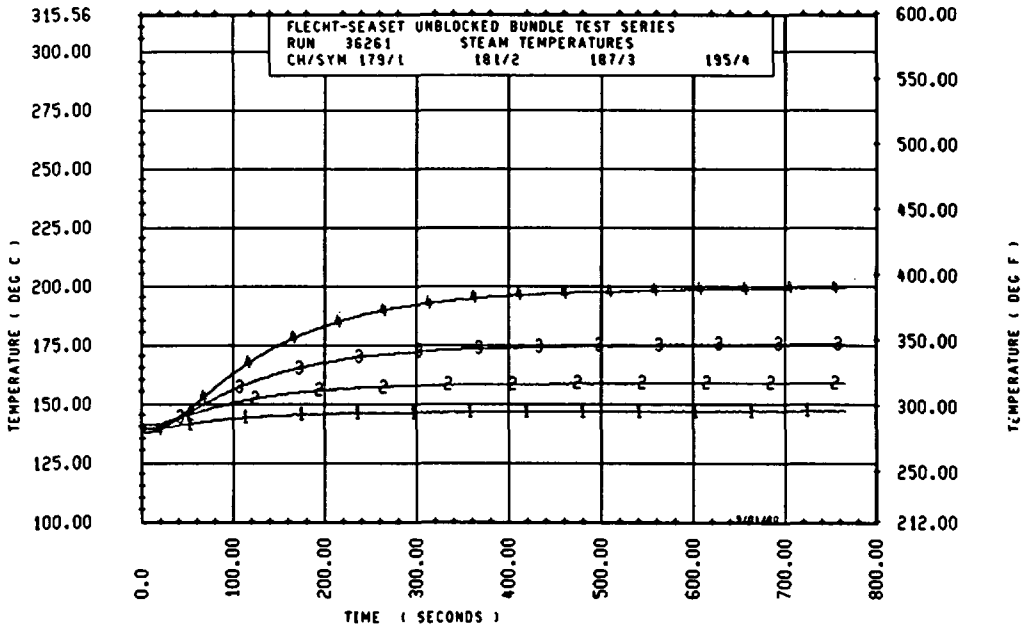

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36261 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
7.8868
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
2500.0
2000.0
1500.0
1000.0
500.00
0.0
-500.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

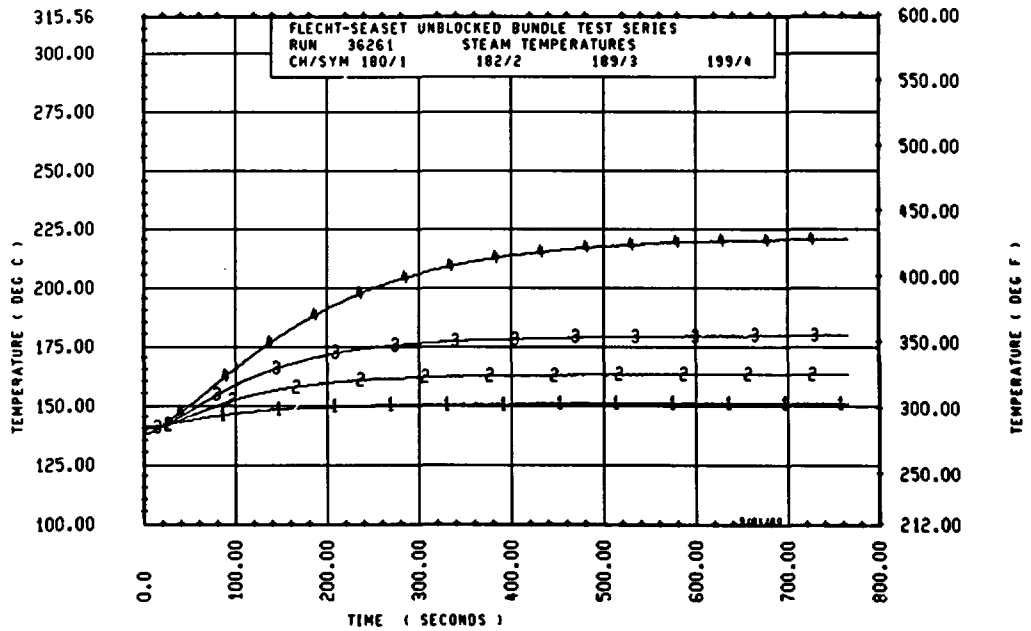

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36261 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

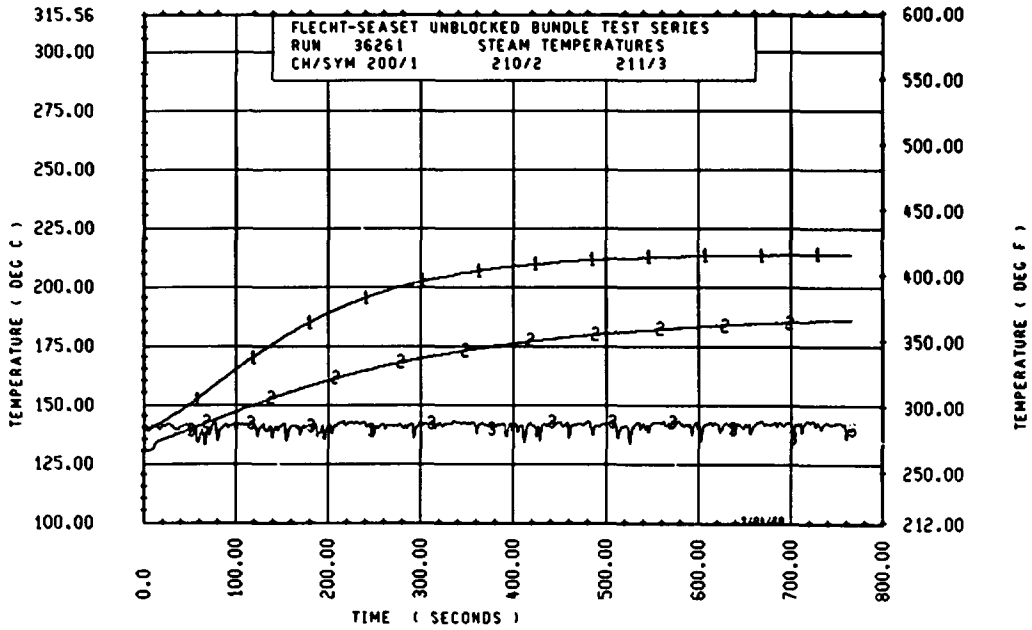

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36261 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
7.8868
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
2500.0
2000.0
1500.0
1000.0
500.00
0.0
-500.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

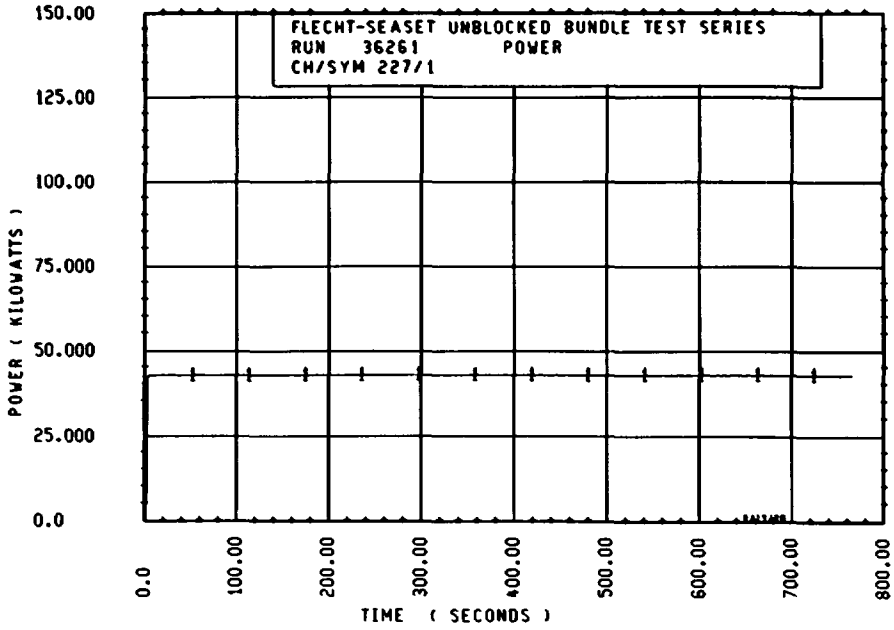

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36261 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36261 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
7.8868
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
2500.0
2000.0
1500.0
1000.0
500.00
0.0
-500.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

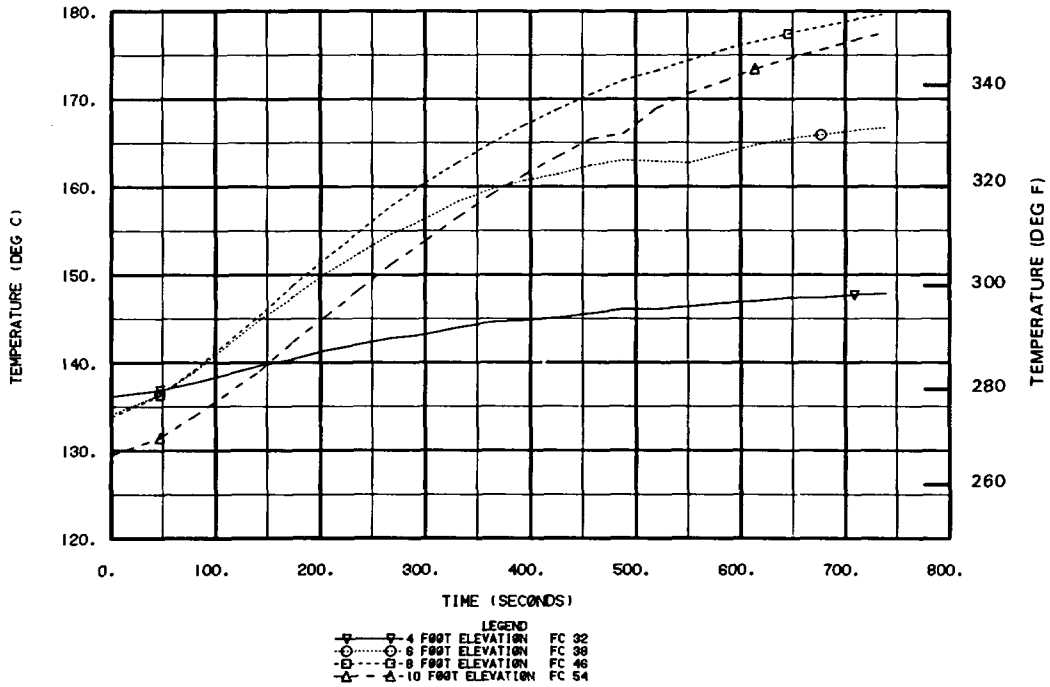

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36261 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36261 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

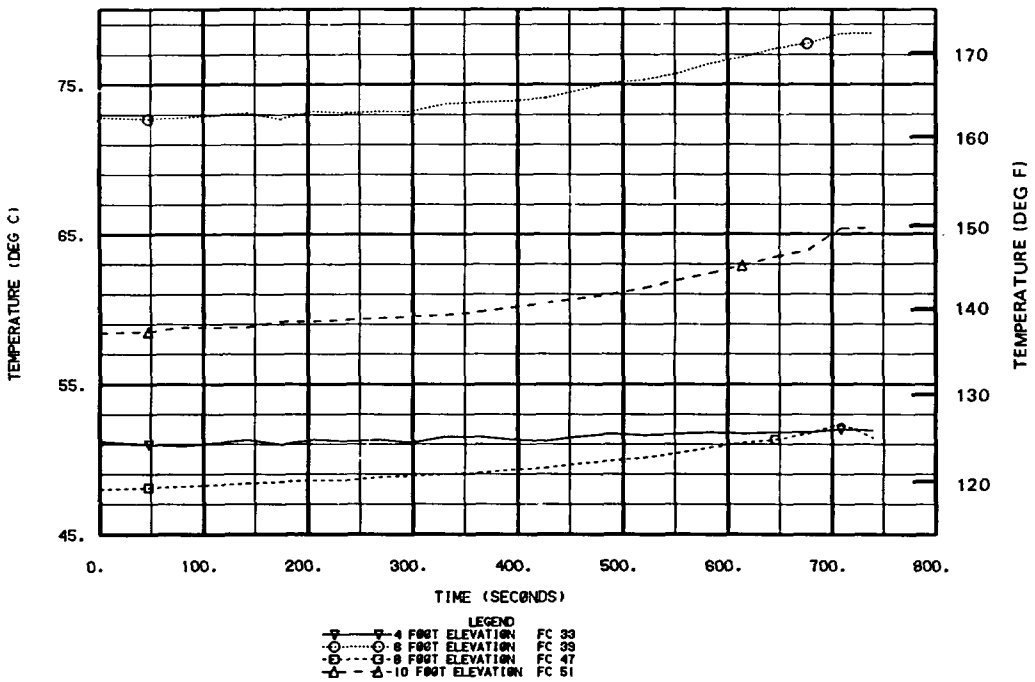

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36261 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36261 POWER
CH/SYM 227/1
POWER (KILOWATTS)
TIME (SECONDS)
150.00
125.00
100.00
75.000
50.000
25.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

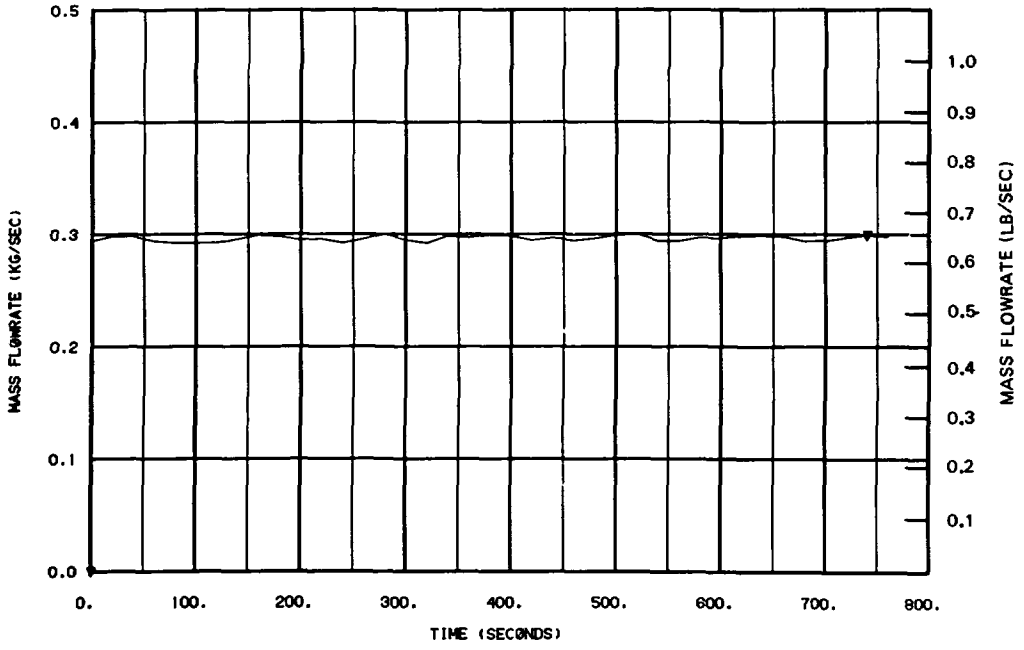
HOUSING TEMPERATURE

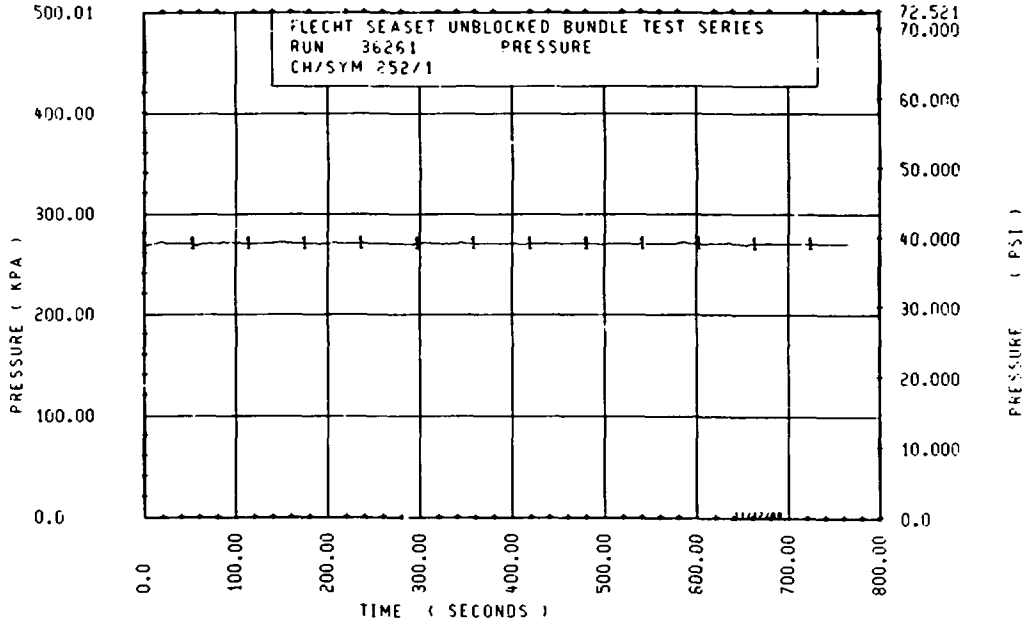


HOUSING INSULATION TEMPERATURE



STEAM FLOW RATE





FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 36362

Date: 9/5/79

Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	142°C (287°F)
Rod peak power	0.079 kw/m (0.024 kw/ft)
Flow rate	0.18 kg/sec (0.40 lb/sec)
Coolant temperature	138°C (280°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK
Inlet Reynolds number	8310

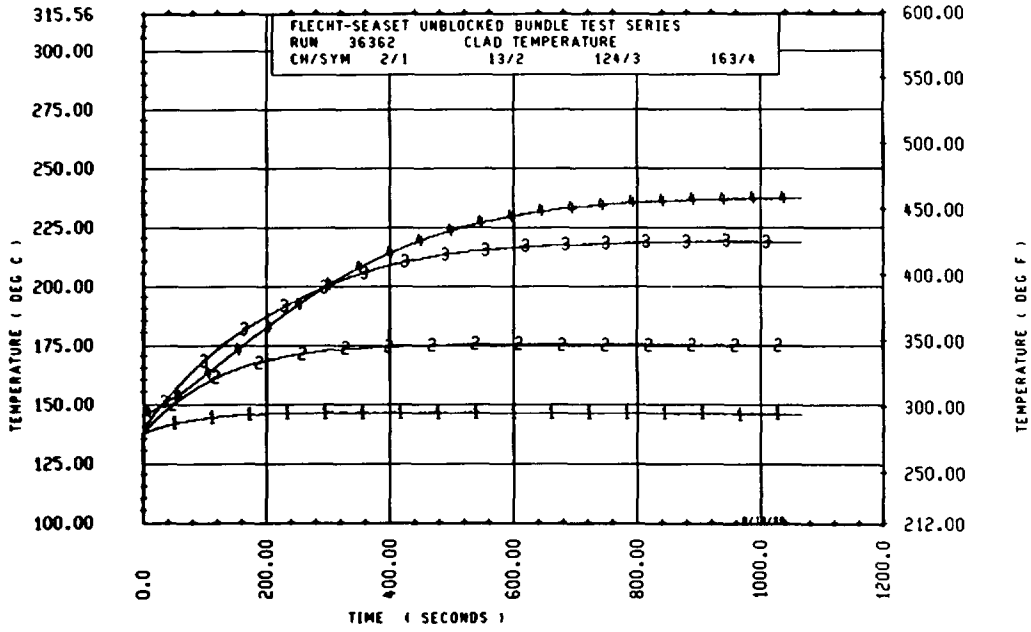
B. Housing Temperatures

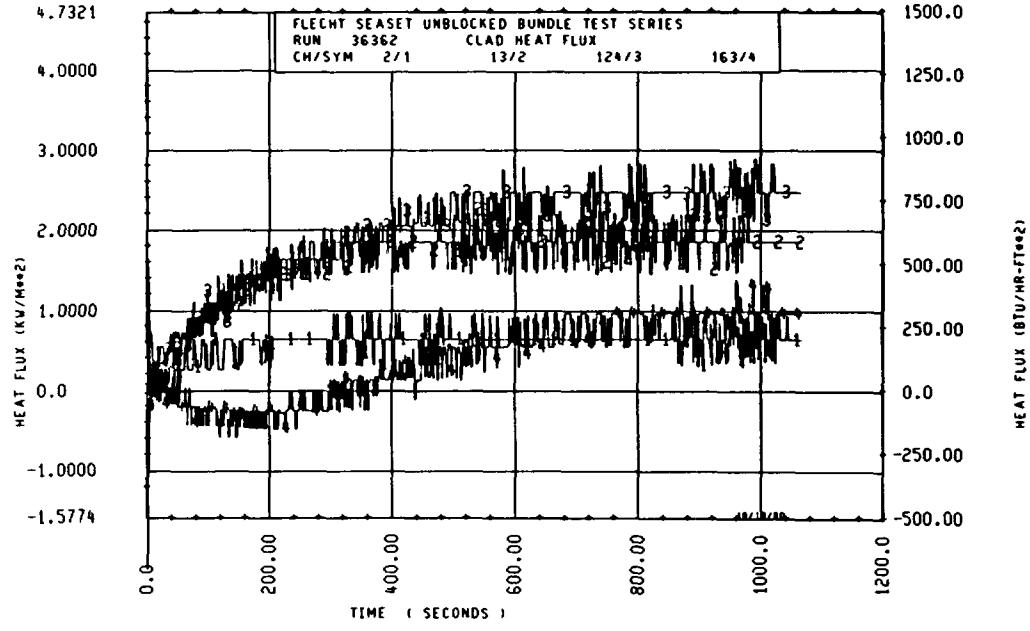
Elevation	Initial Temperature*	Maximum Temperature**
0.61 m (24 in.)	133°C (271°F)	133°C (272°F)
1.22 m (48 in.)	187°C-194°C (369°F-381°F)	144°C (291°F)
1.83 m (72 in.)	117°C-136°C (242°F-277°F)	146°C-163°C (295°F-325°F)
2.44 m (96 in.)	136°C-139°C (277°F-282°F)	163°C-180°C (326°F-356°F)
2.74 m (108 in.)	140°C (284°F)	176°C (349°F)
3.05 m (120 in.)	136°C-139°C (277°F-282°F)	173°C-178°C (344°F-352°F)
3.35 m (132 in.)	128°C-138°C (263°F-281°F)	163°C-180°C (326°F-356°F)

*At 45 seconds after test initiation
**At end of test

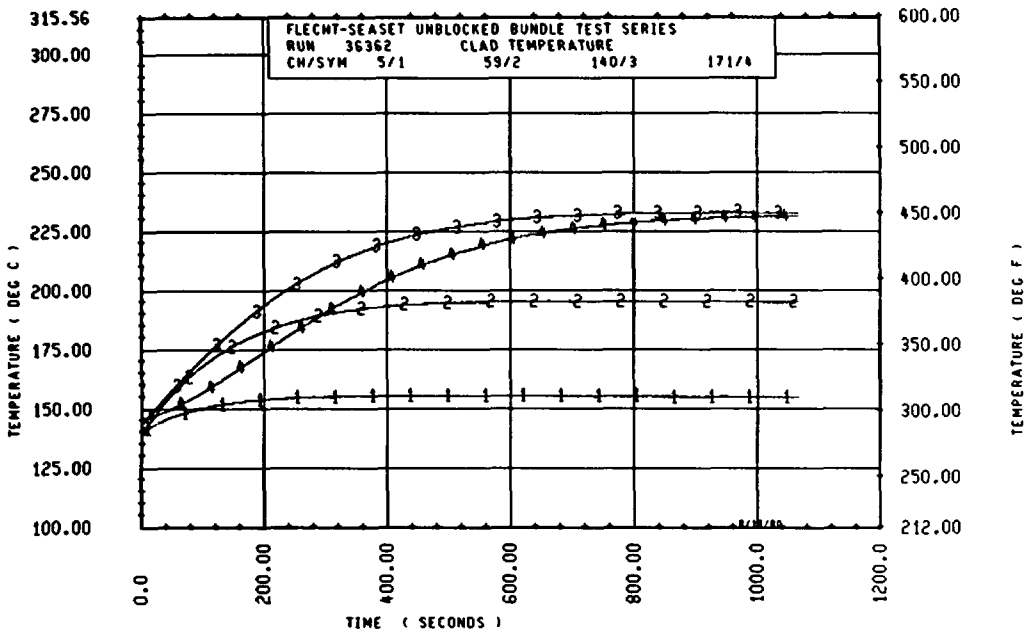
C. Comments

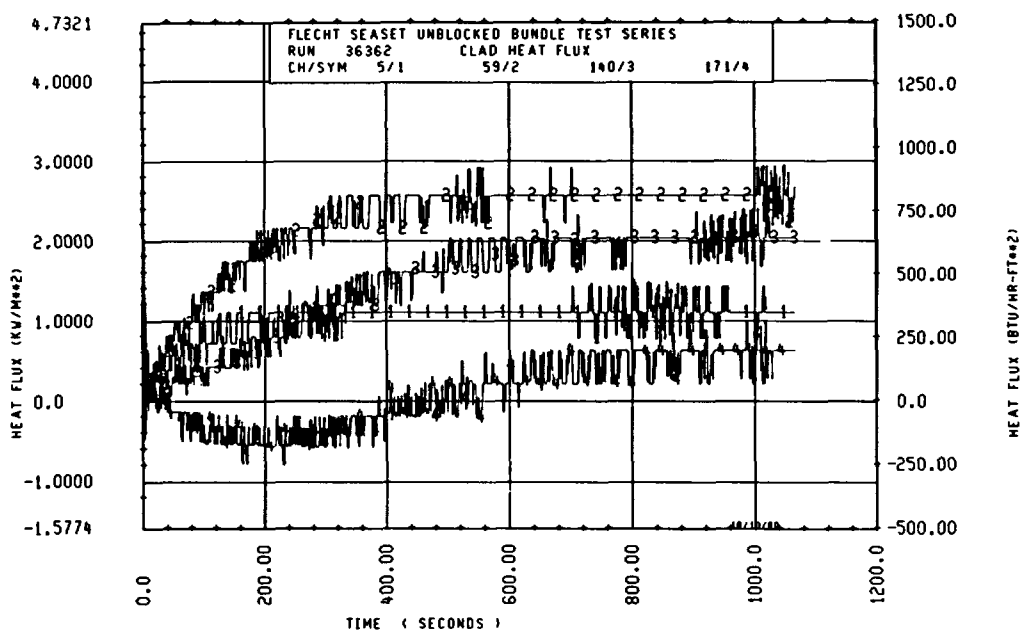
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. There was 1.4 percent mass loss through steam probes from 0.99 to 2.13 m (39 to 84 in.) and 1.4 percent mass loss through steam probes from 2.29 to 3.51 m (90 to 138 in.).

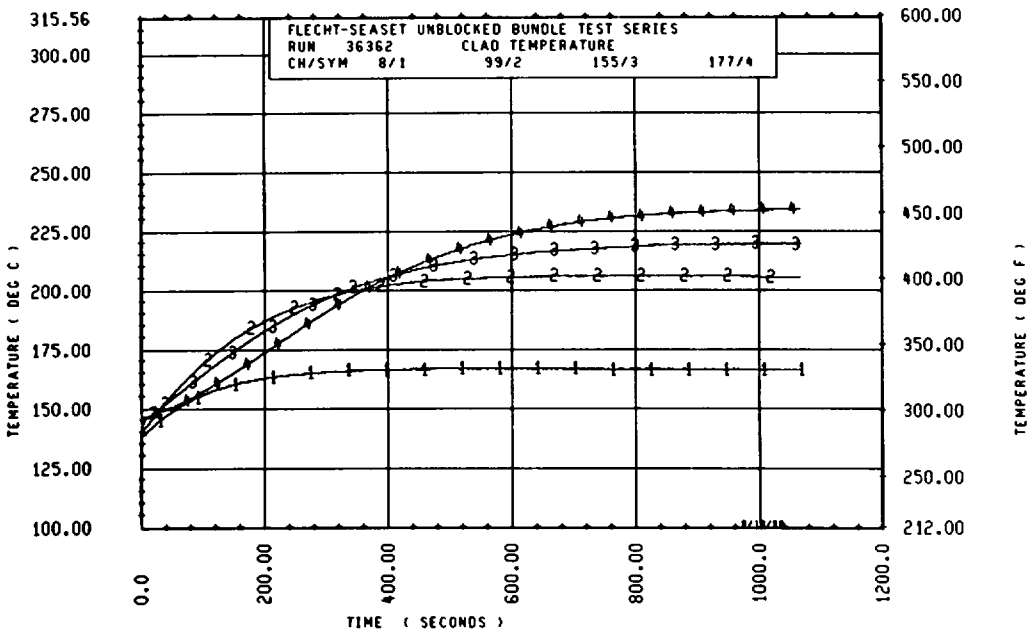

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36362 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0

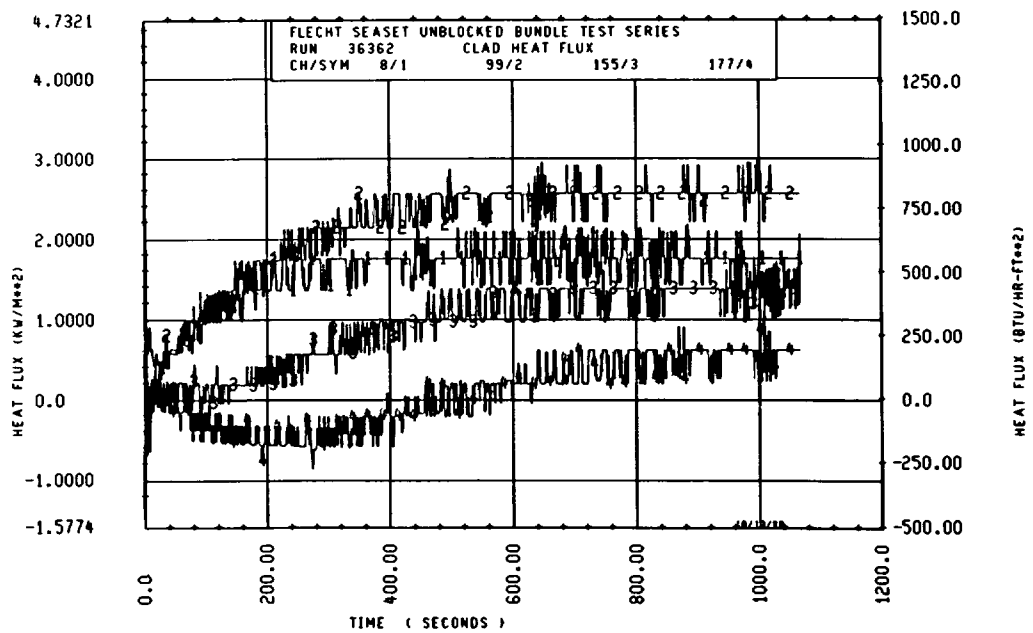

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36362 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.7321
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0

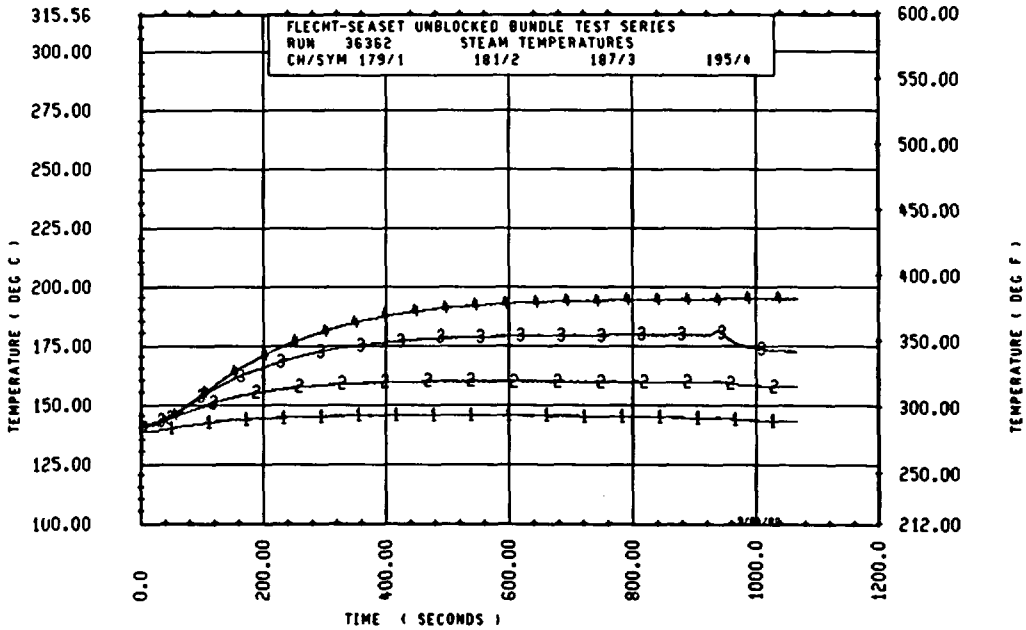
36362-2

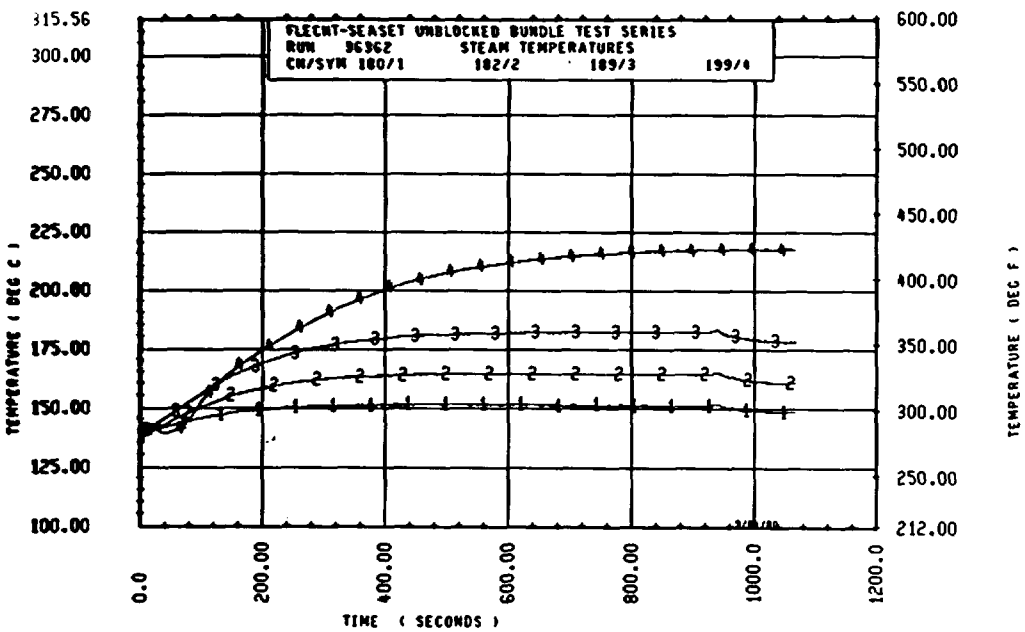

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36362 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0

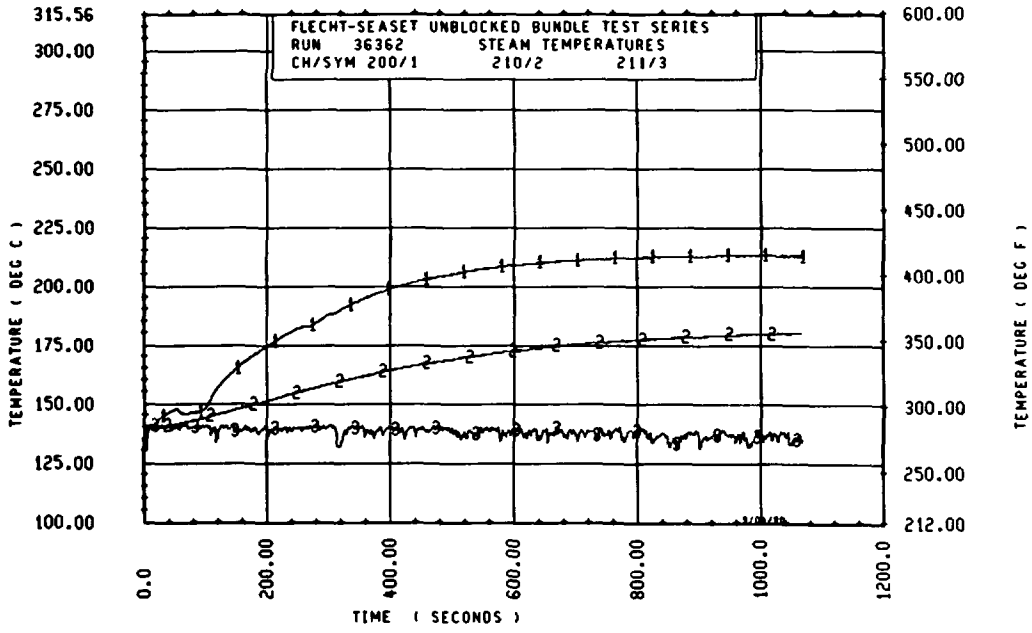

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36362 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.7321
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0

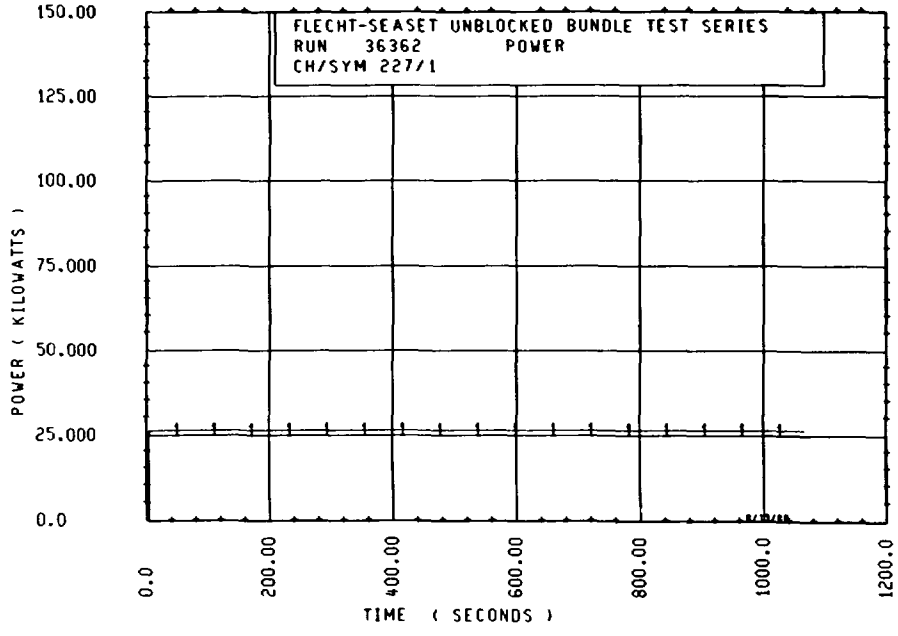

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36362 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36362 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.7321
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36362 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36362 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36362 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36362 POWER
CH/SYM 227/1
POWER (KILOWATTS)
TIME (SECONDS)
150.00
125.00
100.00
75.000
50.000
25.000
0.0
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 36463
Date: 9/6/79
Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	131°C (268°F)
Rod peak power	0.0479 kw/m (0.0146 kw/ft)
Flow rate	0.110 kg/sec (0.243 lb/sec)
Coolant temperature	134°C (273°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK
Inlet Reynolds number	5080

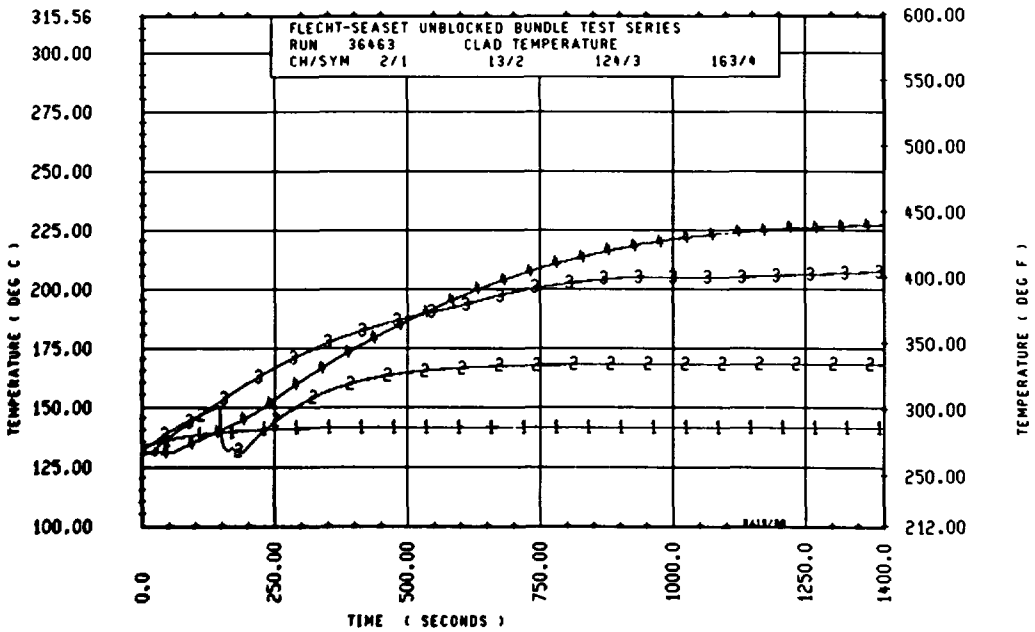
B. Housing Temperatures

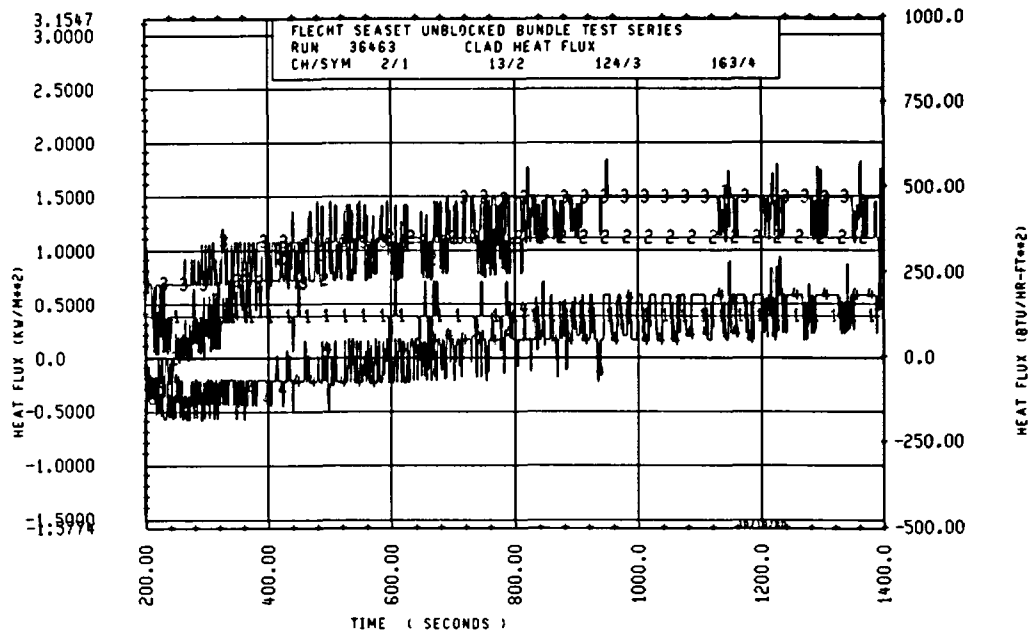
Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	131°C (268°F)	141°C (286°F)
1.22 m (48 in.)	131°C (268°F)	139°C (282°F)
1.83 m (72 in.)	117°C-131°C (242°F-268°F)	147°C-156°C (296°F-313°F)
2.44 m (96 in.)	129°C (264°F)	159°C-172°C (319°F-342°F)
2.74 m (108 in.)	129°C (264°F)	167°C (333°F)
3.05 m (120 in.)	128°C (262°F)	162°C-165°C (323°F-329°F)
3.35 m (132 in.)	128°C (262°F)	153°C-165°C (308°F-329°F)

*At end of test

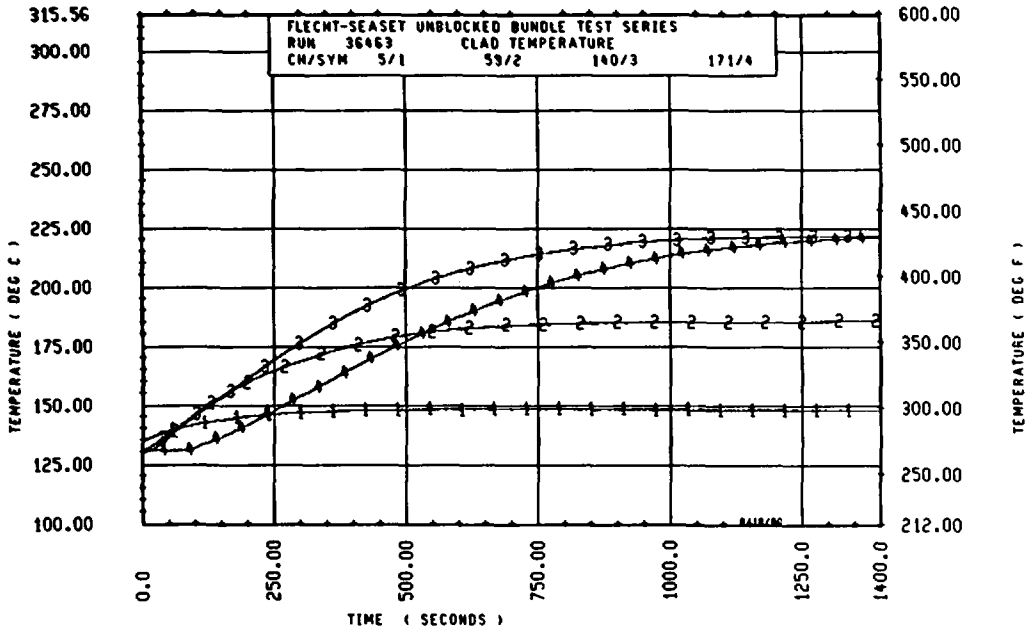
C. Comments

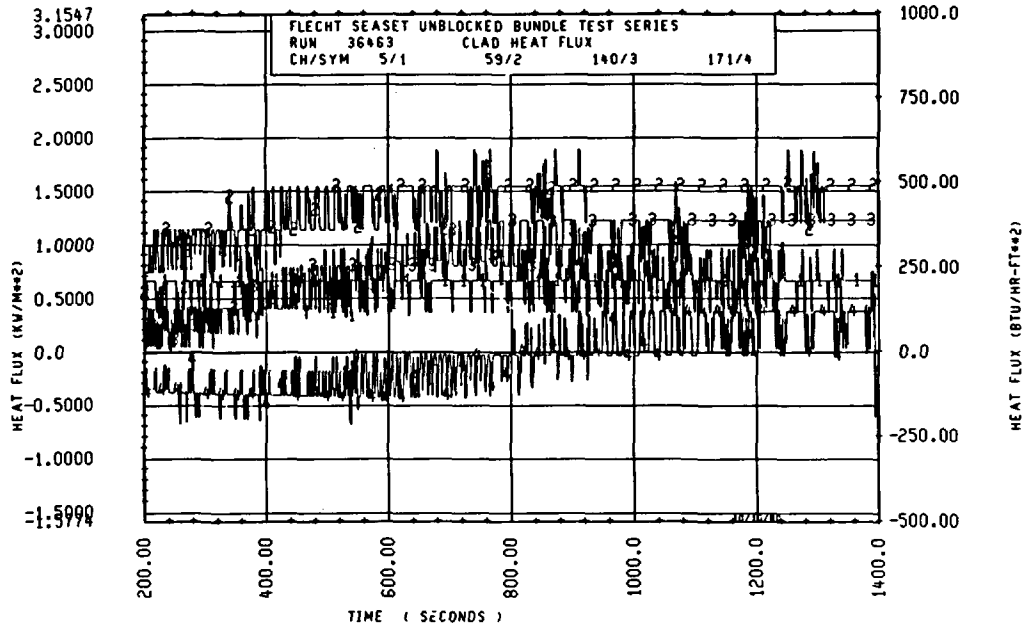
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. There was 1.4 percent mass loss through steam probes from 0.99 to 2.13 m (39 to 84 in.) and 2.4 percent mass loss through steam probes from 2.29 to 3.51 m (90 to 138 in.).

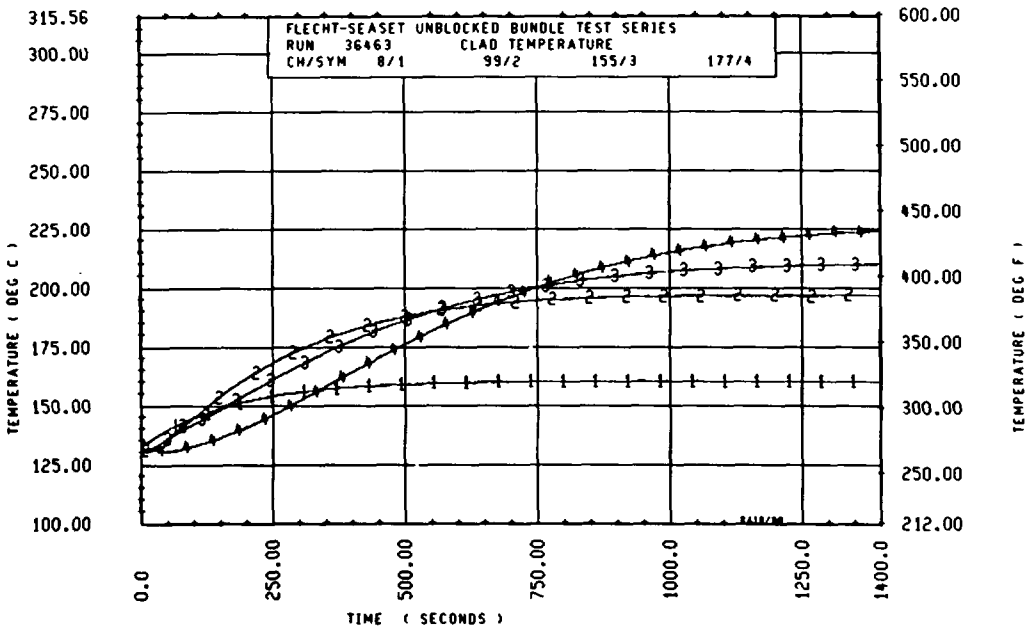

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36463 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

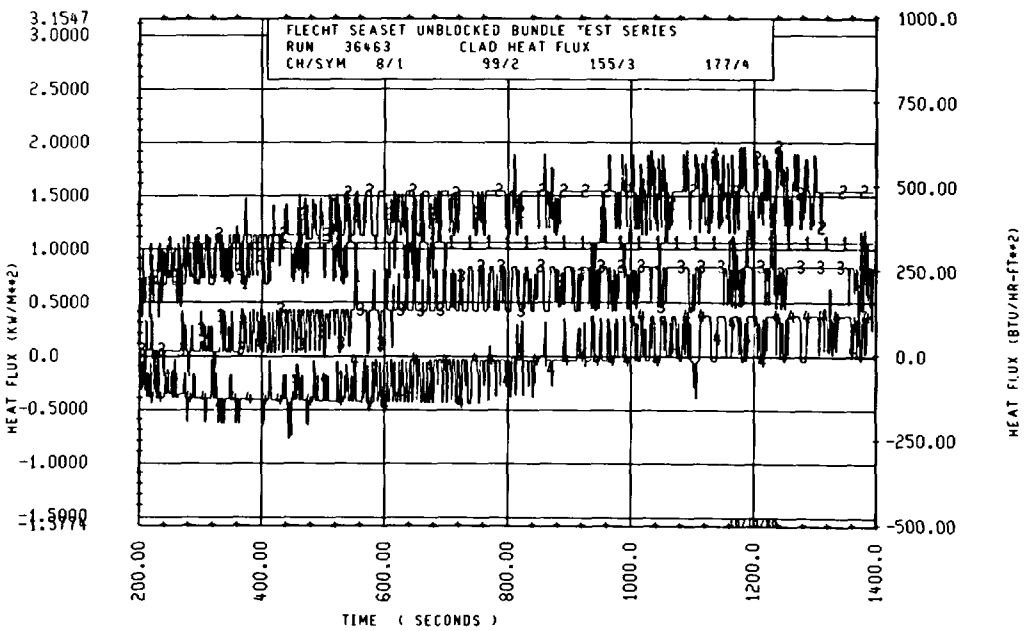

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36463 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
3.1547
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-1.5774
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
200.00
400.00
600.00
800.00
1000.0
1200.0
1400.0

36463-2

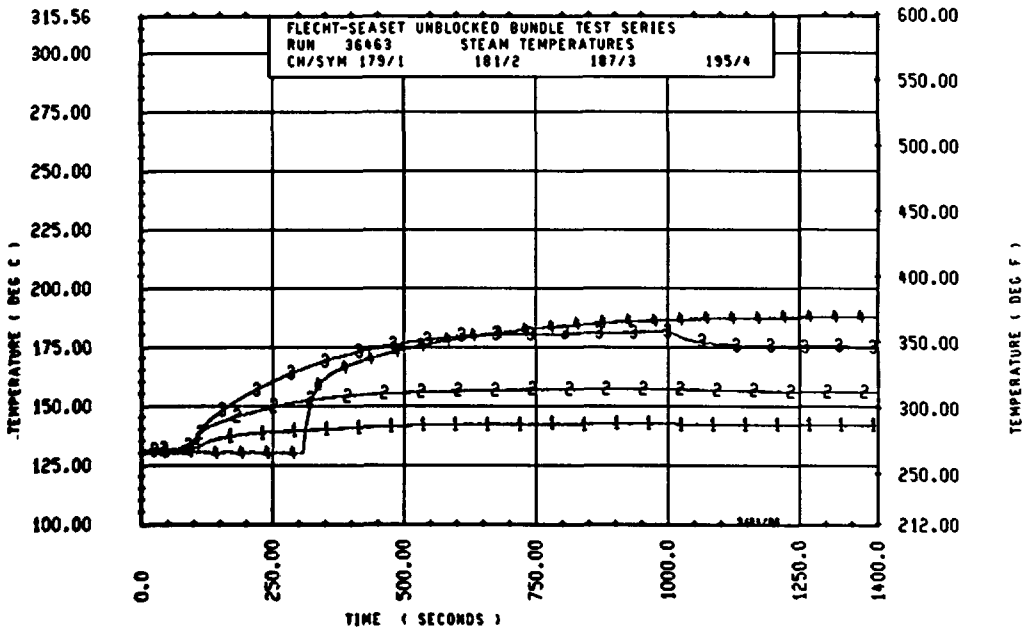

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36463 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

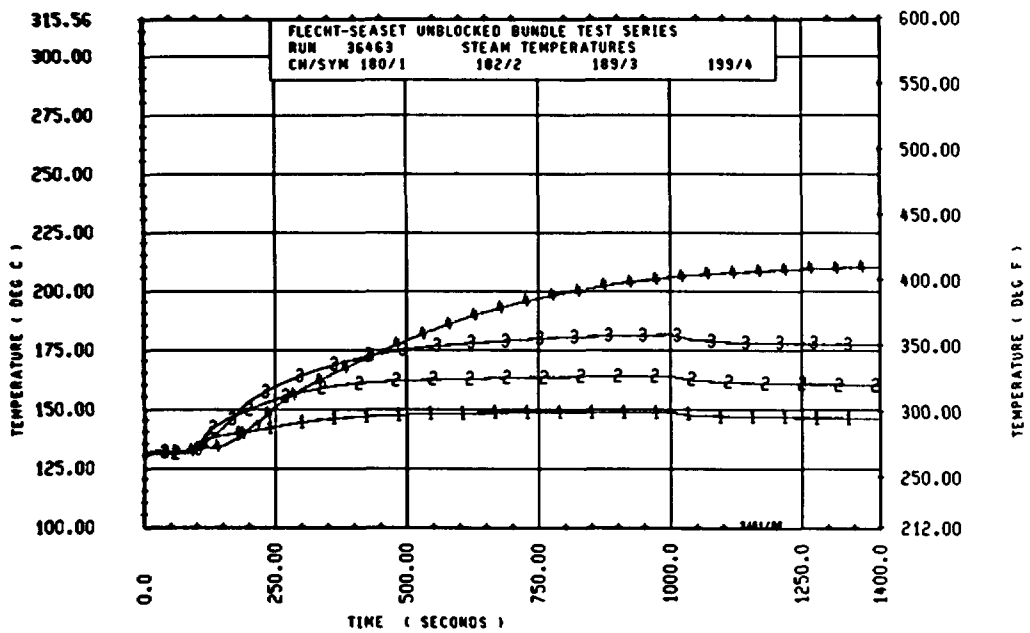

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36463 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)

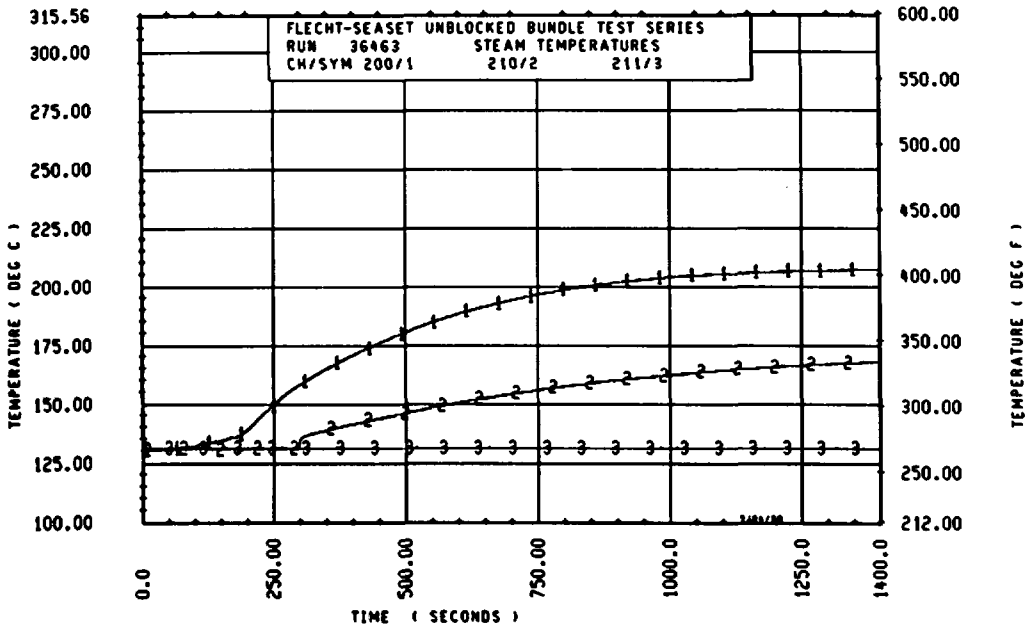

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36463 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

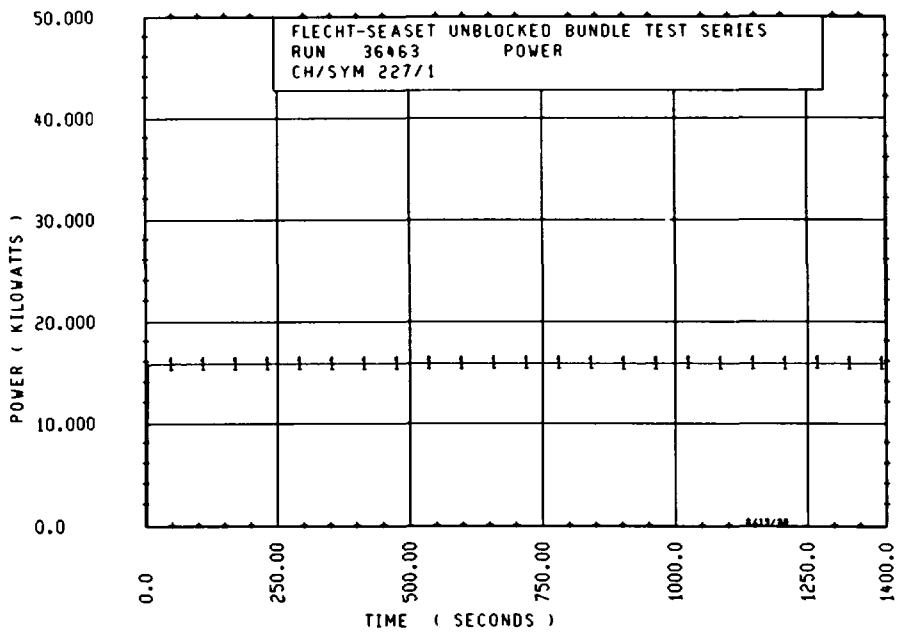

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36463 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
3.1547
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-1.5774
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
200.00
400.00
600.00
800.00
1000.0
1200.0
1400.0

36463-4


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36463 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36463 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36463 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
TEMPERATURE (DEG F)
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36463 POWER
CH/SYM 227/1
POWER (KILOWATTS)
50.000
40.000
30.000
20.000
10.000
0.0
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 36564

Date: 9/6/79

Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	147°C (296°F)
Rod peak power	0.039 kw/m (0.012 kw/ft)
Flow rate	0.0853 kg/sec (0.188 lb/sec)
Coolant temperature	133°C (271°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK
Inlet Reynolds number	3950

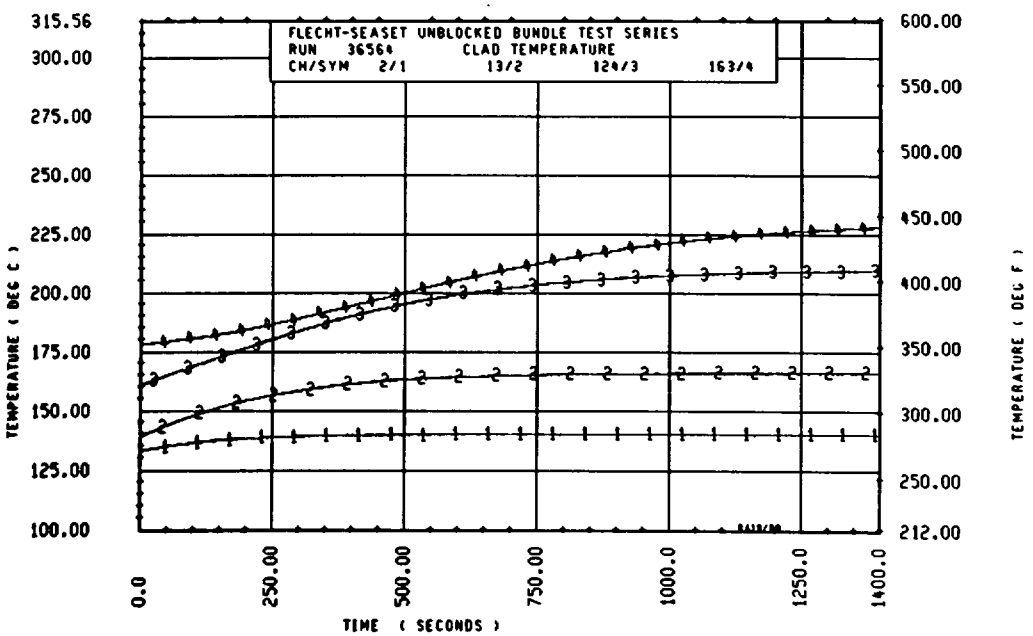
B. Housing Temperatures

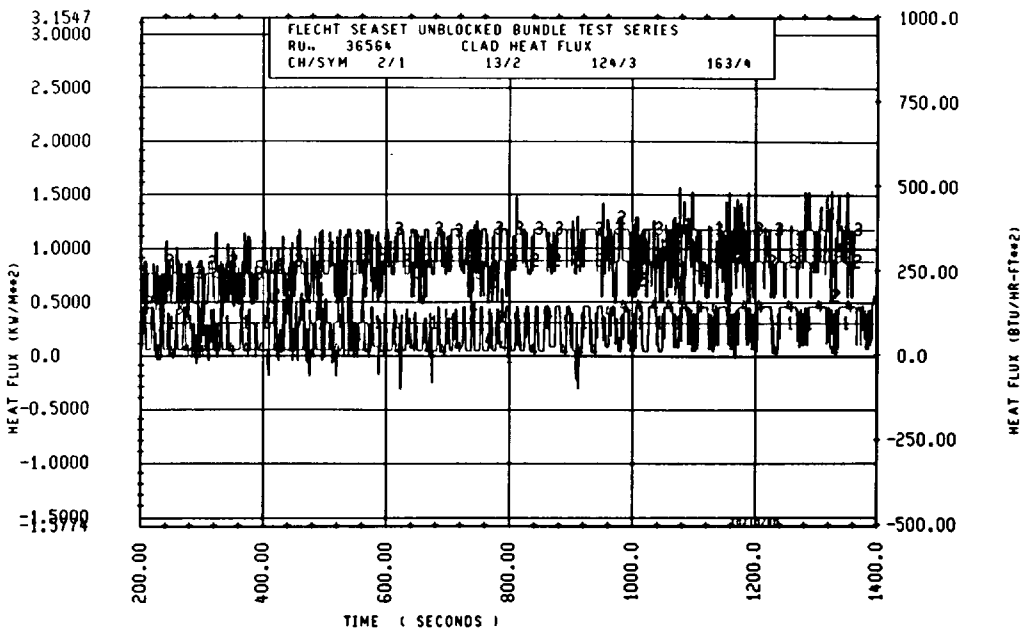
Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	131°C (268°F)	141°C (268°F)
1.22 m (48 in.)	132°C-133°C (269°F-272°F)	138°C (280°F)
1.83 m (72 in.)	127°C-140°C (260°F-284°F)	147°C-154°C (296°F-309°F)
2.44 m (96 in.)	143°C-149°C (289°F-300°F)	159°C-171°C (318°F-340°F)
2.74 m (108 in.)	147°C (296°F)	166°C (331°F)
3.05 m (120 in.)	142°C-145°C (287°F-293°F)	162°C-166°C (323°F-330°F)
3.35 m (132 in.)	139°C-147°C (283°F-296°F)	155°C-166°C (311°F-330°F)

*At end of test

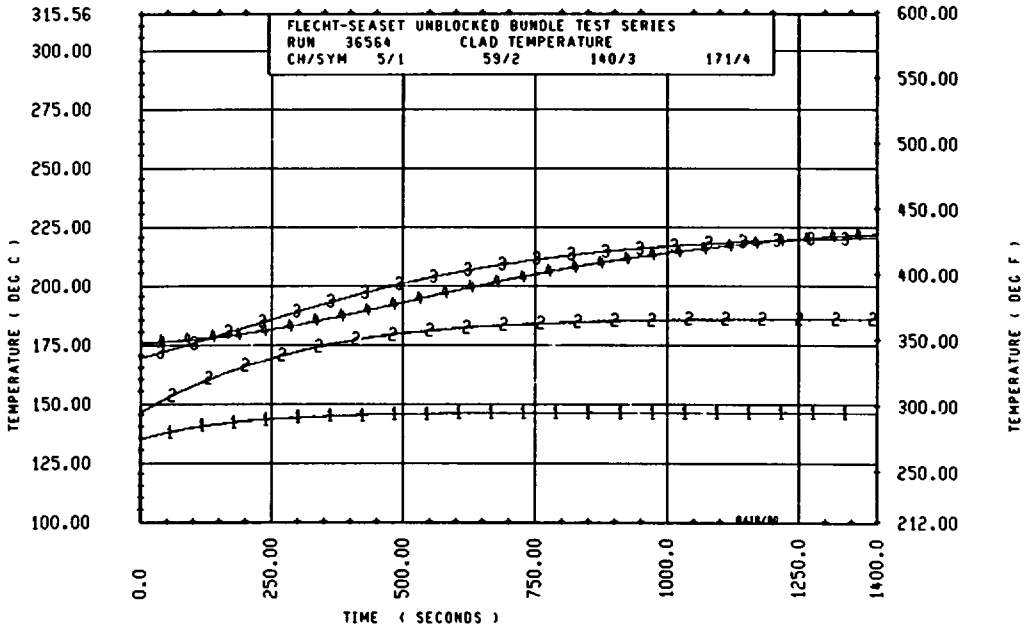
C. Comments

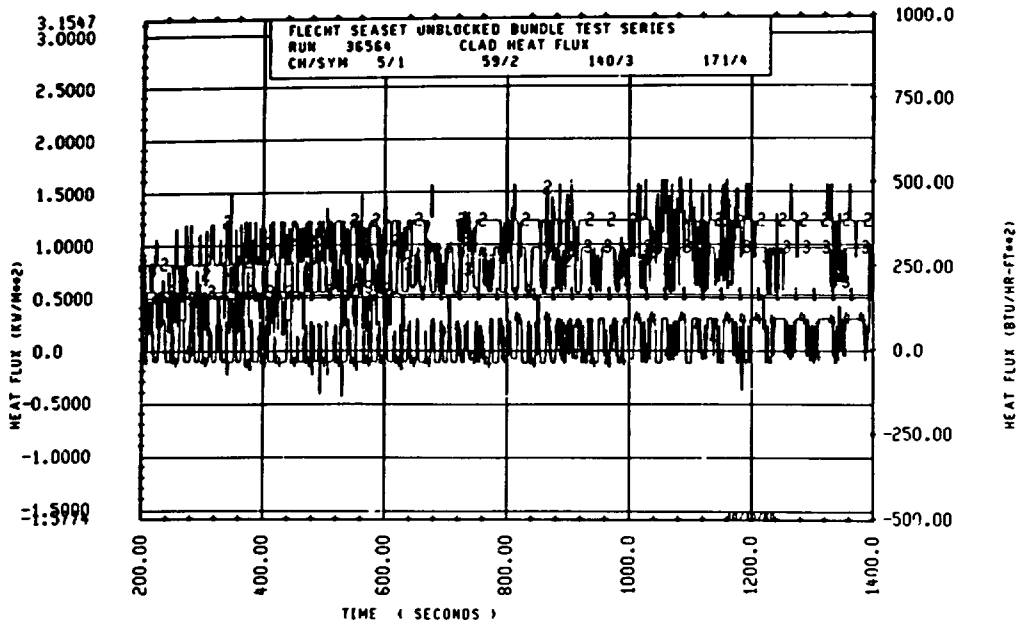
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. There was 2.1 percent mass loss through steam probes from 0.99 to 2.13 m (39 to 84 in.) and 2.8 percent mass loss through steam probes from 2.29 to 3.51 m (90 to 138 in.).

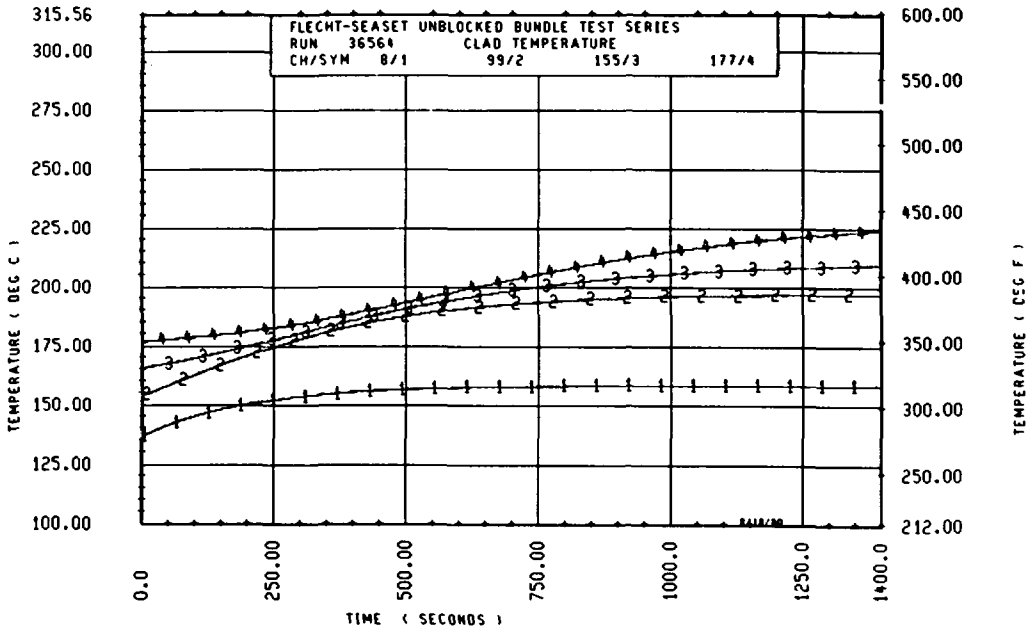

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36564 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

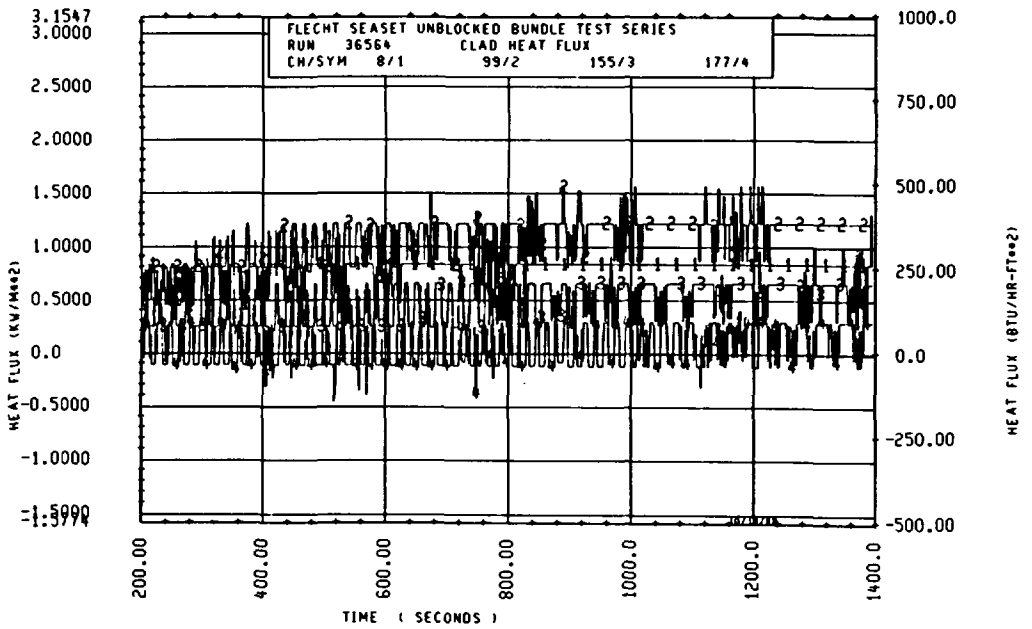

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RU.. 36564 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
3.1547
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-1.3774
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
200.00
400.00
600.00
800.00
1000.0
1200.0
1400.0

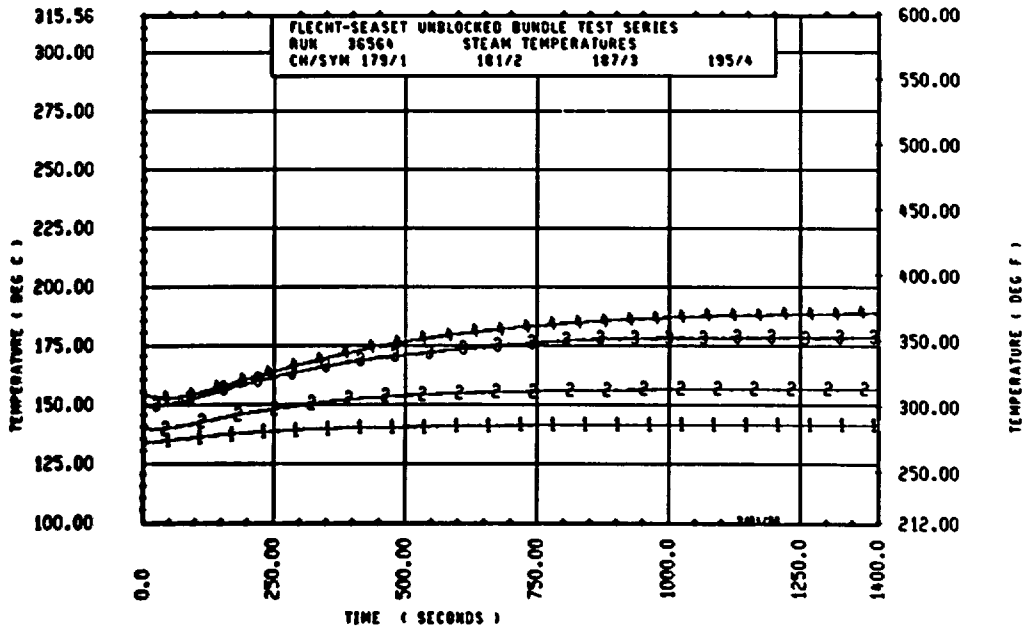
36564-2

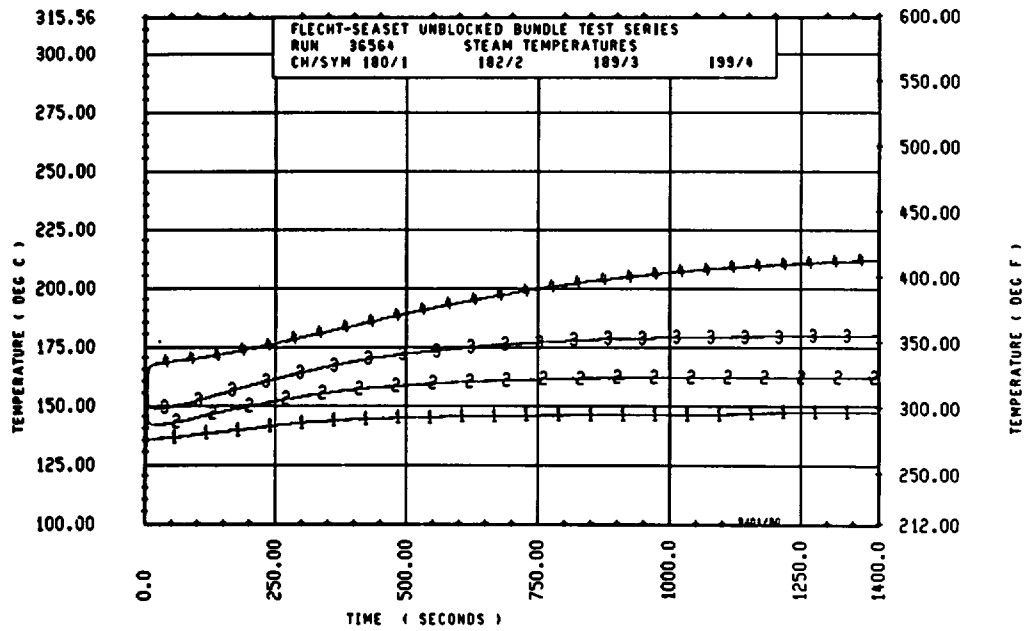

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36564 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

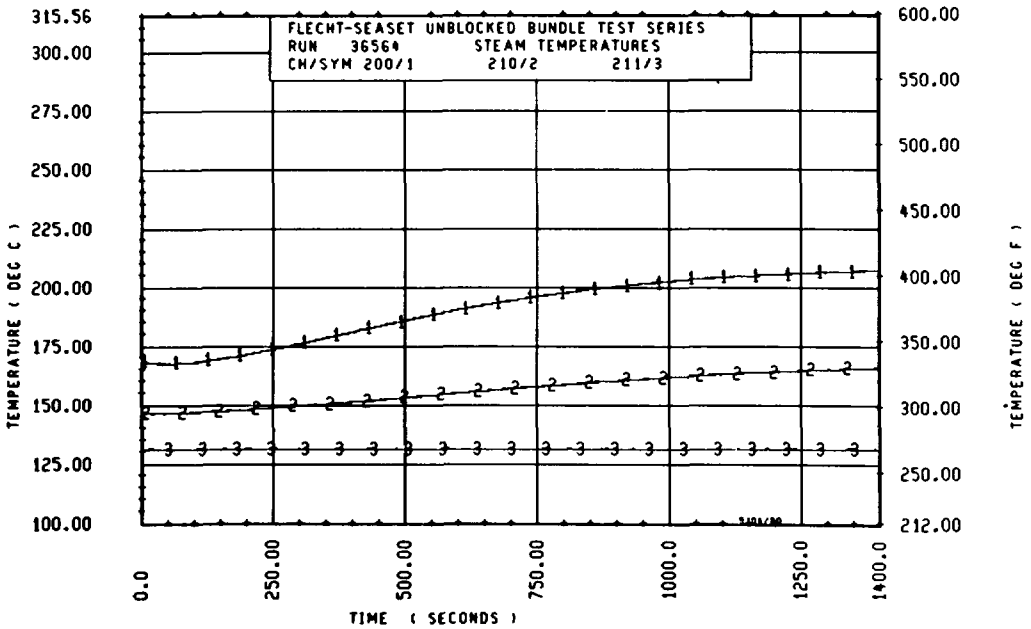

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36564 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
3.1547
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-1.5774
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
200.00
400.00
600.00
800.00
1000.0
1200.0
1400.0

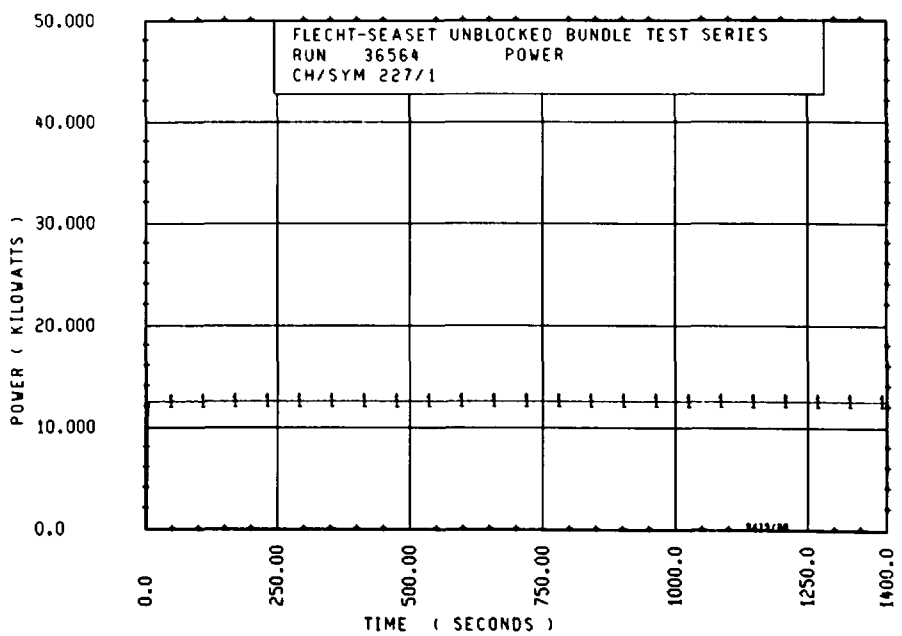

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36564 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36564 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
3.1547
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-1.5774
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
200.00
400.00
600.00
800.00
1000.0
1200.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36564 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36564 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36564 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
TEMPERATURE (DEG F)
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36564 POWER
CH/SYM 227/1
POWER (KILOWATTS)
50.000
40.000
30.000
20.000
10.000
0.0
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 36665
Date: 9/6/79
Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	174°C (345°F)
Rod peak power	0.03 kw/m (0.009 kw/ft)
Flow rate	0.067 kg/sec (0.148 lb/sec)
Coolant temperature	131°C (267°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK
Inlet Reynolds number	3130

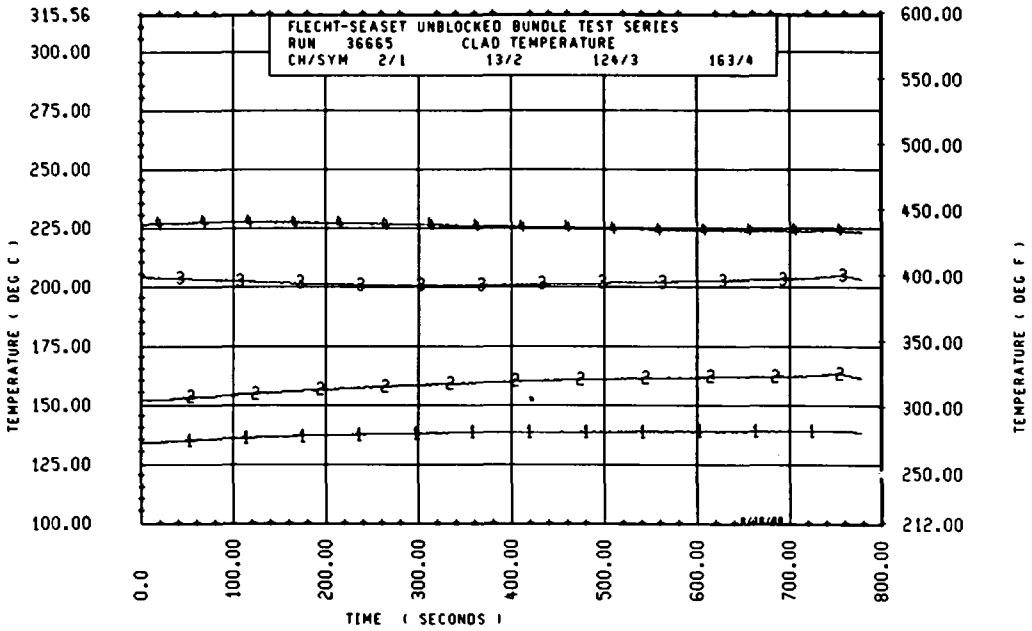
B. Housing Temperatures

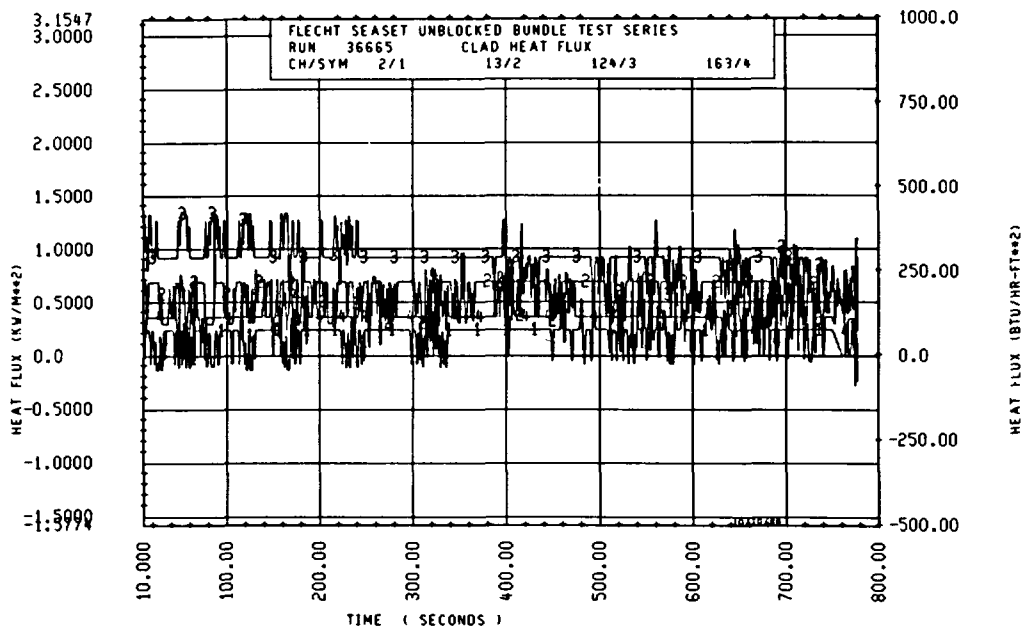
Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	131°C (268°F)	131°C (267°F)
1.22 m (48 in.)	138°C (280°F)	146°C (277°F)
1.83 m (72 in.)	147°C-154°C (297°F-310°F)	134°C-151°C (274°F-304°F)
2.44 m (96 in.)	154°C-169°C (310°F-337°F)	156°C-168°C (312°F-335°F)
2.74 m (108 in.)	163°C (325°F)	163°C (326°F)
3.05 m (120 in.)	150°C-155°C (302°F-311°F)	159°C-163°C (319°F-325°F)
3.35 m (132 in.)	135°C-150°C (275°F-302°F)	148°C-164°C (298°F-327°F)

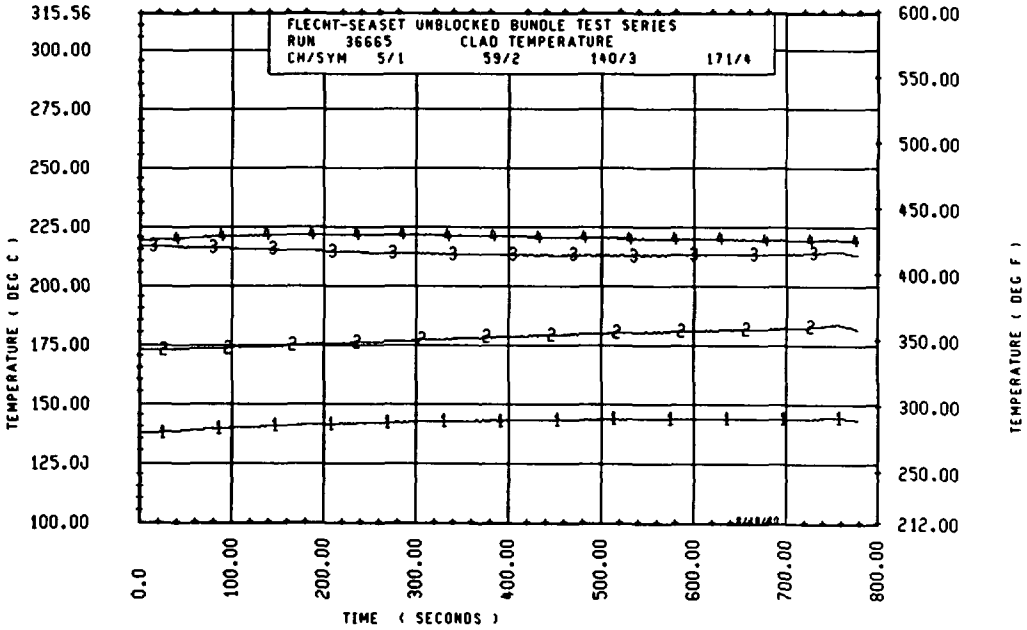
*At end of test

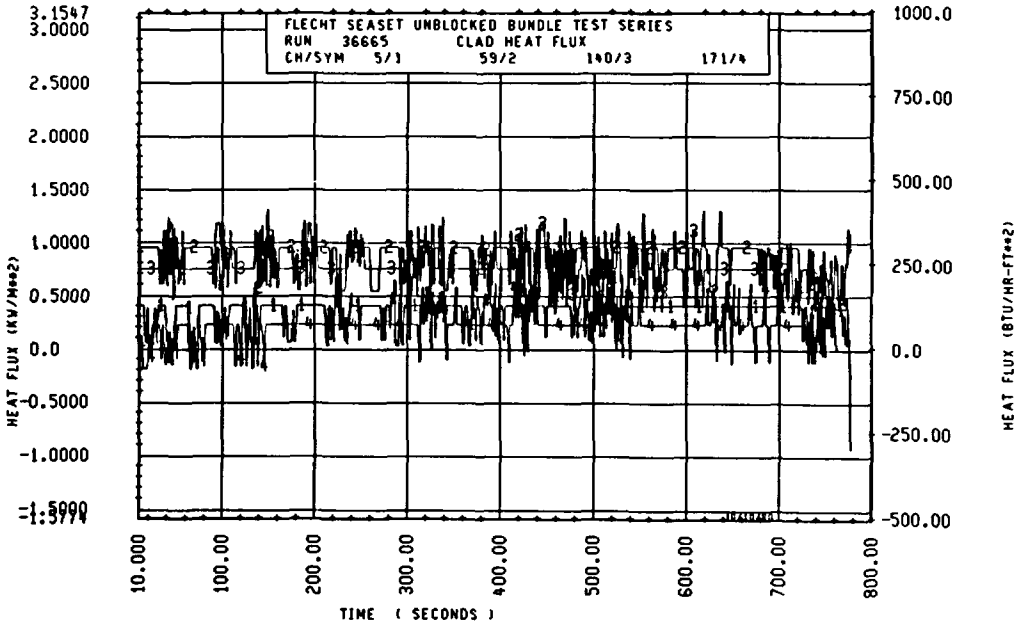
C. Comments

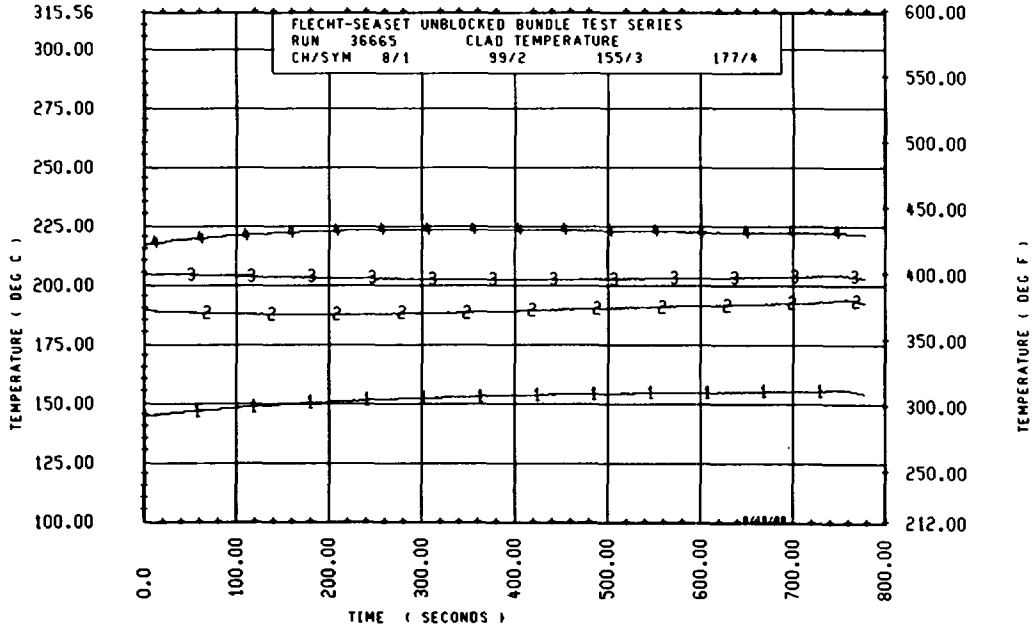
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. No steam probe mass loss measurements were available.

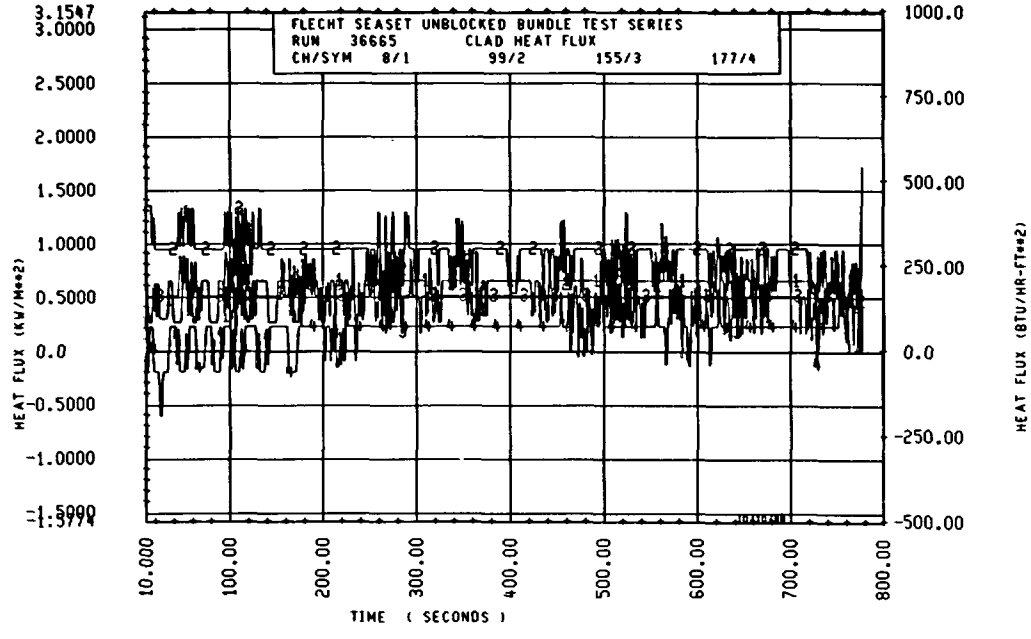

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36665 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

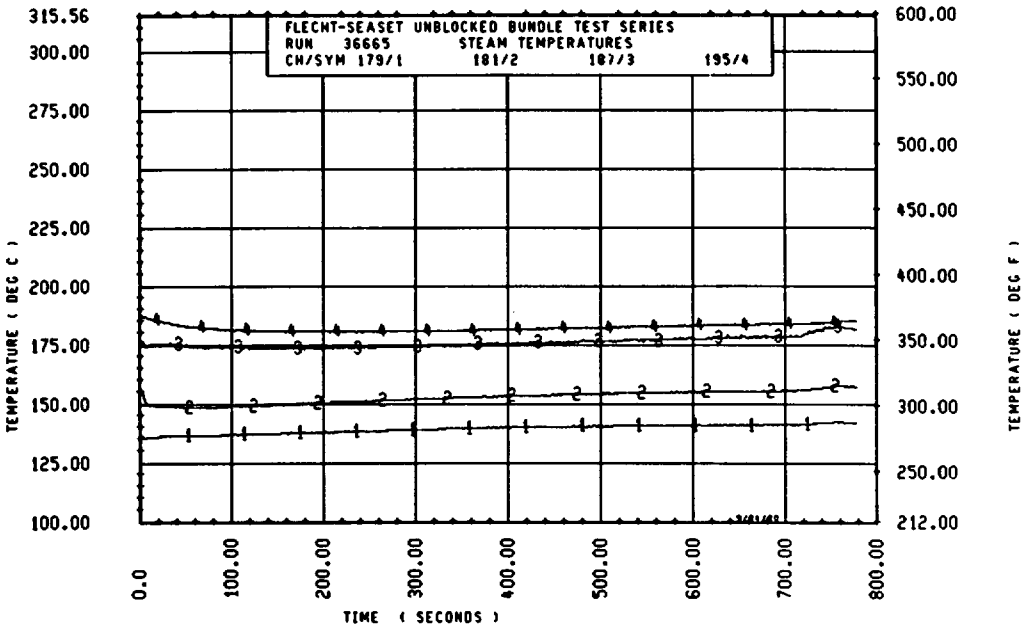

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36665 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
3.1547
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-1.5774
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
10.000
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

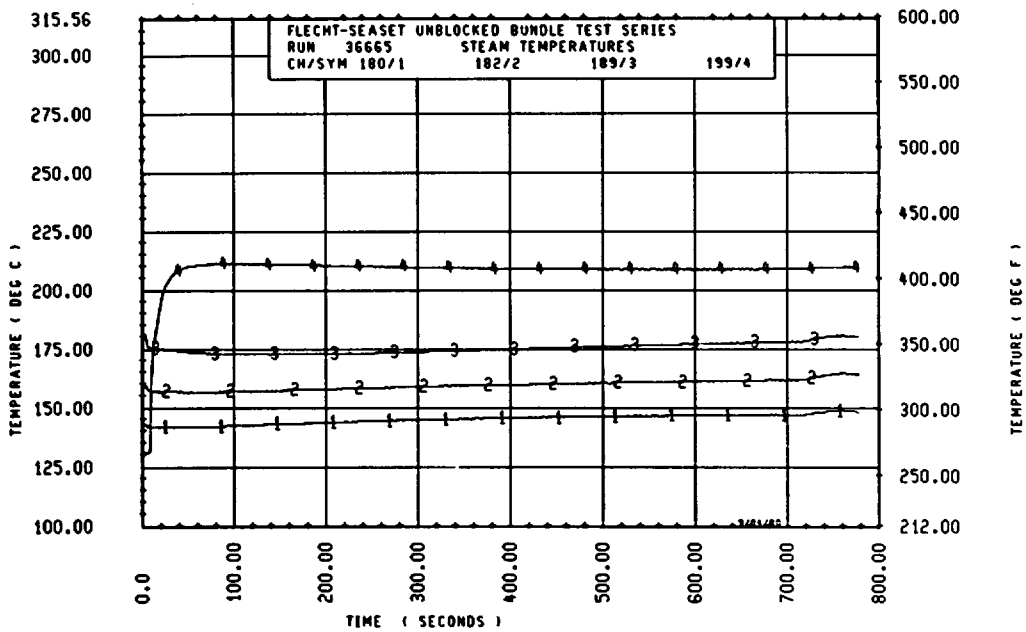

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36665 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

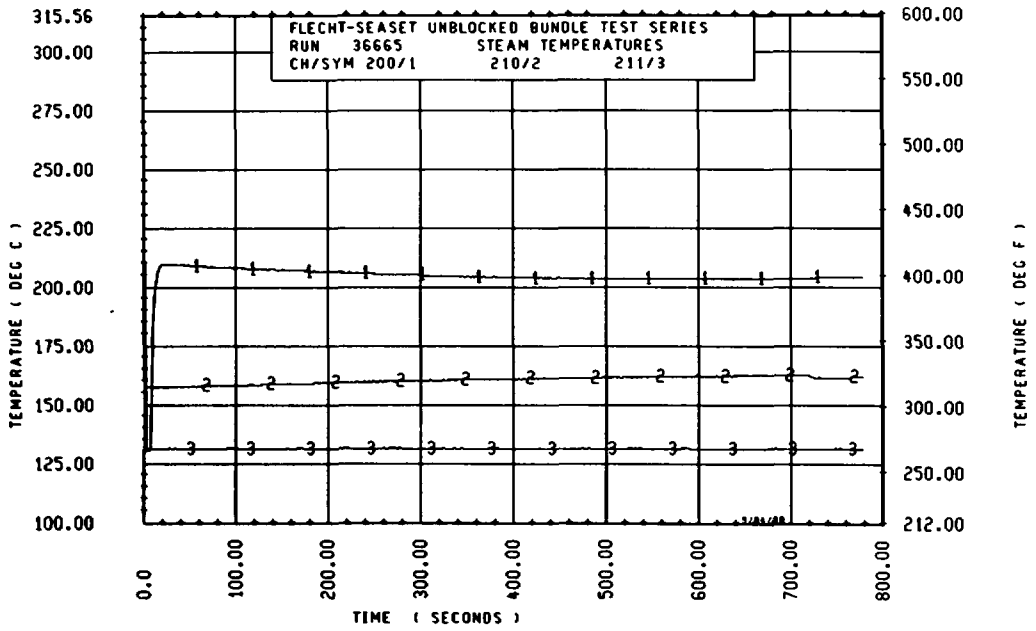

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36665 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)

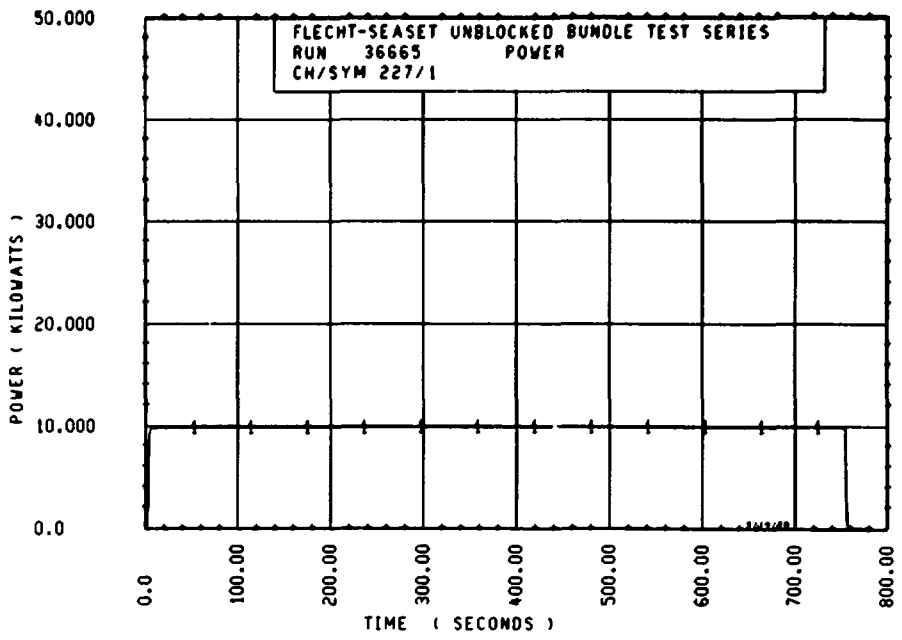

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36665 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36665 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36665 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36665 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36665 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36665 POWER
CH/SYM 227/1
POWER (KILOWATTS)
TIME (SECONDS)
50.000
40.000
30.000
20.000
10.000
0.0
0.0
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

FLECHT SEASET UNBLOCKED BUNDLE

SUMMARY AND COMMENT SHEET

Run 36766

Date: 9/6/79

Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	180°C (356°F)
Rod peak power	0.02 kw/m (0.007 kw/ft)
Flow rate	0.054 kg/sec (0.12 lb/sec)
Coolant temperature	131°C (267°F)
Bundle radial power profile	Uniform
Disconnnected rods	4G, 5G, 11IJK, 12IJK, 13JK
Inlet Reynolds number	2535

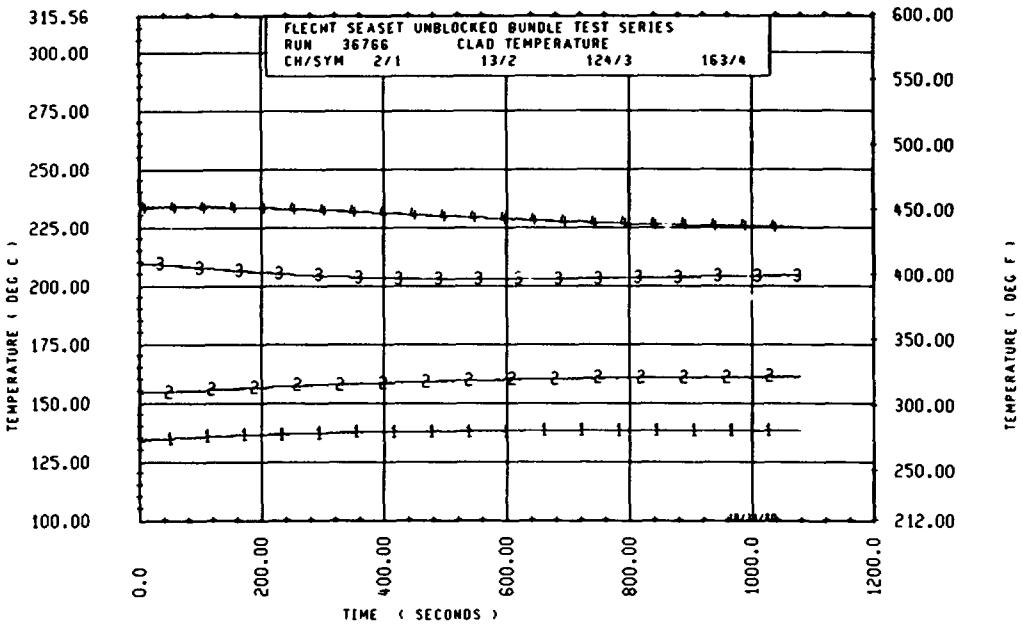
B. Housing Temperatures

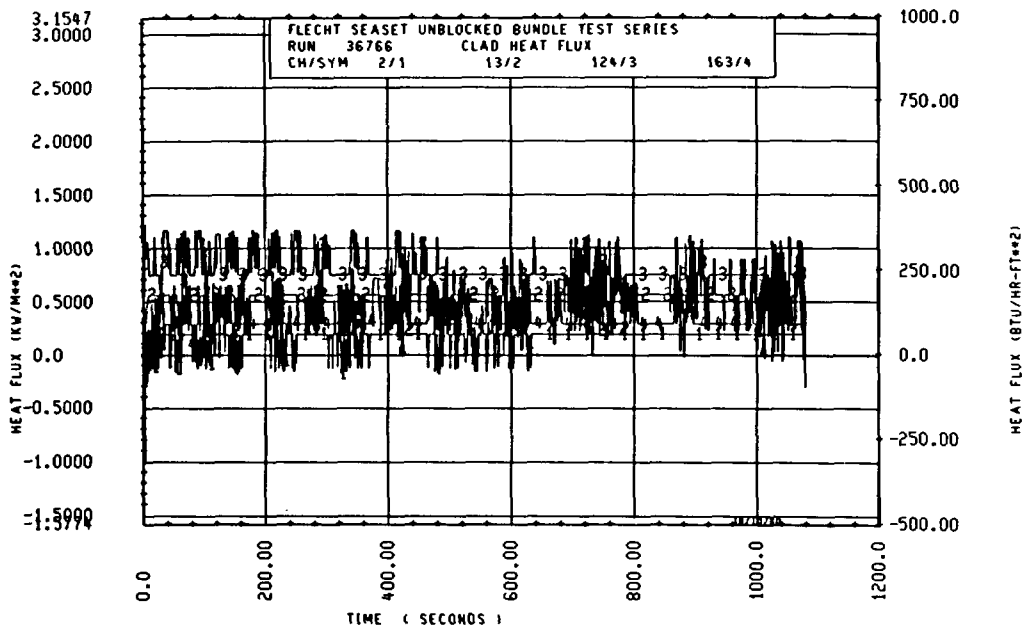
Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	131°C (267°F)	131°C (268°F)
1.22 m (48 in.)	138°C (281°F)	136°C-137°C (277°F-279°F)
1.83 m (72 in.)	147°C-156°C (297°F-313°F)	143°C-152°C (289°F-305°F)
2.44 m (96 in.)	162°C-171°C (323°F-340°F)	157°C-170°C (315°F-338°F)
2.74 m (108 in.)	170°C (338°F)	167°C (332°F)
3.05 m (120 in.)	162°C-169°C (323°F-336°F)	165°C-171°C (329°F-340°F)
3.35 m (132 in.)	153°C-171°C (307°F-340°F)	156°C-176°C (313°F-348°F)

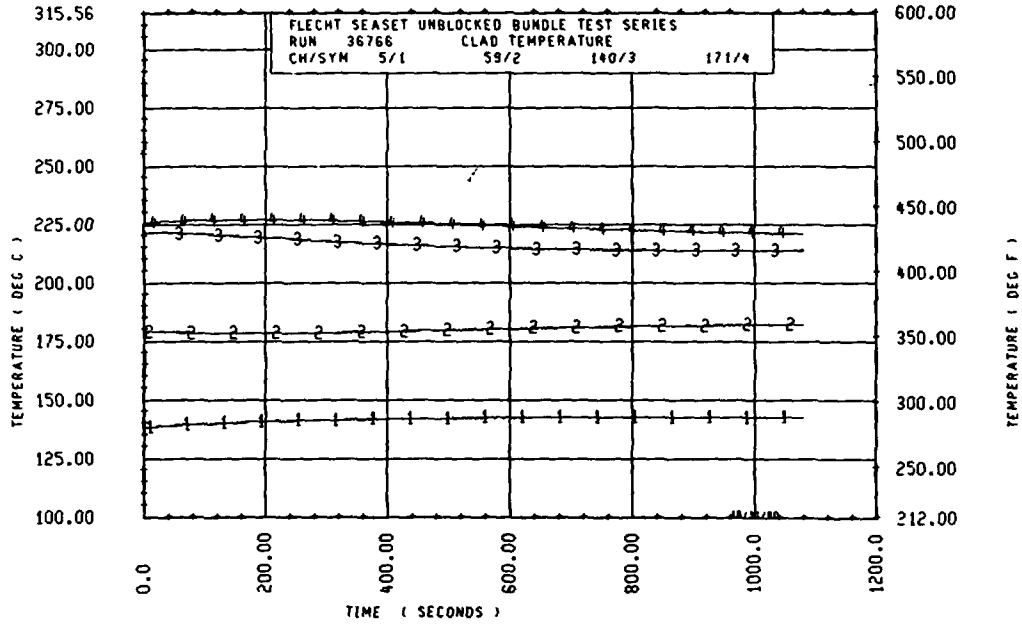
*At end of test

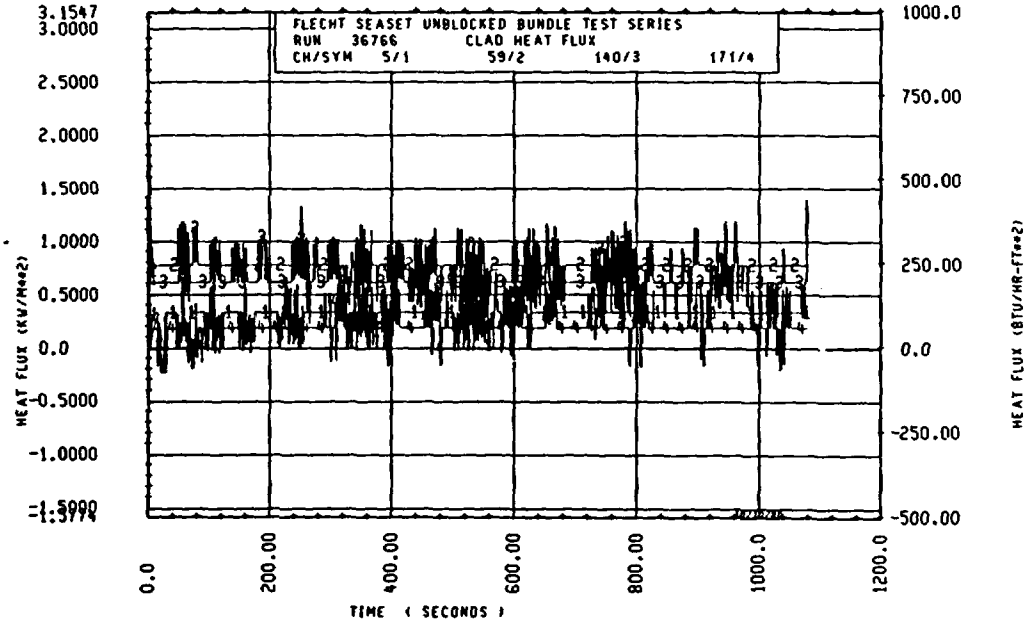
C. Comments

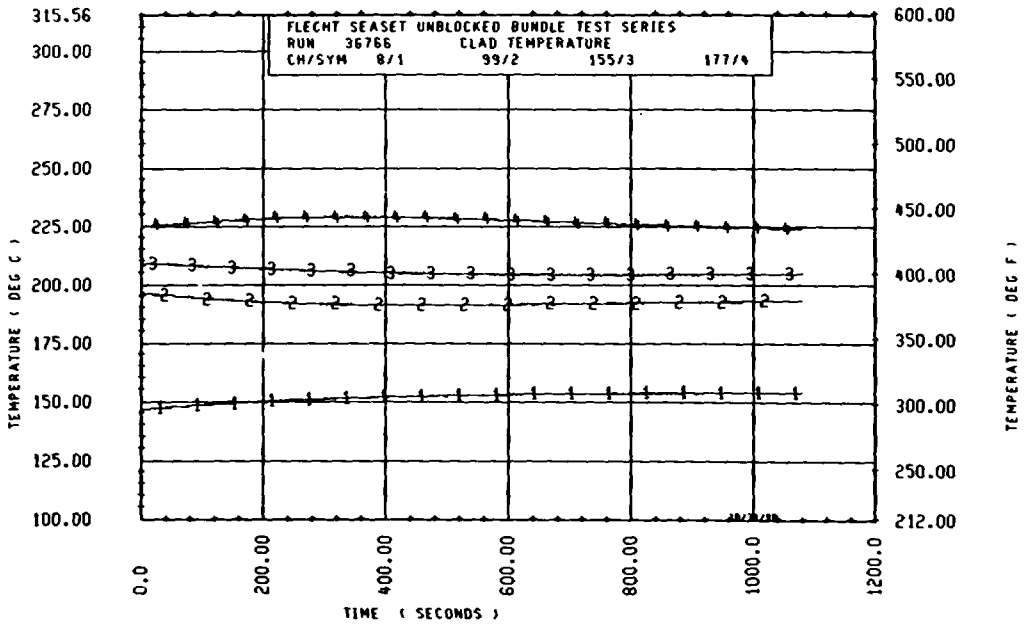
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. No steam probe mass loss measurements were available.

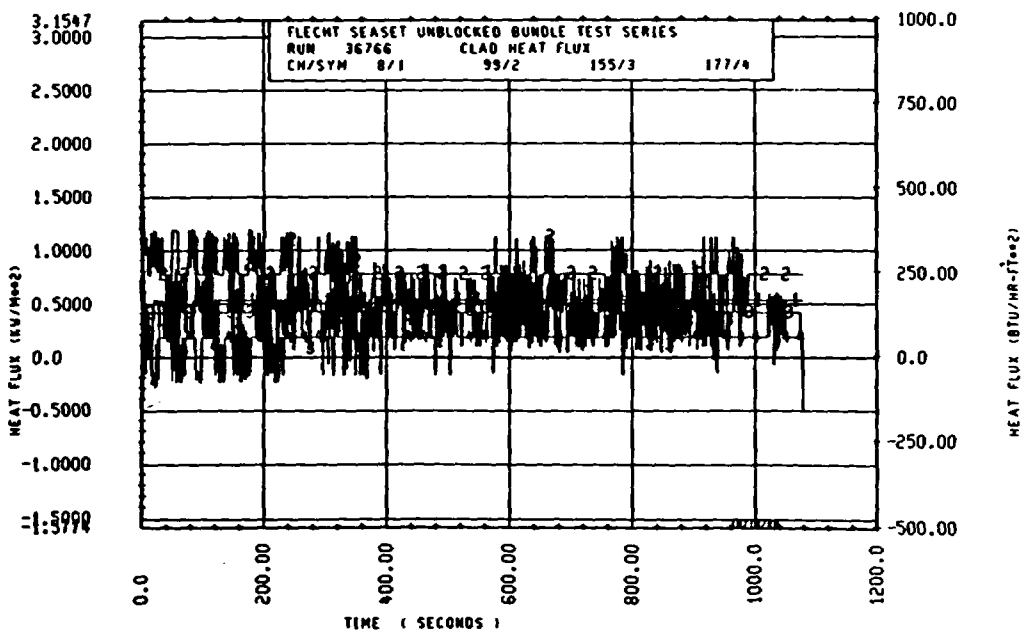

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36766 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

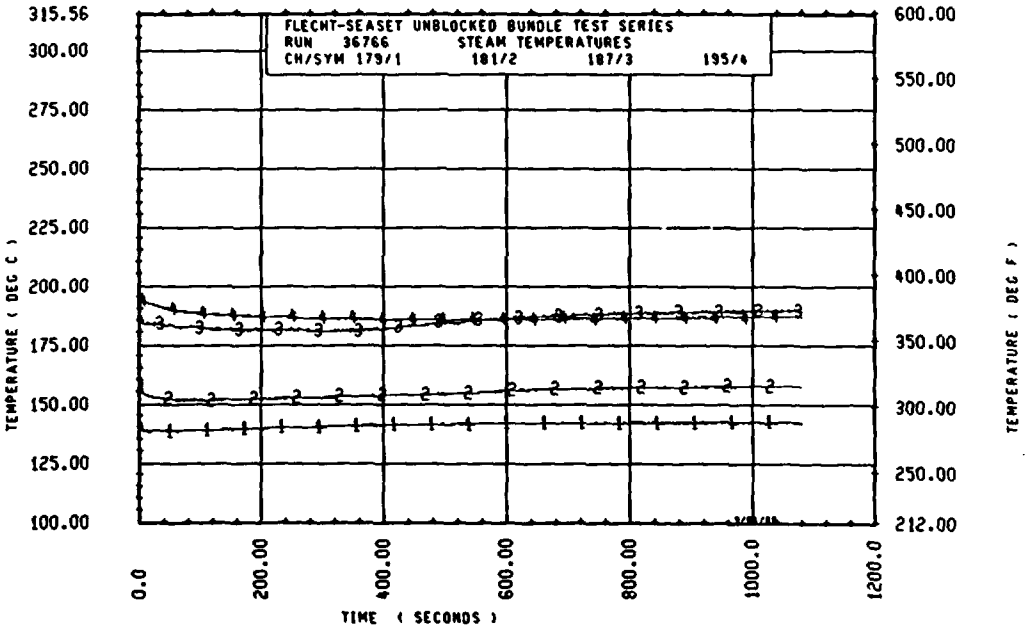

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36766 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)

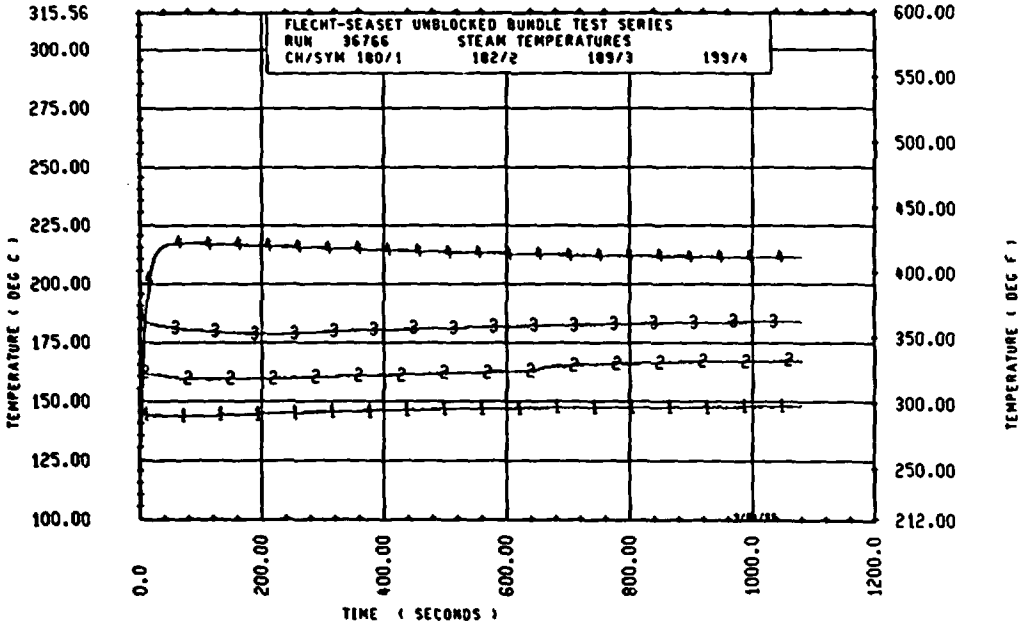

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36766 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

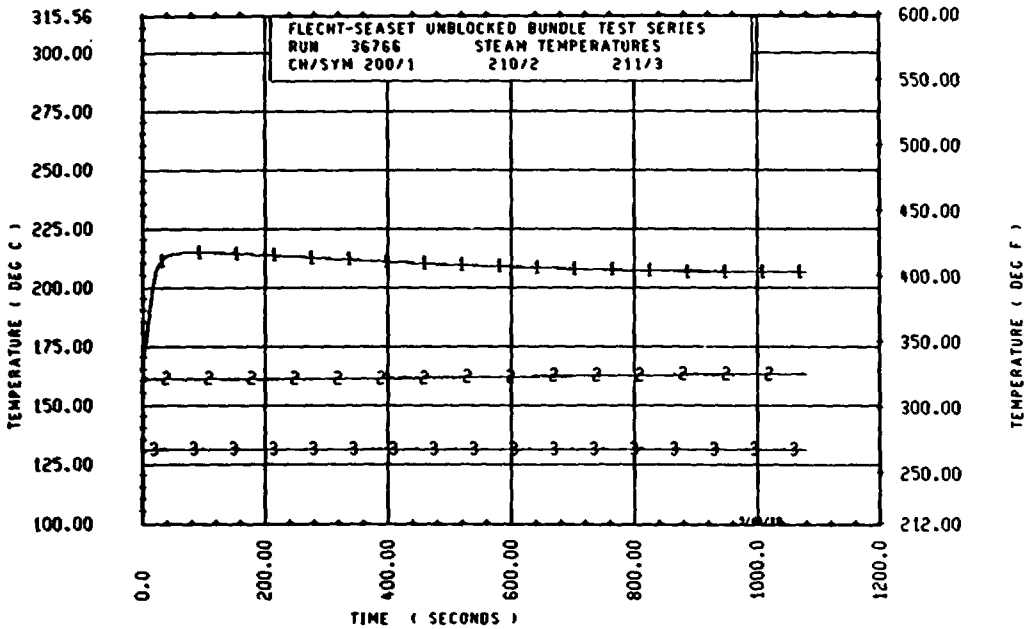

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36766 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)

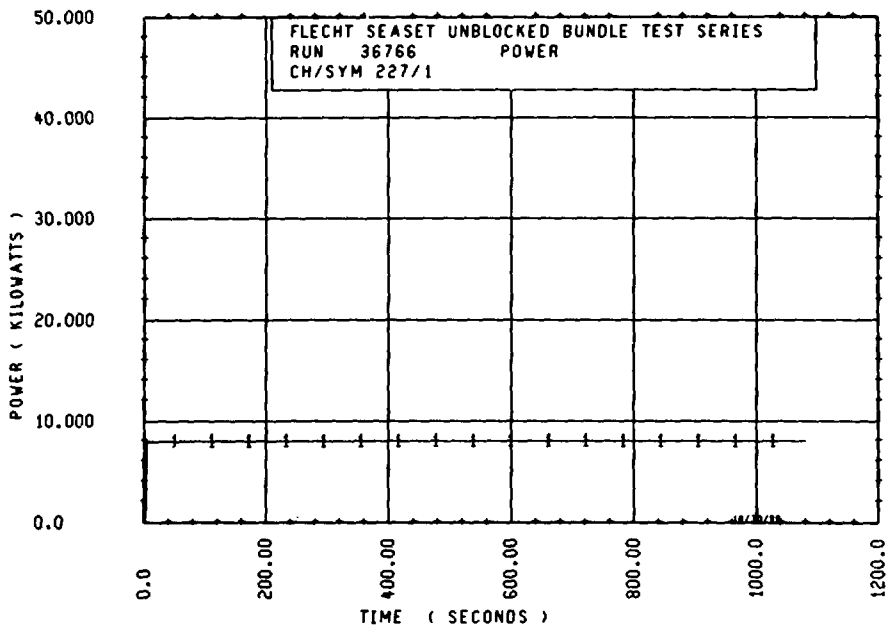

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36766 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36766 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)

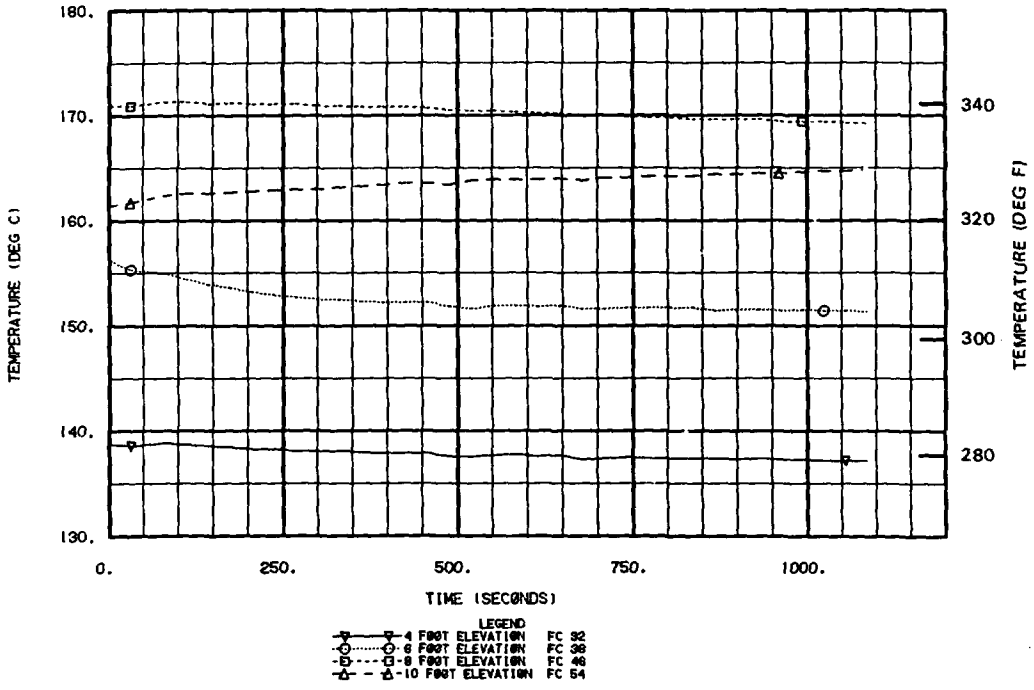

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36766 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36766 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0

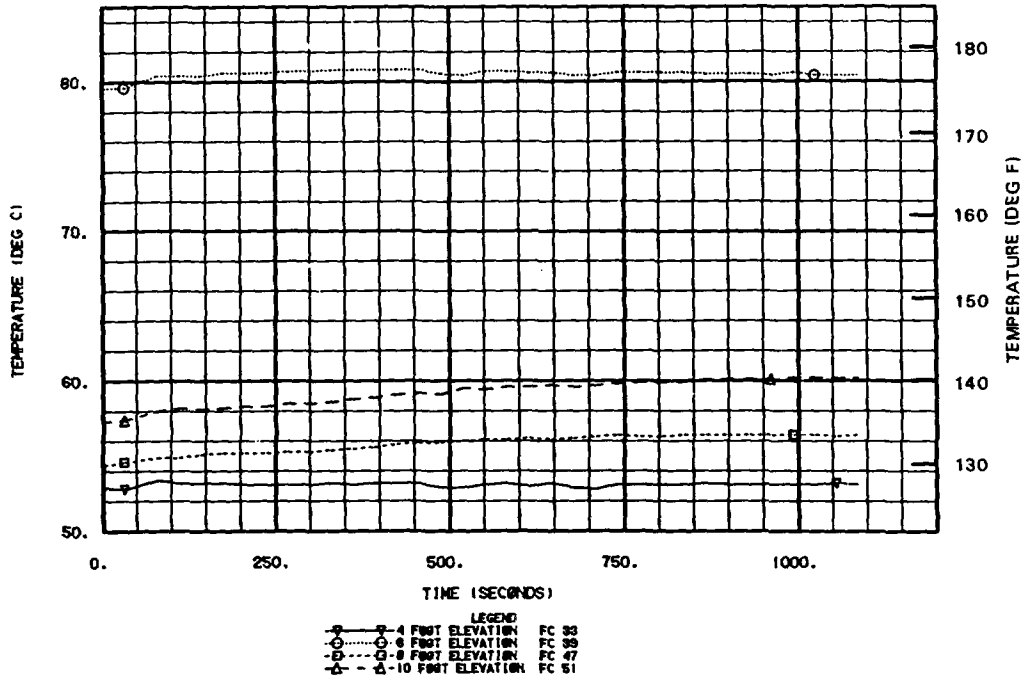

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36766 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
TEMPERATURE (DEG F)
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0
TIME (SECONDS)

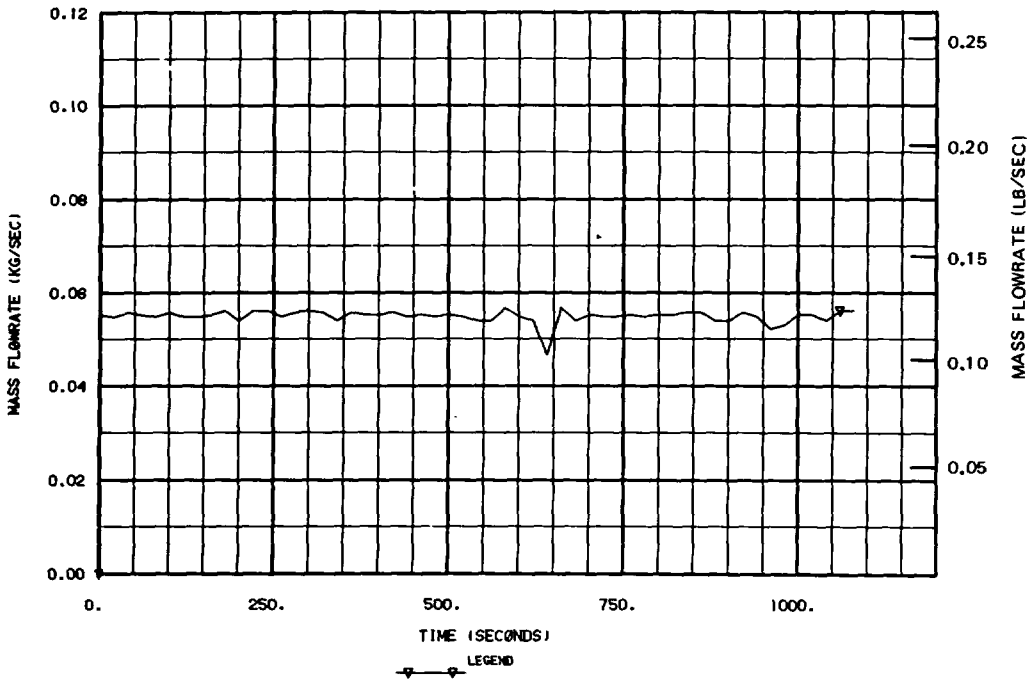

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36766 POWER
CH/SYM 227/1
POWER (KILOWATTS)
50.000
40.000
30.000
20.000
10.000
0.0
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0
TIME (SECONDS)

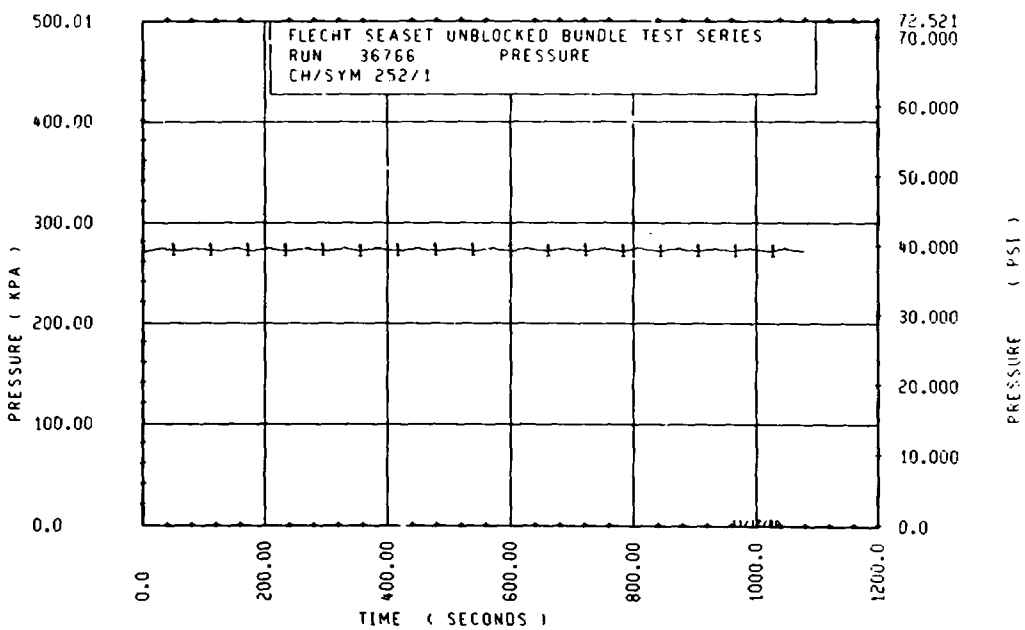
HOUSING TEMPERATURE



HOUSING INSULATION TEMPERATURE




0.12
0.10
0.08
0.06
0.04
0.02
0.00
MASS FLOWRATE (KG/SEC)
0.25
0.20
0.15
0.10
0.05
MASS FLOWRATE (LB/SEC)
0.
250.
500.
750.
1000.
TIME (SECONDS)
LEGEND


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36766 PRESSURE
CH/SYM 252/1
500.01
400.00
300.00
200.00
100.00
0.0
PRESSURE (KPA)
72.521
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.0
PRESSURE (PSI)
0.0
200.00
400.00
600.00
800.00
1000.0
1200.0
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 36867
Date: 9/7/79
Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	174°C (346°F)
Rod peak power	0.02 kw/m (0.006 kw/ft)
Flow rate	0.0531 kg/sec (0.117 lb/sec)
Coolant temperature	131°C (267°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK
Inlet Reynolds number	2470

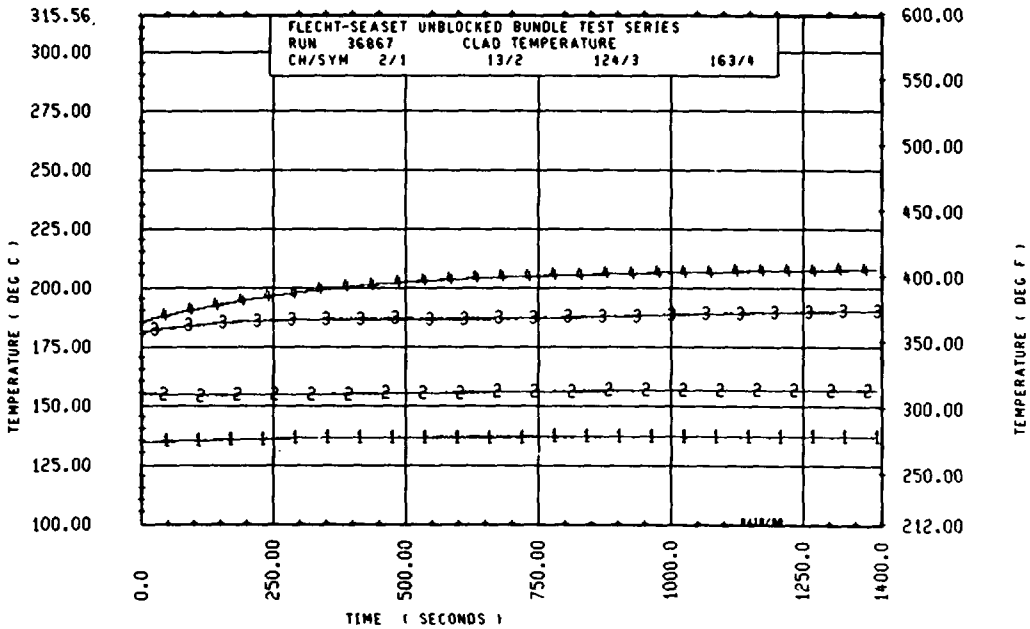
B. Housing Temperatures

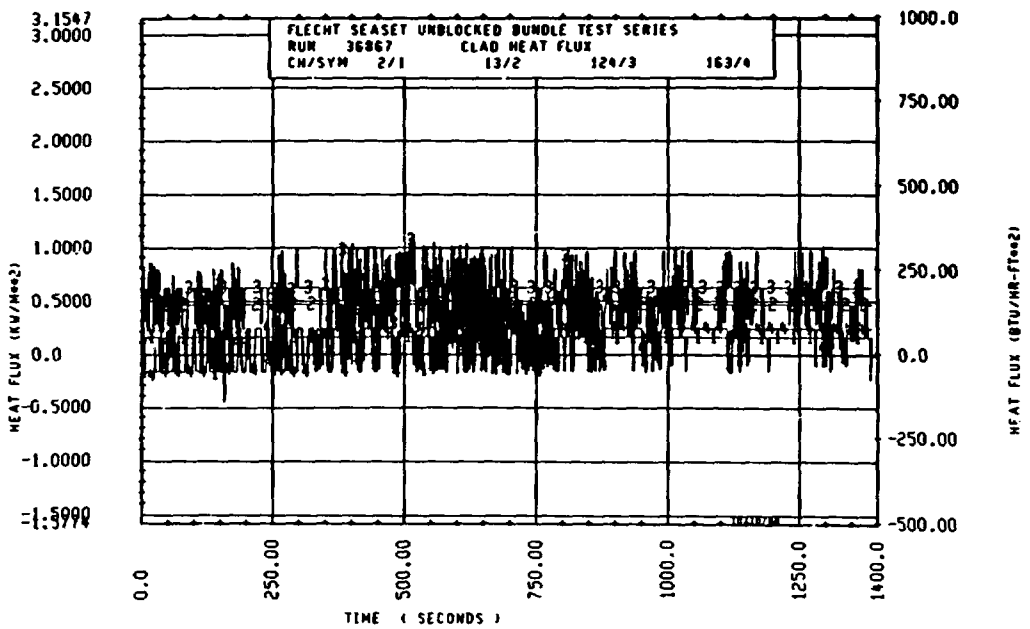
Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	131°C (267°F)	132°C (269°F)
1.22 m (48 in.)	139°C (273°F)	134°C (274°F)
1.83 m (72 in.)	133°C-147°C (271°F-297°F)	136°C-146°C (274°F-294°F)
2.44 m (96 in.)	144°C-155°C (292°F-311°F)	150°C-163°C (302°F-325°F)
2.74 m (108 in.)	147°C (297°F)	157°C (315°F)
3.05 m (120 in.)	137°C-140°C (279°F-284°F)	154°C-157°C (309°F-314°F)
3.35 m (132 in.)	128°C-137°C (263°F-279°F)	146°C-157°C (295°F-315°F)

*At end of test

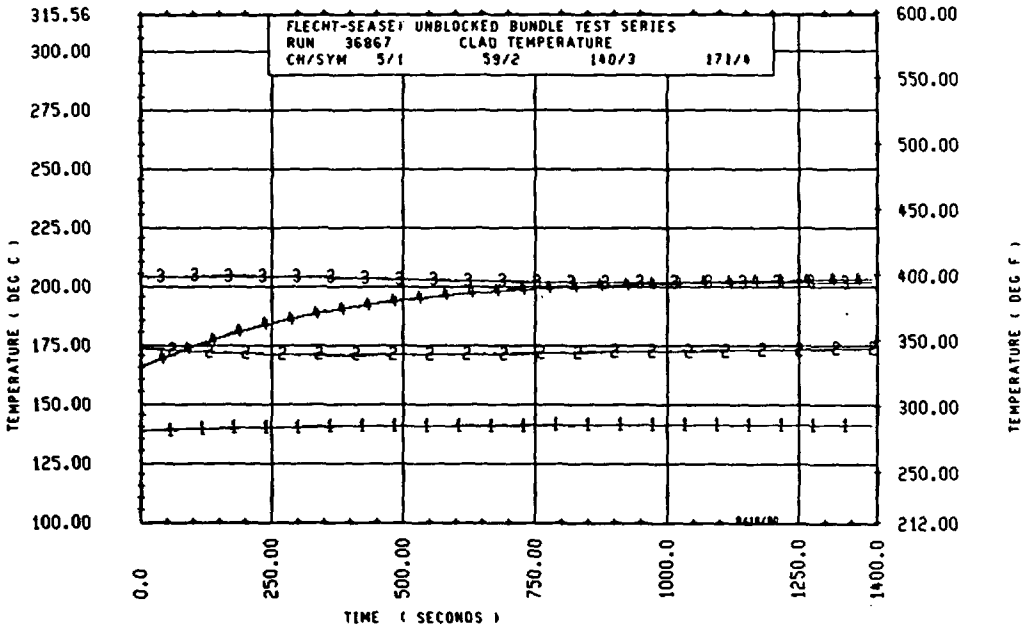
C. Comments

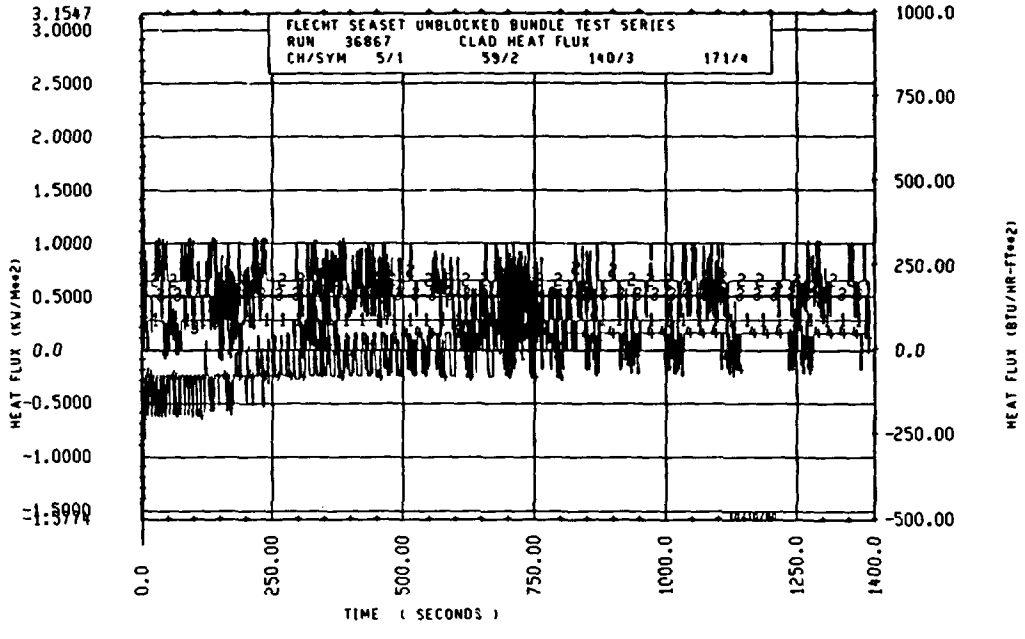
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. There was 2.4 percent mass loss through steam probes from 0.99 to 2.13 m (39 to 84 in.) and 4.8 percent mass loss through steam probes from 2.29 to 3.51 m (90 to 138 in.).

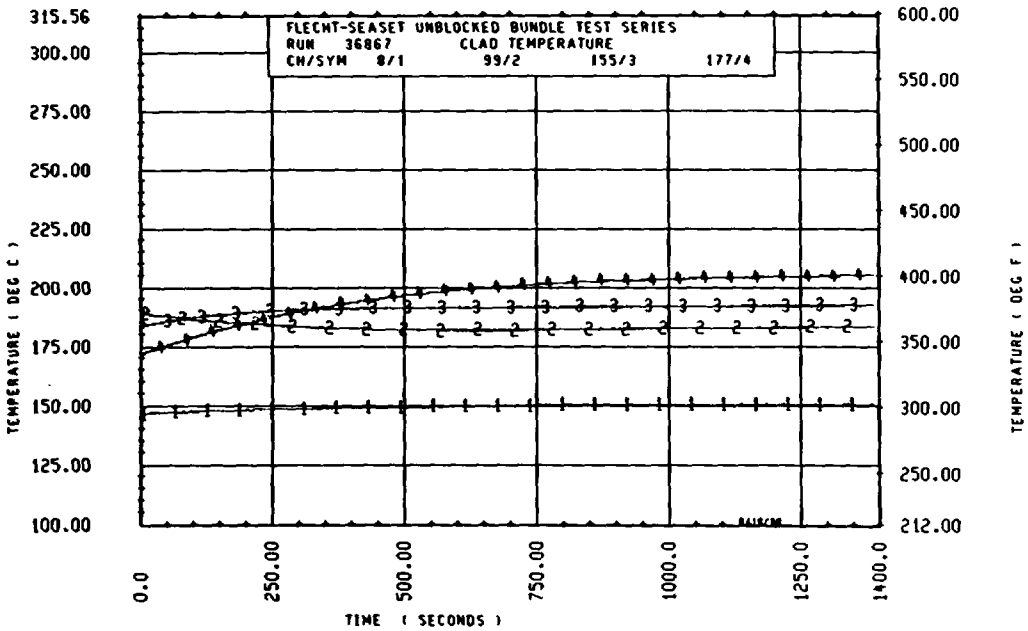

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36867 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

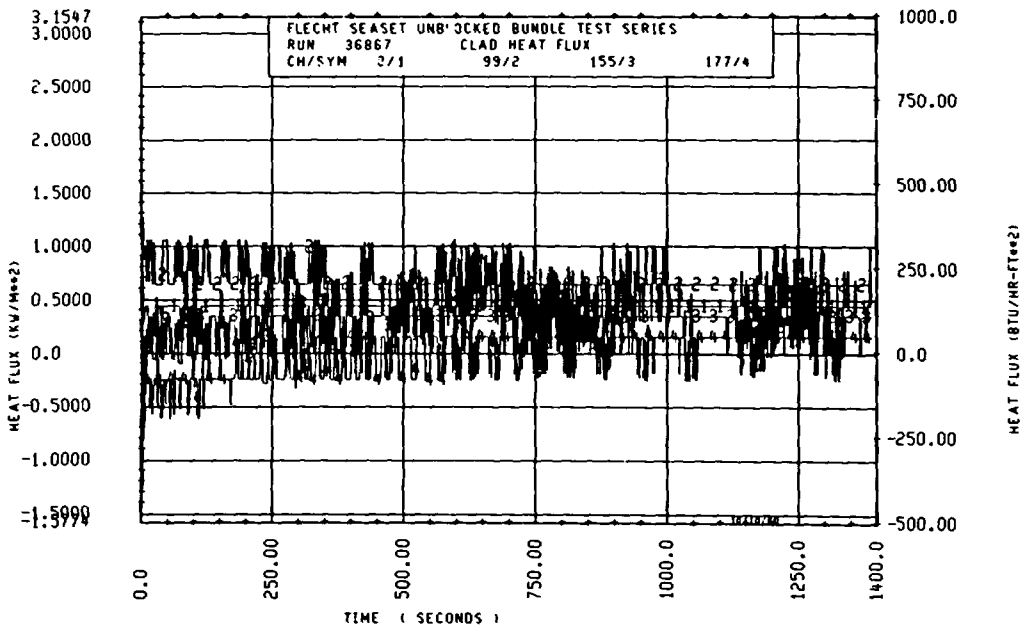

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36867 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
3.1547
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

36867-2

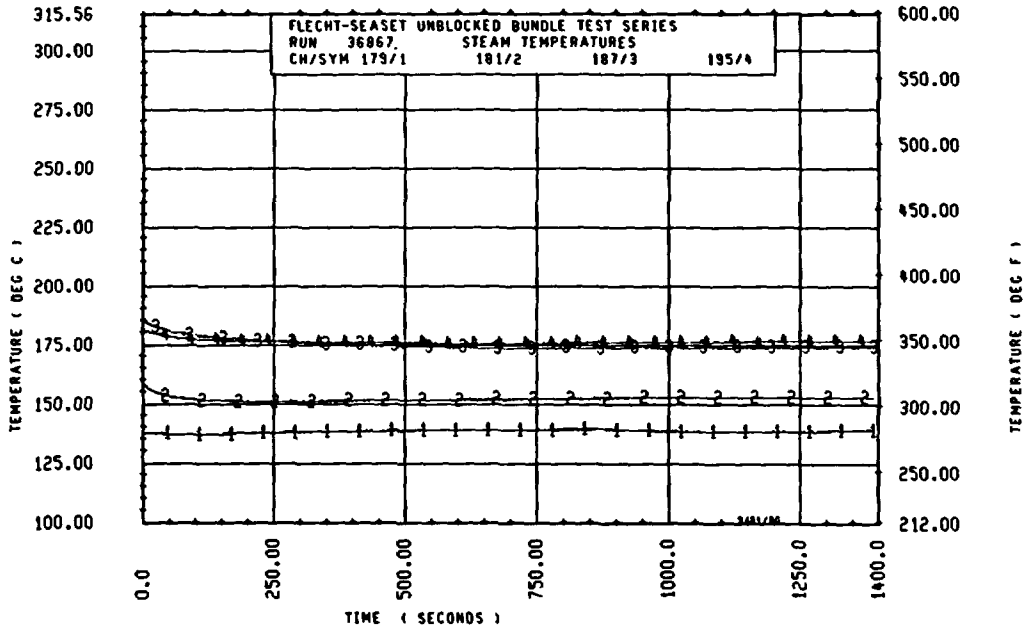

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36867 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)

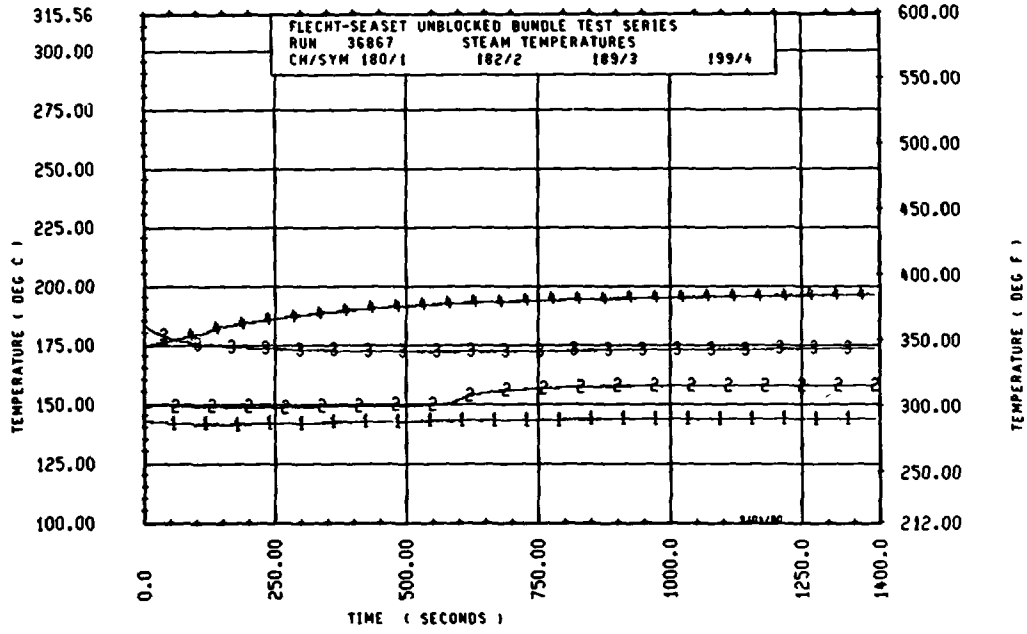

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36867 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)

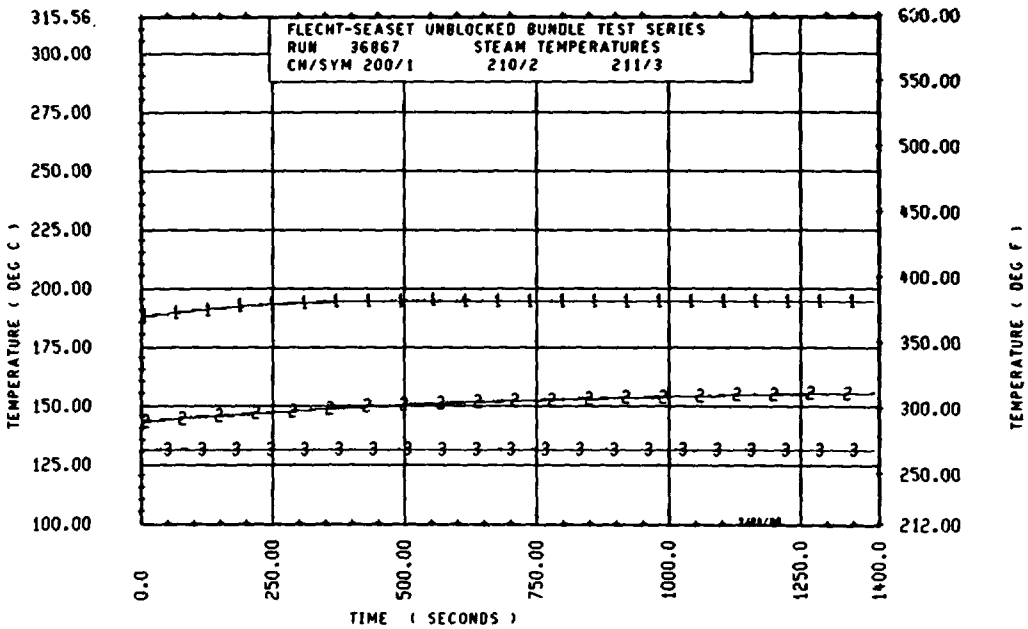

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36867 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

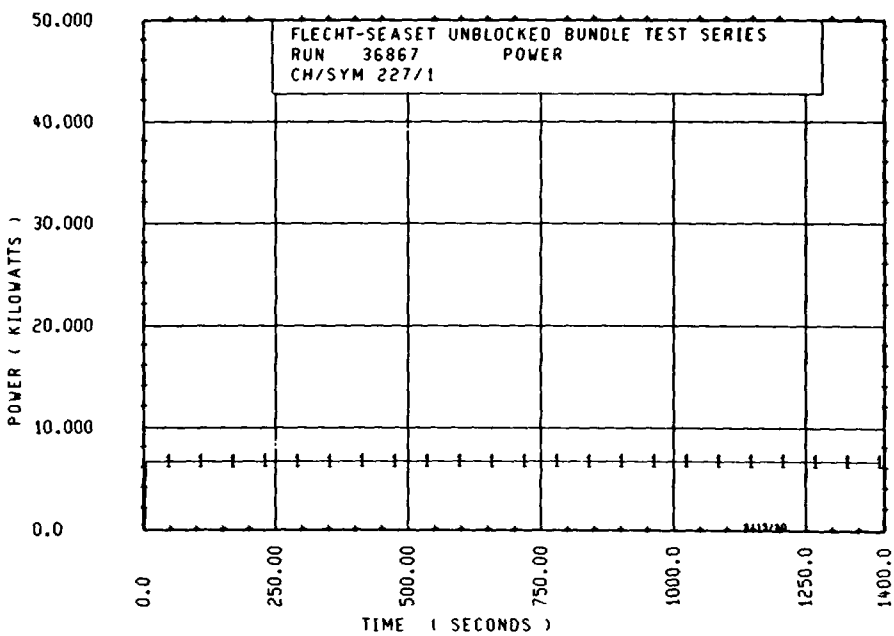

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36867 CLAD HEAT FLUX
CH/SYM 2/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
3.1547
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0
-0.5000
-1.0000
-1.5000
-1.3774
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

36867-4


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36867 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36867 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36867 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
TEMPERATURE (DEG C)
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
TEMPERATURE (DEG F)
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 36867 POWER
CH/SYM 227/1
50.000
40.000
30.000
20.000
10.000
0.0
POWER (KILOWATTS)
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 37069
Date: 9/7/79
Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.27 MPa (39 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	143°C (289°F)
Rod peak power	0.059 kw/m (0.018 kw/ft)
Flow rate	0.137 kg/sec (0.303 lb/sec)
Coolant temperature	131°C (267°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK
Inlet Reynolds number	6400

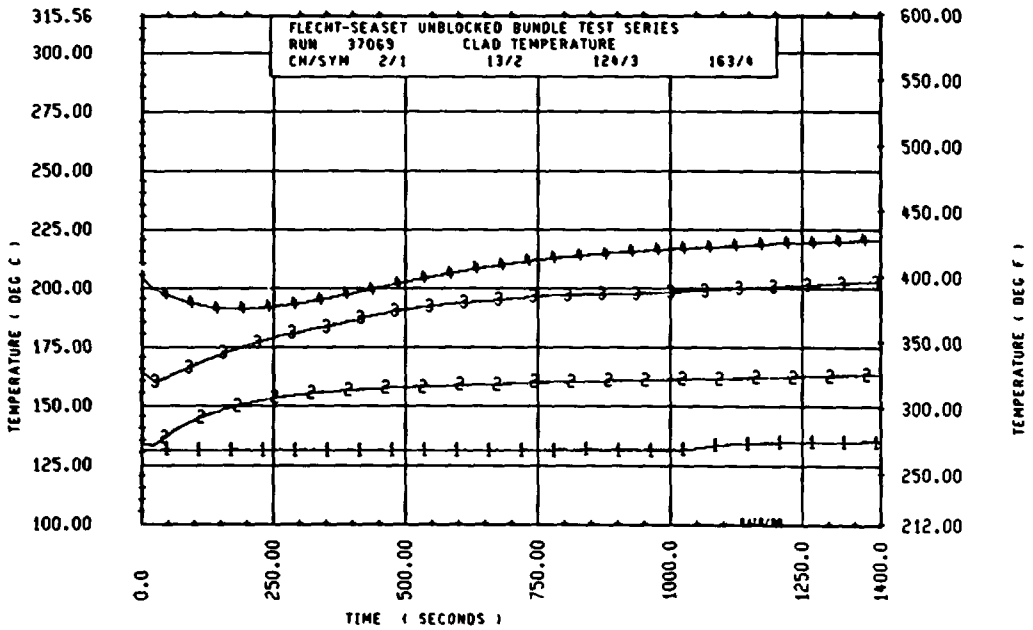
B. Housing Temperatures

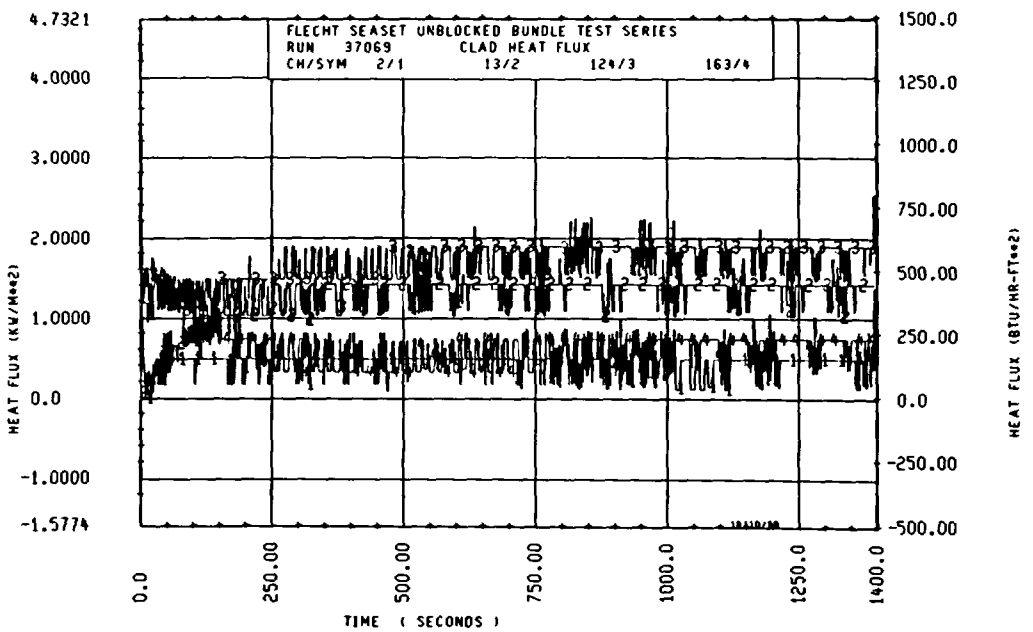
Elevation	Initial Temperature*	Maximum Temperature**
0.61 m (24 in.)	132°C (269°F)	132°C (270°F)
1.22 m (48 in.)	132°C (269°F)	135°C (275°F)
1.83 m (72 in.)	136°C-138°C (277°F-280°F)	147°C-152°C (296°F-306°F)
2.44 m (96 in.)	142°C-157°C (287°F-314°F)	154°C-169°C (309°F-336°F)
2.74 m (108 in.)	152°C (305°F)	165°C (329°F)
3.05 m (120 in.)	150°C-154°C (302°F-310°F)	164°C-168°C (328°F-335°F)
3.35 m (132 in.)	142°C-156°C (287°F-312°F)	156°C-172°C (312°F-341°F)

*At 28 seconds after test initiation
**At end of test

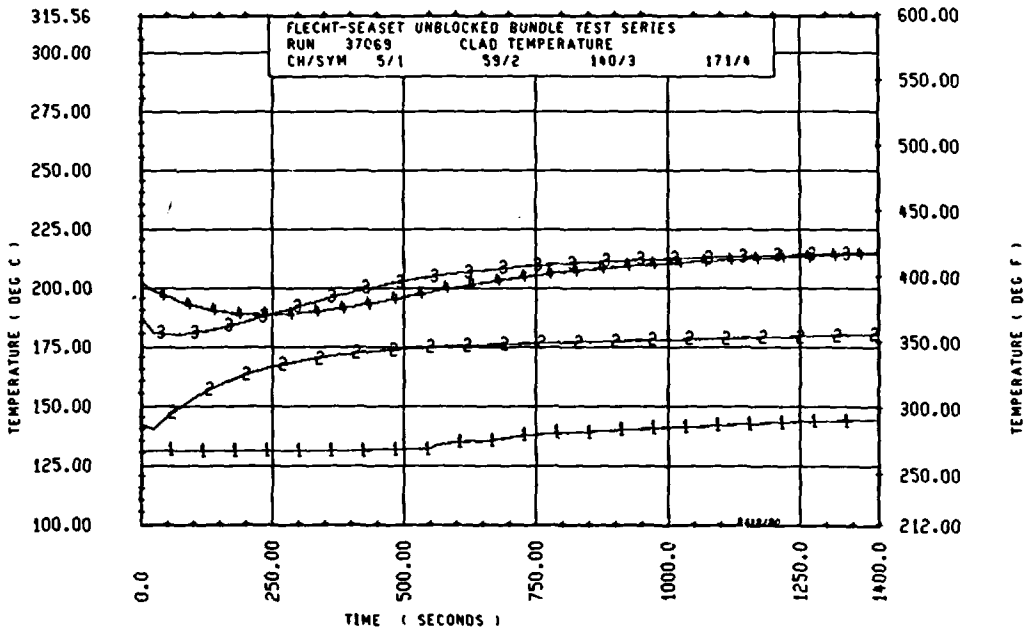
C. Comments

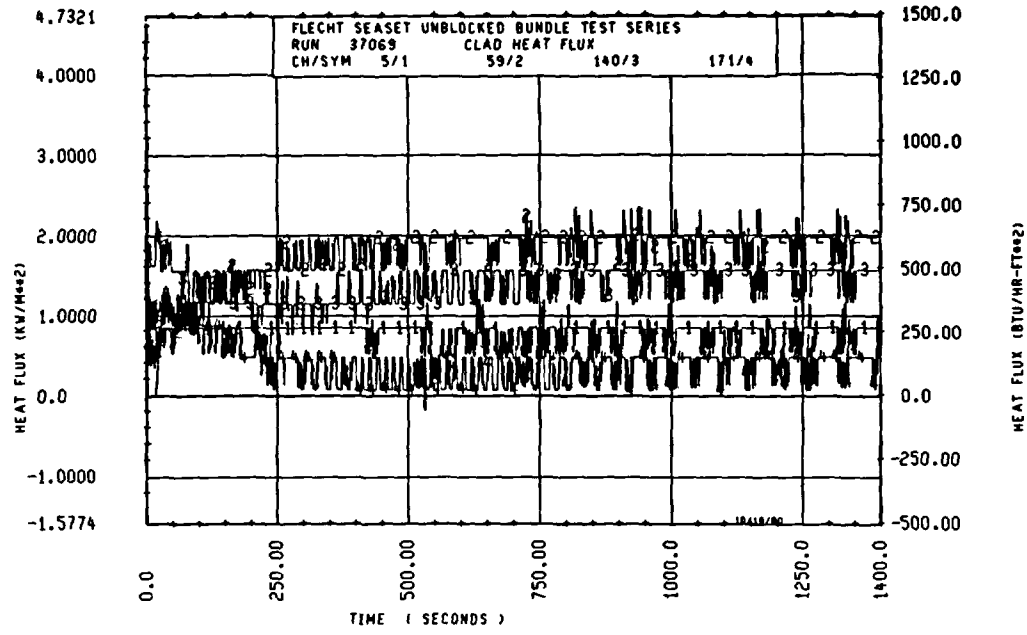
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. There was 0.6 percent mass loss through steam probes from 0.99 to 2.13 m (39 to 84 in.) and 1.7 percent mass loss through steam probes from 2.29 to 3.51 m (90 to 138 in.).

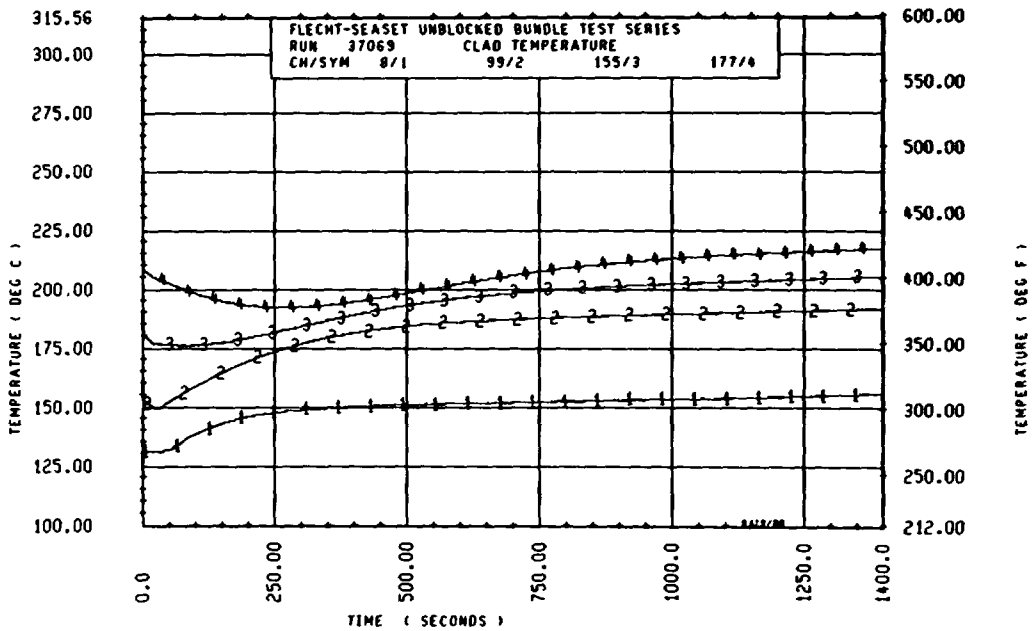

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37069 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

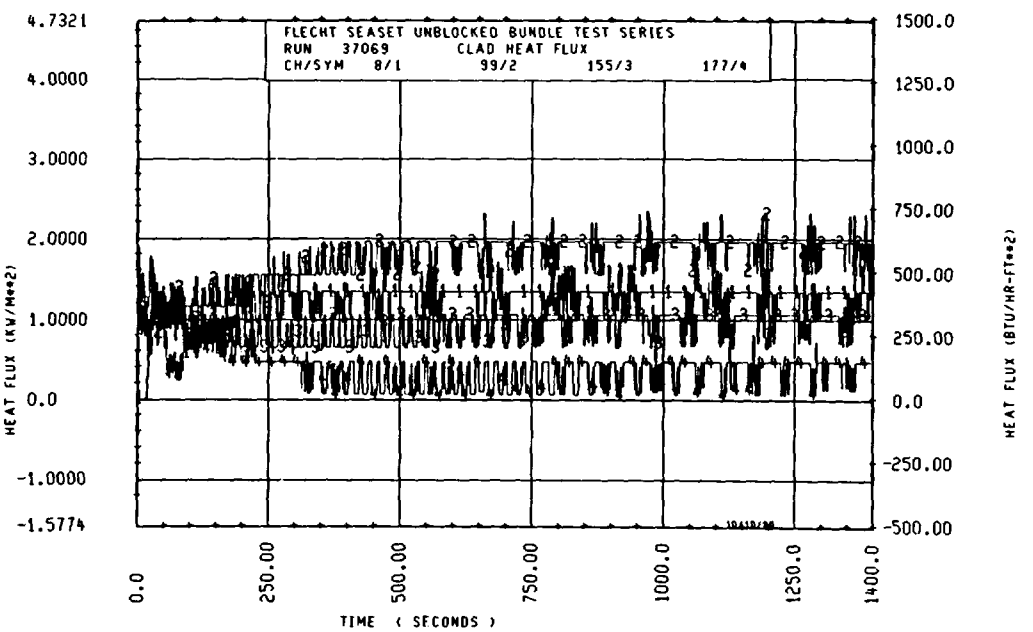

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37069 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.7321
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

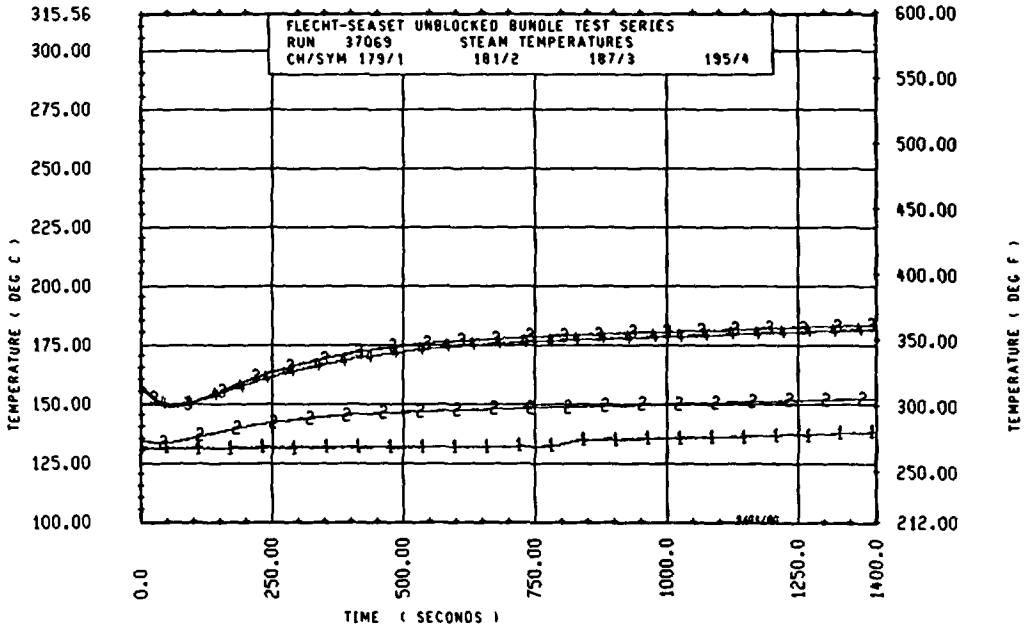
37069-2

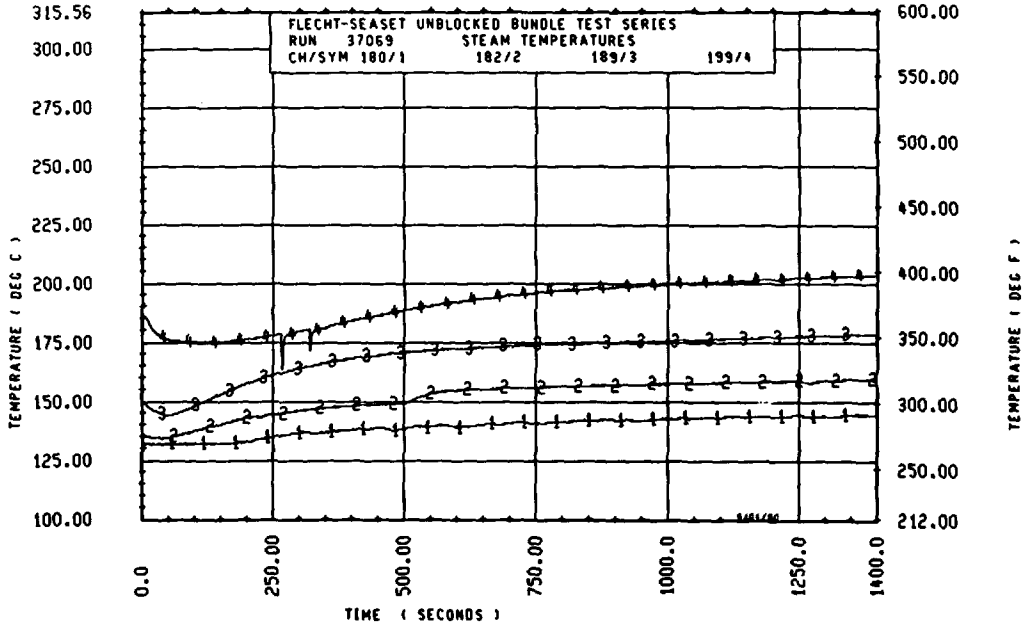

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37069 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

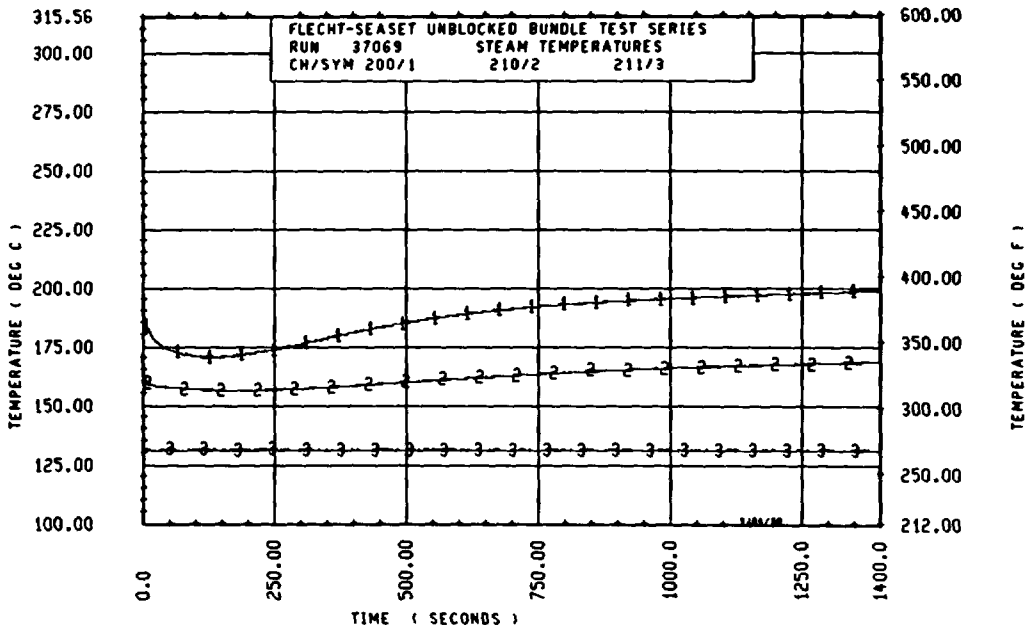

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37069 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.7321
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

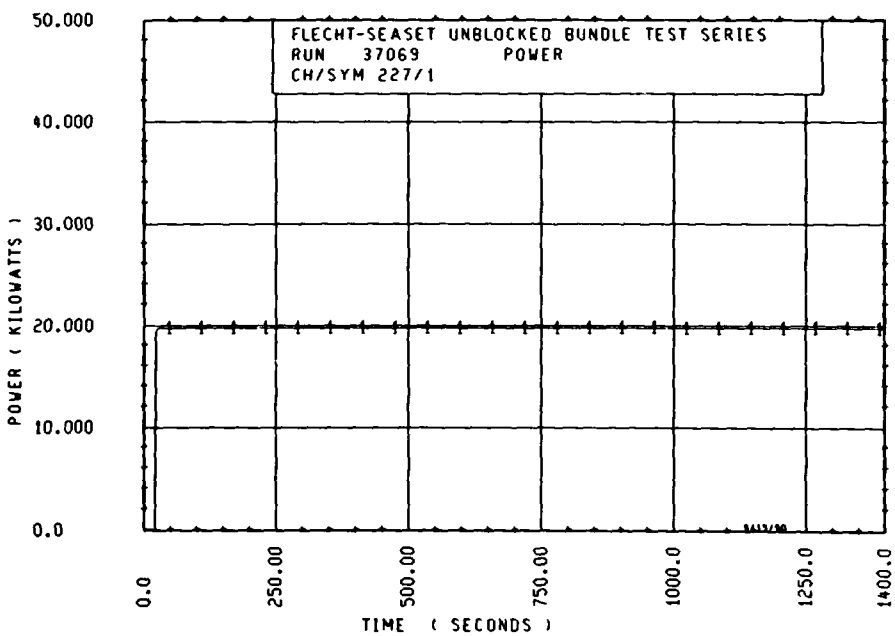

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37069 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37069 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.7321
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37069 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37069 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37069 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
TEMPERATURE (DEG F)
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37069 POWER
CH/SYM 227/1
POWER (KILOWATTS)
50.000
40.000
30.000
20.000
10.000
0.0
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0
TIME (SECONDS)

FLECHT SEASET UNBLOCKED BUNDLE
SUMMARY AND COMMENT SHEET
Run 37170
Date: 9/7/79
Steam Cooling Test

A. Run Conditions

Upper plenum pressure	0.28 MPa (40 psia)
Initial clad temperature at 1.83 m (72 in.) elevation	131°C (268°F)
Rod peak power	0.10 kw/m (0.030 kw/ft)
Flow rate	0.230 kg/sec (0.508 lb/sec)
Coolant temperature	139°C (282°F)
Bundle radial power profile	Uniform
Disconnected rods	4G, 5G, 11IJK, 12IJK, 13JK
Inlet Reynolds number	10520

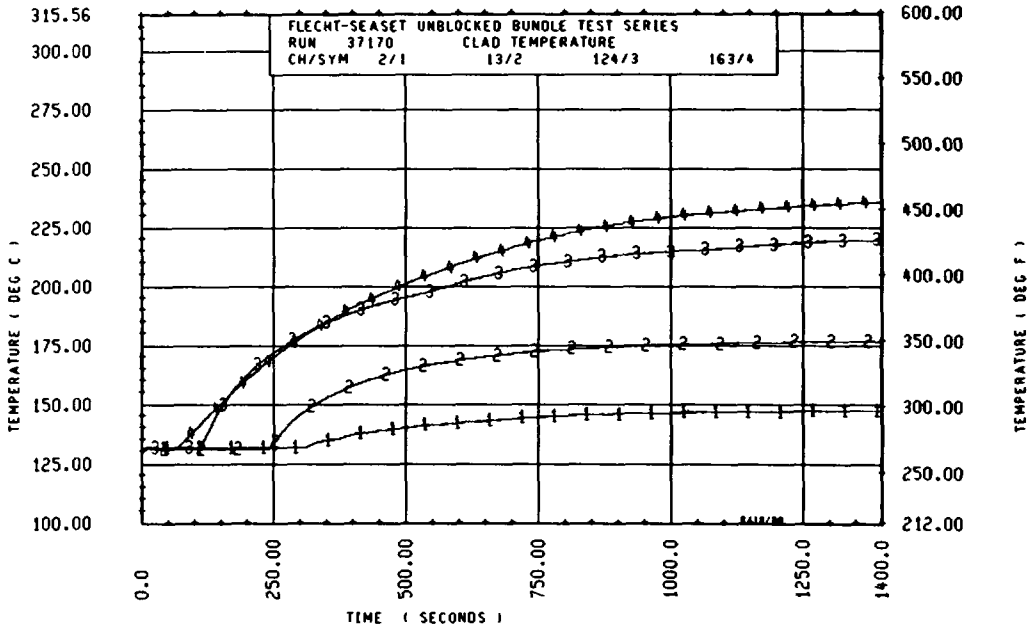
B. Housing Temperatures

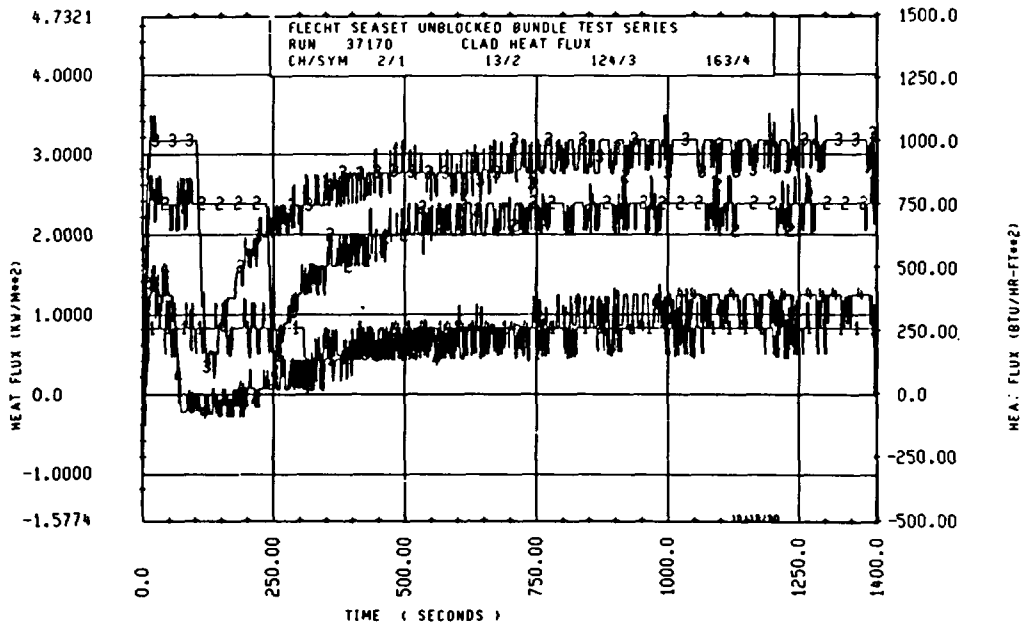
Elevation	Initial Temperature	Maximum Temperature*
0.61 m (24 in.)	132°C (269°F)	137°C (278°F)
1.22 m (48 in.)	132°C (269°F)	145°C (293°F)
1.83 m (72 in.)	119°C-132°C (247°F-269°F)	156°C-164°C (313°F-327°F)
2.44 m (96 in.)	129°C (264°F)	166°C-180°C (330°F-356°F)
2.74 m (108 in.)	130°C (266°F)	176°C (349°F)
3.05 m (120 in.)	129°C (264°F)	176°C-182°C (348°F-354°F)
3.35 m (132 in.)	129°C (264°F)	167°C-185°C (332°F-365°F)

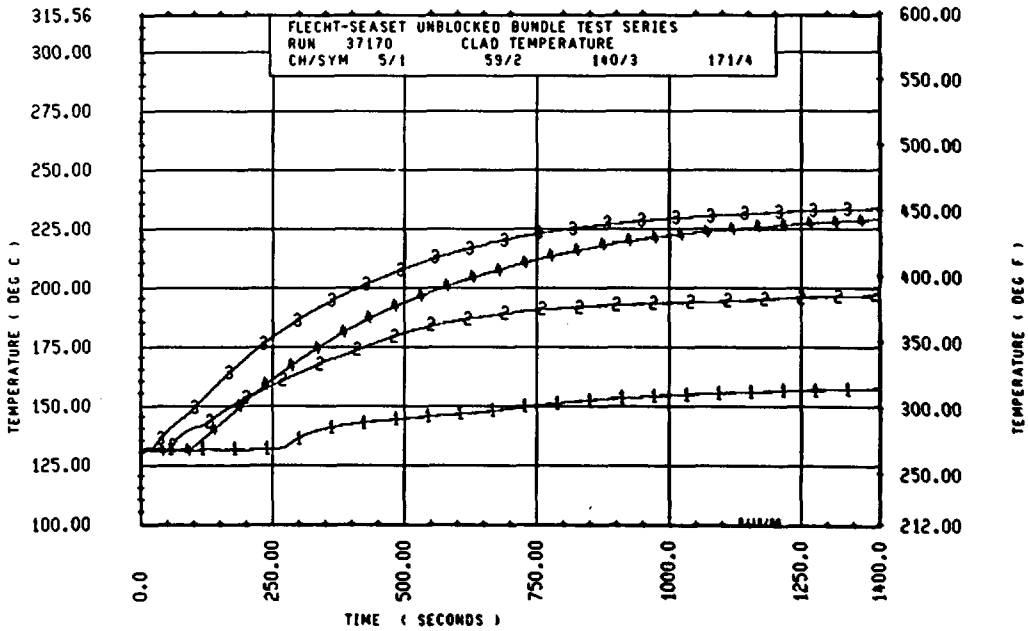
*At end of test

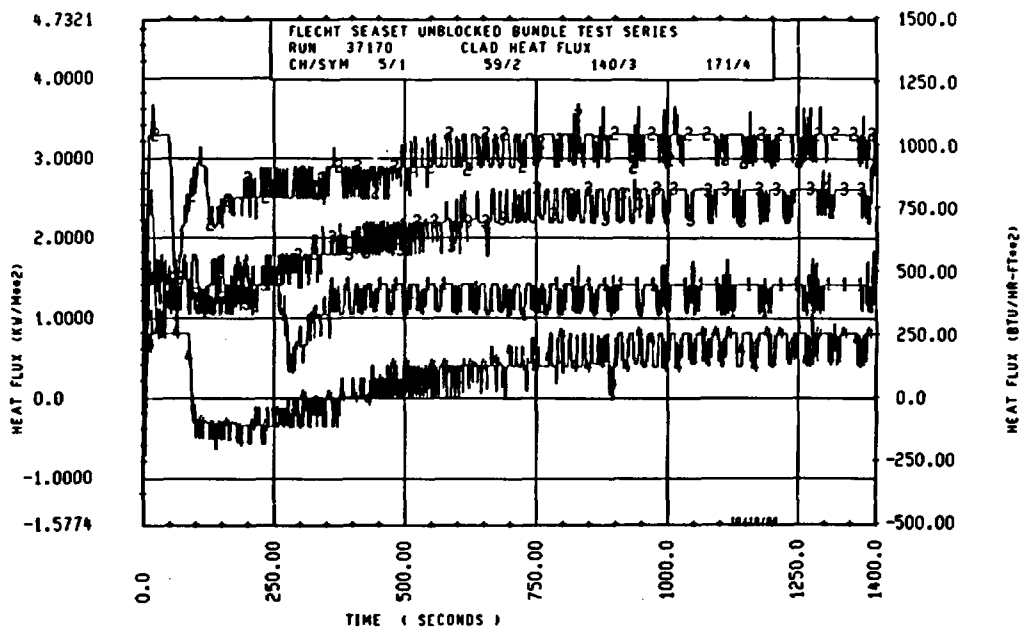
C. Comments

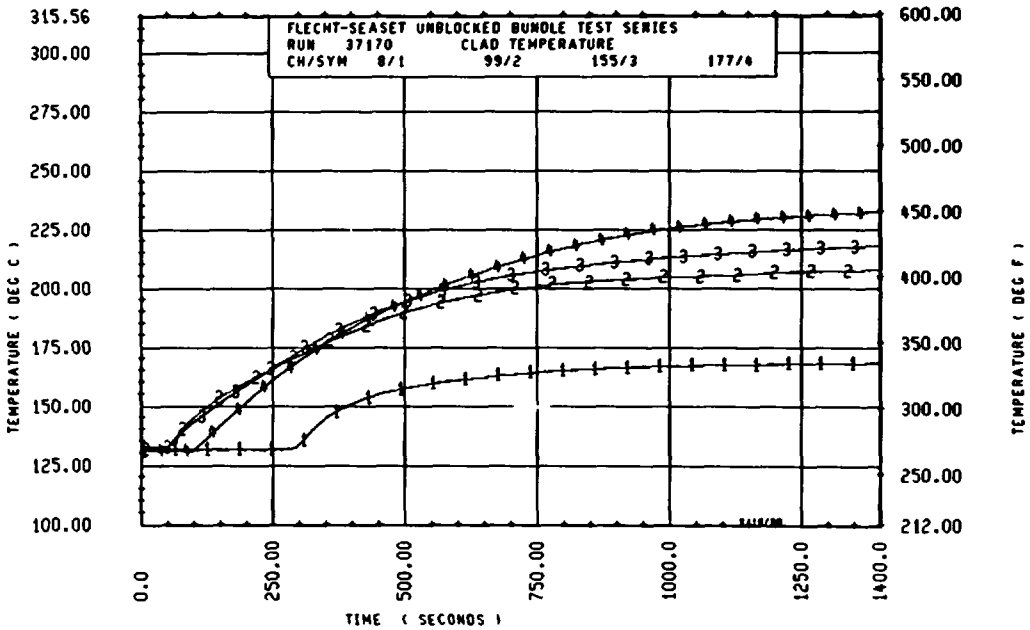
Significant bundle distortion occurred in the center of the bundle between the 1.52 m (60 in.) and 2.27 m (90 in.) elevations. There was 0.57 percent mass loss through steam probes from 0.99 to 2.13 m (39 to 84 in.) and 1 percent mass loss through steam probes from 2.29 to 3.51 m (90 to 138 in.).

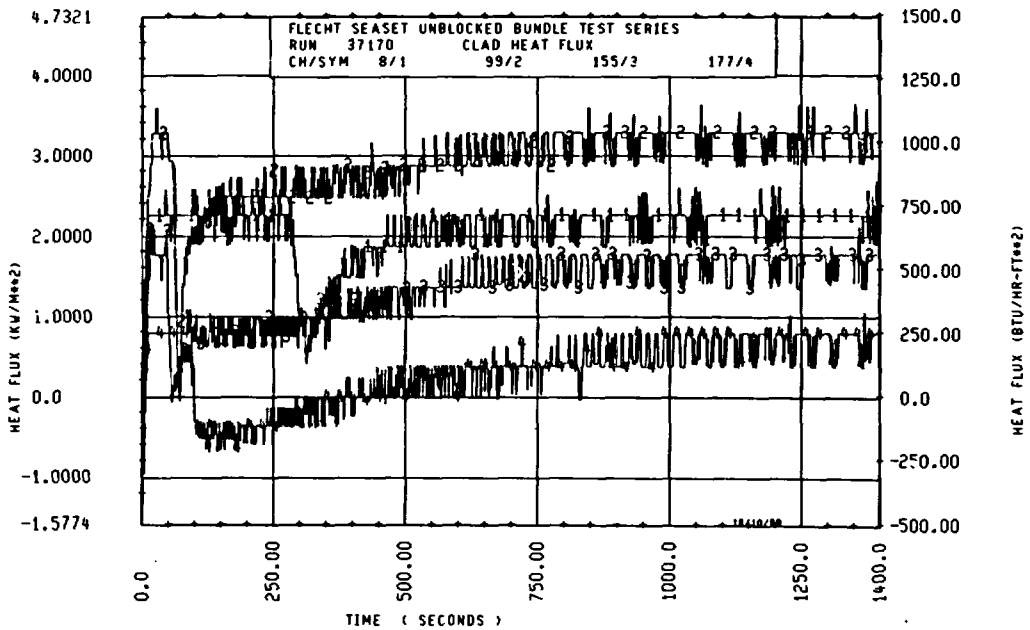

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37170 CLAD TEMPERATURE
CH/SYM 2/1 13/2 124/3 163/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

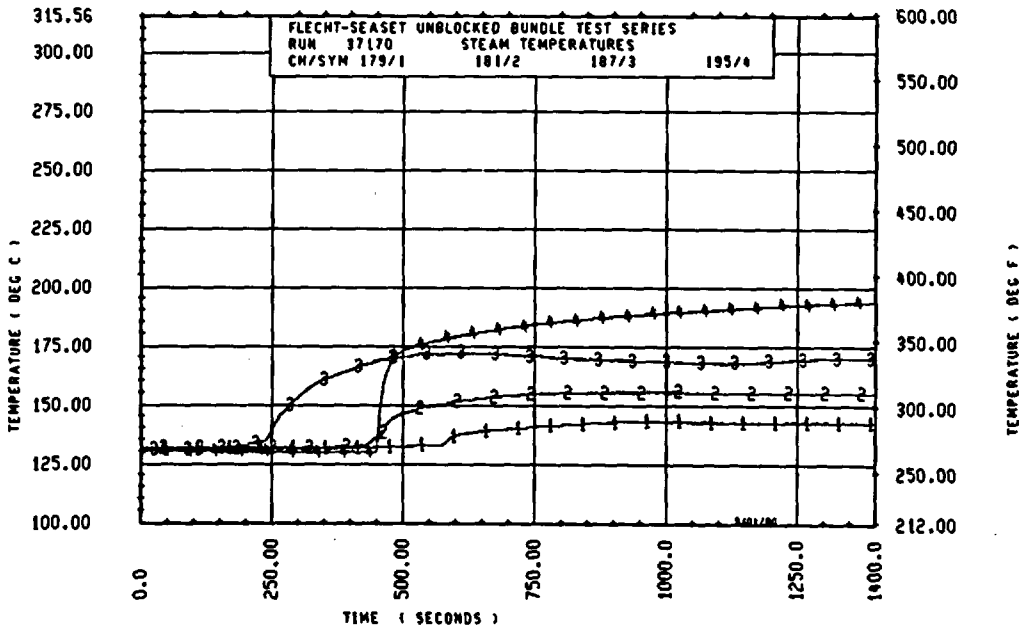

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37170 CLAD HEAT FLUX
CH/SYM 2/1 13/2 124/3 163/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.7321
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

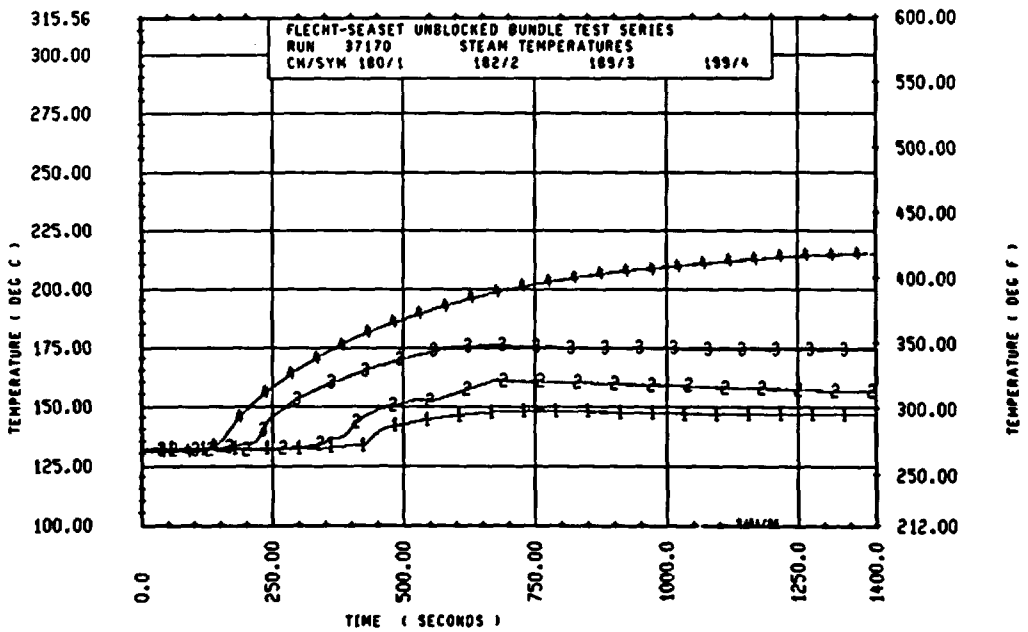

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37170 CLAD TEMPERATURE
CH/SYM 5/1 59/2 140/3 171/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

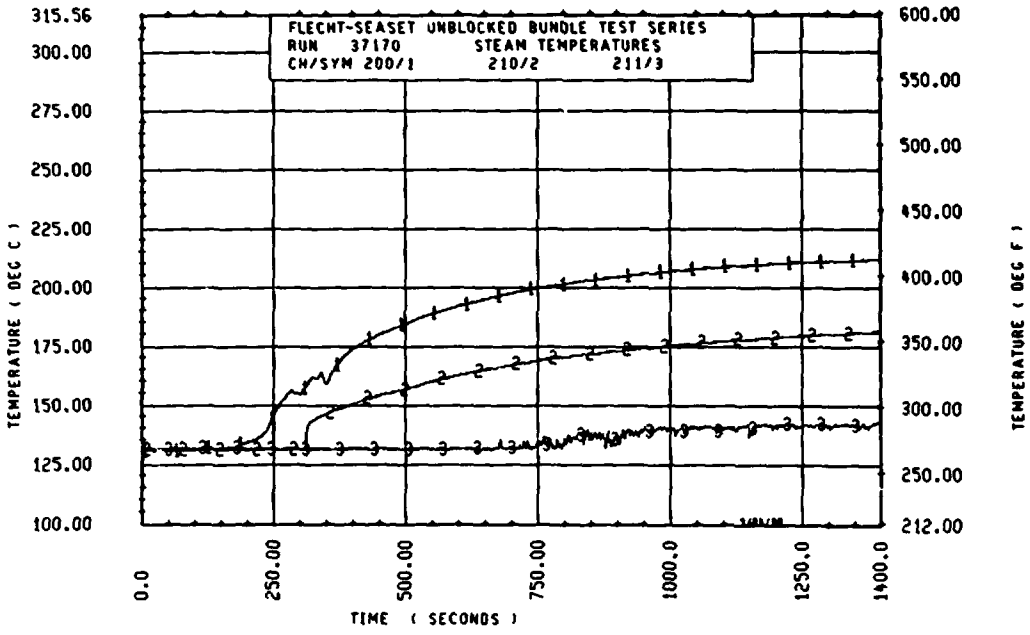

FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37170 CLAD HEAT FLUX
CH/SYM 5/1 59/2 140/3 171/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)
4.7321
4.0000
3.0000
2.0000
1.0000
0.0
-1.0000
-1.5774
1500.0
1250.0
1000.0
750.00
500.00
250.00
0.0
-250.00
-500.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

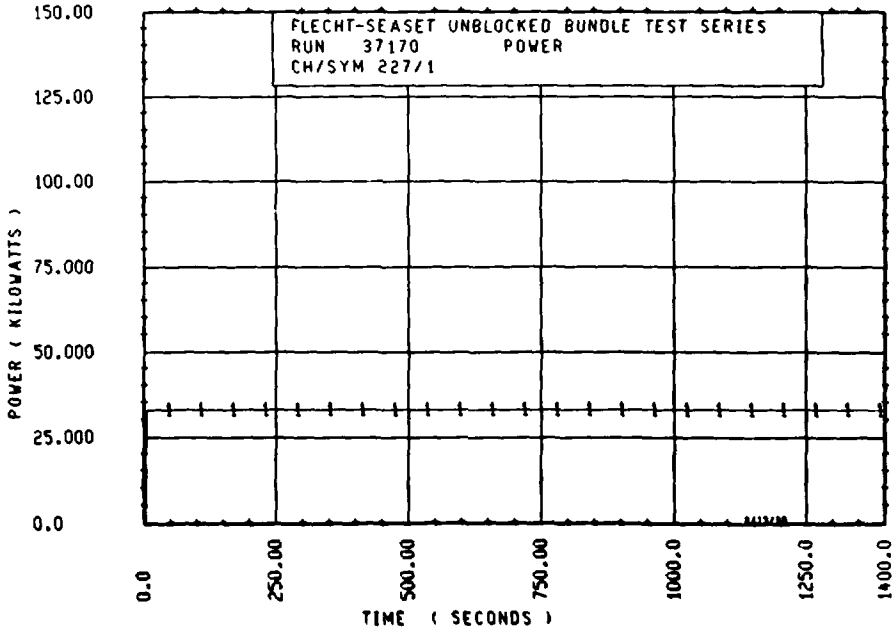

FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37170 CLAD TEMPERATURE
CH/SYM 8/1 99/2 155/3 177/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)


FLECHT SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37170 CLAD HEAT FLUX
CH/SYM 8/1 99/2 155/3 177/4
HEAT FLUX (KW/M**2)
HEAT FLUX (BTU/HR-FT**2)
TIME (SECONDS)


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37170 STEAM TEMPERATURES
CH/SYM 179/1 181/2 187/3 195/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37170 STEAM TEMPERATURES
CH/SYM 180/1 182/2 189/3 199/4
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37170 STEAM TEMPERATURES
CH/SYM 200/1 210/2 211/3
TEMPERATURE (DEG C)
TEMPERATURE (DEG F)
TIME (SECONDS)
315.56
300.00
275.00
250.00
225.00
200.00
175.00
150.00
125.00
100.00
600.00
550.00
500.00
450.00
400.00
350.00
300.00
250.00
212.00
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0


FLECHT-SEASET UNBLOCKED BUNDLE TEST SERIES
RUN 37170 POWER
CH/SYM 227/1
POWER (KILOWATTS)
TIME (SECONDS)
150.00
125.00
100.00
75.000
50.000
25.000
0.0
0.0
250.00
500.00
750.00
1000.0
1250.0
1400.0

EPRI NP-1459, Volume 2

Below are five index cards that allow for filing according to the four cross-references in addition to the title of the report. A brief abstract describing the major subject area covered in the report is included on each card.

EPRI NP-1459
Volume 2
RP959-1
Interim Report
September 1981
FLECHT SEASET
Program
Report No. 7
NUREG/CR-1532
WCAP-9699

ANALYSIS AND TESTING PROGRAM

EPRI

PWR FLECHT SEASET Unblocked Bundle, Forced and Gravity Reflood Task Data Report
Volume 2: Appendix C

Contractor: Westinghouse Electric Corporation

Volume 2 (Appendix C) of this report contains the data acquired in 63 valid tests performed with the 17 x 17 rod bundle having a cosine axial power profile. The data reported herein represent sample tables and plots for each run. 912 pp.

EPRI Project Manager: Bill K. H. Sun

Cross-References:
1. EPRI NP-1459, Volume 2 2. RP959-1 3. Analysis and Testing Program
4. Reflooding

ELECTRIC POWER RESEARCH INSTITUTE
Post Office Box 10412, Palo Alto, CA 94303 415-855-2000

EPRI NP-1459
Volume 2
RP959-1
Interim Report
September 1981
FLECHT SEASET
Program
Report No. 7
NUREG/CR-1532
WCAP-9699

EPRI

PWR FLECHT SEASET Unblocked Bundle, Forced and Gravity Reflood Task Data Report
Volume 2: Appendix C

Contractor: Westinghouse Electric Corporation

Volume 2 (Appendix C) of this report contains the data acquired in 63 valid tests performed with the 17 x 17 rod bundle having a cosine axial power profile. The data reported herein represent sample tables and plots for each run. 912 pp.

EPRI Project Manager: Bill K. H. Sun

Cross-References:
1. EPRI NP-1459, Volume 2 2. RP959-1 3. Analysis and Testing Program
4. Reflooding

ELECTRIC POWER RESEARCH INSTITUTE
Post Office Box 10412, Palo Alto, CA 94303 415-855-2000

EPRI NP-1459, VOLUME 2

EPRI NP-1459
Volume 2
RP959-1
Interim Report
September 1981
FLECHT SEASET
Program
Report No. 7
NUREG/CR-1532
WCAP-9699

EPRI

PWR FLECHT SEASET Unblocked Bundle, Forced and Gravity Reflood Task Data Report
Volume 2: Appendix C

Contractor: Westinghouse Electric Corporation

Volume 2 (Appendix C) of this report contains the data acquired in 63 valid tests performed with the 17 x 17 rod bundle having a cosine axial power profile. The data reported herein represent sample tables and plots for each run. 912 pp.

EPRI Project Manager: Bill K. H. Sun

Cross-References:
1. EPRI NP-1459, Volume 2 2. RP959-1 3. Analysis and Testing Program
4. Reflooding

ELECTRIC POWER RESEARCH INSTITUTE
Post Office Box 10412, Palo Alto, CA 94303 415-855-2000

EPRI NP-1459
Volume 2
RP959-1
Interim Report
September 1981
FLECHT SEASET
Program
Report No. 7
NUREG/CR-1532
WCAP-9699

REFLOODING

EPRI

PWR FLECHT SEASET Unblocked Bundle, Forced and Gravity Reflood Task Data Report
Volume 2: Appendix C

Contractor: Westinghouse Electric Corporation

Volume 2 (Appendix C) of this report contains the data acquired in 63 valid tests performed with the 17 x 17 rod bundle having a cosine axial power profile. The data reported herein represent sample tables and plots for each run. 912 pp.

EPRI Project Manager: Bill K. H. Sun

Cross-References:
1. EPRI NP-1459, Volume 2 2. RP959-1 3. Analysis and Testing Program
4. Reflooding

ELECTRIC POWER RESEARCH INSTITUTE
Post Office Box 10412, Palo Alto, CA 94303 415-855-2000

RP959-1

EPRI NP-1459
Volume 2
RP959-1
Interim Report
September 1981
FLECHT SEASET
Program
Report No. 7
NUREG/CR-1532
WCAP-9699

EPRI

PWR FLECHT SEASET Unblocked Bundle, Forced and Gravity Reflood Task Data Report
Volume 2: Appendix C

Contractor: Westinghouse Electric Corporation

Volume 2 (Appendix C) of this report contains the data acquired in 63 valid tests performed with the 17 x 17 rod bundle having a cosine axial power profile. The data reported herein represent sample tables and plots for each run. 912 pp.

EPRI Project Manager: Bill K. H. Sun

Cross-References:
1. EPRI NP-1459, Volume 2 2. RP959-1 3. Analysis and Testing Program
4. Reflooding

ELECTRIC POWER RESEARCH INSTITUTE
Post Office Box 10412, Palo Alto, CA 94303 415-855-2000