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NONUNIFORM HEAT GENERATION
EXPERIMENTAL PROGRAM

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PRELIMINARY REPORT
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LIST OF PRINCIPAL INVESTIGATORS

ATOMIC ENERGY DIVISION

D. F. Judd
Technical Manager

R. H. Wilson
Analytical Program

ALLIANCE RESEARCH CENTER

C. P. Welch
R. A. Lee
Experimental Program

PREFACE

The Babcock & Wilcox Company and the United States Atomic Energy Commission, acting for the Joint U.S.-Euratom Research and Development Board, signed an agreement for a nonuniform heat generation experimental program.

The program includes experimental and analytical investigations to determine how nonuniformly distributed heat flux along lengths of tubular and annular channels affects the onset of burnout (departure from nucleate boiling). The experimental program is being conducted in the 1.8-MW heat transfer facility at B&W's Research Center, Alliance, Ohio. The analytical program is being conducted by the Atomic Energy Division, Lynchburg, Virginia.

SUMMARY

Since the beginning of the program, complete sets of data have been obtained on four tubular test sections. One set had uniform flux to serve as a reference condition, and three had nonuniform axial heat flux to show the effect of flux distribution on critical heat flux conditions. These data were compared with those of other investigators where comparable data were available. Empirical correlations were developed to express mathematically the effects of the various operating variables on critical heat flux. Before the present report period, complete sets of data were obtained on three annular test sections. In the first case, the inside surface was heated, in the second the outside surface was heated, and in the third both surfaces were heated. Comparison with published burnout correlations revealed a need for improved correlations.

During this report period, data have been obtained on an annular test section with nonuniform flux on the outside surface and zero flux on the inside surface. Additional data were obtained with nonuniform flux on the outside surface and uniform flux on the inside surface.

SCOPE

In an effort to clarify some of the areas of disagreement about the burnout phenomenon, Babcock & Wilcox, as part of the Joint U.S.-Euratom Research and Development Program, is conducting an experimental and analytical program to determine how nonuniform heat generation rates in tubular and annular flow channels affect the operating conditions causing burnout, under experimental conditions representative of water reactor systems. The objective of the program is to seek improved design correlations suitable for direct use by reactor designers; the technical approach to the work emphasizes the development of an improved understanding of the physical phenomena involved and their relation to design variables.

The scope of the experimental program includes data taken on tubular test sections with these conditions:

<u>Axial flux shape</u>	<u>Pressure, psia</u>	<u>Mass velocity, lb/hr-ft² × 10⁻⁶</u>	<u>Inlet subcooling, F</u>
Uniform	2000	0.5	20
Peak near inlet	1500	1.5	50
Peak near midpoint	1000	2.5	100
Peak near outlet	--	--	150

In addition, data have been taken on five annular test sections involving uniform and nonuniform axial flux shapes.

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1. INTRODUCTION

Nuclear reactors and modern boilers require more and more knowledge about the limitations on the transfer rates of heat from channel walls to flowing liquids. Burnout (or critical heat flux) is a serious design problem still facing the reactor designer. As a result of this phenomenon, the heat transfer conductance is reduced considerably, causing the metal and fuel temperatures to rise and initiate failure of the fuel element. Although considerable attention has been given to this problem in recent years, the predictability of the occurrence of burnout conditions is quite uncertain. In fact, there is still much disagreement as to how the channel geometry and operating conditions affect burnout.

In an effort to clarify some of the areas of disagreement, Babcock & Wilcox (B&W), as part of the Joint U. S.-Euratom Research and Development Program, is conducting an experimental and analytical program to determine the effects of nonuniform heat generation rates in tubular and annular flow channels on the operating conditions causing burnout under experimental conditions representative of water reactor systems. The technical approach to the work emphasizes the development of an improved understanding of the physical phenomena involved and their relation to design variables.

The experimental program, which was discussed in the first quarterly report, is being conducted on a heat transfer facility at B&W's Research Center in Alliance, Ohio.¹ The controlled variables for the tests are pressure, inlet subcooling, and mass velocity. The tests have been performed in 6-foot-long tubular and annular test sections having both uniform and nonuniform axial heat flux distributions. The Atomic Energy Division in Lynchburg, Virginia, is conducting the analytical program.

1.1. Previously Reported Work

Fabrication progress on both tubular and annular test sections, along with experimental work and data analysis on the tubular test sections, has been reported previously.²⁻⁷ In addition, experimental work and preliminary data analyses on three annular test sections have been reported.⁸⁻¹⁰

The feasibility of an analytical critical heat flux model was determined; the physical concepts, derivations, and supporting calculations were reported last quarter.

1.2. Current Work

Test sections 8 (outer tube nonuniformly heated) and 9 (outer tube nonuniformly heated, inner tube uniformly heated) were installed in January. Installation of these test sections was combined into a single project by installing the inner tube of section 9 as part of section 8 but not heating it. This procedure allowed us to complete the work on February 14, 1966, and testing and data processing were completed within the month of February. The reduction in time was made possible by our automatic data system.

The objectives of this report are:

1. To show the tabulated data.
2. To show plots of the data collected on test sections 7, 8, and 9.
3. To compare the results from test sections 7, 8, and 9 with those from tubular test sections 1 and 2 (annular versus tubular).
4. To compare the results from test section 7 with those from test section 9, and the results from test section 6 with those from test section 8 (annular versus annular).

2. EXPERIMENTAL EQUIPMENT

The principal geometric measurements of the uniform annular test sections are as follows:

OD (inside tube), inches	0.607
ID (outside tube), inches	1.053
Heated length, inches	72

The description of equipment and the general arrangement of annular test sections 5 through 9 are included in the eighth quarterly report.⁸ These descriptions will not be duplicated here, since the same equipment and test section arrangements were used. However, certain changes were made in the instrumentation on test sections 7 through 9, which is different from that used on test sections 5 and 6. These differences are reported in the paragraphs that follow.

2.1. Outer Tube Instrumentation

Figure 1 shows the voltage tap and thermocouple arrangements used for test sections 7, 8, and 9. Figure 5 in the eighth quarterly report shows the voltage tap and thermocouple arrangements for test section 6 (outer tube uniformly heated). The voltage tap locations on test sections 7, 8, and 9 are identical and are located on 6-inch centers, but they are only installed over the upper 3 feet of the 6-foot heated length. On test section 6 the taps are located on 6-inch centers over the entire (6-foot) heated length (see Figure 5, eighth quarterly report). This gives rise to a change in the tube segment numbering system. As shown in Figure 1, the outlet tube segment is now station 7, while on test section 6 the outlet tube segment is station 12. The change in station numbers must be noted if we are to compare data from test sections 7 through 9 and 6. Figure 1 also shows that the thermocouples are attached 1 inch from the outlet and at the upper spacer pin location (test section 7). Because of the nonuniform flux distribution on sections

8 and 9, the thermocouples are attached on 6-inch centers over the outlet half of the tube. On section 6 the thermocouples were attached on 1-inch centers over the outlet half of the tube as shown in Figure 5, eighth quarterly report.

2.2. Inner Tube Instrumentation

Figure 2 shows the instrumentation used on test sections 7 and 9 (inner tubes heated). Figure 4 in the eighth quarterly report shows the instrumentation used on test section 5 (inner tube heated). Figure 2 shows the voltage taps welded to the tube wall at the test section inlet and outlet. The intermediate taps are welded to metal spools, which are gold-brazed to the tube wall; the metal spools have replaced the Inconel spiders that were previously used as voltage taps on test section 5. A Baldwin-Lima-Hamilton "Micro Miniature" sheath thermocouple is spot-welded to the tube wall near the outlet (Figure 2). Because of a faster response time (0.1 second), this thermocouple has replaced the slower-response (5 seconds) thermocouple previously used on test section 5 (see equipment section, eighth quarterly report).

2.3. Test Sections 8 and 9 Heat Flux Distribution

The outer tubes of test sections 8 and 9 were designed to produce the axial heat flux distribution shown in Figure 3. This was accomplished by carefully machining the outside diameter of the tube to vary the wall thickness, and thus its electrical resistance, in the desired proportion. Table 1 gives the required (designed) wall thicknesses and the actual variations after machining. The actual flux was determined during test operation with power by measuring the voltage drop across the tube segments. The results of these measurements are shown as the plotted points in Figure 3. Both +5 and -5% curves are drawn on the figure for graphic illustration of the precision obtained.

Table 1. Geometry of Nonuniform Outer Tube, Test
Sections 8 and 9

<u>Distance From Inlet End of Heated Length</u>	<u>Required Wall Thickness</u>	<u>Required Tolerance</u>	<u>Actual Measured Variation</u>
0	0.3632	±0.004	0.000
2	0.2848	↓	0.000
4	0.2349	↓	0.000
6	0.2001	↓	+0.001
8	0.1745	±0.003	±0.003
10	0.1574	↓	+0.002
12	0.1414	↓	+0.001
14	0.1299	±0.002	+0.001
16	0.1217	↓	0.000
18	0.1144	↓	-0.001
20	0.1082	↓	+0.002
22	0.1036	↓	+0.001
24	0.1004	↓	0.000
26	0.0974	↓	+0.001
28	0.0946	↓	+0.001
30	0.0927	↓	+0.001
32	0.0910	↓	-0.001
34	0.0910	↓	±0.001
36	0.0901	↓	+0.001
38	0.0910	↓	±0.001
40	0.0910	↓	+0.001
42	0.0927	↓	+0.001
44	0.0946	↓	0.000
46	0.0974	↓	+0.003
48	0.1004	↓	+0.002
50	0.1036	↓	+0.003
52	0.1082	↓	+0.003
54	0.1144	↓	+0.001
56	0.1217	↓	0.000
58	0.1299	↓	+0.001
60	0.1414	↓	+0.001
62	0.1574	±0.003	+0.002
64	0.1745	↓	±0.003
66	0.2001	↓	+0.001
68	0.2349	±0.004	+0.001
70	0.2848	↓	+0.001
72	0.3632	↓	+0.001

Note: All Dimensions are in Inches

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3. EXPERIMENTAL OPERATION

The experimental procedures used in testing test sections 7, 8, and 9 are described in the eighth quarterly report.⁸ One of these procedures consists of taking pressure drop data across the test section to detect possible changes in the flow channel. Figure 4 compares the isothermal friction factor curve generated for the annular test sections with the curve for the tubular test sections. Since the pressure drop data remained consistent with previous annular test section data, it is concluded that there were no detectable changes in the flow channels of test sections 7, 8, and 9. The annular data curve falls above the other two curves, probably because of the additional pressure drop across the spacer pins in the annular flow channel.

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4. EXPERIMENTAL DATA

The experimental results on test sections 7 through 9 are tabulated in Tables A-1 through A-3, respectively, which include all the final data on these three test sections. The results on test sections 7, 8, and 9 are shown as plots of critical heat flux (average heat input rate) versus inlet subcooling in Figures 5 through 7, 8 through 10, and 11 through 13, respectively.

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5. DATA COMPARISONS

Data from test sections 7 through 9 are compared with tubular data from sections 1, 2, 5, and 6 in Figures 14 through 16 (sections 1, 5, 6, and 7), Figures 17 through 19 (sections 2 and 8), and Figures 20 through 22 (sections 2 and 9), using the same parameters. We have compared annular with annular data in Figures 23 through 25 (sections 7 and 9) and 26 through 28 (sections 6 and 8).

The observations from these figures are reviewed in the following paragraphs. Although we have chosen inlet condition as the independent parameter in plots of the data, we could have chosen steam quality just as easily. Since the observations depend very heavily on the choice of the independent parameter, an attempt was made to show lines of constant exit quality on the plots of critical heat flux versus inlet subcooling. This attempt proved impractical, but it was easily accomplished on other plots of average critical heat flux versus mass velocity. These plots are shown in Figures 29 through 31.

5.1. Data From Test Sections 7, 8, and 9

Figures 5 through 7 (test section 7, both tubes uniformly heated), Figures 8 through 10 (test section 8, outer tube nonuniformly heated), and Figures 11 through 13 (test section 9, outer tube nonuniformly heated, inner tube uniformly heated) show the effect of inlet subcooling on the critical heat flux at pressures of 1000, 1500, and 2000 psia. From these figures the following observations are made:

1. The results from test sections 7 and 9, where both tubes were heated, indicate no predictable preference for the occurrence of the critical heat flux on either the inner or outer tube. Certain preferences are evident within limited ranges of subcooling and mass velocity (Figures 5, 6, 7, 11, 12, and 13).

2. It is possible to obtain the critical heat flux on both the inner and outer tubes simultaneously, but the pattern is random with respect to mass velocity, subcooling, and pressure (Figures 5, 6, 7, 11, 12, and 13).

3. The addition of heat to the inner tube of an annular test section that has a nonuniformly heated outer tube always causes a reduction in the critical heat flux (compare Figures 8, 9, and 10 with Figures 11, 12, and 13, respectively).

5.2. Comparison of Annular With Tubular Results

Figures 14 through 16 compare annular data (test section 7, both tubes uniformly heated; section 6, outside only uniformly heated; and section 5, inside only uniformly heated) with tubular data (test section 1) when the results are plotted on the basis of inlet conditions at pressures of 1000, 1500, and 2000 psia. Figures 17 through 19 (test section 8, outer tube nonuniformly heated) and Figures 20 through 22 (test section 9, outer tube nonuniformly heated, inner tube uniformly heated) show additional comparisons of annular with tubular (test section 2) data when the results are plotted on the same basis. From these comparisons the following observations are made:

1. There is only fair agreement between critical heat flux data from a uniformly heated tubular test section and that from an annular test section with both tubes uniformly heated. The agreement is best at high pressure. The data indicate that we cannot predict which type of test section will provide the higher critical heat flux without detailed testing at the specific conditions of interest (Figures 14, 15, and 16).

2. There are obvious differences between cases in which the entire perimeter is heated and those in which only part of the perimeter is heated. Further differences depend on whether the inside or outside surface is heated. The ratio of heated-to-unheated surface area seems to be important in Figures 14, 15, and 16: the smaller this ratio, the higher the critical heat flux.

3. An annular test section with a nonuniformly heated outer tube (chopped cosine) and an unheated inner tube provides higher critical heat fluxes than a nonuniformly heated (chopped cosine) tubular test

section for the same inlet subcooling, mass velocity, and pressure conditions (Figures 17, 18, and 19).

4. The addition of a uniformly heated inner tube to a non-uniformly heated outer tube has a somewhat unpredictable effect on the critical heat flux, compared with data from a nonuniformly heated tubular test section (see Figures 20, 21, and 22). However, the pattern of this effect is similar to that obtained when data from a test section with both tubes uniformly heated are compared with those from a uniformly heated tubular test section.

5.3. Comparison of Annular Test Section Data

Figures 23 through 25 show comparisons of annular data from test sections 7 (both tubes heated) and 9 (outer tube nonuniformly heated, inner tube uniformly heated) when the results are plotted on the basis of inlet subcooling at pressures of 1000, 1500, and 2000 psia, respectively. Figures 26 through 28 show additional comparisons of annular data from test sections 6 (outer tube uniformly heated) and 8 (outer tube nonuniformly heated) when the results are plotted on the same basis and at the same pressures. From these comparisons the following observations are made:

1. A comparison of two annular test sections having both tubes heated, but one with a nonuniformly heated outer tube (chopped cosine), shows little consistency in the capability of one to provide higher critical heat fluxes than the other (Figures 23, 24, and 25).

2. A comparison of annular test sections, one having a uniformly heated outer tube, the other a nonuniformly heated outer tube (chopped cosine), shows that there is no obvious way of predicting which test section will provide the higher critical heat flux (Figures 26, 27, and 28).

5.4. Effects of Mass Velocity in Test Section 7

Figures 29 through 31 show the effects of mass velocity on the critical heat flux at pressures of 1000, 1500, and 2000 psia for inlet subcoolings ranging from 20 to 150 F. Dashed lines of exit steam quality (%), which have also been added to each figure, are representative of critical heat flux conditions at the test section outlet. Although the curves of inlet

subcooling best describe the relationship between critical heat flux and mass velocity, the lines of steam quality permit us to simultaneously estimate conditions at the test section outlet. This was not practical in other plots of the data.

The test data exhibit trends with mass velocity similar to those reported in the ninth quarterly report for test sections 5 and 6 (see Figures 6, 7, 12, and 14 in reference 9). These and Figures 29 through 31 show no distinct change in the slope of critical heat flux versus mass velocity at constant inlet subcoolings. This strongly indicates that only one flow regime is present in the data—probably the "middle" regime. Some of the figures also show that data along the curves of constant mass velocity are not linear. This means that some of these data may lie in the "transition" region between the "low" and "middle" flow regimes.

6. FUTURE WORK

Analyses of the annular data and the final report will be completed during the next quarter, which is scheduled to be the last quarter of this program.

Figure 1. Annular Test Section Outer Tube Instrumentation

Figure 2. Annular Test Section Inner Tube Instrumentation

Figure 3. Heat Input Rate Distribution (Chopped Cosine) for Nonuniform Outer Tube, Test Sections 8 and 9

Figure 4. Results of Pressure Drop Tests,
Test Sections 1 - 9

Figure 5. Critical Heat Flux Vs Inlet Subcooling for Annular Geometry, Both Tubes Uniformly Heated at 1000 psia, Test Section 7

Figure 6. Critical Heat Flux Vs Inlet Subcooling for Annular Geometry, Both Tubes Uniformly Heated at 1500 psia, Test Section 7

Figure 7. Critical Heat Flux Vs Inlet Subcooling for Annular Geometry, Both Tubes Uniformly Heated at 2000 psia, Test Section 7

Figure 8. Critical Heat Flux Vs Inlet Subcooling for Annular Geometry, Inner Tube Unheated and Outer Tube Nonuniformly Heated (Chopped Cosine) at 1000 psia, Test Section 8

Figure 9. Critical Heat Flux Vs Inlet Subcooling for Annular Geometry, Inner Tube Unheated and Outer Tube Nonuniformly Heated (Chopped Cosine) at 1500 psia, Test Section 8

Figure 10. Critical Heat Flux Vs Inlet Subcooling for Annular Geometry, Inner Tube Unheated and Outer Tube Nonuniformly Heated (Chopped Cosine) at 2000 psia, Test Section 8

Figure 11. Critical Heat Flux Vs Inlet Subcooling for Annular Geometry, Inner Tube Uniformly Heated and Outer Tube Nonuniformly Heated at 1000 psia, Test Section 9

Figure 12. Critical Heat Flux Vs Inlet Subcooling for Annular Geometry; Inner Tube Uniformly Heated and Outer Tube Nonuniformly Heated at 1500 psia, Test Section 9

Figure 13. Critical Heat Flux Vs Inlet Subcooling for Annular Geometry, Inner Tube Uniformly Heated and Outer Tube Nonuniformly Heated at 2000 psia, Test Section 9

Figure 14. Effect of Geometry on Burnout With Uniform Flux at 1000 psia

Figure 15. Effect of Geometry on Burnout With Uniform Flux at 1500 psia

Figure 16. Effect of Geometry on Burnout With Uniform Flux at 2000 psia

Figure 17. Comparison of Tubular Test Section 2 With Annular Test Section 8 at 1000 psia on Basis of Inlet Subcooling

Figure 18. Comparison of Tubular Test Section 2 With Annular Test Section 8 at 1500 psia on Basis of Inlet Subcooling

Figure 19. Comparison of Tubular Test Section 2 With Annular Test Section 8 at 2000 psia on Basis of Inlet Subcooling

Figure 20. Comparison of Tubular Test Section 2 With Annular Test Section 9 at 1000 psia on Basis of Inlet Subcooling

Figure 21. Comparison of Tubular Test Section 2 With Annular Test Section 9 at 1500 psia on Basis of Inlet Subcooling

Figure 22. Comparison of Tubular Test Section 2 With Annular Test Section 9 at 2000 psia on Basis of Inlet Subcooling

Figure 23. Comparison of Annular Test Section 7 With Annular Test Section 9 at 1000 psia on Basis of Inlet Subcooling

Figure 24. Comparison of Annular Test Section 7 With
Annular Test Section 9 at 1500 psia on
Basis of Inlet Subcooling

Figure 25. Comparison of Annular Test Section 7 With Annular Test Section 9 at 2000 psia on Basis of Inlet Subcooling

Figure 26. Comparison of Annular Test Section 6 With Annular Test Section 8 at 1000 psia on Basis of Inlet Subcooling

Figure 27. Comparison of Annular Test Section 6 With Annular Test Section 8 at 1500 psia on Basis of Inlet Subcooling

Figure 28. Comparison of Annular Test Section 6 With
Annular Test Section 8 at 2000 psia on
Basis of Inlet Subcooling

Figure 29. Critical Heat Flux Vs Mass Velocity for Annular Geometry, Both Tubes Uniformly Heated at 1000 psia, Test Section 7

Figure 30. Critical Heat Flux Vs Mass Velocity for Annular Geometry, Both Tubes Uniformly Heated at 1500 psia, Test Section 7

Figure 31. Critical Heat Flux Vs Mass Velocity for Annular Geometry, Both Tubes Uniformly Heated at 2000 psia, Test Section 7

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- ⁶ Judd, D. F., et al., Nonuniform Heat Generation Experimental Program, Quarterly Progress Report No. 6, The Babcock & Wilcox Company, BAW-3238-6, Lynchburg, Virginia, December 1964.
- ⁷ Judd, D. F., et al., Nonuniform Heat Generation Experimental Program, Quarterly Progress Report No. 7, The Babcock & Wilcox Company, BAW-3238-7, Lynchburg, Virginia, March 1965.
- ⁸ Judd, D. F., et al., Nonuniform Heat Generation Experimental Program, Quarterly Progress Report No. 8, The Babcock & Wilcox Company, BAW-3238-8, Lynchburg, Virginia, June 1965.
- ⁹ Judd, D. F., et al., Nonuniform Heat Generation Experimental Program, Quarterly Progress Report No. 9, The Babcock & Wilcox Company, BAW-3238-10, Lynchburg, Virginia, September 1965.

¹⁰ Judd, D. F. , et al. , Nonuniform Heat Generation Experimental Program, Quarterly Progress Report No. 10, The Babcock & Wilcox Company, BAW-3238-11, Lynchburg, Virginia, December 1965.

APPENDIX

List of Symbols

Table A-1.	Data Summary Sheets, Test Section 7
Table A-2.	Data Summary Sheets, Test Section 8
Table A-3.	Data Summary Sheets, Test Section 9

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List of Symbols

CHF	Critical heat flux (average heat input rate), Btu/hr-sq ft. O or I indicates the station number at which the CHF occurred. O on left side of column indicates CHF on <u>tubular test section</u> or <u>outside tube</u> of annular test section. I on right side of column indicates CHF on <u>inside tube</u> of annular test section.
P	Test section outlet pressure, psia.
ΔP	Total test section pressure drop, psid.
G	Test section mass velocity, lb/hr-sq ft.
KW	Net electrical power input to the test section, kilowatts.
Sta. No.	Location on test section for which local operating conditions are calculated.
ΔT_s	Fluid subcooling at center of station number indicated, degrees F.
h	Fluid enthalpy at center of station number indicated, Btu/lb.
x	Steam quality, by weight, at center of station number indicated, %.
V_m	Fluid mixture velocity at center of station number indicated (assuming zero slip), ft/sec.
$\phi_{l,o}$	Local average heat input rate at station number indicated for <u>tubular test sections</u> and <u>outside tube</u> in annular test sections, Btu/hr-sq ft.
ϕ_o	Integrated average heat input rate from test section inlet to center of station number indicated for <u>tubular test sections</u> and <u>outside tube</u> in annular test sections, Btu/hr-sq ft.
$\phi_{l,i}$	Local average heat input rate at station number indicated for inside tube in annular test section, Btu/hr-sq ft.
ϕ_i	Integrated average heat input rate from test section inlet to center of station number indicated for inside tube in annular test section, Btu/hr-sq ft.

Table A-1. Data Summary Sheets, Test Section 7

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
979		11-15-65	16:36	990	2.89	.691	445.0	INLET	152.6	366.1	-26.23	3.5				
	O							6	.0	842.6	46.32	42.3		.583		.582
	O I							7	.0	887.6	53.23	48.0		.583		.582
	O I							EXIT	.0	910.2	56.71	50.8		.583		.582
980		11-15-65	16:53	978	3.00	.694	428.5	INLET	123.8	395.3	-22.02	3.6				
	O I							7	.0	894.8	54.43	49.8		.566		.552
	O I							EXIT	.0	916.7	57.78	52.6		.566		.552
981		11-15-65	17:13	977	3.21	.713	409.3	INLET	100.8	420.3	-18.11	3.8				
	I							7	.0	885.4	53.01	50.0		.537		.534
	I							EXIT	.0	905.6	56.10	52.6		.537		.534
982		11-15-65	17:33	976	3.28	.708	393.5	INLET	81.3	441.8	-14.83	3.8				
	I							7	.0	891.9	53.99	50.5		.514		.516
	I							EXIT	.0	911.6	57.00	53.1		.514		.517
983		11-15-65	17:57	986	2.95	.710	356.3	INLET	59.3	468.3	-11.04	3.9				
	O							6	.0	839.6	45.90	43.3		.465		.470
	O I							7	.0	874.7	51.28	47.8		.464		.470
	O I							EXIT	.0	892.4	54.01	50.2		.464		.470
984		11-15-65	18:11	982	3.05	.714	327.9	INLET	33.2	498.8	-6.26	4.1				
	I							7	.0	870.2	50.63	47.8		.424		.437
	I							EXIT	.0	886.7	53.16	49.9		.424		.437
985		11-15-65	18:29	987	3.14	.723	309.4	INLET	9.5	528.3	-1.68	4.3				
	I							7	.0	874.7	51.28	48.6		.398		.416
	I							EXIT	.0	890.0	53.63	50.6		.399		.416
990		11-17-65	13:02	986	5.48	1.013	477.8	INLET	98.5	424.2	-17.79	5.4				
	I							7	.0	806.1	40.78	55.5		.626		.625
	I							EXIT	.0	822.7	43.31	58.6		.626		.624
991		11-17-65	13:46	995	4.94	1.023	495.0	INLET	126.8	394.4	-22.68	5.3				
	I							7	.0	786.4	37.62	51.7		.642		.659
	I							EXIT	.0	803.1	40.19	54.8		.642		.659
992		11-17-65	14:32	998	4.54	1.010	509.3	INLET	145.8	374.1	-25.29	5.2				
	I							7	.0	781.7	36.85	50.0		.658		.679
	I							EXIT	.0	800.1	39.70	53.4		.660		.679
993		11-17-65	15:18	998	5.76	1.248	565.1	INLET	150.4	369.3	-26.62	6.4				
	O I							7	.0	736.3	29.87	51.5		.734		.750
	O I							EXIT	.0	752.0	32.29	55.0		.734		.749
994		11-17-65	15:41	1003	6.01	1.230	541.8	INLET	130.3	351.6	-23.31	6.4				
	I							7	.0	748.2	31.65	53.0		.702		.721
	I							EXIT	.0	763.7	34.04	56.5		.703		.721
996		11-18-65	10:35	986	7.00	1.262	482.9	INLET	75.8	449.4	-13.90	6.9				
	I							7	.0	759.1	33.58	58.2		.625		.643
	I							EXIT	.0	772.9	35.69	61.4		.626		.643

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,0}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
997		11-18-65	11:06	996	7.15	1.271	444.7	INLET	51.4	479.1	-9.66	7.1				
	I							7	.0	762.6	33.95	58.6		.572		.600
	I							EXIT	.0	774.8	35.83	61.5		.572		.600
998		11-18-65	11:34	1002	7.43	1.269	393.7	INLET	20.6	516.8	-4.03	7.4				
	I							7	.0	768.3	34.74	59.3		.507		.530
	I							EXIT	.0	779.1	36.40	61.8		.507		.531
999		11-18-65	12:06	993	7.84	1.258	373.5	INLET	5.6	534.2	-1.09	7.5				
	I							7	.0	775.0	35.91	61.2		.480		.507
	I							EXIT	.0	785.1	37.47	63.5		.479		.506
600		11-18-65	12:39	998	9.49	1.497	413.3	INLET	17.3	520.1	-3.37	8.8				
	I							7	.0	743.5	31.01	63.8		.534		.592
	I							EXIT	.0	753.4	32.52	66.5		.534		.592
601		11-18-65	12:53	994	9.74	1.508	407.6	INLET	12.6	525.6	-2.44	8.9				
	I							7	.0	744.8	31.26	64.9		.528		.545
	I							EXIT	.0	754.1	32.68	67.4		.527		.545
602		11-18-65	13:17	991	9.16	1.505	478.2	INLET	49.8	480.3	-9.37	8.5				
	I							7	.0	737.5	30.15	63.0		.622		.631
	I							EXIT	.0	748.8	31.90	66.1		.623		.631
603		11-18-65	13:32	987	8.64	1.499	510.8	INLET	73.0	452.8	-13.42	8.2				
	I							7	.0	728.7	28.89	60.8		.667		.672
	I							EXIT	.0	740.7	30.74	64.1		.667		.672
604		11-18-65	13:54	993	7.91	1.489	545.5	INLET	99.2	424.4	-17.97	8.0				
	I							7	.0	720.9	27.60	57.7		.713		.716
	I							EXIT	.0	733.9	29.60	61.2		.713		.716
605		11-18-65	14:09	989	7.68	1.492	589.5	INLET	124.7	395.8	-22.22	7.8				
	I							7	.0	715.8	26.88	56.8		.775		.766
	I							EXIT	.0	729.7	29.02	60.6		.775		.767
606		11-18-65	14:28	984	7.37	1.496	615.0	INLET	147.0	371.2	-25.27	7.7				
	I							7	.0	703.8	25.11	54.0		.798		.815
	I							EXIT	.0	718.6	27.37	58.1		.799		.815
607		11-18-65	15:05	993	9.29	1.984	696.6	INLET	147.2	372.1	-26.01	10.2				
	O							7	.0	656.4	17.68	53.5		.910		.914
	O							EXIT	.0	668.9	19.60	58.0		.911		.914
608		11-18-65	15:16	995	9.15	2.000	702.1	INLET	150.4	369.1	-26.55	10.3				
	O							7	.0	653.2	17.15	52.6		.918		.920
	O							EXIT	.0	665.7	19.07	57.1		.919		.919
609		11-18-65	15:48	992	10.06	1.961	659.7	INLET	121.9	399.3	-21.21	10.3				
	O I							7	.0	671.9	20.07	58.5		.857		.876
	O I							EXIT	.0	683.7	21.88	62.7		.856		.876

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i0}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{ij}}{10^6}$	$\frac{\phi_i}{10^6}$
611		11-19-65	10:05	998	11.09	2.005	622.1	INLET	95.9	428.6	-17.45	10.8				
	I							7	.0	680.0	21.23	62.2		.813		.817
	I							EXIT	.0	690.9	22.51	66.2		.813		.817
612		11-19-65	10:38	1000	11.70	2.000	578.9	INLET	75.8	451.7	-13.55	10.9				
	I							7	.0	686.0	22.14	64.1		.756		.761
	I							EXIT	.0	696.3	23.71	67.8		.756		.760
613		11-19-65	11:06	999	12.51	1.978	514.0	INLET	45.5	486.4	-8.62	11.2				
	I							7	.0	696.6	23.75	67.2		.663		.688
	I							EXIT	.0	706.0	25.20	70.6		.664		.689
614		11-19-65	11:33	1003	13.80	1.977	440.2	INLET	12.3	527.2	-2.38	11.7				
	I							7	.0	707.5	25.40	70.8		.567		.592
	I							EXIT	.0	715.4	26.61	73.6		.567		.592
615		11-19-65	11:58	1003	13.80	2.033	470.7	INLET	22.2	515.1	-4.25	11.8				
	0							7	.0	702.6	24.64	71.0		.609		.628
	0							EXIT	.0	710.8	25.89	74.8		.609		.629
623		11-19-65	15:37	991	10.63	2.514	766.0	INLET	149.5	369.5	-26.38	12.9				
	0							6	.0	595.0	8.26	39.7		1.005		1.001
	0							7	.0	616.2	11.52	49.5		1.003		1.002
	0							EXIT	.0	627.0	13.18	54.5		1.003		1.002
624		11-19-65	15:42	983	10.61	2.523	769.7	INLET	149.8	367.9	-26.31	12.9				
	0							6	.0	593.6	8.27	40.1		1.010		1.005
	0							7	.0	615.0	11.54	50.0		1.009		1.005
	0							EXIT	.0	625.8	13.20	55.1		1.009		1.005
633		11-30-65	13:47	1479	.91	.721	355.3	INLET	148.0	426.6	-32.52	3.8				
	0							7	.0	826.2	38.01	24.7		.466		.466
	0							EXIT	.0	842.8	41.78	26.3		.465		.466
634		11-30-65	13:51	1485	.88	.720	355.3	INLET	147.7	427.5	-32.58	3.8				
	0							7	.0	827.4	38.55	24.7		.465		.466
	0							EXIT	.0	844.5	42.02	26.2		.465		.466
635		11-30-65	14:11	1467	.96	.716	342.6	INLET	125.3	450.5	-27.82	3.9				
	0							7	.0	837.6	40.58	25.9		.444		.455
	0							EXIT	.0	854.9	44.05	27.5		.444		.455
636		11-30-65	14:29	1485	.96	.705	332.5	INLET	102.6	478.3	-23.48	3.9				
	0							7	.0	860.4	44.86	27.1		.431		.443
	0							EXIT	.0	877.0	47.83	28.6		.431		.443
637		11-30-65	14:46	1499	1.02	.722	315.3	INLET	73.0	514.7	-17.37	4.2				
	0							7	.0	868.1	46.13	28.1		.405		.425
	0							EXIT	.0	883.7	48.54	29.6		.406		.425

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,0}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
638		11-30-65	15:05	1486	1.10	.729	295.8	INLET	50.6	541.2	-12.25	4.3				
	0							7	.0	270.7	46.71	22.9		.383		.396
	0							EXIT	.0	224.7	49.21	30.2		.382		.396
639		11-30-65	15:10	1502	1.06	.723	297.9	INLET	49.9	543.8	-12.16	4.3				
	0 I							7	.0	276.8	47.69	22.9		.384		.398
	0 I							EXIT	.0	251.9	50.40	30.3		.385		.398
640		11-30-65	15:28	1495	1.03	.715	271.2	INLET	20.3	581.9	-5.21	4.5				
	0 I							7	.0	229.0	49.91	25.8		.350		.363
	0 I							EXIT	.0	502.5	52.33	31.1		.350		.363
641		11-30-65	15:53	1487	1.08	.714	246.0	INLET	.0	610.5	.16	4.7				
	I							7	.0	229.1	50.00	30.0		.315		.333
	I							EXIT	.0	501.6	52.23	31.2		.315		.333
642		11-30-65	16:19	1479	.06	.473	217.3	INLET	.0	618.2	1.69	3.6				
	I							7	.0	590.4	62.12	26.1		.283		.287
	I							EXIT	.0	1006.8	71.04	27.1		.283		.287
643		12-01-65	10:06	1482	2.53	1.035	321.3	INLET	29.4	568.1	-7.35	6.4				
	I							7	.0	219.5	37.57	34.5		.416		.428
	I							EXIT	.0	230.5	39.54	35.9		.416		.428
644		12-01-65	10:28	1488	2.57	1.038	289.8	INLET	11.3	593.4	-2.50	6.6				
	I							7	.0	219.3	37.52	34.4		.372		.392
	I							EXIT	.0	229.3	39.30	35.7		.372		.392
645		12-01-65	10:47	1480	2.41	1.032	337.2	INLET	50.3	540.8	-12.15	6.1				
	0 I							7	.0	205.3	35.07	32.6		.437		.449
	0 I							EXIT	.0	216.9	37.14	34.1		.437		.449
646		12-01-65	11:02	1480	2.26	1.024	355.5	INLET	70.0	516.3	-16.51	5.9				
	0							6	.0	773.4	29.40	22.2		.462		.474
	0							7	.0	757.4	33.69	31.3		.461		.473
	0							EXIT	.0	209.7	35.26	32.9		.461		.473
647		12-01-65	11:20	1491	2.08	1.027	375.2	INLET	96.2	426.7	-22.13	5.8				
	0							7	.0	722.5	30.22	25.1		.485		.502
	0							EXIT	.0	755.4	33.18	30.2		.485		.501
648		12-01-65	11:39	1507	1.90	1.024	402.6	INLET	128.5	451.1	-29.02	5.6				
	0							7	.0	769.4	28.31	26.9		.523		.534
	0							EXIT	.0	723.3	30.21	22.7		.523		.534
649		12-01-65	11:54	1501	1.82	1.028	416.8	INLET	147.9	429.0	-32.77	5.5				
	0							7	.0	757.7	26.30	25.7		.541		.555
	0							EXIT	.0	771.8	22.23	27.3		.540		.556
650		12-01-65	12:11	1479	2.65	1.266	464.0	INLET	146.6	428.2	-32.22	6.2				
	0							7	.0	725.3	20.20	27.1		.606		.611
	0							EXIT	.0	738.0	23.07	25.1		.606		.611
651		12-01-65	12:36	1489	2.84	1.274	446.3	INLET	129.1	448.8	-22.29	6.9				
	0							7	.0	732.8	21.59	22.1		.583		.588
	0							EXIT	.0	744.9	24.15	30.1		.582		.588

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
652		12-01-65	13:12	1470	3.01	1.264	414.0	INLET	95.9	484.7	-21.86	7.1				
	0							7	.0	749.9	25.33	31.3		.537		.549
	0							EXIT	.0	761.6	27.41	33.2		.538		.549
653		12-01-65	13:31	1496	3.11	1.266	387.3	INLET	74.3	512.9	-17.57	7.3				
	0							7	.0	760.9	26.94	32.3		.498		.524
	0							EXIT	.0	771.4	28.83	34.0		.497		.524
654		12-01-65	13:44	1480	3.49	1.273	368.9	INLET	51.7	539.0	-12.44	7.6				
	0							7	.0	773.4	29.40	35.0		.480		.486
	0							EXIT	.0	783.9	31.28	36.8		.481		.487
655		12-01-65	14:02	1495	3.58	1.243	336.8	INLET	26.5	573.5	-6.68	7.7				
	I							7	.0	792.8	32.67	36.8		.437		.447
	I							EXIT	.0	802.4	34.39	38.3		.437		.448
656		12-01-65	14:29	1495	3.84	1.265	300.9	INLET	5.2	603.3	-1.34	8.1				
	0							6	.0	779.8	30.33	35.3		.394		.398
	I							7	.0	796.2	33.26	37.9		.393		.397
	I							EXIT	.0	804.3	34.72	39.2		.392		.397
657		12-01-65	14:51	1488	5.09	1.487	314.1	INLET	2.5	606.2	-.66	9.6				
	I							7	.0	777.3	29.97	41.3		.407		.418
	I							EXIT	.0	784.7	31.30	42.7		.407		.418
658		12-01-65	15:02	1497	4.80	1.495	345.5	INLET	21.1	581.4	-5.35	9.3				
	0							6	.0	752.5	25.38	36.5		.491		.486
								7	.0	768.7	28.28	39.5		.490		.497
								EXIT	.0	776.7	29.73	41.0		.490		.497
659		12-01-65	15:23	1481	4.60	1.514	392.5	INLET	49.9	541.6	-12.01	9.0				
	0 I							7	.0	751.6	25.48	37.4		.510		.521
	0 I							EXIT	.0	760.7	27.11	39.2		.510		.521
660		12-01-65	15:38	1496	4.12	1.515	423.5	INLET	75.8	511.3	-17.84	8.7				
	0							7	.0	737.7	22.79	34.2		.553		.558
	0							EXIT	.0	747.5	24.54	36.1		.552		.558
661		12-01-65	16:04	1503	3.75	1.507	450.1	INLET	99.9	483.5	-23.08	8.4				
	0							7	.0	725.3	20.43	31.4		.587		.592
	0							EXIT	.0	735.9	22.33	33.4		.587		.592
662		12-01-65	16:25	1513	3.42	1.506	480.1	INLET	128.1	452.0	-29.02	8.2				
	0							7	.0	710.1	17.54	28.2		.628		.628
	0							EXIT	.0	721.4	19.58	30.3		.628		.629
663		12-01-65	16:40	1499	3.07	1.504	516.2	INLET	151.4	425.0	-33.51	8.0				
	0							7	.0	702.8	16.42	27.2		.678		.672
	0							EXIT	.0	715.0	18.61	29.5		.678		.672
664		12-01-65	16:50	1502	3.11	1.499	507.4	INLET	152.6	423.7	-33.76	8.0				
	0							7	.0	657.5	15.47	26.0		.664		.663
	0							EXIT	.0	709.6	17.65	28.3		.665		.663
665		12-02-65	11:08	1486	4.73	2.016	604.7	INLET	150.5	424.5	-33.06	10.7				
	0							7	.0	667.6	10.41	28.0		.787		.800
	0							EXIT	.0	678.1	12.28	30.7		.787		.800

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
666		12-02-65	11:42	1508	5.04	2.017	571.1	INLET	130.6	448.8	-29.43	11.0				
	0							7	.0	678.1	11.87	29.8		.743		.755
	0							EXIT	.0	688.1	13.67	32.4		.743		.755
667		12-02-65	12:06	1493	5.58	1.996	520.2	INLET	100.7	481.5	-23.10	11.2				
	0							7	.0	692.4	14.70	33.7		.672		.695
	0							EXIT	.0	701.7	16.37	36.1		.673		.695
668		12-02-65	12:38	1489	6.19	2.022	483.9	INLET	75.6	511.0	-17.72	11.6				
	0							6	.0	688.1	14.00	33.2		.634		.639
								7	.0	704.8	16.99	37.5		.632		.636
								EXIT	.0	713.2	18.49	39.7		.632		.636
669		12-02-65	12:59	1497	6.76	2.021	445.4	INLET	54.4	537.8	-13.14	12.0				
	0							6	.0	701.0	16.16	36.2		.580		.591
								7	.0	716.4	18.92	40.1		.579		.590
								EXIT	.0	724.0	20.29	42.0		.579		.590
670		12-02-65	13:27	1488	7.56	1.978	385.0	INLET	20.9	580.1	-5.30	12.3				
	0							6	.0	724.2	20.49	41.6		.502		.508
								7	.0	737.8	22.92	45.1		.501		.508
								EXIT	.0	744.6	24.14	46.8		.501		.509
671		12-02-65	13:50	1501	7.79	1.989	365.5	INLET	12.0	594.2	-3.13	12.6				
	0							6	.0	730.2	21.33	42.7		.477		.483
	0							7	.0	743.1	23.65	45.9		.476		.483
	0							EXIT	.0	749.5	24.80	47.6		.475		.484
672		12-02-65	14:14	1502	10.97	2.470	391.4	INLET	9.1	598.2	-2.42	13.8				
	0							6	.0	715.4	18.66	48.4		.512		.513
								7	.0	726.5	20.66	51.9		.512		.513
								EXIT	.0	732.1	21.66	53.6		.512		.513
673		12-02-65	14:31	1484	10.46	2.493	423.5	INLET	23.8	575.8	-6.01	13.5				
	0							6	.0	701.7	16.51	45.5		.553		.560
								7	.0	713.5	18.61	49.3		.552		.560
								EXIT	.0	719.3	19.65	51.1		.551		.560
674		12-02-65	14:49	1501	8.71	2.485	471.8	INLET	54.7	537.7	-13.29	14.7				
	0							6	.0	678.3	11.99	37.1		.618		.620
								7	.0	691.5	14.36	41.2		.616		.621
								EXIT	.0	698.1	15.56	43.3		.615		.622
675		12-02-65	15:05	1492	8.03	2.493	514.7	INLET	74.9	511.8	-17.70	14.4				
	0							6	.0	664.7	9.71	33.3		.675		.675
								7	.0	679.1	12.29	37.9		.674		.674
								EXIT	.0	686.3	13.59	40.2		.674		.674
676		12-02-65	15:25	1500	7.17	2.484	565.6	INLET	99.8	483.4	-23.04	13.9				
	0							6	.0	651.9	7.26	28.8		.741		.742
								7	.0	667.8	10.12	33.8		.739		.742
								EXIT	.0	675.8	11.56	36.3		.739		.743

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	v_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
677		12-02-65	15:51	1527	6.33	2.473	617.5	INLET	126.0	455.9	-28.25	13.5				
0								6	.0	640.5	4.64	24.0		.804		.815
								7	.0	658.0	7.81	26.4		.803		.816
								EXIT	.0	666.9	9.42	32.1		.803		.817
678		12-02-65	15:58	1498	6.56	2.478	613.8	INLET	122.6	456.9	-27.68	13.6				
0								6	.0	640.2	5.23	25.3		.799		.813
								7	.0	657.5	8.33	30.7		.798		.814
								EXIT	.0	666.2	9.90	33.4		.797		.814
679		12-02-65	16:57	1495	6.12	2.499	671.4	INLET	147.9	428.3	-32.70	13.4				
0								6	.0	627.0	2.94	21.5		.876		.884
0								7	.0	645.9	6.32	27.4		.875		.884
0								EXIT	.0	655.4	8.03	30.4		.876		.885
680		12-02-65	17:34	1522	7.36	2.930	751.5	INLET	151.1	427.3	-33.23	15.8				
0								7	.0	633.1	3.44	26.3		.985		.983
0								EXIT	.0	641.9	5.03	29.6		.984		.983
681		12-02-65	17:54	1509	8.01	2.954	705.4	INLET	130.3	449.4	-29.41	16.1				
0								6	.0	626.2	2.45	24.3		.919		.934
								7	.0	642.8	5.46	30.5		.918		.934
								EXIT	.0	651.2	6.96	33.6		.917		.934
682		12-02-65	18:16	1495	8.65	2.962	640.1	INLET	108.4	472.8	-24.79	16.4				
0								6	.0	632.7	3.51	27.4		.841		.833
								7	.0	647.9	6.63	33.1		.840		.834
								EXIT	.0	655.5	7.99	36.0		.840		.834
683		12-02-65	18:36	1488	9.65	2.976	567.6	INLET	79.5	506.1	-18.96	17.0				
0								6	.0	647.3	6.72	33.5		.741		.749
								7	.0	660.7	9.11	38.6		.740		.750
								EXIT	.0	667.3	10.29	41.1		.739		.750
684		12-02-65	18:49	1491	11.30	2.982	509.4	INLET	53.6	537.6	-13.00	17.7				
0								6	.0	664.1	9.66	39.8		.662		.679
								7	.0	676.0	11.79	44.3		.661		.678
								EXIT	.0	682.0	12.86	46.6		.661		.678
685		12-02-65	19:09	1489	13.45	2.975	446.1	INLET	22.8	577.9	-5.76	18.5				
0								6	.0	689.0	14.15	45.2		.586		.584
								7	.0	699.4	16.01	53.1		.585		.584
								EXIT	.0	704.6	16.93	55.1		.584		.583
686		12-08-65	12:50	983	1.13	.517	246.9	INLET	1.0	538.5	-.19	3.1				
I								7	.0	925.6	59.12	39.8		.317		.334
I								EXIT	.0	942.4	61.70	41.4		.317		.334
687		12-08-65	13:08	986	1.01	.509	251.5	INLET	19.8	515.4	-3.81	3.0				
I								7	.0	916.6	57.72	38.1		.323		.341
I								EXIT	.0	933.7	60.24	39.7		.323		.341
688		12-08-65	13:28	985	1.02	.512	271.8	INLET	37.2	494.2	-7.01	2.9				
I								7	.0	924.6	58.97	39.2		.351		.365
I								EXIT	.0	943.0	61.78	40.9		.350		.365

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,0}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,1}}{10^6}$	$\frac{\phi_i}{10^6}$
689		12-08-65	13:48	986	1.03	.511	279.9	INLET	48.6	480.9	-9.12	2.9				
	I							7	.0	524.4	58.92	39.1		.360		.377
	I							EXIT	.0	543.8	61.89	40.9		.360		.377
690		12-08-65	14:11	984	1.02	.504	294.4	INLET	70.6	455.1	-12.97	2.8				
	I							7	.0	528.2	59.51	39.0		.380		.394
	I							EXIT	.0	549.0	62.70	40.9		.380		.395
691		12-08-65	14:29	984	1.05	.503	311.8	INLET	96.6	425.8	-17.46	2.7				
	I							7	.0	528.0	59.48	38.9		.403		.417
	I							EXIT	.0	550.1	62.88	40.9		.403		.417
692		12-08-65	14:55	985	1.18	.500	335.8	INLET	118.9	401.7	-21.19	2.6				
	I							7	.0	545.7	62.19	40.2		.436		.446
	I							EXIT	.0	569.5	65.84	42.4		.436		.446
693		12-08-65	15:10	983	1.13	.507	348.2	INLET	143.8	374.5	-25.30	2.6				
	I							7	.0	531.0	59.54	39.6		.453		.462
	I							EXIT	.0	554.5	63.55	41.8		.452		.462
694		12-08-65	15:23	983	1.06	.497	345.5	INLET	157.9	359.5	-27.58	2.5				
	O							6	.0	573.1	51.09	33.5		.448		.459
	O I							7	.0	521.5	58.49	37.9		.447		.460
	O I							EXIT	.0	546.5	62.32	40.2		.448		.460
695		12-08-65	15:49	984	2.79	.695	438.2	INLET	146.4	371.9	-25.80	3.6				
	I							7	.0	882.5	52.49	47.9		.570		.579
	I							EXIT	.0	905.0	55.94	50.7		.571		.579
696		12-08-65	16:08	984	2.96	.695	426.7	INLET	125.1	394.6	-22.24	3.6				
	I							7	.0	891.9	53.95	49.2		.559		.558
	I							EXIT	.0	913.4	57.25	51.9		.559		.558
697		12-08-65	16:15	983	2.97	.695	421.9	INLET	124.4	395.4	-22.07	3.6				
	O I							7	.0	887.3	53.26	48.6		.550		.558
	O I							EXIT	.0	908.3	56.48	51.3		.549		.558
698		12-08-65	16:32	983	3.04	.697	406.2	INLET	101.3	420.7	-18.24	3.7				
	O I							7	.0	892.6	54.07	49.4		.524		.545
	O I							EXIT	.0	913.1	57.21	52.0		.524		.545
699		12-08-65	16:51	984	3.05	.702	386.3	INLET	79.4	445.2	-14.49	3.8				
	I							7	.0	891.5	53.89	49.6		.504		.510
	I							EXIT	.0	910.6	56.81	52.0		.503		.510
700		12-08-65	17:14	986	3.01	.705	358.2	INLET	53.8	474.8	-10.07	3.9				
	I							7	.0	886.5	53.09	49.0		.468		.471
	I							EXIT	.0	904.3	55.82	51.3		.467		.472
701		12-08-65	17:38	983	2.94	.698	320.7	INLET	20.9	513.7	-3.58	4.1				
	I							7	.0	885.6	52.59	48.6		.416		.426
	I							EXIT	.0	902.0	55.51	50.7		.416		.427
702		12-08-65	18:01	982	3.12	.700	304.3	INLET	.5	539.1	-.08	4.2				
	I							7	.0	891.0	53.82	49.5		.393		.406
	I							EXIT	.0	906.6	56.21	51.5		.394		.406

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
703		12-08-65	10:04	981	3.03	.710	291.1	INLET	.0	545.2	.91	5.0				
	I							7	.0	877.4	51.76	48.9		.376		.391
	I							EXIT	.0	891.6	53.93	50.4		.376		.390
704		12-09-65	10:08	979	2.95	.699	302.3	INLET	3.0	535.5	-.57	4.2				
	I							7	.0	885.4	52.99	48.9		.392		.402
	I							EXIT	.0	900.9	55.36	50.9		.392		.402
705		12-09-65	10:20	983	2.48	.653	290.8	INLET	5.2	533.1	-1.01	3.9				
	I							7	.0	893.9	54.27	46.9		.376		.389
	I							EXIT	.0	909.4	56.63	48.3		.376		.389
706		12-09-65	10:30	983	1.90	.599	276.5	INLET	7.2	530.3	-1.42	3.5				
	I							7	.0	904.3	55.86	43.8		.356		.372
	I							EXIT	.0	920.7	58.37	45.6		.356		.372
707		12-09-65	10:39	987	3.58	.771	320.5	INLET	6.3	532.3	-1.22	4.6				
	I							7	.0	869.0	50.42	51.1		.417		.424
	I							EXIT	.0	883.4	52.62	53.1		.417		.424
708		12-09-65	10:45	988	4.14	.820	339.1	INLET	6.5	532.3	-1.26	4.9				
	I							7	.0	867.1	50.11	54.0		.443		.445
	I							EXIT	.0	881.7	52.35	56.2		.443		.445
709		12-09-65	10:51	986	4.78	.899	352.5	INLET	11.7	525.7	-2.26	5.3				
	I							7	.0	843.3	46.47	59.3		.460		.463
	I							EXIT	.0	857.2	48.59	57.6		.460		.463
710		12-09-65	11:20	983	5.80	.997	364.1	INLET	6.8	531.1	-1.32	5.9				
	I							7	.0	826.8	43.98	58.6		.473		.482
	I							EXIT	.0	839.6	45.95	61.0		.473		.482
711		12-09-65	11:28	982	5.88	1.001	356.7	INLET	3.8	534.7	-.72	5.9				
	I							7	.0	823.5	43.90	58.3		.462		.475
	I							EXIT	.0	836.0	45.41	60.6		.462		.476
712		12-09-65	11:43	989	5.54	.996	381.7	INLET	23.3	511.4	-4.53	5.8				
	I							7	.0	821.8	43.13	57.2		.496		.506
	I							EXIT	.0	835.3	45.20	59.7		.496		.506
713		12-09-65	11:59	996	5.40	.997	416.0	INLET	48.2	482.6	-9.11	5.6				
	I							7	.0	820.4	42.85	56.5		.541		.550
	I							EXIT	.0	835.2	45.12	59.2		.541		.550
714		12-09-65	12:07	1002	5.32	.999	416.1	INLET	54.3	476.7	-10.18	5.6				
	I							7	.0	814.1	41.81	55.1		.541		.552
	I							EXIT	.0	828.6	44.05	57.7		.541		.552
715		12-09-65	12:32	985	5.36	.999	442.4	INLET	69.7	456.2	-12.27	5.5				
	I							7	.0	815.0	42.14	56.9		.577		.585
	I							EXIT	.0	830.3	44.49	59.3		.576		.584
716		12-09-65	13:04	957	5.40	1.008	476.4	INLET	97.5	421.1	-17.40	5.4				
	O I							7	.0	803.8	40.77	56.9		.620		.629
	O I							EXIT	.0	820.6	43.33	60.1		.621		.629

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
717		12-09-65	13:33	981	5.22	1.015	479.2	INLET	102.7	419.0	-18.43	5.4				
	O I							7	.0	801.4	40.12	55.1		.623		.634
	O I							EXIT	.0	818.1	42.67	58.2		.623		.635
718		12-09-65	13:41	988	5.00	1.013	479.0	INLET	103.8	418.4	-18.71	5.4				
	O I							7	.0	801.7	40.09	54.5		.625		.631
	O I							EXIT	.0	818.1	42.61	57.6		.624		.631
719		12-09-65	13:59	990	4.79	1.004	502.1	INLET	129.4	391.1	-23.04	5.2				
	O I							7	.0	795.5	39.08	52.8		.654		.662
	O I							EXIT	.0	813.5	41.84	56.1		.654		.662
720		12-09-65	14:15	987	4.41	1.004	500.4	INLET	148.9	369.5	-26.22	5.2				
	I							7	.0	773.1	35.70	48.8		.649		.667
	I							EXIT	.0	790.6	38.37	52.1		.648		.667
721		12-09-65	14:20	986	4.54	1.008	514.8	INLET	148.0	370.3	-26.02	5.2				
	I							7	.0	784.0	37.40	51.1		.670		.681
	I							EXIT	.0	802.0	40.15	54.5		.670		.681
722		12-09-65	14:59	981	7.43	1.488	627.4	INLET	147.0	370.7	-25.23	7.6				
	I							7	.0	712.0	26.43	56.3		.824		.816
	I							EXIT	.0	727.0	28.72	60.4		.824		.817
723		12-09-65	15:28	982	7.59	1.489	576.9	INLET	121.5	398.3	-21.68	7.8				
	I							7	.0	712.4	26.45	56.2		.750		.766
	I							EXIT	.0	725.8	28.50	59.9		.749		.766
724		12-09-65	15:52	987	8.38	1.498	546.1	INLET	94.5	428.7	-17.10	8.0				
	I							7	.0	724.0	28.19	59.4		.712		.721
	I							EXIT	.0	736.7	30.13	62.9		.712		.720
725		12-09-65	16:18	999	7.88	1.496	548.5	INLET	100.3	423.8	-18.22	8.0				
	I							7	.0	720.4	27.44	57.3		.712		.727
	I							EXIT	.0	733.6	29.47	60.9		.712		.727
726		12-09-65	16:37	991	8.61	1.502	525.0	INLET	77.2	448.6	-14.23	8.2				
	I							7	.0	731.5	29.24	61.2		.686		.688
	I							EXIT	.0	744.0	31.15	64.6		.687		.688
727		12-09-65	17:29	990	9.17	1.488	492.1	INLET	50.5	479.1	-9.45	8.4				
	I							7	.0	746.8	31.63	65.0		.646		.640
	I							EXIT	.0	758.6	33.44	68.2		.646		.641
728		12-09-65	18:01	981	9.77	1.496	438.5	INLET	23.3	510.4	-4.45	8.7				
	I							7	.0	747.8	31.50	66.4		.570		.581
	I							EXIT	.0	758.2	33.48	69.2		.569		.582
729		12-10-65	9:19	987	9.73	1.487	412.5	INLET	12.6	524.4	-2.44	8.7				
	I							7	.0	748.9	32.00	65.8		.531		.554
	I							EXIT	.0	758.8	33.51	68.5		.532		.554
730		12-10-65	9:34	986	13.79	1.962	421.9	INLET	6.4	531.8	-1.26	11.6				
	I							7	.0	706.0	25.45	71.5		.542		.571
	I							EXIT	.0	713.5	26.60	74.2		.541		.571

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
731	I	12-10-65	9:50	987	13.59	1.978	475.9	INLET	24.0	510.3	-4.63	11.5				
	I							7	.0	705.1	25.26	71.6		.620		.627
	I							EXIT	.0	713.6	26.56	74.7		.621		.627
732	I	12-10-65	10:06	987	12.82	2.001	532.4	INLET	50.1	479.1	-9.41	11.2				
	I							7	.0	694.4	23.62	68.5		.698		.694
	I							EXIT	.0	703.9	25.08	72.0		.698		.695
733	I	12-10-65	10:27	989	11.17	2.008	573.7	INLET	80.3	445.0	-14.64	10.9				
	I							7	.0	676.1	20.83	61.9		.748		.754
	I							EXIT	.0	686.5	22.41	65.7		.749		.755
734	I	12-10-65	10:52	1002	10.67	1.989	605.4	INLET	96.3	428.7	-17.54	10.7				
	I							7	.0	675.5	20.48	59.8		.792		.796
	I							EXIT	.0	686.0	22.09	63.5		.791		.795
735	I	12-10-65	11:09	987	10.36	2.004	635.4	INLET	109.9	411.7	-19.75	10.6				
	I							7	.0	668.2	19.61	59.0		.831		.832
	I							EXIT	.0	679.6	21.36	63.2		.832		.832
737	I	12-10-65	11:33	984	9.82	1.984	660.2	INLET	128.0	391.4	-22.76	10.3				
	I							7	.0	661.1	18.57	56.1		.863		.868
	I							EXIT	.0	672.6	20.34	60.3		.862		.868
738	I	12-10-65	11:51	985	9.46	1.968	693.8	INLET	145.3	373.1	-25.60	10.1				
	I							7	.0	658.8	18.20	54.7		.905		.915
	I							EXIT	.0	671.1	20.08	59.1		.904		.915
739	I	12-10-65	12:04	984	9.16	1.977	696.9	INLET	150.9	367.0	-26.53	10.1				
	I							7	.0	652.8	17.28	52.8		.909		.920
	I							EXIT	.0	664.9	19.14	57.2		.908		.920
740	I	12-10-65	12:39	984	10.23	2.474	759.7	INLET	153.6	364.2	-26.97	12.6				
	I							7	.0	612.9	11.15	47.9		.991		.999
	I							EXIT	.0	623.8	12.82	52.8		.991		1.000
741	I	12-10-65	13:49	987	12.27	2.455	711.9	INLET	118.1	402.9	-21.15	12.9				
	I							7	.0	637.8	14.50	58.4		.932		.931
	I							EXIT	.0	647.9	16.46	63.0		.932		.931
742	I	12-10-65	14:04	985	9.87	1.980	648.6	INLET	125.6	394.4	-22.33	10.3				
	I							7	.0	659.7	18.34	55.3		.846		.859
	I							EXIT	.0	671.3	20.11	59.6		.846		.854
743	I	12-10-65	14:35	993	13.53	2.471	672.5	INLET	96.8	426.9	-17.58	13.2				
	I							7	.0	647.2	16.27	62.5		.881		.877
	I							EXIT	.0	656.9	17.76	66.9		.882		.878
744	I	12-10-65	15:03	996	14.49	2.471	609.8	INLET	70.8	456.6	-13.08	12.6				
	I							7	.0	656.5	17.65	66.4		.793		.807
	I							EXIT	.0	665.2	19.00	70.3		.793		.807
745	I	12-10-65	15:19	992	16.25	2.480	551.0	INLET	44.4	486.8	-8.39	14.0				
	I							7	.0	666.9	19.29	71.7		.718		.728
	I							EXIT	.0	674.5	20.47	75.1		.717		.728

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
746		12-10-65	15:33	994	17.39	2.496	509.0	INLET	27.5	507.1	-5.25	14.4				
	I							7	.0	672.3	20.12	74.5		.660		.678
	I							EXIT	.0	679.5	21.23	77.8		.660		.678
747		12-10-65	15:42	990	18.33	2.464	471.2	INLET	10.6	527.5	-2.04	14.5				
	I							7	.0	682.3	21.73	78.5		.609		.630
	I							EXIT	.0	689.1	22.77	81.6		.609		.630
748		12-10-65	15:44	989	18.70	2.515	465.0	INLET	9.8	528.4	-1.87	14.8				
	I							7	.0	678.1	21.10	78.4		.602		.621
	I							EXIT	.0	684.6	22.10	81.4		.601		.621
749		12-10-65	15:56	990	23.29	2.981	518.0	INLET	14.0	523.3	-2.71	17.5				
	I							7	.0	664.2	18.51	85.0		.674		.687
	I							EXIT	.0	670.2	19.84	88.3		.673		.687
750		12-10-65	16:11	987	21.27	2.962	589.6	INLET	36.3	495.5	-6.89	16.9				
	I							7	.0	656.7	17.85	80.9		.774		.769
	I							EXIT	.0	663.7	18.52	84.7		.773		.769
751		12-10-65	16:26	985	18.08	2.958	668.6	INLET	71.5	454.3	-13.13	16.2				
	O							6	.0	621.6	12.52	62.1		.886		.859
								7	.0	637.3	14.52	70.6		.884		.859
								EXIT	.0	645.3	16.15	74.9		.885		.859
752		12-10-65	16:55	986	15.41	2.957	721.1	INLET	99.1	423.7	-17.86	15.8				
	O							6	.0	604.3	9.83	52.5		.949		.939
								7	.0	621.3	12.44	61.7		.947		.940
								EXIT	.0	629.7	13.74	66.3		.946		.940
753		12-11-65	9:41	1482	.02	.504	221.2	INLET	.0	609.3	.04	3.3				
	O							7	.0	564.6	63.52	26.1		.286		.295
	O							EXIT	.0	580.2	66.30	27.1		.286		.295
754		12-11-65	9:57	1489	.05	.512	238.1	INLET	21.6	579.4	-5.47	3.2				
	O							7	.0	556.2	61.59	25.8		.305		.322
	O							EXIT	.0	572.7	64.94	26.9		.305		.322
755		12-11-65	10:10	1491	-.01	.504	248.4	INLET	52.1	539.7	-12.61	3.0				
	I							7	.0	538.1	58.75	24.3		.319		.335
	I							EXIT	.0	555.9	61.55	25.4		.319		.336
756		12-11-65	10:19	1491	-.05	.498	239.0	INLET	46.4	546.9	-11.33	3.0				
	I							7	.0	535.4	58.27	23.8		.306		.325
	I							EXIT	.0	552.2	61.29	24.9		.306		.325
757		12-11-65	10:31	1489	.04	.500	249.5	INLET	81.2	504.1	-18.51	2.9				
	O							7	.0	508.1	53.40	22.2		.321		.337
	O							EXIT	.0	525.4	56.49	23.3		.321		.336
758		12-11-65	10:40	1497	.00	.511	248.5	INLET	69.6	518.9	-16.49	3.0				
	O							7	.0	512.9	54.22	22.8		.319		.336
	O							EXIT	.0	529.9	57.26	23.9		.319		.336
759		12-11-65	10:57	1495	.03	.507	247.3	INLET	63.9	525.6	-15.29	3.0				
	O							7	.0	520.7	55.61	23.2		.318		.335
	O							EXIT	.0	537.5	58.63	24.3		.317		.335

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	v_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
760		12-11-65	11:16	1493	.24	.514	263.2	INLET	100.3	481.8	-23.13	2.9				
0								7	.0	857.4	51.42	22.0		.339		.356
0								EXIT	.0	614.6	54.51	23.2		.339		.355
761		12-11-65	11:32	1489	.31	.506	276.0	INLET	118.5	460.5	-26.73	2.8				
0								7	.0	901.7	52.25	22.1		.356		.370
0								EXIT	.0	921.1	55.72	23.3		.356		.370
762		12-11-65	11:49	1487	.46	.505	279.6	INLET	141.9	434.1	-31.36	2.7				
0								7	.0	882.2	48.79	20.8		.361		.375
0								EXIT	.0	901.8	52.28	22.1		.360		.376
763		12-11-65	12:13	1482	.74	.454	268.6	INLET	148.5	426.4	-32.65	2.4				
0								7	.0	905.8	53.00	20.1		.344		.364
0								EXIT	.0	926.8	56.76	21.3		.344		.364
764		12-11-65	12:26	1488		.405	248.9	INLET	145.2	430.4	-32.06	2.2				
0								7	.0	928.7	57.10	19.1		.317		.342
0								EXIT	.0	950.0	60.91	20.1		.317		.342
765		12-11-65	12:38	1500	.47	.378	225.3	INLET	147.7	429.0	-32.74	2.0				
0								7	.0	911.6	53.96	16.8		.288		.307
0								EXIT	.0	933.0	57.81	17.8		.288		.307
766		12-11-65	12:49	1488	.46	.382	238.7	INLET	149.0	426.5	-32.89	2.0				
0								7	.0	933.0	57.82	18.2		.308		.320
0								EXIT	.0	954.9	61.75	19.2		.308		.320
767		12-11-65	13:03	1488		.344	220.0	INLET	148.1	427.4	-32.63	1.8				
0								7	.0	945.7	60.13	16.9		.284		.295
0								EXIT	.0	968.0	64.12	17.9		.284		.295
768		12-11-65	14:02	1993	-.49	.506	216.2	INLET	149.9	470.7	-43.07	2.8				
0								7	.0	816.9	31.44	10.8		.278		.292
0								EXIT	.0	831.8	34.64	11.5		.278		.292
769		12-11-65	14:19	2000	-.52	.504	202.2	INLET	120.4	505.4	-39.81	2.9				
0								7	.0	830.0	34.21	11.4		.260		.273
0								EXIT	.0	844.3	37.29	12.1		.260		.273
770		12-11-65	14:33	1986	-.52	.505	192.6	INLET	98.8	530.0	-30.04	2.9				
0								7	.0	839.0	36.26	11.9		.247		.262
0								EXIT	.0	852.3	39.11	12.6		.247		.262
771		12-11-65	14:50	1997	-.56	.511	181.6	INLET	78.1	557.0	-24.50	3.1				
0								7	.0	845.1	37.55	12.3		.232		.249
0								EXIT	.0	857.4	40.20	12.9		.231		.249
772		12-11-65	15:08	2006	-.64	.517	160.8	INLET	46.3	600.2	-15.56	3.3				
0								7	.0	852.1	38.91	12.7		.204		.223
0								EXIT	.0	862.8	41.24	13.2		.203		.223
773		12-11-65	15:11	1989	-.64	.510	159.6	INLET	48.5	595.1	-16.08	3.2				
0								7	.0	848.7	38.37	12.5		.202		.221
0								EXIT	.0	859.7	40.73	13.1		.202		.221

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
774		12-13-65	9:35	2005	2.73	1.500	249.9	INLET	13.3	649.0	-4.98	10.3				
	0							6	.0	772.4	21.70	25.3		.324		.335
								7	.0	784.0	24.22	27.0		.323		.335
								EXIT	.0	789.7	25.45	27.8		.323		.335
775		12-13-65	9:56	1997	2.59	1.494	266.5	INLET	24.5	630.4	-8.76	9.9				
	0							6	.0	763.0	19.80	24.0		.347		.398
	I							7	.0	775.0	22.39	25.7		.345		.397
	I							EXIT	.0	781.1	23.71	26.6		.344		.397
776		12-13-65	10:19	2002	2.38	1.486	302.8	INLET	47.8	597.5	-16.10	9.4				
	0							6	.0	748.4	16.51	21.6		.396		.400
	I							7	.0	762.5	19.57	23.7		.395		.400
	I							EXIT	.0	769.6	21.09	24.7		.395		.399
777		12-13-65	10:35	1998	2.22	1.522	338.8	INLET	72.1	564.8	-22.93	9.2				
	0							6	.0	729.6	12.59	19.5		.443		.446
								7	.0	745.1	15.92	21.8		.442		.446
								EXIT	.0	753.0	17.62	22.9		.442		.446
778		12-13-65	10:52	2007	1.82	1.514	366.3	INLET	102.4	527.4	-31.37	8.8				
	0							6	.0	706.4	7.35	15.8		.478		.482
	0							7	.0	723.3	11.01	18.3		.477		.483
	0							EXIT	.0	731.8	12.86	19.5		.477		.483
779		12-13-65	11:02	1997	1.59	1.512	376.7	INLET	122.5	502.7	-36.29	8.6				
	0							7	.0	704.7	7.22	15.7		.490		.500
	0							EXIT	.0	713.2	9.07	17.0		.489		.500
780		12-13-65	11:18	2000	1.47	1.509	411.1	INLET	149.8	471.1	-43.28	8.3				
	0							7	.0	691.8	4.35	13.7		.537		.541
	0							EXIT	.0	701.4	6.41	15.1		.536		.541
781		12-13-65	11:36	1996	2.68	1.994	490.8	INLET	147.9	473.2	-42.61	11.0				
	0							7	.0	672.6	.33	14.5		.641		.644
	0							EXIT	.0	681.3	2.20	16.2		.642		.644
782		12-13-65	11:54	1992	2.89	2.001	453.8	INLET	123.4	500.8	-36.44	11.3				
	0							7	.0	684.5	3.03	17.0		.590		.602
	0							EXIT	.0	692.5	4.75	18.5		.589		.602
783		12-13-65	12:11	1986	3.30	2.004	413.0	INLET	94.7	535.2	-28.88	11.8				
	0							7	.0	702.2	6.94	20.6		.538		.546
	0							EXIT	.0	709.4	8.48	22.0		.537		.546
784		12-13-65	12:24	1995	3.74	2.001	383.8	INLET	71.7	564.7	-22.87	12.1				
	0							6	.0	706.5	7.66	21.2		.497		.512
								7	.0	720.1	10.58	23.8		.496		.513
								EXIT	.0	726.8	12.03	25.1		.496		.513
785		12-13-65	12:52	1997	4.21	2.003	345.4	INLET	47.5	597.6	-15.87	12.7				
	0							6	.0	725.4	11.68	24.8		.450		.498
	I							7	.0	737.4	14.26	27.1		.449		.499
	I							EXIT	.0	743.3	15.54	28.3		.448		.499

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,l}}{10^6}$	$\frac{\phi_i}{10^6}$
786		12-13-65	13:13	1991	4.73	2.011	319.5	INLET	29.6	622.6	-10.30	13.2				
	0							6	.0	740.0	14.54	27.9		.412		.427
								7	.0	751.1	17.33	30.1		.412		.427
								EXIT	.0	756.8	18.56	31.2		.413		.427
787		12-13-65	13:31	2000	4.81	1.987	309.1	INLET	25.6	629.0	-9.08	13.2				
	0							6	.0	744.0	15.72	28.2		.403		.408
								7	.0	754.9	18.06	30.3		.402		.408
								EXIT	.0	760.5	19.26	31.4		.402		.409
788		12-13-65	13:36	1989	4.97	1.981	285.9	INLET	14.2	645.9	-5.20	13.5				
	0							6	.0	752.6	17.72	30.0		.371		.380
								7	.0	762.7	19.88	32.0		.370		.380
								EXIT	.0	767.9	20.99	33.0		.371		.381
789		12-13-65	14:02	1998	7.69	2.468	316.6	INLET	13.4	648.1	-4.98	16.8				
	0							6	.0	743.3	15.54	34.9		.412		.423
								7	.0	752.1	17.45	37.0		.410		.423
								EXIT	.0	756.5	18.39	38.0		.410		.423
790		12-13-65	14:11	1985	6.97	2.493	348.2	INLET	30.0	620.9	-10.45	16.3				
	0							6	.0	724.5	11.75	31.1		.457		.457
								7	.0	734.1	13.82	33.4		.456		.457
								EXIT	.0	738.9	14.85	34.6		.455		.457
791		12-13-65	14:34	2014	5.84	2.478	390.4	INLET	54.4	589.5	-18.20	15.5				
	0							6	.0	706.0	7.11	25.5		.510		.514
								7	.0	717.1	9.51	28.2		.509		.514
								EXIT	.0	722.6	10.71	29.5		.509		.514
792		12-13-65	14:45	1993	5.91	2.497	392.5	INLET	53.4	588.6	-17.66	15.6				
	1							7	.0	715.9	9.72	28.7		.509		.522
	1							EXIT	.0	721.4	10.92	30.1		.509		.522
793		12-13-65	15:07	2010	5.10	2.492	417.8	INLET	73.7	563.9	-23.58	15.1				
	1							7	.0	699.8	5.86	24.3		.540		.559
	1							EXIT	.0	705.6	7.12	25.7		.540		.559
794		12-13-65	15:31	1993	4.71	2.499	470.2	INLET	95.7	534.7	-29.20	14.7				
	1							7	.0	687.1	3.57	21.8		.613		.619
	1							EXIT	.0	693.8	5.00	23.4		.613		.620
796		12-13-65	16:07	1995	4.29	2.469	566.6	INLET	138.6	483.8	-40.26	13.8				
	0							6	10.0	653.6	-3.71	17.0		.744		.738
	0							7	.6	669.7	-.24	17.9		.744		.738
	0							EXIT	.0	677.7	1.48	19.2		.744		.737
797		12-13-65	16:20	1985	4.25	2.499	612.6	INLET	157.4	461.6	-44.65	13.7				
	0							7	5.6	660.1	-2.09	17.4		.803		.799
	0							EXIT	.6	668.8	-.23	17.7		.803		.800

Table A-1. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	v_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
798		12-13-65	16:31	1995	4.36	2.495	400.7	INLET	149.6	471.2	-42.98	13.8				
	0							6	12.9	649.2	-4.66	17.0		.783		.792
	0							7	2.7	666.1	-1.02	17.6		.782		.793
	0							EXIT	.0	674.6	.82	18.7		.782		.793
799		12-13-65	16:43	2005	4.50	2.496	556.9	INLET	131.5	492.8	-38.75	14.0				
	0							6	7.9	658.2	-3.00	17.3		.728		.736
	0.1							7	.0	673.6	.32	18.2		.725		.736
	0.1							EXIT	.0	681.3	2.01	20.0		.725		.737
800		12-13-65	16:54	2025	4.60	2.473	525.0	INLET	115.5	513.4	-35.14	14.2				
	0							6	2.1	670.7	-.85	17.6		.687		.689
	0.1							7	.0	685.4	2.37	20.3		.686		.689
	0.1							EXIT	.0	692.9	4.00	22.0		.687		.688

Table A-2. Data Summary Sheets, Test Section 8

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
962		02-07-66	11:54	971	.96	.930	248.8	INLET	39.7	489.4	-7.42	3.0				
	0							6	.0	860.3	49.21	34.9		.548		
	0							7	.0	879.2	52.10	36.8		.626		
	0							EXIT	.0	886.3	53.19	37.5		.513		
963		02-07-66	12:47	986	.65	.504	270.6	INLET	95.0	428.0	-17.20	2.7				
	0							6	.0	852.3	47.86	31.9		.596		
	0							7	.0	874.1	51.21	32.9		.573		
	0							EXIT	.0	882.0	52.42	34.6		.558		
964		02-07-66	13:13	976	.52	.497	287.3	INLET	142.3	375.0	-24.99	2.6				
	0							6	.0	830.0	44.56	29.8		.630		
	0							7	.0	853.8	48.19	31.9		.606		
	0							EXIT	.0	863.8	49.73	32.9		.593		
965		02-07-66	14:39	993	3.49	1.482	419.3	INLET	140.8	379.0	-24.63	7.7				
	0							6	.0	602.3	9.38	25.4		.923		
	0							7	.0	613.7	11.14	28.5		.886		
	0							EXIT	.0	618.1	11.82	29.7		.865		
966		02-07-66	15:19	991	4.55	1.490	374.9	INLET	95.2	428.4	-17.21	8.0				
	0							6	.0	627.1	12.21	32.3		.826		
	0							7	.0	637.2	14.75	35.1		.793		
	0							EXIT	.0	641.0	15.24	36.1		.774		
967		02-07-66	15:52	1000	5.66	1.494	324.3	INLET	45.1	486.9	-8.51	8.4				
	0							6	.0	658.1	17.84	40.3		.714		
	0							7	.0	666.9	19.20	42.7		.685		
	0							EXIT	.0	670.3	19.72	43.6		.669		
968		02-07-66	16:24	988	6.61	1.481	289.9	INLET	14.2	522.5	-2.74	8.7				
	0							6	.0	677.2	20.99	46.0		.640		
	0							7	.0	684.9	22.17	48.1		.613		
	0							EXIT	.0	687.9	22.62	48.9		.598		
969		02-07-66	16:55	990	11.84	2.446	322.7	INLET	19.4	516.5	-3.73	14.3				
	0							6	.0	620.4	12.21	50.2		.709		
	0							7	.0	625.8	13.04	52.6		.681		
	0							EXIT	.0	628.0	13.29	53.6		.666		
970		02-07-66	17:19	1001	9.80	2.441	360.0	INLET	43.0	489.6	-8.16	13.8				
	0							3	.0	573.5	4.76	28.3		.799		
	0							4	.0	586.5	6.76	34.0		.815		
	0							5	.0	597.8	8.50	39.0		.814		
	0							6	.0	606.5	9.85	42.9		.796		
	0							7	.0	612.3	10.74	45.4		.763		
	0							EXIT	.0	614.3	11.04	46.3		.743		

Table A-2. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
971		02-08-66	9:00	1499	-.41	.507	168.0	INLET	23.7	578.1	-5.96	3.2				
0								6	.0	839.1	40.93	17.9		.369		
								7	.0	852.4	43.33	18.8		.355		
								EXIT	.0	857.9	44.32	19.1		.347		
972		02-08-66	9:14	1507	-.42	.503	180.8	INLET	51.7	542.2	-12.61	3.0				
0								6	.0	826.8	38.64	16.8		.399		
0								7	.0	841.0	41.21	17.7		.383		
0								EXIT	.0	846.0	42.10	18.1		.373		
973		02-08-66	9:33	1475	-.39	.502	203.0	INLET	99.6	480.9	-22.73	2.8				
0								6	.0	800.6	34.28	15.6		.448		
0								7	.0	817.1	37.21	16.7		.430		
0								EXIT	.0	822.6	38.21	17.0		.419		
974		02-08-66	9:51	1489	-.34	.499	225.9	INLET	147.5	428.2	-32.50	2.7				
0								6	.0	786.5	31.63	14.4		.499		
0								7	.0	804.1	34.79	15.6		.478		
0								EXIT	.0	810.6	35.95	16.0		.466		
975		02-08-66	10:46	1496	1.74	1.504	378.1	INLET	149.2	427.1	-32.89	8.0				
0								4	13.5	591.3	-3.44	9.5		.851		
								5	.0	610.7	.64	9.8		.852		
								6	.0	625.8	2.74	12.7		.834		
								7	.0	635.9	4.55	14.6		.800		
								EXIT	.0	639.6	5.22	15.3		.780		
976		02-08-66	10:54	1532	1.55	1.471	368.5	INLET	152.7	426.8	-34.26	7.8				
0								3	33.8	568.1	-8.59	9.0		.812		
0								4	17.5	590.3	-4.57	9.3		.829		
								5	3.9	609.6	-1.06	9.5		.829		
								6	.0	624.7	1.69	11.3		.812		
								7	.0	634.9	3.53	13.2		.780		
								EXIT	.0	638.5	4.19	13.8		.760		
977		02-08-66	11:03	1497	1.75	1.500	374.4	INLET	147.9	428.4	-32.75	8.0				
0								6	.0	625.4	2.62	12.5		.825		
								7	.0	635.6	4.45	14.5		.792		
								EXIT	.0	639.3	5.11	15.2		.772		
978		02-08-66	11:30	1486	2.22	1.498	317.0	INLET	94.3	488.2	-21.68	8.4				
0								6	.0	655.4	8.21	18.5		.699		
								7	.0	663.8	9.73	20.1		.670		
								EXIT	.0	667.0	10.30	20.7		.654		
979		02-08-66	11:59	1478	2.77	1.499	263.6	INLET	49.1	542.0	-11.93	8.9				
0								6	.0	680.6	12.82	23.5		.580		
								7	.0	687.9	14.12	24.9		.557		
								EXIT	.0	690.6	14.60	25.4		.544		

Table A-2. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,0}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
980		02-08-66	12:25	1491	3.06	1.510	217.3	INLET	20.0	581.6	-5.07	9.4				
	0							6	.0	695.2	15.28	26.2		.479		
								7	.0	701.1	16.34	27.3		.460		
								EXIT	.0	703.2	16.70	27.7		.448		
981		02-08-66	12:59	1493	7.06	2.487	264.9	INLET	24.7	575.9	-6.24	15.4				
	0							3	.0	636.1	4.55	24.2		.585		
								4	.0	645.6	6.24	27.2		.597		
								5	.0	653.9	7.73	29.8		.598		
								6	.0	660.1	8.85	31.7		.584		
								7	.0	664.2	9.59	33.0		.560		
								EXIT	.0	666.0	9.90	33.6		.547		
982		02-08-66	13:03	1489	7.09	2.486	262.4	INLET	24.1	576.2	-6.02	15.4				
	0							3	.0	636.3	4.74	24.5		.584		
								4	.0	645.5	6.39	27.4		.594		
								5	.0	653.5	7.82	30.0		.593		
								6	.0	659.7	8.54	31.9		.580		
								7	.0	664.0	9.69	33.3		.556		
								EXIT	.0	665.4	9.95	33.7		.542		
983		02-08-66	13:40	1491	5.79	2.467	313.5	INLET	50.5	541.5	-12.30	14.7				
	0							3	.0	613.6	.61	17.1		.694		
								4	.0	624.8	2.61	20.6		.708		
								5	.0	634.5	4.36	23.7		.707		
								6	.0	642.0	5.70	26.0		.692		
								7	.0	647.0	6.60	27.6		.663		
								EXIT	.0	648.9	6.95	28.2		.647		
984		02-08-66	14:11	1492	4.63	2.483	406.6	INLET	96.5	486.2	-22.28	14.0				
	0							3	22.2	578.8	-5.68	15.5		.898		
								4	11.9	593.2	-3.10	15.8		.916		
								5	3.3	605.7	-.86	16.0		.915		
								6	.0	615.3	.86	17.7		.894		
								7	.0	621.9	2.05	19.7		.859		
								EXIT	.0	624.6	2.53	20.6		.839		
985		02-08-66	14:36	1485	3.95	2.462	497.1	INLET	146.4	429.0	-32.28	13.2				
	0							3	48.8	543.1	-11.88	14.7		1.097		
	0							4	35.1	560.7	-8.74	15.0		1.117		
								5	23.6	576.0	-5.58	15.3		1.116		
								6	14.8	588.1	-3.82	15.5		1.093		
								7	8.9	596.4	-2.24	15.7		1.050		
								EXIT	6.7	599.6	-1.76	15.8		1.026		

Table A-2. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	v_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
986		02-09-66	9:24	1978	-.83	.506	115.1	INLET	19.4	636.9	-6.88	3.4				
0								6	.0	816.8	31.60	10.9		.254		
								7	.0	825.7	33.51	11.4		.244		
								EXIT	.0	828.9	34.18	11.5		.237		
987		02-09-66	9:47	1979	-.79	.499	137.6	INLET	47.7	594.8	-15.71	3.1				
0								6	.0	810.2	30.28	10.5		.300		
								7	.0	822.4	32.88	11.1		.290		
								EXIT	.0	827.7	34.00	11.4		.284		
988		02-09-66	10:15	1984	-.68	.507	172.1	INLET	101.2	526.9	-30.55	3.0				
0								6	.0	795.8	27.07	9.9		.381		
								7	.0	809.1	29.91	10.5		.365		
								EXIT	.0	813.5	30.87	10.7		.355		
989		02-09-66	10:33	1979	-.61	.500	197.1	INLET	152.7	466.3	-43.27	2.7				
0								6	.0	777.3	23.22	8.9		.434		
								7	.0	793.3	26.63	9.6		.416		
								EXIT	.0	799.6	27.97	10.0		.407		
990		02-09-66	11:36	1983	1.13	1.499	338.7	INLET	149.6	470.1	-42.69	8.3				
0								3	45.7	598.3	-15.23	9.5		.751		
								4	31.8	618.1	-10.99	9.8		.765		
								5	20.4	635.4	-7.28	10.0		.764		
								6	12.1	648.8	-4.43	10.2		.747		
								7	6.7	657.7	-2.51	10.4		.716		
								EXIT	4.7	661.1	-1.78	10.5		.699		
991		02-09-66	12:03	1989	3.63	2.450	474.8	INLET	144.9	476.0	-41.68	13.6				
0								4	42.8	603.0	-14.41	15.6		1.072		
0								5	32.6	617.7	-11.26	15.9		1.070		
								6	24.9	629.2	-8.79	16.2		1.047		
								7	19.8	637.0	-7.12	16.4		1.005		
								EXIT	18.0	639.8	-6.51	16.5		.980		
992		02-09-66	12:36	1993	3.98	2.479	393.8	INLET	97.8	532.0	-29.80	14.5				
0								3	30.1	621.8	-10.49	16.2		.870		
								4	21.0	635.6	-7.51	16.6		.886		
								5	13.4	647.7	-4.91	16.9		.885		
								6	7.7	657.2	-2.86	17.2		.866		
								7	3.9	663.8	-1.46	17.4		.832		
								EXIT	2.5	666.2	-.93	17.5		.813		
993		02-09-66	13:00	1987	1.24	1.503	272.8	INLET	97.8	531.4	-29.74	8.8				
0								3	21.1	634.7	-7.58	10.0		.607		
								4	11.2	650.4	-4.20	10.3		.617		
								5	3.2	664.2	-1.25	10.6		.616		
								6	.0	675.3	1.14	11.5		.604		
								7	.0	682.4	2.67	12.5		.578		
								EXIT	.0	684.8	3.17	12.8		.563		

Table A-2. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	v_m	$\frac{\phi_{i,e}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
994	0	02-09-66	13:46	1992	1.58	1.517	212.4	INLET	47.1	597.4	-14.76	9.6				
								3	.0	676.6	1.28	11.7		.469		
								4	.0	688.9	3.53	13.5		.479		
								5	.0	699.6	6.22	15.1		.478		
								6	.0	708.0	8.02	16.3		.468		
								7	.0	713.7	9.24	17.1		.449		
								EXIT	.0	715.7	9.69	17.5		.438		
995	0	02-09-66	14:12	1984	2.03	1.505	176.3	INLET	15.5	643.8	-5.55	10.2				
								3	.0	709.7	8.57	16.6		.387		
								4	.0	719.8	10.74	18.1		.394		
								5	.0	729.0	12.71	19.4		.395		
								6	.0	736.1	14.23	20.5		.388		
								7	.0	740.8	15.25	21.2		.372		
								EXIT	.0	742.8	15.67	21.9		.364		
996	0	02-09-66	14:50	1994	5.59	2.490	239.9	INLET	24.5	630.3	-8.66	16.5				
								3	.0	684.8	3.05	21.2		.530		
								4	.0	693.1	4.84	23.2		.539		
								5	.0	700.4	6.42	24.9		.538		
								6	.0	706.2	7.65	26.3		.527		
								7	.0	710.2	8.51	27.3		.507		
								EXIT	.0	711.8	8.85	27.7		.495		
997	0	02-09-66	15:08	1979	4.82	2.503	288.6	INLET	47.3	595.8	-15.66	15.8				
								3	4.3	661.3	-1.65	17.5		.640		
								4	.0	671.4	.52	18.3		.652		
								5	.0	680.1	2.38	20.5		.651		
								6	.0	686.9	3.83	22.1		.636		
								7	.0	691.5	4.82	23.3		.610		
								EXIT	.0	693.2	5.19	23.7		.596		

Table A-2. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,0}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
998		02-09-66	17:15	982	11.87	2.512	330.5	INLET	22.1	511.9	-4.24	14.6				
	0							6	.0	615.7	11.65	50.2		.727		
								7	.0	621.0	12.47	52.7		.698		
								EXIT	.0	623.1	12.79	53.6		.682		
999		02-09-66	17:34	1000	9.47	2.449	358.0	INLET	45.3	486.7	-8.59	13.8				
								1	19.7	517.7	-3.82	14.3		.741		
	0							2	.0	556.0	2.08	20.7		.765		
	0							3	.0	570.0	4.23	26.9		.797		
								4	.0	582.6	6.19	32.5		.810		
								5	.0	593.6	7.87	37.4		.807		
								6	.0	602.1	9.18	41.2		.789		
								7	.0	608.0	10.09	43.8		.757		
								EXIT	.0	610.2	10.43	44.8		.739		
1000		02-09-66	18:03	994	6.88	2.467	428.4	INLET	91.0	433.6	-16.61	13.3				
								1	58.5	470.3	-10.98	13.7		.883		
	0							2	20.7	515.4	-4.04	14.4		.909		
	0							3	7.6	531.8	-1.51	14.6		.946		
								4	.0	546.9	.80	17.1		.963		
								5	.0	560.3	2.86	23.1		.963		
								6	.0	570.8	4.47	27.9		.944		
								7	.0	577.7	5.54	31.0		.906		
								EXIT	.0	580.4	5.95	32.2		.884		
1001		02-09-66	18:43	989	4.90	2.439	507.5	INLET	142.5	376.6	-25.18	12.6				
	0							3	37.4	494.4	-7.10	13.9		1.123		
								4	22.3	512.7	-4.30	14.2		1.144		
								5	9.6	528.4	-1.08	14.4		1.142		
								6	.0	540.9	.03	14.7		1.118		
								7	.0	549.3	1.33	18.5		1.073		
								EXIT	.0	552.5	1.81	19.9		1.047		
1002		02-10-66	8:43	980	.76	.509	238.3	INLET	16.7	518.4	-3.22	3.0				
	0							6	.0	888.1	53.39	35.8		.525		
	0							7	.0	907.1	56.30	37.6		.504		
	0							EXIT	.0	914.4	57.42	38.2		.492		
1003		02-10-66	8:57	977	.72	.506	249.2	INLET	47.0	481.4	-8.80	2.8				
	0							6	.0	870.3	50.49	34.0		.549		
	0							7	.0	889.9	53.69	35.9		.527		
	0							EXIT	.0	897.7	54.88	36.6		.514		

Table A-2. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	X	V_m	$\frac{\phi_o}{10^6}$	$\frac{\phi_i}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_i}{10^6}$
1051		02-12-66	14:54	1999	-.63	.503	196.2	INLET	150.8	470.0	-43.41	2.8				
	0							6	.0	777.6	22.93	8.8		.432		
								7	.0	793.4	26.33	9.5		.415		
								EXIT	.0	799.5	27.65	9.8		.405		
1052		02-12-66	16:50	1493	1.70	1.495	374.6	INLET	146.2	429.9	-32.44	8.0				
	0							3	27.4	572.2	-6.92	9.2		.831		
								4	11.6	594.0	-3.01	9.5		.846		
								5	.0	613.1	.42	10.2		.845		
								6	.0	627.9	3.08	13.0		.826		
								7	.0	637.9	4.87	14.9		.792		
								EXIT	.0	641.7	5.54	15.6		.773		
1053		02-12-66	17:14	1496	.79	1.012	313.6	INLET	147.7	428.6	-32.68	5.4				
	0							6	.0	673.9	11.33	14.7		.692		
								7	.0	686.1	13.53	16.2		.664		
								EXIT	.0	690.6	14.33	16.8		.647		
1054		02-12-66	17:48	1493	-.31	.506	226.1	INLET	149.3	426.4	-33.05	2.7				
	0							7	.0	800.4	34.05	15.5		.483		
	0							EXIT	.0	807.0	35.22	15.9		.471		
1055		02-12-66	18:41	982	.48	.509	277.2	INLET	139.3	379.4	-24.59	2.6				
	0							7	.0	831.1	44.64	30.4		.586		
	0							EXIT	.0	839.5	45.91	31.1		.572		
1056		02-12-66	18:50	982	.42	.503	277.5	INLET	144.3	373.8	-25.43	2.6				
	0							6	.0	808.6	41.19	27.9		.610		
	0							7	.0	831.2	44.66	30.0		.586		
	0							EXIT	.0	840.0	46.00	30.8		.573		

Table A-3. Data Summary Sheets, Test Section 9

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
1004		02-10-66	10:57	980	1.10	.900	258.5	INLET	13.2	922.7	-2.54	2.9				
	I							7	.0	948.8	62.69	40.8		.350		.335
	I							EXIT	.0	959.7	64.36	41.8		.340		.336
1005		02-10-66	11:21	981	1.22	.499	290.2	INLET	47.8	481.2	-8.93	2.8				
	I							7	.0	958.4	64.15	41.6		.391		.375
	I							EXIT	.0	972.2	66.27	42.8		.382		.376
1006		02-10-66	11:39	982	1.35	.501	328.2	INLET	98.6	423.4	-17.87	2.7				
	I							7	.0	962.7	64.79	42.0		.444		.425
	I							EXIT	.0	976.8	66.95	43.3		.432		.426
1007		02-10-66	12:07	980	1.45	.503	370.1	INLET	145.7	372.0	-25.57	2.6				
	O							7	.0	976.3	66.51	43.6		.497		.482
	O							EXIT	.0	993.6	69.55	45.2		.486		.483
1008		02-10-66	13:14	972	6.81	1.491	595.2	INLET	150.4	366.2	-26.24	7.6				
	O							6	.0	674.2	20.79	46.6		.836		.773
								7	.0	694.5	23.90	52.2		.802		.773
								EXIT	.0	703.5	25.27	54.7		.782		.774
1009		02-10-66	14:12	982	7.76	1.507	527.1	INLET	99.7	422.3	-17.97	8.0				
	O							6	.0	692.3	23.39	51.4		.734		.697
								7	.0	710.0	26.10	56.3		.703		.697
								EXIT	.0	717.9	27.30	58.5		.685		.698
1010		02-10-66	14:45	981	8.68	1.490	454.3	INLET	46.1	483.4	-8.64	8.4				
	O							6	.0	718.5	27.38	58.0		.640		.586
								7	.0	734.1	29.78	62.3		.615		.585
								EXIT	.0	741.0	30.84	64.2		.600		.586
1011		02-10-66	15:11	984	9.63	1.495	416.9	INLET	16.5	519.4	-3.17	8.7				
	O							6	.0	733.9	29.71	62.3		.582		.543
	I							7	.0	748.6	31.97	66.3		.560		.543
	I							EXIT	.0	755.0	32.95	68.1		.547		.544
1012		02-10-66	15:37	985	16.64	2.481	467.2	INLET	20.6	514.5	-3.92	14.4				
	O							6	.0	660.0	18.38	69.5		.656		.610
								7	.0	669.6	19.25	73.8		.628		.610
								EXIT	.0	673.6	20.47	75.7		.612		.612
1013		02-10-66	15:54	988	14.66	2.459	503.3	INLET	42.5	488.1	-8.03	13.9				
	O							6	.0	645.8	16.16	62.2		.704		.655
								7	.0	656.3	17.78	67.0		.676		.656
								EXIT	.0	661.0	18.50	69.1		.660		.657
1014		02-10-66	16:01	984	14.15	2.461	514.8	INLET	50.0	479.1	-9.34	13.8				
	O							6	.0	640.4	15.39	60.1		.723		.668
								7	.0	651.2	17.04	65.0		.695		.666
								EXIT	.0	655.9	17.76	67.1		.678		.666
1015		02-10-66	16:20	984	11.43	2.467	581.9	INLET	92.2	430.9	-16.71	13.3				
	O							6	.0	612.9	11.19	47.9		.822		.748
								7	.0	624.9	13.02	53.3		.788		.749
								EXIT	.0	630.2	13.84	55.7		.769		.749

Table A-3. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	v_m	$\frac{\phi_{i,o}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,i}}{10^6}$	$\frac{\phi_i}{10^6}$
1016		02-10-66	16:42	983	9.04	2.469	676.4	INLET	142.1	376.1	-25.07	12.7				
	0							6	.0	587.2	7.27	36.3		.949		.877
								7	.0	601.3	9.43	42.7		.911		.878
								EXIT	.0	607.6	10.40	45.6		.889		.879
1017		02-10-66	16:45	987	8.80	2.475	680.6	INLET	144.3	374.5	-25.51	12.7				
	0							6	.0	586.6	7.04	35.6		.956		.882
								7	.0	600.6	9.20	42.0		.917		.883
								EXIT	.0	606.9	10.16	44.9		.895		.884
1018		02-11-66	9:25	1481	.13	.931	243.3	INLET	21.5	578.6	-5.43	3.3				
	0							6	.0	932.3	57.75	25.4		.340		.319
								7	.0	955.9	61.95	27.0		.326		.319
								EXIT	.0	965.8	63.73	27.6		.318		.320
1019		02-11-66	9:58	1477	.05	.506	247.4	INLET	46.4	545.7	-11.17	3.0				
	0							6	.0	923.2	56.15	23.7		.344		.329
								7	.0	947.9	60.56	25.3		.329		.329
								EXIT	.0	958.6	62.47	26.0		.321		.329
1020		02-11-66	10:25	1484	.08	.911	269.8	INLET	98.3	483.2	-22.55	2.9				
	0							6	.0	889.2	50.02	21.5		.376		.351
								7	.0	916.9	54.99	23.3		.362		.352
								EXIT	.0	929.3	57.21	24.2		.353		.353
1021		02-11-66	10:43	1481	.05	.506	285.2	INLET	143.9	431.3	-31.71	2.7				
	0							6	.0	866.2	45.55	19.9		.400		.372
	0							7	.0	894.9	51.08	21.8		.384		.372
	0							EXIT	.0	907.4	53.31	22.6		.374		.372
1022		02-11-66	11:39	1486	2.99	1.511	481.4	INLET	145.4	430.2	-32.07	8.1				
	0							6	.0	676.3	11.54	22.7		.672		.634
								7	.0	692.4	14.82	25.8		.644		.634
								EXIT	.0	699.5	16.10	27.1		.628		.634
1023		02-11-66	11:47	1480	3.06	1.510	497.1	INLET	148.7	425.9	-32.66	8.1				
	0							6	.0	680.1	12.73	23.6		.700		.643
								7	.0	696.9	15.72	26.8		.672		.642
								EXIT	.0	704.2	17.02	28.2		.656		.642
1024		02-11-66	12:17	1483	3.48	1.492	418.2	INLET	95.6	486.2	-22.01	8.4				
	0							6	.0	702.3	16.62	27.4		.581		.552
								7	.0	716.8	19.20	30.1		.557		.553
								EXIT	.0	723.2	20.34	31.3		.544		.553
1025		02-11-66	12:21	1488	3.51	1.495	417.0	INLET	93.5	489.3	-21.65	8.4				
	0							6	.0	704.2	16.84	27.6		.581		.547
								7	.0	718.6	19.42	30.3		.558		.548
								EXIT	.0	725.0	20.58	31.6		.544		.548
1026		02-11-66	12:47	1482	4.11	1.507	341.5	INLET	44.3	548.8	-10.75	9.0				
	0							6	.0	723.7	20.48	31.8		.474		.453
								7	.0	735.2	22.54	34.0		.455		.453
								EXIT	.0	740.4	23.46	35.0		.444		.453

Table A-3. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i0}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i1}}{10^6}$	$\frac{\phi_i}{10^6}$
1027	0	02-11-66	12:52	1484	4.00	1.509	352.0	INLET	51.5	540.0	-12.33	9.0				
								6	.0	719.6	19.76	31.1		.494		.455
								7	.0	731.7	21.52	33.4		.474		.456
								EXIT	.0	737.1	22.89	34.4		.463		.456
1028	0	02-11-66	13:15	1500	4.15	1.508	296.4	INLET	21.5	580.7	-5.53	9.4				
								6	.0	731.9	21.64	32.7		.412		.390
								7	.0	742.3	23.51	34.7		.396		.390
								EXIT	.0	746.8	24.32	35.6		.387		.390
1029	0	02-11-66	13:56	1490	9.29	2.480	360.9	INLET	20.8	588.6	-5.29	15.5				
								6	.0	692.7	14.79	42.1		.508		.466
								7	.0	700.2	16.14	44.5		.487		.466
								EXIT	.0	703.5	16.74	45.5		.476		.467
1030	0	02-11-66	14:12	1495	8.18	2.455	419.6	INLET	47.0	546.7	-11.55	14.7				
								6	.0	678.5	12.11	36.9		.587		.548
								7	.0	687.2	13.68	39.7		.563		.549
								EXIT	.0	691.1	14.37	40.9		.549		.549
1031	0	02-11-66	14:35	1492	6.71	2.477	520.1	INLET	95.1	488.1	-21.89	13.9				
								6	.0	650.3	7.17	28.7		.729		.679
								7	.0	661.0	9.06	32.0		.699		.680
								EXIT	.0	665.6	9.91	33.5		.681		.681
1032	0	02-11-66	15:04	1495	5.25	2.479	625.4	INLET	147.9	428.4	-32.69	13.2				
								6	.0	623.0	2.21	20.0		.879		.810
								7	.0	636.0	4.54	24.1		.844		.810
								EXIT	.0	641.6	5.55	25.8		.823		.811
1033	0	02-11-66	16:01	1996	4.25	2.483	589.3	INLET	143.1	478.6	-41.45	13.8				
								6	5.3	661.8	-2.00	17.4		.830		.763
								7	.0	673.8	.60	18.3		.796		.762
								EXIT	.0	679.1	1.74	19.6		.777		.762
1034	1	02-11-66	16:29	1983	1.87	1.495	435.9	INLET	142.3	478.7	-40.83	8.3				
	1							7	.0	718.5	10.53	17.8		.585		.570
								EXIT	.0	725.1	11.95	18.8		.570		.571
1035	0	02-11-66	17:15	1994	2.20	1.517	385.0	INLET	99.5	529.9	-30.29	8.9				
	0							4	.0	690.6	4.29	13.7		.554		.496
	0							5	.0	709.5	6.34	16.5		.554		.497
	0							6	.0	725.4	11.77	18.9		.541		.497
								7	.0	738.5	14.58	20.8		.519		.497
								EXIT	.0	744.4	15.86	21.7		.507		.498
1036	0	02-11-66	17:22	1995	2.15	1.508	398.1	INLET	108.0	519.6	-32.59	8.7				
	0							4	.0	686.7	-3.38	13.0		.569		.520
	0							5	.0	706.6	7.68	16.0		.570		.521
	0							6	.0	723.4	11.29	18.4		.557		.521
								7	.0	736.7	14.16	20.4		.534		.522
								EXIT	.0	742.6	15.43	21.3		.521		.522

Table A-3. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^6$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i,e}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i,l}}{10^6}$	$\frac{\phi_l}{10^6}$
1037		02-11-66	17:48	1977	5.16	2.524	530.1	INLET	105.5	521.4	-31.54	14.6				
	0							6	.0	683.1	3.03	21.4		.742		.689
	I							7	.0	694.1	5.37	24.1		.713		.690
	I							EXIT	.0	698.9	6.41	25.3		.695		.691
1038		02-11-66	17:55	1993	5.15	2.510	523.5	INLET	103.4	525.2	-31.29	14.6				
	0							6	.0	686.0	3.30	21.6		.732		.684
	I							7	.0	696.7	5.61	24.2		.702		.685
	I							EXIT	.0	701.5	6.63	25.4		.685		.685
1039		02-12-66	9:52	1994	2.58	1.509	318.9	INLET	47.9	596.2	-16.02	5.5				
	0							3	.0	713.0	9.10	16.9		.445		.421
								4	.0	730.0	12.77	19.5		.453		.421
								5	.0	745.6	14.13	21.7		.453		.421
								6	.0	759.1	19.03	23.7		.443		.421
								7	.0	770.0	21.38	25.3		.425		.421
								EXIT	.0	774.8	22.41	26.0		.415		.422
1040		02-12-66	10:10	1985	2.62	1.514	317.1	INLET	50.0	592.8	-16.51	9.5				
	0							3	.0	708.3	8.26	16.5		.439		.424
	0							4	.0	725.4	11.91	19.0		.448		.424
	0							5	.0	740.9	15.24	21.3		.447		.424
	0							6	.0	754.2	18.09	23.2		.437		.424
	I							7	.0	765.0	20.41	24.8		.420		.424
	I							EXIT	.0	769.8	21.44	25.6		.410		.425
1041		02-12-66	10:39	1998	2.87	1.521	282.9	INLET	24.3	631.0	-8.70	10.1				
	0							3	.0	733.8	13.46	20.1		.399		.367
								4	.0	748.9	16.71	22.3		.407		.367
								5	.0	762.6	19.67	24.3		.406		.367
								6	.0	774.4	22.21	26.1		.397		.367
	I							7	.0	783.9	24.27	27.5		.381		.367
	I							EXIT	.0	788.1	25.18	28.1		.372		.367
1042		02-12-66	10:44	1996	2.81	1.517	283.2	INLET	26.2	627.9	-9.28	10.0				
	I							7	.0	781.6	23.83	27.1		.383		.366
	I							EXIT	.0	785.7	24.71	27.7		.373		.367
1043		02-12-66	11:07	1992	7.46	2.489	365.4	INLET	25.8	628.2	-9.13	16.4				
	I							7	.0	748.8	16.82	36.7		.487		.482
	I							EXIT	.0	752.2	17.55	37.5		.476		.483
1044		02-12-66	11:27	1980	6.86	2.491	403.7	INLET	44.5	600.1	-14.72	15.8				
	I							7	.0	733.4	13.80	32.4		.539		.533
	I							EXIT	.0	737.0	14.57	34.3		.526		.533
1045		02-12-66	11:37	2013	6.42	2.500	434.5	INLET	57.3	585.4	-18.99	15.6				
	I							7	.0	728.4	12.02	31.2		.582		.570
	I							EXIT	.0	732.3	12.87	32.2		.568		.570
1046		02-12-66	13:12	1995	-1.75	.503	156.0	INLET	18.0	640.6	-4.51	3.4				
	0							6	.0	879.6	44.54	13.8		.217		.205
								7	.0	895.7	44.41	14.6		.209		.205
								EXIT	.0	902.8	46.54	14.9		.203		.206

Table A-3. (Cont'd)

RUN NO.	CHF	DATE	TIME	P	ΔP	$G \times 10^{-6}$	KW	STA NO.	ΔT_s	h	x	V_m	$\frac{\phi_{i0}}{10^6}$	$\frac{\phi_o}{10^6}$	$\frac{\phi_{i1}}{10^6}$	$\frac{\phi_i}{10^6}$
1047		02-12-66	13:33	2007	-.67	.512	175.8	INLET	45.0	601.8	-15.24	3.3				
	0							7	.0	884.1	45.84	14.2		.235		.231
	0							EXIT	.0	891.8	47.50	14.5		.229		.231
1048		02-12-66	13:39	1996	-.64	.509	180.0	INLET	50.5	593.3	-16.70	3.2				
	0							7	.0	884.6	46.02	14.2		.242		.234
	0							EXIT	.0	892.6	47.74	14.6		.236		.234
1049		02-12-66	13:52	2002	-.58	.500	209.2	INLET	96.5	534.2	-29.66	2.9				
	0							7	.0	878.1	44.59	13.6		.280		.274
	0							EXIT	.0	888.0	46.72	14.0		.273		.275
1050		02-12-66	14:07	1997	-.48	.514	240.2	INLET	144.9	476.8	-41.78	2.8				
	0							6	.0	836.6	35.69	11.9		.334		.315
	0							7	.0	860.9	40.52	13.2		.321		.316
	0							EXIT	.0	871.7	43.25	13.7		.314		.316
1057		02-12-66	19:26	979	1.49	.507	377.5	INLET	151.9	365.3	-26.62	2.6				
	0							7	.0	978.3	67.20	44.1		.588		.494
	0							EXIT	.0	995.2	69.79	45.7		.494		.495

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